Mohave Valley Conservation Area
Backwater Project
Finding of No Significant Impacts (FONSI) and Final Environmental Assessment / Mitigated Negative Declaration (EA/MND)

Bureau of Reclamation, Lower Colorado Region,
Needles, CA
Document No. LC-15-07

California State Lands Commission
MND No. 786
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Finding Of No Significant Impact
(FONSI)

LC-15-07
for
Final Environmental Assessment (EA) for Mohave Valley Conservation Area
Backwaters Project

Needles, CA

Based on a thorough analysis of the potential environmental impacts presented in the EA, the Bureau of Reclamation (Reclamation) finds that implementation of the Proposed Action will not significantly affect the quality of the human environment within or adjacent to the project area, therefore an Environmental Impact Statement will not be prepared.

Accordingly, this FONSI is submitted to document environmental review and evaluation of the Proposed Action Alternative in compliance with the National Environmental Policy Act (NEPA) of 1969, as amended.

Prepared: [Signature]
Environmental Protection Specialist

Recommended: [Signature]
Manager, Environmental Compliance Group

Approved: [Signature]
Chief, Resources Management Office

Date: DEC 21 2015
BACKGROUND

The Bureau of Reclamation (Reclamation) is proposing to design, create, monitor, and maintain approximately 50 acres of backwater habitat within a 149-acre parcel of State-owned sovereign land within Moabi Regional Park (Park), on the Colorado River near Needles, California, to benefit species covered by the Lower Colorado River Multi-Species Conservation Program (LCR MSCP). The California Department of Fish and Wildlife (CDFW or Applicant), as a State partner for implementation of the LCR MSCP, would be the lease holder. The Final Environmental Assessment/Mitigated Negative Declaration (EA/MND) has been prepared by Reclamation as the Federal lead agency under the National Environmental Policy Act (NEPA) (42 U.S.C. § 4321 et seq.), and the California State Lands Commission (CSLC) as the State lead agency under the California Environmental Quality Act (CEQA) (Pub. Resources Code, § 21000 et seq.), to analyze and disclose the environmental effects associated with the proposed Mojave Valley Conservation Area Backwater Project (Project). The Final EA/MND is attached to and incorporated by reference into this FONSI.

The Project is located along the Colorado River between River Miles 237 and 236. It is about 13 miles south of Needles, California in San Bernardino County (County). The 149-acre State-owned parcel is on the California side of the Colorado River at the center of Section 36, Township 8 N, and Range 23 E, San Bernardino Meridian and is currently leased to the County. The Project area, which is located within the historic floodplain of the Colorado River, remains undeveloped and possesses the potential to be developed into connected backwater habitat. Under the Project, Reclamation would excavate soil from the currently vacant parcel and construct a river inlet and outlet to create a backwater channel and associated backwater habitat that contribute to the habitat restoration requirements identified in the LCR MSCP for flannelmouth sucker (\textit{Catostomus latipinnis}). The proposed design would include the development of 50 acres into backwater habitat while using the remaining 99 acres as a staging area during construction.

The \textit{Lower Colorado River Multi-Species Conservation Program, Final Programmatic Environmental Impact Statement/Environmental Impact Report} (LCR MSCP FEIS/EIR) provided NEPA compliance for the LCR MSCP. The LCR MSCP FEIS/EIR resulted in the \textit{Record of Decision, Lower Colorado River Multi-Species Conservation Plan}, which describes and analyzes the selected alternative, the Habitat Conservation Plan (HCP), for the LCR MSCP. Following the guidelines of the LCR MSCP HCP, the backwater must be connected to the Colorado River so that it is accessible to native fish from the main stem, and contributes to the conservation of native fishes and a mosaic of marsh, riparian, and upland vegetation types on the Colorado River. The LCR MSCP requires 360 acres of backwater for bonytail (\textit{Gila elegans}) and razorback sucker (\textit{Xyrauchen texanus}) including, 85 acres of backwater specifically for flannelmouth sucker.

Implementation of the Project would allow the LCR MSCP to work towards satisfying the HCP requirements for the creation of backwater habitat between Davis and Parker Dams in Reach 3 of the Colorado River, and ensure continued Endangered Species Act (ESA) compliance for Federal and non-Federal entities operating on the Colorado River.
As part of the NEPA and CEQA process, a 30 day public comment period was conducted in October 2015 on the draft EA/MND. The 30 public comment period concluded on November 2015. The San Manuel Band of Mission Indians and San Bernardino County sent “no comment” e-mails; no other comments were received.

ALTERNATIVES CONSIDERED

A No Action Alternative and a Proposed Project Alternative were considered. Under the No Action Alternative the Project would not be implemented. Reclamation would not restore 50 acres of backwater habitat for flannelmouth sucker and other riparian species under the LCR MSCP; consequently the Project area would not be used to create habitat to meet the goals of the LCR MSCP.

THE PROPOSED PROJECT ALTERNATIVE

Under the proposed Project alternative (Project), Reclamation would design, create, monitor, and maintain approximately 50 acres of backwater habitat within a 149-acre parcel owned in fee by the CSLC that is currently part of the Park in Reach 3. The Project would be designed as a backwater channel and riparian habitat that includes water depth, vegetation, and substrate characteristics that provide the elements of flannelmouth sucker habitat. The development of the backwater would connect to and induce additional flow through the existing Park Moabi Channel, an existing channel within the Park dredged in 1961 to create a deep water area to improve boat launching and the sport fishery. Other listed species, including the razorback sucker may also benefit from the backwater creation since they are already in the Colorado River and the Park Moabi Channel.

The Project would satisfy the LCR MSCP objectives by including the following design elements:

- Connected backwater channel from the Colorado River to the Park Moabi channel for native fish;
- Water control structures to control flows, provide for water elevation stabilization, and exchange water from the Colorado River;
- Roadway/bridge crossings for vehicle access;
- Primitive boat ramps intended for Project management (i.e., not public recreation) purposes; and
- Landscape re-contouring and habitat restoration to create marsh, riparian, and upland habitat for use by other wildlife species.

The Project would be implemented in four phases: Phase 1 – Vegetation Clearing; Phase 2 – Excavation and Construction; Phase 3 – Establishment/Re-Vegetation; Phase 4 – Habitat Management, Operations, and Maintenance. Phases 1 through 3 would span the next two to three years. Phase 4 would include habitat management, operation, and maintenance for the life of the LCR MSCP.

A more detailed description of the activities in Phase 1 through Phase 4 of the Project is located in Section 2.0 of the EA/MND (EA/MND, page 2-1).
ENVIRONMENTAL COMMITMENTS

In accordance with CEQA, an analysis of environmental impacts is provided in the EA/MND based in part on the impact questions contained in Appendix G of the State CEQA Guidelines. These impact questions are intended to assess impacts for each of the following environmental categories under CEQA:

- Aesthetics/Visual Resources
- Agriculture and Forestry Resources
- Air Quality
- Biological Resources
- Cultural and Paleontological Resources/Traditional Cultural Properties/Sacred Sites
- Geology and Soils
- Greenhouse Gas Emissions and Climate Change
- Hazards/Hazardous Materials/Human Health and Safety
- Hydrology and Water Quality
- Land Use and Planning
- Mineral Resources
- Noise
- Population and Housing
- Public Services
- Recreation
- Transportation/Traffic
- Utilities and Service Systems
- Other Major Areas of Concern Required under NEPA:
  - Environmental Justice
  - Indian Trust Assets or Tribal Lands

Based on the analysis of the environmental categories in the EA/MND, the following mitigation measures (MMs) will be implemented as part of the Project to reduce or eliminate impacts to the following environmental categories:

**Biological Resources**
The following MMs will be incorporated into construction, monitoring, and maintenance activities to prevent harassment, injuries, or mortalities to listed, candidate, species of conservation concern, and species under the LCR MSCP:

<table>
<thead>
<tr>
<th>Potential Impact</th>
<th>Mitigation Measures</th>
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<tbody>
<tr>
<td><strong>Special Status Species</strong></td>
<td>MM BIO-1. Worker Environmental Awareness Program (WEAP). Prior to initiating work at the site, an education program (WEAP) will be provided by the Project Biologist to workers. The WEAP shall include:</td>
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<td>• Brief life history;</td>
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<td>• Ecology;</td>
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<td>• Identification;</td>
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<td>• Legal protections afforded all potentially occurring special-status plant and animal species as well as the identified protective measures; and</td>
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FONSI-3
**Mojave Valley Conservation Area Backwaters Project**  
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- **Implications of noncompliance.**  
  All persons employed or otherwise working on the Project sites shall attend a WEAP presentation prior to performing any work on site.

**MM BIO-2:** Designated Project Biologist. At least 30 days before initiating Project activities, the Project proponent shall obtain the California Department of Fish and Wildlife’s written approval for a designated Project Biologist/biological field contact representative. The Project Biologist shall be on site during initial Project activities and as necessary to oversee activities described for monitoring breeding and nesting (MM BIO-3) avoidance measures and may halt Project activities that are in violation. In addition, all occurrences of MSCP covered species and California sensitive species observed in the Project area will be submitted to the CNDDDB by the Project Biologist or the long-term site monitor, as appropriate (information and forms at [http://www.dfg.ca.gov/biogeodata/cnnddb/submitting_data_to_cnnddb.asp](http://www.dfg.ca.gov/biogeodata/cnnddb/submitting_data_to_cnnddb.asp)).

**MM BIO-3** Bird Breeding Season Avoidance. To the extent feasible, all work for Phases 1 and 2 shall be conducted outside the breeding season (September 1 through February 28) to reduce the possibility of abandonment, or commenced prior to occupation by sensitive birds in the spring in order to prevent occupation and breeding/nesting. If ground disturbance or vegetation clearing is needed during the breeding/nesting season for any phase, a pre-construction survey will be completed by the Project Biologist and a minimum 100-foot buffer will be enforced around all nests until the young have fledged.

**Invasive Species**

**MM BIO-4. Reduce Terrestrial Invasive Species.** All vehicles and equipment entering and leaving the site will be properly cleaned to avoid spreading non-native invasive species.

**MM BIO-5. Reduce Aquatic Invasive Species.** All vehicles and equipment will be appropriately washed by implementing the “Clean, Drain, Dry” philosophy to prevent the spread of aquatic invasive species like the quagga mussel [https://www.wildlife.ca.gov/Conservation/Invasives/Quagga-Mussels](https://www.wildlife.ca.gov/Conservation/Invasives/Quagga-Mussels).

**Cultural and Paleontological Resources/ Traditional Cultural Properties/Sacred Sites**

The following MMs will be incorporated into construction, monitoring, and maintenance activities to prevent impacts to cultural and paleontological resources, traditional cultural properties, and sacred sites:

<table>
<thead>
<tr>
<th>Potential Impact</th>
<th>Mitigation Measures</th>
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<tbody>
<tr>
<td>Cultural Resources and human Remains</td>
<td><strong>MM CUL-1. Discovery of Unanticipated Cultural Resources.</strong> Should additional cultural materials such as archaeological and/or historical resources be uncovered during earthmoving activities, all work in that area shall cease immediately and a qualified archeologist shall be retained to access the findings and CSLC staff shall be contacted immediately. Earthmoving shall be diverted no closer than 100 feet temporarily around the deposits until they have been evaluated, recorded, excavated, and/or recovered as necessary. Construction will be allowed to proceed on the site when the archaeologist, in consultation with the Bureau of Reclamation, CSLC, appropriate Native American Tribe(s) and the County of San Bernardino Museum, determine the resources are recovered to their satisfaction. The State requires that the location of any such findings must be kept confidential and measures should be taken to ensure that the area is secured to minimize site disturbance and potential vandalism. Additional measures to meet these</td>
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FONSI-4
requirements include assessment of the nature and extent of the resource, including its possible eligibility for listing in the National Register of Historic Places, and subsequent recordation and notification of relevant parties based upon the results of the assessment. Title to all abandoned shipwrecks, archaeological sites, and historic or cultural resources on or in the tide and submerged lands of California is vested in the State and under the jurisdiction of the CSLC. The final disposition of archaeological, historical, and paleontological resources recovered on State lands under the jurisdiction of the CSLC must be approved by the Commission.

**MM CUL-2. Discovery of Unanticipated Human Remains.** If human remains are encountered during implementation of the Project, all provisions provided in California Health and Safety Code section 7050.5 and California Public Resources Code section 5097.98 shall be followed. Work shall stop within 100 feet of the discovery and a qualified Cultural Resources Specialist must be contacted immediately, who shall consult with the County Coroner. In addition, CSLC staff shall be notified. If human remains are of Native American origin, the County Coroner shall notify the Native American Heritage Commission within 24 hours of this determination and a Most Likely Descendant shall be identified. No work is to proceed in the discovery area until consultation is complete and procedures to avoid and/or recover the remains have been implemented.

**Hazards/Hazardous Materials/Human Health and Safety**

The following MMs will be incorporated into construction, monitoring, and maintenance activities to ensure human health and safety:

<table>
<thead>
<tr>
<th>Potential Impact</th>
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</thead>
<tbody>
<tr>
<td><strong>Hazards and Hazardous Materials</strong></td>
<td><strong>MM HHM-1. Discovered Contaminants Protections.</strong> Should contaminants be identified, activity on the site shall cease and a qualified Reclamation Hazardous Materials Specialist for the Project shall be retained to conduct the following:</td>
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<td>• Obtain samples of the suspected contaminants;</td>
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<td>• Require lab analysis and access findings to identify specific contaminants; and</td>
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<td>• Ensure appropriate remediation is conducted and completed in accordance with the regulations specific to the contaminants identified.</td>
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<td><strong>MM HHM-2. Toxic Substances Protections.</strong></td>
<td>To ensure toxic substances are not released into the aquatic environment, the following measures shall be followed:</td>
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<td>• All engine-powered equipment shall be well-maintained and free of leaks of fuel, oil, hydraulic fluid or any other potential contaminant.</td>
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<td>• Staging areas for refueling of equipment shall be located away from the backwater and away from the Colorado River to prevent any accidental fuel leakage from contaminating surface water.</td>
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<td>• A spill prevention and response plan shall be prepared in advance of the commencement of work; a spill kit with appropriate clean-up supplies shall be kept on hand during operations.</td>
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<td>o The kit shall include a floating oil-absorbent sock that could be immediately deployed and maintained around the Project area in the event of a spill or any accidental leakage of fuel or hydraulic fluids;</td>
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<td></td>
<td>o Refueling and maintenance of mobile equipment shall not be performed directly over the waters of the Colorado River. Only approved and certified fuel cans with &quot;no-spill&quot; spring-loaded nozzles shall be used; and</td>
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<td>o All spill cleanup materials or other liquid or solid wastes shall be securely containerized and labeled in the field.</td>
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<td>• The application and control of herbicides and pesticides shall be in accordance with the Toxic Substance Control Act (TSCA) and Environmental Protection Agency Labeling requirements including but not limited to:</td>
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</table>
Hydrology and Water Quality
The following MMs will be incorporated into construction, monitoring, and maintenance activities to ensure water quality:

<table>
<thead>
<tr>
<th>Potential Impact</th>
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</thead>
<tbody>
<tr>
<td>Water Quality</td>
<td>MM HHM-2. Toxic Substances Protection. (see above)</td>
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</tbody>
</table>

Transportation/Traffic
The following MMs will be incorporated into construction, monitoring, and maintenance activities to prevent impacts to access for transportation and traffic:

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Navigable Waters</td>
<td>MM TT-1 Placement of Dredge Pipe in Navigable Waters. The dredge pipe used to move dredge material across the river shall be submerged at a depth where no obstruction to the navigable waters would occur, as follows: • At least 10 feet from the bottom of the Colorado River if there is no obstruction to the navigable waterway. • If there is still obstruction, the pipe shall be laid at the bottom of the Colorado River to ensure there is no obstruction.</td>
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<tr>
<td>Temporary Road Closures</td>
<td>MM TT-2. Traffic Plan During Construction. A traffic plan shall be developed to ensure emergency and public access within the Project Area is not affected. The Traffic plan shall include, but is not limited to, the following: • Not involve any long-term increase in traffic that would conflict with adopted policies, plans, or programs supporting alternative transportation or obstruct current access within and around the Project area; • Provide an ingress and egress to the Project area; • Ensure traffic and safety signed are posted appropriately; • Provide trained personnel to ensure the implementation of the Traffic Plan; and • Ensure coordination and communication with local emergency response agencies.</td>
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ENVIRONMENTAL IMPACTS AND FINDINGS
In accordance with CEQA, an analysis of environmental impacts is provided in the EA/MND to determine if any of the environmental categories would be potentially affected by this Project. With the implementation of MMs that reduce or minimize the impacts as detailed in Section 3 of this EA/MND, there will be no significant Project-related impacts. The reasons for this determination are summarized by resource below. References to the location of the supporting information in the EA are given in parenthesis.
Aesthetics/Visual Resources
Short-term direct and indirect impacts would result from the implementation of Phase 1 through Phase 3 due to clearing, excavation and construction activities. However, the direct or indirect impacts to aesthetics and visual resources would be less than significant because the Project would include re-vegetation that would ensure the open water channel and new water control structures would blend into the exiting natural landscape and not impair or obstruct the views from the Colorado River or the I-40.

Although short-term impacts are identified, re-vegetation would occur and no cumulative impacts to aesthetics and visual resources from the Project are anticipated. (EA/MND, page 3-4).

Agriculture and Forestry Resources
Impacts to agriculture and forestry resources were evaluated with respect to the Farmland Protection Policy Act (7 U.S.C. 4201). The analysis tiered to the analysis from the LCR MSCP FEIS/EIR. This analysis concluded that the impact of the Project is not located in the vicinity of farmland or forest land. There would be no cumulative impacts for agricultural and forestry resources as there would be no direct or indirect impact to this environmental category (EA/MND, page 3-7).

Air Quality
Short-term impacts would result from the implementation of the Project with the use of vehicles for travel and heavy fuel based equipment for transport, clearing, and construction that would generate criteria air pollutant emissions from temporary and short-term burning of gasoline and diesel fuel. However, direct or indirect impacts to air quality would be less than significant because emissions of the Project are estimated to be under the maximum daily and annual emission thresholds set by the Mohave Desert Air Quality Management District (MDAQMD) and would be negligible.

Additionally, although the Project’s estimated emissions would be under the established emission thresholds and no mitigation measures are required, the following best management practices (BMPs) would be implemented to further control and reduce the production of fugitive dust (EA/MND, page 3-14):

- BMP AQ-1 – Reduce dust emissions during grading
- BMP AQ-2 – Reduce pollutant emissions
- BMP AQ-3 – Reduce dust emissions

Moreover, it is anticipated that re-vegetation of native plants and the creation of backwater habitat would potentially result in long-term improvements to air quality within the Project area.

Although implementation of the Project would generate criteria air pollutant emissions, emissions would not exceed the daily and annual thresholds established by the MDAQMD and would be negligible. Thus, direct and indirect cumulative impacts to air quality are not anticipated (EA/MND, page 3-11).
Biological Resources
Potential direct and indirect impacts to biological resources were identified as a result of implementing Phase 1 through Phase 4 of the Project. Wildlife may be temporarily displaced, injured, or killed if not avoided during Project implementation and maintenance activities from vehicle machinery traffic. Human activity, noise, and vibrations can cause wildlife to be temporarily displaced from nesting, roosting, or foraging areas. As a result of vegetation removal activities needed for maintenance activities, wildlife may lose small areas of habitat that may be important for cover, foraging, or other activities. Ground dwelling species could be entrapped in trenches during Project implementation or maintenance.

The implementation of MM BIO-1, MM BIO-2, and MM BIO-3 will ensure potential impacts to wildlife are reduced to less than significant. The Project would result in native habitat and backwater creation for the long-term benefit of fish and wildlife species.

Indirect impacts to wildlife from the Project can occur as a result of human activities and disturbance in the area. Reproduction could be interrupted or delayed if they are forced to leave their nests or abandon young for long periods of time. Because construction and vegetation removal would be scheduled outside of the migratory bird breeding season or would begin prior to spring occupation by breeding/nesting birds (Phase 1), or would be preceded by surveys for breeding birds with an avoidance buffer established around any nests until the young have fledged (Phase 3 onward) these impacts are anticipated to be negligible and avoided.

ESA Section 7 consultation was completed for the LCR MSCP 1 in 2005 and concurrence for the Project was sent to the USFWS on January 28, 2015, restating that the creation of new habitats for covered species could have minor impacts on existing low-value habitat in the LCR MSCP project area. In consideration of the incidental take provided for in the BO (File No.22410-2004-F-0161) in addition to avoidance and minimization measures, particularly avoiding the migratory bird breeding season during construction activities to the extent feasible, the USFWS concurred with Reclamation’s determinations.

In addition, a concurrence request letter will be sent to CDFW with the Habitat Restoration and Management Plan and the Monitoring, Research, and Adaptive Management Plan for review and approval, as stated in the provisions of the Incidental Take Permit issued by CDFW (Incidental Take Permit File No. 2081-2005-008-06).

Potential cumulative impacts were identified from recreation activities and development. Recreation activities and development can result in additional habitat loss for wildlife; however, the Project would recreate additional habitat in the long-term. Native fish like the razorback sucker are being stocked in the Park Moabi Channel and flannelmouth sucker is the target species to benefit from the Project. Increased human activity can impact wildlife and result in avoidance of an area and competition for resources. The long-term benefit of the backwater creation would provide native habitat for wildlife and backwater habitat for native fish. Cumulative impacts from Project activities are expected to be largely beneficial to plant, aquatic, and wildlife communities as they ultimately enable the LCR MSCP to implement goals and objectives for the benefit of LCR MSCP covered species (EA/MND, page 3-20).
Cultural and Paleontological Resources/Traditional Cultural Properties/Sacred Sites

There would be no direct, indirect, or cumulative impacts to cultural resources from the construction, monitoring, and maintenance activities of the Project. Federal and/or State laws developed to preserve and manage cultural resources would apply to activities undertaken at the Project area. A “No Historic Properties Affected” consultation with the California State Historic Preservation Office (SHPO) was conducted in July 2015. The SHPO concurred with Reclamation’s determination. Tribal consultations were also conducted and resulted in no comments from the Tribes.

No Traditional Cultural Properties (TCP) or sacred sites have been identified in the Project area (EA/MND, page 3-30).

Geology and Soils

Short-term impacts would result from vegetation clearing, grading, and excavation activities. However, direct or indirect impacts to geology and soils would be less than significant because the Project would not result in the loss of soil materials because soil material would remain within the Project area.

In addition, short-term impacts would be minimized and controlled by having a National Pollutant Discharge Elimination System (NPDES), Stormwater Pollution Prevention Plan (SWPPP), and a Water Quality Management Plan (WQMP) in place and would include a re-vegetation plan using native plants to improve and enhance wildlife and riparian habitat and minimize any potential soil erosion. Conditions and stipulations specific to the Project area would be adhered to for soil erosion control during and after construction. The implementation of the Project, specifically during re-vegetation, is anticipated to restore and improve site conditions and would have no increased potential for soil erosion.

No cumulative impacts are anticipated to geology and soils from the Project because the short term potential impacts identified would not contribute to measurable cumulative impacts (EA/MND, page 3-39).

Greenhouse Gas Emissions and Climate Change

Short-term impacts would result from the implementation of the Project with the use of vehicles for travel and heavy fuel based equipment for transport, clearing, and construction that would generate GHG emissions from temporary and short-term burning of gasoline and diesel fuel. However, GHG emissions are estimated to be under the maximum daily and annual GHG emission thresholds set by the MCAQMD and direct and indirect impacts would be negligible, therefore would be less than significant.

Additionally, although the Project’s estimated GHG emissions would be under the established GHG emission thresholds and no mitigation measures are required, the following BMP would be implemented to further control and reduce the production of GHG emissions (EA/MND, page 3-48):

- BMP GHG-1 – Reduction of GHG Emissions
Moreover, it is anticipated that long-term improvements would occur to the Project area’s air quality, including the offset of Project related GHG emissions, as a result of re-vegetation of native plants that is part of the Project design.

Because the impact of GHG emissions would be negligible, cumulative impacts to GHG emissions and climate change are not anticipated (EA/MND, page 3-45).

**Hazards/Hazardous Materials/Human Health and Safety**

Potential direct and indirect impacts to hazards/hazardous materials/human health and safety were identified as a result of implementing Phase 1 through Phase 4 of the Project due to the use of fuel based construction equipment during removal/clearing, construction, maintenance, and operational activities, as well as the use of herbicides to control the re-growth of invasive plants during the all phases of the Project, which may lead to the potential for spills, leaks, and overspray of chemicals.

The implementation of MM HHM-1 and MM HHM-2, in addition to the conditions and stipulations of the NPDES, SWPPP, and WQMP prepared for the Project to address potential discharge and pollution to the created backwater and the Colorado River would reduce the risk to the health and safety of the public.

No cumulative impacts are anticipated to hazards/hazardous materials/human health and safety because the Project would not cause direct or indirect impacts to this environmental category (EA/MND, page 3-50).

**Hydrology and Water Quality**

Short-term impacts would result from the creation of an open backwater that would divert flows. However, direct or indirect impacts to hydrology and water would be less than significant because flows diverted resulting from the creation of the backwater would return to the Colorado River by way of the Park Moabi Channel and restore water flows to degraded wetlands within the Project area.

The Project area possesses the characteristics of jurisdictional water bodies regulated by the U.S. Army Corps of Engineers (USACE). To ensure all USACE requirements are met under the Clean Water Act (CWA), a CWA Section 404 permit and Section 401 certification application is being prepared for the Project. Once the USACE makes its determination and a permit is issued, all conditions, stipulations and requirements will be met to ensure compliance with the CWA.

To ensure short-term potential impacts to hydrology and water quality would be reduced and minimized, CWA regulatory requirements such as the implementation of a NPDES, SWPPP and a WQMP, and MM HHM-2 would be incorporated into the Project. The implementation of the Project is anticipated to improve and enhance site conditions.

No cumulative impacts are anticipated to hydrology and water quality from the Project because the short term potential impacts identified would not contribute to measurable cumulative impacts (EA/MND, page 3-59).
**Land Use and Planning**

The Project is located within an area designated as an Off Highway Vehicles (OHV) recreational area managed by the County. However, direct or indirect impacts to land use and planning would be less than significant because Reclamation, CDFW, and the County have agreed that management of the backwater for LCR MSCP purposes is compatible with the Park. Implementation of the Project would not prohibit or encourage continued OHV within the newly created backwater habitat. OHV use would likely continue around the perimeter of the Project area where OHV access trails are already established.

Activities described in Phases 1 through 3 may have the potential to temporarily conflict with the desert wash/riparian habitat conservation provisions of the California Desert Conservation Area Plan, West Mojave Plan (CDCAP WMP). However, the completed Project would be in conformance with the CDCAP WMP.

No cumulative impacts are anticipated to land use and planning from the Project because the short term potential impacts identified would not contribute to measurable cumulative impacts (EA/MND, page 3-68).

**Mineral Resources**

The Project area is within Mineral Resource Zone MRZ-3a. However, direct or indirect impacts to mineral resources would be less than significant because the area is being used as a regional Park and no mining activities are present. In addition, although sand is considered a mineral resource, the excavation of the soil material (composed of clay and sand respective to the specific location) within the Project area, the soil material would remain within the Project area to the east of the backwater channel.

No cumulative impacts are anticipated to mineral resources because the Project would not cause direct or indirect impacts to this environmental category (EA/MND, page 3-71).

**Noise**

The Project would require the use of heavy fuel based equipment that would temporally raise the ambient noise levels. However, direct or indirect impacts to noise would be less than significant because construction equipment is exempt from the County Development Code Section 83.01.080 (g) (3). In addition, construction is proposed to take place for maintenance, repair, or clearing activities during business hours between 7:00 a.m. and 7:00 p.m. and potential impacts from Project related noise would be short-term. Noise conditions after construction would go back to the current conditions.

No cumulative impacts are anticipated to noise from the Project because the short term potential impacts identified would not contribute to measurable cumulative impacts (EA/MND, page 3-74).

**Population and Housing**

The Project Area is within the regional Park where recreational activities are available to the public. Therefore, direct, indirect, or cumulative impacts to population and housing from the Project are not anticipated. (EA/MND, page 3-78).
Public Services
The Project would not induce population growth or construction of housing since there are no plans to construct facilities that would encourage increased Park visitation. Therefore, direct, indirect, or cumulative impacts to public services are not anticipated (EA/MND, page 3-80).

Recreation
The Project would create an open backwater channel where an area designated as an OHV recreational area managed by the County currently exists. However, long term direct or indirect impacts to recreation are not anticipated because the Project would allow for continued use of OHV along the perimeter of the Project area where designated OHV access trails are currently located. It is anticipated that short-term/temporary impacts to Park operations and recreation would occur during construction. However, this would be short-term and once the Project is completed, the Project area would blend into the existing landscape and the regional Park would maintain its current operations.

OHV recreational use and other recreational activities would not be prohibited or encouraged where the open backwater, wetland, riparian, and upland areas are developed.

No cumulative impacts are anticipated to recreation because the Project would not cause long term direct or indirect impacts to this environmental category (EA/MND, page 3-83)

Transportation/Traffic
The Project would create a temporary increase in traffic related to construction and other vehicles traveling to the Project area during Phase 1 through Phase 3. However, direct or indirect impacts to transportation/traffic would be less than significant because the impacts would be temporary and the Project design does not require alteration of the existing roadway alignment and no measurable increase in traffic is expected once the Project is completed.

In addition, during construction, temporary closures may be required for the installation of the water control structures at the inlet and outlet of the backwater channel. However, MM-TT-1 and MM TT-2 would be implemented to mitigate the potential impacts of temporary increased traffic and closures during all phases of the Project.

No cumulative impacts are anticipated to transportation/traffic because the Project would not cause long-term direct or indirect impacts to this environmental category (EA/MND, page 3-86)

Utilities and Service Systems
The Project would not induce the generation of wastewater and solid waste as a result of the implementation of the Project. Although debris from vegetation clearing and construction activities would be generated, vegetation debris would be buried on site with materials excavated during the creation of the open backwater and solid waste generated by construction activities would be diverted/recycled where possible to minimize solid waste disposal to the local landfill. Therefore, direct or indirect impacts to utilities and service systems are not anticipated.

No cumulative impacts to utilities and service systems are anticipated because the Project would not cause direct or indirect impacts to this environmental category (EA/MND, page 3-91).
**Environmental Justice**

The Project would not result in disproportionately high and adverse human health or environmental effects on minority and low-income populations. A minority population was not identified for the analysis area. The percent of individuals below poverty levels in the Census Tracts were compared to those for Needles, CA. The poverty levels for the Census Tracts in Mohave County were either below or only slightly higher than those for Mohave County or Arizona. Census Tract Needles, CA has a poverty rate that is 12.4 percent higher than the national average in 2010. Although Census Tract in Needles, CA has a higher poverty rate than the national average as a whole, no high and adverse human health or environmental effects have been identified that may impact this Census Tract. No cumulative impacts were identified because no direct or indirect environmental justice impacts were identified (EA, page 4-1).

**Indian Trust Assets or Tribal Lands**

Direct or indirect impacts to Indian trust assets (ITA) or Tribal lands are not anticipated because there are no ITAs or Tribal lands identified at or in the immediate vicinity of the Project area. No cumulative impacts are anticipated to ITAs or Tribal Lands because the Project would not cause direct or indirect impacts to ITAs or Tribal lands (EA, page 4-4).
ENVIRONMENTAL ASSESSMENT/MITIGATED NEGATIVE DECLARATION (EA/MND)
MOHAVE VALLEY CONSERVATION AREA BACKWATER PROJECT
Bureau of Reclamation, Lower Colorado Region
Needles, California
Document No. LC-15-07
California State Lands Commission
MND No. 786

October 2015

Lead Agencies:

U.S. Department of the Interior
Bureau of Reclamation, Lower Colorado Region
P.O. Box 61470
Boulder City, Nevada 89006

California State Lands Commission
100 Howe Avenue, Suite 100 South
Sacramento, California 95825

Applicant:

California Department of Fish and Wildlife
Inland Deserts Region 6
P.O. Box 2160
Blythe, California 92226
Mission Statements

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

The California State Lands Commission serves the people of California in the stewardship of the lands, waterways, and resources entrusted to its care through protection, preservation, restoration, and economic development.
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<td>MND</td>
<td>Mitigated Negative Declaration</td>
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EXECUTIVE SUMMARY

This Environmental Assessment/Mitigated Negative Declaration (EA/MND) has been prepared by the Bureau of Reclamation (Reclamation) as the Federal lead agency under the National Environmental Policy Act (NEPA) (42 U.S.C. § 4321 et seq.), and the California State Lands Commission (CSLC) as the State lead agency under the California Environmental Quality Act (CEQA) (Pub. Resources Code, § 21000 et seq.), to analyze and disclose the environmental effects associated with the proposed Mohave Valley Conservation Area Backwater Project (Project). The Project would authorize Reclamation, as the Federal implementing agency of the Lower Colorado River Multi-Species Conservation Program (LCR MSCP) to create, maintain, and monitor a backwater habitat on approximately 50 acres of a 149-acre parcel of State-owned sovereign land within Moabi Regional Park (Park) to benefit species covered by the LCR MSCP. The California Department of Fish and Wildlife (CDFW or Applicant), as a State partner for implementation of the LCR MSCP, would be the lease holder.

The proposed Project is located along the Colorado River (River) between River Miles 237 and 236. It is about 13 miles south of Needles, California in San Bernardino County (County) (Figures ES-1 and ES-2). The 149-acre State-owned parcel is on the California side of the River at the center of Section 36, Township 8 N, and Range 23 E, San Bernardino Meridian and is currently leased to San Bernardino County (County). The Project area, which is located within the historic floodplain of the River, remains undeveloped and possesses the potential to be developed into connected backwater habitat (Figure ES-2). Under the proposed Project, Reclamation would excavate soil from the currently vacant parcel and construct a river inlet and outlet to create a backwater channel and associated backwater habitat that contribute to the habitat restoration requirements identified in the LCR MSCP.

Reclamation and CSLC prepared an EA/MND because, while the Initial Study identified potentially significant impacts related to creating the backwater habitat, after analysis of all the facts and circumstances, Reclamation and CSLC staffs believe that measures have been incorporated into the Project proposal and agreed to by Reclamation and CDFW that avoid or mitigate those impacts to a point where no significant impacts would occur.

BACKGROUND

The LCR MSCP is a multi-stakeholder Federal and non-Federal partnership responding to the need to balance the use of lower River water resources and the conservation of native species and their habitats in compliance with the Endangered Species Act of 1973 (ESA; 16 U.S.C. § 1531 et seq.).
Figure ES-1. Project Area Vicinity Map
Figure ES-2. Project Site Map
Executive Summary

In April 1997, the U.S. Fish and Wildlife Service (USFWS) issued a Biological and Conference Opinion (BO) to Reclamation covering routine operations and maintenance activities along the River. As part of this BO, the USFWS called for stakeholders along the lower Colorado River to develop and implement the LCR MSCP. This effort was completed in 2005 after the approval of a Programmatic Environmental Impact Statement/Environmental Impact Report (EIS/EIR) which evaluated the environmental effects associated with implementation of the Habitat Conservation Plan (HCP) for the LCR MSCP. The incidental take permits for the LCR MSCP issued under Section 10 of the ESA for the non-Federal LCR MSCP partners and section 2081 of the California Endangered Species Act (CESA; Fish & G. Code, § 2050 et seq.), and the BO issued to Reclamation under Section 7 of the ESA require the Permittees (LCR MSCP) to implement the HCP.

The LCR MSCP operates under the Water Accounting Agreement passed by Congress as part of the Omnibus Public Land Management Act of 2009 (Public Law No. 111-11, Title IX, Subtitle E, 123 Statute 991, 1327-29). The Omnibus Public Land Management Act of 2009 permits Reclamation to create and manage conservation areas, which do not contain any water entitlement from the Secretary of the Interior, by using River water to meet the performance requirements of the LCR MSCP. Under the Water Accounting Agreement, Reclamation shall not consider any resulting increase in evaporation or percolation of lower Colorado River water to be a diversion or consumptive use.

The LCR MSCP is a long-term (50-year) plan consisting of conservation measures that provide protection along the lower Colorado River from Lake Mead to the southerly International Boundary with Mexico for 26 species currently threatened or endangered and five species on the verge of becoming threatened or endangered. The LCR MSCP anticipates development and/or protection of a minimum of 8,132 acres of habitat consisting of a mosaic of cottonwood-willow (*Populus fremontii*), honey mesquite (*Prosopis glandulosa*), marsh, and backwater components. The program uses adaptive management principles to research and monitor species and habitats, and to adjust and enhance management actions and science applications over the life of the program. Under the guidance of the LCR MSCP’s HCP, the program is tasked with creating 85 acres of connected backwater habitat between Davis and Parker Dams (Reach 3).

Reclamation is responsible for implementing the LCR MSCP over the 50-year term of the program. The LCR MSCP is governed by a Steering Committee, which is an unincorporated association of more than 50 water and power users, State, Federal, local entities, and tribes. The Steering Committee works with Reclamation to coordinate the implementation of the LCR MSCP.

Much of the bank line within this reach of the River is developed or runs through Topock Gorge, which is composed of steep, rocky terrain that is unsuitable for LCR MSCP development based on site access restraints and landownership restrictions. However, within the Park south of Needles, CA, an approximately 149-acre parcel of land residing within the historic floodplain of the lower Colorado River possesses the landscape characteristics to allow for development of a connected backwater.
PROPOSED PROJECT

For this Project, Reclamation proposes to design, create, monitor, and maintain approximately 50 acres of backwater habitat within a 149-acre parcel owned in fee by the CSLC that is currently part of the Park. The remaining 99 acres would be used as a staging area during construction. Once construction of the Project is completed, the remaining 99 acres would continue to be operated and maintained as a designated Off-Highway Vehicle (OHV) area by the County.

Following the guidelines of the LCR MSCP HCP, the backwater must be connected to the River so that it is accessible to native fish from the main stem, and contributes to the conservation of native fishes and a mosaic of marsh, riparian, and upland vegetation types on the Colorado River. The LCR MSCP requires 360 acres of backwater for bonytail (*Gila elegans*) and razorback sucker (*Xyrauchen texanus*) including, 85 acres of backwater specifically for flannelmouth sucker (*Catostomus latipinnis*). HCP Conservation Measure FLSU1 states, “Of the 360 acres of LCR MSCP-created backwaters, at least 85 acres will be created in Reach 3 with water depth, vegetation, and substrate characteristics that provide the elements of flannelmouth sucker habitat.”

The development of the backwater would connect to and induce additional flow through the existing Park Moabi Channel, an existing channel within the Park dredged in 1961 to create a deep water area to improve boat launching and the sport fishery. Other listed species, including the razorback sucker may also benefit from the backwater creation since they are already in the River and the Park Moabi Channel.

Implementation of the Project would allow the LCR MSCP to work towards satisfying the HCP requirements for need to create backwater habitat between Davis and Parker Dams in Reach 3 of the River, and ensure continued ESA compliance for Federal and non-Federal entities operating on the River. The Project would satisfy the LCR MSCP objectives by including the following design elements:

- Connected backwater channel from the River to the Park Moabi channel for native fish;
- Water control structures to control flows, provide for water elevation stabilization, and exchange water from the River;
- Roadway/bridge crossings for vehicle access;
- Primitive boat ramps intended for Project management (i.e., not public recreation) purposes; and
- Landscape re-contouring and habitat restoration to create marsh, riparian, and upland habitat for use by other wildlife species.

The Project would be implemented in four phases.

- Phase 1 – Vegetation Clearing
- Phase 2 – Excavation and Construction
- Phase 3 – Establishment/Re-Vegetation
- Phase 4 – Habitat Management, Operations, and Maintenance
Phases 1 through 3 would span the next two to three years. Phase 4 would include habitat management, operation, and maintenance for the life of the LCR MSCP.

**Phase 1 – Vegetation Clearing.** During Phase 1, vegetation (primarily non-native) such as saltcedar (*Tamarix spp*), within the 149-acre parcel would be removed. This would be accomplished by a combination of manual and mechanical clearing (i.e., land-based mechanical and hydraulic equipment). Manual clearing would be conducted with hand tools such as shovels, clippers, and grubbers. Mechanical clearing would be conducted with equipment including, but not limited to, scraper tractor, track hoes, front loaders, and skid steers. The equipment would be used to remove and break down vegetation debris into manageable pieces to be buried on-site. A bulldozer or similar equipment may be used to pile and stage the vegetation debris within the Project site until it is collected and buried under fill material at the on-site disposal area (Figure ES-3). Land-based mechanical and hydraulic equipment being used for the Project would be obtained from the local area and transported to the Project area. Equipment would be staged within the Project area (Figure ES-3).

Vegetation clearing would prepare the Project area for Phase 2 and Phase 3. To avoid impacts to potentially nesting migratory birds or other special-status species that may inhabit the area, vegetation clearing for Phase 1 would commence at the beginning of March (prior to the nesting season) before the vegetation is occupied by breeding/nesting birds. If Phase 1 vegetation clearing is not commenced prior to the
vegetation being used by breeding/nesting birds, then Phase 1 would be conducted during the months of September through February to avoid nesting season.

**Phase 2 – Excavation and Construction.** Upon the completion of sufficient vegetation clearing described in Phase 1, a managed backwater habitat channel system between the River and the Park Moabi Channel would be constructed. All clearing and construction activities would occur within the 149 acres, and no open water construction is anticipated. The backwater channel system would incorporate inlet and outlet water control structures and roadway crossings over the excavated backwater channel at the upstream and downstream ends as shown in the Draft Design Report (Appendix A).

*Backwater Channel Excavation*

The backwater channel system would be designed to provide water inflow and outflow flexibility for adaptive management. The backwater habitat would be created through dry-cutting (dry land excavation) to establish a new channel within the Project area (Figure ES-3). Dry-cutting would involve earthwork consisting of excavation, grading, and contouring of the perimeter of the backwater channel that would extend from the River to the existing Park Moabi Channel. Excavated material would consist of dry fill gathered above the ground water elevation. Areas within the footprint of the backwater channel may be excavated until the groundwater elevations are reached and further if necessary and feasible.

Groundwater elevations within the Project area fluctuate between a depth of 3.5 and 13 feet with the rise and fall of the River. Excavation would be accomplished through the use of mechanical and hydraulic equipment such as excavators, back hoes, skid steers, and front loaders. Approximately 1.2 million cubic yards of compacted fill would be excavated. Dry fill materials would be placed directly adjacent to the newly excavated channel to bury the vegetation debris collected during Phase 1 (Figure ES-3).

*Backwater Channel Design*

The backwater channel design as shown in Appendix A, would incorporate the construction of two new water control structures which would be concrete arch culverts to allow water to flow through the inlet (Northern Structure) and outlet (Southern Structure) (Figure ES-3). The design would provide spatially variable topography with an appropriate distribution of depths (between 0 to -15 feet) and velocities for a variety of aquatic habitats. In addition, the design would accommodate seasonal flows and fluctuations of the River.

An engineered fill mat would be laid within the area below the new culvert and any appurtenant wing wall footing to stabilize the subsurface soil conditions within the channel. The new backwater channel would be constructed with riprap bank protection to prevent scour at the downstream end of the culverts. The riprap material would be similar material currently used within the River and Park Moabi Channel that would be obtained from an existing Reclamation stockpile along the River.
Executive Summary

Water Control Structure Construction

To control water flows at the inlet and outlet of the backwater channel, water control structures would be constructed at the concrete arch culverts. The water control structures would provide hydraulic control for flows in and out of the backwater channel during moderate to high flows in the River. Water control structures would also limit the amount of River bed sediment entering the backwater channel.

Roadway/Bridge Crossing Construction

To provide access at the intersections of existing roadways where the backwater channel would be excavated at the inflow and outflow, a roadway/bridge crossing would be constructed atop the upstream and downstream concrete arch culverts that would span the length and width of the inlet and outlet structures.

Temporary closure of the existing roadway atop the water control structures may be needed during its construction. Once the water control structures are in place, the roadway/bridge crossings would be constructed to reconnect the existing roadway. The unpaved roadways within the Project area would be constructed of untreated road base and aggregate that would be compacted to the maximum dry density.

Backwater Access Points

The Project design of the backwater channel would include a primitive boat ramp to provide an access point for use by the LCR MSCP staff to maintain and operate the backwater and its structures upon completion of all of the phases of the Project. The boat ramp would be accessed by an existing road and would be constructed for official Project use limiting access to lightweight and non-motorized boat launching. The low impact design of the backwater access point is intended to blend with the surrounding features of the backwater channel.

Phase 3 – Establishment/Re-Vegetation. Upon the implementation of Phases 1 and 2, landscape restoration would be conducted through the tilling along the contours of the backwater channel and planting of four land cover types (Figure ES-4). The distribution and design for re-vegetation follow the recommendations outlined in the HCP and incorporates plant types that already occur in the Park area. The four land cover types that would be created within the 149 acres would include approximately:

- 26 acres of open deep backwater areas;
- 24 acres of shallow marsh areas (e.g., bulrush, cattail [Typha spp.], and other native seed species);
- 15 acres of cottonwood/willow areas (e.g., Goodding’s willow [Salix gooddingii], coyote willow [Salix exigua], and Fremont cottonwood [Populus fremontii]); and
- 37 acres of upland areas (e.g., honey mesquite and arrowweed [Pluchea sericea]).
The combined total area for the backwater and marsh land cover habitats would be approximately 50 acres, which would be submerged underwater (Figure ES-5). The 52 (15+37) acres of riparian and upland vegetation of cottonwood/willow, honey mesquite and arrowweed would be planted to stabilize and re-vegetate the perimeter of the fill area. For MSCP habitat credit purposes, only approximately 50 acres of backwater created land cover habitat would be used towards the goal of 85 acres in Reach 3 for flannelmouth sucker.

**Phase 4 – Habitat Management, Operations, and Maintenance.** Phases 1 through 3 would be designed to limit the long-term maintenance requirements of the backwater habitat. A Draft Mohave Valley Backwater Restoration Development and Monitoring Plan (Development and Monitoring Plan) (Appendix B) has been prepared and would be implemented by LCR MSCP to address habitat/vegetation management, as well as operation and maintenance of the constructed facilities (e.g., water control structures), roadway access, and backwater access.

The Development and Monitoring Plan follows the guidelines of the HCP and identifies the development of the Project and the applications used to manage and maintain the Project area. In addition, the Development and Monitoring Plan includes fish and wildlife monitoring and reporting methods, and success criteria.
Executive Summary

Figure ES-5. Land Cover Types for Vegetation Restoration at 60% Design 60%
In Phase 4, dredging operations are anticipated to occur as needed to manage sediment accumulation and to maintain the backwater channel depth of at least 10 feet. The dredge material would be placed at a previously designated and approved disposal site across the River by moving material with a deep sunken pipe attachment to place the sediment at the disposal site along the River on the Arizona River bank. The pipe used to move the dredge material across the River would be submerged at a depth to ensure there would be no obstruction to navigable waters. The pipe would be removed at the completion of the work.

EXISTING CONDITIONS

The Park in total is nearly 1,400 acres and has two land owners: the CSLC and Reclamation. The area under the Commission’s jurisdiction was the historic bed of the Colorado River prior to channelization by Reclamation; the parcel now resides within the abandoned River channel and, while no longer submerged, is still owned by the CSLC. Today, the LCR MSCP stocks and monitors native razorback suckers within the Park Moabi Channel.

The Project site is currently being used as an OHV recreational area. The Project area consists of dredged spoils from Reclamation’s bankline/levee maintenance. There are also invasive species like saltcedar, mesquite series, arrow weed series, creosote bush series, sand dunes, and desert wash/riparian. There are no structures on the Project site.

In recent years the concessionaire under contract with the County has significantly developed the services available within the Park. Currently, the Park provides a 7-lane launch ramp, a marina, recreational vehicle (RV) and tent camping, waterfront cabins, a convenience store, and the Pirate’s Cove Restaurant & Bar. In 2012, the County proposed plans to make the 149-acre parcel an OHV recreational area. The OHV use area consists of land within a dredge spoil area located within the County lease area and provides open riding and designated, signed trails for OHV use. The OHV area re-established inner-park limited speed OHV access trails adjacent to existing internal roadways, designated roadway crossings, and OHV temporary parking sites and staging areas.

ENVIRONMENTAL IMPACTS AND PROPOSED MITIGATION MEASURES

The environmental factors checked below in Table ES-1 would be potentially affected by this Project; a checked box indicates that at least one impact has the potential to be a “Potentially Significant Impact” except that the Applicant and Reclamation have agreed to Project revisions, including the implementation of mitigation measures (MMs) that reduce the impact to “Less than Significant with Mitigation,” as detailed in Section 3 of this EA/MND. Table ES-2 lists proposed MMs designed to reduce or avoid potentially significant impacts. With implementation of the MMs, all Project-related impacts would be reduced to less than significant.
Table ES-1. Environmental Issues and Potentially Significant Impacts

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Table ES-2. Summary of Proposed Project Mitigation Measures

**Biological Resources**
- MM BIO-1 Worker Environmental Awareness Program (WEAP)
- MM BIO-2 Designated Project Biologist
- MM BIO-3 Bird Breeding Season Avoidance
- MM BIO-4 Reduce Terrestrial Invasive Species
- MM BIO-5 Reduce Aquatic Invasive Species

**Cultural and Paleontological Resources/Traditional Cultural Properties/Sacred Sites**
- MM CUL-1 Discovery of Unanticipated Cultural Resources
- MM CUL-2 Discovery of Unanticipated Human Remains

**Hazards/Hazardous Materials/Human Health and Safety**
- MM HHM-1 Discovered Contaminants Protections
- MM HHM-2 Toxic Substances Protections

**Hydrology and Water Quality**
- MM HHM-2 Toxic Substances Protections (see above)

**Transportation/Traffic**
- MM TT-1 Placement of dredge pipe in navigable waters
- MM TT-2 Traffic Plan During Construction
1.0 PROJECT AND AGENCY INFORMATION

1.1 PROJECT TITLE

Mohave Valley Conservation Area Backwater Project (Project)

1.2 LEAD AGENCIES AND PROJECT SPONSOR

Lead Agencies

NEPA

Bureau of Reclamation, Lower Colorado Region (Reclamation)
PO Box 61470 (LC-2625)
Boulder City, NV 89006

Contact Person:
Ms. Dana Anat, Environmental Protection Specialist
Resource Management Office
E-mail: Danat@usbr.gov
Office Phone: (702) 293-8055

CEQA

California State Lands Commission (CSLC)
100 Howe Avenue, Suite 100-South
Sacramento, CA 95825

Contact Person:
Afifa Awan, Environmental Scientist
California State Lands Commission
Division of Environmental Planning and Management
E-mail: Afifa.Awan@slc.ca.gov
Office Phone: (916) 574-1891

Applicant

California Department of Fish and Wildlife
Inland Deserts Region 6
P.O. Box 2160, Blythe, CA 92226

Contact Person:
Mr. Gerald P. Mulcahy, Environmental Scientist/Associate Wildlife Biologist
E-mail: Gerald.Mulcahy@wildlife.ca.gov
Office Phone: (760) 922-4686
1.3 ORGANIZATION/HOW TO USE THIS DOCUMENT

This Environmental Assessment/Mitigated Negative Declaration (EA/MND) is intended to provide the Bureau of Reclamation (Reclamation), as the Federal lead agency under the National Environmental Policy Act (NEPA) (42 U.S.C. § 4321 et seq.), and the California State Lands Commission (CSLC), as the State lead agency under the California Environmental Quality Act (CEQA) (Pub. Resources Code, § 21000 et seq.), and other responsible agencies with the information required to exercise their discretionary responsibilities with respect to the Project. An EA is prepared in accordance with NEPA to analyze impacts of the Project and is used to issue a Finding of No Significant Impacts, if applicable. An MND is prepared in accordance with CEQA when Project revisions and/or mitigation measures (MM) are made or agreed to by the Applicant that ensure no significant effect on the environment would occur.

This EA/MND is a joint document intended to fulfill both NEPA and CEQA requirements for this Project analysis. Table 1.3-1 includes a list of terminology that is comparable in NEPA and CEQA throughout the EA/MND.

Table 1.3-1. Equivalent NEPA and CEQA Terminology

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The document is organized as follows:

- Section 1 provides the Lead Agency and Applicant information, organization/how to use this document, Project location, Project background, State and Federal lead agency actions, summary of the public review and comment process, and applicable regulatory requirements and anticipated agency approvals.

- Section 2 describes the proposed Project including its purpose and need/Project objectives, location, layout, equipment use, personnel, and Project design. This Section provides an overview of the Project’s operations and schedule. It also provides a description of a No Action alternative to the Project. A No Action Alternative is included “because it provides an appropriate basis by which all other alternatives are compared,” including the Proposed Action (Reclamation NEPA Handbook Section 6.4.2.1, 2012). Lastly, it includes past, present, and reasonably foreseeable future projects.

- Section 3 provides the Initial Study (IS) for the Project, including the environmental setting, regulatory setting, identification and analysis of potential impacts, and discussion of various Project changes and other measures that, if incorporated into the Project, would mitigate or avoid those impacts, such that no
significant effect on the environment would occur. The IS was conducted by Reclamation and CSLC pursuant to State CEQA Guidelines section 15063. In addition, each environmental resource area summarizes and describes the potential environmental impacts in accordance with NEPA for each alternative described in Section 2 (NEPA Handbook Section 6.4.2.2). The summary includes a description of cumulative impacts for each resource area that considers past, present and future actions taken by all Federal, State, and local agencies and how they relate to the action being considered (NEPA Handbook Section 6.4.4).

- Section 4 includes an analysis and discussion on Environmental Justice (Executive Order [EO] 12898, 59 FR 7629, 1994) and Indian Trust Assets [ITA] or Tribal Lands (Secretarial Order No. 3175).
- Section 5 presents the Mitigation Monitoring Program (MMP).
- Section 6 presents information on document preparation and references.
- Appendices. The appendices include specifications, technical data, and other information supporting the analysis presented in this EA/MND.

  o Appendix A. LCR Park Moabi Backwater Channel Restoration Design Report 60% Draft
  o Appendix B. Mohave Valley Backwater Restoration Development and Monitoring Plan, September, 2015
  o Appendix C. Estimated Quantities for Emissions Calculation Sheet
  o Appendix D. Emission Factors for Criteria Pollutants - Selected WebFire Factors
  o Appendix E. Biological Resources Clearance Surveys for Soil Sampling at Test Pit Locations Within the Proposed Park Moabi Backwater in Accordance With the Non-Exclusive Geological Sampling Permit PRC 9283
  o Appendix F. U.S. Fish and Wildlife Endangered Species Section 7 Consultation Letter, January 28, 2015
  o Appendix G. Incidental Take Permit issued by California Department of Fish and Wildlife (Incidental Take Permit File No. 2081-2005-008-06)
  o Appendix H. Phase I Cultural Resources Investigation for the Proposed OHV Area-Park Moabi Regional Park Trail Improvements San Bernardino County California, June 3, 2011

1 The State “CEQA Guidelines” are found in Title 14 of the California Code of Regulations, commencing with section 15000.
1.4 PROJECT LOCATION

The proposed Project is located on a 149-acre State-owned parcel along the lower Colorado River (River), 13 miles south of Needles, California, between River Miles 237 and 236 (Figure 1.4-1). Please see Section 2, Project Description, for further details on the Project location. The proposed Project area is zoned for Open Space by San Bernardino County (County).

1.5 PROJECT BACKGROUND

1.5.1 Lower Colorado River Multi-Species Conservation Program

The Lower Colorado River Multi-Species Conservation Program (LCR MSCP) is a 50-year (2005 to 2055) multi-stakeholder Federal and non-Federal partnership which was created to balance the use of lower Colorado River water resources with the conservation of native species and their habitats. The LCR MSCP was initiated to bring administrators and users of the River into compliance with the Federal and California Endangered Species Acts (ESA and CESA, respectively). The 50-year program is designed to conserve at least 26 species between Lake Mead and the southern International Boundary with Mexico, and is implemented through the program’s Habitat Conservation Plan (HCP).

Water and power agencies in Arizona, California, and Nevada share the current estimate of LCR MSCP costs equally with the United States on a 50/50 Federal/non-Federal basis.
Figure 1.4-1. Project Area Vicinity Map

Mohave Valley Conservation Area
The LCR MSCP’s purpose and need/objectives are to conserve habitat and work towards the recovery of listed and included species within the 100-year floodplain of the lower Colorado River pursuant to the ESA to develop and implement a plan that will:

- Conserve habitat and work toward the recovery of threatened and endangered species, as well as reduce the likelihood of additional species being listed;
- Accommodate current water diversions and power production and optimize opportunities for future water and power development, to the extent consistent with existing laws; and
- Provide the basis for incidental take authorizations.

Reclamation is responsible for implementing the LCR MSCP over the 50-year term of the program. The LCR MSCP is governed by a Steering Committee, which is an unincorporated association of more than 50 water and power users, State, Federal, local entities, and tribes. The Steering Committee works with Reclamation to coordinate the implementation of the LCR MSCP and its HCP requirements.

A major component of the LCR MSCP is creating and managing habitat to benefit 26 covered species. Cottonwood-willow, honey mesquite, marsh, and backwater are the predominant land vegetation types to be created under the LCR MSCP HCP. Habitat creation goals include the establishment of a total of 8,132 acres of habitat including:

- 5,940 acres of cottonwood-willow
- 1,320 acres of honey mesquite
- 512 acres of marsh
- 360 acres of backwater

The following documents provide the framework and implementation of the LCR MSCP which can be accessed at http://www.lcrmscp.gov/:

- Lower Colorado River Multi-Species Conservation Program, Final Programmatic Environmental Impact Statement/Environmental Impact Report (LCR MSCP FEIS/EIR) (LCR MSCP 2004b);
- Record of Decision, Lower Colorado River Multi Species Conservation Plan;
- Final HCP;
- Final Biological Assessment, the Biological and Conference Opinion on the Lower Colorado River Multi-Species Conservation Program, Arizona, California and Nevada (LCR MSCP 2005a);
- Section 10 Endangered & Threatened Species – Federal Incidental Take Permit;
- Section 2081 Endangered & Threatened Species – State Incidental Take Permit;
- LCR MSCP Funding and Management Agreement; and
- LCR MSCP Implementing Agreement (LCR MSCP 2005b).
1.5.2 Park Moabi Channel and Moabi Regional Park

The Park Moabi Channel was dredged in 1961 to create a deep water area to improve boat launching and the sport fishery. Today, the LCR MSCP stocks and monitors native razorback suckers within the Park Moabi Channel.

In recent years the concessionaire under contract with the County has significantly developed the services available within the Park. Currently, the park provides a 7-lane launch ramp, a marina, recreational vehicle (RV) and tent camping, waterfront cabins, a convenience store, and the Pirate’s Cove Restaurant & Bar. In 2012, the County proposed plans to make the 149-acre parcel an Off-Highway Vehicle (OHV) recreational area.

The OHV use area consists of land within a dredge spoil area located within the County lease area and provides open riding and designated signed trails for OHV use. The OHV area re-established inner-park limited speed OHV access trails adjacent to existing internal roadways, designated roadway crossings, and OHV temporary parking sites and staging areas.

The proposed Project area is the entire parcel including the inlet and outlet water channels used to connect the main stem of the River to the backwater and the Park Moabi Channel (Figure 1.4-1). The Project would develop 50 acres of the 149-acre parcel into backwater habitat for fish and other riparian species.

1.5.3 Water Accounting Agreement

The LCR MSCP operates under the Water Accounting Agreement passed by Congress as part of the Omnibus Public Land Management Act of 2009 (Public Law No. 111-11, Title IX, Subtitle E, 123 Statute 991, 1327-29). The Omnibus Public Land Management Act of 2009 permits Reclamation to create and manage conservation areas, which do not contain any water entitlement from the Secretary of the Interior, by using Colorado River water to meet the performance requirements of the LCR MSCP. Under the Water Accounting Agreement, Reclamation shall not consider any resulting increase in evaporation or percolation of lower Colorado River water to be a diversion or consumptive use.

1.6 PUBLIC REVIEW AND COMMENT

Pursuant to State CEQA Guidelines sections 15072 and 15073, this proposed EA/MND will be circulated for a minimum 30-day public review period. Local and State agencies and the public will have the opportunity to review and comment on the document. Responses to written comments received by the CSLC during the 30-day public review period will be incorporated as appropriate into the proposed Final EA/MND. In accordance with State CEQA Guidelines section 15074, subdivision (b), the CSLC will review and consider the proposed Final EA/MND, together with any comments received during the public review process, prior to taking action on the EA/MND and the Project.
1.7 APPLICABLE REGULATORY REQUIREMENTS AND APPROVALS

1.7.1 Compliance with Environmental Statutes

This EA/MND complies with all applicable environmental, natural resource, and cultural resource statutes, regulations, and guidelines. These additional statutes, regulations, and guidelines may require permits, approvals, consultations with outside agencies, or implementation of mitigation measures. Federal, state, and local statutes and regulations relevant to the Project are identified in Section 3 under each resource or issue area titled Regulatory Setting.

1.7.2 Tiering and Incorporation by Reference

The NEPA implementing regulations encourage both tiering and incorporation by reference. Tiering refers to following up on analysis contained in a broader EIS with an EIS or EA of a narrower scope, incorporating by reference the general discussions and concentrating solely on the issues specific to the narrower scope EIS or EA. An EA tiered to a broad EIS need only analyze the changes to, or details of, the original proposal not previously analyzed to determine if any of the changes or details result in potentially significant impacts (40 Code of Federal Regulations [CFR] 1502.20).

To facilitate focusing on Project-specific issues, this EA/MND:

- is tiered to and incorporates by reference the LCR MSCP FEIS/EIR in order to use the programmatic analysis in the FEIS/EIR;
- summarizes environmental impacts identified in the FEIS/EIR by focusing the analysis in the EA/MND on only those impacts that were not described in the FEIS/EIR to determine if any previously undescribed impacts would be significant; and
- also incorporates information/analysis from the IS Checklist prepared in October 2012 by the County for a new lease of State Lands from the CSLC for portions within the Park to encompass Pirate’s Cove Master Plan and the re-opening of the OHV area and trails (SBC 2012).

1.7.3 State Action

The CSLC is fee owner of 149 acres of land within the Park on the River near Needles, California currently under lease to the County. The California Department of Fish and Wildlife (CDFW or Applicant) proposes to enter into a lease with CSLC to partner with Reclamation for the management and maintenance of 50 acres of open backwater, wetland, and upland habitat to be constructed by Reclamation’s LCR MSCP. The remaining 99 acres would be used as a staging area during construction. The CSLC is the State lead agency for this EA/MND under CEQA.

The CSLC’s authority is set forth in Division 6 of the California Public Resources Code and it is regulated by the California Code of Regulations, Title 2, sections 1900–2970. The CSLC has authority to issue leases or permits for the use of sovereign lands held in the public trust, including all ungranted tidelands, submerged lands, and the beds of

Mohave Valley Conservation Area Backwater Project EA/MND LC-15-07 October 2015
navigable lakes and waterways, as well as certain residual and review authority for
tidelands and submerged lands legislatively granted in trust to local jurisdictions (Pub.
Resources Code, §§ 6301, 6306). All tidelands and submerged lands, granted or
ungranted, as well as navigable lakes and waterways, are subject to the protections of
the Common Law Public Trust. As general background, the State of California acquired
sovereign ownership of all tidelands and submerged lands and beds of navigable lakes
and waterways upon its admission to the U.S. in 1850. The State holds these lands for
the benefit of all people of the State for statewide Public Trust purposes, which include
but are not limited to waterborne commerce, navigation, fisheries, water-related
recreation, habitat preservation and open space. On tidal waterways, the State's
sovereign fee ownership extends landward to the mean high tide line, except for areas
of fill or artificial accretion. For the proposed Project, the CSLC has received an
application for backwater habitat.

The CSLC must comply with CEQA when it undertakes an activity defined by CEQA as
a "project" that must receive some discretionary approval (i.e., the CSLC has the
authority to deny the requested lease, permit, or other approval) which may cause either
a direct physical change in the environment or a reasonably foreseeable indirect change
in the environment. CEQA requires the CSLC to identify the significant environmental
impacts of its actions and to avoid or mitigate those impacts, if feasible.

1.7.4 Federal Action

Reclamation is the implementing agency for the LCR MSCP, in partnership with the
LCR MSCP Steering Committee. In its capacity as the LCR MSCP Federal
implementing agency, Reclamation proposes to enter into an agreement with CDFW to
design, create, operate, and maintain a backwater habitat on 50 acres within a 149-acre
parcel owned in fee by the CSLC that is currently part of the Park on the River near
Needles, California. The proposed design would include the development of 50 acres
into backwater habitat while using the remaining 99 acres as a staging area during
construction. Reclamation is the lead Federal agency for this EA/MND under NEPA.

1.7.5 Other Agencies with Review/Approval over Project Activities

Other agencies that may review and/or take action on elements of the Project are listed
below.

- U.S. Army Corps of Engineers: A Section 404 Clean Water Act (CWA) permit
  and Section 10 Rivers and Harbors permit would be required for the placement of
  fill and dredge materials directly adjacent to navigable waters.

- U.S. Fish and Wildlife Service: Formal Consultation Concurrence under the LCR
  MSCP Biological Opinion is required for working within potential habitat for LCR
  MSCP listed species.

- California Regional Water Quality Control Board, Colorado River Basin Region: A
  Water Quality Certification is required in accordance with Section 401 of the
  CWA.
- California State Historic Preservation Officer: A Section 106 consultation is required to determine impacts to cultural resources.
- CDFW: The CDFW, in addition to being the proposed Lessee for the Project, has jurisdiction for issuance of Lake and Streambed Alteration Agreements in accordance with Fish and Game Code section 1602. However, a Lake and Streambed Alteration Agreement would not be required for this Project as noted in Appendix Q.
2.0 PROJECT DESCRIPTION

2.1 PURPOSE AND NEED/PROJECT OBJECTIVES

The National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) require the identification of the purpose and need or project objectives, respectively, sought by the Mohave Valley Conservation Area Backwater Project (Project). Under NEPA, the purpose and need is used to establish the basis for the development of the range of reasonable alternatives, if any, to assist with the identification and selection of the preferred alternative. Under CEQA, the Project objective provides an explanation of the underlying fundamental purpose of the Project. In this Environmental Assessment/Mitigated Negative Declaration (EA/MND), the NEPA Purpose and Need and the CEQA Project Objectives are interchangeable (Table 1.3-1).

The purpose and need/objectives of the proposed Project is to create connected backwater habitat in Reach 3 on the Lower Colorado River (River) to enhance the conservation of native fishes through implementation of the Lower Colorado River Multi-Species Conservation Program (LCR MSCP) Habitat Conservation Plan (HCP) (LCR MSCP 2004a). In the HCP, Conservation Measure FLSU1 requires the LCR MSCP to “Create 85 acres of flannelmouth sucker habitat. Of the 360 acres of LCR MSCP-created backwaters, at least 85 acres will be created in Reach 3 with water depth, vegetation, and substrate characteristics that provide the elements of flannelmouth sucker habitat.” The Project location is within the historic floodplain of the River and provides suitable site characteristics that would allow for creation of the backwater habitat. The Project is needed to ensure Federal and California Endangered Species Acts (ESA and CESA, respectively) compliance for Federal and non-Federal entities operating on the River and implementing the LCR MSCP.

2.2 PROJECT LOCATION

The proposed Project is located directly adjacent to the Colorado River between River Miles 236 and 237 as seen in Figure 2.2-1 below. It is about 13 miles from Needles, California. To the south of the Project site are Interstate 40 (I-40) and Pirate’s Cove Restaurant & Bar.

2.3 CURRENT CONDITIONS

The Park in total is nearly 1,400 acres and has two land owners: the California State Lands Commission (CSLC) and Reclamation. The parcel of interest, while no longer submerged, resides within the historic River channel and is owned by the CSLC. The Park Moabi Channel was dredged in 1961 to create a deep water area to improve boat launching and the sport fishery. Today, the LCR MSCP stocks and monitors native razorback suckers within the Park Moabi Channel.

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3 State CEQA Guidelines section 15124, subdivision (b).
Figure 2.2-1. Project Site Map
The proposed Project site is currently being used as an Off-Highway Vehicle (OHV) recreational area. The proposed Project site consists of dredged spoils placed there by the Reclamation from dredging and bankline/levee maintenance conducted by the Reclamation itself. There are also invasive species like saltcedar, mesquite series, arrowweed series, creosote bush series, sand dunes, and desert wash/riparian. There are no structures on the proposed Project site.

In recent years the concessionaire under contract with San Bernardino County (County) has significantly developed the services available within the Park. Currently, the Park provides a 7-lane launch ramp, a marina, Recreational Vehicle (RV) and tent camping, waterfront cabins, a convenience store, and the Pirate’s Cove Restaurant & Bar. In 2012, the County proposed plans to make the 149-acre parcel into an OHV recreational area. The OHV use area consists of land within a dredge spoil area located within the County lease area and provides open riding and designated, signed trails for OHV use. The OHV area re-established inner-park limited speed OHV access trails adjacent to existing internal roadways, designated roadway crossings, and OHV temporary parking sites and staging areas.

In late 2012, the LCR MSCP approached the CSLC and the County with the Project. At that time, the County was willing to accommodate both projects. The Project area is the entire parcel including the inlet and outlet water channels used to connect the main stem of the River to the backwater and the Park Moabi Channel. The California Department of Fish and Wildlife (CDFW or Applicant) proposes to enter into a lease with CSLC to partner with Reclamation for the management and maintenance of the 50 acres of restored open backwater, wetland, and upland habitat to be constructed. The remaining 99 acres currently leased to the County would be used as a staging area during construction. After Construction, the County would resume and continue to operate the remaining 99 acres as a designated OHV area.

2.4 DESCRIPTION OF THE PROPOSED PROJECT/PROPOSED ACTION

In April 1997, the U.S. Fish and Wildlife Service (USFWS) issued a Biological and Conference Opinion (BO) to Reclamation covering routine operations and maintenance activities along the River. As part of this BO, the USFWS called for stakeholders along the lower River to develop and implement the LCR MSCP. This effort was completed in 2005 after approval of a Programmatic Environmental Impact Statement/Environmental Impact Report (EIS/EIR) which evaluated the environmental effects associated with implementation of the HCP for the LCR MSCP that was developed to balance the use of the River water resources with the conservation of native species and their habitats. The incidental take permits for the LCR MSCP issued under Section 10 of the ESA and Section 2081 of the CESA require the Permittees to implement the HCP.

Under the guidance of the LCR MSCP’s HCP the program is tasked with creating 85 acres of connected backwater habitat between Davis and Parker Dams. HCP Conservation Measure FLSU1 states, “Create 85 acres of flannelmouth sucker habitat. Of the 360 acres of LCR MSCP-created backwaters, at least 85 acres will be created in Reach 3 with water depth, vegetation, and substrate characteristics that provide the elements of flannelmouth sucker habitat” (see Figure 1.4-1).
The Big Bend Conservation Area south of Laughlin, Nevada, currently accounts for 151 acres, leaving 70 acres to be created. Much of the bank line within Reach 3 is developed or runs through Topock Gorge, which is composed of steep, rocky terrain that is unsuitable for backwater development. However, within the Park south of Needles, California, a 149-acre parcel of land residing within the historic floodplain of the lower River remains undeveloped and possesses the potential to be developed into connected backwater habitat.

The Park in total is nearly 1,400 acres and has two land owners: the CSLC and Reclamation. The parcel of interest resides within the abandoned River channel and is owned by the CSLC. The LCR MSCP is partnering with the CSLC, County, and CDFW, the proposed lessee, on developing a backwater through the 149-acre parcel just north of the existing Park Moabi Channel. Following the guidelines of the HCP, the backwater must be connected to the River so that is it accessible to native fish from the main stem. The development of the backwater would connect to and induce additional flow through the existing Park Moabi Channel. Other listed species already in the River and Channel, like the razorback sucker, may also benefit from the backwater creation.

For this Project, Reclamation proposes to design, create, operate, and maintain approximately 50 acres of backwater habitat within a 149-acre parcel owned in fee by the CSLC that is currently part of the Park and would maintain the 50 acres leased by CDFW on behalf of the LCR MSCP. The remaining 99 acres leased by the County would be used as a staging area during construction. Upon Project completion, the remaining 99 acres would continue to be operated and maintained as a designated OHV area by the County.

Under this alternative, Reclamation would enter into a land use agreement with the County and CDFW to restore and create, operate, maintain, and monitor backwater and marsh habitat within the Project area through the creation of natural channels and aquatic habitat, and re-vegetation of native plants such as cottonwood/willow and mesquite. The Project would be constructed incorporating the general design and target criteria identified in the LCR MSCP FEIS/EIR and the HCP discussed in Section 1.5.

The Project would satisfy the needs/objectives by including the following design elements:

- Connected backwater channel from the River to the Park Moabi channel for native fish;
- Water control structures to control flows, provide for water elevation stabilization, and exchange water from the River;
- Roadway/bridge crossings for vehicle access;
- Primitive boat ramps intended for Project management (i.e., not public recreation) purposes; and
- Landscape re-contouring and habitat restoration to create marsh, riparian, and upland habitat for use by other wildlife species.
The Project would be implemented in four phases. Phases 1 through 3 would span two to three years. The first three phases would incorporate vegetation clearing, excavation, construction, and re-vegetation. Following these phases, Phase 4 would include habitat management, operation, and maintenance for the life of the LCR MSCP.

**Phase 1 – Vegetation Clearing.** During Phase 1, vegetation (primarily non-native) such as saltcedar (Tamarix spp.), within the 149-acre parcel would be removed. This would be accomplished by a combination of manual and mechanical clearing (i.e., land-based mechanical and hydraulic equipment). Manual clearing would be conducted with hand tools such as shovels, clippers, and grubbers. Mechanical clearing would be conducted with equipment including, but not limited to, scraper tractor, track hoes, front loaders, and skid steers. The equipment would be used to remove and break down vegetation debris into manageable pieces to be buried on-site. A bulldozer or similar equipment may be used to pile and stage the vegetation debris within the Project site until it is collected and buried under fill material at the on-site disposal area (Figure 2.4-1). Land-based mechanical and hydraulic equipment being used for the Project would be obtained from the local area and transported to the Project area. Equipment would be staged within the Project area. Herbicide use and mechanical treatment may be necessary during Phase 1 and all subsequent Project phases to eliminate and prevent undesired growth/regrowth of invasive vegetation.

Vegetation clearing would prepare the Project area for Phase 2 – Excavation, Dredging, and Construction, and Phase 3 – Establishment and Re-Vegetation. To avoid impacts to potentially nesting migratory birds or other special-status species that may inhabit the area, vegetation clearing for Phase 1 would commence at the beginning of March (prior to the nesting season) before the vegetation is occupied by breeding/nesting birds. If Phase 1 vegetation clearing does not start prior to the vegetation being used by breeding/nesting birds, then Phase 1 would be conducted during September through February to avoid nesting season. Work hours would be in accordance with the San Bernardino County Development Code, Monday through Friday from 7:00 a.m. to 7:00 p.m. (SBC 2007).

**Phase 2 – Excavation and Construction.** Upon the completion of sufficient vegetation clearing described in Phase 1, a managed backwater habitat channel system between the River and the Park Moabi channel would be constructed. All clearing and construction activities would occur within the 149 acres, and no open water construction is anticipated. The backwater channel system would incorporate inlet and outlet water control structures and roadway crossings over the excavated backwater channel at the upstream and downstream ends as shown in the Draft Design Report (Appendix A).

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4 A draft design report, Lower Colorado River Park Moabi Backwater Channel Restoration Design Report 60% Draft for the Mohave Valley Conservation Area Ecological Restoration Project, Park Moabi San Bernardino County, California (Draft Design Report) (Otis Bay Inc. and Tetra Tech Inc. 2015), was prepared in April 2015 at 60% completion (Appendix A). The design, specifications, and construction activities incorporated in this EA/MND are taken from the Draft Design Report. Although the Draft Design Report is currently in draft at 60% completion at the preparation of this EA/MND, the overall conceptual design to include the system infrastructure (i.e., backwater channel, water control structures, roadway and boat access) has fulfilled the LCR MSCP HCP guidelines referenced in Section 1.5 of this EA/MND.
Backwater Channel Excavation

The backwater channel system would be designed to provide water inflow and outflow flexibility for adaptive management. The backwater habitat would be created through dry-cutting (dry land excavation) to establish a new channel within the Project area (Figure 2.4-1).

Dry-cutting would involve earthwork consisting of excavation, grading, and contouring of the perimeter of the backwater channel that would extend from the River to the existing Park Moabi Channel. Excavated material would consist of dry fill gathered above the groundwater elevation. Areas within the footprint of the backwater channel may be excavated until the groundwater elevations are reached and further if necessary and feasible.

Groundwater elevations within the Project area fluctuate between a depth of 3.5 and 13 feet with the rise and fall of the River. Excavation would be accomplished through the use of mechanical and hydraulic equipment such as excavators, back hoes, skid steers, and front loaders.

As indicated by the Draft Design Report (Appendix A), during the earthwork and excavation, approximately 1.2 million cubic yards of compacted fill would be excavated. Dry fill materials would be placed directly adjacent to the newly excavated channel to bury the vegetation debris collected during Phase 1 (Figure 2.4-1).
Backwater Channel Design

The backwater channel design would incorporate the construction of two new water control structures which would be concrete arch culverts to allow water to flow through the inlet (Northern Structure) and outlet (Southern Structure) (Figure 2.4-1). The design would provide spatially variable topography with an appropriate distribution of depths (between 0 to -15 feet) and velocities for a variety of aquatic habitats. In addition, the design would accommodate seasonal flows and fluctuations of the River.

An engineered fill mat would be laid within the area below the new culvert and any appurtenant wing wall footing to stabilize the subsurface soil conditions within the channel. The new backwater channel would be constructed with riprap bank protection to prevent scour at the downstream end of the culverts. The riprap material would be similar material currently used within the River and Park Moabi channel that would be obtained from an existing Reclamation stockpile along the River (Figure 2.4-2).

Figure 2.4-2. Example Riprap Material

Water Control Structure Construction

To control water flows at the inlet and outlet of the backwater channel, water control structures would be constructed at the concrete arch culverts. The water control structures would provide hydraulic control for flows in and out of the backwater channel during moderate to high flows in the River. Water control structures would also limit the amount of River bed sediment entering the backwater channel. The water control structures would be designed to include:

- A stop-log system to provide an adjustable crest elevation to regulate the water surface in the channel; and
A sill elevation for water inflow and outflow flexibility to enable adjustment for adaptive management

The final design and specification of the water control structures would incorporate the design criteria that would accommodate the mean velocity of water flow through the backwater channel to remain below 0.5 feet/second during channel depth of 0-15 feet and would also accommodate daily and seasonal water level fluctuations of the River and the regular exchange of water between the River and the Park Moabi channel. The concrete arch culverts would be constructed after excavation and prior to the start of dredging operations to allow a steady flow of water required for the operation and prior to connecting the backwater channel to the River.

Roadway/Bridge Crossing Construction

To provide access at the intersections of existing roadways where the backwater channel would be excavated at the inflow and outflow, structural roadway/bridge crossings would be constructed atop the upstream and downstream concrete arch culverts that would span the length and width of the inlet and outlet structures. Temporary closure of the existing roadway atop the water control structures may be needed during its construction. Once the water control structures are in place, the roadway/bridge crossings would be constructed to reconnect the existing roadway. The unpaved roadways within the Project area would be constructed of untreated road base and aggregate that would be compacted to the maximum dry density.

Backwater Access Points

The Project design of the backwater channel would include a primitive boat ramp to provide an access point for use by the LCR MSCP staff to maintain and operate the backwater and its structures upon completion of all of the phases of the Project. The boat ramp would be accessed by an existing road and would be constructed for official Project use limiting access to lightweight and non-motorized boat launching. The low impact design of the backwater access point is intended to blend with the surrounding features of the backwater channel.

Phase 3 – Establishment/Re-Vegetation. Upon the implementation of Phase 1 and 2, landscape restoration would be conducted through the tilling along the contours of the backwater channel and planting of four land cover types (Figure 2.4-3). The distribution and design for re-vegetation follows the recommendations outlined in the HCP and incorporates plant types that already occur in the Park area. The four land cover types that would be created within the 149 acres would include approximately (Figure 2.4-3):

- 26 acres of open deep backwater areas;
- 24 acres of shallow marsh areas (e.g., bulrush, cattail [Typha spp.], and other native reed species);
- 15 acres of cottonwood/willow areas (e.g., Goodding’s willow [Salix gooddingii], coyote willow [Salix exigua], and Fremont cottonwood [Populus fremontii]); and
- 37 acres of upland areas (e.g., honey mesquite and arrowweed [Pluchea sericea]).
The combined total area for the backwater and marsh land cover habitats would be approximately 50 acres, which would be submerged underwater. The 52 (15+37) acres of riparian and upland vegetation of cottonwood/willow, honey mesquite and arrowweed would be planted to stabilize and re-vegetate the perimeter of the fill area. For MSCP habitat credit purposes, only approximately 50 acres of backwater created land cover habitat would be used towards the goal of 85 acres in Reach 3 for flannelmouth sucker.

**Phase 4 – Habitat Management, Operations, and Maintenance.** Phases 1 through 3 would be designed to limit the long-term maintenance requirements of the backwater habitat. A Draft Mohave Valley Backwater Restoration Development and Monitoring Plan (Development and Monitoring Plan) (Appendix B) has been prepared and would be implemented by LCR MSCP to address habitat/vegetation management, as well as operation and maintenance of the constructed facilities (e.g., water control structures), roadway access, and backwater access. The Development and Monitoring Plan follows the guidelines of the HCP and identifies the development of the Project and the applications used to manage and maintain the Project area. In addition, the Development and Monitoring Plan includes fish and wildlife monitoring and reporting methods, and success criteria (Appendix B).

In Phase 4, dredging operations are anticipated to occur as needed to manage sediment accumulation and to maintain the backwater channel depth of at least 10 feet. The dredge material would be placed at a previously designated and approved disposal site by moving material with a deep sunken pipe attachment to place the sediment along the River on the Arizona River bank (Figure 2.4-5). The pipe used to move the dredge material across the River would be submerged at a depth to ensure no obstruction to navigable waters. The pipe would be removed at the completion of work.
Figure 2.4-4. Land Cover Types for Vegetation Restoration at 60% Design
2.4.1 Timing Considerations and Estimated Schedule

The Project schedule for the proposed four phases is provided in Table 2.4-1.

Table 2.4-1. Anticipated Project Schedule

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<tr>
<th>Phase</th>
<th>Activity</th>
<th>Time Period</th>
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</thead>
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<tr>
<td>1: Vegetation Clearing</td>
<td>Spring 2016 earth work begins</td>
<td>March 2016 - November 2016</td>
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<tr>
<td>2: Excavation and Construction</td>
<td>Summer 2016 construction begins</td>
<td>August 2016 - May 2017</td>
</tr>
<tr>
<td>3: Establishment/ Re-Vegetation</td>
<td>Spring 2017 planting begins</td>
<td>April 2017 - June 2017</td>
</tr>
<tr>
<td>4: Habitat Management, Operations,</td>
<td>Spring 2017 monitoring and site maintenance begins</td>
<td>April 2017 - remaining life of program</td>
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<tr>
<td>and Maintenance</td>
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<td></td>
</tr>
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</table>

The Topock Setting Basin is covered under the LCR MSCP for sediment disposal.
2.4.2 Proposed Construction Area, Equipment, and Personnel

The Project area includes the 149 acre State-owned parcel, which includes the main parcel bound by gravel roads as well as lands used to connect the backwater to the main stem of the River and the Park Moabi Channel. Table 2.4-2 lists the equipment and personnel that are anticipated to implement the Project during each phase.

### Table 2.4-2. Anticipated Project Equipment and Personnel

<table>
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<th>Phase</th>
<th>Type/Activity</th>
<th>Quantity</th>
<th>Personnel</th>
</tr>
</thead>
<tbody>
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<td>2 operators</td>
</tr>
<tr>
<td></td>
<td>John Deere Tractor Scrapers</td>
<td>3</td>
<td>3 operators</td>
</tr>
<tr>
<td></td>
<td>Excavator</td>
<td>1</td>
<td>1 operator</td>
</tr>
<tr>
<td></td>
<td>4000 Gallon Water Truck</td>
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<td>1 operator</td>
</tr>
<tr>
<td>2: Excavation and Construction</td>
<td>140M Motor Grader</td>
<td>1</td>
<td>1 operator</td>
</tr>
<tr>
<td></td>
<td>D6R Dozers</td>
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<td>John Deere Tractor Scrapers</td>
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</tr>
<tr>
<td></td>
<td>4000 Gallon Water Truck</td>
<td>1</td>
<td>1 operator</td>
</tr>
<tr>
<td></td>
<td>Crane</td>
<td>1</td>
<td>1 operator</td>
</tr>
<tr>
<td>3: Establishment/Re-Vegetation</td>
<td>Planting</td>
<td></td>
<td>8 Planting Crew Members</td>
</tr>
<tr>
<td></td>
<td>140M Motor Grader</td>
<td>1</td>
<td>1 operator</td>
</tr>
<tr>
<td></td>
<td>4000 Gallon Water Truck</td>
<td>1</td>
<td>1 operator</td>
</tr>
<tr>
<td>4: Habitat Management, Operations, and Maintenance</td>
<td>Fisheries Monitoring</td>
<td></td>
<td>2 Biologists 3 Biological Technicians</td>
</tr>
<tr>
<td></td>
<td>4000 Gallon Water Truck</td>
<td>1</td>
<td>1 operator</td>
</tr>
<tr>
<td></td>
<td>Dredge (for possible future backwater maintenance)</td>
<td>1</td>
<td>1 operator</td>
</tr>
</tbody>
</table>

2.4.3 Other Project Design Features and Considerations

Mitigation Measures Incorporated into the Project

Mitigation measures have been incorporated into the Project by Reclamation to ensure impacts are avoided or lessened, such that they remain less than significant. These measures would be implemented for the following resources:

- Biological Resources
- Cultural and Paleontological Resources/Traditional Cultural Properties/Sacred Sites
- Hazards/Hazardous Materials/Human Health and Safety
- Hydrology and Water Quality
- Transportation/Traffic
The full explanation of each mitigation measure for each identified potentially significant impact is provided in Section 3 of this EA/MND. In addition, a Mitigation Monitoring Program is provided in Section 5.

2.4.4 Alternatives

A discussion of alternatives to the proposed Action is included below to meet the requirements of NEPA.

**No Project Alternative (No Action Alternative).** Under this alternative, the CSLC would not issue a lease to CDFW within the Park and the agreement between Reclamation, the County, and CDFW would not be implemented. Reclamation would not enter into the land use agreement; consequently the backwater habitat would not be created to meet the goals of the LCR MSCP. The 149 acres of land within the Park would remain under the management of the County and designated for OHV use.

**Alternatives Considered but Not Evaluated in Detail.** Reclamation considered the following additional alternatives that featured LCR MSCP general design criteria and targets outlined in Section 1.5. The following alternatives have been eliminated from further evaluation for the reasons described below.

**Dredging Alternative**

This alternative identifies excavation of dry material and dredging of wet material to create the proposed 50 acres of backwater habitat. The excavation work would continue until the groundwater elevation is reached. Dredging operations were included in this alternative to access and remove wet material below the groundwater elevation. Phase 1 construction of water control features and the implementation of the subsequent phases (2-4) of the Project would remain the same within this alternative.

Although this alternative would allow for a wide range of activity options to create the backwater channel in the event deeper depth are required for the final specifications to control water flows in and out of the channel, this alternative is not incorporated into the Project as part of the construction of the backwater discussed in Section 2.4 because dredging equipment would not be available at the time of the scheduled implementation of Phase 1 and 2. The Project described in this EA/MND provides an option to achieve the backwater channel specifications and infrastructure and to ensure environmental and human health and safety.

**Other Feasible Location Alternative**

Backwater construction in other locations within Reach 3 were not considered at this time because feasibility studies have not yet been conducted or completed for other locations. The Project is the first backwater habitat restoration project being proposed for the flannelmouth sucker because a feasibility study has already been conducted. LCR MSCP continues to conduct feasibility studies to evaluate additional locations for the restoration of backwater habitats to achieve the goal of 85 acres.
2.4.5 Past, Present, and Reasonably Foreseeable Future Projects

Both NEPA and CEQA require lead agencies to examine impacts that, even if they are not individually significant, may be cumulatively considerable. Cumulative impacts are defined as impacts to the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes the action. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time (40 Code of Federal Regulations [CFR] 1508.7).

The discussion below addresses the cumulative impacts of the Project in combination with other projects or management activities. The list below identifies activities (past, present, and reasonably foreseeable) that are either located in the vicinity of the proposed Project area or have been identified as having the potential for cumulative impacts when considered in addition to the impacts of the Project. These actions will be addressed as appropriate in Section 3.

Other past, present, and reasonably foreseeable future actions by Federal, State, and local agencies within the Project area that would be considered in the cumulative impacts section of each resource area are identified in Table 2.4-3.

Table 2.4-3. Past, Present, and Reasonably Foreseeable Future Actions

<table>
<thead>
<tr>
<th>Project</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Past Projects</strong></td>
<td></td>
</tr>
</tbody>
</table>
| Moabi Regional Park | • OHV use and operations  
• RV and tent camping areas  
• 7 lane boat launch area  
• Marina  
• Waterfront cabins and convenience store |
| Pirate’s Cove Restaurant & Bar | • Café and Bar  
• Zip Lining |
| Dredging Operations | • Sediment control operations  
• Stockpile management of dredge spoil material  
• Operations conducted by Reclamation’s Yuma Area Office |
| PG&E Topock Compressor Station CERCLA Remediation Project | • Groundwater and soil investigation and remediation |
| **Present and Reasonably Foreseeable Future Projects** | |
| Dredging Operations | • Sediment control operations  
• Stockpile management of dredge spoil material  
• Operations conducted by Reclamation’s Yuma Area Office |
| PG&E Topock Compressor Station CERCLA Remediation Project | • Groundwater and soil investigation and remediation |

Notes: CERCLA = Comprehensive Environmental Response and Compensation Liability Act
This section combines the discussion of the environmental consequences in accordance with the requirements of National Environmental Policy Act (NEPA) and the analysis of the Project’s potential impacts on the environment in accordance with the requirements of California Environmental Quality Act (CEQA), and is presented using the CEQA Initial Study (IS) format. The IS identifies site-specific conditions and impacts, evaluates their potential significance, and discusses ways to avoid or lessen impacts that are potentially significant. The IS was completed for the Bureau of Reclamation (Reclamation), as the Lead Federal agency for creating, monitoring, and maintaining the proposed Mohave Valley Conservation Area Backwater Project (Project), and the California State Lands Commission (CSLC), as the landowner and lessor to the California Department of Fish and Wildlife (CDFW or Applicant or Lessee).

A prior IS, prepared by the San Bernardino County (County) in 2012 for developing the overall Moabi Regional Park (Park) (the proposed Project is within the Park), was also used for some of the still relevant environmental resources assessments in this Environmental Assessment/Mitigated Negative Declaration (EA/MND). The 2012 IS is referred to as “2012 IS Checklist” or cited as “SBC 2012.” This Section identifies site-specific conditions and impacts, evaluates their potential significance, and discusses ways to avoid or lessen impacts that were identified as potentially significant absent Project revisions or implementation of mitigation measures.

The information, analysis and conclusions included in the IS provide the basis for determining the appropriate document needed to comply with NEPA and CEQA. For the Project, based on the analysis and information contained herein, CSLC staff has found that the IS shows that there is substantial evidence that the Project may have a significant effect on the environment but revisions to the Project would avoid the effects or mitigate the effects to a point where clearly no significant effect on the environment would occur. As explained below, the determination of significance under NEPA occurs at the time of approval, via a Finding of No Significant Impact (FONSI), if appropriate. As a result, Reclamation and CSLC have concluded that an EA/MND is the appropriate NEPA and CEQA document for the Project.

**NEPA’s Environmental Consequences (Also Part of CEQA Impact Analysis)**

The “Environmental Consequences” section presents an analysis of the potential environmental impacts of the “No Action” alternative and “Proposed Action” (Project) alternative in accordance with NEPA. The analysis area for all impacts is the access road, Project area, and the immediate vicinity.

The analysis of the Project includes direct, indirect, and cumulative effects. The Council on Environmental Quality (CEQ) Regulations define direct effects as those which are caused by the action and occur at the same time and place and indirect effects as those which are caused by the action and occur later in time or further removed in distance. In accordance with NEPA, determination of significance is reserved for the FONSI prepared (if appropriate) for the Project.
CEQA’s Checklist and Impact Analysis

The evaluation of environmental impacts provided in this IS is based in part on the impact questions contained in Appendix G of the State CEQA Guidelines; these questions, which are included in an impact assessment matrix for each environmental category (Aesthetics/Visual Resources, Agriculture and Forest Resources, Air Quality, Biological Resources, etc.), are “intended to encourage thoughtful assessment of impacts.” Where there is a possibility for the action to affect a specific resource, there is a discussion of the direction and magnitude of the impact. Each question is followed by a check-marked box with column headings that are defined below.

- **Potentially Significant Impact.** This column is checked if there is substantial evidence that a Project-related environmental effect may be significant. If there are one or more “Potentially Significant Impacts,” a Project Environmental Impact Report (EIR) would be prepared.

- **Less than Significant with Mitigation.** This column is checked when the Project may result in a significant environmental impact, but the incorporation of identified Project revisions or mitigation measures would reduce the identified effect(s) to a less than significant level.

- **Less than Significant Impact.** This column is checked when the Project would not result in any significant effects. The Project’s impact is less than significant even without the incorporation of Project-specific mitigation measures.

- **No Impact.** This column is checked when the Project would not result in any impact in the category or the category does not apply. When the determination in the checklist is "No Impact," and there is no possibility for the Project to have an effect on the resource, there is no explanation of the answer. Where this project could be presumed to have an effect on the resource in question, there is an explanation provided for any “No Impact” determinations. All other determinations are accompanied by an explanation.

Potentially Affected Environmental Factors

The environmental factors checked below would be potentially affected by this Project; a checked box indicates that at least one impact would be a “Potentially Significant Impact” except that the Applicant has agreed to Project revisions, including the implementation of mitigation measures, that reduce the impact to “Less than Significant with Mitigation.”
Environmental Consequences and Analysis

<table>
<thead>
<tr>
<th>□ Aesthetics/Visual Resources</th>
<th>□ Agriculture and Forestry Resources</th>
<th>□ Air Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Biological Resources</td>
<td>□ Cultural and Paleontological</td>
<td>□ Geology and Soils</td>
</tr>
<tr>
<td></td>
<td>Resources/Traditional Cultural</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Properties/Sacred Sites</td>
<td></td>
</tr>
<tr>
<td>□ Greenhouse Gas Emissions</td>
<td>□ Hazards/Hazardous Materials</td>
<td>□ Hydrology and Water Quality</td>
</tr>
<tr>
<td>and Climate Change</td>
<td>Human Health and Safety</td>
<td></td>
</tr>
<tr>
<td>□ Land Use and Planning</td>
<td>□ Mineral Resources</td>
<td>□ Noise</td>
</tr>
<tr>
<td>□ Population and Housing</td>
<td>□ Public Services</td>
<td>□ Recreation</td>
</tr>
<tr>
<td>□ Transportation/Traffic</td>
<td>□ Utilities and Service Systems</td>
<td></td>
</tr>
<tr>
<td>□ Other Major Areas of Concern: Environmental Justice and Indian Trust Assets or Tribal Lands</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 Detailed descriptions and analyses of impacts from Project activities and the basis for their significance determinations are provided for each environmental factor on the following pages, beginning with Section 3.1, Aesthetics/Visual Resources. Relevant laws, regulations, and policies potentially applicable to the Project are listed in the Regulatory Setting for each environmental factor analyzed in this IS.

6 AGENCY DETERMINATION

7 Based on the environmental impact analysis provided by this Initial Study:

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

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

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

Signature: ___________________________ Date: 10/27/2015

Afifa Awan
Division of Environmental Planning and Management
California State Lands Commission

October 2015
3.1 AESTHETICS/VISUAL RESOURCES

<table>
<thead>
<tr>
<th>AESTHETICS/VISUAL RESOURCES – Would the Project:</th>
<th>Potentially Significant Impact</th>
<th>Less Than Significant with Mitigation</th>
<th>Less Than Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Have a substantial adverse effect on a scenic vista?</td>
<td>☐ ☐ ☒ ☐</td>
<td>☐ ☐ ☒ ☐</td>
<td>☐ ☐ ☒ ☐</td>
<td>☐ ☐ ☒ ☐</td>
</tr>
<tr>
<td>b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?</td>
<td>☐ ☐ ☐ ☒</td>
<td>☐ ☐ ☐ ☒</td>
<td>☐ ☐ ☐ ☒</td>
<td>☐ ☐ ☐ ☒</td>
</tr>
<tr>
<td>c) Substantially degrade the existing visual character or quality of the site and its surroundings?</td>
<td>☐ ☐ ☐ ☒</td>
<td>☐ ☐ ☐ ☒</td>
<td>☐ ☐ ☐ ☒</td>
<td>☐ ☐ ☐ ☒</td>
</tr>
<tr>
<td>d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?</td>
<td>☐ ☐ ☐ ☒</td>
<td>☐ ☐ ☐ ☒</td>
<td>☐ ☐ ☐ ☒</td>
<td>☐ ☐ ☐ ☒</td>
</tr>
</tbody>
</table>

3.1.1 Environmental Setting

The Project site is located directly adjacent to the Colorado River (River) about 13 miles south of Needles, California. The site is already disturbed, consisting of sediment spoils from dredging and bankline/levee maintenance conducted by Reclamation. There are sand dunes and dense invasive species vegetation such as saltcedar. Currently, it is being used for Off-Highway Vehicles (OHV) recreation. The Project site can be seen from levee roads, riverfront campsites, River from the east, Interstate 40 (I-40), Burlington Northern and Santa Fe (BNSF) Railway from the west, and County recreational developments (Pirate’s Cove Restaurant & Bar, 7-lane launch ramp, marina, RV and tent camping, waterfront cabins, and convenient store) from the south.

3.1.2 Regulatory Setting

The following Federal and State laws and regulations pertaining to this issue area and relevant to the Project are identified in Table 3.1-1.

| CA | California Scenic Highway Program | The California Scenic Highway Program, managed by the California Department of Transportation, was created to preserve and protect scenic highway corridors from change that would diminish the aesthetic value of lands adjacent to highways. State highways identified as scenic, or eligible for designation, are listed in California Streets and Highways Code section 260 et seq.

The following local goals and policies related to aesthetics are from the San Bernardino County 2007 General Plan (SBC 2007):

- Chapter VI. Open Space Element – Section B.
  - **Goal OS 5.** To maintain and enhance the visual character of scenic routes in the County by enhancing habitat for native fish and wildlife.
The Project area is not officially designated as a scenic vista under the San Bernardino County General Plan Policy OS 5.1 according to the following criteria (SBC 2012):

- A roadway, vista point, or area that provides a vista of undisturbed natural areas;
- Includes a unique or unusual feature that compromises an important or dominant portion of the viewshed (the area within the field of view of the observer); and
- Offers a distant vista that provides relief from less attractive views of nearby features (such as views of mountain backdrops from urban areas).

The I-40 to the west of the Project area is not designated as a State Scenic Highway. The Historic Route 66 (National Trails Highway or Main Street) to the south of the Pirate’s Cove Restaurant & Bar is also not designated as a scenic highway in the vicinity of the Project area (Ref. Page VI-15 Open Space Element).

3.1.3 Impact Analysis (CEQA)

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

Less than Significant Impact. As described in the Regulatory Setting discussion above, there are no officially designated scenic vistas within or adjacent to the Project site. During Project activities, there would be short-term, temporary impacts to views of the Project site from the levee roads, riverfront campsites, the River from the east, I-40 and BNSF Railway from the west, and the County recreational development from the south. The proposed Project-related activities would include vegetation clearing, grading, and excavation to construct a new open water channel and new water control structures. After Project completion, views from publicly accessible viewpoints of the Project site would be enhanced by creating an open backwater channel that would be re-vegetated with a variety of native plants.

b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

No Impact. As explained in the Regulatory Setting discussion, above, no officially designated Federal, State, or local scenic highway corridors are located in, or are visible from, the Project site. In addition, no such resources were identified within the Project area based on the Phase I Cultural Resources Investigation (Appendix H) prepared for the Moabi Regional Park OHV area in 2011. Therefore, the Project would have no impact on scenic resources including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway corridor.

c) Substantially degrade the existing visual character or quality of the site and its surroundings?

No Impact. As noted in the responses to items a) and b) above, the Project would not substantially degrade the Project site’s existing visual quality. The
visual character is expected to be improved by creating an open backwater channel that would be re-vegetated with a variety of native plants.

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

No Impact. The Project would not include the construction or installation of any lighting or illuminating sources. The proposed Project activities would take place during daylight hours. Therefore, there would be no new impact resulting from visual glare or light.

3.1.4 Environmental Consequences (NEPA)

No Action Alternative

The No Action Alternative would have no effect to Aesthetics/Visual Resources. The Aesthetics/Visual Resources would not be altered and viewshed would remain in its current condition, dominated by dense vegetation; primarily saltcedar.

Proposed Action (Project)

Short-term impacts would result from the implementation of Phases 1 through Phase 3 described in Section 2.4 such as vegetation removal activities, construction operations, restoration activities, and maintenance activities. These activities would temporarily lessen the visual quality of the area on or near visually sensitive resources because of the use of land based mechanical and hydraulic equipment.

However, re-vegetation would occur around the excavated channel. The new open water channel and new water control structures would be designed to blend into the existing natural landscape and would not impair or obstruct the views from the River or I-40. The re-vegetation and creation of habitat would restore the Project area to a natural appearance that would enhance the visual aesthetics, as well as add value to the area and the viewshed (Appendix B).

Cumulative Impacts

No cumulative impacts are anticipated for Aesthetics/Visual Resources.

3.1.5 Mitigation Summary (CEQA Only)

The Project would not result in significant impacts to Aesthetics/Visual Resources. Therefore, no mitigation is required.
3.2 AGRICULTURE AND FORESTRY RESOURCES

<table>
<thead>
<tr>
<th>AGRICULTURE AND FORESTRY RESOURCES [6] - Would the Project:</th>
<th>Potentially Significant Impact</th>
<th>Less Than Significant with Mitigation</th>
<th>Less Than Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Natural Resources Agency, to non-agricultural use?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Pub. Resources Code, § 12220, subd. (g)), timberland (as defined by Pub. Resources Code, § 4526), or timberland zoned Timberland Production (as defined by Gov. Code, § 51104, subd. (g))?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>d) Result in the loss of forest land or conversion of forest land to non-forest use?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
</tbody>
</table>

3.2.1 Environmental Setting

The Project site consists of dredged materials, and contains sand dunes and invasive species vegetation like saltcedar, mesquite series, arrow weed series, creosote bush series, sand dunes, and desert wash/riparian. It is currently being used as an OHV recreational use. There is no land designated for agricultural use within or around the Project site.

3.2.2 Regulatory Setting

The following Federal and State laws and regulations pertaining to this issue area and relevant to the Project are identified in Table 3.2-1.

---

6 In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the State’s inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment Project; and the forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board.
Table 3.2-1. Laws, Regulations, and Policies (Agriculture and Forestry Resources)

<table>
<thead>
<tr>
<th>CA</th>
<th>Williamson Act (Gov. Code, §§ 51200-51207)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>This Act enables local governments to enter into contracts with private landowners to restrict specific parcels of land to agricultural or related open space use, and provides landowners with lower property tax assessments in return. Local government planning departments are responsible for the enrollment of land into Williamson Act contracts. Generally, any commercial agricultural use would be permitted within any agricultural preserve. In addition, local governments may identify compatible uses permitted with a use permit.</td>
</tr>
</tbody>
</table>

The following local goals and policies related to agriculture and forestry resources are from the San Bernardino County 2007 General Plan include (SBC 2007):

- Chapter V. Conservation Element – Section C. Countywide Goals and Policies of the Conservation Element. 5. Soils/Agriculture Goals:
  - CO 6.1. The protection of prime agricultural lands from the adverse effects of urban encroachment, particularly increased erosion and sedimentation, trespass, and non-agricultural land development.
  - CO 6.3. The preservation of prime and statewide important soil types, as well as exhibiting viable agricultural operations will be considered as an integral portion of the Open Space element when reviewing development proposals.
  - CO 6.4. Provide and maintain a viable and diverse agricultural industry in San Bernardino County.

3.2.3 Impact Analysis (CEQA)

a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?

No Impact. The Project would not impact the County’s goal to: recognize commercial agriculture as a desirable land use type and a major segment of the County's economic base; identify areas where agriculture is the primary land use but where other secondary uses that directly support agricultural uses may be permitted; preserve the agricultural base of the County economy and encourage the open space values of these uses; provide areas for both intensive and extensive agricultural pursuits; and identify areas of commercial (prime and non-prime) agricultural soils and operations.

The California Resources Agency (CRA) defines Prime Farmland, Unique Farmland, or Farmland of Statewide Importance for the County as farmlands which include dryland grains of wheat, barley, oats, and dryland pasture. As described in the County General Land Use Plan, there are no agriculture or forest lands because the Project area does not meet the CRA’s characteristics. Therefore, the Project would not convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance as shown on the maps prepared pursuant to
the Farmland Mapping and Monitoring Program of the California Resources Agency.

b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?

No Impact. The Project site is designated for “Open Space” and is not designated as agricultural land use or under a Williamson Act contract.

c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code, § 12220, subd. (g)), timberland (as defined by Pub. Resources Code, § 4526), or timberland zoned Timberland Production (as defined by Gov. Code, § 51104, subd. (g))?

No Impact. As described above, there is no forest land or timberland in the Project area. Therefore, the Project does not conflict with, nor could it result in the rezoning of forest or timber land.

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

No Impact. As noted in response to item c) above, the Project would not include any forest land. Therefore, the Project would not result in the loss of forest land or convert forest land to a non-forest use.

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

No Impact. As noted in responses to items a) and d) above, the Project would not change the existing environment such that farmland or forest land would be converted to non-agriculture and non-forest land.

3.2.4 Environmental Consequences (NEPA)

No Action Alternative

The No Action Alternative would have no effect to Agriculture and Forestry Resources because the Project area is no located in the vicinity of farmland or forest land. The dense monotypic stand of vegetation communities consisting of saltcedar, mesquite series, arrow weed series, creosote bush series, sand dunes, and desert wash/riparian would remain the primary type of vegetation within the Project area.

Proposed Action (Project)

The Project would have no effect to Agriculture and Forestry Resources because the Project area is not located in the vicinity of farmland or forest land. Overall, since there are no agricultural and forestry resources within the Project area, the Project would not
result in the conversion, rezone, loss of, and/or change prime farmland, unique farmland, farmland, forest land, or timberland.

Cumulative Impacts

No cumulative impacts are anticipated for Agricultural and Forestry Resources as there would be no direct or indirect impact to these resources.

3.2.5 Mitigation Summary (CEQA Only)

The Project would not result in significant impacts to Agriculture and Forestry Resources. Therefore, no mitigation is required.
### 3.3 AIR QUALITY

<table>
<thead>
<tr>
<th>AIR QUALITY – Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the Project:</th>
<th>Potentially Significant Impact</th>
<th>Less Than Significant with Mitigation</th>
<th>Less Than Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Conflict with or obstruct implementation of the applicable air quality plan?</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
</tr>
<tr>
<td>b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
</tr>
<tr>
<td>c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
</tr>
<tr>
<td>d) Expose sensitive receptors to substantial pollutant concentrations?</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
</tr>
<tr>
<td>e) Create objectionable odors affecting a substantial number of people?</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
</tr>
</tbody>
</table>

#### 3.3.1 Environmental Setting

The Mojave Desert Air Quality Management District (MDAQMD) has jurisdiction over air quality issues and regulations within the Mojave Desert Air Basin (MDAB), where the Project is located. The Project area lies within low desert areas located in the Palo Verde Valley portion of the MDAB. The MDAB is an interspersed mountain range with long broad valleys that contain dry lake beds. The lower mountain terrain rises from 1,000 to 4,000 feet above the valley floor, where prevailing winds are out of the west and southwest due to coastal and central regions and the blocking effect of the Sierra Nevada Mountains to the north. In 2009, the MDAQMD estimated the average precipitation in Needles, California over a 48-year period to be 4.55 inches for a duration of 23 precipitation days.

The Project would be located within a designated OHV recreational area. The OHV recreational area includes limited speed OHV access trails established adjacent to the existing internal roadways, OHV temporary parking sites, and staging areas. In addition, RV parking and camping areas are located to the east, between the Project area and the River. Criteria air pollutant emissions within the proposed Project area are generated from the use of OHVs and other motor vehicles including RVs and watercrafts.
Sensitive receptors within and in the vicinity of the Project area include the OHV users, riverfront cabin occupants, patrons of Pirate’s Cove Restaurant & Bar, Park concessions, and River recreationalists.

3.3.2 Regulatory Setting

The following Federal and State laws and regulations pertaining to this issue area and relevant to the Project are identified in Table 3.3-1.

Table 3.3-1. Laws, Regulations, and Policies (Air Quality)

| U.S. | Federal Clean Air Act (FCAA) (42 USC 7401 et seq.) | The FCAA requires the U.S. Environmental Protection Agency (USEPA) to identify National Ambient Air Quality Standards (NAAQS) to protect public health and welfare. National standards are established for ozone (O\textsubscript{3}), carbon monoxide (CO), nitrogen dioxide (NO\textsubscript{2}), sulfur dioxide (SO\textsubscript{2}), particulate matter (PM\textsubscript{10} and PM\textsubscript{2.5}), and lead (Pb). In 2007, the U.S. Supreme Court ruled that carbon dioxide (CO\textsubscript{2}) is an air pollutant as defined under the FCAA, and that the USEPA has authority to regulate GHG emissions. Pursuant to the 1990 FCAA Amendments, USEPA classifies air basins (or portions thereof) as in “attainment” or “nonattainment” for each criteria air pollutant, based on whether or not the NAAQS are achieved. The classification is determined by comparing monitoring data with State and Federal standards.
|   |   | • An area is classified as in “attainment” for a pollutant if the pollutant concentration is lower than the standard.
|   |   | • An area is classified as in “nonattainment” for a pollutant if the pollutant concentration exceeds the standard.
|   |   | • An area is designated “unclassified” for a pollutant if there are not enough data available for comparisons.

| CA | California Clean Air Act of 1988 (CCAA) (Assembly Bill [AB] 2595) | The CCAA requires all air districts in the State to endeavor to achieve and maintain State ambient air quality standards for O\textsubscript{3}, CO, SO\textsubscript{2}, NO\textsubscript{2}, and PM; attainment plans for areas that did not demonstrate attainment of State standards until after 1997 must specify emission reduction strategies and meet milestones to implement emission controls and achieve more healthful air quality. The 1992 CCAA Amendments divide O\textsubscript{3} nonattainment areas into four categories of pollutant levels (moderate, serious, severe, and extreme) to which progressively more stringent requirements apply. State ambient air standards are generally stricter than national standards for the same pollutants; California also has standards for sulfates, hydrogen sulfide (H\textsubscript{2}S), vinyl chloride, and visibility-reducing particles.

| CA | Other | • Under California’s Diesel Fuel Regulations, diesel fuel used in motor vehicles, except harbor craft, has been limited to 500 parts per million (ppm) sulfur since 1993. The sulfur limit was reduced to 15 ppm beginning September 1, 2006, and harbor craft were included starting in 2009.
|   |   | • CARB’s Heavy Duty Diesel Truck Idling Rule (Cal. Code Regs., tit. 13, § 2485) prohibits heavy-duty diesel trucks from idling for longer than 5 minutes at a time (except while queuing, provided the queue is located beyond 100 feet from any homes or schools).
|   |   | • The Statewide Portable Equipment Registration Program (PERP) regulates portable engines/engine-driven equipment units. Once registered in the PERP, engines and equipment units may operate throughout California without the need to obtain individual permits from local air districts.

Local goals, policies and/or regulations applicable to air quality are listed below:

• The Mojave Desert Air Quality Management District California Environmental Quality Act (CEQA) and Federal Conformity Guidelines, August 2011.
Table 3.3-2 below identifies air quality significance thresholds from the MDAQMD CEQA and Federal Conformity Guidelines from August 2011. These were used to determine whether the Project’s emissions could pose a significant threat to air quality.

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Pollutant Abbr.</th>
<th>Daily Thresholds (Lbs./Day)</th>
<th>Annual Threshold (Metric Tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greenhouse Gas (GHG) - Carbon Dioxide</td>
<td>CO₂e</td>
<td>548,000</td>
<td>100,000.00</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>CO</td>
<td>548</td>
<td>100.00</td>
</tr>
<tr>
<td>Oxides of Nitrogen</td>
<td>NOx</td>
<td>137</td>
<td>25.00</td>
</tr>
<tr>
<td>Volatile Organic Compounds</td>
<td>VOC</td>
<td>137</td>
<td>25.00</td>
</tr>
<tr>
<td>Oxides of Sulfur</td>
<td>SOx</td>
<td>137</td>
<td>25.00</td>
</tr>
<tr>
<td>Particulate Matter (Primary)</td>
<td>PM₁₀</td>
<td>82</td>
<td>15.00</td>
</tr>
<tr>
<td>Particulate Matter (Primary)</td>
<td>PM₂,₅</td>
<td>82</td>
<td>15.00</td>
</tr>
</tbody>
</table>

*The MDAQMD emissions thresholds can be found in Table 6 of the MDAQMD CEQA and Federal Conformity Guidelines (August 2011).

The MDAQMD is responsible for updating the Air Quality Management Plan (AQMP) or the Rules and Regulations. The AQMP was developed for the primary purpose of controlling emissions to maintain all federal and state ambient air standards for the MDAQMD. A project is non-conforming if it conflicts with or delays implementation of any applicable attainment or maintenance plan. A project is conforming if it complies with all applicable AQMP rules and regulations, complies with all proposed control measures that are not yet adopted from the applicable plan(s), and is consistent with the growth forecasts in the applicable plan(s) (or is directly included in the applicable plan). Conformity with growth forecasts can be established by demonstrating that the Project is consistent with the land use plan used to generate the growth forecast.

Projects that would result in the criteria air pollutant emissions below these significance thresholds would not violate an air quality standard, contribute substantially to an air quality violation, or result in a cumulatively considerable net increase in criteria air pollutants within the MDAQMD.

3.3.3 Impact Analysis (CEQA)

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

Less than Significant Impact. The Project is consistent with the zoning and land use classifications that were used to prepare the MDAQMP. In addition, Project-generated emissions were calculated using the criteria pollutant emission factors obtained from the Environmental Protection Agency’s (EPA) Clearinghouse for Inventories and Emissions Factors, Web Factor Information Retrieval System (WebFIRE) (EPA 2015 and Appendix D).7

7 The project generated emissions were calculated using the EPA’s emissions factors identified in WebFIRE for ultra low sulfur diesel fuel. The emission factor was converted from pounds/gallon to tons.
The Project’s air pollutant emissions generated during all phases were calculated based on the estimated total Project fuel use in gallons (Table 3.3-3). Because each phase of the Project would require the use and operation of different type of equipment and hours of operation of each type of equipment, emission from each phase of the proposed Project was calculated and evaluated against the MDAQMD daily emission threshold (lbs./day).

Air pollutant emissions generated by the implementation of the Project will not exceed the daily (by each phase) and annual emission thresholds in tons (Table 3.3-4). Therefore, the proposed Project’s emissions are in compliance with the thresholds established by the MDAQMD. The Project would not significantly increase local air emissions and not conflict with or obstruct implementation of the AQMP. Therefore, it would be a less than significant impact.

Even though the Project’s air quality impacts are expected to be less than significant, existing federal policies encourage federal implementing agencies to take actions that reduce pollution and the generation of emissions to the extent practicable. As a result, Reclamation will implement the following best management practices (BMPs) to control dust and pollutant emissions:

**BMP AQ-1: Reduce Dust Emissions During Grading.** Reclamation shall ensure that any portion of the Project site to be graded shall be pre-watered before grading the ground and ensure the following:

1. Watering of the site or other soil stabilization method shall be employed on an on-going basis after the initiation of any grading.

2. Portions of the site that are actively being graded shall be watered to ensure that a crust is formed on the ground surface, and shall be watered at the end of each workday.

3. All disturbed areas are treated to prevent erosion.

4. All grading activities are suspended when winds exceed 25 miles per hour.

**BMP AQ-2: Reduce Pollutant Emissions.** Reclamation shall implement the following:

1. All equipment used for grading and construction must be tuned and maintained to the manufacturer’s specification to maximize efficient burning of vehicle fuel.

[short US]. Calculations were made for each phase based on the anticipated equipment being used for each phase, estimated hours operated and estimated gallons burned per hour for each equipment being operated. Total emissions for the Proposed Project were divided by the three years, the estimated duration of construction and restoration phases of the proposed project to estimate Annual emissions and determine compliance with the AQMP.
2. The operator shall maintain and effectively utilize and schedule on-site equipment and on-site and off-site haul trucks in order to minimize exhaust emissions from truck idling.

3. The operator shall comply with all existing and future California Air Resources Board (CARB) and MDAQMD regulations related to diesel-fueled trucks, which may include among others:
   A. Meeting more stringent emission standards;
   B. Retrofitting existing engines with particulate traps;
   C. Using of low sulfur fuel; and
   D. Using alternative fuels or equipment. MDAQMD rules for diesel emissions from equipment and trucks are embedded in the compliance for all diesel fueled engines, trucks, and equipment with the statewide CARB Diesel Reduction Plan. These measures will be implemented by CARB in phases with new rules imposed on existing and new diesel-fueled engines.

**BMP AQ-3: Reduce Dust Emissions.** Reclamation shall use water to control dust through the following measures:

1. Water all active construction areas at least twice daily.
2. Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least 2 feet of freeboard.

**b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?**

**Less than Significant Impact:** The CEQA Guidelines indicate that a significant impact would occur if the Project would violate any air quality standard or contribute significantly to an existing or projected air quality violation. The applicable thresholds of significance for air emissions generated by the Project are established by the MDAQMD and are described in Table 3.3-2.

Table 3.3-3 summarizes the type of equipment and fuel anticipated to be used during all four phases of the proposed Project. Table 3.3-4 calculates the daily and annual Project emissions during Phase 1 through Phase 4 of the proposed Project. Based on the information presented in Table 3.3-3 and Table 3.3-4, emissions generated by the Project during all four phases would not exceed the MDAQMD’s daily or annual thresholds.
Table 3.3-3. Estimated Total Project Fuel Use per Equipment Type

<table>
<thead>
<tr>
<th>Estimated Quantity</th>
<th>Equipment Type</th>
<th>Estimated Hours in Operation</th>
<th>Estimated Gallons/Hour</th>
<th>Estimated Fuel Use (Gallons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Crew/Staff Transportation to and from Workstation to Project area</td>
<td>204</td>
<td>4</td>
<td>738</td>
</tr>
<tr>
<td>Sub-Total Gasoline Estimate:</td>
<td></td>
<td>204</td>
<td>4</td>
<td>738</td>
</tr>
</tbody>
</table>

Low Sulfur Diesel Fuel

<table>
<thead>
<tr>
<th>Estimated Quantity</th>
<th>Equipment Type</th>
<th>Estimated Hours in Operation</th>
<th>Estimated Gallons/Hour</th>
<th>Estimated Fuel Use (Gallons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Heavy Equipment Transport</td>
<td>29</td>
<td>9</td>
<td>265</td>
</tr>
<tr>
<td>1</td>
<td>Crane</td>
<td>80</td>
<td>10</td>
<td>800</td>
</tr>
<tr>
<td>2</td>
<td>D6R Dozer</td>
<td>1,200</td>
<td>6</td>
<td>7,200</td>
</tr>
<tr>
<td>3</td>
<td>John Deere Tractor Scraper</td>
<td>2,340</td>
<td>7</td>
<td>16,380</td>
</tr>
<tr>
<td>1</td>
<td>345 Excavator</td>
<td>1,000</td>
<td>8</td>
<td>8,000</td>
</tr>
<tr>
<td>1</td>
<td>4000 Gallon Water truck</td>
<td>800</td>
<td>6</td>
<td>4,800</td>
</tr>
<tr>
<td>1</td>
<td>140M Motor Grader</td>
<td>80</td>
<td>6</td>
<td>480</td>
</tr>
<tr>
<td>1</td>
<td>Dredging Machine</td>
<td>2,000</td>
<td>25</td>
<td>50,000</td>
</tr>
<tr>
<td>Sub-Total Low Sulfur Diesel Fuel Estimate:</td>
<td></td>
<td>7,529</td>
<td>77</td>
<td>87,925</td>
</tr>
<tr>
<td>Total Combined Fuel Type Estimate:</td>
<td></td>
<td>7,733</td>
<td>81</td>
<td>88,663.32</td>
</tr>
</tbody>
</table>

1 Estimated fuel use in gallons reflects estimated quantities for use for all Project phases, including construction (anticipated to be completed in 2-3 years), monitoring and maintenance (anticipated for the life of the project). These quantities were estimated by considering the estimated duration of each phase of the project and the type of equipment that would be used to accomplish the tasks in each phase.

Table 3.3-4. Project Emissions – Combined all Fuel Types

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Abr.</th>
<th>Maximum Unmitigated Daily Emissions (lbs./day)¹</th>
<th>Daily Thresholds (lbs./day)</th>
<th>Maximum Unmitigated Annual Emissions (tons)²</th>
<th>Annual Thresholds (Tons)</th>
<th>Exceeds Daily or Annual Thresholds?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>All Phases</td>
<td>Phase 1</td>
<td>Phase 2</td>
<td>Phase 3</td>
<td>Phase 4</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>CO</td>
<td>256.88</td>
<td>255.58</td>
<td>254.19</td>
<td>255.12</td>
<td>548</td>
</tr>
<tr>
<td>Oxides of Nitrogen</td>
<td>NOx</td>
<td>98.08</td>
<td>68.96</td>
<td>37.76</td>
<td>58.56</td>
<td>137</td>
</tr>
<tr>
<td>Volatile Organic Compounds</td>
<td>VOC</td>
<td>8.78</td>
<td>7.50</td>
<td>6.12</td>
<td>7.04</td>
<td>137</td>
</tr>
<tr>
<td>Oxides of Sulfur</td>
<td>SOx</td>
<td>0.38</td>
<td>0.37</td>
<td>0.35</td>
<td>0.36</td>
<td>137</td>
</tr>
<tr>
<td>Particulate Matter (Primary)</td>
<td>PMₐ₁</td>
<td>3.17</td>
<td>2.29</td>
<td>1.35</td>
<td>1.97</td>
<td>82</td>
</tr>
<tr>
<td></td>
<td>PM₂₅</td>
<td>3.06</td>
<td>2.22</td>
<td>1.31</td>
<td>1.91</td>
<td>82</td>
</tr>
</tbody>
</table>

¹ Daily emission was calculated by phase for the proposed Project. Each phase would require the use and operation of different types of equipment, frequency, and number of hours operated. The determination of daily thresholds are based on emission totals by phase (As a reference to how these estimate quantities were calculated, the Estimated Quantities calculation sheet provided in Appendix C).

² Annual emissions estimated for this project were calculated by dividing the proposed Project totals for the life of the project by the expected duration of Phase 1 through Phase 3, estimated at 3 years.
Although the Project would not exceed MDAQMD thresholds, and the impacts would be less than significant, compliance with all applicable MDAQMD rules and regulations is required as the MDAB is in non-attainment status for ozone and suspended particulates (PM$_{10}$ and PM$_{2.5}$). Although less than significant impacts are anticipated to air quality, to further reduce fugitive dust production (ozone, NOx and PM$_{10}$), BMP AQ-1, BMP AQ-2, and BMP AQ-3 would be incorporated into the Project. Studies show that BMPs significantly control fugitive dust and the mitigation measures imposed by the proponent reduces fugitive dust generated by construction and demolition activities from 10 to 98 percent (Countness Environmental 2006).

\((c)\) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?

Less than Significant Impact. The Project is located in a region that is identified as a non-attainment area for Ozone and PM$_{10}$ according to the California Air Resources Board Area Designation Maps (California Air Resources Board 2013). This means that the background concentration of these pollutants have historically been over the Federal and/or State Ambient Air Quality Standards. With respect to air quality, no individual project would by itself result in non-attainment of the Federal or State Ambient Air Quality Standards. However, a Project’s air pollution emissions, although individually limited, may be cumulatively considerable when taken in combination with past, present, and reasonably foreseeable future development projects. In order to be considered significant, a project’s air pollutant emissions must exceed the emission thresholds established by the MDAQMD.

According to the calculations for criteria air pollutants, emissions do not exceed the annual thresholds established by the MDAQMD (Table 3.3-4). Therefore, the criteria air pollutant emissions generated by the Project would not be cumulatively considerable when included with other past, present, and foreseeable future projects and would result in a less than significant impact.

\((d)\) Expose sensitive receptors to substantial pollutant concentrations?

Less than Significant Impact. According to the MDAQMD CEQA Guidelines, residences, schools, daycare centers, playgrounds and medical facilities are considered sensitive receptor land uses. The following project types proposed for sites within the specified distance to an existing or planned (zoned) sensitive receptor must not expose sensitive receptors to substantial pollutant concentrations (MDAQMD 2011).

- Any industrial project within 1,000 feet;
- A distribution center (40 or more trucks per day) within 1,000 feet;
- A major transportation project (50,000 or more vehicles per day) within 1,000 feet;
Environmental Consequences and Analysis – Air Quality

- A dry cleaner using perchloroethylene within 500 feet; and
- A gasoline dispensing facility within 300 feet.

The Project would not result in any of the above uses. Therefore, implementation of the Project would result in a less than significant impact to sensitive receptors to substantial pollutant concentrations.

e) Create objectionable odors affecting a substantial number of people?

Less than Significant Impact. The Project would provide restored and enhanced backwater habitat within the existing Park. The generation of objectionable odors is typically not associated with construction, restoration, management and maintenance of habitat conservation projects. The Project design does not include the construction or installation of structures and/or permanent equipment that would release objectionable odors. Therefore, less than significant impacts are anticipated with respect to odors.

3.3.4 Environmental Consequences (NEPA)

No Action Alternative

The No Action Alternative would have no effect to Air Quality because there would be no criteria air pollutant emissions generated by the Project. The current use as a designated regional park OHV recreational area would continue and the criteria air pollutants would remain in its current condition.

Proposed Action (Project)

Short-term impacts are anticipated to Air Quality as a result of the implementation of the Project. The Project is anticipated to generate criteria air pollutant emissions resulting from the use of vehicles for travel and heavy fuel based equipment for transport, clearing, and construction to complete the four phases of the Project. The generation of criteria air pollutant emissions from temporary and short-term burning of gasoline and diesel fuel during the Project is estimated to be under the maximum daily and annual emission thresholds set by the MCAQMD (Table 3.3-4 and a calculation sheet is provided in Appendix C).

Additionally, although the Project’s estimated emissions would be under the established emission thresholds and no mitigation measures are required, BMP AQ-1, BMP AQ-2, and BMP AQ-3 would be implemented to further control and reduce the production of fugitive dust. Overall, the Project’s estimated criteria pollutant emissions would be below the MDAQMD thresholds. Moreover, it is anticipated that re-vegetation of native plants and the creation of backwater habitat would potentially result in long-term improvements to air quality within the Project area.

Cumulative Impacts

Although implementation of the Project would generate criteria air pollutant emissions, emissions would not exceed the daily and annual thresholds established by the
1 MDAQMD and emissions (Table 3.3-4). Thus, cumulative impacts to air quality are not
2 anticipated when considered with other projects in the past, present, and foreseeable
3 future.

4 **3.3.5 Mitigation Summary (CEQA Only)**

5 The Project would not result in significant impacts to Air Quality. Therefore, no
6 mitigation is required.
3.4 BIOLOGICAL RESOURCES

<table>
<thead>
<tr>
<th>BIOLOGICAL RESOURCES – Would the Project:</th>
<th>Potentially Significant Impact</th>
<th>Less Than Significant with Mitigation</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
</tr>
<tr>
<td>b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>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, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>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?</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>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?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

3.4.1 Environmental Setting

The Project area has experienced moderate to heavy OHV recreational use and consists largely of dense, largely non-native vegetation and unvegetated sand dunes. The sand dunes were formed from disposed dredge spoil. Vegetation consists mainly of non-native salt cedar, with arrowweed and some creosote bush interspersed on the periphery. A dense thicket of salt cedar runs through the middle of Project channel footprint. More compact soils and coarser substrates are found on the far western side of the parcel that is bounded by a gravel road.

Biological surveys were completed in June of 2014 in preparation for soil sampling at 15 test pits within the Project area (USBR 2014 and Appendix E). Of the species included in the California Natural Diversity Database (CNDDB) records for the area, only the
yellow-breasted chat (*Icteria virens*) was detected during survey efforts. Bird territories were detected within the densest habitat including at least four yellow-breasted chat territories. The yellow-breasted chat is a California species of special concern. The numbers of bird territories around five of the test pit locations were high and the habitat was so dense that nests for those territories would have been difficult to locate and buffer.

Additionally, on June 18, 2014, presence/absence surveys were conducted by Reclamation for the Mojave desert tortoise (*Gopherus agassizii*) within the upland scrub habitat adjacent to and within the proposed Project area. No desert tortoise or desert tortoise sign were detected. Surveys for burrowing owls (*Athene cunicularia*) and their burrows were conducted at the same time as the desert tortoise surveys. No burrowing owls or their burrows were detected. The Project area is not considered habitat for Mojave desert tortoise or western burrowing owl due to the sandy soil types and riparian vegetation. The habitat quality is poor in the Project area for these species and sandy soil types are not conducive to burrowing and attempts will collapse easily. Additionally, the Project area is not considered habitat for listed fish species on the River because the area is not currently connected to the River and lacks adequate water flow. However, depending on rainfall amounts and season, there is a small area of standing water in the salt cedar stand.

Migratory species of birds observed during the general reconnaissance surveys included the Abert’s towhee (*Pipilo aberti*), black-tailed gnatcatcher (*Polioptila melanura*), Gambel’s quail (*Callipepla gambelii*), great-tailed grackle (*Quiscalus mexicanus*), lesser night hawk (*Chordeiles gundlachii*), mourning dove (*Zenaida macroura*), northern mockingbird (*Mimus polyglottos*), red-winged blackbird (*Agelaius phoeniceus*), verdin (*Auriparus flaviceps*), white-winged dove (*Zenaida asiatica*), and yellow-breasted chat (USBR 2014). The number of individuals per species was not tallied because they could not be accurately counted during general reconnaissance surveys (USBR 2014).

Other wildlife common to the area include small mammals, reptiles, and amphibians. These species may be resident or migrating through the Project area to access water, cover, or forage.

### 3.4.2 Regulatory Setting

The following Federal and State laws and regulations pertaining to this issue area and relevant to the Project are identified in Table 3.4-1.

| U.S. Endangered Species Act (FESA) (7 USC 136, 16 USC 1531 et seq.) | The FESA, which is administered in California by the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS), provides protection to species listed as threatened or endangered, or proposed for listing as threatened or endangered. Section 9 prohibits the “take” of any member of a listed species. • Take is defined as “...to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” |

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### Table 3.4-1. Laws, Regulations, and Policies (Biological Resources)

| U.S. | Migratory Bird Treaty Act (MBTA) (16 USC 703-712) | The MBTA was enacted to ensure the protection of shared migratory bird resources. The MBTA prohibits the take, possession, import, export, transport, selling, purchase, barter, or offering for sale, purchase, or barter, of any migratory bird, their eggs, parts, and nests, except as authorized under a valid permit. The responsibilities of Federal agencies to protect migratory birds are set forth in Executive Order (EO) 13186. The USFWS is the lead agency for migratory birds. The USFWS issues permits for takes of migratory birds for activities such as scientific research, education, and depredation control, but does not issue permits for incidental take of migratory birds. |
| U.S. | Rivers and Harbors Act (RHA) (33 USC 403) | Section 10 of the RHA prohibits the creation of any obstruction not affirmatively authorized by Congress to the navigable capacity of any of the waters of the United States. Except where recommended by the Chief of Engineers and authorized by the Secretary of War, it is unlawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river, or to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity of, any port, roadstead, haven, harbor, canal, lake, harbor of refuge, or enclosure within the limits of any breakwater, or of any channel of any navigable waters of the United States. |
| U.S. | Federal Water Pollution Control Act (AKA Clean Water Act - CWA) (33 USC 1251-1376) | Section 401 (33 USC 1341) of the CWA specifies that any applicant for a federal permit to conduct any activity which may result in any discharge into the navigable waters of the United States to obtain a certification or waiver thereof from the state in which the discharge originates that such a discharge will comply with state water quality standards. Section 404 (33 USC 1344) of the CWA authorizes the U.S. Army Corps of Engineers (USACE) to issue permits for the discharge of dredged or fill material into waters of the United States, including wetlands, streams, rivers, lakes, coastal waters or other water bodies or aquatic areas that qualify as waters of the United States. |
| U.S. | Other | • The Bald and Golden Eagle Protection Act makes it illegal to import, export, take (including molest or disturb), sell, purchase or barter any bald eagle or golden eagle or parts thereof.  
• Clean Water Act (33 USC 1251 et seq.) and Rivers and Harbors Act (33 USC 401) (see Section 3.9, Hydrology and Water Quality).  
• Executive Order 13112 requires Federal agencies to use authorities to prevent introduction of invasive species, respond to and control invasions in a cost-effective and environmentally sound manner, and provide for restoration of native species and habitat conditions in invaded ecosystems.  
• Executive Order 13158 requires Federal agencies to identify actions that affect natural or cultural resources within a Marine Protected Area (MPA) and, |
### Table 3.4-1. Laws, Regulations, and Policies (Biological Resources)

<table>
<thead>
<tr>
<th>CA</th>
<th>California Endangered Species Act (CESA) (Fish &amp; G. Code, § 2050 et seq.)</th>
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<tbody>
<tr>
<td></td>
<td>The CESA provides for the protection of rare, threatened, and endangered</td>
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<td>plants and animals, as recognized by the California Department of Fish</td>
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<td>and Wildlife (CDFW), and prohibits the taking of such species without</td>
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<td>its authorization. Furthermore, the CESA provides protection for those</td>
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<td>species that are designated as candidates for threatened or endangered</td>
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<td>listings. Under the CESA, the CDFW has the responsibility for maintaining</td>
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<td>a list of threatened species and endangered species (Fish &amp; G. Code, §</td>
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<td></td>
<td>2070). The CDFW also maintains a list of candidate species, which are</td>
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<tr>
<td></td>
<td>species that the CDFW has formally noticed as under review for addition</td>
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<td></td>
<td>to the threatened or endangered species lists. The CDFW also maintains</td>
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<td></td>
<td>lists of Species of Special Concern that serve as watch lists. Pursuant</td>
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<td>to the requirements of the CESA, an agency reviewing a proposed project</td>
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<td>within its jurisdiction must determine whether any State-listed endangered</td>
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<td></td>
<td>or threatened species may be present in the project site and determine</td>
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<td>whether the proposed project will have a potentially significant impact</td>
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<td>on such species. In addition, the CDFW encourages informal consultation</td>
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<td>on any proposed project that may affect a candidate species. The CESA</td>
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<td></td>
<td>also requires a permit to take a State-listed species through incidental</td>
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<td></td>
<td>or otherwise lawful activities (§ 2081, subd. (b)).</td>
</tr>
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<table>
<thead>
<tr>
<th>CA</th>
<th>Lake and Streambed Alteration Program (Fish &amp; G. Code, §§ 1600-1616)</th>
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<tr>
<td></td>
<td>The CDFW regulates activities that would interfere with the natural</td>
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<td>flow of, or substantially alter, the channel, bed, or bank of a lake,</td>
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<td>river, or stream. These regulations require notification of the CDFW</td>
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<td></td>
<td>for lake or stream alteration activities. If, after notification is</td>
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<td></td>
<td>complete, the CDFW determines that the activity may substantially</td>
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<td></td>
<td>adversely affect an existing fish and wildlife resource, the CDFW has</td>
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<td></td>
<td>authority to issue a Streambed Alteration Agreement.</td>
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<table>
<thead>
<tr>
<th>CA</th>
<th>Other relevant California Fish and Game Code sections</th>
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<tbody>
<tr>
<td></td>
<td>• The California Native Plant Protection Act (Fish &amp; G. Code, § 1900</td>
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<tr>
<td></td>
<td>et seq.) is intended to preserve, protect, and enhance endangered or</td>
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<td></td>
<td>rare native plants in California. This Act includes provisions that</td>
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<td>prohibit the taking of listed rare or endangered plants from the wild</td>
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<td>and a salvage requirement for landowners. The Act directs the CDFW</td>
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<td>to establish criteria for determining what native plants are rare or</td>
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<td>endangered. Under section 1901, a species is endangered when its</td>
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<td>prospects for survival and reproduction are in immediate jeopardy</td>
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<td>from one or more causes. A species is rare when, although not</td>
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<td>threatened with immediate extinction, it is in such small numbers</td>
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<td>throughout its range that it may become endangered.</td>
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<td></td>
<td>• The California Species Preservation Act (Fish &amp; G. Code, §§ 900-903)</td>
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<tr>
<td></td>
<td>provides for the protection and enhancement of the amphibians, birds,</td>
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<td></td>
<td>fish, mammals, and reptiles of California.</td>
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<td>• Fish and Game Code sections 3503 &amp; 3503.5 prohibit the taking and</td>
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<td>possession of native birds’ nests and eggs from all forms of needless</td>
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<td>take. These regulations also provide that it is unlawful to take,</td>
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<td></td>
<td>possess, or destroy any birds in the orders Falconiformes or Strigiformes</td>
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<td></td>
<td>(birds-of-prey) or to take, possess, or destroy the nests or eggs of</td>
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<td>any such bird except as otherwise provided by this Code or any</td>
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<td>regulation adopted pursuant thereto.</td>
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<tr>
<td></td>
<td>• Fish and Game Code sections 3511 (birds), 4700 (mammals), 5050</td>
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<tr>
<td></td>
<td>(reptiles and amphibians), &amp; 5515 (fish) designate certain species as</td>
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<td>“fully protected.” Fully protected species, or parts thereof, may not</td>
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<td>be taken or possessed at any time without permission by the CDFW.</td>
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<td></td>
<td>• Fish and Game Code section 3513 does not include statutory or</td>
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<td>regulatory mechanism for obtaining an incidental take permit for the</td>
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<td>loss of non-game, migratory birds.</td>
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</table>
The following local goal related to biological resources is from the San Bernardino County 2007 General Plan (SBC 2007) Chapter V. Conservation Element (Section C. Countywide Goals and Policies of the Conservation Element 1. Biological Resources):

- **GOAL CO 2.** The County will maintain and enhance biological diversity and healthy ecosystems throughout the County by:
  - **CO 2.1.** Coordinating with State and Federal agencies and departments to ensure that their programs to preserve rare and endangered species and protect areas of special habitat value, as well as conserve populations and habitats of commonly occurring species, are reflected in reviews and approvals of development programs.
  - **CO 2.2.** Provide a balanced approach to resource protection and recreational using of the natural environment.
  - **CO 2.3.** Establish long-term comprehensive plans for the County’s role in the protection of native species because preservation and conservation of biological resources are statewide, Regional, and local issues that directly affect development rights.
  - **CO 2.4.** All discretionary approvals requiring mitigation measures for impacts to biological resources will include the condition that the mitigation measures be monitored and modified, if necessary, unless a finding is made that such monitoring is not feasible.

### 3.4.3 Impact Analysis (CEQA)

a) **Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?**

**Less than Significant with Mitigation.** As discussed in Section 2, Project Description, Reclamation completed ESA Section 7 consultation for the LCR MSCP in 2005 related to potential effects on sensitive species from implementing MSCP activities. Reclamation sent notification of the proposed Project to the USFWS on January 28, 2015 (Appendix F), stating that the creation of new habitats for covered species could have minor impacts on existing low-value habitat in the LCR MSCP Project area. Importantly, incidental take and avoidance and minimization measures are provided in the Biological Opinion (BO) (File No. 22410-2004-F-0161) and State and Federal incidental take permits, and LCR MSCP must fully implement appropriate avoidance measures as stated therein to reduce or eliminate potential impacts to covered species. A concurrence request letter will be sent to CDFW with the Mohave Valley Backwater Restoration Development and Monitoring Plan (Appendix B) and the Monitoring, Research, and Adaptive Management Plan for review and approval, as stated in the provisions of the Incidental Take Permit issued by CDFW (Incidental Take Permit File No. 2081-2005-008-06) (Appendix G).
Notwithstanding the requirements for avoidance and minimization of impacts contained in the prior consultations and permits for the overall LCR MSCP, because sensitive species could be present at the Project site and could be affected by the Project, the potential for a significant impact exists. Specifically, vegetation clearing, grading, and other Project-related activities could impact yellow-breasted chat and other avian species if activities were to occur during breeding or nesting. Therefore, to reduce this potential impact, the following mitigation measures will be implemented for all construction and maintenance activities: MM BIO-1, MM BIO-2, MM BIO-3, MM BIO-4, and MM BIO-5.

MM BIO-1: Worker Environmental Awareness Program (WEAP). Prior to initiating work at the site, an education program (WEAP) will be provided by the Project Biologist to workers. The WEAP shall include:

1. Brief life history,
2. Ecology
3. Identification
4. Legal protections afforded all potentially occurring special-status plant and animal species as well as the identified protective measures
5. Implications of noncompliance.

All persons employed or otherwise working on the Project site shall attend a WEAP presentation prior to performing any work on site.

MM BIO-2: Designated Project Biologist. At least 30 days before initiating Project activities, the Project proponent shall obtain the California Department of Fish and Wildlife’s written approval for a designated Project Biologist/biological field contact representative. The Project Biologist shall be on site during initial Project activities and as necessary to oversee activities described for monitoring breeding and nesting (MM BIO-3) avoidance measures and may halt Project activities that are in violation. In addition, all occurrences of MSCP covered species and California sensitive species observed in the Project area will be submitted to the CNDDB by the Project Biologist or the long-term site monitor, as appropriate (information and forms at http://www.dfg.ca.gov/biogeodata/cnddb/submitting_data_to_cnddb.asp.)

MM BIO-3 Bird Breeding Season Avoidance. To the extent feasible, all work for Phases 1 and 2 shall be conducted outside the breeding season (September 1 through February 28) to reduce the possibility of abandonment, or commenced prior to occupation by sensitive birds in the spring in order to prevent occupation and breeding/nesting. If ground disturbance or vegetation clearing is needed during the breeding/nesting season for any phase, a pre-construction survey will be completed by the Project Biologist and a minimum 100-foot buffer will be enforced around all nests until the young have fledged.

MM BIO-4: Reduce Terrestrial Invasive Species. All vehicles and equipment entering and leaving the site will be properly cleaned to avoid spreading terrestrial non-native invasive species.
MM BIO-5: Reduce Aquatic Invasive Species. All vehicle and equipment would be appropriately washed by implementing the “Clean, Drain, Dry” philosophy to prevent the spread of aquatic invasive species like the quagga mussel (https://www.wildlife.ca.gov/Conservation/Invasives/Quagga-Mussels).

Project related impacts to biological resources would be less than significant due to the requirement that the LCR MSCP comply with the BO (LCR MSCP 2005a) and incidental take permits issued by CDFW and USFWS, along with the implementation of MM BIO-1, MM BIO-2, MM BIO-3, MM BIO-4, and MM BIO-5.

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

Less than Significant Impact. The Project is expected to have a less than significant impact on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulation or by the CDFW or USFWS. The Project area consists largely of non-native salt cedar and will be replaced with native vegetation.

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, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

Less than Significant Impact. The Project is expected to have less than significant impacts to federally protected wetlands under Section 404 of the Clean Water Act (CWA), defined as “those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas" (40 Code of Federal Regulations [CFR] 230.3(t)).

The Project area is to the west of the River within the floodplain and is separated by a roadway berm directly adjacent to the River. The Project is located within 133.4 acres of uplands and 33.8 acres of seasonally flooded shrub wetland and perennially flooded emergent wetlands (Bio-West, 2015) (Appendix E).

Although the Project area has been highly modified, conditions have normalized to a degree that routine wetland delineation is appropriate. The wetland investigations states that hydrologic indicators observed in the Project area include saturated soils, surface water flooding, surface salt crust, and surface soil cracks (Bio-West, 2015).
Short term impacts would result from clearing and excavation activities during Phase 1 and Phase 2 of the Project through vegetation clearing, grading, and dredging to create the backwater and restored wetland habitat. However, clearing of invasive plant species, degraded wetlands areas, and the excavation of an open backwater would restore water flows and allow for increased and improved flows to existing wetland areas. In addition, native vegetation would be planted to restore upland and wetlands habitat.

Although clearing and excavation activities during Phase 1 and Phase 2 would temporarily impact the existing wetland areas described above, after the construction of the Project the existing wetland functions would be restored and enhanced above existing conditions. Because the Project would not have a substantial adverse impact on federally protected wetlands, and would instead result in an improvement over the existing degraded conditions, this impact would be less than significant.

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?**

**Less than Significant Impact.** The Project is not anticipated to substantially impact the movement of native resident or migratory fish and wildlife species or with established resident or migratory corridors, or impede the use of native wildlife nursery site. Project construction may temporarily displace wildlife directly from vehicular travel and excavation in the area. Impacts are anticipated to be temporary and habitat created will increase wildlife use and benefit of native habitat over time.

e) **Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?**

**No Impact.** The Project would not impact local policies or ordinances protecting biological resources, such as tree preservation policy or ordinance. The Project would create and enhance habitat for LCR MSCP covered species.

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?**

**No Impact.** The 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 Project is in conformance with the LCR MSCP.
3.4.4 Environmental Consequences (NEPA)

No Action Alternative

The No Action Alternative would have no impacts to Biological Resources. The Biological Resources would not be altered and the vegetation would remain in its current condition. Non-native salt cedar would continue to spread and LCR MSCP ecological site restoration would not occur at this location on the River.

Proposed Action (Project)

The Project would result in removal of existing vegetation in the Project area and the creation of a backwater and marsh habitat for target species (i.e., flannelmouth sucker) covered under the LCR MSCP. The Project would disturb up to 149 acres and develop 50 acres of backwater habitat for listed fish; primarily for the flannelmouth sucker but razorback sucker is also in the Park Moabi Channel. In addition to the backwater creation, migratory birds and other wildlife species may also take advantage of the mosaic of marsh, riparian, and upland vegetation types.

Negative impacts to wildlife can occur as a result of construction, operation, and maintenance activities. Wildlife may be temporarily displaced, injured, or killed if not avoided during Project implementation and maintenance activities from vehicle machinery traffic. Human activity, noise, and vibrations can cause wildlife to be temporarily displaced from nesting, roosting, or foraging areas. If vegetation removal is needed for maintenance activities, wildlife may lose small areas of habitat that may be important for cover, foraging, or other activities. Ground dwelling species could be entrapped in trenches during Project implementation or maintenance. However, MM BIO-1, MM BIO-2, and MM BIO-3 will avoid and minimize these impacts to wildlife. The Project would result in native habitat and backwater creation for the long-term benefit of fish and wildlife species.

Indirect impacts to wildlife from the Project can occur as a result of human activities and disturbance in the area. Reproduction could be interrupted or delayed if they are forced to leave their nests or abandon young for long periods of time; however, because construction and vegetation removal would be scheduled outside of the migratory bird breeding season or would begin prior to spring occupation by breeding/nesting birds (Phase 1), or would be preceded by surveys for breeding birds with an avoidance buffer established around any nests until the young have fledged (Phase 3 onward) these impacts are anticipated to be negligible and avoided. Maintenance activities may also cause temporary restrictions to accessing forage or foraging areas but most species will be able to circumvent any temporary barriers to movement. Prey species may also be temporarily displaced and may cause wildlife to spend more time locating prey species or foraging.

Positive impacts to wildlife can also occur as a result of maintenance activities. Minor routine maintenance can prevent large emergency repairs with bigger disturbance footprints which could result in more habitat loss.
ESAs Section 7 consultation was completed for the LCR MSCP in 2005. Project specific notification was sent to the USFWS on January 28, 2015 (Appendix F). The letter restated that the creation of new habitats for covered species could have minor impacts on existing low-value habitat in the LCR MSCP project area. Incidental take is provided for in the BO (File No.22410-2004-F-0161) in addition to avoidance and minimization measures, particularly avoiding the migratory bird breeding season during construction activities to the extent feasible. There is no designated critical habitat within the Project area; however, directly adjacent to the Project area, the Park Moabi Channel, is designated critical habitat for the bonytail chub. A concurrence request letter will be sent to CDFW with the Habitat Restoration and Management Plan and the Monitoring, Research, and Adaptive Management Plan for review and approval, as stated in the provisions of the Incidental Take Permit issued by CDFW (Incidental Take Permit File No. 2081-2005-008-06) (Appendix G).

Cumulative Impacts

The analysis area to determine cumulative impacts to Biological Resources is the area within the Park boundary. Activities that may impact wildlife and fish include recreation activities and development. Recreation activities and development can result in additional habitat loss for wildlife; however, the Project would recreate additional habitat in the long-term. Native fish like the razorback sucker are being stocked in the Park Moabi Channel and flannelmouth sucker is the target species to benefit from the Project. Increased human activity can impact wildlife and result in avoidance of an area and competition for resources. The long-term benefit of the backwater creation would provide native habitat for wildlife and backwater habitat for native fish. Cumulative impacts from activities within the analysis area are not expected to reach the level of significance.

3.4.5 Mitigation Summary (CEQA Only)

Implementation of the following mitigation measures would reduce the potential for Project related impacts to Biological Resources to less than significant.

- MM BIO-1: Worker Environmental Awareness Program (WEAP)
- MM BIO-2: Designated Project Biologist
- MM BIO-3: Bird Breeding Season Avoidance
- MM BIO-4: Reduce Terrestrial Invasive Species
- MM BIO-5: Reduce Aquatic Invasive Species
3.5 CULTURAL AND PALEONTOLOGICAL RESOURCES/TRADITIONAL CULTURAL PROPERTIES/SACRED SITES

<table>
<thead>
<tr>
<th>CULTURAL AND PALEONTOLOGICAL RESOURCES/TRADITIONAL CULTURAL PROPERTIES/SACRED SITES</th>
<th>Would the Project:</th>
<th>Potentially Significant Impact</th>
<th>Less Than Significant with Mitigation</th>
<th>Less Than Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Cause a substantial adverse change in the significance of a historical resource (as defined in State CEQA Guidelines, § 15064.5)?</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>b) Cause a substantial adverse change in the significance of an archaeological resource (pursuant to State CEQA Guidelines, § 15064.5)?</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>c) Cause a substantial adverse change in the significance of a tribal cultural resource as defined in Public Resources Code section 21074?</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>d) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
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<tr>
<td>e) Disturb any human remains, including those interred outside of formal cemeteries?</td>
<td>☐</td>
<td>☒</td>
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3.5.1 Environmental Setting

Early human occupation on the lower River is evidenced by stone tools and projectile points, the earliest of which may date to 40,000 to 30,000 B.C. The introduction of pottery on the River is associated with the Patayan culture. The Patayan culture gave rise to Yuman speaking groups including the Quechan, Mohave, and Halchidhoma. Tribes occupying the River in the vicinity of the Project area included the Mohave who made use of the River from approximately the south end of Black Canyon (where Hoover Dam was built) to Blythe, California. This Tribe historically subsisted on a combination of gathering and agriculture with a lesser dependence on hunting and fishing, living in villages along and within the floodplain.

European settlement began when Spanish explorers first entered the River in 1539. They traded with the Mohave and other Tribes. These initial explorations led to further white settlement and the establishment of mines, military forts, ranches, and farms. The Reclamation Act of June 17, 1902 was passed to encourage agricultural growth in the western United States and resulted in dams and other irrigation works along the lower River. Reclamation, formed to construct these irrigation works, has had a long history of River maintenance in the vicinity of the Project area between 1949 and the present. The goal of this maintenance is to protect properties adjacent to the River from high water flows and to reduce sediment accumulation that could impact the delivery of water throughout the River system. This maintenance includes straightening and deepening the River channel, dredging, construction of levees, and riprap placement.
Environmental Consequences and Analysis – Cultural and Paleontological Resources/
Traditional Cultural Properties/Sacred Sites

The Project area is located entirely on sediment spoils that resulted from Reclamation’s
dredging and bankline/levee maintenance. Because these sediment spoils all came
from the River channel, there is no potential for in situ (originating locally) subsurface
cultural materials.

Historic resources near the Project area include the nearby National Trails
Highway/Route 66 which is eligible for listing on the National Register of Historic Places
(NRHP) and California Register of Historical Resources; it is identified as a California
Historical Landmark. This roadway can be used as a secondary access to the Park.

Recent Cultural Resources Investigations, Consultations, and Sacred Sites

In 2011, a Phase I Cultural Resources Investigation for the Proposed OHV Area-Park
Moabi Regional Park Trail Improvement, San Bernardino County California (Appendix
H) was completed as part of County’s CEQA analysis for various projects within the
Park. The Project area is located entirely within the 2011 Phase I project area. The
2011 Phase I included archaeological records search, historic background research,
Native American consultations, a paleontological overview, and an intensive
archaeological survey. No archaeological materials were identified within the Project
area (McKenna et al. 2011) (Appendix H).

In 2014, Reclamation consulted with the California State Historic Preservation Officer
(SHPO) under a “No Historic Properties Affected” determination for the test pits dug
within the Project area as part of the geotechnical investigations for the Project
(Appendix I). As part of this consultation, Reclamation conducted archival research of
Reclamation’s cultural resource files, referenced the archaeological survey conducted
as part of the 2011 Phase I, and consulted with Native American Tribes as identified by
the Native American Heritage Commission (NAHC) (Appendix J). The SHPO concurred
with Reclamation’s determination of no effect. No archaeological materials were found
during monitoring activities undertaken by Reclamation during the geotechnical
investigation.

In 2015, Reclamation continued consultation with the SHPO under a “No Historic
Properties Affected” for the construction of the Project. During consultation,
Reclamation referenced the 2014 archival research indicating that no previously
recorded archaeological resources were within the Project area (Appendix K). On March
28, 2014, Reclamation contacted the NAHC and mailed individual tribal letters
(Appendix J). A list of Federally identified Tribes and contact information were provided.
In addition, a check of the files and information at the NAHC “failed to identify Native
American traditional cultural places or properties.” Tribal consultation letters were
mailed on May 20, 2015 (Appendix L). One reply was received from the Hopi Tribe who
had no concerns about the Project (Appendix M). The SHPO concurred with
Reclamation’s determination in a letter dated September 1, 2015 (Appendix K). In
summary, no cultural properties were identified during these consultation efforts and no
traditional cultural properties (TPCs) or sacred sites have been identified within the
Project area.
Title to all abandoned shipwrecks, archeological sites and historical and cultural resources on or in the submerged tidelands of California is vested in the State and under the jurisdiction of the CSLC (Pub. Resources Code, § 6313). On September 21, 2015, Reclamation searched the CSLC-maintained shipwreck database which lists shipwrecks by county and is based primarily on historical accounts of known and potential vessels (CSLC 2015). No known shipwrecks appear within the Project footprint or within 0.5 mile of the Project.

3.5.2 Regulatory Setting

Federal and State Laws and regulations pertaining to this issue area and relevant to the Project are identified in Table 3.5-1.

Table 3.5-1. Laws, Regulations, and Policies (Cultural And Paleontological Resources/Traditional Cultural Properties/Sacred Sites)

| U.S. | Archaeological and Historic Preservation Act (AHPA) | The AHPA provides for the preservation of historical and archaeological data that might be irreparably lost or destroyed as a result of (1) flooding, the building of access roads, the erection of workmen’s communities, the relocation of railroads and highways, and other alterations of terrain caused by the construction of a dam by an agency of the U.S. or by any private person or corporation holding a license issued by any such agency; or (2) any alteration of the terrain caused as a result of a Federal construction project or federally licensed project, activity, or program. This Act requires Federal agencies to notify the Secretary of the Interior when they find that any federally permitted activity or program may cause irreparable loss or destruction of significant scientific, prehistoric, historical, or archaeological data. The AHPA built upon the national policy, set out in the Historic Sites Act of 1935, "...to provide for the preservation of historic American sites, buildings, objects, and antiquities of national significance...."

| U.S. | Archaeological Resources Protection Act (ARPA) | The ARPA states that archaeological resources on public or Indian lands are an accessible and irreplaceable part of the nation’s heritage and:
- Establishes protection for archaeological resources to prevent loss and destruction due to uncontrolled excavations and pillaging;
- Encourages increased cooperation and exchange of information between government authorities, the professional archaeological community, and private individuals having collections of archaeological resources prior to the enactment of this Act;
- Establishes permit procedures to permit excavation or removal of archaeological resources (and associated activities) located on public or Indian land; and
- Defines excavation, removal, damage, or other alteration or defacing of archaeological resources as a "prohibited act" and provides for criminal and monetary rewards to be paid to individuals furnishing information leading to the finding of a civil violation or conviction of a criminal violator.

ARPA has both enforcement and permitting components. The enforcement provision provides for the imposition of both criminal and civil penalties against violators of the Act. The ARPA’s permitting component allows for recovery of certain artifacts consistent with the standards and requirements of the National Park Service (NPS) Federal Archeology Program.

| U.S. | National Historic Preservation | This applies only to Federal undertakings. Archaeological resources are protected through the NHPA, as amended, and its implementing regulation, Protection of Historic Properties (36 Code of Federal Regulations [CFR] 800),
Table 3.5-1. Laws, Regulations, and Policies (Cultural And Paleontological Resources/Traditional Cultural Properties/Sacred Sites)

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S.</td>
<td>Executive Order 13007: “Indian Sacred Sites” requires that Federal agencies with legal or administrative responsibility for management of Federal lands, “to the extent practicable permitted by law, and not clearly inconsistent with essential agency functions, to: (1) accommodate access to, and ceremonial use of, Indian sacred sites by Indian religious practitioners; and (2) avoid adversely affecting the physical integrity of such sacred sites.”</td>
</tr>
<tr>
<td></td>
<td>Executive Order 13158 requires Federal agencies to (1) identify actions that affect natural or cultural resources that are within a MPA; and (2) in taking such actions, to avoid harm to the natural and cultural resources that are protected by a MPA.</td>
</tr>
<tr>
<td></td>
<td>NPS Abandoned Shipwreck Act of 1987 (43 USC 2101–2106). Under this Act, states have the responsibility for management of living and nonliving resources in State waters and submerged lands, including certain abandoned shipwrecks. The NPS has issued guidelines that are intended to: maximize the enhancement of cultural resources; foster a partnership among sport divers, fishermen, archeologists, sailors, and other interests to manage shipwreck resources of the states and the U.S.; facilitate access and utilization by recreational interests; and recognize the interests of individuals and groups engaged in shipwreck discovery and salvage. Specific provisions of the Act’s guidelines include procedures for locating and identifying shipwrecks, methods for determining which shipwrecks are historic, and preservation and long-term management of historic shipwrecks.</td>
</tr>
</tbody>
</table>
| CA       | CEQA (Pub. Resources Code, § 21000 et seq.) As the CEQA lead agency, the CSLC is responsible for complying with all provisions of the CEQA and State CEQA Guidelines that relate to “historical resources.” A historical resource includes: (1) a resource listed in, or eligible for listing in, the California Register of Historic Resources (CRHR); (2) a resource included in a local register of historical or identified as significant in an historical resource surveys; and (3) any resource that a lead agency determines to be historically significant for the purposes of CEQA, when supported by substantial evidence in light of the whole record. The CRHR was created to identify resources deemed worthy of preservation on a State level and was modeled closely after the National Register. The criteria, which are nearly identical to those of the National Register but focus on resources of statewide significance (see State CEQA Guidelines, § 15064.5, subd. (a)(3)), are defined as any resource that meets any of the following criteria: (1) Is associated with events that have made a significant contribution to the broad patterns of California’s history and cultural heritage; (2) Is associated with lives of persons important in our past; (3) Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative
### Table 3.5-1. Laws, Regulations, and Policies (Cultural And Paleontological Resources/Traditional Cultural Properties/Sacred Sites)

<table>
<thead>
<tr>
<th>State</th>
<th>Legal Reference</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA</td>
<td>Health and Safety Code section 7050.5</td>
<td>This code states that if human remains are exposed during construction, no further disturbance shall occur until the County Coroner has made the necessary findings as to origin and disposition pursuant to Public Resources Code section 5097.998. The Coroner has 24 hours to notify the Native American Heritage Commission (NAHC) if the remains are determined to be of Native American descent. The NAHC will contact most likely descendants, who may recommend how to proceed.</td>
</tr>
<tr>
<td>CA</td>
<td>Assembly Bill (AB) 52 (Gatto, Stats. 2014, Ch. 532)</td>
<td>AB 52 (effective July 1, 2015) adds sections 21073, 21074, 21080.3.1, 21080.3.2, 21082.3, 21083.09, 21084.2, and 21084.3 to CEQA, relating to consultation with California Native American tribes, consideration of tribal cultural resources, and confidentiality. The definition of tribal cultural resources considers tribal cultural values in addition to scientific and archaeological values when determining impacts and mitigation. AB 52 provides procedural and substantive requirements for lead agency consultation with California Native American tribes and consideration of effects on tribal cultural resources, as well as examples of mitigation measures to avoid or minimize impacts to tribal cultural resources. AB 52 establishes that if a project may cause a substantial adverse change in the significance of a tribal cultural resource, that project may have a significant effect on the environment. Lead agencies must avoid damaging effects to tribal cultural resources, when feasible, and shall keep information submitted by tribes confidential.</td>
</tr>
<tr>
<td>CA</td>
<td>Public Resources Code section 5097.98</td>
<td>This code states protocol for notifying the most likely descendant from the deceased if human remains are determined to be Native American in origin. It also provides mandated measures for appropriate treatment and disposition of exhumed remains.</td>
</tr>
</tbody>
</table>

The following local goals and policies regarding cultural resources are from the San Bernardino County General Plan 2012 (San Bernardino County, 2012).

- Chapter V: Conservation – Section C. 2. Cultural/Paleontological Resources.
  - Goal CO 3. To preserve and promote its historic and prehistoric cultural heritage by:
    - CO 3.1. Identify and protect important archaeological and historic cultural resources in areas of the County that have been determined to have known cultural resource sensitivity.
    - CO 3.2. Identify and protect important archaeological and historic cultural resources in all lands that involve disturbance of previously undisturbed ground.
    - CO 3.3. Establish programs to preserve the information and heritage value of cultural and historical resources.
Environmental Consequences and Analysis – Cultural and Paleontological Resources/Traditional Cultural Properties/Sacred Sites

- CO 3.4. The County will comply with Government Code section 65352.2 (SB 18) by consulting with tribes as identified by the California NAHC on all General Plan and specific plan actions.
- CO 3.5. Ensure that important cultural resources are avoided or minimized to protect Native American beliefs and traditions.

3.5.3 Impact Analysis (CEQA)

a) **Cause a substantial adverse change in the significance of a historical resource as defined in CEQA Guidelines, § 15064.5?**

**Less than Significant Impact.** As described in the Environmental setting discussion, above, there are no known historic resources in the Project area that could potentially be affected by construction or operation of the Project because the Project area was created by sediment spoils as a result of dredging and bankline/levee maintenance conducted by Reclamation. None of the right-of-way for the National Trails Highway/Route 66 roadway is within the Project area and the Project does not propose any activities that would impact the roadway. Given the site’s location, the investigations and consultations with the NAHC, Tribes, and the California SHPO concluded that there were no known historic resources in the Project area.

b) **Cause a substantial adverse change in the significance of an archaeological resource (pursuant to State CEQA Guidelines, § 15064.5)?**

**Less than Significant with Mitigation.** As described in the Environmental Setting discussion, above, there are no known archaeologically significant resources located within or adjacent to the Project site. Additionally, the Project would not increase the potential for disruption of a site or increase the potential for vandalism or trespassing. Impacts would be less than significant, therefore, based on what is known; however, the possibility exists that previously unidentified cultural resources could be discovered during Project implementation, which would be potentially significant. If this occurred, MM CUL-1 would ensure potential impacts to cultural resources remain less than significant.

**MM CUL-1: Discovery of Unanticipated Cultural Resources.** Should additional cultural materials such as archaeological and/or historical resources be uncovered during earthmoving activities, all work in that area shall cease immediately and a qualified archeologist shall be retained to access the findings and CSLC staff shall be contacted immediately. Earthmoving shall be diverted no closer than 100 feet temporarily around the deposits until they have been evaluated, recorded, excavated, and/or recovered as necessary. Construction will be allowed to proceed on the site when the archaeologist, in consultation with the Bureau of Reclamation, CSLC, appropriate Native American Tribe(s) and the County of San...
Bernardino Museum, determines the resources are recovered to their satisfaction.

The State requires that the location of any such findings must be kept confidential and measures should be taken to ensure that the area is secured to minimize site disturbance and potential vandalism. Additional measures to meet these requirements include assessment of the nature and extent of the resource, including its possible eligibility for listing in the National Register of Historic Places, and subsequent recordation and notification of relevant parties based upon the results of the assessment. Title to all abandoned shipwrecks, archaeological sites, and historic or cultural resources on or in the tide and submerged lands of California is vested in the State and under the jurisdiction of the CSLC. The final disposition of archaeological, historical, and paleontological resources recovered on State lands under the jurisdiction of the CSLC must be approved by the Commission.

c) **Cause a substantial adverse change in the significance of a tribal cultural resource as defined in Public Resources Code section 21074?**

**Less than Significant Impact.** The term tribal cultural resource includes consideration of the resource’s cultural value to a California Native American tribe in addition to the resource’s scientific and archaeological values (Table 3.5-1), and can include sites, features, places, landscapes, sacred places, and objects. CSLC’s Executive Officer sent letters on October 2, 2015 notifying the Native American Representatives of the Project (Appendix N). Based on information collected and investigations conducted for the EA/MND analysis there do not appear to be any known tribal cultural resources in the area that would be affected by the Project, as nothing was identified in the 2011 survey, nothing reported as included or eligible for inclusion in the California Register of Historical Resources, nothing reported as included in local registers of historical resources, and nothing resulting from CSLC’s Executive Officer’s October 2, 2015 notification letters sent out to the known tribes in the region.

As discussed in detail in the Environmental Setting section above, Reclamation conducted a pedestrian surface survey in 2011 that did not identify archaeological sites in the Project area, sent notifications to Federally recognized tribes pursuant to Federal consultation provisions on or around May 20, 2015, and was provided a Sacred Lands File search report by the NAHC that did not identify Native American traditional cultural places or properties in the Project area (although it noted that the Project site may be considered “culturally sensitive” by local tribes). CSLC also sent notification letters of the proposed Project on October 2, 2015 to the Federally recognized and non-Federally recognized tribes with cultural affiliation in the Project area identified by the NAHC in order to solicit input related to potential tribal cultural resources.
d) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

Less than Significant Impact. The 2011 Phase I (Appendix H) determined that there is no potential for the presence of paleontological resources within the site.

e) Disturb any human remains, including those interred outside of formal cemeteries?

Less than Significant with Mitigation. There are no known existing cemeteries, previously recorded Native American or other human remains within or directly adjacent to the Project. The Project work would be in area that contains sediment spoils from dredging and bankline/levee maintenance. Additionally, these areas are already being disturbed by the OHVs in the area. Therefore, the potential for the inadvertent discovery of Native American or other human remains during subsurface activity associated with the Project is considered extremely low. However, if previously unidentified human remains were discovered during Project activities, the impact would be potentially significant. Implementation of MM CUL-2, however, would ensure this potential impact remains less than significant.

MM CUL-2: Discovery of Unanticipated Human Remains. If human remains are encountered during implementation of the Project, all provisions provided in California Health and Safety Code section 7050.5 and California Public Resources Code section 5097.98 shall be followed. Work shall stop within 100 feet of the discovery and a qualified Cultural Resources Specialist must be contacted immediately, who shall consult with the County Coroner. In addition, CSLC staff shall be notified. If human remains are of Native American origin, the County Coroner shall notify the NAHC within 24 hours of this determination and a Most Likely Descendent shall be identified. No work is to proceed in the discovery area until consultation is complete and procedures to avoid and/or recover the remains have been implemented.

3.5.4 Environmental Consequences (NEPA)

No Action Alternative

The No Action Alternative would have no impacts to Cultural and Paleontological Resources/Traditional Cultural Properties/Sacred Sites since no archaeological materials or cultural properties were identified. The Project area would not be altered and would remain in its current condition. The LCR MSCP ecological site restoration would not occur at this location on the River.

Proposed Action (Project)

The implementation of the Project would not have impacts to Cultural and Paleontological Resources/Traditional Cultural Properties/Sacred Sites because no previously recorded archeological materials, Traditional Cultural Properties, or historical properties were identified.
properties have been identified in the Project area due to its origin as sediment spoils resulting from dredge and backline/levee maintenance.

Reclamation’s efforts, with the concurrence of the NAHC and ongoing consultations with the Tribes and the SHPO, to identify and evaluate archeological materials, TCPs, and historical properties have resulted in no cultural resources identified within the Project area. Additionally, no sacred sites have been identified within the Project area.

Cumulative Impacts

Cumulative impacts are not anticipated to Cultural and Paleontological Resources/Traditional Cultural Properties/Sacred Sites as a result of the implementation of the Project since no cultural resources, TCPs, or historic properties have been identified within the Project area.

3.5.5 Mitigation Summary (CEQA Only)

Implementation of the following mitigation measures would reduce the potential for Project related impacts to Cultural and Paleontological Resources/Traditional Cultural Properties/Sacred Sites to less than significant.

- MM CUL-1: Discovery of Unanticipated Cultural Resources
- MM CUL-2: Discovery of Unanticipated Human Remains
1 3.6 GEOLOGY AND SOILS

<table>
<thead>
<tr>
<th>GEOLOGY AND SOILS – Would the Project:</th>
<th>Potentially Significant Impact</th>
<th>Less Than Significant with Mitigation</th>
<th>Less Than Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>ii) Strong seismic ground shaking?</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>iii) Seismic-related ground failure, including liquefaction?</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>iv) Landslides?</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>b) Result in substantial soil erosion or the loss of topsoil?</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
</tbody>
</table>

2 3.6.1 Environmental Setting

The backwater habitat would be created through dry-cutting (dry land excavation) to establish a new channel within the Project area. Dry-cutting would involve earthwork consisting of excavation, grading, and contouring of the perimeter of the backwater channel that would extend from the River to the existing Park Moabi Channel (Figure 2.4-1). Excavated material would consist of dry fill gathered above the ground water elevation. Areas within the footprint of the backwater channel may be excavated until the groundwater elevations are reached and further if necessary and feasible.

Groundwater elevations within the Project area fluctuate between the depth of 3.5 and 13 feet with the rise and fall of the River. Excavation would be accomplished through
the use of mechanical and hydraulic equipment such as excavators, back hoes, skid steers, and front loaders.

During earthwork and excavation, approximately 1.2 million cubic yards of compacted fill would be excavated. Dry fill materials would be placed directly adjacent to the newly excavated channel to bury vegetation debris collected during Phase 1 (Figure 2.4-1).

The dry fill material would be soils that are characterized as Salothids and Indio-Silt. Soil textures within the Project area are a combination of clay to sand depending on their position in the landscape. The diameter ranges from 0.0625 millimeter (or 1/16 inch) to 2 millimeter in diameter. The Project area contains large areas that are covered with a salt crust and soils that commonly contain salt concentrations. Currently, this area consists of 146.5 acres of land within a Reclamation dredge spoil area created as a result of past dredging operations.

All material excavated within the Project area, located on fee lands of CSLC leased to the CDFW and the County, would fall under the jurisdiction of CSLC. Ownership of the dry fill material belongs to the state of California.

Hazard overlay maps prepared by the County for the areas do not identify the risk of seismic activity. Seismic ground shaking is influenced by the proximity of the site to an earthquake fault, the intensity of the seismic event, and the underlying soil composition.

In addition, the area is relatively flat and has been altered by the construction roadways around the perimeter. The hazard overlay maps do not identify the risk of landslides and liquefaction. Liquefaction or lateral spreading refers to landslides that commonly form on gentle slopes and that have rapid fluid-like flow movement, like water.

3.6.2 Regulatory Setting

The following Federal and State laws and regulations pertaining to this issue area and relevant to the Project are identified in Table 3.6-1.

<table>
<thead>
<tr>
<th>Table 3.6-1. Laws, Regulations, and Policies (Geology and Soils)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CA</strong></td>
</tr>
<tr>
<td><strong>California Building Code (CBC)</strong> (Cal. Code Regs., tit. 23)</td>
</tr>
<tr>
<td><strong>California Seismic Hazards</strong></td>
</tr>
<tr>
<td><strong>California Seismic Hazards</strong></td>
</tr>
</tbody>
</table>
Table 3.6-1. Laws, Regulations, and Policies (Geology and Soils)

<table>
<thead>
<tr>
<th>Mapping Act (Pub. Resources Code, § 2690 and following as Division 2, Chapter 7.8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>hazards caused by earthquakes. The Act requires that site-specific geotechnical investigations be conducted identifying the hazard and formulating mitigation measures prior to permitting most developments designed for human occupancy. Special Publication 117, Guidelines for Evaluating and Mitigating Seismic Hazards in California (CDC 208), constitutes guidelines for evaluating seismic hazards other than surface fault rupture and for recommending mitigation measures as required by section 2695, subdivision (a).</td>
</tr>
</tbody>
</table>

The following local goals and policies related to geology and soils from the San Bernardino County 2007 General Plan include (SBC 2007):

- Chapter VIII. Safety Element – Section B. Goals and Policies of the Safety Element:
  - Goal S 6. To protect residences from natural and manmade hazards by utilizing the Hazard and Resources Overlay Maps to identify areas suitable or required for retention as open space.
  - Goal S 7. To minimize exposure to hazards and structural damage from geological and seismic conditions by:
    - Designating areas identified by the Alquist-Priolo Earthquake Fault Zoning Act (Public Resource Code, Division 2, Chapter 7.5) on the Hazard Overlay Maps to protect occupants and structures from high level of risk caused by ground rupture during earthquake.
    - Minimizing damage cause by liquefaction, which can cause devastating structural damage and a high potential for saturation exists when the groundwater level is within the upper 50 feet of alluvial material.
    - Protecting life and property from risks resulting from landslide, especially in San Bernardino and San Gabriel Mountains that have high landslide potential.

Regulatory requirement and permits related to this resource area including, but not limited to, the CWA 404 Permit, National Pollutant Discharge Elimination System (NPDES), Storm Water Pollution Prevention Program (SWPPP), and Water Quality Management Plan (WQMP) would be obtained to control soil erosion during and after construction. Conditions and stipulations required in the permits would be adhered to by Reclamation.

3.6.3 Impact Analysis (CEQA)

a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.
No Impact. The Project is not located within an Alquist-Priolo Earthquake Fault Zone according to maps prepared by the California Geologic Survey or on the County of San Bernardino Geologic Hazards Overlay Surface Mining and Reclamation Act (SMARA) Overlay Map (California Department of Conservation 2015a).

ii. Strong seismic ground shaking?

Less than Significant Impact. The Project is not located in the immediate vicinity of an earthquake fault but like all of Southern California, large earthquakes can subject land that is not in the immediate vicinity of an earthquake fault to some degree of seismic ground shaking. Impacts from seismic ground shaking are forecast to be less than significant because the site is not located within close proximity of an earthquake fault.

iii. Seismic-related ground failure, including liquefaction?

No Impact. According to the Geologic Hazards Overlay SMARA Overlay Map the Project is not located in an area susceptible to liquefaction (California Department of Conservation 2015a).

iv. Landslides?

No Impact. According to the Geologic Hazards Overlay SMARA Overlay Map, the Project is not located in an area susceptible to landslides (California Department of Conservation 2015a). In addition, the Project area is relatively flat and no new significant slopes will be created.

b) Result in substantial soil erosion or the loss of topsoil?

Less than Significant Impact. Development of the Project would require vegetation removal, grading, and excavation to create the open backwater. The excavated material would be placed at the adjacent staging area to the east of the Project area leased by the County. There would be no loss of soil material within the Project area because the excavated soil material would stay within the Project area.

The Project design includes a re-vegetation plan using native plants to improve and enhance wildlife and riparian habitat. Although Phase 1, vegetation clearing activities, and Phase 2, construction activities, would present a potential for soil erosion, the impacts would be short-term and controlled by having an NPDES, SWPPP, and a WQMP in place. Preparation of an NPDES, SWPPP, and WQMP are regulatory requirements and would be obtained by the Applicant. Conditions and stipulations specific to the Project area would be adhered to, to control soil erosion during and after construction.

The implementation of the Project, specifically during re-vegetation scheduled in Phase 3, is anticipated to restore and improve site conditions. Following
construction of the Project, the restored and improved site conditions would have no increased potential for soil erosion and would maintain current conditions.

c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?

Less than Significant Impact. As noted in the response to item a) above:

- Item a, iv) above, the Project site is not susceptible to landslides; thus, the impacts from lateral spreading are considered less than significant.
- Item a, iv) above, the Project site is not susceptible to landslides; thus, no impacts from landslides are forecast to occur.
- Item a, iii) above, the Project site is not located in an area that is susceptible to liquefaction.

In addition, there is no identifiable risk from a geologic unit that is unstable or soil that is unstable within the Project area. The proposed design of the open backwater area does not propose habitable structures so there is no risk from a geologic unit that is unstable or soil that is unstable.

d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?

No Impact. The Project area is not located in an area which has been identified by the County Building and Safety Geologist as having the potential for expansive soils. No impact is anticipated.

e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?

No Impact. The Project will not require a wastewater system. No impact is anticipated.

3.6.4 Environmental Consequences (NEPA)

No Action Alternative

The No Action Alternative would have no effect to Geology and Soils because there would be no construction to alter the existing conditions of the Project area. The current use as a designated OHV recreational area would continue and the geology/soils would remain in its current condition.

Proposed Action (Project)

The Project would be implemented within a location that is relatively flat and outside any areas at risk for severe seismic activity, liquefaction, and landslides. Although the implementation of the Project would require vegetation removal, grading, and
excavation of an open backwater channel in Phases 1 and 2, soil materials excavated would be moved within the Project area to the east (leased by the County). It would not result in the loss of soil material.

The Project design includes a re-vegetation plan using native plants to improve and enhance wildlife and riparian habitat. Although Phase 1, vegetation clearing activities, and Phase 2, construction activities, would present a potential for soil erosion, the impacts would be short term and controlled by having an NPDES, SWPPP, and a WQMP in place. Preparation of an NPDES, SWPPP, and WQMP are regulatory requirements and would be obtained by the applicant. Conditions and stipulations specific to the Project area that would be adhered to control soil erosion during and after construction.

The implementation of the Project, specifically during re-vegetation scheduled in Phase 3, is anticipated to restore and improve site conditions. Following construction of the Project, the restored and improved site conditions would have no increased potential for soil erosion and would maintain or improve current conditions.

**Cumulative Impacts**

The OHV use within the Park may contribute to localized soil erosion on previously disturbed lands. Re-vegetation is expected to restore and improve site conditions that would have no increased potential for soil erosion and would maintain or improve current site conditions; therefore, significant cumulative impacts from soil erosion are not anticipated. No other cumulative impacts are anticipated as there would be no other potential impacts to the resources evaluated in this section.

**3.6.5 Mitigation Summary (CEQA Only)**

The Project would result in less than significant impacts to Geology and Soils. Therefore, no mitigation measure is required.
3.7 GREENHOUSE GAS EMISSIONS AND CLIMATE CHANGE

<table>
<thead>
<tr>
<th>GREENHOUSE GAS EMISSIONS AND CLIMATE CHANGE – Would the Project:</th>
<th>Potentially Significant Impact</th>
<th>Less Than Significant with Mitigation</th>
<th>Less Than Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
</tr>
<tr>
<td>b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
</tr>
</tbody>
</table>

3.7.1 Environmental Setting

A solid body of scientific evidence supports the theory that rising global Greenhouse Gas (GHG) emissions are significantly affecting the Earth’s climate (IPCC 2014). GHG emissions are defined as any gas that absorbs infrared radiation in the atmosphere, including but not limited to, water vapor, carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and fluorocarbons. These GHGs lead to the trapping and buildup of heat in the atmosphere near the earth’s surface, commonly known as the Greenhouse Effect.

The release of GHGs in the atmosphere, especially Carbon Dioxide Equivalent (CO₂e), is a result of human induced emissions such as the burning certain types of fuels and other various natural cycles. However, Federal guidelines request that Federal, State and local agencies consider the amount of emissions that may be produced as a result of proposed Federal actions and projects.

The quantification of GHG emissions associated with a project can be complex and relies on a number of assumptions. GHG emissions are generally classified as direct and indirect. Direct emissions are associated with the production of GHG emissions from the immediate Project area. These include the combustion of natural gas as well as the combustion of fuel in engines and construction vehicles used on the site. In addition, direct emissions include fugitive emissions from valves and connections of equipment used during implementation or throughout the project life. Indirect emissions include the emissions from vehicles (both gasoline and diesel) delivering materials and equipment to the site (e.g., haul trucks).

The County as a whole emitted an estimated 28 million metric tons (MT) of CO₂e in 2002 (SBC 2009). Currently, the Project area is within the Park and is designated for recreation where CO₂e are primarily generated by the recreational boating, OHV use, RVs, and other recreational emission generating activities. In 2012, the County proposed to conduct Park improvements to accommodate these activities and facilities for recreation and estimated that the Park’s CO₂e emissions would be 263.49 MT CO₂e per year, below the County and MDAQMD thresholds (SBC 2012).

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8 SBC’s calculations combined MDAQMD and the South Coast Air Quality Management District’s CO₂e emission data from 2002 since County is located in two basins. SBC used emissions data from within its land use jurisdiction (SBC 2009).
3.7.2 Regulatory Setting

The following Federal and State laws and regulations pertaining to this issue area and relevant to the Project are identified in Table 3.7-1.

Table 3.7-1. Laws, Regulations, and Policies (Greenhouse Gas Emissions and Climate Change)

<table>
<thead>
<tr>
<th>U.S.</th>
<th></th>
<th>CA</th>
<th>Senate Bills (SB) 97 and 375</th>
<th>CA</th>
<th>Executive Orders (EOs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal Clean Air Act (FCAA) (42 USC 7401 et seq.)</td>
<td>In 2007, the U.S. Supreme Court ruled that carbon dioxide (CO₂) is an air pollutant as defined under the FCAA, and that the USEPA has authority to regulate GHG emissions.</td>
<td>California Global Warming Solutions Act of 2006 (AB 32)</td>
<td>Under AB 32, CARB is responsible for monitoring and reducing GHG emissions in the State and for establishing a statewide GHG emissions cap for 2020 that is based on 1990 emissions levels. CARB (2009) has adopted the AB 32 Climate Change Scoping Plan (Scoping Plan), which contains the main strategies for California to implement to reduce CO₂ equivalent (CO₂e) emissions by 169 million metric tons (MMT) from the State’s projected 2020 emissions level of 596 MMT CO₂e under a business-as-usual scenario. The Scoping Plan breaks down the amount of GHG emissions reductions the CARB recommendations for each emissions sector of the State’s GHG inventory, but does not directly discuss GHG emissions generated by construction activities.</td>
<td>EO B-30-15 (Governor Brown, April 2015) established a new interim statewide GHG emission reduction target to reduce GHG emissions to 40 percent below 1990 levels by 2030 in order to ensure California meets its target of reducing GHG emissions to 80 percent below 1990 levels by 2050. It additionally directed all state agencies with jurisdiction over sources of GHG emissions to implement measures, pursuant to statutory authority, to achieve GHG emissions reductions to meet the 2030 and 2050 targets.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>EO S-01-07 (Governor Schwarzenegger, January 2007) established a low carbon fuel standard for California, and directed the carbon intensity of California’s transportation fuels to be reduced by at least 10 percent by 2020.</td>
<td>EO S-3-05 (Governor Schwarzenegger, June 2005) directed the state to reduce GHG emissions to 2000 levels by 2010, to 1990 levels by 2020, and to 80 percent below 1990 level by 2050.</td>
</tr>
</tbody>
</table>

The following goal related to aesthetics is from the San Bernardino County 2007 General Plan (SBC 2007), Chapter V. Conservation Element (Section C. Countywide Goals and Policies of the Conservation Element – 3. Air Quality):
- **Goal 4.13.** The County will ensure good air quality for its residents, businesses, and visitors to reduce impacts on human health and the economy by reducing GHG emissions within the County boundaries.

3.7.3 Impact Analysis (CEQA)

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

**Less than Significant Impact.** Estimated Project-generated GHGs were calculated using the criteria pollutant emission factors obtained from the EPA WebFIRE (EPA 2015). Project generated operational emissions were calculated based on Project specific information. The Project is estimated to generate 907.86 Metric Tonne (ton)/MT of CO₂e annually. Table 3.7-2 below compares the Project’s GHG emissions against the thresholds established by the San Bernardino County Greenhouse Gas Emissions Reduction Plan adopted in September, 2011 and the thresholds established by the MDAQMD AQMP. GHG calculations for the use of low sulfur diesel fuel for heavy equipment and gasoline for equipment and crew transportation vehicles are shown in Table 3.7-2.

**Table 3.7-2 Estimated Annual Greenhouse Gas Emissions and Thresholds**

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Maximum Unmitigated Annual Emissions (MT/yr)</th>
<th>San Bernardino County Annual Threshold (MT/yr)</th>
<th>MDAQMD Annual Threshold (MT/yr)</th>
<th>Exceeds Annual Thresholds/Reference Points?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Dioxide Equivalent (CO₂e)</td>
<td>907.86</td>
<td>3,000</td>
<td>100,000</td>
<td>NO</td>
</tr>
</tbody>
</table>

According to the San Bernardino County Greenhouse Gas Emissions Reduction Plan, small projects that do not exceed 3,000 MTCO₂e per year will be considered to be consistent with the Plan. As shown on Table 3.7-2, the Project’s annual operational emissions are 907.86 MT CO₂e per year for 3 years, which does not exceed the 3,000 MT/yr CO₂e threshold for the County.

The annual CO₂e emissions generated from the implementation of the Project would not exceed the 100,000 MT CO₂e threshold for MDAQMD, thus the Project would not substantially contribute to regional emissions.

The CEQ (2014) Draft Guidance on Consideration of GHGs and the Effects of Climate Change in NEPA Reviews provides Federal guidance on addressing GHG in NEPA reviews. Since the Project would not exceed the County and MDAQMD annual thresholds, the Project’s impacts to Regional GHG emissions would not be significant and would not be evaluated in further detail.

Therefore, the Project’s GHG emissions are not anticipated to exceed the established GHG emissions threshold. A less than significant impact would be forecasted.
Although GHG emission are not expected to violate air quality standards or negatively contribute to existing or projected air quality conditions and is forecasted to be less than significant, Reclamation is committed to reducing pollutant emissions and reducing GHGs to the extent practicable in accordance with Federal policies. As a result, Reclamation would implement **BMP GHG-1** to further reduce GHGs emitted by the Project:

**BMP GHG-1: Reduction of GHG Emissions.** Reclamation shall ensure the reduction of GHG emissions by implementing the following:

- Select construction equipment based on low GHG emissions factors and high-energy efficiency. When reasonably available, accessible and/or affordable, all diesel/gasoline-powered construction equipment shall be replaced with equivalent electric or Compressed Natural Gas equipment.

- All construction equipment engines shall be properly tuned and maintained in accordance with the manufacturers’ specifications prior to arriving on site and throughout construction duration.

- All construction equipment (including electric generators) shall be shut off by work crews when not in use and shall not idle for more than 5 minutes.

Long-term improvements to the Project area’s air quality, including the offset of Project related GHG emissions, would potentially occur from re-vegetation of native plants as a part of the Project design.

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

**Less than Significant Impact.** The state and local regulatory programs for GHG emissions and climate change are described in the response to item *a)* above. **BMP GHG-1** would provide additional assurance that there would be no conflict with any applicable plan, policy, or regulation and that emissions are being reduced to the extent practicable. Therefore, impacts would be less than significant, and no imposed mitigation would be required.

**3.7.4 Environmental Consequences (NEPA)**

**No Action Alternative**

The No Action Alternative would have no impact on GHG emissions. Air quality and GHGs would remain the same in the vicinity of the Project area with the exception of an unpredictable wildfire event. In the event of a wildfire on this site, the fire would likely burn the established vegetation and may continue past the delineated boundaries of the Project area. Smoke emissions resulting from an unplanned fire on this site may result in much larger smoke and dust emissions.
Proposed Action (Project)

The Project would use fuel-based construction equipment during removal/clearing, construction, maintenance, and operational activities, as well as transportation vehicles that would burn fossil fuels and generate GHG emissions. These emissions would be considered as short-term and would not violate air quality standards or negatively contribute to existing or projected air quality conditions as defined by County and MDAQMD (Section 3.3).

In accordance with the draft CEQ GHG Guidance, the GHG emissions generated by the Project were calculated (Table 3.7-2). These emissions did not exceed the threshold established by the County at 3,000 MT/yr and are not expected to substantially add to Regional GHG emissions.

Although GHG emission are not expected to violate air quality standards or negatively contribute to existing or projected air quality conditions, BMP GHG-1 would be incorporated into the Project to further reduce GHGs emitted by the Project.

Long-term improvements to the Project area’s air quality, including the offset of Project related GHG emissions, would potentially occur from re-vegetation of native plants as a part of the Project design.

The risk of wildfire would decrease due to the removal of the dense stands of saltcedar and increased management of the site. This decrease in wildfire potential can be translated into a decreased probability of the occurrence of reduced air quality resulting from smoke and airborne dust originating from wildland fires at the Project area after the Project is implemented.

After the initial clearing and ground contouring portions of the Project, the vegetation restoration component would be implemented. Thus, GHG emission and climate change impacts are anticipated to be less than significant.

Cumulative Impacts

The analysis area for potential cumulative impacts GHG emissions was defined as the MDAQMD within the County because thresholds established GHG emissions for the Project area are set by these entities. No cumulative impacts are anticipated because although implementation of the Project would generate GHG emissions, according to the calculations for GHG emissions in Table 3.7-2, emissions do not exceed the annual thresholds established by the County and MDAQMD. Emissions would not be cumulatively considerable. No cumulative impacts are anticipated when included with other past, present, and foreseeable future projects for the emission of GHGs.

3.7.5 Mitigation Summary (CEQA Only)

The Project would not result in significant impacts related to GHG emissions. Therefore no mitigation is required.
Environmental Consequences and Analysis – Hazards/Hazardous Materials/
Human Health and Safety

1  3.8  HAZARDS/HAZARDOUS MATERIALS/HUMAN HEALTH AND SAFETY

<table>
<thead>
<tr>
<th>HAZARDS/HAZARDOUS MATERIALS/ HUMAN HEALTH AND SAFETY – Would the Project:</th>
<th>Potentially Significant Impact</th>
<th>Less Than Significant with Mitigation</th>
<th>Less Than Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2  3.8.1  Environmental Setting

The Project area is located within the Park, which is outside of the Pacific Gas and Electric Comprehensive Environmental Response and Compensation Liability Act (CERCLA) Area of Potential Effect (APE). The CERCLA preliminary investigation for groundwater and soil did not discover any contamination within the Project area (CH2MILL 2009). Thus, there are no known hazardous materials or contaminants on the Project area.
### 3.8.2 Regulatory Setting

The following Federal and State laws and regulations pertaining to this issue area and relevant to the Project are identified in Table 3.8-1.

#### Table 3.8-1. Laws, Regulations, and Policies (Hazards/Hazardous Materials/Human Health and Safety)

<table>
<thead>
<tr>
<th>U.S.</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Clean Water Act (CWA) (33 USC 1251 et seq.)</strong></td>
<td>The CWA is comprehensive legislation (it generally includes reference to the Federal Water Pollution Control Act of 1972, its supplementation by the CWA of 1977, and amendments in 1981, 1987, and 1993) that seeks to protect the nation’s water from pollution by setting water quality standards for surface water and by limiting the discharge of effluents into waters of the U.S. (see below and in Section 3.9, Hydrology and Water Quality).</td>
</tr>
<tr>
<td><strong>Federal Clean Air Act (FCAA) (42 USC 7401 et seq.)</strong></td>
<td>The FCAA requires the U.S. EPA to identify National Ambient Air Quality Standards (NAAQS) to protect public health and welfare. National standards are established for ozone (O3), carbon monoxide (CO), nitrogen dioxide (NO2), sulfur dioxide (SO2), particulate matter (PM10 and PM2.5), and lead (Pb). In 2007, the U.S. Supreme Court ruled that carbon dioxide (CO2) is an air pollutant as defined under the FCAA, and that the USEPA has authority to regulate greenhouse gas (GHG) emissions. Pursuant to the 1990 FCAA Amendments, USEPA classifies air basins (or portions thereof) as in “attainment” or “nonattainment” for each criteria air pollutant, based on whether or not the NAAQS are achieved. The classification is determined by comparing monitoring data with State and Federal standards.</td>
</tr>
<tr>
<td>- An area is classified as in “attainment” for a pollutant if the pollutant concentration is lower than the standard.</td>
<td></td>
</tr>
<tr>
<td>- An area is classified as in “nonattainment” for a pollutant if the pollutant concentration exceeds the standard.</td>
<td></td>
</tr>
<tr>
<td>- An area is designated the standard attainment for a pollutant if the pollutant data available for comparisons. (see above and in Section 3.3, Air Quality and Section 3.7, Greenhouse Gas(GHG) Emissions).</td>
<td></td>
</tr>
<tr>
<td><strong>California Toxics Rule (40 CFR 131)</strong></td>
<td>In 2000, the USEPA promulgated numeric water quality criteria for priority toxic pollutants and other water quality standards provisions to be applied to waters in the State of California. USEPA promulgated this rule based on the Administrator's determination that the numeric criteria are necessary in the State of California to protect human health and the environment. Under CWA section 303(c)(2)(B), the USEPA requires states to adopt numeric water quality criteria for priority toxic pollutants for which the USEPA has issued criteria guidance, and the presence or discharge of which could reasonably be expected to interfere with maintaining designated uses. These Federal criteria are legally applicable in California for inland surface waters, enclosed bays, and estuaries.</td>
</tr>
<tr>
<td><strong>National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 CFR 300)</strong></td>
<td>Authorized under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 USC 9605, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), Pub. L. 99 through 499; and by CWA section 311(d), as amended by the Oil Pollution Act of 1990 (OPA), Pub. L. 101 through 380. The NCP outlines requirements for responding to both oil spills and releases of hazardous substances. It specifies compliance, but does not require the preparation of a written plan. It also provides a comprehensive system for reporting, spill containment, and cleanup. The United States Coast Guard (USCG) and USEPA co-chair the National</td>
</tr>
</tbody>
</table>
Table 3.8-1. Laws, Regulations, and Policies (Hazards/Hazardous Materials/Human Health and Safety)

<table>
<thead>
<tr>
<th>Region</th>
<th>Law/Act</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S.</td>
<td>Oil Pollution Act (OPA) (33 USC 2712)</td>
<td>The OPA requires owners and operators of facilities that could cause substantial harm to the environment to prepare and submit plans for responding to worst-case discharges of oil and hazardous substances. The passage of the OPA motivated California to pass a more stringent spill response and recovery regulation and the creation of the Office of Spill Prevention and Response (OSPR) to review and regulate oil spill plans and contracts.</td>
</tr>
<tr>
<td>U.S.</td>
<td>Resource Conservation and Recovery Act (RCRA) (42 USC 6901 et seq.)</td>
<td>The RCRA authorizes the USEPA to control hazardous waste from &quot;cradle-to-grave,&quot; which encompasses its generation, transportation, treatment, storage, and disposal. RCRA's Federal Hazardous and Solid Waste Amendments from 1984 include waste minimization and phasing out land disposal of hazardous waste as well as corrective action for releases. The Department of Toxic Substances Control is the lead State agency for corrective action associated with RCRA facility investigations and remediation.</td>
</tr>
<tr>
<td>U.S.</td>
<td>Toxic Substances Control Act (TSCA) (15 USC 2601–2692)</td>
<td>The TSCA authorizes the USEPA to require reporting, record-keeping, testing requirements, and restrictions related to chemical substances and/or mixtures. It also addresses production, importation, use, and disposal of specific chemicals, such as polychlorinated biphenyls (PCBs), asbestos-containing materials, lead-based paint, and petroleum.</td>
</tr>
<tr>
<td>U.S.</td>
<td>Other Navigation and Navigable Waters regulations (33 CFR)</td>
<td>Include requirements pertaining to prevention and control of releases of materials (including oil spills) from vessels, traffic control, and restricted areas, and general ports and waterways safety.</td>
</tr>
<tr>
<td>CA</td>
<td>Lempert-Keene-Seastrand Oil Spill Prevention and Response Act (Gov. Code, § 8574.1 et seq.; Pub. Resources Code, § 8750 et seq.)</td>
<td>This Act and its implementing regulations seek to protect State waters from oil pollution and to plan for the effective and immediate response, removal, abatement, and cleanup in the event of an oil spill. The Act requires vessel and marine facilities to have marine oil spill contingency plans and to demonstrate financial responsibility, and requires immediate cleanup of spills, following the approved contingency plans, and fully mitigating impacts on wildlife. The Act assigns primary authority to the Office of Spill Prevention and Response (OSPR) division within the CDFW to direct prevention, removal, abatement, response, containment, and cleanup efforts with regard to all aspects of any oil spill in the marine waters of the State. The CSLC assists OSPR with spill investigations and response.</td>
</tr>
</tbody>
</table>
| CA | Other | - California Clean Coast Act (SB 771) establishes limitations for shipboard incinerators, and the discharge of hazardous material—including oily bilgewater, graywater, and sewage—into State waters or a marine sanctuary. It also provides direction for submitting information on visiting vessels to the CSLC and reporting of discharges to the State water quality agencies.  
- California Harbors and Navigation Code specifies a State policy to "promote safety for persons and property in and connected with the use and equipment of vessels," and includes laws concerning marine navigation that are implemented by local city and county governments. This Code also regulates discharges from vessels within territorial waters of the State of California to prevent adverse impacts on the marine environment. This Code regulates oil discharges and imposes civil penalties and liability for cleanup costs when oil |
### Table 3.8-1. Laws, Regulations, and Policies (Hazards/Hazardous Materials/Human Health and Safety)

<table>
<thead>
<tr>
<th>#</th>
<th>Laws, Regulations, and Policies</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>is intentionally or negligently discharged to the State waters.</td>
</tr>
<tr>
<td></td>
<td>- California Seismic Hazards Mapping Act (Pub. Resources Code, § 2690) and Seismic Hazards Mapping Regulations (Cal. Code Regs., tit. 14, Div. 2, Ch. 8, Art. 10) (See Section 3.6, Geology and Soils).</td>
</tr>
<tr>
<td></td>
<td>- Porter-Cologne Water Quality Control Act (Cal. Water Code, § 13000 et seq.) (See Section 3.9, Hydrology and Water Quality).</td>
</tr>
<tr>
<td></td>
<td>- California Code of Regulations Title 22, Division 4.5 regulates hazardous wastes and materials by the implementation of a Unified Program to ensure consistency throughout the state in administration requirements, permits, inspections, and enforcement through a Certified Unified Program Agency (CUPA).</td>
</tr>
</tbody>
</table>

1. The following local goals and policies related to hazardous materials are from the San Bernardino County 2007 General Plan:

2. Chapter IV Circulation and Infrastructure Element – Section D.2.Goal CI 11. Water, Wastewater, and Stormwater. To ensure safe, reliable, and high quality water supply for all residents and ensure prevention of surface and ground water pollution by:

3. **CI 11.1.** Apply Federal and State water quality standards for surface and groundwater and wastewater discharge requirements in the review of development proposals that relate to type, location, and size of the proposed project to safeguard public health.

4. **CI 11.2.** Support the safe management of hazardous materials to avoid the pollution of both surface and groundwaters. Prohibit hazardous waste disposal facilities within any area known to be or suspected of supplying principal recharge to a regional aquifer.

5. **CI 11.3.** Support the development of groundwater quality management plans with emphasis on protection of the quality of underground waters from non-point pollution sources.

6. Certified Unified Program Agency (CUPA) (SBC Fire 2015): To ensure the implementation of the applicable programs required under the CUPA to “minimize the potential risk to human health and the environment and establish an atmosphere to promote fair business practices.” Below lists the applicable programs to the Project:

7. **o** Hazardous Materials Release Response Plans and Inventory

8. **o** California Accidental Release Prevention Program
3.8.3 Impact Analysis (CEQA)

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

Less than Significant with Mitigation. The Project would not pose a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials because the implementation of the Project would not be considered a “hazardous waste generator” as defined by the USEPA. A hazardous waste generator would routinely transport, use, or dispose of hazardous materials.

Although no known hazardous material or contaminants are present and the Project area is outside of any identified CERCLA APE, if previously unknown hazardous materials or contaminants were discovered during Project implementation, the impact would be potentially significant without mitigation. As a result, MM HHM-1 would be incorporated into the Project to provide assurance that impacts resulting from discovery of previously unknown hazards would remain less than significant.

MM HHM-1: Discovered Contaminants Protections. Should contaminants be identified, activity on the site shall cease and a qualified Reclamation Hazardous Materials Specialist for the Project shall be retained to conduct the following:

- Obtain samples of the suspected contaminants
- Require lab analysis and access findings to identify specific contaminants
- Ensure appropriate remediation is conducted and completed in accordance to the regulations specific to the contaminants identified.

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

Less than Significant with Mitigation.

The Project, once constructed, would operate in the same manner as under current conditions as an open area and there would be no increase in the transport, use, or disposal of hazards materials to the public or environment. During all Project phases (Phases 1 through 4), there would be the use of heavy equipment to construct the Project requiring the use of fuel (diesel and gasoline). These fluids could leak from construction vehicles or be inadvertently released in the event of an accident, potentially releasing petroleum compounds and metals. Unless properly managed, such releases could result in adverse health effects or contaminate exposed soil.
In addition, due to the known persistence of invasive plants in the Project area such as saltcedar, the use of herbicides would be implemented to prevent the re-growth of invasive plants as needed. This would assist the successful establishment of the native plants once the re-vegetation plan is implemented. There is potential to release herbicides into the created open backwater through accidental spills or overspray. Since the Project would operate as a restored wildlife and aquatic habitat, there would be no routine use of hazardous materials, other than during construction.

Although the Project phases would present a potential for spills, the impacts would be short-term and controlled by having an NPDES, SWPPP, and a WQMP in place. Preparation of an NPDES, SWPPP, and WQMP are regulatory requirements and would be obtained by Reclamation. Conditions and stipulations specific to the Project area would be adhered to.

In addition, although not routine once construction is completed, the transport, use, or disposal of hazardous materials described above during the Project phases could have a potentially significant impact to the public or the environment. However, implementation of **MM HHM-2** to contain potential leaks from heavy fuel based equipment and overspray from the application of herbicides, will reduce impacts to less than significant.

**MM HHM-2: Toxic Substances Protections.** To ensure toxic substances are not released into the aquatic environment, the following measures shall be followed:

- All engine-powered equipment shall be well-maintained and free of leaks of fuel, oil, hydraulic fluid or any other potential contaminant;

- Staging areas for refueling of equipment shall be located away from the backwater and away from the River to prevent any accidental fuel leakage from contaminating surface water;

- A spill prevention and response plan shall be prepared in advance of the commencement of work; a spill kit with appropriate clean-up supplies shall be kept on hand during operations.
  - The kit shall include a floating oil-absorbent sock that could be immediately deployed and maintained around the Project area in the event of a spill or any accidental leakage of fuel or hydraulic fluids;
  - Refueling and maintenance of mobile equipment shall not be performed directly over the waters of the River. Only approved and certified fuel cans with “no-spill” spring-loaded nozzles shall be used; and
All spill cleanup materials or other liquid or solid wastes shall be securely containerized and labeled in the field.

- The application and control of herbicides and pesticides shall be in accordance with the Toxic Substances Control Act (TSCA) and Environmental Protection Agency Labeling requirements including but not limited to:
  - Requiring a certified and trained applicator
  - Application of the material in accordance with its label

As discussed in Section 2.4, Phase 2 includes excavation of the open backwater. This would be conducted by dry cutting so no turbidity issues would be anticipated during this work. After construction of the open backwater channel, water would be released to flow through the created open backwater. Filling of the open backwater is anticipated to create an environment of temporary turbidity. Turbid environments are ideal for the targeted fish species.

c) **Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?**

No Impact. There are no existing or proposed schools within one-quarter mile of the proposed Project. Upon completion of the Project, site maintenance and landscaping will require the use of ordinary types of hazardous materials such as herbicides, but none of these would be used or stored on site in large enough quantities that would create a significant impact resulting in accidental release or spill.

Based on maps produced by the CARB, the site is not located within a region that is likely to contain serpentines or ultramafic rocks; therefore, the potential for release of naturally occurring asbestos during construction activities is considered to be low to non-existent.

d) **Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?**

No Impact. The Project site is not identified on the list of hazardous materials sites compiled pursuant to Government Code section 65962.5.

e) **For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?**
No Impact. As shown on San Bernardino County General Plan, Hazards Overlay Regional Map EKFKB (Southeast portion of the County), the Project site is not located within an airport influence area (SBC 2010). The Project would not result in safety hazard impacts from aircraft-related uses.

f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?

No Impact. The Project area would not be within the vicinity or approach/departure flight path of a private airstrip. No impact is anticipated.

g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

No Impact. Activities associated with the Project would not impede existing emergency response plans for the Project area and/or other land uses in the vicinity. All construction vehicles and stationary construction equipment would be staged off the internal roadway system and would not block emergency access routes during construction. The Project would not alter the roadway system that provides access to the larger Park area and would not impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan.

h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

No Impact. As shown on San Bernardino County General Plan, Hazards Overlay Regional Map EKFKB (Southeast portion of the County), the Project site is not located within a Fire Safety Overlay District (SBC 2010). The Project would not result in any safety hazard impacts from wild fires.

3.8.4 Environmental Consequences (NEPA)

No Action Alternative

The No Action Alternative would have no impacts related to Hazards and Hazardous Materials/Human Health and Safety. The Project area would remain at its current condition where the potential of spills and leaks of fuel from the use of OHV would remain the same. There are no hazardous materials or contaminants in the Project area.

Proposed Action (Project)

The Project would use fuel based construction equipment during removal/clearing, construction, maintenance, and operational activities, as well as the use of herbicides to control the re-growth of invasive plants during the all phases of the Project, which may lead to the potential for spills, leaks, and overspray of chemicals. To further reduce the
risk to the health and safety of the public, **MM HHM-2** and conditions and stipulations required under the NPDES, SWPPP, and WQMP prepared for the Project to address soil erosion and spills would be implemented to ensure control measures and monitoring are in place to minimize risk of discharge and pollution to the created backwater and the River located to the east of the Project area.

The use of the heavy fuel based equipment would be used during only Phases 1 through 2 and the potential of spills and leaks would be considered short-term. In addition, herbicides for the control of invasive plant re-growth would be used as needed and would be applied in accordance with the manufacturer label (**MM HHM-2**).

Although no known hazardous material or contaminants are present and the Project area outside of any identified CERCLA APE, **MM HHM-1** would be incorporated into the Project to provide assurance discovered contaminants would be handled appropriately.

**Cumulative Impacts**

The analysis area for potential cumulative impacts related to hazards and hazardous materials was defined as the Project area because no potential impacts are anticipated outside of the Project area. No cumulative impacts are anticipated because impacts identified related to the Project would be short-term and the implementation of mitigation measures would be implemented to prevent or minimize impacts relating to hazards and hazardous materials.

**3.8.5 Mitigation Summary (CEQA Only)**

Implementation of the following mitigation measures would reduce the potential for Project-related impacts to Hazards/Hazardous Materials/Human Health and Safety to less than significant:

- **MM HHM-1**: Discovered Contaminants Protections
- **MM HHM-2**: Toxic Substances Protections
## 3.9 HYDROLOGY AND WATER QUALITY

<table>
<thead>
<tr>
<th>HYDROLOGY AND WATER QUALITY – Would the Project:</th>
<th>Potentially Significant Impact</th>
<th>Less Than Significant with Mitigation</th>
<th>Less Than Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Violate any water quality standards or waste discharge requirements?</td>
<td>☐</td>
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</tr>
<tr>
<td>b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?</td>
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<tr>
<td>c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?</td>
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<tr>
<td>d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?</td>
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<tr>
<td>e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
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<tr>
<td>f) Otherwise substantially degrade water quality?</td>
<td>☐</td>
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<tr>
<td>g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?</td>
<td>☐</td>
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<tr>
<td>h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?</td>
<td>☐</td>
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<td>☐</td>
</tr>
<tr>
<td>i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?</td>
<td>☐</td>
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<tr>
<td>j) Inundation by seiche, tsunami, or mudflow?</td>
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</tbody>
</table>

### 3.9.1 Environmental Setting

The Project area would be located within the floodplain of the lower River within the River Basin Region and more specifically in the Dead Mountains Hydrologic Unit which is a sub unit of the HOMER Hydraulic Unit as identified in the Water Quality Control...
Environmental Consequences and Analysis – Hydrology and Water Quality

Plan, Colorado River Basin-Region 7 Regional Ground Water Basin (Hydrologic Unit) Map (CRWCB 2014). Hydrologic connections between the Project area and River are present through groundwater flows and surface water runoff. Hydrologic indicators, including salt crust and surface water, exist throughout a significant portion of the Project area (Bio-West Inc. 2015).

The Project area is located where soil characteristics are Salothids and Indio-Silt. Although the Project area has been highly modified, conditions have normalized to a degree that routine wetland delineation is appropriate. A wetlands investigation report prepared in May 2015 identified that hydrologic indicators were generally present despite dry season conditions (Appendix O). Soil textures generally ranged from clay to sand depending on their position in the landscape. The Project area contains large areas that are covered with a salt crust and the soils that commonly contain salt concentrations. Currently, this area consists of 146.5 acres of land within a Reclamation dredge spoil area created as a result of past dredging operations and provides designated and signed trails for OHV recreational use. The OHV recreational area is located northwest of the Park Moabi Channel and Beach.

On September 21, 2015, consultations with CDFW determined that no Lake and Streambed Alteration Permit Agreement was required for the Project. CDFW determined that the Project would not substantially affect an existing fish or wildlife resource (Appendix Q).

3.9.2 Regulatory Setting

The following Federal and State laws and regulations pertaining to this issue area and relevant to the Project are identified in Table 3.9-1.

### Table 3.9-1. Laws, Regulations, and Policies (Hydrology and Water Quality)

<table>
<thead>
<tr>
<th>U.S.</th>
<th>Clean Water Act (CWA) (33 USC 1251 et seq.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The CWA is comprehensive legislation (it generally includes reference to the Federal Water Pollution Control Act of 1972, its supplementation by the CWA of 1977, and amendments in 1981, 1987, and 1993) that seeks to protect the nation’s water from pollution by setting water quality standards for surface water and by limiting the discharge of effluents into waters of the U.S. These water quality standards are promulgated by the USEPA and enforced in California by the State Water Resources Control Board (SWRCB) and nine Regional Water Quality Control Boards (RWQCBs). CWA sections include:</td>
</tr>
<tr>
<td></td>
<td>• State Water Quality Certification. Section 401 (33 USC 1341) requires certification from the State or interstate water control agencies that a proposed water resources project is in compliance with established effluent limitations and water quality standards. USACE projects, as well as applicants for Federal permits or licenses are required to obtain this certification.</td>
</tr>
<tr>
<td></td>
<td>• National Pollution Discharge Elimination System (NPDES). Section 402 (33 USC 1342) establishes conditions and permitting for discharges of pollutants under the NPDES.</td>
</tr>
<tr>
<td></td>
<td>• Permits for Dredged or Fill Material. Section 404 (33 USC 1344) authorizes a separate permit program for disposal of dredged or fill material in U.S. waters.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>U.S.</th>
<th>Oil Pollution Act (OPA) (33 USC 2712)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The OPA requires owners and operators of facilities that could cause substantial harm to the environment to prepare and submit plans for responding to worst-case discharges of oil and hazardous substances. The passage of the OPA</td>
</tr>
</tbody>
</table>
### Table 3.9-1. Laws, Regulations, and Policies (Hydrology and Water Quality)

| U.S. | Rivers and Harbors Act (33 USC 401) | This Act governs specified activities (e.g., construction of structures and discharge of fill) in "navigable waters" of the U.S. (waters subject to the ebb and flow of the tide or that are presently used, have been used in the past, or may be susceptible for use to transport interstate or foreign commerce). Under section 10, excavation or fill within navigable waters requires approval from the USACE, and the building of any wharf, pier, jetty, or other structure is prohibited without Congressional approval. |
| CA | Porter-Cologne Water Quality Control Act (Cal. Water Code, § 13000 et seq.) (Porter-Cologne) | Porter-Cologne is the principal law governing water quality in California. The Act established the SWRCB and nine RWQCBs who have primary responsibility for protecting State water quality and the beneficial uses of State waters. Porter-Cologne also implements many provisions of the Federal CWA, such as the National Pollutant Discharge Elimination System (NPDES) permitting program. Pursuant to the CWA section 401, applicants for a Federal license or permit for activities that may result in any discharge to waters of the U.S. must seek a Water Quality Certification (Certification) from the State in which the discharge originates. Such Certification is based on a finding that the discharge will meet water quality standards and other appropriate requirements of State law. In California, RWQCBs issue or deny certification for discharges within their jurisdiction. The SWRCB has this responsibility where projects or activities affect waters in more than one RWQCB’s jurisdiction. If the SWRCB or a RWQCB imposes a condition on its Certification, those conditions must be included in the Federal permit or license. Statewide Water Quality Control Plans include: individual RWQCB Basin Plans; the California Ocean Plan; the San Francisco Bay/Sacramento-San Joaquin Delta Estuary Water Quality Control Plan (Bay-Delta Plan); the Water Quality Control Plan for Enclosed Bays and Estuaries of California; and the Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California (Thermal Plan). These Plans contain enforceable standards for the various waters they address. For example:  
- Basin Plan. Porter-Cologne (§ 13240) requires each RWQCB to formulate and adopt a Basin Plan for all areas within the Region. Each RWQCB establishes water quality objectives to ensure the reasonable protection of beneficial uses and a program of implementation for achieving water quality objectives within the basin plans. 40 CFR 131 requires each State to adopt water quality standards by designating water uses to be protected and adopting water quality criteria that protect the designated uses. In California, the beneficial uses and water quality objectives are the State’s water quality standards. |
| CA | Sections 1601 to 1603 of the Fish and Game Code | Under Sections 1601 to 1603 of the Fish and Game Code, the California Department of Fish and Wildlife (CDFW) must be notified prior to any project that would divert, obstruct, or change the natural flow, bed, channel, or bank of any river, stream, or lake. The term “stream” can include perennial, intermittent, and ephemeral streams; rivers; creeks; dry washes; sloughs; and watercourses with subsurface flows. The CDFW has issued a Draft Streambed Alteration Agreement for the GP Antioch wharf project, which would become final after the CEQA MND has been approved. |
| CA | Other | - California Water Code section 8710 requires that a reclamation board permit be obtained prior to the start of any work, including excavation and construction activities, if projects are located within floodways or levee sections. Structures for human habitation are not permitted within designated floodways. |
Water Quality Standards

Water Quality Standards can be summarized as follows:

- State-adopted and USEPA approved ambient standards for water bodies. The standards prescribe the use of the water body and establish the water quality criteria that must be met.

- The limits or levels of water quality elements or biological characteristics established to reasonably protect the beneficial uses of water or the prevent problems within a specific area. Water quality objectives may be numeric or narrative.

- Levels of water quality determined by the USEPA and expected to render a body of water suitable for its designated use. Criteria are based on specific levels of pollutants that would make the water harmful if used for drinking, swimming, farming, fish production, or industrial processes.

The State Water Resources Control Board in conjunction with the nine Regional Water Quality Control Boards is responsible for implementing water quality standards.

This section incorporates by reference information and data from the Mohave Valley Conservation Area Wetlands Investigation Draft Report, San Bernardino County, California prepared in May 2015 as a component of the CWA Section 404 permit application and the 401 state certification. (Appendix O).

In addition, this section incorporates information from the Moabi Regional Park Lease of State Lands, San Bernardino County Initial Study Environmental Checklist Form prepared in October, 2012 (2012 IS Checklist) (SBC 2012). Information from the County IS is based in part on the Hydrology Reports prepared by ARQ Engineering, LLC and the In-House Water and Sewer Feasibility Study South/North Peninsula Project/Park Moabi prepared by County of San Bernardino Special Districts Department (ARQ Engineering LLC 2012) (Appendix P).

Local

The following goals and policies related to water are from the San Bernardino County 2007 General Plan:

- Chapter V Conservation – Section D.2.Goal CI 13. Water, Wastewater, and Stormwater. To ensure safe, reliable, and high quality water supply for all residents and ensure prevention of surface and ground water pollution by:
  - CI 11.1. Apply Federal and State water quality standards for surface and groundwater and wastewater discharge requirements in the review of development proposals that relate to type, location and size of the proposed project to safeguard public health.
  - CI 11.2. Support the safe management of hazardous materials to avoid the pollution of both surface and groundwaters. Prohibit hazardous waste
disposal facilities within any area known to be or suspected of supplying principal recharge to a regional aquifer.

- CI 11.3. Support the development of groundwater quality management plans with emphasis on protection of the quality of underground waters from non-point pollution sources.

3.9.3 Impact Analysis (CEQA)

a) **Violate any water quality standards or waste discharge requirements?**

f) **Otherwise substantially degrade water quality?**

**Less than Significant with Mitigation.** The Project would require grading to contour the wetland and open backwater habitat. No new impervious surfaces or pavements that would result in potential surface runoff would be created from grading and excavation activities during Phases 1 through 2. To control contaminants entering nearby water bodies as a result of surface runoff, **MM HHM-2** would be incorporated into the Project to provide assurance that impacts would remain less than significant:

**MM HHM-2: Toxic Substances Protections.** To ensure toxic substances are not released into the aquatic environment, the following measures shall be followed:

- All engine-powered equipment shall be well-maintained and free of leaks of fuel, oil, hydraulic fluid or any other potential contaminant;

- Staging areas for refueling of equipment shall be located away from the backwater and away from the Colorado River to prevent any accidental fuel leakage from contaminating surface water;

- A spill prevention and response plan shall be prepared in advance of the commencement of work; a spill kit with appropriate clean-up supplies shall be kept on hand during operations.

  - The kit shall include a floating oil-absorbent sock that could be immediately deployed and maintained around the Project area in the event of a spill or any accidental leakage of fuel or hydraulic fluids;

  - Refueling and maintenance of mobile equipment shall not be performed directly over the waters of the Colorado River. Only approved and certified fuel cans with “no-spill” spring-loaded nozzles shall be used; and

  - All spill cleanup materials or other liquid or solid wastes shall be securely containerized and labeled in the field.
• The application and control of herbicides and pesticides shall be in accordance with the Toxic Substances Control Act (TSCA) and Environmental Protection Agency Labeling requirements including but not limited to:
  
  o Requiring a certified and trained applicator

  o Application of the material in accordance with its label

In addition, no waste water facilities would be incorporated into the Project design. Impacts are expected to be less than significant with the implementation of MM HHM-2.

b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?

**Less than Significant Impact.** The Project area is not within a groundwater storage or recharge area. The wetlands hydrology within the area appears to be primarily associated with precipitation, and/or high groundwater table.

The Project would create wetland and backwater habitat in addition to what currently exists in the adjacent areas, which would reduce the amount of impervious surfaces. The open backwater would be connected to the River and the Park Moab Channel and allow for a natural flow of River water to pass through the newly created backwater habitat.

Thus, the Project would enhance wetlands conditions within the Project area and would not interfere with groundwater recharge. Please refer to Section 3.17, Utilities and Service Systems for discussion on water supply.

c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?

d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?

e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?
Less than Significant Impact. The Project area is currently a dredge spoil area densely populated by non-native vegetation. Currently, the Park Moabi Channel and a roadway berm that surrounds the Project area prevent flooding by the River. Seasonal flooding and surface runoff from offsite hills to the west drain into depressional swales that appear to be remnants of the historic River channels (Figure 2.2-1). An emergent wetland at the south of the Project area appears to be continuously flooded by the Park Moabi Channel (Appendix O).

The Project is designed to create an open backwater system that would connect to the River and the Park Moabi Channel, creating additional habitat for Threatened and Endangered (T&E) fish species. Although the development of a new open backwater would create an additional channel, it is designed to allow flows to pass through and enter back into the River by way of the Park Moabi Channel. The course of the River would remain at its current course and surface runoff would continue to drain into the River. To control flow rate through the open backwater, water control structures would be constructed at the north and southern end (Figure 2.4-1).

In addition, since no buildings or additional paved areas would be constructed, no new impervious surfaces would be created that would increase the amount and flow rate of surface runoff within the Project area.

The Project would not substantially alter the existing drainage pattern of the site or area; substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site; or create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems.

Although the Project would not alter any drainage patterns, the Project would alter existing structures in the channel of the River. Both during and after construction of the created open backwater and additional shoreline, the new flow of the River would not be obstructed or restrained. The created backwater flows would return back into the River through Park Moabi Channel via the outlet located on the south end of the new open water channel designed into the Project (Figure 2.4-1).

Hydrological indicators were documented in the 2015 Wetlands Delineation Report (Appendix O). This Report indicated that seasonal flooding from ephemeral washes drain into the Project Area from the offset hills to the west. This seasonal flooding feeds a wetlands area that spans the majority of the Project area (Figure 2.2-1). These wetlands are characterized as depressional swales located between upland communities. Current conditions present in the Project area indicate that drainage patterns flowing into the area would not be altered. Although the Project would not alter the existing drainage pattern of the site or surrounding area, the Project’s removal of soil material to create the deeper open water backwater could result in potential erosion near the created shore (Figure 2.4-5). Implementation of the re-vegetation plan described in
Section 2.4 under Phase 3 would improve and enhance conditions that would minimize soil erosion after the Project is constructed.

In addition, implementation of the conditions and stipulations required under the NPDES, SWPPP, and the WQMP to control soil erosion, will ensure Project activities do not produce substantial erosion during the implementation of the Project.

g) **Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?**

**No Impact.** According to FEMA Community Panel 5658H effective 8-28-08 both the North Peninsula and South Peninsula are located in Zone X (defined as an area of moderate flood hazard, usually the area between the limits of the 100-year and 500-year floods). Therefore, no housing or structures are being proposed within a 100-year flood plain. Improvements to the wetlands and backwater habitat area consist of the creation of open water and re-vegetation of native plants. Also, no housing or structures are being proposed within a 100-year flood hazard area which would impede or redirect flood flows.

h) **Place within a 100-year flood hazard area structures which would impede or redirect flood flows?**

**No Impact.** According to FEMA Community Panel 5658H effective 8-28-08 both the North Peninsula and South Peninsula are located in Zone X (defined as an area of moderate flood hazard, usually the area between the limits of the 100-year and 500-year floods). Therefore, no housing or structures are being proposed within a 100-year flood plain. Improvements to the wetlands and backwater habitat area consist of the creation of open water and re-vegetation of native plants. Also, no housing or structures are being proposed within a 100-year flood hazard area which would impede or redirect flood flows.

i) **Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?**

**No Impact.** According to County of San Bernardino Hazards Overlay Map EJFJB (Essex), the Project area and surrounding area is located outside of any designated dam inundation area (SBC 2010). The Project would not expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam, because no levee or dam is proposed as part of the Project. Therefore, impacts are anticipated to be less than significant.

j) **Inundation by seiche, tsunami, or mudflow?**

**No Impact.** The Project area is not identified on the Tsunami Inundation Maps prepared by the California Department of Conservation (2015b).

A seiche is an oscillating surface wave in a restricted or enclosed body of water generated by ground motion, usually during an earthquake. Inundation from a seiche can occur if the wave overflows a containment wall or the banks of a water body. Based on information obtained from the United States Geological Survey, the River in the Project area has a depth that has fluctuated less than 5 feet over the past three years. Due to the relatively fixed depth of the water (6 to
18 feet) and the narrow width of the River (approximately 200 feet) at the Project area, the impacts from a seiche are not anticipated to be significant.

Based on the responses to Section 3.6.3 (items a and c) of the 2012 IS Checklist, the Project area is not located in an area prone to landslides, soil slips, or slumps (SBC 2012). Therefore, the Project would have no impacts from mudflows.

3.9.4 Environmental Consequences (NEPA)

No Action Alternative

The No Action Alternative would have no impacts related to Hydrology and Water Quality. The Project would not be implemented and the Project area would remain at its current hydrologic condition described in Section 3.9.1.

Proposed Action (Project)

Although the Project would result in the creation of an open backwater that would divert flows, the flows would return to the River by way of the Park Moabi Channel and restore water flows to degraded wetlands within the Project area. The Wetlands Delineation Report prepared in May 2015 concluded that seasonally flooded wetlands and perennially flooded emergent wetlands that possess the characteristics of jurisdictional water bodies regulated by the U.S. Army Corps of Engineers (USACE) are within the Project area (Appendix O). To ensure all USACE requirements are met under the CWA, a CWA Section 404 permit and Section 401 certification application is being prepared for the Project. Once the USACE makes its determination and a permit is issued, all conditions, stipulations and requirements will be met to ensure compliance with the CWA. To ensure short-term potential impacts to hydrology and water quality would be reduced and minimized, regulatory requirements are met under the CWA such as the implementation of a NPDES, SWPPP and a WQMP, and MM HHM-2 would be incorporated into the Project. The implementation of the Project is anticipated to improve and enhance site conditions.

Cumulative Impacts

The analysis area for potential cumulative impacts related to Hydrology and Water Quality was defined as the Project area because no potential impacts are anticipated outside of the Project area. No cumulative impacts are anticipated because of the mitigation measures that would be implemented under the Project are expected to prevent or minimize impacts relating to hydrology and water quality.

3.9.5 Mitigation Summary (CEQA Only)

Implementation of the following mitigation measure would reduce the potential for Project-related impacts to Hydrology and Water Quality to less than significant.

- MM HHM-2: Toxic Substances Protections
3.10 LAND USE AND PLANNING

<table>
<thead>
<tr>
<th>LAND USE AND PLANNING – Would the Project:</th>
<th>Potentially Significant Impact</th>
<th>Less Than Significant with Mitigation</th>
<th>Less Than Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Physically divide an established community?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
</tr>
<tr>
<td>c) Conflict with any applicable habitat conservation plan or natural community conservation plan?</td>
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</tbody>
</table>

3.10.1 Environmental Setting

The Project area is currently designated as an OHV recreational area and currently provides OHV access trails around the perimeter of the Project area. A portion of the designated OHV area is dense with vegetation making OHV and pedestrian access difficult (Figure 2.2-1). No communities are within the Project area.

The proposed Project Area was identified in the California Desert Conservation Area Plan, West Mojave Plan (CDCAP WMP) (BLM 1999). It covers approximately 9.3 million acres in portions of the Mojave Desert including parts of San Bernardino, Los Angeles, and Inyo Counties.

3.10.2 Regulatory Setting

No Federal or State laws and regulations pertaining to land use and planning and relevant to the Project have been identified. The following goals and policies related to land use for State Parks are from the San Bernardino County 2007 General Plan:

- Chapter VI. Open Space Element – Section B. Goal OS 1. Countywide Goals and Policies of the Open Pace Element. Plentiful open spaces, local parks, and a wide variety of recreational amenities for all residents would be achieved by:
  - OS 1.1. Provide for uses that respect open space values by utilizing appropriate land use categories on the Land Use maps. Land use zoning districts appropriate for various types of open space preservation include: Agriculture (AG), Floodway (FW), Resource Conservation (RC), and Open Space (OS).
  - OS 1.2. Support retention of open space lands by requiring large lot sizes, high percentage of open space or agricultural uses, and clustering within the AG, FW, RC, and OS Land Use Zoning Districts. Evaluate the value of surplus County property for open space uses so that all actions are consistent with the land use policy map.
The Regional Parks Department shall continue to identify and acquire future sites suitable for siting new regional park land to keep pace with public need.

- Ensure that the variety of recreational experiences at Regional Park sites meets the needs of the region.
- Ensure that open space and recreation areas are both preserved and provided to contribute to the overall balance of land users and quality of life.

- California Desert Conservation Area Plan, West Mojave Plan 1980, as amended (amended in 1999): To conserve and protect the wildlife such as the desert tortoise, the Mohave ground squirrel and nearly 100 other sensitive plants and animals and the natural communities of which they are a part.

### 3.10.3 Impact Analysis (CEQA)

**a) Physically divide an established community?**

**No Impact.** Since improvements will take place within an existing Park; because there are no communities within the Project area, an established community will not be divided by the Project.

**b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?**

**Less than Significant Impact.** The analysis contained in the 2012 IS Checklist prepared by the County addresses the potential conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction resulting from the implementation of the Project by identifying the purpose of avoiding or mitigating an environmental effect through mitigation measures (SBC 2012). Based on this analysis, desert wash/riparian habitat may be impacted within the Project area with the implementation of Phases 1 through 3 and nesting birds may be impacted in the north and south peninsula area (BLM 1999).

Although minor temporary impacts are expected to result to desert wash/riparian habitat during Phases 1 through 3 of the Project, the implementation of the Project would restore and create high quality open backwater habitat for fish to include wetland and upland habitat for riparian species. Therefore, the Project as implemented will not conflict with any land use plan or policy.

**c) Conflict with any applicable habitat conservation plan or natural community conservation plan?**

**Less than Significant Impact.** While temporary impacts to desert wash/riparian habitat would occur, implementation of the Project and maintenance of the area under the LCR MSCP would be in compliance with the CDCAP WMP. Therefore, there would be no conflict with any applicable habitat conservation plan.
Furthermore, the Project is not in an area or near any natural community conservation plans.

3.10.4 Environmental Consequences (NEPA)

No Action Alternative

The No Action Alternative would have no impacts related to Land Use and Planning. The Project would not be implemented and the Project area would be managed as a Regional Park described in Section 3.10.1.

Proposed Action (Project)

The Project area is located within an area that is currently designated as an OHV recreational area. The Project would not conflict with the OHV designation as Reclamation, CDFW, and the County have agreed that management of the backwater for LCR MSCP purposes is compatible with the Park. Implementation of the Project would not prohibit or encourage continued OHV within the newly created backwater habitat. OHV use would likely continue around the perimeter of the Project area where OHV access trails are already established (Figure 2.2-1).

The Project would not result in the division of communities since no communities are within the Project area. Activities described in Phases 1 through 3 may have the potential to temporarily conflict with the desert wash/riparian habitat conservation provisions of the CDCAP WMP. However, the completed Project would be in conformance with the CDCAP WMP.

Cumulative Impacts

The analysis area for potential cumulative impacts related to Land Use and Planning was defined as the Project area because no potential impacts are anticipated outside of the Project area. No cumulative impacts are anticipated because of the mitigation measures that would be implemented under the Project are expected to prevent or minimize impacts relating to Land Use and Planning.

3.10.5 Mitigation Summary (CEQA Only)

The Project would not result in significant impacts related to Land Use and Planning. Therefore no mitigation is required.
3.11 MINERAL RESOURCES

<table>
<thead>
<tr>
<th>MINERAL RESOURCES – Would the Project:</th>
<th>Potentially Significant Impact</th>
<th>Less Than Significant with Mitigation</th>
<th>Less Than Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
</tbody>
</table>

3.11.1 Environmental Setting

According to the State of California Department of Conservation Mineral Land Classification Map, portions of Needles is located within a study area for Mineral Resources Zone (MRZ) – 2a (California Department of Conservation Division of Mines and Geology 1985) (California Department of Conservation 2015c). The following major findings within Needles study area for minerals include:

- Hydrothermal mineralization within the Cherokee Mine Area, a 0.4 square mile mineralized zone located south of Monumental Pass;

- Magnesite deposits located just west of Eagle Peak, which is considered the most significant area containing industrial minerals in Needles; and

- Small magnesite occurrences, called the Captain deposit, east of the Needles magnesite deposit

Portions of the Project area are within a MRZ-3a containing montmorillonite clay beds located within 9 square miles along the west side of the River. This zone is described as an area that has a moderate potential for the discovery of economic mineral deposits. However, the Project area is currently planned and zoned as a regional park and no current mining activities are present in or directly adjacent to the Project area.

The Project area is located where soil characteristics are Salothids and Indio-Silt. Although the Project area has been highly modified, conditions have normalized to a degree that routine wetland delineation is appropriate. The 2015 Wetlands Delineation Report (Appendix O) identified soil textures generally ranged from clay to sand depending on their position in the landscape. The Project area contains large areas that are covered with a salt crust and the soils that commonly contain salt concentrations. Currently, this area consists of 146.5 acres of land within a Reclamation dredge spoil area created as a result of past dredging operations. Sand is considered a mineral resource in the State of California.

During Phase 2, the creation of the open backwater channel would be conducted through the excavation of soil material in the Project area. Once excavated, the soil material would be placed in the staging area to the east directly adjacent to the Project area (Figure 2.4-1); thus, the excavated material would not leave the Project area and...
would remain on California lands. In addition, riprap material used to prevent scour in the new backwater channel would be obtained from an existing Reclamation stockpile along the River (Figure 2.4-2).

Phase 4 would include a monitoring plan that indicates future maintenance that may be needed to maintain channel depths and ideal conditions/water levels for the LCR MSCP targeted fish species. This may be conducted by dredging sediment from the channel and moving dredge spoils to a spoil area used by Reclamation’s Dredging Operations Program directly across the River located along the Arizona bankline (Figure 2.4-5). If this maintenance activity is conducted, the quantity of the dredge material would be dependent on the amount of sediment accumulated in the open backwater. Dredge spoils have no value and are not sold by Reclamation.

3.11.2 Regulatory Setting

The following Federal and State laws and regulations pertaining to this issue area and relevant to the Project are identified in Table 3.11-1.

<table>
<thead>
<tr>
<th>CA</th>
<th>Surface Mining and Reclamation Act (SMARA) (Pub. Resources, §§ 2710-2796)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In accordance with SMARA, the California Geological Survey classifies the regional significance of mineral resources and assists in the designation of lands containing significant aggregate resources. Mineral Resource Zones (MRZs) have been designated to indicate the significance of mineral deposits. The MRZ categories are:</td>
</tr>
<tr>
<td></td>
<td>1. MRZ-1: Areas where adequate information indicates that no significant mineral deposits are present or where it is judged that little likelihood exists for their presence.</td>
</tr>
<tr>
<td></td>
<td>2. MRZ-2: Areas where adequate information indicates significant mineral deposits are present, or where it is judged that a high likelihood exists for their presence.</td>
</tr>
<tr>
<td></td>
<td>3. MRZ-3: Areas containing mineral deposits the significance of which cannot be evaluated from available data.</td>
</tr>
<tr>
<td></td>
<td>4. MRZ-4: Areas where available information is inadequate for assignment to any other MRZ.</td>
</tr>
</tbody>
</table>

The following goals and policies related to minerals are from the San Bernardino County 2007 General Plan, Chapter VI. Open Space Element – Section B.6:

- **Goal CO 7. Minerals.** Current and future extraction of mineral resources that are important to the County’s economy while minimizing impacts of this use on the public and the environment would be protected by:
  - **CO 7.1.** In areas containing valuable mineral resources, establish and implement conditions, criteria, and standards that are designed to protect the access to, and economic use of, these resources, provided that the mineral extraction does not result in significant adverse environmental effects and that open space uses have been considered for the area once mining operations cease;
  - **CO 7.2.** Implement the state Mineral Resource Zone (MRZ) designations to establish a system that identifies mineral potential and economically viable reserves.
3.11.3 Impact Analysis (CEQA)

a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?

b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?

No Impact. The Project Area is currently being used as a regional Park and mining activities presently do not take place within the Project area. Although sand is considered a mineral resource, the excavation of the soil material (composed of clay and sand respective to the specific location) within the Project area, the soil material would remain within the Project area to the east, directly adjacent to the Project area (Figure 2.4-1). Therefore, development of the Project will not result in the loss of availability of a known mineral resource or the loss of a site delineated as a mineral resource recovery area.

3.11.4 Environmental Consequences (NEPA)

No Action Alternative

The No Action Alternative would have no impacts related to Mineral Resources. The Project would not be implemented and the Project area would be managed as a Regional Park as described in Section 3.11.1.

Proposed Action (Project)

The Project is not anticipated to impact Mineral Resources within the Project area. Although the Project area is within Mineral Resource Zone MRZ-3a, the area is used as a regional Park and no mining activities are present. Although sand is considered a mineral resource, the excavation of the soil material (composed of clay and sand respective to the specific location) within the Project area, the soil material would remain within the Project area to the east, directly adjacent to the Project area (Figure 2.4-1).

Cumulative Impacts

The analysis area for potential cumulative impacts related to Mineral Resources was defined as the Project area because no potential impacts are anticipated outside the Project area. No cumulative impacts are anticipated because the Project area is used as a regional Park and no mining activities are present.

3.11.5 Mitigation Summary (CEQA Only)

The Project would not result in significant impacts to Mineral Resources. Therefore, no mitigation is required.
3.12 NOISE

<table>
<thead>
<tr>
<th>NOISE – Would the Project result in:</th>
<th>Potentially Significant Impact</th>
<th>Less Than Significant with Mitigation</th>
<th>Less Than Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
</tr>
<tr>
<td>b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
</tr>
<tr>
<td>c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
</tr>
<tr>
<td>d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
</tr>
<tr>
<td>e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
</tr>
<tr>
<td>f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
</tr>
</tbody>
</table>

3.12.1 Environmental Setting

Existing noise levels within the Park result from associated OHV operations, boating and camping, and other related recreational activities within and directly adjacent to the Project area. The nearest sensitive receptor (e.g., residential uses, schools, hospitals, nursing homes, religious institutions, libraries, and similar uses) is the short-term/limited stay mobile home park located approximately one mile southeast from the current designated OHV area and the Project area.

The Project area is not located within an airport land use plan or within two miles of a public airport or public use airport, or within the vicinity of a private airstrip.

3.12.2 Regulatory Setting

The following Federal and State laws and regulations pertaining to this issue area and relevant to the Project are identified in Table 3.12-1.
Table 3.12-1. Laws, Regulations, and Policies (Noise)

<table>
<thead>
<tr>
<th>U.S.</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• The Noise Control Act (42 USC 4910) required the USEPA to establish noise emission criteria, as well as noise testing methods (40 CFR Chapter 1, Subpart Q). These criteria generally apply to interstate rail carriers and to some types of construction and transportation equipment. The USEPA published a guideline (USEPA 1974) containing recommendations for acceptable noise level limits affecting residential land use of 55 dBA $L_{dn}$ for outdoors and 45 dBA $L_{dn}$ for indoors.</td>
<td></td>
</tr>
<tr>
<td>• NTIS 550.9-74-004, 1974 (“Information on Levels of Environmental Noise Requisite to Protect Health and Welfare with an Adequate Margin of Safety”). In response to a Federal mandate, the USEPA provided guidance in this document, commonly referenced as the, “Levels Document,” that establishes an $L_{dn}$ of 55 dBA as the requisite level, with an adequate margin of safety, for areas of outdoor uses including residences and recreation areas. The USEPA recommendations contain a factor of safety and do not consider technical or economic feasibility (i.e., the document identifies safe levels of environmental noise exposure without consideration for achieving these levels or other potentially relevant considerations), and therefore should not be construed as standards or regulations.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CA</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>State regulations for limiting population exposure to physically and/or psychologically significant noise levels include established guidelines and ordinances for roadway and aviation noise under California Department of Transportation as well as the now defunct California Office of Noise Control. The California Office of Noise Control land use compatibility guidelines provided the following:</td>
<td></td>
</tr>
<tr>
<td>• An exterior noise level of 60 to 65 dBA Community Noise Equivalent Level (CNEL) is considered &quot;normally acceptable&quot; for residences.</td>
<td></td>
</tr>
<tr>
<td>• A noise level of 70 dBA CNEL is considered to be &quot;conditionally acceptable&quot; (i.e., the upper limit of &quot;normally acceptable&quot; noise levels for sensitive uses such as schools, libraries, hospitals, nursing homes, churches, parks, offices, and commercial/professional businesses).</td>
<td></td>
</tr>
<tr>
<td>• A noise level of greater than 75 dBA CNEL is considered &quot;clearly unacceptable&quot; for residences.</td>
<td></td>
</tr>
</tbody>
</table>

The following goals and policies related to noise are from the San Bernardino County 2007 General Plan:

- Chapter VII. Noise Element – Section B. Goal N 1. Countywide Goals and Policies of the Noise Element. There are no specific goals for the Desert Region. Provide the abatement and avoidance of excessive noise exposures through noise mitigation measures incorporated into the design of new noise-generating and new noise-sensitive land uses, while protecting areas within the County where the present noise environment is within acceptable limits.

- San Bernardino County 2007 Development Code, Section 83.01.080 (g) (3).

3.12.3 Impact Analysis (CEQA)

- a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

- c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

- d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?
Less than Significant Impact. The Project does not propose to construct facilities that would generate noise near sensitive receptors (e.g., residential uses, schools, hospitals, nursing homes, religious institutions, libraries, and similar uses), and therefore will not subject persons to long-term excessive noise impacts.

Construction activities may increase the ambient noise in the vicinity of the Project area; however, according to County Development Code Section 83.01.080 (g) (3), the following sources of noise shall be exempt from the regulations of this Section: “Temporary construction, maintenance, repair, or demolition activities between 7:00 a.m. and 7:00 p.m., except Sundays and Federal holidays.” Construction is proposed to take place within these timeframes; therefore, there will be a less than significant impacts related to construction noise.

The operation of construction equipment for Phases 1 through 3 applies under the Development Code Section 83.01.080 (g) (3). Therefore, operation of the construction equipment would have less than significant impacts to noise levels within and around the Project area.

Since there are no facilities or structures generating noise included in the design of the Project, current noise levels associated with OHV operations, boating and camping activities and related recreational activities is anticipated to remain at its current levels in the Park.

b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?

Less than Significant Impact. Groundborne vibration can be an issue when vibration causes structural damage to existing buildings or disturbs sleep. Equipment used for construction will be graders, excavators, water truck, and haul trucks (Figure 2.4.1). These would not be a permanent or substantial source of vibration. Therefore, no significant impacts from excessive groundborne vibration or groundborne noise levels would result.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?

No Impact. The Project would not expose people at the Project area to excessive noise levels since no airport-related noise currently exists within two miles of the Project area. Therefore, impacts from airport-related noise are not anticipated.
3.12.4 Environmental Consequences (NEPA)

No Action Alternative

The No Action Alternative would have no impacts related to Noise. The Project would not be implemented and no noise would be generated from heavy fuel based construction equipment. The Project area would be managed as a regional Park as described in Section 3.12.1. and current noise levels from recreational activities within the Park would continue.

Proposed Action (Project)

Although Phases 1 through 3 would require the use of heavy fuel-based equipment that would temporarily raise ambient noise levels when in use, the use of construction equipment is exempt according to County Development Code Section 83.01.080 (g) (3). Construction is proposed to take place for maintenance, repair, or clearing activities during business hours between 7:00 a.m. and 7:00 p.m. Impacts to Project related noise would be short-term. Noise conditions after construction would go back to the current conditions.

In addition, no additional sensitive receptors, facilities, and other noise generating structures would be constructed.

Cumulative Impacts

The analysis area for potential cumulative impacts related to Noise was defined as the Project area because no potential impacts are anticipated outside of the Project area. No cumulative impacts are anticipated because the Project design would not include additional sensitive receptors, facilities, and other noise generating structures that would cumulatively impact noise levels in the Project area.

3.12.5 Mitigation Summary (CEQA Only)

The Project would not result in significant impacts to Noise. Therefore, no mitigation is required.
3.13 POPULATION AND HOUSING

<table>
<thead>
<tr>
<th>POPULATION AND HOUSING – Would the Project:</th>
<th>Potentially Significant Impact</th>
<th>Less Than Significant Impact with Mitigation</th>
<th>Less Than Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
</tr>
<tr>
<td>b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
</tr>
<tr>
<td>c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
</tr>
</tbody>
</table>

3.13.1 Environmental Setting

The population of Needles is estimated at 4,844 according to the U.S. Census conducted in 2010. Current activities in the Park include boating, camping, OHV operation, and other recreational activities. Although a limited stay mobile home park is located approximately one mile southeast from the Project area, there are no permanent residences or housing within and directly adjacent to the Project area.

3.13.2 Regulatory Setting

No Federal or State laws relevant to this issue area are applicable to the Project. The following goals and policies related to population and housing are from the San Bernardino County 2007 General Plan, Chapter IV. Housing Element:

- Section B. Goal H 1. Countywide Goals and Policies of the Housing Element. Implementation of streamlining measures regarding governmental review and standards may facilitate the reduction of housing cost; the following action programs will be implemented or pursued.
  - H 1.1. Integration of environmental review with the function of the regional planning teams.
- Section E. Goal D/H 1. Desert Region Goals and Policies of the Housing Element. Encourage a diversity of housing types that will accommodate all individuals and families from all income levels.

3.13.3 Impact Analysis (CEQA)

a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?

No Impact. The Project would not induce substantial population growth in the Project area either directly or indirectly. The Project consists of enhancing open...
backwater, wetland, and upland habitat for listed T&E species. The creation of habitat would not induce population growth. No impacts are anticipated.

**b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?**

**No Impact.** The Project would not displace substantial numbers of existing housing units, or require the construction of replacement housing, as no housing units are proposed to be demolished as a result of this Project. No impacts are anticipated.

**c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?**

**No Impact.** Implementation of the Project would not displace substantial numbers of people necessitating the construction of replacement housing elsewhere, as no housing exists on the Project area.

### 3.13.4 Environmental Consequences (NEPA)

**No Action Alternative**

The No Action Alternative would have no impacts related to Population and Housing. The Project would not be implemented and the Park would continue to be operated as a regional Park with activities as boating, camping, and limited stay mobile housing within the Park boundaries.

**Proposed Action (Project)**

The Project area is within a regional Park where recreational activities such as boating and camping, and limited stay mobile housing are available to the public. The Project would not impact population and housing since no permanent housing exists within or directly adjacent to the Project area and no new housing or structures are proposed; therefore, the Project would not induce population growth within or near the Park.

**Cumulative Impacts**

The analysis area for potential cumulative impacts related to Population and Housing was defined as the area within the Project area, the Park, and adjacent areas of the Park. No potential impacts are anticipated within the area of analysis and no cumulative impacts are anticipated because the Project design would not include additional housing, facilities, and other structures that would induce population growth. In addition, there would be no cumulative impacts anticipated related to displacement of the population, in part or whole.

### 3.13.5 Mitigation Summary (CEQA Only)

The Project would not result in significant impacts to Population and Housing. Therefore, no mitigation is required.
3.14 PUBLIC SERVICES

<table>
<thead>
<tr>
<th>PUBLIC SERVICES</th>
<th>Potentially Significant Impact</th>
<th>Less Than Significant with Mitigation</th>
<th>Less Than Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Would the Project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire protection?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>Police Protection?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>Schools?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>Parks?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>Other public facilities?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
</tbody>
</table>

3.14.1 Environmental Setting

The current Project area consists of OHV recreational access trails that are designed to accommodate the use and operation of OHVs. Directly adjacent to the Project area, there are areas that accommodate OHV use, boats, camping and recreational vehicles (e.g., fifth wheel travel trailer, travel trailer, truck camper, and folding pop-up tent trailer) that contain hook-ups to electrical pedestals.

The County Fire Department provides fire protection services on a contract basis to Needles and operates as the Needles Fire Department. The Needles Fire Department currently serves the existing Park.

Police protection is provided by the County Sheriff’s Department which also operates the Sheriff’s Water Safety Center located within the Park.

3.14.2 Regulatory Setting

The following Federal and State laws and regulations pertaining to this issue area and relevant to the Project are identified in Table 3.14-1.

Table 3.14-1. Laws, Regulations, and Policies (Public Services)

<table>
<thead>
<tr>
<th>U.S. Code of Federal Regulations</th>
<th>Under 29 CFR 1910.38, whenever an Occupational Safety and Health Administration (OSHA) standard requires one, an employer must have an Emergency Action Plan that must be in writing, kept in the workplace, and available to employees for review. An employer with 10 or fewer employees may communicate the plan orally to employees. Minimum elements of an emergency action plan are:</th>
</tr>
</thead>
</table>
exit route assignments;
- Procedures to be followed by employees who remain to operate critical plant operations before they evacuate;
- Procedures to account for all employees after evacuation;
- Procedures to be followed by employees performing rescue or medical duties; and
- The name or job title of every employee who may be contacted by employees who need more information about the plan or an explanation of their duties under the plan.

- Under 29 CFR 1910.39, an employer must have a Fire Prevention Plan (FPP). A FPP must be in writing, be kept in the workplace, and be made available to employees for review; an employer with 10 or fewer employees may communicate the plan orally to employees. Minimum elements of a FPP are:
  - A list of all major fire hazards, proper hazardous material handling and storage procedures, potential ignition sources and their control, and the type of fire protection equipment necessary to control each major hazard;
  - Procedures to control accumulations of flammable and combustible waste materials;
  - Procedures for regular maintenance of safeguards installed on heat-producing equipment to prevent the accidental ignition of combustible materials;
  - The name or job title of employees responsible for maintaining equipment to prevent or control sources of ignition or fires; and
  - The name or job title of employees responsible for the control of fuel source hazards.

- Under 29 CFR 1910.155, Subpart L, Fire Protection, employers are required to place and keep in proper working order fire safety equipment within facilities.

The following goals and policies related to public services are from the San Bernardino County 2007 General Plan:

- Chapter III. Circulation and Infrastructure Element – Section D. Countywide goals and Policies of the Circulation and Infrastructure Element
  - This includes policies and goals for public services including telecommunications, fire protection, law enforcement, and other utilities.

3.14.3 Impact Analysis (CEQA)

a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in...
order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:

No Impacts:

- **Fire Protection**: Because the Project would not result in a significant increase in the number of Park visitors and no new major structures are proposed, there would be no increase in the demand for fire protection services.
- **Police Protection**: Because the Project does not result in a significant increase in the number of Park visitors, there would be no increase in the demand for police protection services.
- **Schools**: Because the Project would not generate a significant number of new permanent jobs or create housing, impacts on schools are negligible.
- **Parks**: Because the Project would not generate a significant number of new permanent jobs or create housing, impacts on existing parks are negligible.
- **Other Public Facilities**: Because the Project would not generate a significant number of new permanent jobs or create housing, impacts on existing parks are negligible.

### 3.14.4 Environmental Consequences (NEPA)

#### No Action Alternative

The No Action Alternative would have no impacts related to Public Services. The Project would not be implemented and the Park would continue to be operated as a regional Park with activities as boating, camping, and limited stay mobile housing within the Park boundaries.

#### Proposed Action (Project)

The Project would not induce population growth and the construction of housing since there are no plans to construct facilities that would encourage increased Park visitation within the Project area.

#### Cumulative Impacts

The analysis area for potential cumulative impacts related to Public Services was defined as the area within the Project area, the Park, and the adjacent areas of the Park. No potential impacts are anticipated within the area of analysis and no cumulative impacts are anticipated because the Project design would not include additional housing, facilities, and other structures that would induce population growth.

### 3.14.5 Mitigation Summary (CEQA Only)

The Project would not result in significant impacts to Public Services. Therefore, no mitigation is required.
3.15 RECREATION

<table>
<thead>
<tr>
<th>RECREATION</th>
<th>Potentially Significant Impact</th>
<th>Less Than Significant with Mitigation</th>
<th>Less Than Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
</table>
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated? | ☐ | ☐ | ☑ | ☐ |
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment? | ☐ | ☐ | ☑ | ☐ |

3.15.1 Environmental Setting

The Park is designated as parks/recreation and resort in Needles, California General Plan, Land Use (City of Needles 2015). The Park offers boating, camping, and limited stay mobile housing. Amenities for visitors include full and partial hook-ups for RVs and unlimited tent camping, water park, and horse shoe pits. Activities within the Park include fishing and swimming in the River, use of OHVs at the designated OHV areas, and inland and peninsula camping.

In addition, directly adjacent to the Project area, the Pirate’s Cove Resort and Marina provide lodging, concession and other services to the visitors of the Park.

OHV areas are designated within the Project area; however, although OHV recreational users access small pockets within the Project area, the designated areas are along the perimeter of the footprint of the new open backwater channel. OHV trails run along the current access roads and would remain OHV trails after the construction of the Project (Figure 2.2-1). The Project would create an open backwater channel where currently dense vegetation is located and OHV users are unable to access.

3.15.2 Regulatory Setting

No Federal or State laws relevant to this issue area are applicable to the Project. The following goals and policies related to recreation are from the San Bernardino County 2007 General Plan:

- Chapter VI. Open Space Element – Section B. Goal OS 1. Countywide Goals and Policies of the Open Pace Element. To provide plentiful open spaces, local parks, and a wide variety of recreational amenities for all residents.
3.15.3 Impact Analysis (CEQA)

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

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

Less than Significant Impact. As discussed in Section 3.13, Population and Housing, implementation of the Project would not generate the need for new jobs or housing which would induce population growth in adjacent areas, and ultimately increase the use of Park facilities or other recreational facilities in the region.

In addition, OHV designated trails are located along the perimeter of the Project area. Although the OHV recreational users can access small pockets within the Project area, the open backwater channel would be located in the areas where dense vegetation currently exist and as a result, is not accessible to OHV users (Figure 2.2-1). Construction of the Project would not eliminate or reduce OHV access. Moreover, the placement of the excavated materials to the east of the Project area (Figure 2.4-1) where OHV recreation is designated, is anticipated to be easily accessible as a result of the placement and grading of the materials. This area (the remaining 99 acres) would remain under the responsibility of the County and would be managed as a regional Park; therefore, the impacts to recreation would be less than significant.

3.15.4 Environmental Consequences (NEPA)

No Action Alternative

The No Action Alternative would have no impacts related to Recreation. The Project would not be implemented and the Park would continue to be operated as a regional Park with activities as boating, camping, and limited stay mobile housing within the Park boundaries. The creation of additional open backwater habitat would not be constructed and the level of visitation and recreational activities within the Park would not be influenced by the Project.

Proposed Action (Project)

The Project is designed to create open backwater, wetland, riparian, and upland habitat within the Project area where it is currently being utilized as a designated OHV recreation area (Figure 2.4-4). The implementation of the Project would allow for the continued use and operation of OHVs along the perimeter of the Project area, where the designated OHV access trails are currently located.

Although OHV use and operation are occurring within small pockets of the densely vegetated areas, excavation of the open backwater would occur in these areas where
access is currently limited because of the existing dense vegetation (Figure 2.2-1).

During construction of Phases 1 through 3, construction activities would temporarily limit
the OHV recreational use because adjacent areas would be used by the Project until
the backwaters and other habitat areas are established (Figure 2.4-1).

OHV recreational use and other recreational activities would not be prohibited or
encouraged where the open backwater, wetland, riparian, and upland areas are
developed (Figure 2.4-1).

It is anticipated that short-term/temporary impacts to Park operations and recreation
would occur during construction. However, this would be short-term and once the
Project is completed, the Project area would blend into the existing landscape and the
regional Park would maintain its current operations.

Cumulative Impacts

The analysis area for potential cumulative impacts related to Recreation was defined as
the Project area since no cumulative impacts are anticipated outside the Project area.
Although the Project would limit OHV recreational use to the perimeter of the Project
area during construction, no potential impacts are anticipated within the area of analysis
and no cumulative impacts are anticipated to recreation because the Project design
would not impact the current operations of the Park.

3.15.5 Mitigation Summary (CEQA Only)

The Project would not result in significant impacts to Recreation. Therefore, no
mitigation is required.
3.16 TRANSPORTATION/TRAFFIC

<table>
<thead>
<tr>
<th>TRANSPORTATION/TRAFFIC – Would the Project:</th>
<th>Potentially Significant Impact</th>
<th>Less Than Significant with Mitigation</th>
<th>Less Than Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?</td>
<td>☐</td>
<td>✗</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?</td>
<td>☐</td>
<td>✗</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>✗</td>
</tr>
<tr>
<td>d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>✗</td>
</tr>
<tr>
<td>e) Result in inadequate emergency access?</td>
<td>☐</td>
<td>✗</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?</td>
<td>☐</td>
<td>✗</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

3.16.1 Environmental Setting

The Project is within an area that is currently operated as a regional Park that supports boating, camping, RV spaces, cabin sites and similar recreational vehicles during peak use weekends and holidays.

The Project area is surrounded by a local paved access road where Park visitors can access the boating and camping areas, RV spaces, and OHV trails within the designated site (Figure 2.2-1). This road may also be accessed by emergency response personnel and County staff for Park maintenance and operations.

In addition to the roads, the adjacent Park areas are accessed via the River and the Park Moabi Channel. Boats and other watercrafts access boat slips, launch areas, and the River banks.
3.16.2 Regulatory Setting

The following Federal and State laws and regulations pertaining to this issue area and relevant to the Project are identified in Table 3.16-1.

Table 3.16-1. Federal and/or State Laws, Regulations, and Policies Potentially Applicable to the Project (Transportation/Traffic)

| U.S. | Ports and Waterways Safety Act | This Act provides the authority for the USCG’s program to increase vessel safety and protect the marine environment in ports, harbors, waterfront areas, and navigable waters, including by authorizing the Vessel Traffic Service, controlling vessel movement, and establishing requirements for vessel operation. |
| CA  | California Vehicle Code        | Chapter 2, Article 3 of the Vehicle Code defines the powers and duties of the California Highway Patrol, which has enforcement responsibilities for the vehicle operation and highway use in the State. |
| CA  | Other                         | The California Department of Transportation is responsible for the design, construction, maintenance, and operation of the California State Highway System and the portion of the Interstate Highway System in California. |

The following goals and policies related to transportation/traffic are from the San Bernardino County 2007 General Plan:

- Chapter III. Circulation and Infrastructure Element – Section D. Countywide Goals and Policies of the Circulation and Infrastructure Element

3.16.3 Impact Analysis (CEQA)

a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?

b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?

Less than Significant with Mitigation. Vehicle traffic related to the Project is anticipated to be primarily due to traffic related to construction activities during Phases 1 through 3 of the Project. The Project is not intended or designed to increase traffic that is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either number of vehicle trips, volume to capacity ratio on roads, or congestion at intersections), or exceed, either individually or cumulatively, a level of service standard. There is no travel management plan within the Park. All posted speed limits, road signs, and existing traffic laws would be obeyed.
During Phase 4 of the Project, sediment management may be required to ensure appropriate flows through the Project’s backwater area. This would be anticipated once every 10 to 15 years or as needed depending on River conditions. It is anticipated that this work would be conducted with dredging equipment as part of Reclamation’s dredging and bankline/levee maintenance activities.

For purposes of this analysis, on-water navigation of boats was considered a form of transportation. If not properly submerged, the dredge pipe (to be used for required periodic maintenance) could interfere with boat traffic, creating a potentially significant impact. To provide assurance that impacts to transportation within navigable waters would remain less than significant, MM TT-1 would be implemented.

**MM TT-1: Placement of Dredge Pipe in Navigable Waters.** The dredge pipe used to move dredge material across the River shall be submerged at a depth where no obstruction to the navigable waters would occur, as follows:

- At least 10 feet from the bottom of the River if there is no obstruction to the navigable waterway.

- If there is still obstruction, the pipe shall be laid at the bottom of the River to ensure there is no obstruction.

**c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?**

**No Impact.** The Project would not affect air traffic patterns at any airport or airstrip as no airport facilities are located in the vicinity of the site.

**d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?**

**No Impact.** The Project does not propose any changes to the existing roadway alignment or lane configurations that would result in sharp curves or dangerous intersections.

**e) Result in inadequate emergency access?**

**f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?**

**Less than Significant with Mitigation.** Activities associated with the Project would not impede existing emergency response plans for the Project area and/or other land uses in the Project vicinity. All vehicles and stationary equipment would be staged off of public roads and would not block emergency access routes.
Implementation of the Project has the potential to result in temporary road closures during construction of the water control structures at the northern and southern ends of the newly created open backwater channel (Figure 2.4-1). Although road closure would be temporary, to provide assurance that emergency and public access is not affected and would remain less than significant, the following MM TT-2 would be incorporated into the Project:

**MM TT-2: Traffic Plan During Construction.** A traffic plan shall be developed to ensure emergency and public access within the proposed Project Area is not affected. The Traffic Plan shall include, but is not limited to, the following:

- Not involve any long-term increase in traffic that would conflict with adopted policies, plans, or programs supporting alternative transportation or obstruct current access within and around the Project area;
- Provide an ingress and egress to the Project area;
- Ensure traffic and safety signed are posted appropriately;
- Provide trained personnel to ensure the implementation of the Traffic Plan; and
- Ensure coordination and communication with local emergency response agencies.

### 3.16.4 Environmental Consequences (NEPA)

#### No Action Alternative

The No Action Alternative would have no impacts related to Transportation/Traffic. The Project would not be implemented and the Park would continue to be operated as a regional Park with activities as boating, camping, and limited stay mobile housing within the Park boundaries. Additional open backwater habitat would not be constructed and the level of visitation and recreational activities within the Park would remain at its current level.

#### Proposed Action (Project)

The Project would result in a temporary increase in traffic related to construction and other vehicles traveling to the Project area during Phases 1 through 3. After construction, there would be occasional vehicles traveling to the Project area for operation and maintenance purposes. This occasional travel is not expected to result in a measurable increase in Park traffic.

During Phase 4 of the Project, sediment management may be required to ensure appropriate flows through the Project’s backwater area. Minor impacts are anticipated during dredging operations because dredging activities would be temporary and would...
be conducted once every 5 to 10 years or as needed depending on River conditions. To provide assurance that the impacts to transportation within navigable waters would remain minor, MM TT-1 would be implemented.

The Project would have minimal impacts to transportation because construction traffic would be managed in accordance with Park requirements and there would be no measurable increase in long-term traffic. In addition, the design of the Project would not alter the exiting roadway alignment. Although temporary road closures may be anticipated, MM TT-2 would be implemented to avoid effects on emergency and public access on the existing roadways.

**Cumulative Impacts**

The analysis area for potential cumulative impacts related to Transportation/Traffic was defined as the Project area since no cumulative impacts are anticipated outside the Project area. Less than significant impacts are anticipated within the area of analysis and no cumulative impacts are anticipated to transportation because the Project is not designed to encourage increased traffic within the Project area.

**3.16.5 Mitigation Summary (CEQA Only)**

Implementation of the following mitigation measures would reduce the potential for Project-related impacts to Transportation/Traffic to less than significant.

- MM TT-1: Placement of Dredge Pipe in Navigable Waters
- MM TT-2: Traffic Plan During Construction
### 3.17 UTILITIES AND SERVICE SYSTEMS

<table>
<thead>
<tr>
<th>UTILITIES AND SERVICE SYSTEMS – Would the Project:</th>
<th>Potentially Significant Impact</th>
<th>Less Than Significant with Mitigation</th>
<th>Less Than Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>d) Have sufficient water supplies available to serve the Project from existing entitlements and resources, or are new or expanded entitlements needed?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>e) Result in a determination by the wastewater treatment provider which serves or may serve the Project that it has adequate capacity to serve the Project’s projected demand in addition to the provider’s existing commitments?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>f) Be served by a landfill with sufficient permitted capacity to accommodate the Project’s solid waste disposal needs?</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
</tr>
<tr>
<td>g) Comply with federal, state, and local statutes and regulations related to solid waste?</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
</tr>
</tbody>
</table>

#### 3.17.1 Environmental Setting

Currently, the Park supports existing grouped RV sites, or point sites, that contain utility hook-ups including electrical pedestal with 50/30/20 Amp outlets. The group "point sites" currently accommodate various numbers of RV’s and other similar recreational vehicles (e.g., fifth wheel travel trailer, travel trailer, truck camper, and folding pop-up tent trailer). Minimum accommodations are driven by the number of provided hook-ups. In addition, the Park supports finished RV and cabin sites.

Water for LCR MSCP’s conservation and restoration projects is supplied through the LCR MSCP Water Accounting Agreement (Agreement) discussed under Section 1.5.
3.17.2 Regulatory Setting

No Federal or State laws relevant to this issue area are applicable to the Project. The following local goals and policies are from the San Bernardino County 2007 General Plan:

- Chapter III. Circulation and Infrastructure Element – Section D. Countywide Goals and Policies of the Circulation and Infrastructure Element

3.17.3 Impact Analysis (CEQA)

a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?

b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project’s projected demand in addition to the provider’s existing commitments?

No Impact. The Project design would not require the use and/or construction of a wastewater treatment facility. Wastewater would not be generated by implementation of the Project; thus, no impacts are anticipated that would exceed any threshold set by the RWQCB or cause significant environmental effects due to the use or construction of a wastewater facility.

d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?

No Impact. The Project would be supplied by River water that would be diverted through an open backwater channel system designed to return flows back into the River (Figure 2.4-4). Water used for the Project would be controlled by the two water control structures at the north and south ends of the channel system to provide management flexibility (Figure 2.4-1). Since LCR MSCP projects are supplied through the Agreement and water flows would be returned to the River by way of the Park Moabi Channel, no impacts are anticipated.

f) Be served by a landfill with sufficient permitted capacity to accommodate the project’s solid waste disposal needs?

g) Comply with federal, state, and local statutes and regulations related to solid waste?
Less than Significant Impact. During Phases 1 and 2 of the Project, solid waste would be generated primarily through the clearing of vegetation and construction activities. Vegetation cleared from the site would be placed directly adjacent to the Project area and buried onsite by the excavation material generated from the creation of the open backwater channel system (Figure 2.4-1), where it would naturally decompose.

Minimal waste would be generated after Phases 1 through 3 are completed. Solid waste generated by the Project would be recycled, diverted where possible, or taken to the local landfill.

3.17.4 Environmental Consequences (NEPA)

No Action Alternative

The No Action Alternative would have no impacts related to Utilities and Service Systems. The Project would not be implemented and the Park would continue to be operated as a regional Park. No additional utilities or system services would be utilized by the Project.

Proposed Action (Project)

The implementation of the Project would have no potential impacts to utilities and service systems since no generation of wastewater is anticipated; thus, no wastewater treatment facilities would be built or utilized for the Project.

In addition, although solid waste would be generated, the majority of the solid waste generated by vegetation clearing would be buried onsite (Figure 2.4-1) and solid waste generated by construction activities would be diverted/recycled where possible to minimize solid waste disposal into the local landfill.

Cumulative Impacts

The analysis area for potential cumulative impacts related to Utilities and Service Systems was defined as the Project area since no cumulative impacts are anticipated outside the Project area. No cumulative impacts are related to wastewater because no wastewater would be generated because the Project would not be designed to encourage increased visitation within the Project area. Although solid waste would be generated during Phases 1 through 2, less than significant impacts are anticipated within the area of analysis and no cumulative impacts are anticipated because the primary source of solid waste would be vegetation with minimal solid waste generated by construction activities.

3.17.5 Mitigation Summary (CEQA Only)

The Project would result in less than significant impacts to Utilities and Service Systems. Therefore, no mitigation is required.
### 3.18 MANDATORY FINDINGS OF SIGNIFICANCE

The lead agency shall find that a project may have a significant effect on the environment and thereby require an EIR to be prepared for the project where there is substantial evidence, in light of the whole record, that any of the following conditions may occur. Where prior to commencement of the environmental analysis a project proponent agrees to MMs or project modifications that would avoid any significant effect on the environment or would mitigate the significant environmental effect, a lead agency need not prepare an EIR solely because without mitigation the environmental effects would have been significant (per State CEQA Guidelines, § 15065).

<table>
<thead>
<tr>
<th><strong>MANDATORY FINDINGS OF SIGNIFICANCE</strong></th>
<th>Potentially Significant Impact</th>
<th>Less Than Significant with Mitigation</th>
<th>Less Than Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Does the project have impacts that are individually limited, but cumulatively considerable? (“Cumulatively considerable” means that the incremental effects of a project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of past, present and probable future projects)?</td>
<td></td>
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</tr>
<tr>
<td>c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?</td>
<td></td>
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</tbody>
</table>

### 3.18.1 Discussion of Impacts

**a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?**

**Less than Significant with Mitigation.** Based on the analysis contained in this EA/MND, impacts to the following environmental issue areas are considered as having a less than significant or no impact on the environment.
Environmental Consequences and Analysis – Mandatory Findings of Significance

1. Aesthetics/Visual Resources
2. Agriculture and Forestry Resources
3. Air Quality
4. Geology and Soils
5. Greenhouse Gas Emissions and Climate Change
6. Land Use and Planning
7. Mineral Resources
8. Noise
9. Population and Housing
10. Public Services
11. Recreation
12. Utilities and Service Systems

The results of the EA/MND show that there are less than significant impacts with mitigation measures to the following resources:

- **Biological Resources (Desert Wash/Riparian habitat and nesting birds).** These impacts will be reduced to less than significant after incorporation of MM BIO-1, MM BIO-2, MM BIO-3, MM BIO-4, and MM BIO-5. Therefore, the Project would not degrade the quality of the environment and no habitat, wildlife populations, or plant and animal communities would be impacted.

- **Cultural and Paleontological Resources/Traditional Cultural Properties/Sacred Sites.** Although within the known conditions of the Project area, no impacts are anticipated to Cultural Resources. However, in the event of discovery of cultural and paleontological resources/cultural properties/sacred sites, human remains, and/or historic places, impacts can potentially become significant. To provide assurance that impacts to cultural and paleontological resources/traditional cultural properties/sacred sites would remain less than significant, in the event of discovery, MM CUL-1 and MM CUL-2 would be implemented.

- **Hazards and Hazardous Materials/Human Health and Safety.** Within the known conditions of the Project area, no hazardous materials/human health and safety/contaminants have been identified and no impacts are anticipated. However, in the event of discovery of hazardous materials/contaminants, impacts could potentially become significant. To provide assurance that impacts related to hazards and hazardous materials would remain less than significant, in the event of discovery, MM HHM-1 would be implemented.

  In addition, the use of fuel based equipment and application of herbicides can pose the potential for spills or overspray. These impacts will be reduced to less than significant after incorporation of MM HHM-2.

- **Hydrology and Water Quality.** The Project includes activities that could result in toxics being released into the water during dredging, cutting, and
grading to create the backwater. This impact would be reduced to less than significant through compliance with MM HHM-2 and implementation of measures required by other regulatory permits.

- **Transportation/Traffic.** The Project may impact transportation/traffic with the implementation of Phase 1 through Phase 2. These impacts will be reduced to less than significant after incorporation of MM TT-1 and MM TT-2. Therefore the Project area would not prevent access for Park users and emergency responders to the Project area.

  b) **Does the project have impacts that are individually limited, but cumulatively considerable?** ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?

  **Less than Significant Impact.** The analysis in this EA/MND demonstrated that the Project would be in compliance with all applicable regional plans including, but not limited to, water quality control plan, air quality maintenance plan, and plans or regulations for the reduction of greenhouse gas emissions. Compliance with these regional plans serves to reduce impacts on a regional basis so that the Project would not result in impacts that considered with the effects of other past, present, and probable foreseeable future projects, would be cumulatively considerable.

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

  **Less than Significant Impact.** As discussed in this EA/MND, the Project would not expose persons to adverse impacts related to Air Quality, Greenhouse Gas Emissions, Land Use and Planning, Noise, Population and Housing, Public Services, Recreation, Transportation/Traffic hazards, or Environmental Justice and Indian Trust Assets or Tribal Lands. These impacts were identified to have no impact or a less than significant impact. Thus, there would be no substantial adverse effects on human beings, either directly or indirectly.
4.0 ADDITIONAL NEPA AND CEQA CONSIDERATIONS

4.1 ENVIRONMENTAL JUSTICE

State

Environmental justice is defined by California law as “the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies.” This definition is consistent with the Public Trust Doctrine principle that the management of trust lands is for the benefit of all of the people. The CSLC adopted an environmental justice policy in October 2002 to ensure that environmental justice is an essential consideration in the agency’s processes, decisions, and programs. Through its policy, the CSLC reaffirms its commitment to an informed and open process in which all people are treated equitably and with dignity, and in which its decisions are tempered by environmental justice considerations.

As part of the CSLC environmental justice policy, the CSLC pledges to continue and enhance its processes, decisions, and programs with environmental justice as an essential consideration by:

1) Identifying relevant populations that might be adversely affected by CSLC programs or by projects submitted by outside parties for its consideration;

2) Seeking out community groups and leaders to encourage communication and collaboration with the CSLC and its staff;

3) Distributing public information as broadly as possible and in multiple languages, as needed, to encourage participation in the CSLC’s public processes;

4) Incorporating consultations with affected community groups and leaders while preparing environmental analyses of projects submitted to the CSLC for its consideration;

5) Ensuring that public documents and notices relating to human health or environmental issues are concise, understandable, and readily accessible to the public, in multiple languages, as needed;

6) Holding public meetings, public hearings, and public workshops at times and in locations that encourage meaningful public involvement by members of the affected communities;

7) Educating present and future generations in all walks of life about public access to lands and resources managed by the CSLC;

8) Ensuring that a range of reasonable alternatives is identified when siting facilities that may adversely affect relevant populations and identifying, for the CSLC’s consideration, those that would minimize or eliminate environmental impacts affecting such populations;
Additional NEPA and CEQA Considerations

9) Working in conjunction with Federal, State, regional, and local agencies to ensure consideration of disproportionate impacts on relevant populations, by instant or cumulative environmental pollution or degradation;

10) Fostering research and data collection to better define cumulative sources of pollution, exposures, risks, and impacts;

11) Providing appropriate training on environmental justice issues to staff and the CSLC so that recognition and consideration of such issues are incorporated into its daily activities;

12) Reporting periodically to the CSLC on how environmental justice is a part of the programs, processes, and activities conducted by the CSLC and by proposing modifications as necessary.

Federal

Executive Order (EO) 12898 “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations” directs Federal agencies to determine whether their programs, policies, and activities have disproportionately high and adverse human health or environmental effects on minority and low-income populations. Under the EO, low-income populations are defined as those living below the poverty level. Minorities are defined as members of the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic.

Affected Environment

The analysis area for Environmental Justice includes Census Area of Needles, CA. Population and income data for the Project area that were obtained from the U.S. Department of Commerce-Bureau of the 2010 Census at the census area level (Census 2009). Data were used from the 2010 census of the population as the 2015 data were not yet available.

According to Council on Environmental Quality (CEQ) Guidance, communities should be identified as “low income” based on the annual statistical poverty thresholds from the U.S. Census Bureau (CEQ 1997). Table 4.1-1 includes per capita income, median household income, and poverty rates for Needles, CA.

<table>
<thead>
<tr>
<th>Census Area</th>
<th>Total Population</th>
<th>Per Capita Income</th>
<th>Median Household Income</th>
<th>Percent of Households Below Poverty Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Needles, CA</td>
<td>4,844</td>
<td>$17,906</td>
<td>$30,051</td>
<td>27.0%</td>
</tr>
</tbody>
</table>

1 U.S. Census Bureau. Information was retrieved from the US Census Bureau from the 2010 Census and the 2013 American Community Survey 5-Year Estimates at: http://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml
In accordance with CEQ Guidance, minority populations should be identified if the minority population in the Project area “exceeds 50 percent” or if the percentage of minority population in the Project area is meaningfully greater than the “minority population percentage in the general population or other appropriate unit of analysis” (CEQ 1997). For this analysis, the population percentages of the various racial and ethnic groups are compared to those in Needles, CA to determine any disproportionately high and adverse effects (Table 4.1-2).

**Table 4.1-2. Area Demographic Breakdown**

<table>
<thead>
<tr>
<th>Race</th>
<th># of Individuals</th>
<th>% of Total for Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>3,669</td>
<td>75.7</td>
</tr>
<tr>
<td>Black or African American</td>
<td>95</td>
<td>2.0</td>
</tr>
<tr>
<td>American Indian</td>
<td>399</td>
<td>8.2</td>
</tr>
<tr>
<td>Asian</td>
<td>35</td>
<td>.7</td>
</tr>
<tr>
<td>Native Hawaiian and other Pacific Islander</td>
<td>9</td>
<td>.2</td>
</tr>
<tr>
<td>Other</td>
<td>323</td>
<td>6.7</td>
</tr>
<tr>
<td>Two or more Races</td>
<td>314</td>
<td>6.5</td>
</tr>
<tr>
<td>Hispanic or Latino (Of any Race)</td>
<td>1,083</td>
<td>22.4</td>
</tr>
</tbody>
</table>

Minority populations in the Census Area did not exceed 50 percent of the analysis area for Environmental Justice. The percentage of minority population in the Census Area was not found to be meaningfully greater than the minority population percentage for Needles, CA. The minority populations present in the Needles, CA do not meet the thresholds identified for Environmental Justice analysis, therefore are not addressed further in an Environmental Justice context.

**Analysis/Environmental Consequences**

**No Action Alternative**

The no-action alternative would not result in disproportionately high and adverse human health or environmental effects on minority and low-income populations. A minority population was not identified for the analysis area. Based on the existing condition of other resources at and in the vicinity of Project area, there are no known high and adverse health or environmental effects occurring that would impact low-income populations.

**Proposed Action (Project)**

The Project would not result in disproportionately high and adverse human health or environmental effects on minority and low-income populations. A minority population was not identified for the analysis area. The percent of individuals below poverty levels in the Census Area is at 27.8 percent, which is 12.4 percent higher than the national average in 2010. Although Census Area shows a higher poverty rate than the national...
average of 15.4 percent, no high and adverse human health or environmental effects have been identified that may impact this Census Area.

*Cumulative Impacts*

There were no Environmental Justice impacts identified for Needles, CA from the Project. Therefore, there would be no cumulative impacts.

4.2 INDIAN TRUST ASSETS OR TRIBAL LANDS

**Affected Environment**

Indian Trust Assets (ITAs) are legal interests in property held in trust by the United States for Indian Tribes or individuals. The Secretary of the Interior, acting as the trustee, holds many assets in trust. Examples of objects that may be trust assets are lands, minerals, hunting and fishing rights, and water rights. While most ITAs are on reservations, they may also be found off-reservations. The United States has an Indian trust responsibility to protect and maintain rights reserved by or granted to Indian Tribes or Indian individuals by treaties, statutes, and EOs. These are sometimes further interpreted through court decisions and regulations.

Tribal lands are lands that have been deeded to tribes or upon which tribes have a historical claim. There are no ITA or Tribal lands identified within or directly adjacent to the Project area.

**Analysis/Environmental Consequences**

**No Action Alternative**

Since there are no identified ITAs or Tribal lands within the Project area and the Project would not be implemented, the No Action Alternative would not result in any impacts to ITAs or Tribal lands.

**Proposed Action Alternative (Project)**

Since there are no identified ITAs or Tribal lands within the Project area, there are no anticipated impacts to ITA or Tribal lands as a result of the Project.

**Cumulative Impacts**

Since there are no identified ITAs or Tribal lands within the Project area, there would be no anticipated cumulative impacts to ITAs or Tribal lands.
5.0 MITIGATION MONITORING PROGRAM

The California State Lands Commission (CSLC) is the lead agency under the California Environmental Quality Act (CEQA) for the Mohave Valley Conservation Area Backwater Project (Project). In conjunction with approval of this Project, the CSLC adopts this Mitigation Monitoring Program (MMP) for implementation of mitigation measures (MMs) for the Project to comply with Public Resources Code section 21081.6, subdivision (a) and State CEQA Guidelines sections 15091, subdivision (d), and 15097.

The Project authorizes Bureau of Reclamation (Reclamation) and the California Department of Fish and Wildlife (CDFW or Applicant) to create, manage, and monitor the backwater habitat accordance with the MMP and any additional terms and conditions contained in proposed CSLC Lease No. PRC 9239.9.

5.1 PURPOSE

It is important that significant impacts from the Project are mitigated to the maximum extent feasible. The purpose of a MMP is to ensure compliance and implementation of MMs; this MMP shall be used as a working guide for implementation, monitoring, and reporting for the Project’s MMs.

5.2 ENFORCEMENT AND COMPLIANCE

The CSLC is responsible for enforcing this MMP. Reclamation and CDFW are responsible for the successful implementation of and compliance with the MMs identified in this MMP. This includes all field personnel and contractors working for the Applicant.

5.3 MONITORING

The CSLC staff may delegate duties and responsibilities for monitoring to other environmental monitors or consultants as necessary. Some monitoring responsibilities may be assumed by other agencies, such as affected jurisdictions, cities, and/or the CDFW. The CSLC and/or its designee shall ensure that qualified environmental monitors are assigned to the Project.

Environmental Monitors. To ensure implementation and success of the MMs, an environmental monitor must be on site during all Project activities that have the potential to create significant environmental impacts or impacts for which mitigation is required. Along with the CSLC staff, the environmental monitor(s) are responsible for:

- Ensuring that the Applicant has obtained all applicable agency reviews and approvals;
- Coordinating with the Applicant to integrate the mitigation monitoring procedures during Project implementation (for this Project, many of the monitoring procedures shall be conducted during Phases 1 through 3); and
- Ensuring that the MMP is followed.
The environmental monitor shall immediately report any deviation from the procedures identified in this MMP to the CSLC staff or its designee. The CSLC staff or its designee shall approve any deviation and its correction.

**Workforce Personnel.** Implementation of the MMP requires the full cooperation of Project personnel and supervisors. Many of the MMs require action from site supervisors and their crews. The following actions shall be taken to ensure successful implementation.

- Relevant mitigation procedures shall be written into contracts between the Applicant and any contractors.
- For this Project, a Worker Environmental Awareness Program (under MM BIO-1) shall be implemented and all personnel would be required to participate.

**General Reporting Procedures.** A monitoring record form shall be submitted to the Applicant, and once the Project is complete, a compilation of all the logs shall be submitted to the CSLC staff. The CSLC staff or its designated environmental monitor shall develop a checklist to track all procedures required for each MM and shall ensure that the timing specified for the procedures is followed. The environmental monitor shall note any issues that may occur and take appropriate action to resolve them.

**Public Access to Records.** Records and reports are open to the public and would be provided upon request.

### 5.4 MITIGATION MONITORING PROGRAM

This section presents the Mitigation Monitoring Program (Table 5-1) for the following environmental disciplines: Biological Resources, Cultural and Paleontological Resources/Traditional Cultural Properties/Sacred Sites, Hazards/Hazardous Materials/Human Health and Safety, Hydrology and Water Quality, and Transportation/Traffic. All other environmental disciplines were found to have less than significant or no impacts and are therefore not included below. The table lists the following information, by column:

- Potential Impact;
- Mitigation Measure (full text of the measure);
- Location (where impact occurs and mitigation measure should be applied);
- Monitoring/Reporting Action (action to be taken by monitor or Lead Agency);
- Timing (before, during, or after construction; during operation, etc.);
- Responsible Party; and
- Effectiveness Criteria (how the agency can know if the measure is effective).
### Table 5.1. Mitigation Monitoring Program

<table>
<thead>
<tr>
<th>Potential Impact</th>
<th>Mitigation Measure (MM)</th>
<th>Location</th>
<th>Monitoring/Reporting Action</th>
<th>Timing</th>
<th>Responsible Party</th>
<th>Effectiveness Criteria</th>
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<td><strong>Biological Resources</strong></td>
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</table>
| Special-Status Species | **MM BIO-1. Worker Environmental Awareness Program (WEAP).** Prior to initiating work at the site, an education program (WEAP) will be provided by the Project Biologist to workers. The WEAP shall include:  
  - Brief life history;  
  - Ecology;  
  - Identification;  
  - Legal protections afforded all potentially occurring special-status plant and animal species as well as the identified protective measures; and  
  - Implications of noncompliance.  
  All persons employed or otherwise working on the Project sites shall attend a WEAP presentation prior to performing any work on site. | Not Applicable | Submit a copy of the training material, duration of training, attendees sign-in sheet to CSLC before starting work. | Before work | Applicant/Contractors/CSLC | Minimize/Avoid impacts to special status species |
<p>| MM BIO-2: Designated Project Biologist. At least 30 days before initiating Project activities, the Project proponent shall obtain the California Department of Fish and Wildlife’s written approval for a designated Project Biologist/biological field contact representative. The Project Biologist shall be on site during initial Project activities and as necessary to oversee activities described for monitoring breeding and nesting (MM BIO-3) avoidance measures and may halt Project activities that are in violation. In addition, all occurrences of MSCP covered species and California sensitive species observed in the Project area will be submitted to the CNDDB by the Project Biologist or the long-term site monitor, as appropriate (information and forms at <a href="http://www.dfg.ca.gov/biogeodata/cnddb/submitting_data_to_cnddb.asp">http://www.dfg.ca.gov/biogeodata/cnddb/submitting_data_to_cnddb.asp</a>). | Project Site and Vicinity | Submit name and contact information of Biologist, and any monitoring records to CSLC before starting work | Before work and during work; during long-term monitoring | Applicant/Contractors/CDFW | Minimize impacts to migratory birds and special status species |</p>
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<tr>
<th>Potential Impact</th>
<th>Mitigation Measure (MM)</th>
<th>Location</th>
<th>Monitoring/Reporting Action</th>
<th>Timing</th>
<th>Responsible Party</th>
<th>Effectiveness Criteria</th>
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<td><strong>MM BIO-3. Bird Breeding Season Avoidance.</strong> To the extent feasible, all work for</td>
<td>Sensitive habitat areas</td>
<td>Comply and coordinate with the</td>
<td>Before work and during work</td>
<td>Applicant/Contractors/CDFW</td>
<td>Minimize impacts to migratory birds and special status species</td>
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<td>Phases 1 and 2 shall be conducted outside the breeding season (September 1 through</td>
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<td>appropriate CDFW staff.</td>
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<td>February 28) to reduce the possibility of abandonment, or commenced prior to</td>
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<td>occupation by sensitive birds in the spring in order to prevent occupation and</td>
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<td>breeding/nesting. If ground disturbance or vegetation clearing is needed during the</td>
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<td>breeding/nesting season for any phase, a pre-construction survey will be completed</td>
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<td>by the Project Biologist and a minimum 100-foot buffer will be enforced around all</td>
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<td>nests until the young have fledged.</td>
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<td><strong>Invasive Species</strong></td>
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<td><strong>MM BIO-4. Reduce Terrestrial Invasive Species.</strong> All vehicles and equipment</td>
<td>Project Site and Vicinity</td>
<td>Comply</td>
<td>Before work and during work</td>
<td>Applicant/Contractors</td>
<td>Minimize spread of terrestrial invasive species</td>
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<td>entering and leaving the site will be properly cleaned to avoid spreading non-native</td>
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<td>invasive species.</td>
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<td><strong>MM BIO-5. Reduce Aquatic Invasive Species.</strong> All vehicles and equipment will be</td>
<td>Project Site and Vicinity</td>
<td>Comply</td>
<td>Before work and during work</td>
<td>Applicant/Contractors</td>
<td>Minimize spread of aquatic invasive species</td>
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<td>appropriately washed by implementing the “Clean, Drain, Dry” philosophy to prevent</td>
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<td>the spread of aquatic invasive species like the quagga mussel [<a href="https://www.wildlife.">https://www.wildlife.</a></td>
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<td>ca.gov/Conservation/Invasives/Quagga-Mussels](<a href="https://www.wildlife.ca.gov/Conservation/">https://www.wildlife.ca.gov/Conservation/</a></td>
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<td>Invasives/Quagga-Mussels).</td>
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<td></td>
<td><strong>Cultural and Paleontological Resources/Traditional Cultural Properties/Sacred Sites</strong></td>
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<td></td>
<td><strong>Cultural Resources and Human Remains</strong></td>
<td>Project Site and Vicinity</td>
<td>Comply and coordinate with CSLC</td>
<td>During work</td>
<td>Applicant/Contractors/CSLC</td>
<td>Minimize impacts to cultural resource</td>
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<td><strong>MM CUL-1. Discovery of Unanticipated Cultural Resources.</strong> Should additional</td>
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<td>cultural materials such as archaeological and/or historical resources be uncovered</td>
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<td>during earthmoving activities, all work in that area shall cease immediately and a</td>
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<td>qualified archeologist shall be retained to access the findings and CSLC staff shall</td>
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<td>be contacted immediately. Earthmoving shall be diverted no closer than 100 feet</td>
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<td>temporarily around the deposits until they have been evaluated, recorded, excavated,</td>
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<td>and/or recovered as</td>
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<td>Potential Impact</td>
<td>Mitigation Measure (MM)</td>
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<td>Monitoring/Reporting Action</td>
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<td>Effectiveness Criteria</td>
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<td>necessary. Construction will be allowed to proceed on the site when the archaeologist, in consultation with the Bureau of Reclamation, CSLC, appropriate Native American Tribe(s) and the County of San Bernardino Museum, determine the resources are recovered to their satisfaction. The State requires that the location of any such findings must be kept confidential and measures should be taken to ensure that the area is secured to minimize site disturbance and potential vandalism. Additional measures to meet these requirements include assessment of the nature and extent of the resource, including its possible eligibility for listing in the National Register of Historic Places, and subsequent recordation and notification of relevant parties based upon the results of the assessment. Title to all abandoned shipwrecks, archaeological sites, and historic or cultural resources on or in the tide and submerged lands of California is vested in the State and under the jurisdiction of the CSLC. The final disposition of archaeological, historical, and paleontological resources recovered on State lands under the jurisdiction of the CSLC must be approved by the Commission.</td>
<td>Project Site and Vicinity</td>
<td>Comply and coordinate with CSLC</td>
<td>During work</td>
<td>Applicant/Contractors/CSLC</td>
<td>Minimize impacts to cultural resource</td>
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</table>

**MM CUL-2. Discovery of Unanticipated Human Remains.** If human remains are encountered during implementation of the Project, all provisions provided in California Health and Safety Code section 7050.5 and California Public Resources Code section 5097.98 shall be followed. Work shall stop within 100 feet of the discovery and a qualified Cultural Resources Specialist must be contacted immediately, who shall consult with the County Coroner. In addition, CSLC staff shall be notified. If human remains are of Native American origin, the County Coroner shall notify the Native American Heritage **
<table>
<thead>
<tr>
<th>Potential Impact</th>
<th>Mitigation Measure (MM)</th>
<th>Location</th>
<th>Monitoring/ Reporting Action</th>
<th>Timing</th>
<th>Responsible Party</th>
<th>Effectiveness Criteria</th>
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<tbody>
<tr>
<td></td>
<td>Commission within 24 hours of this determination and a Most Likely Descendant shall be identified. No work is to proceed in the discovery area until consultation is complete and procedures to avoid and/or recover the remains have been implemented.</td>
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<tr>
<td><strong>Hazardous and Hazardous Materials</strong></td>
<td><strong>MM HHM-1. Discovered Contaminants Protections.</strong> Should contaminants be identified, activity on the site shall cease and a qualified Reclamation Hazardous Materials Specialist for the Project shall be retained to conduct the following: - Obtain samples of the suspected contaminants; - Require lab analysis and access findings to identify specific contaminants; and - Ensure appropriate remediation is conducted and completed in accordance with the regulations specific to the contaminants identified.</td>
<td>Project Site and Vicinity</td>
<td>Comply</td>
<td>During work</td>
<td>Applicant/ Contractors/ CSLC</td>
<td>Minimize impacts to hazards, health and safety</td>
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<tr>
<td><strong>MM HHM-2. Toxic Substances Protections.</strong> To ensure toxic substances are not released into the aquatic environment, the following measures shall be followed: - All engine-powered equipment shall be well-maintained and free of leaks of fuel, oil, hydraulic fluid or any other potential contaminant. - Staging areas for refueling of equipment shall be located away from the backwater and away from the Colorado River to prevent any accidental fuel leakage from contaminating surface water. - A spill prevention and response plan shall be prepared in advance of the commencement of work; a spill kit with appropriate clean-up supplies shall be kept on hand during operations. - The kit shall include a floating oil-absorbent sock that could be immediately deployed and maintained around the Project area in the event of a spill or any accidental leakage of fuel or</td>
<td>Project Site and Vicinity</td>
<td>Comply</td>
<td>During work</td>
<td>Applicant/ Contractors/ CSLC</td>
<td>Minimize impacts to hazards, health and safety</td>
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<td>Potential Impact</td>
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<td>equipment shall not</td>
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<td>and certified fuel</td>
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<td>cans with “no-spill”</td>
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<td>spring-loaded nozzles</td>
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<td>shall be used; and</td>
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<td>materials or other</td>
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<td>liquid or solid</td>
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<td>wastes shall be</td>
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**Hydrology and Water Quality**

**Water Quality** | MM HHM-2 Toxic Substances Protections (see above)

**Transpiration/Traffic**

**Navigable Waters** | MM TT-1 Placement of Dredge Pipe in Navigable Waters. The dredge pipe used to move dredge material across the river shall be submerged at a depth where no obstruction to the navigable waters would occur, as follows:
- At least 10 feet from the bottom of the Colorado River if there is no obstruction to the navigable waterway.
- If there is still obstruction, the pipe shall be laid at the bottom of the Colorado River to ensure there is no obstruction.

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<th>Project Site and Vicinity</th>
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<th>Applicant/Contractors/CSLC</th>
<th>Minimize impacts to navigable waters</th>
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**Temporary Road Closures** | MM TT-2. Traffic Plan During Construction. A traffic plan shall be developed to ensure emergency and public access within the proposed Project Area is not affected. The Traffic plan shall include, but is not

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<th>Minimize impacts to road access and traffic</th>
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6.1 PERSONS/AGENCIES CONSULTED

Local
San Bernardino County

State
California Department of Fish and Wildlife
California Native American Heritage Commission
California State Historic Preservation Office
California State Lands Commission

Federal
Bureau of Land Management
Bureau of Indian Affairs
Bureau of Reclamation
U.S. Army Corps of Engineers
U.S. Fish and Wildlife Service

Tribes
Ah-Mut_Pipa Foundation
Ahamakav Cultural Society, Fort Mohave Indian Tribe
Chemehuevi Indian Tribe
Cocopah Indian Tribe
Colorado River Indian Tribe
Fort Mohave Indian Tribe
Fort Yuma Quechan Tribe
Hopi Tribe of Arizona
Hualapai Tribe
Las Vegas Paiute Tribe
MOAPA Band of Paiutes
Morongo Band of Mission Indians
Pathrump Paiute Tribe
San Manuel Band of Mission Indians
Twenty-Nine Palms Band of Mission Indians

6.2 SCOPING/PUBLIC INVOLVEMENT

The Environmental Assessment/Mitigated Negative Declaration (EA/MND) is anticipated to be available for public comment in October, 2015. A 30 day public comment period on the Draft EA/MND will be provided. Letters will be sent directly to those expressing interest in the Project and the consulting Federal, State, and local agencies would be contacted by Reclamation if any information is released about the Project. An advertisement would be placed in the “Legal” section of the news publication.
Reclamation’s Lower Colorado Regional Office in Boulder City will also prepare a news release to several media outlets and will post the information on its public website at.

6.3 DISTRIBUTION LIST

The distribution list of entities that would be notified that the Draft and Final EA/MND can be accessed for public review online will include:

- Ahamakav Cultural Society, Fort Mohave Indian Tribe
- Ah-Mut_Pipa Foundation
- Bureau of Indian Affairs
- Bureau of Land Management
- Bureau of Reclamation
- California Department of Fish and Wildlife
- California Department of Water Resources
- California Native American Heritage Commission
- California Office of Historic Preservation
- California Regional Water Quality Control Board, Colorado River Basin Region
- California State Historic Preservation Officer
- California State Lands Commission
- Chemehuevi Indian Tribe
- Cocopah Indian Tribe
- Colorado River Indian Tribes
- Fort Mohave Indian Tribe
- Fort Yuma Quechan Tribe
- Hopi Tribe of Arizona
- Hualapai Tribe
- Las Vegas Paiute Tribe
- MOAPA Band of Paiutes
- Mojave Desert Air Quality Management District
- Morongo Band of Mission Indians
- Pathrump Paiute Tribe
- Pirate’s Cove Restaurant & Bar
- San Bernardino County Clerk Office
- San Bernardino County Regional Parks Department
- San Manuel Band of Mission Indians
- Twenty-Nine Palms Band of Mission Indians
- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service

In addition, a paper copy of the Draft and Final EA/MND will be available upon request.
6.4 LIST OF PREPARERS

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Bureau of Reclamation, LCR MSCP

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Bureau of Reclamation, Lower Colorado Regional Office

6.5 REFERENCES CITED


City of Needles. 2015. City of Needles California General Plan, Land Use Map.


______. 2014. Revised Draft Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in


McKenna, Jeanette et al. 2011. A Phase I Cultural Resources Investigation for the Proposed OHV Area-Park Moabi Regional Park Trail Improvements San Bernardino County California, June 3, 2011.


United States Bureau of Reclamation (USBR). 2014. Biological Resource clearance surveys for soil sampling at test pit locations within the proposed Park Moabi Backwater in accordance with the Non-Exclusive Geological Sampling Permit P.R.C. 9283. 9p.


APPENDICES
Lower Colorado River
Park Moabi Backwater Channel Restoration Design

DESIGN REPORT
60% DRAFT

Mojave Valley Conservation Area
Ecological Restoration Project

Park Moabi
San Bernardino County, California

April 9, 2015

Prepared For:
United States Bureau of Reclamation
Lower Colorado Region
500 Fir St.
Boulder City, NV 89005

Prepared By:
Otis Bay, Inc.
Ecological Consultants
PO Box 919
Verdi, NV 89439

AND

Tetra Tech, Inc.
4801 E. Broadway, Suite 521
Tucson, Arizona 85711
Executive Summary

The United States Bureau of Reclamation (USBR) contracted with Otis Bay Ecological Consultants and Tetra Tech, Inc., to design approximately 50 acres of connected backwater habitat on the Lower Colorado River near Needles, CA, within the northern portion of Moabi Regional Park. The backwater habitat will consist of open water and marsh land cover types and is being implemented as part of the Lower Colorado Multi-Species Conservation Program (LCR MSCP). The project will provide critical habitat for the flannelmouth sucker (*Castotomus latipinnis*) and two endangered species of native Colorado River fish, the razorback sucker (*Xyrauchen texanus*) and the bonytail chub (*Gila elegans*).

This 60% Draft Design Report has been prepared in conjunction with the preparation of 60% Draft construction plans and specifications for construction of the backwater habitat. The construction plans and specifications include excavation and grading of the backwater channel, installation of two pre-cast concrete-arch culverts with adjustable sills, riprap erosion protection, a maintenance road, and an access point for small boats. The backwater channel and arch-culvert structures were designed to meet the criteria presented in the USBR’s *Colorado River Side Channel at Park Moabi, California: Conceptual Design* Technical Service Center Sedimentation and River Hydraulics. SRH-2012-26. October 2012.

The vegetative component of the project is not included in this design package and will be implemented by the LCR MSCP at a later date. The proposed land cover types are summarized in Appendix C.
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Appendix A – Hydrologic and Hydraulic Analysis Technical Memorandum
Appendix B – USBR Subsurface Exploration & Geotechnical Data
Appendix C – Landscape/ Land Types Document
Appendix D – 30% Design Concept: Water Control Structure Alternatives Analysis
1. INTRODUCTION

The Lower Colorado River – Park Moabi Backwater Channel Restoration project is designed to provide approximately 50 acres of connected backwater habitat on the Colorado River near Needles, CA, within the northern portion of Moabi Regional Park (Figure 1, Figure 2). The backwater habitat will consist of open water and marsh land cover types and is being implemented as part of the Lower Colorado Multi-Species Conservation Program (LCR MSCP). The project will provide critical habitat for the flannelmouth sucker (Castotomus latipinnis) and two endangered species of native Colorado River fish, the razorback sucker (Xyrauchen texanus) and the bonytail chub (Gila elegans).

The LCR MSCP consists of Federal and non-Federal stakeholders, created to respond to the need to balance the use of Lower Colorado River water resources and the conservation of native species and their habitats in compliance with the Endangered Species Act.

The Moabi Regional Park (Park Moabi) resides within the historic floodplain of the Colorado River. Park Moabi operates on 1,027 acres and has two land owners: the California State Lands Commission and the USBR. The project is located on the northern end of the park where landscape characteristics allow for the development of a connected backwater habitat.

The site is located between two major hydroelectric dams on the Colorado River, Davis Dam upstream and Parker Dam downstream. Flows through this section of the Colorado River are highly regulated and the river stages at Davis Dam can regularly fluctuate up and down 4 feet on a given day, with seasonal stage fluctuations of 7 feet possible.

Following the guidelines of the HCP, the connected backwater channel will flow from the Colorado River through the backwater habitat and will provide accessibility for native fish. The channel will exit into the existing Park Moabi backwater channel. The backwater channel will consist of inlet and outlet control structures, set at equal elevations, with roadway crossings at the upstream and downstream ends. The backwater channel is expected to regularly exchange water with the main river channel during normal conditions, although there will be times when no water enters or exits the channel. Approximately 26 acres of open water, 24 acres of marsh, 15 acres of cottonwood/willow, and 38 acres of upland mesquite habitat will be created.

2. LOCATION

The Mojave Valley Conservation Area (MVCA) is located along the lower Colorado River, approximately 13 miles south of Needles, CA, between river miles 236 and 237 (Figure 1). According to the lease between San Bernardino County and the California State Lands Commission, which came into effect on July 2, 1965, the property of interest commences at the center of Section 6, Township 7 N, and Range 24 E, San Bernardino Meridian (S.B.M.).
3. DESIGN OBJECTIVE

The primary goal of the project is to prepare a design that will create approximately 50 acres of connected backwater habitat for endangered fishes and a mosaic of marsh, riparian, and upland vegetation types. The backwater channel was evaluated over a range of flows to estimate the predicted performance of the design relative to the flow depth, velocity and other criteria described in the scope of work and identified through additional discussions with the USBR.

The design includes excavation and grading for a backwater channel that extends from the Colorado River to the existing Park Moabi Channel and two water-crossing structures over the excavated backwater channel. The structures include adjustable sills and are designed to provide hydraulic control for flows in and out of the backwater channel during moderate to high flows in the Colorado River. Water control structures will also limit the amount of Colorado River bed sediment entering the backwater channel.

The design will provide spatially variable topography with an appropriate distribution of depths and velocities for a variety of aquatic habitats. The design has been developed to limit long-term maintenance requirements.

4. PROJECT SETTING

4.1. Land and Water Requirements

4.1.1. Land Ownership

The project is located on property owned by the State of California, which is currently leased to San Bernardino County. California Department of Fish and Wildlife will lease the area where the backwater channel is to be constructed from CSLC. Reclamation, as implementing agency of the LCR MSCP, will enter into an agreement for restoration activities consistent with the Lower Colorado River Multi-Species Conservation Program with CDFW. Under the California Endangered Species Act (CESA) permit, habitat established in the state of California shall be protected in perpetuity.

4.1.1. Water

As documented in the 2012 Conceptual Design Report, the water for the project is supplied through the LCR MSCP Water Accounting Agreement passed by Congress as part of the Omnibus Public Land Management Act of 2009 (Public Law No. 111-11, Title IX, Subtitle E, 123 Statute 991, 1327-29). The Act permits the USBR to create and manage Conservation Areas, which do not contain any water entitlement from the Secretary of the Interior, by using Colorado River water to meet the performance requirements of the LCR MSCP. Under the Water Accounting Agreement, the USBR shall not consider any resulting increase in evaporation or percolation of Lower Colorado River water to be a diversion or consumptive use.
4.2. Hydrologic & Hydraulic Conditions

4.2.1. Colorado River Dam Release Patterns

Davis Dam (forming Lake Mohave) on the Colorado River is about 70 miles downstream from Hoover Dam (forming Lake Mead) and spans the border between Arizona and Nevada. Water from Lake Mohave is released through the hydroelectric power plant in response to the varying demand for electricity. Below the dam, Colorado River discharge (flow) and stage fluctuate throughout the day.

Average and maximum days were identified within the 7 years of available hourly data at the USBR below Needles Bridge (BNB) and RS 41 (RS41) gages. The maximum flow in the 7 years of data at the BNB gage was approximately 24,000 cfs, which corresponds to a 5-year event at Davis Dam, and was considered a reasonable representation of a regular high flow event at the project site. One-hour interval, 3-day hydrographs which included the days of interest were developed, and used to represent average and high flow events.

In September of 2013, the USBR installed a temporary stage gage to record water-surface elevations directly upstream of the project site. Due to the relatively short period of record, data for previous years and missing data points at this gage location were supplemented with averages of the RS41 and BNB stage data. Preliminary analyses outlined in the Restoration and Development Plan (RDP) found this to be a reasonably accurate approximation of the water surface elevation at the project site (within ±0.5 feet).

5. BASIS OF DESIGN

The basis of design for the backwater channel at Park Moabi is summarized in the following sections.

5.1. Studies and Design Documents

5.2. Survey and Mapping

5.2.1. Topographic Mapping and Survey

The elevations and dimensions of the embankment referenced in this report are based on Field survey, Bathymetric survey and LiDAR sources as combined by the USBR (See Table 1).

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1) As provided by the USBR.

The USBR provided a file with 1-foot interval contours for the project area (SiteTopographyContours.shp) that was previously processed to incorporate the various data sources and was used for the basis of design and earthwork computations.
5.2.2. **Horizontal and Vertical Data**

Horizontal control is based on Universal Transverse Mercator, Zone 11 on the NAD83 Datum. All coordinates are presumed to be grid and not ground.

Vertical control is based on the National Geodetic Vertical Datum of 1929 (NGVD29). Unless otherwise noted, all elevations called out in this report are based on NGVD 29. National Geodetic Survey Program VERTCON version 2.1 was used to convert from North American Vertical Datum of 1988 (NAVD88) to NGVD29 for the control points. A summary of the vertical conversion is provided in Table 2.

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National Geodetic Survey (NGS) vertical and horizontal control points are shown on the project plans.

5.3. **Hydrologic and Hydraulic Design Criteria**

The design of the backwater channel needs to accommodate the daily and seasonal fluctuations in stage on the Colorado River. The backwater channel is expected to regularly exchange water with the main river channel during normal conditions, although there will be times when no water enters or exits the channel. The primary design criterion requires mean velocities through the backwater channel to remain below 0.5 ft/s at mean-high flow conditions, with channel depths ranging between 0 and 15 feet.

### 6. DESIGN NARRATIVE

#### 6.1. General

The project includes a new backwater channel that extends from an inlet at the Colorado River to an exit at the existing Park Moabi Channel. The channel is contoured and graded to include deeper pools and shallower areas to provide fish habitat and to promote the establishment of healthy vegetation. Inlet and outlet structures provide hydraulic control and roadway crossings at the upstream and downstream ends of the new channel.

#### 6.2. Backwater Channel Design

The 60% backwater channel design is based on the grading that was included in the 30% Draft Design with modifications to reduce the number of disconnected islands. HEC-RAS modeling developed for the 60% design was documented in the Hydrologic and Hydraulic Technical Memorandum (Otis Bay and Tetra Tech 2015) included in Appendix A. The results show that mean velocities through the main section of the channel will remain below 0.5 ft/s under high flow conditions, with velocities through the concrete-arch culvert openings peaking at approximately 4 ft/s. The modeling shows that the backwater channel will
decrease the water surface elevation in the Colorado River by less than 0.1 feet and will slightly increase the velocities near the outlet of the project site on the Park Moabi channel. Both changes are considered to be insignificant. Overall, the 60% design meets the design criteria for the backwater channel.

6.3. **Roadway Crossings**

The design includes structural roadway crossings over where the backwater channel intersects existing roadways. The selected structure for each crossing is a concrete-arch culvert equivalent to CONTECH prefabricated O-series arch structure with a concrete base slab foundation. The upstream structure, at the Colorado River inlet is 36 feet wide by 11 feet and 7.75 inches high. The downstream structure, at the exit to the Park Moabi Channel is 38 feet wide by 10 feet and 8.25 inches high. The selected dimensions were based on an iterative analyses of the flow capacity using the HEC-RAS model for the 60% channel design.

The concrete-arch culverts are designed with a cast-in-place concrete floor due to the limited bearing capacities of the existing soils (see Section 7.3). CONTECH prefabricated structures are designed to meet AASHTO Standard Specifications for Highway Bridges - Section 16.8 and LRFD Bridge Design Specifications - Section 12.14, and are manufactured in accordance with ASTM C1504. With suitable foundation design and adequate bearing capacities the CONTECH O-series arch can be designed to safely carry HS20 or highway loads.

6.4. **Water Control Structure**

Water control structures are required at the concrete-arch culverts to regulate the fluctuation of water passing through the backwater channel during moderate to high flows in the Colorado River. The 60% HEC-RAS analysis confirmed that the optimal sill elevation of 453.5 feet that was recommended by the 2012 Conceptual Design Report.

The 60% design includes a stop-log system that will provide an adjustable crest elevation to regulate the water surface in the backwater channel. The stop-log system was selected on the basis of an alternatives analysis that was included in the 30% Draft Design. A copy of this evaluation in letter format is included in Appendix D. Stop logs can either be custom fabricated or specified as one of the available prefabricated options available through a manufacturer. Further structural design of the water control structure will be developed for the 90% submittal.

The intent of the design is to provide a sill elevation with flexibility so that the inflow and outflow from the new backwater channel can be adjusted for adaptive management. Therefore the adjustable sill elevation is design to vary between 452.5 and 454.5 feet. This elevation brackets the elevation (453.5) in the 2012 Conceptual Design by ± 1 foot.

6.5. **Backwater Access point**

The 60% draft design includes a boat ramp facility that is intended for use by the LCR MSCP in maintaining the project. The new boat ramp will be accessed from the existing road along the west side of the project and will be obscured by disposal areas to be inconspicuous to the public. The new boat ramp is 30 feet wide with a slope of 15 percent and intended for lightweight and non-motorized boat launching. The ramp
includes 2-foot diameter boulder breakwaters and gravel fill placed within a Presto Geoweb system. The low-impact design will blend well with the surrounding features.

6.6. Landscape Restoration

The project area and constructed wetlands will be tilled along contours and will be planted to establish four classifications of land type cover including; backwater, marsh, cottonwood/willow, and other riparian areas. Tillage and planting will be performed by the LCR MSCP and is not specifically addressed in this report. Additional information regarding the land type covers is included for reference in Appendix C.

7. SOIL MECHANICS DESIGN

Geotechnical considerations for the 60% design including slope stability, foundation design, riprap requirements, and disposal of material are summarized below.

7.1. Geotechnical Data Collection

Geotechnical investigations and data collection were performed by the USBR in 2014. Eight test pits were excavated to depths of 14 to 23 feet within the project area. Selected samples taken from the test pits were tested to evaluate moisture content, gradation, and plasticity. Direct shear tests and permeability tests were also performed on selected remolded samples. Test pit logs and testing data are documented in Appendix B. Geotechnical characteristics for collected samples are summarized in Table 3.

Table 3. USBR Test Pits Summary

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Test Pit(s) Sample</th>
<th>Density (pcf)</th>
<th>Moisture Content (%)</th>
<th>Coefficient of Permeability (cm/s)</th>
<th>Friction Angle (degrees)</th>
<th>Cohesion (psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sands</td>
<td>TP-14-1 @ 4 ft</td>
<td>101.5</td>
<td>11</td>
<td>2.98x10^{-4}</td>
<td>28.1</td>
<td>0</td>
</tr>
<tr>
<td>Sands</td>
<td>TP-14-2 @ 3 ft</td>
<td>100.9</td>
<td>11</td>
<td>3.27x10^{-4}</td>
<td>29.3</td>
<td>0</td>
</tr>
<tr>
<td>Clay</td>
<td>Combined TP-14-8 (@2ft), 10 (@13ft), 12 (@14ft), &amp; 14 (@14ft)</td>
<td>91.06</td>
<td>21.1</td>
<td>2.30x10^{-7}</td>
<td>22.7</td>
<td>4</td>
</tr>
</tbody>
</table>

7.2. Slope Stability & Bearing Capacity

Field or laboratory testing of the in-situ density and strength of the on-site material is presently unavailable, therefore, geotechnical design parameters for this project will require a conservative assessment. Based on the shear strength testing done by USBR, as noted by the Friction Angle and Cohesion shown in Table 3, graded slopes for the backwater channel should be kept to 3(H):1(V) or flatter.
Based on existing geotechnical data the project structural components will be designed using nominal values provided by the California Building Code (CBC) for material types encountered the in the test pits. The assumed values for geotechnical parameters are summarized in Table 4.

Table 4. Geotechnical Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allowable Vertical Bearing Capacity</td>
<td>1,500 psf</td>
</tr>
<tr>
<td>Allowable Lateral Bearing Capacity</td>
<td>100 psf/foot of depth</td>
</tr>
<tr>
<td>Allowable Lateral Sliding Resistance</td>
<td>130 psf</td>
</tr>
</tbody>
</table>

7.3. Foundation Design

7.3.1. Foundation Characteristics and Preparation

Based on subsurface conditions encountered in the exploratory test pits, groundwater could be encountered in the excavation for the invert of the new arch culverts. Based on nominal CBC allowable bearing capacities an invert base slab foundation should be used for the arch culvert design. Additionally, either loose to medium dense sand or soft to medium stiff clay could be encountered at the invert elevation. It is expected that these conditions will produce a relatively soft or loose bearing surface and difficult working conditions. Therefore, it is recommended that an engineered fill mat be constructed within the area below the new culvert and any appurtenant wing wall footings. The engineered fill should be constructed as follows:

- Over-excavate at least 2 feet below the base of the culvert slab or wall footing elevation
- Stabilize the soft subgrade by working open-graded aggregate material (typically ¾-inch or 1.5-inch crushed rock, coarser for softer subgrade) at least 4 to 6 inches into the soil.
- Place non-woven geotextile, Mirafi 180N or approved equivalent, over the stabilized subgrade.
- Place and compact well-graded select aggregate base fill over the geotextile.

7.3.2. Limitations

The existing data does not allow for detailed evaluation of a number of factors that may be pertinent to the project. The factors are discussed below:

- **Foundation Design:** If structural design requires higher than the nominal CBC code values, exploratory borings with laboratory strength testing or Cone Penetrometer Test (CPT) should be performed at the structure locations.
- **Seismic Evaluation:** If structural design requires evaluation of soil liquefaction and seismic deformation potential, exploratory borings or CPT would be required to depths of at least 50 feet below grade.
• **Corrosion**: Assessment of corrosion potential of the on-site soils would require retrieval of bulk samples and testing of material. Samples from previous exploration could be used if they have not been removed from the sample bag.

• **Seepage Analysis**: Detailed evaluation/modeling of seepage below the concrete-arch culverts would require exploratory borings or CPT at each structure to evaluate the site-specific soil stratigraphy.

• **Steeper Slopes**: Construction of slopes steeper than 3H:1V would require knowledge of in-situ strength of the material. This would require exploratory borings or CPT.

### 7.4 Riprap Design

Riprap bank protection is required at both the Colorado River and Moabi Channel connections to the new backwater channel. Riprap is also required to prevent scour on the downstream ends of the concrete-arch culverts. The material intended for the riprap application will be similar to that present on the bank of the Colorado River and will be obtained from existing USBR stockpiles along the river. Riprap will be constructed over a suitable drainage layer including a sand and gravel backfill filter. Design of the riprap slope revetment will continue to be developed for the 90% design submittal.

### 7.5 Road Base and Aggregates

Compacted base materials for unpaved roadways will consist of untreated aggregate base as shown on the 60% project plans. Roadways and subgrade for structures and the boat ramp will need to be compacted to 95% of the maximum dry density. Boat ramp materials, aggregates and subgrade preparation will additionally be required to comply with the Geoweb manufacturer’s (Presto Geosystems) requirements for this applications.

### 7.6 Excavation and Disposal

#### 7.6.1 Clearing and Grubbing

The site is currently vegetated and includes dense stands of salt cedar (tamarisk trees). The backwater channel site will be cleared and grubbed in its entirety to accommodate excavation, grading, fill, and disposal. Vegetative waste will be buried under the fill at the on-site disposal area (see Figure 2).

#### 7.6.2 Earthwork

The grading plan in the 60% design results in approximately 1.2 million cubic yards of excavation and placement of approximately 1.2 million cubic yards of compacted fill in designated disposal areas shown on the drawings. A currently unaccounted for volume of vegetative waste will also be buried in the onsite disposal areas.
8. CONSTRUCTION DRAWINGS

The 60% construction drawings have been prepared using computer assisted drafting software. They do not contain any special or unusual features and have been organized and presented in a manner to facilitate construction. Design plans will continue to be developed for the 90% design submittal.

9. CONSTRUCTION SPECIFICATIONS

Specifications for the project are based on the Caltrans and USBR Standard. Project specifications and project notes are shown on the 60% plans and will continue to be refined for the 90% design submittal.

10. SURFACE WATER CONTROL

A Stormwater Pollution Prevention Plan will be established prior to start and be maintained at all times during construction. Construction will be phased such that the backwater channel is excavated and the concrete-arch culverts are constructed prior to connecting to the Moabi Channel and the Colorado River. The connection to the Colorado River to fill the backwater channel should occur first and should allow enough time to allow any silts disturbed during the connection to settle out prior to connection with the Moabi Channel.

11. DEWATERING

Construction of the concrete-arch culvert foundations may require localized dewatering efforts based on the information provided in the USBR test pit logs. A summary of groundwater elevations based on interpretation of the test pit logs is included in Table 5. Surface elevations were not provided on the test pit logs so the groundwater elevations shown in the table were interpreted from test pit depths and existing condition contour data. Groundwater elevations are expected to fluctuate with the rise and fall of the Colorado River due to the high presence of sandy soils.

Table 5. Ground Water Approximation during Test Pits

<table>
<thead>
<tr>
<th>Test Pit</th>
<th>Ground Elevation</th>
<th>Depth to Groundwater</th>
<th>Groundwater Elevation</th>
<th>Total Depth</th>
<th>Bottom Elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP-14-1</td>
<td>463</td>
<td>13</td>
<td>450</td>
<td>16</td>
<td>447</td>
</tr>
<tr>
<td>TP-14-2</td>
<td>470</td>
<td>DRY</td>
<td>DRY</td>
<td>16</td>
<td>454</td>
</tr>
<tr>
<td>TP-14-5</td>
<td>476</td>
<td>DRY</td>
<td>DRY</td>
<td>22</td>
<td>454</td>
</tr>
<tr>
<td>TP-14-8</td>
<td>458</td>
<td>3.5</td>
<td>454.5</td>
<td>23</td>
<td>435</td>
</tr>
<tr>
<td>TP-14-10</td>
<td>458</td>
<td>8</td>
<td>450</td>
<td>15</td>
<td>443</td>
</tr>
<tr>
<td>TP-14-12</td>
<td>458</td>
<td>6</td>
<td>452</td>
<td>17</td>
<td>441</td>
</tr>
<tr>
<td>TP-14-14</td>
<td>458</td>
<td>5</td>
<td>453</td>
<td>15</td>
<td>443</td>
</tr>
<tr>
<td>TP-14-15</td>
<td>460</td>
<td>7</td>
<td>453</td>
<td>14</td>
<td>446</td>
</tr>
</tbody>
</table>
Groundwater could be encountered in the excavation for the new concrete-arch culvert structures, especially at the downstream end. It should be expected that local well points to dewater near the culvert foundations may be a suitable means of groundwater control. For the primary excavation of the backwater channel, it is expected that this excavation will occur in the wet and dewatering such a large area would not be practical.

12. UTILITIES

Power poles, electric boxes, and sewer dump stations at existing recreational vehicle campsites were observed during a site visit in December 2014. Utility confirmations are pending, but it is likely that existing underground utilities will be encountered during construction of the backwater channel. Underground utilities servicing existing campsites are expected near the northern concrete-arch culvert and inlet channel from the Colorado River. Potential utility conflicts may include but are not limited to sewer, gas and underground electrical. For this reason the constructor will be required to contact California DigAlert (USA/SC directly by telephone at 8-1-1) at least two (2) full working days, excluding weekends and holidays, prior to construction.

13. TRAFFIC CONTROL

The USBR will be able to access the construction from the Park Moabi Road Exit from Interstate 40. The two concrete-arch culvert locations in the project are located on unpaved portions of roads which connects the Pirate Cove area to the beachfront RV campsites. A construction traffic control plan will need to be developed and implemented prior to construction.
FIGURES
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Figure 1. Location Map
Site Plan Overview

Park Moabi
Proposed Backwater Channel

Figure 2. Site Plan
APPENDIX A Hydrologic and Hydraulic Analysis Technical Memorandum
Project Overview

Otis Bay and Tetra Tech were hired by the Bureau of Reclamation to design approximately 50 acres of connected backwater habitat on the Lower Colorado River near Needles, CA, within the northern portion of Moabi Regional Park. The restored backwater habitat will consist of open water, marsh, and riparian landcover types, and is being implemented as part of the Lower Colorado Multi-Species Conservation Program (LCR MSCP) in order to provide critical habitat for the flannelmouth sucker (*Catostomus latipinnis*). Two endangered species of native Colorado River fish, razorback sucker (*Xyrauchen texanus*) and bonytail chub (*Gila elegans*), as well as numerous migratory bird species will also benefit from the increase in habitat.

In order to adequately satisfy design criteria, detailed hydrologic and hydraulic analyses are needed, as the flow regime near the project site is extremely complex. The site is located between two major dams on the Colorado River, Davis Dam upstream and Parker Dam downstream. Flows through this section of river are highly regulated and the river stage regularly fluctuates up to 4 feet on a given day below Davis Dam. Seasonal stage fluctuations may vary by as much as 7 feet.

The desired configuration of the backwater channel will consist of inlet and outlet control structures, set at equal elevations, with roadway crossings at the upstream and downstream ends. Although there will be times when no water enters or exits the channel, the backwater channel is expected to regularly exchange water with the main river channel during normal conditions. Mean velocities through the channel will ideally remain below 0.5 ft/s at high flow conditions, with channel depths ranging between 0 and 15 feet. The channel will exit into the existing Park Moabi backwater channel, which is controlled at the inlet only, and is occupied by Pirate Cove Resort and Marina. These detailed hydrologic and hydraulic analyses will allow the project to function as desired, without adversely impacting existing infrastructure and hydraulic conditions in surrounding areas.

Data Collection

Topography/Bathymetry

Topographic and bathymetric data were obtained from the US Bureau of Reclamation (USBR). Otis Bay and Tetra Tech received 2-foot interval contours derived from LiDAR points (flown in 2008) and merged with bathymetric data of the main Colorado River channel. These contours were converted to a TIN surface using AutoCAD Civil3D 2015, and were used to represent the existing topography for the purpose of hydraulic modeling. Bathymetric data for the Park Moabi channel (where available) were received as a separate file and merged with the topography in HEC-RAS. Similarly, a TIN surface of the 60% restoration design grading plan was developed in Civil3D 2015 and added to the model, in order to represent proposed conditions. No bathymetric data was available for a small portion of the Park Moabi channel, therefore the channel bottom upstream of the large sediment plug was represented by interpolated contours that were included in the original LiDAR data.
Hydrologic Data

The closest USGS gage to the project site is Below Davis Dam (Davis Dam), which recorded data as early as 1905; however, the dam and powerplant were not completed until 1953. As such, discharge data collected prior to 1953 were not used in the hydrologic analyses. In order to analyze the magnitude and frequency of extreme, post-dam events on the section of river adjacent to the project site, peak flows and corresponding recurrence intervals were estimated for the Davis Dam gage. A Log Pearson-III frequency analysis for water years 1953-2014 resulted in a 100-year flow of almost 42,000 cfs, which was selected as the 100-year design flow (Table 1).

Table 1. Recurrence intervals of post-dam peak events obtained from a Log Pearson-III regression analysis on the Davis Dam gage.

<table>
<thead>
<tr>
<th>WY 1953-2014</th>
<th>Frequency (years)</th>
<th>Skew Coefficient K(1.862)</th>
<th>Discharge Q (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
<td>-0.29</td>
<td>20,600</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>0.60</td>
<td>24,400</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>1.30</td>
<td>27,600</td>
</tr>
<tr>
<td></td>
<td>25</td>
<td>2.23</td>
<td>32,500</td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>2.93</td>
<td>36,700</td>
</tr>
<tr>
<td></td>
<td>100</td>
<td>3.64</td>
<td>41,400</td>
</tr>
<tr>
<td></td>
<td>200</td>
<td>4.35</td>
<td>46,700</td>
</tr>
</tbody>
</table>

In order to perform unsteady flow simulations in HEC RAS, representative hydrographs were needed for the Colorado River near the project site. Average and maximum days were identified within the 7 years of hourly data at the USBR Below Needles Bridge (BNB) and RS 41 (RS41) gages. The locations of these gages relative to the project site are depicted in Figure 1. The maximum observed flow in the 7 years of data at the BNB gage was approximately 24,000 cfs, which corresponds to a 5-year event at Davis Dam, and was considered a reasonable representation of a regular high flow event at the project site. One-hour interval, 3-day hydrographs, which included the average and maximum days, were developed and used to represent average and high flow events, respectively.
Figure 1. Locations of USGS and USBR gages relative to the project site.
In September of 2013, the USBR installed a temporary gage (Temporary) directly upstream of the project site, which records stage (water surface elevation) only. Due to the relatively short period of record, data for previous years and missing data points at this gage location were supplemented with averages of the RS41 and BNB stage data, as preliminary analyses outlined in the Restoration and Development Plan (RDP) found this to be a reasonably accurate approximation of the water surface elevation at the project site (± 0.5 feet). Otis Bay and Tetra Tech further verified that this approximation would not significantly impact the accuracy of the hydraulic calculations by confirming that the accuracy was within 0.5 feet.

**HEC RAS Model Development**

HEC-RAS is a widely used 1-dimensional step backwater hydraulic model developed by the Hydrologic Engineering Center in Davis, CA. The software predicts water surface elevations and computes hydraulic properties based on channel geometry, using various forms of the energy, momentum, and Manning’s equations. Computations were performed for both steady state and unsteady state flow conditions, where steady state equations are based on the assumption that the flow is independent of time while unsteady state equations consider a time component.

**Calibration**

In order to calibrate the model to observed conditions and verify the accuracy of results, rating curves (stage vs discharge) were developed for the RS41 and Temporary gages. A large amount of variability exists within the data for both gages (± 1-2 feet in stage measurements), which is likely due to the numerous factors regularly affecting flow in the Colorado River. Simplified stage vs discharge curves that could be extrapolated and used for calibration purposes and model boundary conditions were developed by conducting regression analyses on each gage over the complete data sets.

Because the Temporary gage only records stage, an initial stage discharge relationship was developed using averaged flows from the BNB and RS41 gages and the recorded stage data (Figure 2). A regression of this relationship was used as a basis for initial calibration of channel roughness factors during steady flow simulations. In order to predict flows corresponding to stage measurements at the Temporary gage, unsteady flow simulations were performed using fixed stage measurements as upstream and downstream boundary conditions. The results were subsequently used to further refine roughness factors and calibrate downstream boundary conditions to observed conditions.
The model was calibrated by iteratively adjusting the “Manning’s n” variable at various cross sections until the modeled and observed water surface elevations were reasonably close. Over the period of record for the temporary gage (approximately 1 year), the simulated water surfaces were within approximately 0.5 feet of the observed water surfaces up to 25,000 cfs (Figure 3), which was deemed to be sufficiently accurate, considering variability in the data. The extrapolated water surfaces begin to diverge from the modeled water surface as flows increase to greater than 30,000 cfs, which is likely due to uncertainties in the overall dataset and lack of data points near the project site for flows exceeding 25,000 cfs. At higher flows the simulated water surface elevations are greater than the values extrapolated from the regression, which provides a more conservative estimate of expected water surface elevations during high flow events. Results of the finalized calibration are displayed in Figure 3, where the modeled water surfaces at the Temporary gage location are represented by blue lines and the stage discharge regression for the temporary gage is represented by the black line.

Figure 2. Initial stage discharge relationship for the temporary gage that was used for model calibration.
Figure 3. Unsteady flow simulated water surfaces (blue lines) compared to water surfaces obtained through regression analysis of gage data (black line), demonstrating the accuracy of model results.

Model Extents and Boundary Conditions
The locations of the Temporary and RS41 gages were set as the upstream and downstream boundaries of the model during the calibration process. After the model was calibrated, flow hydrographs obtained from the BNB gage were used as an upstream boundary condition (Figure 4), and the downstream boundary condition was set as the RS41 rating curve (Figure 5). In order to assess peak flow events, steady flow computations were performed for flows ranging between 24,000 and 42,000 cfs, with the same RS41 rating curve set as the downstream boundary condition.
Figure 4. Average and high flow hydrographs that were used as upstream boundary conditions.

Figure 5. RS41 gage regression that was used as a downstream boundary condition for all simulations.
**Cross Sections and Hydraulic Structures**

Representative cross sections were developed for the main Colorado River channel and existing Park Moabi channel. Throughout the main channel of the Colorado River, various overbank channels and pools were set as ineffective flow areas, where water is stored but not actively conveyed downstream. This process was done iteratively to ensure that model results reflected reality. In order to address the large sediment plug at the upstream end of the Moabi channel, estimates of the elevation of the plug surface were made during a field survey. The channel bottom on the three cross sections that represent the plug was adjusted to the estimated elevations, and a high roughness factor was used to represent the thick marsh vegetation and corresponding amount of expected flow resistance. A comparison of simulations with and without the plug suggested that the backwater effects are relatively insignificant; however, the cross sections that were used to represent the plug were incorporated into the model geometry to provide more conservative results.

The Interstate 40 and BNSF railroad bridges (Figure 6) are the only significant structures that could potentially impact hydraulics in the main Colorado River channel near the project area. Data for both bridges were obtained from design drawings, and the backwater effects of the bridges were considered during all simulations using appropriate bridge routines. The upstream entrance to the existing Moabi channel contains three 42” culverts in parallel; however, the exact configuration of these culverts is unknown. A configuration of three 42” circular concrete culverts with blocked obstructions and high friction coefficients was assumed to provide a reasonably accurate representation of the poor condition of the Park Moabi channel inlet structure (Figure 7).
Results

Existing Conditions
The model of existing conditions consists of the main stem of the Colorado River and the Moabi backwater channel as separate reaches. After performing simulations, the model predicted very little flow entering the Moabi Channel from the upstream end (approximately 5-10 cfs during average conditions), while a majority of the water entered as backwater from the downstream end (Figure 8). This result was consistent with field observations, suggesting that the overall configuration of the model provided an accurate representation of existing conditions.
Figure 8. Computed discharge in the Park Moabi channel during the average event, where negative discharges represent upstream flow and the downstream end of the channel begins 0 feet on the x-axis.
Based on the analysis of existing conditions near the project site and guidelines outlined in the RDP, a sill elevation of 453.5 feet (NGVD29) was selected. Fixing the water surface elevation at the project site to this elevation will allow hydraulic conditions in the backwater slough to be consistent with the desired effects, including frequent exchange with the Colorado River during summer months and a period of no exchange during winter. The location of the proposed project site, relative to the USBR gages and other important design features, is provided in Figure 9. Hourly water surface elevations for the average event at the main channel cross section just upstream of the proposed site are displayed in Figure 10. The sill will be designed with flexibility so that the water surface can be adjusted between 452.5-454.5 feet using stop logs if desired. These sill elevations, in relation to simulated stage elevations averaged over the 5 complete water years (WY) of record at the BNB and RS41 gages, are displayed in Figure 11.
Figure 9. Overview of the project area with USBR gage locations and HEC-RAS cross section lines.
Figure 10. Hourly water surface elevations (blue lines) for the average event in the main Colorado River channel just upstream of the proposed project site.
Figure 11. Mean hourly stage data from the RS41 and BNB gages, averaged over WY2009-WY2013, in relation to sill elevations.
**Proposed Conditions**

Using the same hydrographs and rating curves as boundary conditions, the proposed geometry (60% design) was analyzed for the same average, high flow, and peak events as existing conditions. Once the sill elevation was determined, the 60% design grading plan was incorporated into the existing model as an additional reach. In order to establish an effective and efficient design, configurations of hydraulic structures and channel geometry were iteratively adjusted to achieve the desired hydraulic properties within the project area. CONTECH pre-cast CON/SPAN arch bridges were selected as the entrance and outlet control structures. The inverts for the bridge openings were set at an elevation of 452.5 feet so that stop logs or some similar structure can be used to adjust the sill elevation. The stop logs were modeled as in-line weirs with overflow gates, set at the design sill elevation of 453.5 feet. Hydraulic properties were also evaluated for sill elevations of 452.5 and 454.5 feet. Figure 12 depicts the expected flow entering, flowing through, and leaving the project site during average, high flow, and peak conditions with the sill set at the design elevation of 453.5 feet.
Figure 12. Discharge through the proposed channel during average (top), high flow (middle), and peak (bottom) conditions.
Results suggest that flow through the inlet structure can be expected to occur in both directions under normal conditions, which is consistent with expectations, as the water surface typically recedes below the design sill elevation. Figure 13 is a velocity profile through the proposed channel that demonstrates the variation throughout the project site during average and high flow events. Negative velocities signify upstream flow, and a channel distance of 0 feet represents the downstream end of the channel. These results further show that mean velocities through the main section of the proposed channel will remain below 0.5 ft/s during the regular high flow event, with velocities through the bridge openings peaking at approximately 4 ft/s.
Figure 13. Velocity profiles through the project site during average and high flow conditions.
The impacts on stage in the main Colorado River channel caused by the proposed channel were considered negligible, as the water surface elevation is expected to decrease by less than 0.1 feet near the project site. Impacts on velocities, stage, and flows in the Park Moabi channel were also considered, and a slight increase in the velocities near the outlet of the project site is expected. However, these changes are considered to be insignificant, as velocities will remain below approximately 1 ft/s, even during the high flow (5-year) event (Figure 14 A&B).
Figure 14-A. Velocity profiles through the existing Moabi channel for existing conditions during average and high flow events.
Figure 14-B. Velocity profiles through the existing Moabi channel for proposed conditions during average and high flow events. (Note: the gap in the profiles is an artifact of a model requirement for displaying multiple reaches and does not represent an actual gap in the data.)
The effects of these various scenarios on the hydraulics of the proposed channel and surrounding area will be analyzed in more detail as the channel design is revised further. Adjustments to the design will be made as necessary, to ensure that the design will adequately and effectively achieve desired results.
APPENDIX B

USBR Subsurface Exploration & Geotechnical Data
Park Moabi Regional Park
Backwater Project

Mojave Valley Conservation Area
Lower Colorado Region
Mission Statements

The mission of the Department of the Interior is to protect and provide access to our Nation’s natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.
Park Moabi Regional Park
Backwater Project

Mojave Valley Conservation Area
Lower Colorado Region

prepared by

David Nielsen
Geologist
Provo Area Office
Provo, UT
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1.0 Introduction

1.1 Purpose and Scope

The purpose of this study was to survey the subsurface soil profiles and collect soil samples to characterize subsurface soil materials and groundwater levels underlying the Park Moabi Regional Park Area along the Colorado River. The Mojave Valley Conservation Area is being investigated for development as a backwater habitat under the Lower Colorado River Multi-Species Conservation Program and is within the Park Moabi Regional Park boundary. Personnel from the Provo Area Office of the Bureau of Reclamation, Upper Colorado Region under the guidance of staff from the Lower Colorado Region, excavated test pits to survey and collect the subsurface soils at the Park Moabi site between June 24 and 26, 2014. Test pit locations were limited due to regulations under the Federal Migratory Bird Act and the California Endangered Species Act.

1.2 Location

Park Moabi Regional Park is located about 9.5 miles southeast of Needles, California, upstream of the entrance to Topock Gorge, about 2 miles northwest of where Interstate 40 crosses the Colorado River. The site lies on the west side (California side) of the Colorado River.
2.0 Investigation

The field investigation of Park Moabi Regional Park was conducted by excavating 8 test pits across the site using a John Deere 250 G track mounted excavator. The locations of the test pits at the study site are shown on Figure 1. The test pits ranged in depth from 14 to 23 feet below ground surface. Soil profiles encountered in the test pits were logged at the time of excavation and are included in Appendix A at the end of this report. Groundwater levels encountered in the test pit excavations were measured and recorded on the test pit logs are also included in Appendix A, and discussed below and outlined in Table 1. After logging and sampling the test pits, the test pits were backfilled with the excavated spoils. The spoils where placed in approximately 1.5 foot soil lifts and compacted using the excavator bucket.
Figure 1 - The image shows the Park Moabi study area with the locations of the test pits indicated. The Colorado River is shown along the northeastern portion of the study area in the image. Test pit locations were limited due to regulations under the Federal Migratory Bird Act and the California Endangered Species Act.
2.1 Test Pits

The 8 test pits excavated for the study consisted of TP-14-1, TP-14-2, TP-14-5, TP-14-8, TP-14-10, TP-14-12, TP-14-14, and TP-14-15. The majority of the soil encountered on the surface and in the test pits consisted of sands. Along the central western portion of the study area medium and highly plastic clays were encountered in pockets on the surface, and in the subsurface profile. The test pits excavated in sand soils typically experienced caving of the side walls from the surface to the bottom. Caving of sand soils hampered the excavator’s progress of digging some of the test pits deeper. The following describes soils encountered and groundwater levels observed during test pit excavation. Logs of the test pits are included in Appendix A.

Test Pit TP-14-1
Test pit TP-14-1, was excavated in the northern portion of the study area, approximately 150 feet from the western edge of the Colorado River. Soils encountered in the test pit consisted of light brown Poorly Graded Sand (SP) from the ground surface down to about 13 feet below the ground surface. The sand was in a loose state at the surface, transitioning with depth to a loose to medium dense state. Underlying the sand was dark grayish brown Silty Clay (CL-ML) from 13 feet down to the bottom of the test pit at 16 feet. The clay had a soft to medium stiff consistency. The soil profile was dry at the surface with increasing moisture content with depth. At about 11 feet the soil appeared to be very moist, groundwater was encountered at about 13 feet.

Test Pit TP-14-2
Test pit TP-14-2, was excavated in the northern portion of the study area. The soil encountered consisted of light brown Poorly Graded Sand (SP) from the surface to 16 feet, the bottom of the test pit. The sand was loose at the surface, transitioning with depth to a loose to medium dense state. The soil profile was dry at the surface with increasing moisture content with depth. Figure 2 shows the spoil pile excavated from the test pit with the John Deere Excavator alongside.
Test Pit TP-14-5
Test pit TP-14-5, was excavated along the western side of the north-central portion of the study area. The soil encountered consisted of light brown Poorly Graded Sand (SP) from the surface to 22 feet, the bottom of the test pit. The sand was loose at the surface, transitioning with depth to a loose to medium dense state. The soil profile was dry at the surface with increasing moisture content with depth. At about 19 feet the soil was very moist. Figure 3 shows the test pit with bedding planes exposed in the side wall. Caving of the side wall in sandy soils was common during the test pit study.
Test Pit TP-14-8
Test pit TP-14-8, was excavated along the western side of the central portion of the study area. Soils encountered consisted of grayish brown Lean Clay (CL) from the surface to about 3.5 feet. The clay was soft to medium stiff and slightly moist at the surface with moisture increasing to very moist at about 3 feet. Underlying the lean clay was dark gray Clayey Sand (SC) from 3.5 feet down to about 6.5 feet. Less than 10 percent fine subangular to subrounded gravel was present. The clayey sand was loose and very moist to wet with groundwater perched within the unit at about 3.5 feet. At 6.5 feet a brown Fat Clay with Sand (CH)s was encountered and continued to 23 feet, the bottom of the test pit. The clay soil was moist, and in a stiff state. Figure 4 shows test pit TP-14-8 with clay exposed in the bottom portion of the test pit. The perched groundwater in the clayey sand layer has caused sloughing of the test pit side wall above the lower clay unit.
Figure 3 - View looking into test pit TP-14-8, Fat Clay with Sand (CH)s overlying a wet Silty Clay (CL-ML) unit, followed by a stiff Lean Clay (CL). Groundwater was perched in the sandy clay unit. Photograph by David Nielsen.

Test Pit TP-14-10
Test pit TP-14-10 was excavated along the western side of the central portion of the study area. Figure 5 shows the test pit being excavated. Soils encountered in the test pit consisted of light brown Silty Sand (SM) from the surface to about 0.5
foot, followed by Poorly Graded Sand (SP) from 0.5 foot down to about 10 feet below the ground surface. The color of the sand changed at about 7 feet to grayish brown. The sand was loose at the surface, transitioning with depth to a loose to medium dense state. The sand soil profile was dry at the surface with increasing moisture content with depth. At about 6.5 feet the moisture content appeared to be very moist. Groundwater was encountered at about 8 feet below surface in the sand layer. Underlying the sand was dark gray Lean Clay (CL) from 10 feet down to the bottom of the test pit at 15 feet. The clay had a medium stiff consistency and was moist.

![Excavator digging test pit TP-14-10 with spoil pile](image)

**Figure 5 - Excavator digging test pit TP-14-10 with spoil pile. Photograph by David Nielsen.**

**Test Pit TP-14-12**

Test pit TP-14-12 was excavated along the western side of the south-central portion of the study area. Soils encountered in the test pit consisted of light brown Poorly Graded Sand with Silt (SP-SM) from the surface to about 8 feet, followed by Poorly Graded Sand (SP) down to about 14 feet. The color of the sand changed to brown at about 1.5 feet, and at about 8 feet to grayish brown. The sand was loose at the surface, transitioning with depth to a loose to medium dense state. The sand soil profile was dry at the surface with increasing moisture content with depth. At about 5 feet the moisture content appeared to be very moist. Groundwater was encountered at about 6 feet below surface in the sand layer. Figure 6 shows groundwater seeping into the test pit during excavation. Underlying the sand was Lean Clay (CL) from 14 feet down to the bottom of the test pit.
Test pit at 17 feet. The clay was dark gray mottled with olive green and brown. The clay had a medium stiff consistency and was moist.

Figure 6 - Test pit TP-14-12 with groundwater seeping into the excavation at about 6 feet. Photograph by David Nielsen.

Test Pit TP-14-14
Test pit TP-14-14 was excavated along the western side of the southern portion of the study area. Soils encountered in the test pit consisted of light brown Poorly Graded Sand (SP) from the surface to about 11.5 feet below the ground surface. The color of the sand changed at about 5 feet to grayish brown. The sand was loose at the surface, transitioning with depth to a loose to medium dense state. The sand soil profile was dry at the surface with increasing moisture content with depth. At about 4 feet the moisture content appeared to be very wet. Groundwater was encountered at about 5 feet below surface in the sand layer. Underlying the sand was Lean Clay (CL) from 11.5 feet down to the bottom of the test pit at 15 feet. The color of the clay soil was black; the soil had a medium stiff consistency and was moist.

Test Pit TP-14-15
Test pit TP-14-15 was excavated in the southern portion of the study area. The soil encountered consisted of brown Poorly Graded Sand (SP) from the surface to 14 feet, the bottom of the test pit. The sand was in a loose at the surface, transitioning with depth to a loose to medium dense state. The soil profile was dry at the surface with increasing moisture content with depth. At about 4.5 feet the soil was moist and about 6 feet very moist. Groundwater was encountered at about 7 feet during excavation.
2.2 Groundwater

Groundwater was encountered in 6 of the 8 test pits excavated for the study. The following Table 1 outlines where groundwater was encountered in the test pits excavated for the study.

<table>
<thead>
<tr>
<th>Groundwater depth below surface</th>
<th>Test Pits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TP-14-1</td>
</tr>
<tr>
<td>13 feet</td>
<td>3.5 feet perched</td>
</tr>
</tbody>
</table>

In the northern portion of the study area groundwater was typically out of reach for the excavator, and caving of the side walls hampered digging and observations. Test pit TP-14-1, excavated in the northern portion of the site near the river, had groundwater at about 13 feet below the ground surface. Along the western and southern portions of the site groundwater depths varied from 5 to 8 feet. Groundwater encountered in test pit TP-14-8 at 3.5 feet appeared to be perched in the Clayey Sand soil unit above the Fat Clay unit observed at 6.5 feet. The underlying clay at 6.5 feet was in a moist state.

2.3 Laboratory Analysis

Soils collected in the test pits were delivered to the soils laboratory at Reclamation’s Provo Area Office in Utah. The samples were analyzed in the laboratory and classified by the Unified Soil Classification System. Laboratory testing of the soil samples included gradation analysis, Atterberg Limit characterization, hydrometer analysis, and moisture evaluations. Results of the laboratory analysis are included in Appendix B of this report.

The laboratory analysis of the soil samples indicated that the sand soils present across the site were primarily Poorly Graded Sand (SP) with little fines content and exhibiting no plastic characteristics. Low to medium plasticity clays were encountered underlying the sand soils in the western and southern portions of the study area with a few exposures of the clay at the surface.
3.0 Summary

The Mojave Valley Conservation Area is being investigated for development as a backwater habitat under the Lower Colorado Multi-Species Conservation Program and is within the Park Moabi Regional Park boundary. Personnel from Reclamation’s Provo Area Office under the guidance of staff from the Lower Colorado Region, excavated test pits to survey and collect the subsurface soils at the Park Moabi site.

The field investigation of Park Moabi Regional Park was conducted by excavating 8 test pits across the site. The test pits ranged in depth from 14 to 23 feet below ground surface. The 8 test pits excavated for the study consisted of TP-14-1, TP-14-2, TP-14-5, TP-14-8, TP-14-10, TP-14-12, TP-14-14, and TP-14-15. The majority of the soil encountered on the surface and in the test pits consisted of sands. Along the central western portion of the study area low to medium plasticity clays were encountered in pockets on the surface, and in the subsurface profile. The test pits excavated in sand soils typically experienced caving of the side walls from the surface to the bottom. Caving of sand soils hampered the excavator’s progress of digging some of the test pits deeper.

Groundwater was encountered in 6 of the 8 test pits excavated for the study. In the northern portion of the study area groundwater was typically out of reach for the excavator, and caving of the side walls hampered observations. However, test pit TP-14-1, excavated in the northern portion of the site near the river, had groundwater at about 13 feet below the ground surface. Along the western and southern portions of the site groundwater depths varied from 5 to 8 feet.

Soil samples collected in the field were analyzed in the Provo Area Office’s soils laboratory and were classified by the Unified Soil Classification System. Laboratory testing of the soil samples included gradation analysis, Atterberg Limit characterization, hydrometer analysis, and moisture evaluations. Soils encountered across the majority of the site consisted of Poorly Graded Sand (SP) with low to medium plastic Lean Clay (CL) and Fat Clay (CH) encountered underlying the sand soils in the western and southern portions of the study area.
Appendix A
TestPitLog
**LOG OF TEST PIT**

<table>
<thead>
<tr>
<th>Feature: Park Moabi Regional Park, California</th>
<th>PROJECT: Mojave Valley Conservation Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area Designation:</td>
<td>Ground Elevation: El.</td>
</tr>
<tr>
<td>Coordinates: Lat. 34°44′39.3″, Long. -114°31′29.4″</td>
<td>Station and Offset: none</td>
</tr>
<tr>
<td>Depth to Water: 13 ft., Date: 6-24-2014</td>
<td>Logged by: David Nielsen</td>
</tr>
<tr>
<td>Date(s) Logged: 6-24-2014</td>
<td></td>
</tr>
</tbody>
</table>

### Classification and Description of Material

<table>
<thead>
<tr>
<th>Classification Group Symbol</th>
<th>Classification and Description of Material (See USBR 5000, 5005)</th>
<th>% Plus 3-Inch by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>(SP) (laboratory classification)</td>
<td><strong>0.0 to 13.0 ft. Poorly Graded Sand, (SP):</strong> Laboratory classified as 100% sand; 0.3% fines; non-plastic; total moisture content = 9.9%.</td>
<td>0 0 0</td>
</tr>
<tr>
<td></td>
<td>IN-PLACE CONDITION: Light brown 7.5 YR 6/3; homogeneous; fine to medium, subangular to subrounded sand; about 5% fine subangular to subrounded gravel observed on the surface; thin bedding laminations and cross-bedding present, occasional interbedded thin clayey sand seams; maximum particle size about 15 mm; no reaction with HCl; some roots present maximum diameter about 20 mm; caving of sidewalls from surface to bottom (16 ft).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dry 0.0 to 1.5 ft, dry to slightly moist 1.5 to 7.0 ft, moist 7 to 13.0 ft; loose 0.0 to 1.5 ft, loose to medium dense 1.5 to 13.0 ft.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sample collected at 4 ft.</td>
<td></td>
</tr>
<tr>
<td>(CL-ML) (laboratory classification)</td>
<td><strong>13.0 to 16.0 ft. Silty Clay, (CL-ML):</strong> Laboratory classified as 2% sand; 98% fines; LL = 28.5%; PI = 6.2%; total moisture content = 32.9%.</td>
<td>0 0 0</td>
</tr>
<tr>
<td></td>
<td>IN-PLACE CONDITION: Dark grayish brown 10 YR 4/2, homogeneous; no reaction with HCl; some organic and small roots present.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Very moist 13.0 to 16.0 ft; soft to medium stiff 13.0 to 16.0 ft.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sample collected at 14 ft.</td>
<td></td>
</tr>
<tr>
<td>16.0 ft.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Remarks

- Refer to attached figure.
- Approx. = approximate; ds = downstream; ft. = foot; lb(s) = pound; mm = millimeter; HCl = hydrochloric acid; tr = trace; El. = elevation; LL = liquid limit; PI = Plastic Index; FM = Field Moisture.
- Excavated with a John Deer 250 G Excavator with a 42-inch-wide toothed bucket.
# LOG OF TEST PIT

<table>
<thead>
<tr>
<th>Hole No.</th>
<th>TP-14-2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FEATURE:</strong></td>
<td>Park Moabi Regional Park, California</td>
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<tr>
<td><strong>PROJECT:</strong></td>
<td>Mojave Valley Conservation Area</td>
</tr>
<tr>
<td><strong>GROUND ELEVATION:</strong></td>
<td>El.</td>
</tr>
<tr>
<td><strong>COORDINATES:</strong></td>
<td>Lat. 34°44'34.4&quot;, Long. -114°31'29.9&quot;</td>
</tr>
<tr>
<td><strong>STATION AND OFFSET:</strong></td>
<td>none</td>
</tr>
<tr>
<td><strong>APPROX. DIMENSIONS:</strong></td>
<td>18.0 ft. long x 18 ft. wide, 16 ft. deep</td>
</tr>
<tr>
<td><strong>DEPTH TO WATER:</strong></td>
<td>None Observed, DATE: 6-24-2014</td>
</tr>
<tr>
<td><strong>METHOD OF EXPLORATION:</strong></td>
<td>John Deer 250 G Excavator.</td>
</tr>
<tr>
<td><strong>LOGGED BY:</strong></td>
<td>David Nielsen</td>
</tr>
<tr>
<td><strong>DATE(S) LOGGED:</strong></td>
<td>6-24-2014</td>
</tr>
</tbody>
</table>

## CLASSIFICATION GROUP SYMBOL

<table>
<thead>
<tr>
<th><strong>CLASSIFICATION AND DESCRIPTION OF MATERIAL</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>(SP) (laboratory classification)</td>
</tr>
</tbody>
</table>

**0.0 to 16.0 ft. Poorly Graded Sand, (SP):** Laboratory classified as 99% sand; 1% fines; non-plastic; total moisture content = 1.0%.

**IN-PLACE CONDITION:**
- light brown 7.5 YR 6/3; homogeneous; fine to medium, subangular to subrounded sand; about 5% fine subangular to subrounded gravel observed at the surface; thin bedding laminations and cross-bedding present; maximum particle size about 15 mm; no reaction with HCl; some roots present from surface to about 7 ft., maximum root diameter about 15 mm; some bivalve shells observed; caving of sidewalls from surface to bottom (16 ft.).

Dry 0.0 to 2.0 ft, dry to slightly moist 2.0 to 16.0 ft.; loose 0.0 to 2.0 ft, loose to medium dense 2.0 to 16.0 ft.

Sample collected at 2 ft.

Sample collected at 7 ft.

**REMARKS:**
- Refer to attached figure.
- Approx. = approximate; ds = downstream; ft. = foot; lb(s) = pound; mm = millimeter; HCl = hydrochloric acid; tr = trace; El. = elevation; LL = liquid limit; PI = Plastic Index; FM = Field Moisture.
- Excavated with a John Deer 250 G Excavator with a 42-inch-wide toothed bucket.
**LOG OF TEST PIT**

**FEATURE:** Park Moabi Regional Park, California  
**PROJECT:** Mojave Valley Conservation Area  
**GROUND ELEVATION:** El.  
**COORDINATES:** Lat. 34°44′22.4″, Long. -114°31′28.0″  
**APPROX. DIMENSIONS:** 20.0 ft. long x 20 ft. wide, 22 ft. deep.  
**DEPTH TO WATER:** None Observed, DATE: 6-25-2014  
**DATE(S) LOGGED:** 6-25-2014

<table>
<thead>
<tr>
<th>CLASSIFICATION GROUP SYMBOL</th>
<th>CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE USBR 5000, 5005)</th>
<th>% PLUS 3-INCH BY WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>(SP) (laboratory classification)</td>
<td>0.0 to 22.0 ft. Poorly Graded Sand, (SP): Laboratory classified as 99% sand; 1% fines; non-plastic; total moisture content = 2.4%. IN-PLACE CONDITION: light brown 7.5 YR 6/3, and brown 7.5 YR 5/3 from 4 ft. to bottom (22 ft.); homogeneous; fine to medium, subangular to subrounded sand; about 5% fine subangular to rounded gravel observed at the surface; thin bedding laminations and cross-bedding present; maximum particle size about 20 mm; no reaction with HCl; some roots present from surface to about 7 ft., maximum root diameter about 15 mm; trace bivalve shells observed; caving of sidewalls from surface to bottom (22 ft.). Dry 0.0 to 2.0 ft, dry to slightly moist 2.0 to 14.0 ft. increasing moisture with depth, moist 14.0 to 19.0 ft., very moist from 19.0 to 22.0 ft.; loose 0.0 to 2.0 ft, loose to medium dense 2.0 to 22.0 ft. Sample collected at 10 ft.</td>
<td>0 0 0</td>
</tr>
<tr>
<td>22.0 ft.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

REMARKS: - Refer to attached figure.  
Approx. = approximate; ds = downstream; ft. = foot; lb(s) = pound; mm = millimeter; HCl = hydrochloric acid; tr = trace; El. = elevation; LL = liquid limit; PI = Plastic Index; FM = Field Moisture.  
- Excavated with a John Deer 250 G Excavator with a 42-inch-wide toothed bucket.
**LOG OF TEST PIT**

**FEATURE:** Park Moabi Regional Park, California  
**AREA DESIGNATION:**  
**COORDINATES:** Lat. 34°44'10.8", Long. -114°31'29.9"  
**APPROX. DIMENSIONS:** 15.0 ft. long x 15 ft. wide, 23 ft. deep.  
**DEPTH TO WATER:** perched at 3.5 to 6.5 ft.,  
**WATER LEVEL DATE:** 6-25-2014  
**PROJECT:** Mojave Valley Conservation Area  
**GROUND ELEVATION:** El.  
**STATION AND OFFSET:** none  
**METHOD OF EXPLORATION:** John Deer 250 G Excavator.  
**LOGGED BY:** David Nielsen  
**DATE(S) LOGGED:** 6-25-2014

<table>
<thead>
<tr>
<th>CLASSIFICATION GROUP SYMBOL</th>
<th>CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE USBR 5000, 5005)</th>
<th>% PLUS 3-INCH BY WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>(CL) (laboratory classification)</td>
<td>0.0 to 3.5 ft. Lean Clay (CL): Laboratory classified as 5% sand; 95% fines; LL = 44.9%; PI = 25.0%; total moisture content = 45.8%.</td>
<td>0 0 0</td>
</tr>
<tr>
<td>3.5 ft.</td>
<td>IN-PLACE CONDITION: Grayish brown 2.5 Y 5/2; homogeneous; trace fine to medium, subangular to subrounded sand; thin bedding laminations; strong reaction with HCl; caving of sidewalls from surface to about 6.5 ft.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Slightly moist 0.0 to 0.5 ft, moist 0.5 to 3.5 ft.; soft to medium stiff. Sample collected at 2 ft.</td>
<td></td>
</tr>
<tr>
<td>(SC) (laboratory classification)</td>
<td>3.5 to 6.5 ft. Sandy Clay (SC): Laboratory classified as 60% sand; 6% gravel; 34% fines; LL = 24.5%; PI = 10.4%; total moisture content = 21.5.</td>
<td>0 0 0</td>
</tr>
<tr>
<td>6.5 ft.</td>
<td>IN-PLACE CONDITION: Grayish brown 2.5 Y 5/2; homogeneous; about 10 % fine to medium, subangular to subrounded sand; about 10% fine subangular to subrounded gravel; thin bedding laminations; some roots present from surface to about 4 ft.; strong reaction with HCl.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wet 3.5 to 5.0 ft., very moist 5.0 to 6.5 ft.; soft. Sample collected at 5 ft.</td>
<td></td>
</tr>
<tr>
<td>(CH)s (laboratory classification)</td>
<td>6.5 to 23.0 ft. Fat Clay with Sand (CH)s: Laboratory classified as 25% sand; 75% fines; LL = 55.3%; PI = 39.3%; shrinkage ratio 1.9; total moisture content = 18.2%</td>
<td>0 0 0</td>
</tr>
<tr>
<td>23.0 ft.</td>
<td>IN-PLACE CONDITION: Brown 10 YR 4/3; homogeneous; thin bedding laminations (about 1 in. thick); clay is moderately fractured with some oxidizing; strong reaction with HCl.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Moist 6.5 to 23.0 ft.; stiff. Sample collected at 13 ft.</td>
<td></td>
</tr>
</tbody>
</table>

**REMARKS:**  
- Refer to attached figure.  
Approx. = approximate; ds = downstream; ft. = foot; lb(s) = pound; mm = millimeter; HCl = hydrochloric acid; tr = trace; El. = elevation; LL = liquid limit; PI = Plastic Index; FM = Field Moisture.  
- Excavated with a John Deer 250 G Excavator with a 42-inch-wide toothed bucket.
FEATURE: Park Moabi Regional Park, California  
PROJECT: Mojave Valley Conservation Area  
AREA DESIGNATION:  
GROUND ELEVATION: El.  
COORDINATES: Lat. 34°44'06.0", Long. -114°31'25.8"  
STATION AND OFFSET: none  
APPROX. DIMENSIONS: 12 ft. long x 15 ft. wide, 15 ft. deep.  
METHOD OF EXPLORATION: John Deer 250 G Excavator.  
DEPTH TO WATER: 8 ft., DATE: 6-26-2014  
LOGGED BY: David Nielsen  
DATE(S) LOGGED: 6-26-2014

<table>
<thead>
<tr>
<th>CLASSIFICATION GROUP SYMBOL</th>
<th>CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE USBR 5000, 5005)</th>
<th>% PLUS 3-INCH BY WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>(SM)</td>
<td>0.0 to 0.5 ft. Silty Sand (SM):</td>
<td>0 0 0</td>
</tr>
<tr>
<td></td>
<td>IN-PLACE CONDITION: Light brown 7.5 YR 6/3; homogeneous;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>about 75% fine to medium, subangular to subrounded sand; about</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20% non-plastic fines; about 5% fine subangular to rounded</td>
<td></td>
</tr>
<tr>
<td></td>
<td>gravel; maximum particle size about 15 mm; no reaction with</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HCl; some roots present; caving of sidewalls from surface to</td>
<td></td>
</tr>
<tr>
<td></td>
<td>bottom (15 ft.).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dry; loose.</td>
<td></td>
</tr>
<tr>
<td>0.5 ft.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(SP) (laboratory classification)</td>
<td>0.5 to 10.0 ft. Poorly Graded Sand (SP): Laboratory classified as 97% sand; 3% fines; non-plastic; total moisture content = 19.4%;</td>
<td>0 0 0</td>
</tr>
<tr>
<td></td>
<td>IN-PLACE CONDITION: Brown 7.5 YR 5/3 to 7 ft., grayish brown</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10 YR 5/2 from 7 to 10 ft.; homogeneous; fine to medium,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>subangular to subrounded sand; thin bedding laminations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>present; no reaction with HCl.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dry to slightly moist 0.5 to 6.5 ft., very moist 6.5 to 8 ft.,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>wet at 8 ft.; loose to medium dense 0.5 to 10 ft.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sample collected at 4 ft.</td>
<td></td>
</tr>
<tr>
<td>10.0 ft.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(CL) (laboratory classification)</td>
<td>10.0 to 15.0 ft. Lean Clay (CL): Laboratory classified as 2% sand; 98% fines; LL = 45.4%; PI = 26.7%; total moisture content = 33.3%.</td>
<td>0 0 0</td>
</tr>
<tr>
<td></td>
<td>IN-PLACE CONDITION: Dark gray 5 Y 4/1 with dark gray 2.5 Y 4/1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>mottling; homogeneous; about 10% fine to medium, subangular to</td>
<td></td>
</tr>
<tr>
<td></td>
<td>subrounded sand; strong reaction with HCl.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Moist; soft to medium stiff.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sample collected at 13 ft.</td>
<td></td>
</tr>
<tr>
<td>15.0 ft.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

REMARKS: - Refer to attached figure. 
Approx. = approximate; ds = downstream; ft. = foot; lb(s) = pound; mm = millimeter; HCl = hydrochloric acid; tr = trace; El. = elevation; LL = liquid limit; PI = Plastic Index; FM = Field Moisture. 
- Excavated with a John Deer 250 G Excavator with a 42-inch-wide toothed bucket.
**FEATURE:** Park Moabi Regional Park, California  
**PROJECT:** Mojave Valley Conservation Area  
**GROUND ELEVATION:** El.  
**STATION AND OFFSET:** none  
**METHOD OF EXPLORATION:** John Deer 250 G Excavator.

**LOGGED BY:** David Nielsen  
**DATE(S) LOGGED:** 6-25-2014

### APPROX. DIMENSIONS:
17 ft. long x 15 ft. wide, 17 ft. deep.

### DEPTH TO WATER:
6 ft., DATE: 6-25-2014

### CLASSIFICATION GROUP SYMBOL | CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE USBR 5000, 5005) | % PLUS 3-INCH BY WEIGHT
--- | --- | ---
(SP-SM) (laboratory classification) | **0.0 to 8.0 ft. Poorly Graded Sand with Silt (SP-SM):** Laboratory classified as 89% sand; 11% fines; non-plastic; total moisture content = 8.6%.
IN-PLACE CONDITION: light brown 7.5 YR 6/3 to 1.5 ft., brown 7.5 YR 5/3 from 1.5 to 8 ft, grayish brown 10 YR 5/2 from 8 to 14 ft.; homogeneous; about 10% non-plastic fines; fine to medium, subangular to subrounded sand; thin bedding laminations present; no reaction with HCl; some roots present; caving of sidewalls from surface to bottom (17 ft.).
Dry 0.0 to 0.5 ft., dry to slightly moist 0.5 to 1.5 ft., moist with increasing moisture 1.5 to 5 ft., very moist 5 to 6 ft., and wet at 6 ft.; loose 0.0 1.5 ft., loose to medium dense 1.5 to 14 ft.
Sample collected at 5 ft.

<table>
<thead>
<tr>
<th></th>
<th>3-5 inch</th>
<th>5–12 inch</th>
<th>Plus 12 inch</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

8.0 ft.

(SP) (laboratory classification) | **8.0 to 14.0 ft. Poorly graded Sand (SP):** Laboratory classified as 97% sand; 3% fines; non-plastic; total moisture content = 16.1%.
Sample collected at 10 ft.

<table>
<thead>
<tr>
<th></th>
<th>3-5 inch</th>
<th>5–12 inch</th>
<th>Plus 12 inch</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

14.0 ft.

(CL) (laboratory classification) | **14.0 to 17.0 ft. Lean Clay (CL):** Laboratory classified as 3% sand; 97% fines; LL = 45.9%; PI = 28.1%; total moisture content = 31.3%.
IN-PLACE CONDITION: dark gray 10 YR 4/1 with olive and brown mottling; homogeneous; about 10% fine to medium, subangular to subrounded sand; strong reaction with HCl.
Moist; soft to medium stiff.
Sample collected at 14 ft.

<table>
<thead>
<tr>
<th></th>
<th>3-5 inch</th>
<th>5–12 inch</th>
<th>Plus 12 inch</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

17.0 ft.

### REMARKS:
- Refer to attached figure.
- Approx. = approximate; ds = downstream; ft. = foot; lb(s) = pound; mm = millimeter; HCl = hydrochloric acid; tr = trace; El. = elevation; LL = liquid limit; PI = Plastic Index; FM = Field Moisture.
- Excavated with a John Deer 250 G Excavator with a 42-inch-wide toothed bucket.
**FEATURE:** Park Moabi Regional Park, California  
**PROJECT:** Mojave Valley Conservation Area  
**GROUND ELEVATION:** El.  
**STATION AND OFFSET:** none  
**METHOD OF EXPLORATION:** John Deer Excavator 250 G.  
**LOGGED BY:** David Nielsen  
**DATE(S) LOGGED:** 6-25-2014

<table>
<thead>
<tr>
<th>CLASSIFICATION GROUP SYMBOL</th>
<th>CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE USBR 5000, 5005)</th>
<th>% PLUS 3-INCH BY WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>(SP)</td>
<td>0.0 to 11.5 ft. Poorly Graded Sand (SP): Laboratory classified as 96% sand; 4% fines; non-plastic; total moisture content = 14.1%.</td>
<td>0 0 0</td>
</tr>
<tr>
<td></td>
<td>IN-PLACE CONDITION: Light brown 7.5 YR 6/3 to 2 ft., brown 7.5 YR 5/3 from 2 to 5 ft, grayish brown 10 YR 5/2 from 5 to 11.5 ft.; homogeneous; about 10% non-plastic fines; fine to medium, subangular to subrounded sand; thin bedding laminations present; no reaction with HCl; some roots present; caving of sidewalls from surface to bottom (15 ft.). Dry 0.0 to 1.0 ft., dry to slightly moist 1.0 to 2.0 ft., moist with increasing moisture 2.0 to 4.0 ft., very wet 4.0 to 5.0 ft., and wet at 5.0 ft.; loose 0.0 2.0 ft., loose to medium dense 2.0 to 5.0 ft. Sample collected at 4 ft.</td>
<td></td>
</tr>
<tr>
<td>(SP)</td>
<td>11.5 to 15.0 ft. Lean Clay (CL): Laboratory classified as 4% sand; 96% fines; LL = 39.3%; PI = 22.6%; total moisture content = 37.7%.</td>
<td>0 0 0</td>
</tr>
<tr>
<td>(SP)</td>
<td>IN-PLACE CONDITION: Black 7.5 YR 2.5/1; homogeneous; about 10% fine to medium, subangular to subrounded sand; strong reaction with HCl. Very moist; soft to medium stiff. Sample collected at 14 ft.</td>
<td></td>
</tr>
<tr>
<td>(SP)</td>
<td>15.0 ft.</td>
<td></td>
</tr>
</tbody>
</table>

**REMARKS:** - Refer to attached figure.  
Approx. = approximate; ds = downstream; ft. = foot; lb(s) = pound; mm = millimeter; HCl = hydrochloric acid; tr = trace; El. = elevation; LL = liquid limit; PI = Plastic Index; FM = Field Moisture.  
- Excavated with a John Deer 250 G Excavator with a 42-inch-wide toothed bucket.
**Bureau of Reclamation**

**LOG OF TEST PIT**

**FEATURE:** Park Moabi Regional Park, California  
**PROJECT:** Mojave Valley Conservation Area

**AREA DESIGNATION:**  
**COORDINATES: N E**

**APPROX. DIMENSIONS:** 16.0 ft. long x 16 ft. wide, 14 ft. deep.

**DEPTH TO WATER:** about 7.0 ft., **DATE:** 6-25-2014

**LOGGED BY:** David Nielsen  
**DATE(S) LOGGED:** 6-25-2014

<table>
<thead>
<tr>
<th>CLASSIFICATION GROUP SYMBOL</th>
<th>CLASSIFICATION AND DESCRIPTION OF MATERIAL (SEE USBR 5000, 5005)</th>
<th>% PLUS 3-INCH BY WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>(SP) (laboratory classification)</td>
<td><strong>0.0 to 14.0 ft. Poorly Graded Sand, (SP):</strong> Laboratory classified as 96% sand; 4% fines; non-plastic; total moisture content = 20.5%.</td>
<td><img src="chart" alt="" /></td>
</tr>
<tr>
<td>14.0 ft.</td>
<td><strong>IN-PLACE CONDITION:</strong> Light brown 7.5 YR 6/3, and brown 7.5 YR 5/3 from 2 to 10 ft., grayish brown 10 YR 5/2 from 10 ft. to bottom (14 ft.); homogeneous; fine to medium, subangular to subrounded sand; about 5% fine subangular to rounded gravel; thin bedding laminations and cross-bedding present; maximum particle size about 15 mm; no reaction with HCl; some roots present from surface to about 10 ft., maximum root diameter about 15 mm; caving of sidewalls from surface to bottom (14 ft.).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dry 0.0 to 1.5 ft., dry to slightly moist 1.5 to 4.5 ft., moist 4.5 to 6.0 ft., very moist 6.0 to 7.0 ft., wet at 7 ft.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Loose 0.0 to 4.5 ft, loose to medium dense 4.5 to 7.0 ft., loose from 7.0 ft. to the bottom (14 ft.).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sample collected at 5 ft.</td>
<td></td>
</tr>
</tbody>
</table>

**REMARKS:** - Refer to attached figure.  
- Excavated with a John Deer 250 G Excavator with a 42-inch-wide toothed bucket.

**Approx. = approximate; ds = downstream; ft. = foot; lb(s) = pound; mm = millimeter; HCl = hydrochloric acid; tr = trace; El. = elevation; LL = liquid limit; PI = Plastic Index; FM = Field Moisture."
Appendix B

Laboratory Results
1. ASTM D 698 REQUIRES APPROXIMATELY 35 LBS. OF MATERIAL FOR TEST.
2. HIGHLIGHTED SAMPLES WERE COMBINED BEING SIMILAR IN GRADATION TO ACQUIRE SUFFICIENT MATERIAL TO PERFORM ASTM D-698 TEST TO DETERMINE MAXIMUM DENSITY
3. LEFT HAND COLUMN UNDER SAMPLES NO. ARE THE DRY WEIGHTS OF SAMPLES INITIALLY DELIVERED TO LAB FOR TESTING. THESE DRY WEIGHTS = 35.25 LBS.
4. PERMEABILITY AND SHEAR TESTS PERFORMED USING 90% OF MAXIMUM DENSITY

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Date</th>
<th>Group Sym.</th>
<th>Classification</th>
<th>Source</th>
<th>Grading - Particle Size Fraction in Percent Passing</th>
<th>Hydrometer Analysis (min.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>76.2 38.1 19.0 9.5 4.75 2.36 1.18 0.600 0.300 0.150 0.075 0.037 0.019 0.009 0.005 0.002 0.001</td>
<td>1 4 19 60 435 1545</td>
</tr>
<tr>
<td>TP-14-01 @ 4'</td>
<td>Poorly graded sand</td>
<td>(SP)</td>
<td>100 99.9 89.3 5.2</td>
<td>0.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TP-14-01 @ 14'</td>
<td>Silty clay</td>
<td>(CL-ML)</td>
<td>100 98.2 92.0 74.0 46.0 34.0 24.0 20.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TP-14-02 @ 3'</td>
<td>Poorly graded sand</td>
<td>(SP)</td>
<td>100 99.9 99.6 98.0 69.5 7.5</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TP-14-02 @ 7'</td>
<td>Poorly graded sand</td>
<td>(SP)</td>
<td>100 99.7 98.5 65.8 6.6</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TP-14-05 @ 10'</td>
<td>Poorly graded sand</td>
<td>(SP)</td>
<td>100 99.9 98.7 74.7 14.2</td>
<td>3.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.73 lbs. TP-14-05 @ 2'</td>
<td>Lean clay</td>
<td>(CL)</td>
<td>100 99.8 99.6 97.2 95.2</td>
<td>91.8 79.8 63.9 55.9 39.9 35.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TP-14-08 @ 5'</td>
<td>Clayey sand</td>
<td>(SC)</td>
<td>100 97.3 95.7 93.7 90.6</td>
<td>87.7 84.9 79.1 55.8 34.0</td>
<td>29.1 23.6 21.8 20.0</td>
<td></td>
</tr>
<tr>
<td>TP-14-08 @ 13'</td>
<td>Fat clay with sand</td>
<td>(CH)x</td>
<td>100 99.8 98.9 90.6</td>
<td>74.8 69.4 65.5 59.7</td>
<td>54.0 43.4 36.6</td>
<td></td>
</tr>
<tr>
<td>TP-14-10 @ 4'</td>
<td>Poorly graded sand</td>
<td>(SP)</td>
<td>100 99.9 99.7 95.4</td>
<td>37.0</td>
<td>3.4</td>
<td></td>
</tr>
<tr>
<td>13.71 lbs. TP-14-10 @ 13'</td>
<td>Lean clay</td>
<td>(CL)</td>
<td>100 98.0</td>
<td>95.4 90.0 72.0 58.0</td>
<td>41.7 33.8</td>
<td></td>
</tr>
<tr>
<td>TP-14-12 @ 5'</td>
<td>Poorly graded sand with silt</td>
<td>(SP-SM)</td>
<td>100 99.6</td>
<td>67.8</td>
<td>10.5</td>
<td></td>
</tr>
<tr>
<td>TP-14-12 @ 10'</td>
<td>Poorly graded sand</td>
<td>(SP)</td>
<td>100 99.6</td>
<td>25.5</td>
<td>2.7</td>
<td></td>
</tr>
<tr>
<td>6.96 lbs. TP-14-12 @ 14'</td>
<td>Lean clay</td>
<td>(CL)</td>
<td>100 97.4</td>
<td>95.0 93.0</td>
<td>81.0 67.0 53.0</td>
<td>45.0</td>
</tr>
<tr>
<td>TP-14-14 @ 4'</td>
<td>Poorly graded sand</td>
<td>(SP)</td>
<td>100 99.8</td>
<td>98.8</td>
<td>18.9</td>
<td>3.7</td>
</tr>
<tr>
<td>8.99 lbs. TP-14-14 @ 14'</td>
<td>Lean clay</td>
<td>(CL)</td>
<td>100 99.2</td>
<td>95.8</td>
<td>94.0 82.0</td>
<td>66.0 54.0</td>
</tr>
<tr>
<td>TP-14-15 @ 5'</td>
<td>Poorly graded sand</td>
<td>(SP)</td>
<td>100 99.9</td>
<td>99.8</td>
<td>97.3</td>
<td>36.5</td>
</tr>
</tbody>
</table>

NOTE:
1. ASTM D 698 REQUIRES APPROXIMATELY 35 LBS. OF MATERIAL FOR TEST.
2. HIGHLIGHTED SAMPLES WERE COMBINED BEING SIMILAR IN GRADATION TO ACQUIRE SUFFICIENT MATERIAL TO PERFORM ASTM D-698 TEST TO DETERMINE MAXIMUM DENSITY FOR THE FINE GRAINED SOILS.
3. LEFT HAND COLUMN UNDER SAMPLES NO. ARE THE DRY WEIGHTS OF SAMPLES INITIALLY DELIVERED TO LAB FOR TESTING. THESE DRY WEIGHTS = 35.25 LBS.
4. PERMEABILITY AND SHEAR TESTS PERFORMED USING 90% OF MAXIMUM DENSITY.
**Summary of Physical Properties**

**Project:** Lower Colorado Region  
**Feature:** Park Moabi  
**Description:** test pits 2014

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Group Symbol</th>
<th>less Than 0.005 mm</th>
<th>0.05 to 0.075 mm</th>
<th>0.075 mm to #4</th>
<th>#4 to 3 in.</th>
<th>3 in. to 5 in.</th>
<th>5 in. to 12 in.</th>
<th>12 in. plus</th>
<th>Atterberg Limits</th>
<th>Specific Gravity</th>
<th>In-place</th>
<th>Laboratory</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>%LL</td>
<td>%Pl</td>
<td>Shrinkage Fraction</td>
<td>(-) #4</td>
<td>(+) #4</td>
<td>% Abs.</td>
<td>Dry Dens. in pcf</td>
<td>Water Content</td>
<td>Max. Dry Dens. pcf</td>
<td>Opt H20</td>
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</tr>
<tr>
<td>TP-14-01 @ 4'</td>
<td>(SP)</td>
<td>100</td>
<td>np</td>
<td>28.5</td>
<td>6.2</td>
<td>32.9</td>
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</tr>
<tr>
<td>TP-14-01 @ 14'</td>
<td>(CL-ML)</td>
<td>34</td>
<td>64</td>
<td>2</td>
<td>9.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TP-14-02 @ 3'</td>
<td>(SP)</td>
<td>1</td>
<td>99</td>
<td>0.0</td>
<td>106.9**</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>TP-14-02 @ 7'</td>
<td>(SP)</td>
<td>1</td>
<td>99</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TP-14-05 @ 10'</td>
<td>(SP)</td>
<td>1</td>
<td>99</td>
<td>2.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>5.73 lbs.</td>
<td>CL-ML</td>
<td>56</td>
<td>39</td>
<td>5</td>
<td>44.9</td>
<td>25.0</td>
<td>45.9</td>
<td>101.2*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TP-14-08 @ 5'</td>
<td>(SC)</td>
<td>20</td>
<td>14</td>
<td>60</td>
<td>6</td>
<td>24.5</td>
<td>10.4</td>
<td>21.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TP-14-08 @ 13'</td>
<td>(CH)</td>
<td>54</td>
<td>21</td>
<td>25</td>
<td>55.3</td>
<td>39.3</td>
<td>1.9</td>
<td>18.2</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>TP-14-09 @ 4'</td>
<td>(SP)</td>
<td>3</td>
<td>97</td>
<td>np</td>
<td>19.4</td>
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<tr>
<td>13.71 lbs.</td>
<td>CL</td>
<td>58</td>
<td>40</td>
<td>2</td>
<td>45.4</td>
<td>26.7</td>
<td>33.3</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TP-14-10 @ 13'</td>
<td>(SP-ML)</td>
<td>11</td>
<td>89</td>
<td>np</td>
<td>8.6</td>
<td>16.1</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>TP-14-12 @ 10'</td>
<td>(SP)</td>
<td>3</td>
<td>97</td>
<td>np</td>
<td>16.1</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>6.96 lbs.</td>
<td>CL</td>
<td>67</td>
<td>30</td>
<td>3</td>
<td>45.9</td>
<td>28.1</td>
<td>31.3</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TP-14-12 @ 14'</td>
<td>(SP)</td>
<td>4</td>
<td>96</td>
<td>np</td>
<td>14.1</td>
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<td></td>
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</tr>
<tr>
<td>8.99 lbs.</td>
<td>CL</td>
<td>54</td>
<td>42</td>
<td>4</td>
<td>39.3</td>
<td>22.6</td>
<td>37.7</td>
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<tr>
<td>TP-14-14 @ 14'</td>
<td>(SP)</td>
<td>4</td>
<td>96</td>
<td>np</td>
<td>20.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

**Notes:**

- **** indicates max. den performed by ASTM D 7382 vibratory hammer
- * indicates max. den performed by ASTM D 698
**COEFFICIENT OF PERMEABILITY**

Date: 11-24-14  
Location: Park Moabi Test Pits  
Report By: J. Boone

<table>
<thead>
<tr>
<th>NO.</th>
<th>DATE TESTED</th>
<th>PERMEABILITY, k (em/sec)</th>
<th>SAMPLE ID/LOCATION</th>
<th>DESCRIPTION OF SOIL</th>
<th>MOISTURE (%)</th>
<th>DENSITY (pet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11-24-14</td>
<td>2.98x10^{-4}</td>
<td>Test Pit#2 @ 3’</td>
<td>Sand</td>
<td>101.5</td>
<td>11.0</td>
</tr>
<tr>
<td>2</td>
<td>11-24-14</td>
<td>3.27x10^{-4}</td>
<td>Test Pit #1 @ 4’</td>
<td>Sand</td>
<td>100.9</td>
<td>11.0</td>
</tr>
</tbody>
</table>

Sample placed in permeameter mold at density requested by Steve Corless. Sample saturated using backpressure techniques prior to performance of the test.
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<th>Degree of Saturation (%)</th>
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MATERIAL: SAND, SP (REMOLED)

DIRECT SHEAR TEST

Project: United States Bureau of Reclamation
Park Moabi Test Pits

HOLE NO.: TEST PIT #1
DEPTH: 4'

RB&G ENGINEERING, INC.
**DIRECT SHEAR TEST**

Project: United States Bureau of Reclamation  
Park Moabi Test Pits

HOLE NO.: TEST PIT #2  
DEPTH: 3'  

**MATERIAL:** SAND, SP (REMOLED)

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**HOLE No.:** 201408.020  
**Report No.:** 1009150
Coefficient of Permeability

**Project**
Bureau of Reclamation  
**Location**
Dark Moabi  
**Tested By**
J. Boone  
**Date**
9/29/14

**Project No.** 201408.020

**Description of Test**
Determine the coefficient of permeability, using the constant head method in general accordance with ASTM D5084.

**Sample Dimensions:**
- Diameter, D: 7.15 em
- Height, L: 14.20 em
- Area, A: 40.15 cm²

**Test Data**
- Confining Pressure: 10 psi
- Head, h: 351.74 em
- Time, t: 14400 s
- Discharge, Q: 3.3 cm³
- Temperature, T: 22 °C

**Coefficient of Permeability, kT**
2.30E-07 cm/s  

\[ kr = QU(Aht) \]

Lean clay samples combined from TP8, TP10, TP12, and TP14.
NOTE: Because maximum density required 35 pounds of material, soil samples of the same classification (lean clay) from TP8, TP10, TP12, and TP14 were combined to have enough material to analyze the soil.
HOLE NO.: NA lean clay samples combined from TP8, TP10, TP12, and TP14
DEPTH: NA TP8 (2'), TP10 (13'), TP12 (14'), TP14 (14')
APPENDIX C
Landscape/ Land Types Document
Landcover Type Acreage Calculations (60% Design)

Four landcover types will be created through implementation of the Moabi Conservation Area Restoration design: backwater, marsh, cottonwood-willow, and other riparian (honey mesquite & arrowweed) according to the classification used in the Lower Colorado River Multi-Species Conservation Plan (Figure 1). Otis Bay ecologists analyzed existing vegetation along the Park Moabi channel and Beal Slough using aerial imagery paired with LiDAR and a field visit to better understand the environmental characteristics (i.e., elevation, proximity to water) that are suitable for dominant plants at this site. Because honey mesquite and arrowweed occur in the same areas throughout Moabi Park, these landtypes were combined.

**Backwater:** According to hydraulic analyses, the backwater elevation will range annually from 451 to 458 ft. The high elevation of the backwater was delineated by the maximum stage during an average event which occurs at approximately 456.5 ft. The restored backwater will cover 26.4 acres.

**Marsh:** Bulrush, cattail, and common reed will grow along the banks of the channel of the restored backwater. The marsh should range in elevation from 452 to 456.5 ft, approximately 1 ft. below and 2 ft. above the sill elevation (453.5 ft). The marsh will cover 23.8 acres.

The combined total area of backwater and marsh is 50.2 acres.

**Cottonwood/Willow:** Goodding’s willow, coyote willow, and Fremont cottonwood distributions are determined by groundwater elevation. According to test pits excavated by the Bureau in September 2014, groundwater elevations ranged from 449 to 454 ft. throughout the project area. Following restoration, groundwater elevations are expected to rise to the sill elevation. Lite & Stromberg (2005) concluded that Goodding’s willow & Fremont cottonwood maintain dominance over tamarisk in areas with groundwater depths less than 8.5 ft. Based on these data and surveys of existing cottonwoods on the site, the cottonwood/willow landtype is delineated to occur from 456.5 to 464 ft. in elevation and covers 15.1 acres.

**Other Riparian (honey mesquite & arrowweed):** Honey mesquite and arrowweed occur in areas that are not inundated and do not occur in areas where mounds of sand create exciting ORV terrain. The “other riparian” landtype is delineated to occur from 464 to 480 ft. in elevation and covers 37.8 acres.

These guidelines were used to quantify the acreage of each land type. Other factors (e.g., competition, landuse) influence vegetation distribution which should be considered in the revegetation plan to be prepared by the Bureau of Reclamation.
Figure 1. Landcover types resulting from 60% backwater restoration design.
APPENDIX D

30% Design Concept: Water Control Structure Alternatives Analysis
TECHNICAL MEMORANDUM

Date: February 4, 2015
From: Tetra Tech, Inc.
Otis Bay, Inc.
RE: Lower Colorado River; Park Moabi Backwater Channel Restoration Design Water Control Structure Alternatives Analysis (as included within the 30% Design Concept Report)

Water control structures are required at the roadway bridge crossings to regulate the fluctuation of water passing through the proposed backwater channel during moderate to high flows in the Colorado River. The HEC-RAS analysis (30% Design Report - Appendix A) confirmed that the optimal sill elevation of 453.5 feet that was recommended by the 2012 Conceptual Design Report. However, given the uncertainties with the limited hydrologic data, a structure with an adjustable sill would be advantageous. Many different alternatives are available for this purpose with varying levels of cost and flexibility for adaptive management. Three water control structures alternatives were considered: 1) a static concrete sill, 2) an overshot type gate, and 3) Stop-log structure. The cost and function of each alternative are evaluated and compared below.

The alternatives considered for a water control structure are as follows:

Alternative 1. Precast bridge with a fixed sill elevation
Alternative 2. Precast bridge with an overshot gate structure
Alternative 3. Precast bridge with a stop-log structure

A summary of the observations made during the alternative design efforts are described in the following sections below:

**Alternative 1**

Alternative 1 consists of the above described concrete bridges. In each bridge, the concrete floor would serve as the water control sill and would be set at an excavation of 453.5 feet. This alternative requires no additional cost over the construction of the bridges and would require the least amount of maintenance.

**Alternative 2**

Alternative 2 consists of the concrete bridge structures (Alternative 1) combined with an overshot gate to act as the sill to control the water surface elevation in the backwater channel. An overshot gate is defined as a top down opening gate in which water passes over the top. There are many type of overshot gates including drawbridge style gates, pneumatic crest gates, and scissor style gates. For the purposes of this evaluation this alternative will consist of a drawbridge style gate. Two popular styles of this gate are the Weir Gate and Langemann Gate. These gates can be built with either automated or
manual hoist assemblies. The mechanized assemblies allow for the raising or lowering of the sill elevation which can be used as an adaptive management tool to regulate the inflow and outflow of Colorado River water through the proposed backwater channel. The capital cost for an overshot gate, over and above the cost of the concrete bridge, is estimated at approximately $390,000 per installation site. Based on the design literature overshot gates require less maintenance than some other mechanized gate systems, however, for this particular application there is a concern with how the mechanized features would weather due to the high temperatures. High temperatures can cause loss of grease required to keep the parts operational thereby causing the equipment to seize.

Alternative 3

Alternative 3 consists of the concrete bridge structures (Alternative 1) combined with a stop-log structure that will act as the sill crest to regulate the water surface in the backwater channel. A stop-log structure consists of a frame and removable logs. The frame is typically made of concrete but can also be made of fabricated metal. The logs themselves can be a variety of designs and materials depending on their application. Materials options include aluminum, steel, wood or synthetic materials such as fiberglass reinforced plastics. Stop logs can either be custom fabricated or specified by a manufacturer. The capital costs for a stop-log style water control structure was estimated approximately $85,000 per installation site. The stop log structure has no mechanized parts and requires less operational and maintenance. In the case of a custom designed fabricated structure replacement stop logs can be easily and inexpensively fabricated onsite. The stop logs can be designed such that the sill elevation can be adjusted by adding or removing a level of stop logs for adaptive management of the backwater channel.

Recommended Alternative

The intent of the design is to provide a sill elevation with flexibility to adjust the inflow to the proposed backwater channel for adaptive management. The 30% design therefore includes a sill with an adjustable elevation that varies from between 452.5 and 454.5 feet. This elevation brackets the elevation (453.5) in the 2012 Conceptual Design by ± 1 foot. Because of the need for flexible adaptive management the static sill (Alternative 1) was not considered a viable option for the proposed backwater channel. The overshot gate (Alternative 2) met all of the criteria needed for the backwater channel, but has high capital cost and a concern of excessive maintenance due to the mechanized design. The stop-log structure (Alternative 3) meets the criteria for the backwater channel at a cost that is much less than the overshot gate. Alternative 3 is the recommended approach and will continue to be developed for the 60% design submittal.
Mohave Valley Conservation Area
Restoration Development & Monitoring Plan
Lower Colorado River Multi-Species Conservation Program
Steering Committee Members

Federal Participant Group
Bureau of Reclamation
U.S. Fish and Wildlife Service
National Park Service
Bureau of Land Management
Bureau of Indian Affairs
Western Area Power Administration

Arizona Participant Group
Arizona Department of Water Resources
Arizona Electric Power Cooperative, Inc.
Arizona Game and Fish Department
Arizona Power Authority
Central Arizona Water Conservation District
Cibola Valley Irrigation and Drainage District
City of Bullhead City
City of Lake Havasu City
City of Mesa
City of Somerton
City of Yuma
Electrical District No. 3, Pinal County, Arizona
Golden Shores Water Conservation District
Mohave County Water Authority
Mohave Valley Irrigation and Drainage District
Mohave Water Conservation District
North Gila Valley Irrigation and Drainage District
Town of Fredonia
Town of Thatcher
Town of Wickenburg
Salt River Project Agricultural Improvement and Power District
Unit “B” Irrigation and Drainage District
Wellton-Mohawk Irrigation and Drainage District
Yuma County Water Users’ Association
Yuma Irrigation District
Yuma Mesa Irrigation and Drainage District

California Participant Group
California Department of Fish and Game
City of Needles
Coachella Valley Water District
Colorado River Board of California
Bard Water District
Imperial Irrigation District
Los Angeles Department of Water and Power
Palo Verde Irrigation District
San Diego County Water Authority
Southern California Edison Company
Southern California Public Power Authority
The Metropolitan Water District of Southern California

Nevada Participant Group
Colorado River Commission of Nevada
Nevada Department of Wildlife
Southern Nevada Water Authority
Colorado River Commission Power Users
Basic Water Company

Native American Participant Group
Hualapai Tribe
Colorado River Indian Tribes
Chemehuevi Indian Tribe

Conservation Participant Group
Ducks Unlimited
Lower Colorado River RC&D Area, Inc.
The Nature Conservancy

Other Interested Parties Participant Group
QuadState County Government Coalition
Desert Wildlife Unlimited

September 2015
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1.0 Introduction

The Lower Colorado River Multi-Species Conservation Program (LCR MSCP) is a multi-stakeholder federal and non-federal partnership responding to the need to balance the use of lower Colorado River (LCR) water resources and the conservation of native species and their habitats in compliance with the Endangered Species Act.

The LCR MSCP is a long-term (50 year) plan consisting of conservation measures that provide protection along the LCR from Lake Mead to the Southerly International Boundary with Mexico for 26 species currently threatened or endangered and five species on the verge of becoming threatened or endangered. The LCR MSCP anticipates development and/or protection of a minimum of 8,132 acres of habitat consisting of a mosaic of cottonwood-willow, honey mesquite, marsh, and backwater components. The program uses adaptive management principles to research and monitor species and habitats, and to adjust and enhance management actions and science applications over the life of the program.

Under the guidance of the LCR MSCP’s Habitat Conservation Plan (HCP), the program is tasked with creating 85 acres of connected backwater habitat between Davis and Parker Dams. HCP Conservation Measure FLSU1 states, “Create 85 acres of flannelmouth sucker habitat. Of the 360 acres of LCR MSCP-created backwaters, at least 85 acres will be created in Reach 3 with water depth, vegetation, and substrate characteristics that provide the elements of flannelmouth sucker habitat.”

Much of the bank line within this reach of the river is developed or runs through Topock Gorge, which is composed of steep, rocky terrain that is unsuitable for MSCP development based on site access restraints and landownership restrictions. However, within the Moabi Regional Park (Park Moabi) south of Needles, CA approximately 149 acre parcel of land residing within the historic floodplain of the lower Colorado River possesses the landscape characteristics to allow for the development of a connected backwater. (See Appendix G for historical imagery.)

Purpose

The purpose of the project is to create a connected backwater for native fishes and restore native riparian and upland habitat for the benefit of the LCR MSCP covered species. Target species include the flannelmouth sucker (Catostomus latipinnis) and the razorback sucker (Xyrauchen texanus). The project will create a mosaic of marsh and riparian habitat through management of the four land cover types: cottonwood-willow, honey mesquite, marsh and backwater.

Following the guidelines of the LCR MSCP HCP, the backwater must be connected to the river so that is it accessible to native fishes from the main stem. The proposed channel will connect to and induce additional flow through the existing channel to the south rather than exit directly to the river. Partners in the design of the Mohave Valley Conservation Area (MVCA) consists of representatives from the following organizations:
The project area will be 149 acres, which includes the main parcel bound by gravel roads as well as lands used to connect the backwater to the main stem of the river and the Park Moabi channel (Figure 1).

**Location and Description**

Park Moabi operates on 1,027 acres and has two land owners: the California State Lands Commission (CSLC) and the Bureau of Reclamation. The proposed MVCA land is located along the lower Colorado River, approximately 13 miles south of Needles, CA, between river miles 236 and 237 (Figure 1), and is owned by the CSLC. According to the lease between San Bernardino County and the CSLC, which came into effect on July 2, 1965, the property of interest commences at the center of Section 6, Township 7 N, and Range 24 E, S.B.M. The LCR MSCP is partnering with the Lands Commission and San Bernardino County, the lessee, to develop a backwater through the parcel northwest of the existing Park Moabi channel (Figure 1).
Figure 1 Mohave Valley Conservation Area Location
Following the channelization of the river, the existing Park Moabi channel was dredged starting in 1961 to create a deep water area for boat launching and to improve the sport fishery. Currently the park provides a 7-lane launch ramp and while sport fishing does occur. The LCR MSCP monitors razorback suckers within the Park Moabi channel.
In recent years the concessionaire under contract with San Bernardino County has significantly developed the services available within the Moabi Regional Park. Services developed by the concessionaire/sub-lessee include an upgraded 7-lane launch ramp, a marina, RV and tent camping, waterfront cabins, a convenient store, and the Pirate’s Cove Restaurant & Bar. The Conservation Area is upstream of the Park Moabi channel and services, but does parallel the riverside campsites on the east side of the levee road.

The site is a mixture of sand dunes formed from disposed dredge spoil during the construction of Park Moabi with salt cedar and arrow weed interspersed. A dense thicket of salt cedar runs through the proposed channel footprint. Exploratory excavation indicated more compact soil and coarser substrate are found on the far western side of the parcel that is bound by a gravel road.

Two culverts that drain storm water off the steep slopes further to the west run under the gravel road directly into the site (Figure 2). Additionally, an estimated 6000 cubic yards of rock ranging in size from 6 inches to 3 feet is stock piled within the proposed channel footprint. The rock stockpile will be utilized during the construction process for erosion control and placement in the backwater substrate. Just outside the western boundary of the project area there is a buried gas pipeline. Project activities will not disturb the pipeline, as it is out of the project boundary; nevertheless, equipment operators will be made aware of the pipeline’s location prior to construction.

Less than 1.5 miles upstream of the proposed inlet, also on the California side of the river, is another backwater known as Beal Slough (Figure 2). Dredged in 1979 Beal Slough supports a population of razorback suckers. Table 1 summarizes the history and physical attributes of the two neighboring backwaters.
Figure 3 Extended map of the project area shows neighboring backwaters and other site features.
<table>
<thead>
<tr>
<th>Park Moabi Channel</th>
<th>Years Constructed</th>
<th>Purpose of Construction</th>
<th>Channel Width</th>
<th>Channel Length</th>
<th>Maximum Depth</th>
<th>Open Water Acreage</th>
<th>Connection to River</th>
<th>Additional Information</th>
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<tr>
<td>Started in 1961*</td>
<td>Deep water area created for fisheries, improve boat launching. †</td>
<td>50 – 500 ft</td>
<td>1.5 miles (7920 ft)</td>
<td>16 ft ‡</td>
<td>40 acres</td>
<td>A culvert inlet structure moves water into the upper channel; however, the sediment plug that has formed which limits the flow within the upper 7 acres. The lower 33 acres receives water through the open channel outlet.</td>
<td>Marina boat entrance was dredged between Dec. 1971 and Jan. 1972. 100,546 cy of material were dredged using the 12 inch “Little Colorado.” ‡</td>
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| Beal Slough       | 1979-1980†        | Entry 1: For Fish and Wildlife Agencies, † Entry 2: Provide game fish spawning areas. † | 150 – 550 ft | 0.8 miles (4224 ft) | 17 ft ‡ | 25 acres | A porous dike and metal pipe culvert (18-24 inches?) at inlet. Porous dike at outlet. | Beal Slough was dredged and dike was created in 1979. 460,146 cy of material were moved and used for roadways, dikes, and islands. ‡ |

### Table 1 Summary of Park Moabi and Beal Slough Backwaters

* Historical Imagery
‡ Bathymetry surveys of Beal Slough and Park Moabi were conducted in April 2013. The results from those surveys are provided in Appendix B.
Land Ownership
The Conservation Area is located on portions of the property owned by the State of California, which is currently leased to San Bernardino County. California Department of Fish and Wildlife (CDFW) will lease the area where the backwater channel is to be constructed from CSLC. Reclamation, as implementing agency of the LCR MSCP, will enter into an agreement for restoration activities consistent with the Lower Colorado River Mult-Species Conservation Program with CDFW. Under the California Endangered Species Act (CESA) permit, habitat established in the state of California shall be protected in perpetuity.

Water
As documented in the 2012 Conceptual Design Report, the water for the project is supplied through the LCR MSCP Water Accounting Agreement passed by Congress as part of the Omnibus Public Land Management Act of 2009 (Public Law No. 111-11, Title IX, Subtitle E, 123 Statute 991, 1327-29). The Act permits Reclamation to create and manage Conservation Areas, which do not contain any water entitlement from the Secretary of the Interior, by using Colorado River water to meet the performance requirements of the LCR MSCP. Under the Water Accounting Agreement, Reclamation shall not consider any resulting increase in evaporation or percolation of Lower Colorado River water, for any backwater or marsh at an LCR MSCP Conservation Area where no entitlement exists, to be a diversion or consumptive use.

The MVCA will create approximately 50 acres of connected backwater habitat by diverting water off the main stem of the lower Colorado River, just south of river mile 237, and will return the water mainstem two miles downstream. Under the auspices of the Water Accounting Agreement, Reclamation shall not consider any resulting increase in evaporation or percolation of lower Colorado River water to be a diversion or consumptive use.

Land Use Agreement
The LCR MSCP, in coordination with CDFW, will draft a land use agreement to be reviewed and signed by CDFW. The land use agreement between will describe the partnership between LCR MSCP and CDFW for developing and maintaining the Conservation Area, and managing public access throughout. The land use agreement will be developed upon confirmation of the Lease Agreement from CSLC.

Lease Agreement
The lease agreement between the LCR MSCP’s partner CDFW and the CSLC will provide the terms of use for the MVCA property within the Park Moabi Regional Park boundary. LCR MSCP will submit the application to the California State Lands Commission, on behalf of CDFW, to modify an existing lease currently held by San Bernardino County. The lease modification will grant CDFW and LCR MSCP the authority to develop the Mohave Valley Conservation Area within the designated project area.

2.0 Restoration and Development Plan
As partial fulfillment of the LCR MSCP’s backwater acreage goals within Reach 3, approximately of 50 acres of connected backwater habitat for native fishes of the lower Colorado River: the flannelmouth sucker
(Castotomus latipinnis), the razorback sucker (Xyrauchen texanus) and the bonytail chub (Gila elegans).

The backwater habitat will consist of open water and marsh land cover types. The goal of the project is to maximize backwater acreage and incorporate marsh, cottonwood-willow, and mesquite land covers where appropriate.

The design lays out the excavation and grading for a backwater channel that extends from the Colorado River to the existing Park Moabi Channel and two water-crossing structures over the excavated backwater channel. Land based clearing will be done to remove existing vegetation and allow for contouring, infrastructure construction, and planting of native species. Currently, the majority of MVCA is dominated by salt cedar (Tamarix ramosissima), arrowweed (Pluchea sericea), and wetland scrub/shrub. No open water or marsh currently exists. Approximately 50 acres of MVCA will be cleared of existing vergations through land-based mechanical and hydraulic equipment. Removed material will be used to build access roads, a boat ramp and excess material will be placed adjacent to the backwater within the 149 acre boundary. Once clearing is completed excavation and contouring will be done, followed by infrastructure construction.

The structures include adjustable sills and are designed to provide hydraulic control for flows in and out of the backwater channel during moderate to high flows in the Colorado River. These water control structures will also limit the amount of Colorado River bed sediment entering the backwater channel.

The design will provide spatially variable topography with an appropriate distribution of depths and velocities for a variety of aquatic habitats. The design has been developed to reduce long-term maintenance requirements.

**Conceptual Design**

The project comprises a new backwater channel that extends from an inlet at the Colorado River to an exit at the existing Park Moabi Channel. The channel is contoured and graded to include deeper pools and shallower areas to provide fish habitat and to promote the establishment of healthy vegetation. Inlet and outlet structures provide hydraulic control and roadway crossings at the upstream and downstream ends of the new channel.
Figure 4 MVCA Site Plan Overview
**Channel Design**

The 60% backwater channel design is based on the grading that was included in the 30% Draft Design with modifications to reduce the number of disconnected islands. HEC-RAS modeling developed for the 60% design was documented in the Hydrologic and Hydraulic Technical Memorandum (Otis Bay and Tetra Tech 2015) included in Appendix A. The results show that mean velocities through the main section of the channel will remain below 0.5 ft/s under high flow conditions, with velocities through the concrete-arch culvert openings peaking at approximately 4 ft/s. The modeling shows that the backwater channel will decrease the water surface elevation in the Colorado River by less than 0.1 feet and will slightly increase the velocities near the outlet of the project site on the Park Moabi channel. Both changes are considered to be insignificant. Overall, the 60% design meets the design criteria for the backwater channel.

**Roadway Crossings**

The design includes structural roadway crossings over where the backwater channel intersects existing roadways. The selected structure for each crossing is a concrete-arch culvert equivalent to CONTECH prefabricated O-series arch structure with a concrete base slab foundation. The upstream structure, at the Colorado River inlet is 36 feet wide by 11 feet and 7.75 inches high. The downstream structure, at the exit to the Park Moabi Channel is 38 feet wide by 10 feet and 8.25 inches high. The selected dimensions were based on an iterative analyses of the flow capacity using the HEC-RAS model for the 60% channel design.

The concrete-arch culverts are designed with a cast-in-place concrete floor due to the limited bearing capacities of the existing soils (see Section 7.3). CONTECH prefabricated structures are designed to meet AASHTO Standard Specifications for Highway Bridges - Section 16.8 and LRFD Bridge Design Specifications - Section 12.14, and are manufactured in accordance with ASTM C1504. With suitable foundation design and adequate bearing capacities the CONTECH O-series arch can be designed to safely carry HS20 or highway loads.

**Water Control Structures**

Water control structures are required at the concrete-arch culverts to regulate the fluctuation of water passing through the backwater channel during moderate to high flows in the Colorado River. The 60% HEC-RAS analysis confirmed that the optimal sill elevation of 453.5 feet that was recommended by the 2012 Conceptual Design Report.

The 60% design includes a stop-log system that will provide an adjustable crest elevation to regulate the water surface in the backwater channel. The stop-log system was selected on the basis of an alternatives analysis that was included in the 30% Draft Design. A copy of this evaluation in letter format is included in Appendix D. Stop logs can either be custom fabricated or specified as one of the available prefabricated options available through a manufacturer. Further structural design of the water control structure will be developed for the 90% submittal.
The intent of the design is to provide a sill elevation with flexibility so that the inflow and outflow from the new backwater channel can be adjusted for adaptive management. Therefore the adjustable sill elevation is design to vary between 452.5 and 454.5 feet. This elevation brackets the elevation (453.5) in the 2012 Conceptual Design by ± 1 foot.

**Backwater Access**

The 60% draft design includes a boat ramp facility that is intended for use by the LCR MSCP for maintenance and monitoring. The new boat ramp will be accessed from the existing road along the west side of the project and will be obscured by fill areas to be inconspicuous to the public. The new boat ramp is 30 feet wide with a slope of 15 percent and intended for lightweight and non-motorized boat launching. The ramp includes 2-foot diameter boulder breakwaters and gravel fill placed within a Presto Geoweb system. The low-impact design will blend well with the surrounding features.

**Planting Design**

The planting design incorporates native LCR marsh, riparian, and upland species into a mosaic of created habitat. Species will be stratified according to water demand and depth outlined in Table 2. Tall emergent marsh species will be planted along the bank lines in deeper water, while shorter emergent marsh species will be planted further up slope to prevent inundation. In areas where shallow water transitions to saturated soils and upland areas, species adapted to varying water depths, seasonal drought and higher salinities will be planted. The following tables present the acreages of landcover types and the species proposed for planting in each zone.

<table>
<thead>
<tr>
<th>Landcover Type</th>
<th>Elevations (ft)</th>
<th>Acreage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Backwater</td>
<td>451-458</td>
<td>26.4</td>
</tr>
<tr>
<td>Marsh</td>
<td>452-456.5</td>
<td>23.8</td>
</tr>
<tr>
<td><strong>Combined total area of backwater and marsh</strong></td>
<td></td>
<td><strong>50.2</strong></td>
</tr>
<tr>
<td>Cottonwood/Willow</td>
<td>456.5-464</td>
<td>15.1</td>
</tr>
<tr>
<td>Upland (honey mesquite &amp; arrowhead)</td>
<td>464-472</td>
<td>28</td>
</tr>
</tbody>
</table>

Table 2 Landcover Acreage for MVCA
<table>
<thead>
<tr>
<th>Plants</th>
<th>Acres</th>
<th>Plants per Acre</th>
<th>Total Number of Plants</th>
<th>Plant Order</th>
<th>Propagation Collection Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marsh</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Schnoeplectus californicus</em></td>
<td>12</td>
<td>4356</td>
<td>52,272</td>
<td>53,000</td>
<td>1.823</td>
</tr>
<tr>
<td><em>Schnoeplectus americus</em></td>
<td>12</td>
<td>4356</td>
<td>52,272</td>
<td>53,000</td>
<td>1.823</td>
</tr>
<tr>
<td>Riparian</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Distichlis spicata</em></td>
<td>7</td>
<td>13,560</td>
<td>94,920</td>
<td>100,000</td>
<td>0.135</td>
</tr>
<tr>
<td><em>Salix exigua</em></td>
<td>3</td>
<td>2178</td>
<td>6,534</td>
<td>7,000</td>
<td>1.823</td>
</tr>
<tr>
<td><em>Salix goodingii</em></td>
<td>3</td>
<td>2178</td>
<td>6,534</td>
<td>7,000</td>
<td>1.823</td>
</tr>
<tr>
<td><em>Populus fremontii</em></td>
<td>2</td>
<td>2178</td>
<td>4,356</td>
<td>4,500</td>
<td>1.823</td>
</tr>
<tr>
<td>Upland</td>
<td>28</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Proposis glanduluousa</em></td>
<td>28</td>
<td>195</td>
<td>5,460</td>
<td>5,500</td>
<td>3.579</td>
</tr>
</tbody>
</table>

Table 3 Native Plant Species to be planted within the Mohave Valley Conservation Area
Figure 5 Planting scheme for backwater.
Figure 6 Landcover typed resulting from the 60% Mohave Valley Backwater design.
Planting Material / Planting Techniques

Plant material for the project would be delivered via a contractor. Planting techniques that would be used on site include:

- Automated mass transplanting
- Planting poles, potted plants, or slips with a conventional tree planter or by hand
- Perimeter planting of poles, potted plants, or slips

Marsh Plants

*Schnoeplectus californicus,* (California bulrush) will be planted 3 feet inline spacing with rows 40” apart for a total of 4356 per acre, planted first in the deeper water areas. *Schnoeplectus americus* (chaimakers bulrush, formerly scirpus) will be planted 3 feet inline spacing with rows 40” apart for a total of 4356 per acre.

Riparian plants

*Distichlis spicata* (saltgrass) will be planted 1 foot inline spacing with 24” rows apart for a total of 13,560 per acre. *Salix exigua,* *Salix goodingii* and *Populus fremontii* (Coyote willow, goodings willow, and cottonwood) will be planted 6 feet inline spacing with rows 40” apart for a total of 2178 per acre. 1 gallon mesquite trees will be hand planted 15 feet on center for a total of 195 per acre at the highest elevation.

3.0 Management Overview

Land Manager

Reclamation will be responsible for ensuring long-term operation and maintenance of MVCA throughout the term of the LCR MSCP. The details of operation and maintenance of MVCA will be agreed upon between Reclamation and CDFW to include species monitoring, law enforcement, public use, wildfire management, research, and monitoring. After development, long-term management of each Conservation Area is documented in a site specific management plan.

Law Enforcement

CDFW is responsible for law enforcement at MVCA. Reclamation will work with BLM to provide additional assistance and to ensure these activities do not conflict with the LCR MSCP HCP.

Public Use

CDFW has the authority to regulate fish, wildlife, and recreation uses pursuant to CDFW statutes, regulations and policies. In cooperation with Reclamation, CDFW will coordinate its public use and related activities so they are consistent with and do not adversely affect restoration activities at MVCA.

Wildfire Management

As guided by commitments in the LCR MSCP HCP, wildfire management practices on MVCA would:
Reduce the risk of loss of related habitat to wildfire by providing resources to suppress wildfires, e.g., contributing to and integrating with local, State, and Federal agency fire management plans, and Implement land management and habitat creation measures to support the reestablishment of native vegetation that is lost to wildfire.

Specific fire management plan will be drafted as in described in the LCR MSCP Law and Fire Strategy

**Site Maintenance**

Reclamation will be responsible for maintaining the levee road adjacent to the MVCA backwater and the access roads that are used to define the footprint of MVCA. Future backwater maintenance activities may involve dredging the backwater in order to maintain a channel depth of at least 10 feet of open water habitat. The dredging and placement of the dredge material would occur within the previously disturbed project footprint. Equipment (E.g., backhoe, excavator, dump truck, etc.) may be used for land based maintenance activities such as cattail removal and vegetation clearing.

**Herbicide/Fertilizer/Pesticide Application**

To ensure the total eradication of non-native plant species (E.g. Tamarix ramosissima) before planting and to maintain healthy stands of native vegetation species, the application of herbicides, fertilizer, or pesticides may be required. All herbicide, fertilizer or pesticide application would be applied or supervised by a current Certified Pesticide Applicator for the chemical being applied and in compliance with the rules, regulation, and laws set by the State of California, San Bernardino County.

All records and associated chemical application documents will be stored by the land manager and will include:

- Training records of all employees handling pesticides and herbicides
- Material Safety Data Sheets for all pesticides, herbicides and fertilizers
- Location map of herbicide and pesticide storage site
- Use of California approved herbicide, pesticide, and fertilizers
- Record of herbicide, pesticide or fertilizer use

**4.0 Monitoring**

**Fisheries Monitoring**

Monitoring at MVCA is designed to document general use of the backwater by the MSCP covered fish species. Methods used will be diverse enough to detect multiple life stages over several seasons, with an emphasis during seasons of highest abundance. In addition to fish surveys, general habitat assessment will include zooplankton and phytoplankton monitoring, and water quality monitoring and analysis.
**Fish Monitoring**

Monitoring will include 6 trips per year to conduct presence/absence surveys for multiple year classes of native fish. Five spring surveys (January – May) will be conducted to coincide with spawning activities and larval emergence of the razorback and flannelmouth sucker (Mueller 2003), as well as the presumed spawning period for bonytail (Wagner 1955). A single fall survey (November) will be conducted to assess species use outside the spawning season. All trips will consist of two nights of surveys. The spring trips will include trammel netting, remote sensing, and larval collections; the fall survey will include trammel netting and remote sensing. Catch per unit effort (CPUE) will be determined for each survey method and will be compared for annual and seasonal variation.

Six trammel nets of two different sizes (3 at 75’ x 0.5” and 3 at 150’ x 1.5 “) will be deployed during each night of the survey event. The nets are typically set perpendicular to shore with one end attached to shore or anchored near shore and then stretched toward the center of the pond and marked with a small buoy. The nets will be allowed to fish throughout the night and then retrieved the following morning. All fish will be collected from the net and held in fresh water. All fish will be identified, measured for total length, weighed, and released at the capture location. In addition, native fish will be scanned for passive integrated transponders (PIT) and wire tags, and subsequently injected with a PIT tag if none is found.

Larval collections will be conducted in 15 minute intervals at a minimum of 3 locations per night. Two 12-volt “crappie” lights are connected to a battery, placed over each side of the boat, and submerged in 4-10 inches of water. Two “netters” equipped with long-handled aquarium nets are stationed to observe the area around the lights. Larval fish that swim into the lighted area are dip-netted out of the water and placed into a holding bucket. Larvae are identified and enumerated as they are placed into the holding bucket and released at the point of capture once sampling is completed (Albrecht et al. 2010). A subset of larval samples may be retained for genetic analysis or species identification. During construction, a series of antennae will be installed into the slab of the inlet and outlet structures. These antennae will run the entire length of the foundation, and be used to track the movement of tagged fish into and out of the backwater. Data collected from the antennae will be downloaded during each scheduled fish monitoring trip and supplement the manual monitoring data.

**Zooplankton/Phytoplankton Monitoring**

Zooplankton and phytoplankton will be monitored quarterly from two fixed locations, the deepest area near the inflow and outflow. Zooplankton are collected using a vertical tow with a 64 µm plankton net. The depth of the tow is recorded and used to calculate sample volume; multiple tows are taken to achieve the desired filtered volume (250 L). All plankton are rinsed into an amber sample bottle and preserved with 0.3mL of Lugol’s iodine solution per 100mL of sample. Samples are analyzed for biomass and relative abundance, and compared to other regional backwaters.

**Water Quality**

Water quality will be monitored by conducting vertical profiles at least six times per year. All surveys will be separated by a minimum of one month and will encompass at least three seasons (spring, September 2015.
surveys will occur during the six fish monitoring events (five spring trips and one in the fall). A profile will be taken before 9:00 a.m. from the two fixed stations near the inflow and outflow. Profiles will be recorded in 0.5 meter increments using a YSI professional plus multi-parameter probe or similar instrument. Nominal parameters measured include temperature, conductivity, dissolved oxygen (DO) and pH; Secchi depth will also be recorded when pond bottom is not visible.

**Water Chemistry**

Water chemistry samples will be collected once annually between July and September and will be analyzed for general chemistry. This analysis will include:

- Physical properties, conductivity, pH, TDS, TSS
- Major and minor ions
- Metals
- Nutrients, nitrate, nitrite, total nitrogen, Ortho-phosphate, and total phosphate
- Total nutrients

Three 1-liter samples will be collected from each of the water quality stations. Collection for all parameters will occur just below the water surface (approximately 0.2m depth). All sample bottles will be rinsed with the water at the sampling station prior to collecting the sample. Each sample will be immediately placed on ice after acquisition. The three samples from each station will be mixed as a single composite sample prior to being decanted into the appropriate sample bottles. The samples shall then be preserved using the appropriate methods for each water quality parameter (described below) and place on ice for shipping or delivery to the LCR – Regional Lab.

The recommended size and type of sample bottle is described below for each parameter. All sample containers shall be labeled correctly, including site name, date, sample parameter, preservation, and collector.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Preservation</th>
<th>Filtered</th>
<th>Volume</th>
<th>Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Chemistry</td>
<td>None</td>
<td>No</td>
<td>500 ml</td>
<td>Refrigerate</td>
</tr>
<tr>
<td>Metals</td>
<td>Nitric Acid (HNO₃) 2 drops</td>
<td>Yes 0.45µm</td>
<td>50 ml</td>
<td>Refrigerate</td>
</tr>
<tr>
<td>Nitrate/Nitrite</td>
<td>10% Sulfuric Acid (H₂SO₄) 0.4ml</td>
<td>No</td>
<td>100 ml</td>
<td>Refrigerate</td>
</tr>
<tr>
<td>Ortho-Phosphate</td>
<td>None</td>
<td>Yes 0.45µm</td>
<td>100 ml</td>
<td>Frozen by 48 hrs</td>
</tr>
<tr>
<td>Total Nutrients</td>
<td>None</td>
<td>No</td>
<td>100 ml</td>
<td>Frozen by 48 hrs</td>
</tr>
</tbody>
</table>

*Table 4 Sampling parameters.*
**Wildlife Monitoring**

As stated above, MVCA will be managed for covered fish. Additional covered species may utilize the marsh, cottonwood-willow and mesquite land cover that will be planted. The site will be added to conservation area monitoring for marsh birds, neo-tropical birds and small mammals once habitat develops. Monitoring will be conducted to document presence and may not be required annually.

- **Marsh Birds** - Monitoring will be conducted using the multi-species survey from the Standardized North American Marsh Bird Monitoring Protocol (Conway 2005) after all construction is complete and marsh vegetation develops (usually one year after planting). This protocol incorporates playing calls of marsh bird species at designated survey points to elicit responses in order to determine presence of the target species.

- **Neo-tropical Birds** - Double-sampling, rapid-intensive, area-search surveys will be conducted in April-June 2015 prior to construction to identify species currently using the site as detailed in GBBO (2012). The site will be surveyed again at least 2 growing seasons after planting when riparian woodland vegetation reaches sufficient height and density to provide nesting habitat.

- **Small Mammals** - potential cotton rat and desert pocket mouse habitat develops, then presence surveys will be conducted at least once during fall and/or spring. Trapping will be conducted overnight using Sherman live traps. Traps will be placed in linear transects within the transition zone.

If habitat for additional covered species develops, monitoring may be scheduled to document presence.

### 5.0 Reports

**Annual Report**

An annual report will be prepared by Reclamation and made available each calendar year summarizing the following:

- General description of the Project status and the effects on covered species
- A table from the Mitigation Monitoring and Reporting Program (MMRP) indicating current implementation status of each mitigation measure
- A description of all restoration activities and monitoring actions conducted over the past year
- A summary of monitoring and research activities over the past year
- Results and analyses of monitoring and research data
- An assessment of the effectiveness of each mitigation measure in minimizing and compensating for Project impacts
- The total number of acres planted
- The total number of acreage that meets or exceeds the performance standards
- Any other applicable information.
**Final Report**

A final report will be prepared by Reclamation and submitted no later than 180 days after the completion of all mitigation measures. The final report is anticipated in 2055 and will include the following information:

- A copy of the table in the MMRP with notes showing when each mitigation measure was implemented
- All available information regarding Project-related incidental take of covered species
- Information regarding other Project impacts on the covered species in the Permit
- An assessment of effectiveness of the Permit’s conditions of approval for minimizing and compensating for project impacts
- Recommendations on how mitigation measures might be changed to more effectively minimize and mitigate the impacts of future projects on the species
- Any other pertinent information.
**Literature Cited**


<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Pollutant Abbr.</th>
<th>Maximum Unmitigated Emissions (Tons/yr)(^1)</th>
<th>Unit</th>
<th>Appropriate Annual Threshold Applied(^2)</th>
<th>Exceeds Threshold?</th>
</tr>
</thead>
<tbody>
<tr>
<td>GHG - Carbon Dioxide</td>
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<td>PM(_{2.5})</td>
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<td>Tons</td>
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<td>No</td>
</tr>
</tbody>
</table>

1 The annual emissions estimated for this project were calculated by dividing the proposed Project Totals for the life of the project by the expected duration of Phase one through Phase 3, estimated at 3 years.
Greenhouse Gas and Criteria Pollutants Emission Factor Calculation Tools

## Project Information

**Project Name:** Mohave Conservation Area Backwater Project  
**Phase:** Phase One - Vegetation Clearing

## Estimated Fuel Consumption

**Type of Fuel:** Ultra Low Sulfur Diesel Fuel  
**Estimated Total Gallons of Fuel Used:** 22,193  
**Estimated Gallons of Fuel Used Per Hour:** 44

### Criteria Pollutant Emissions

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Pollutant Abb.</th>
<th>Emission Factor</th>
<th>Units</th>
<th>Emission Factor Conversion</th>
<th>Unit</th>
<th>Maximum Unmitigated Emissions (lbs/day)</th>
<th>Unit</th>
<th>Appropriate Threshold Applied&lt;sup&gt;2&lt;/sup&gt;</th>
<th>Unit</th>
<th>Maximum Unmitigated Emissions (Tons)&lt;sup&gt;3&lt;/sup&gt;</th>
<th>Unit</th>
<th>Appropriate Threshold Applied&lt;sup&gt;2&lt;/sup&gt;</th>
<th>Exceeds Threshold?</th>
</tr>
</thead>
<tbody>
<tr>
<td>GHG - Carbon Dioxide</td>
<td>CO&lt;sub&gt;2&lt;/sub&gt;</td>
<td>22,800.0000</td>
<td>lbs per 1000 gallons</td>
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<td>lbs/gallon</td>
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<td>Tons</td>
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<td>lbs/gallon</td>
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<td>Tons</td>
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<td>lbs per 1000 gallons</td>
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<sup>1</sup> Calculation Formula used: 1.38E2*%S (S% = Sulfur Content)
<sup>2</sup> Emission Factor calculation is based on Ultra Low Sulfur Diesel Fuel (Sulfur Content is 10ppm or 0.00125038 lbs/gal). Calculation Formula used: 1.38E2*S (S% = Sulfur Content)
<sup>3</sup> Accelware: Unit Converter, Parts/Million (Ppm) to Pounds/Gallon (US) Conversion Calculator
<sup>4</sup> Accelware: Unit Converter, Pounds (lbs) to Tons (short US) Conversion Calculator

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For more information, please refer to the EPA Technology Transfer Network Clearinghouse for Inventories & Emissions Factors.
<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Pollutant Abbr</th>
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<th>Units</th>
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<td>lbs per 1000 gallons</td>
<td>0.00785000 lbs/gal</td>
<td>0.00755000 lbs/day</td>
<td>0.029800</td>
<td>Tons</td>
<td>0.00382</td>
<td>0.00000</td>
<td>No</td>
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<tr>
<td>Particulate Matter (Primary)</td>
<td>PM2.5</td>
<td>7.8500000</td>
<td>lbs per 1000 gallons</td>
<td>0.00785000 lbs/gal</td>
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<td>Tons</td>
<td>0.00382</td>
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<td>No</td>
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**Criteria Pollutant Emissions**

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<tr>
<th>Pollutant</th>
<th>Pollutant Abbr</th>
<th>Emission Factor</th>
<th>Units</th>
<th>Emission Factor Conversion</th>
<th>Unit</th>
<th>Maximum Unmitigated Emissions (lbs/day)</th>
<th>Unit</th>
<th>Appropriate Threshold Applied</th>
<th>Maximum Unmitigated Emissions (Tons)</th>
<th>Unit</th>
<th>Appropriate Threshold Applied</th>
<th>Exceeds Threshold?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Dioxide</td>
<td>CO2</td>
<td>22.8000000</td>
<td>lbs per 1000 gallons</td>
<td>22.8000000 lbs per gallon</td>
<td>624.00 lbs/day</td>
<td>548.0000</td>
<td>Tons</td>
<td>135.51074</td>
<td>100.0000</td>
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<td>Carbon Monoxide</td>
<td>CO</td>
<td>11.5000000</td>
<td>lbs per 1000 gallons</td>
<td>0.01150000 lbs/gal</td>
<td>0.00755000 lbs/day</td>
<td>0.027800</td>
<td>Tons</td>
<td>0.00825</td>
<td>0.00000</td>
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<td>Oxides of Nitrogen</td>
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<td>0.00785000 lbs/day</td>
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<td>Tons</td>
<td>0.00382</td>
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<tr>
<td>Volatile Organic Compounds</td>
<td>VOC</td>
<td>11.5000000</td>
<td>lbs per 1000 gallons</td>
<td>0.01150000 lbs/gal</td>
<td>0.00755000 lbs/day</td>
<td>0.027800</td>
<td>Tons</td>
<td>0.00825</td>
<td>0.00000</td>
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<td>Tons</td>
<td>0.00382</td>
<td>0.00000</td>
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<tr>
<td>Particulate Matter (Primary)</td>
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<td>lbs per 1000 gallons</td>
<td>0.00785000 lbs/gal</td>
<td>0.00755000 lbs/day</td>
<td>0.029800</td>
<td>Tons</td>
<td>0.00382</td>
<td>0.00000</td>
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</table>

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**Note:** Sulfur Emission Factor calculation is based on Ultra Low Sulfur Diesel Fuel (Sulfur Content is 10ppm or 0.000125038 lbs/gal). Calculation Formula used: 1.38E2*S (S=Sulfur Content)
<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Pollutant Abb.</th>
<th>Emission Factor</th>
<th>Units</th>
<th>Emission Factor Conversion</th>
<th>Unit</th>
<th>Maximum Unmitigated Emissions (lbs/day)</th>
<th>Unit</th>
<th>Appropriate Threshold Applied</th>
<th>Maximum Unmitigated Emissions (Tons)</th>
<th>Unit</th>
<th>Appropriate Threshold Applied</th>
<th>Exceeds Threshold?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Dioxide</td>
<td>CO2</td>
<td>22,600.00</td>
<td>lbs per 1000 gallons</td>
<td>22,600.00 lbs / gallon</td>
<td>lbs/day</td>
<td>2,712.0 lbs/day</td>
<td>Tons</td>
<td>25.966265</td>
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<td>Carbon Monoxide</td>
<td>CO</td>
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<td>lbs per 1000 gallons</td>
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<td>lbs/day</td>
<td>1.39 lbs/day</td>
<td>Tons</td>
<td>0.013328</td>
<td>0.054800</td>
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<tr>
<td>Oxides of Nitrogen</td>
<td>NOx</td>
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<td>lbs per 1000 gallons</td>
<td>0.260000 lbs / gallon</td>
<td>lbs/day</td>
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<tr>
<td>Volatile Organic Compounds</td>
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<td>0.013680</td>
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<td>No</td>
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<tr>
<td>Oxides of Sulfur***</td>
<td>SOx</td>
<td>0.125038</td>
<td>lbs per 1000 gallons</td>
<td>0.00012504 lbs / gallon</td>
<td>lbs/day</td>
<td>0.02 lbs/day</td>
<td>Tons</td>
<td>0.000144</td>
<td>0.000080</td>
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<td>No</td>
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<td>Particulate Matter (Primary)</td>
<td>PM10</td>
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<td>0.009019</td>
<td>0.000800</td>
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<tr>
<td>Particulate Matter (Primary)</td>
<td>PM2.5</td>
<td>7.550000</td>
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<td>lbs/day</td>
<td>0.91 lbs/day</td>
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<td>0.008675</td>
<td>0.000900</td>
<td>Tons</td>
<td>15.000</td>
<td>No</td>
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</tbody>
</table>

*** Sulfur Emission Factor calculation is based on Ultra Low Sulfur Diesel Fuel (Sulfur Content is 15ppm or 0.0000125038 lbs/gal). Calculation Formula used: 1.38E2*S (S=Sulfur Content)
1 Equation for this Calculation Sheet: EPA, May 2015, Technology Transfer Network Clearinghouse for Inventories & Emissions Factors
2 Mojave Desert Air Quality Management District
3 Greenhous Gas and Criteria Pollutants Emission Factor Calculation Tools
4 Accelware: Unit Converter, Parts/Million (Ppm) to Pounds/Gallon (US) Conversion Calculator
5 Accelware: Unit Converter, Pounds (lbs) to Tons (short US) Conversion Calculator
6 Citation for this Calculation Sheet: EPA, May 2015, Technology Transfer Network Clearinghouse for Inventories & Emissions Factors
7 Greenhous Gas and Criteria Pollutants Emission Factor Calculation Tools
8 Mojave Desert Air Quality Management District
9 Accelware: Unit Converter, Parts/Million (Ppm) to Pounds/Gallon (US) Conversion Calculator
10 Accelware: Unit Converter, Pounds (lbs) to Tons (short US) Conversion Calculator
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<thead>
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<th></th>
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</thead>
<tbody>
<tr>
<td>Carbon Dioxide</td>
<td>CO₂</td>
<td>22,600.00000</td>
<td>lbs per 1000 gallons</td>
<td>22.600000000 lbs/1 gallon</td>
<td>4.520.000</td>
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<td>lbs/day</td>
<td>512.559523</td>
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<td>CO</td>
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<td>lbs per 1000 gallons</td>
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<td>0.01160000</td>
<td>2.320000</td>
<td>lbs/day</td>
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<td>100.00</td>
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<td>Oxides of Nitrogen</td>
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<td>260.000000</td>
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<td>0.26000000</td>
<td>0.26000000</td>
<td>52.000000</td>
<td>lbs/day</td>
<td>5.896702</td>
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<td>25.00</td>
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<td>Oxides of Sulfur***</td>
<td>SOx</td>
<td>0.125038</td>
<td>lbs per 1000 gallons</td>
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<td>0.000125038</td>
<td>0.030000</td>
<td>lbs/day</td>
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<td>Particulate Matter (Primary)</td>
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<td>lbs per 1000 gallons</td>
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<td>0.00785000</td>
<td>1.570000</td>
<td>lbs/day</td>
<td>0.178035</td>
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<td>15.00</td>
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<td>Particulate Matter (Primary)</td>
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<td>15.00</td>
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</tbody>
</table>

[^1] Sulfur Emission Factor calculation is based on Ultra Low Sulfur Diesel Fuel (Sulfur Content is 10ppm or 0.000125038 lbs/gal[^3]). Calculation Formula used: 1.38E2*S (S= Sulfur Content)

[^2] Citation for this Calculation Sheet: EPA, May 2015, Technology Transfer Network Emissions for Inventories & Emissions Factors


[^7] **Project Information**

**Project Name**: Mohave Conservation Area Backwater Project

**Type of Fuel**: Ultra Low Sulfur Diesel Fuel

**Estimated Total Gallons of Fuel Used**: 50,000

**Estimated Gallons of Fuel Used Per Hour**: 20
## Greenhouse Gas and Criteria Pollutants Emission Factor Calculation Tools

### Project Information

**Project Name:** Mohave Conservation Area Backwater Project  
**Phase:** Phase One - Vegetation Clearing

### Estimated Fuel Consumption

<table>
<thead>
<tr>
<th>Type of Fuel</th>
<th>Estimated Total Gallons of Fuel Used</th>
<th>Estimated Gallons of Fuel Used Per Hour</th>
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<tbody>
<tr>
<td>Ultra Low Sulfur Diesel Fuel and Gasoline Combin</td>
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### Criteria Pollutant Emissions

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<tbody>
<tr>
<td>GHG - Carbon Dioxide</td>
<td>CO₂</td>
<td>22,600.000000 lbs per 1000 gallons</td>
<td>22,600.000000 lbs/1 gallon</td>
<td>M1</td>
<td>1.325927</td>
<td>Tons</td>
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</tr>
<tr>
<td>Carbon Monoxide</td>
<td>CO</td>
<td>11.600000 lbs per 1000 gallons</td>
<td>0.01160000 lbs/1 gallon</td>
<td>7</td>
<td>0.368357</td>
<td>Tons</td>
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<tr>
<td>Oxides of Nitrogen</td>
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<td>0.26000000 lbs/1 gallon</td>
<td>22</td>
<td>10.369351</td>
<td>Tons</td>
<td>25.00</td>
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<tr>
<td>Oxides of Sulfur**</td>
<td>SOx</td>
<td>0.125038 lbs per 1000 gallons</td>
<td>0.00012504 lbs/1 gallon</td>
<td>0.004987</td>
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</tr>
<tr>
<td>Particulate Matter (Primary)</td>
<td>PM</td>
<td>7.850000 lbs per 1000 gallons</td>
<td>0.00785000 lbs/1 gallon</td>
<td>0.313075</td>
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<td>15.00</td>
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<tr>
<td>Particulate Matter (Primary)</td>
<td>PM</td>
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<td>0.00755000 lbs/1 gallon</td>
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<td></td>
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**[^3]: Sulfur Emission Factor calculation is based on Ultra Low Sulfur Diesel Fuel (Sulfur Content is 15ppm or 0.000125038 lbs/gal). Calculation Formula used: 1.38E2*S (S=Sulfur Content)

[^4]: Jigion for this Calculation Sheet: EPA, May 2015, Technology Transfer Network Datasheet for Inventories & Emissions Factors

**[^2]: Mojave Desert Air Quality Management District

**[^1]: Accelware: Unit Converter, Parts/Million (Ppm) to Pounds/Gallon (US) Conversion Calculator

**[^3]: Accelware: Unit Converter, Pounds (lbs) to Tons (short US) Conversion Calculator
## Greenhouse Gas and Criteria Pollutants Emission Factor Calculation Tools

### Project Information

**Project Name**: Mohave Conservation Area Backwater Project  
**Phase**: Phase One - Vegetation Clearing

### Estimated Fuel Consumption

**Type of Fuel**: Gasoline  
**Estimated Total Gallons of Fuel Used**: 738  
**Estimated Gallons of Fuel Used Per Hour**: 4

### Criteria Pollutants Emissions

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Pollutant Abr.</th>
<th>Emission Factor</th>
<th>Units</th>
<th>Emission Factor Conversion</th>
<th>Unit</th>
<th>Maximum Unmitigated Emissions (lbs/day)</th>
<th>Emission Factor</th>
<th>Maximum Unmitigated Emissions (Tons)</th>
<th>Unit</th>
<th>Appropriate Threshold Applied</th>
<th>Exceeds Threshold?</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO₂</td>
<td>CO</td>
<td>19,500.000000</td>
<td>lbs/1000 gallons</td>
<td>19,500.000000 lbs/1 gallon</td>
<td>624.00 lbs/day</td>
<td>548.000</td>
<td>6.527650</td>
<td>Tons</td>
<td>100</td>
<td>No</td>
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<tr>
<td>Carbon Monoxide</td>
<td>CO</td>
<td>7,900.000000</td>
<td>lbs/1000 gallons</td>
<td>7,900.000000 lbs/1 gallon</td>
<td>252.80 lbs/day</td>
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<td>2.384376</td>
<td>Tons</td>
<td>100</td>
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<tr>
<td>Oxides of Nitrogen</td>
<td>NOx</td>
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<td>0.20500000 lbs/1 gallon</td>
<td>6.56 lbs/day</td>
<td>137</td>
<td>0.068624</td>
<td>Tons</td>
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<td>No</td>
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<td>Volatile Organic Compounds</td>
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<td>0.14800000 lbs/1 gallon</td>
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<td>0.049543</td>
<td>Tons</td>
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<td>Oxides of Sulfur</td>
<td>SOx</td>
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<td>137</td>
<td>0.003548</td>
<td>Tons</td>
<td>15.00</td>
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<td>Particulate Matter (Primary)</td>
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<td>0.01260000 lbs/1 gallon</td>
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<td>0.004218</td>
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<td>15.00</td>
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<tr>
<td>Particulate Matter (Primary)</td>
<td>PM</td>
<td>12.600000</td>
<td>lbs/1000 gallons</td>
<td>0.01260000 lbs/1 gallon</td>
<td>0.40 lbs/day</td>
<td>82</td>
<td>0.004218</td>
<td>Tons</td>
<td>15.00</td>
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</tbody>
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1. Citation for this Calculation Sheet: EPA, May 2016, Technology Transfer Network Clearinghouse for Inventories & Emissions Factors  
2. Mojave Desert AV Quality Management District  
3. Accelware: Unit Converter, Parts/Million (Ppm) to Pounds/Gallon (US) Conversion Calculator  
4. Accelware: Unit Converter, Pounds (lbs) to Tons (short US) Conversion Calculator
## Project Information

**Project Name:** Mohave Conservation Area Backwater Project  
**Phase:** Phase Two - Excavation, Desilting, and Construction

## Estimated Fuel Consumption

<table>
<thead>
<tr>
<th>Type of Fuel</th>
<th>Ultra-Low Sulfur Diesel Fuel</th>
</tr>
</thead>
</table>

### Estimated Gallons of Fuel Used

| Estimated Gallons of Fuel Used | 185 |

### Estimated Fuel Consumption Per Hour

| Estimated Fuel Consumption Per Hour | 4 |

## Criteria Pollutant Emissions

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Pollutant Abr</th>
<th>Emission Factor¹</th>
<th>Units</th>
<th>Emission Factor Conversion</th>
<th>Unit</th>
<th>Maximum Unmitigated Emissions (lbs/day)</th>
<th>Unit</th>
<th>Appropriate Threshold Applied ²</th>
<th>Maximum Unmitigated Emissions (Tons)³</th>
<th>Unit</th>
<th>Appropriate Threshold Applied ²</th>
<th>Exceeds Threshold?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Dioxide</td>
<td>CO₂</td>
<td>19.500 000 000</td>
<td>lbs per 1000 gallons</td>
<td>19.500 000 000</td>
<td>lbs/gallon</td>
<td>624.00</td>
<td>lbs/day</td>
<td>548,000</td>
<td>Tons</td>
<td>1.636335</td>
<td>Tons</td>
<td>100 000 00</td>
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<td>Carbon Monoxide</td>
<td>CO</td>
<td>7.900 000 000</td>
<td>lbs per 1000 gallons</td>
<td>7.900 000 000</td>
<td>lbs/gallon</td>
<td>252.80</td>
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<td>548</td>
<td>Tons</td>
<td>0.730750</td>
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<td>lbs/gallon</td>
<td>6.56</td>
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</tr>
<tr>
<td>Oxides of Sulfur</td>
<td>SOₓ</td>
<td>10 600</td>
<td>lbs per 1000 gallons</td>
<td>0.010600000</td>
<td>lbs/gallon</td>
<td>0.34</td>
<td>lbs/day</td>
<td>137</td>
<td>Tons</td>
<td>0.000981</td>
<td>Tons</td>
<td>25</td>
</tr>
<tr>
<td>Particulate Matter (Primary)</td>
<td>PM₁₀</td>
<td>12 600</td>
<td>lbs per 1000 gallons</td>
<td>0.012600000</td>
<td>lbs/gallon</td>
<td>0.40</td>
<td>lbs/day</td>
<td>82</td>
<td>Tons</td>
<td>0.001166</td>
<td>Tons</td>
<td>15</td>
</tr>
<tr>
<td>Particulate Matter (Primary)</td>
<td>PM₂.₅</td>
<td>12 600</td>
<td>lbs per 1000 gallons</td>
<td>0.012600000</td>
<td>lbs/gallon</td>
<td>0.40</td>
<td>lbs/day</td>
<td>82</td>
<td>Tons</td>
<td>0.001166</td>
<td>Tons</td>
<td>15</td>
</tr>
</tbody>
</table>

¹ Citation for this Calculation Sheet: EPA, May 2015, Technology Transfer Network (TTC) Network for Inventories & Emissions Factors

² Mojave Desert Air Quality Management District

³ Accelware: Unit Converter, Parts/Million (Ppm) to Pounds/Gallon (US) Conversion Calculator

⁴ Accelware: Unit Converter, Pounds (lbs) to Tons (short US) Conversion Calculator
### Project Information
- **Project Name**: Mohave Conservation Area Backwater Project
- **Phase**: Phase Three - Establishment/Re-Vegetation

### Estimated Fuel Consumption
- **Type of Fuel**: Ultra Low Sulfur Diesel Fuel
- **Estimated Total Gallons of Fuel Used**: 785
- **Estimated Gallons of Fuel Used Per Hour**: 4

### Criteria Pollutant Emissions

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Pollutant Abr.</th>
<th>Emission Factor(^a)</th>
<th>Units</th>
<th>Emission Factor Conversion</th>
<th>Unit</th>
<th>Maximum Unmitigated Emissions (lbs/day)</th>
<th>Unit</th>
<th>Appropriate Threshold Applied(^b)</th>
<th>Maximum Unmitigated Emissions (Tons)(^c)</th>
<th>Unit</th>
<th>Appropriate Threshold Applied(^b)</th>
<th>Exceeds Threshold?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Dioxide</td>
<td>CO2</td>
<td>19,500.000000</td>
<td>lbs per 1000 gallons</td>
<td>19.900000000 lbs/l gallon</td>
<td>b/d</td>
<td>624.00</td>
<td>lbs/day</td>
<td>548.00</td>
<td>1.636335 Tons</td>
<td>Tons</td>
<td>125,000.00</td>
<td>No</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>CO</td>
<td>7,900.000000</td>
<td>lbs per 1000 gallons</td>
<td>7.900000000 lbs/l gallon</td>
<td>b/d</td>
<td>212.60</td>
<td>lbs/day</td>
<td>548.00</td>
<td>0.73776 Tons</td>
<td>Tons</td>
<td>100.00</td>
<td>No</td>
</tr>
<tr>
<td>Oxides of Nitrogen</td>
<td>NOx</td>
<td>206.0000000</td>
<td>lbs per 1000 gallons</td>
<td>0.205000000 lbs/l gallon</td>
<td>d/l</td>
<td>137.00</td>
<td>lbs/day</td>
<td>137.00</td>
<td>0.01560 Tons</td>
<td>Tons</td>
<td>25.00</td>
<td>No</td>
</tr>
<tr>
<td>Involatile Organic Compounds</td>
<td>VOC</td>
<td>148.000000</td>
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<td>0.148000000 lbs/l gallon</td>
<td>d/l</td>
<td>137.00</td>
<td>lbs/day</td>
<td>137.00</td>
<td>0.01560 Tons</td>
<td>Tons</td>
<td>25.00</td>
<td>No</td>
</tr>
<tr>
<td>Oxides of Sulfur</td>
<td>SOx</td>
<td>10,600.00000</td>
<td>lbs per 1000 gallons</td>
<td>0.010600000 lbs/l gallon</td>
<td>d/l</td>
<td>0.34</td>
<td>lbs/day</td>
<td>0.34</td>
<td>0.00006 Tons</td>
<td>Tons</td>
<td>25.00</td>
<td>No</td>
</tr>
<tr>
<td>Particulate Matter (Primary)</td>
<td>PM_{10}</td>
<td>12.6000000</td>
<td>lbs per 1000 gallons</td>
<td>0.012600000 lbs/l gallon</td>
<td>d/l</td>
<td>82.00</td>
<td>lbs/day</td>
<td>82.00</td>
<td>0.001159 Tons</td>
<td>Tons</td>
<td>15.00</td>
<td>No</td>
</tr>
<tr>
<td>Particulate Matter (Primary)</td>
<td>PM_{2.5}</td>
<td>12.6000000</td>
<td>lbs per 1000 gallons</td>
<td>0.012600000 lbs/l gallon</td>
<td>d/l</td>
<td>82.00</td>
<td>lbs/day</td>
<td>82.00</td>
<td>0.001159 Tons</td>
<td>Tons</td>
<td>15.00</td>
<td>No</td>
</tr>
</tbody>
</table>

\(^a\) Citation for this Calculation Sheet: EPA, May 2015, Technology Transfer Network Clearinghouse for Inventories & Emissions Factors

\(^b\) Mojave Desert Air Quality Management District

\(^c\) Accelware: Unit Converter, Parts/Million (Ppm) to Pounds/Gallon (US) Conversion Calculator

\(^d\) Accelware: Unit Converter, Pounds (lbs) to Tons (short US) Conversion Calculator

\(^e\) Accelware: Unit Converter, Pounds (lbs) to Tons (short US) Conversion Calculator

\(^f\) Accelware: Unit Converter, Pounds (lbs) to Tons (short US) Conversion Calculator
<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Pollutant Abr.</th>
<th>Emission Factor</th>
<th>Units</th>
<th>Emission Factor Conversion</th>
<th>Unit</th>
<th>Maximum Unmitigated Emissions (lbs/day)</th>
<th>Unit</th>
<th>Appropriate Threshold Applied</th>
<th>Maximum Unmitigated Emissions (Tons)</th>
<th>Unit</th>
<th>Appropriate Threshold Applied</th>
<th>Exceeds Threshold?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Dioxide</td>
<td>CO2</td>
<td>19.5000000</td>
<td>lbs per 1000 gallons</td>
<td>19.5000000 lbs/l gallon</td>
<td>lbs/day</td>
<td>624.00</td>
<td>548.00</td>
<td>1.636335</td>
<td>Tons</td>
<td>100.00</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>CO</td>
<td>7.9000000</td>
<td>lbs per 1000 gallons</td>
<td>7.9000000 lbs/l gallon</td>
<td>lbs/day</td>
<td>252.80</td>
<td>548</td>
<td>0.17076</td>
<td>Tons</td>
<td>100.00</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Oxides of Nitrogen</td>
<td>NOx</td>
<td>205.0000000</td>
<td>lbs per 1000 gallons</td>
<td>0.2050000 lbs/l gallon</td>
<td>lbs/day</td>
<td>6.56</td>
<td>137</td>
<td>0.01880</td>
<td>Tons</td>
<td>25.00</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Nitrogen Oxides</td>
<td>NOx</td>
<td>148.0000000</td>
<td>lbs per 1000 gallons</td>
<td>0.1480000 lbs/l gallon</td>
<td>lbs/day</td>
<td>4.73</td>
<td>137</td>
<td>0.01360</td>
<td>Tons</td>
<td>25.00</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Oxides of Sulfur</td>
<td>SOx</td>
<td>10.6000000</td>
<td>lbs per 1000 gallons</td>
<td>0.0106000 lbs/l gallon</td>
<td>lbs/day</td>
<td>0.34</td>
<td>137</td>
<td>0.00098</td>
<td>Tons</td>
<td>25.00</td>
<td>No</td>
<td>No</td>
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<tr>
<td>Particulate Matter</td>
<td>PM_10</td>
<td>12.6000000</td>
<td>lbs per 1000 gallons</td>
<td>0.0126000 lbs/l gallon</td>
<td>lbs/day</td>
<td>0.40</td>
<td>82</td>
<td>0.00119</td>
<td>Tons</td>
<td>15.00</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Particulate Matter (Primary)</td>
<td>PM_2.5</td>
<td>12.6000000</td>
<td>lbs per 1000 gallons</td>
<td>0.0126000 lbs/l gallon</td>
<td>lbs/day</td>
<td>0.40</td>
<td>82</td>
<td>0.00119</td>
<td>Tons</td>
<td>15.00</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>
### Project Information

**Project Name:** Mohave Conservation Area Backwater Project  
**Phase:** Phase One - Vegetation Clearing

### Estimated Fuel Consumption

**Type of Fuel:** Ultra Low Sulfur Diesel Fuel  
**Estimated Total Gallons of Fuel Used:** 738  
**Estimated Gallons of Fuel Used Per Hour:** 4

### Criteria Pollutant Emissions

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Pollutant Abr.</th>
<th>Emission Factor¹</th>
<th>Units</th>
<th>Emission Factor Conversion</th>
<th>Unit</th>
<th>Maximum Unmitigated Emissions (lbs/day)</th>
<th>Unit</th>
<th>Appropriate Threshold Applied²</th>
<th>Maximum Unmitigated Emissions (Tons)³</th>
<th>Unit</th>
<th>Appropriate Threshold Applied²</th>
<th>Exceeds Threshold?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfur - Carbon Dioxide</td>
<td>CO₂e</td>
<td>10.50000000</td>
<td>lbs per 1000 gallons</td>
<td>10.50000000 lbs/l gallon</td>
<td></td>
<td>6020.0000 lbs/l gallon</td>
<td>lbs/l gallon</td>
<td>8.527650 lbs/l gallon</td>
<td>1250.0000 Tons</td>
<td></td>
<td>1250.0000 Tons</td>
<td>No</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>CO</td>
<td>7.90000000</td>
<td>lbs per 1000 gallons</td>
<td>7.90000000 lbs/l gallon</td>
<td></td>
<td>2015.1000 lbs/l gallon</td>
<td>lbs/l gallon</td>
<td>2.015100 lbs/l gallon</td>
<td>100.0000 Tons</td>
<td></td>
<td>100.0000 Tons</td>
<td>No</td>
</tr>
<tr>
<td>Nitrogen Oxides</td>
<td>NOx</td>
<td>205.00000000</td>
<td>lbs per 1000 gallons</td>
<td>0.20500000 lbs/l gallon</td>
<td></td>
<td>0.175600 lbs/l gallon</td>
<td>lbs/l gallon</td>
<td>0.017560 lbs/l gallon</td>
<td>25.0000 Tons</td>
<td></td>
<td>25.0000 Tons</td>
<td>No</td>
</tr>
<tr>
<td>Nitrogen Oxides (Primary)</td>
<td>NOx</td>
<td>0.14800000</td>
<td>lbs per 1000 gallons</td>
<td>0.14800000 lbs/l gallon</td>
<td></td>
<td>0.054612 lbs/l gallon</td>
<td>lbs/l gallon</td>
<td>0.005461 lbs/l gallon</td>
<td>25.0000 Tons</td>
<td></td>
<td>25.0000 Tons</td>
<td>No</td>
</tr>
<tr>
<td>Particulate Matter (Primary)</td>
<td>PM₁₀</td>
<td>12.60000000</td>
<td>lbs per 1000 gallons</td>
<td>0.01260000 lbs/l gallon</td>
<td></td>
<td>0.004649 lbs/l gallon</td>
<td>lbs/l gallon</td>
<td>0.004649 lbs/l gallon</td>
<td>15.0000 Tons</td>
<td></td>
<td>15.0000 Tons</td>
<td>No</td>
</tr>
<tr>
<td>Particulate Matter (Primary)</td>
<td>PM₂·₅</td>
<td>12.60000000</td>
<td>lbs per 1000 gallons</td>
<td>0.01260000 lbs/l gallon</td>
<td></td>
<td>0.004649 lbs/l gallon</td>
<td>lbs/l gallon</td>
<td>0.004649 lbs/l gallon</td>
<td>15.0000 Tons</td>
<td></td>
<td>15.0000 Tons</td>
<td>No</td>
</tr>
</tbody>
</table>

¹ Sulfur Emission Factor calculation is based on Ultra Low Sulfur Diesel Fuel (Sulfur Content is 15ppm or 0.000125038 lbs/gal). Calculation Formula used: \(1.38E2 \times S\) (S=Sulfur Content)

² Citation for this Calculation Sheet: EPA, May 2015, Technology Transfer Network Clearinghouse for Inventories & Emissions Factors

³ Mojave Desert Air Quality Management District

⁴ Accelware: Unit Converter, Parts/Million (Ppm) to Pounds/Gallon (US) Conversion Calculator

⁵ Accelware: Unit Converter, Pounds (lbs) to Tons (short US) Conversion Calculator

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**Citation for Calculations:**

- EPA, May 2015, Technology Transfer Network Clearinghouse for Inventories & Emissions Factors
- Mojave Desert Air Quality Management District
- Accelware: Unit Converter, Parts/Million (Ppm) to Pounds/Gallon (US) Conversion Calculator
- Accelware: Unit Converter, Pounds (lbs) to Tons (short US) Conversion Calculator

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**Additional Notes:**

- GHG - Carbon Dioxide
- CO₂
- Emission Factor
- 19,500.0000 lbs per 1000 gallons
- 19.50000000 lbs/1 gallon
- 6.527650 Tons
- 100,000.00 No
- Carbon Monoxide
- CO
- 7,900.0000 lbs per 1000 gallons
- 7.90000000 lbs/1 gallon
- 2.915100 Tons
- 100.00 No
- Oxides of Nitrogen
- NOx
- 205.00000000 lbs per 1000 gallons
- 0.20500000 lbs/1 gallon
- 0.017560 lbs/l gallon
- 25.0000 Tons
- 25.00 No
- Particulate Matter (Primary)
- PM₁₀
- 12.60000000 lbs per 1000 gallons
- 0.01260000 lbs/1 gallon
- 0.004649 lbs/l gallon
- 15.0000 Tons
- 15.00 No
- Particulate Matter (Primary)
- PM₂·₅
- 12.60000000 lbs per 1000 gallons
- 0.01260000 lbs/1 gallon
- 0.004649 lbs/l gallon
- 15.0000 Tons
- 15.00 No
### Project Information

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Mohave Conservation Area Backwater Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase</td>
<td>Phase One - Vegetation Clearing</td>
</tr>
</tbody>
</table>

### Estimated Fuel Consumption

<table>
<thead>
<tr>
<th>Type of Fuel</th>
<th>Ultra Low Sulfur Diesel Fuel and Gasoline Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated Total Gallons of Fuel Used</td>
<td>22,377</td>
</tr>
<tr>
<td>Estimated Gallons of Fuel Used Per Hour</td>
<td>48</td>
</tr>
</tbody>
</table>

### Criteria Pollutant Emissions

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Pollutant Abr.</th>
<th>Maximum Unmitigated Emissions (lbs/day)</th>
<th>Unit</th>
<th>Appropriate Threshold Applied</th>
<th>Exceeds Threshold?</th>
</tr>
</thead>
<tbody>
<tr>
<td>GHG - Carbon Dioxide</td>
<td>CO(^2)e</td>
<td>8,579.20</td>
<td>lbs/day</td>
<td>548,000</td>
<td>No</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>CO</td>
<td>256.88</td>
<td>lbs/day</td>
<td>548</td>
<td>No</td>
</tr>
<tr>
<td>Oxides of Nitrogen</td>
<td>NOx</td>
<td>98.08</td>
<td>lbs/day</td>
<td>137</td>
<td>No</td>
</tr>
<tr>
<td>Volatile Organic Compounds</td>
<td>VOC</td>
<td>8.78</td>
<td>lbs/day</td>
<td>137</td>
<td>No</td>
</tr>
<tr>
<td>Oxides of Sulfur***</td>
<td>SOx</td>
<td>0.38</td>
<td>lbs/day</td>
<td>137</td>
<td>No</td>
</tr>
<tr>
<td>Particulate Matter (Primary)</td>
<td>PM(_{10})</td>
<td>3.17</td>
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<td>82</td>
<td>No</td>
</tr>
<tr>
<td>Particulate Matter (Primary)</td>
<td>PM(_{2.5})</td>
<td>3.06</td>
<td>lbs/day</td>
<td>82</td>
<td>No</td>
</tr>
</tbody>
</table>

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1. Citation for this Calculation Sheet: EPA, May 2015, Technology Transfer Network Clearinghouse for Inventories & Emissions Factors
2. Mojave Desert Air Quality Management District
3. Accelware: Unit Converter, Parts/Million (Ppm) to Pounds/Gallon (US) Conversion Calculator
4. Accelware: Unit Converter, Pounds (lbs) to Tons (short US) Conversion Calculator
# Greenhouse Gas and Criteria Pollutants Emission Factor Calculation Tools

## Project Information

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Mohave Conservation Area Backwater Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase</td>
<td>Phase One - Vegetation Clearing</td>
</tr>
</tbody>
</table>

## Estimated Fuel Consumption

<table>
<thead>
<tr>
<th>Type of Fuel</th>
<th>Ultra Low Sulfur Diesel Fuel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated Total Gallons of Fuel Used</td>
<td>13,385</td>
</tr>
<tr>
<td>Estimated Gallons of Fuel Used Per Hour</td>
<td>34</td>
</tr>
</tbody>
</table>

## Criteria Pollutant Emissions

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Pollutant Abr.</th>
<th>Maximum Unmitigated Emissions (lbs/day)</th>
<th>Unit</th>
<th>Appropriate Threshold Applied&lt;sup&gt;2&lt;/sup&gt;</th>
<th>Exceeds Threshold?</th>
</tr>
</thead>
<tbody>
<tr>
<td>GHG - Carbon Dioxide</td>
<td>CO&lt;sub&gt;e&lt;/sub&gt;</td>
<td>1,248.00</td>
<td>lbs/day</td>
<td>548,000</td>
<td>No</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>CO</td>
<td>255.58</td>
<td>lbs/day</td>
<td>548</td>
<td>No</td>
</tr>
<tr>
<td>Oxides of Nitrogen</td>
<td>NOx</td>
<td>68.96</td>
<td>lbs/day</td>
<td>137</td>
<td>No</td>
</tr>
<tr>
<td>Volatile Organic Compounds</td>
<td>VOC</td>
<td>7.50</td>
<td>lbs/day</td>
<td>137</td>
<td>No</td>
</tr>
<tr>
<td>Oxides of Sulfur***</td>
<td>SOx</td>
<td>0.37</td>
<td>lbs/day</td>
<td>137</td>
<td>No</td>
</tr>
<tr>
<td>Particulate Matter (Primary)</td>
<td>PM&lt;sub&gt;10&lt;/sub&gt;</td>
<td>2.29</td>
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<td>PM&lt;sub&gt;2.5&lt;/sub&gt;</td>
<td>2.22</td>
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<td>82</td>
<td>No</td>
</tr>
</tbody>
</table>

---

<sup>1</sup> Citation for this Calculation Sheet: EPA, May 2015, Technology Transfer Network Clearinghouse for Inventories & Emissions Factors

<sup>2</sup> Mojave Desert Air Quality Management District

<sup>3</sup> Accelware: Unit Converter, Parts/Million (Ppm) to Pounds/Gallon (US) Conversion Calculator

<sup>4</sup> Accelware: Unit Converter, Pounds (lbs) to Metric Tons (MT) Conversion Calculator (1 MT = 2204.62262185 lbs)
### Greenhouse Gas and Criteria Pollutants Emission Factor Calculation Tools

#### Project Information

**Project Name**: Mohave Conservation Area Backwater Project  
**Phase**: Phase One - Vegetation Clearing

#### Estimated Fuel Consumption

- **Type of Fuel**: Ultra Low Sulfur Diesel Fuel  
- **Estimated Total Gallons of Fuel Used**: 2,717  
- **Estimated Gallons of Fuel Used Per Hour**: 19

#### Criteria Pollutant Emissions

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Pollutant Abr.</th>
<th>Maximum Unmitigated Emissions (lbs/day)</th>
<th>Unit</th>
<th>Appropriate Threshold Applied</th>
<th>Exceeds Threshold?</th>
</tr>
</thead>
<tbody>
<tr>
<td>GHG - Carbon Dioxide</td>
<td>CO\textsuperscript{2}e</td>
<td>3,336.00 lbs/day</td>
<td>lbs/day</td>
<td>548,000</td>
<td>No</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>CO</td>
<td>254.19 lbs/day</td>
<td>lbs/day</td>
<td>548</td>
<td>No</td>
</tr>
<tr>
<td>Oxides of Nitrogen</td>
<td>NO\textsubscript{x}</td>
<td>37.76 lbs/day</td>
<td>lbs/day</td>
<td>137</td>
<td>No</td>
</tr>
<tr>
<td>Volatile Organic Compounds</td>
<td>VOC</td>
<td>6.12 lbs/day</td>
<td>lbs/day</td>
<td>137</td>
<td>No</td>
</tr>
<tr>
<td>Oxides of Sulfur\textsuperscript{***}</td>
<td>SO\textsubscript{x}</td>
<td>0.35 lbs/day</td>
<td>lbs/day</td>
<td>137</td>
<td>No</td>
</tr>
<tr>
<td>Particulate Matter (Primary)</td>
<td>PM\textsubscript{10}</td>
<td>1.35 lbs/day</td>
<td>lbs/day</td>
<td>82</td>
<td>No</td>
</tr>
<tr>
<td>Particulate Matter (Primary)</td>
<td>PM\textsubscript{2.5}</td>
<td>1.31 lbs/day</td>
<td>lbs/day</td>
<td>82</td>
<td>No</td>
</tr>
</tbody>
</table>

\textsuperscript{1} Citation for this Calculation Sheet: EPA, May 2015, Technology Transfer Network Clearinghouse for Inventories & Emissions Factors  
\textsuperscript{2} Mojave Desert Air Quality Management District  
\textsuperscript{3} Accelware: Unit Converter, Parts/Million (Ppm) to Pounds/Gallon (US) Conversion Calculator  
\textsuperscript{4} Accelware: Unit Converter, Pounds (lbs) to Tons (short US) Conversion Calculator
<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Pollutant Abr.</th>
<th>Maximum Unmitigated Emissions (lbs/day)</th>
<th>Unit</th>
<th>Appropriate Threshold Applied</th>
<th>Exceeds Threshold?</th>
</tr>
</thead>
<tbody>
<tr>
<td>GHG - Carbon Dioxide</td>
<td>CO\textsuperscript{2}e</td>
<td>5,144.00</td>
<td>lbs/day</td>
<td>548,000</td>
<td>No</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>CO</td>
<td>255.12</td>
<td>lbs/day</td>
<td>548</td>
<td>No</td>
</tr>
<tr>
<td>Oxides of Nitrogen</td>
<td>NOx</td>
<td>58.56</td>
<td>lbs/day</td>
<td>137</td>
<td>No</td>
</tr>
<tr>
<td>Volatile Organic Compounds</td>
<td>VOC</td>
<td>7.04</td>
<td>lbs/day</td>
<td>137</td>
<td>No</td>
</tr>
<tr>
<td>Oxides of Sulfur***</td>
<td>SOx</td>
<td>0.36</td>
<td>lbs/day</td>
<td>137</td>
<td>No</td>
</tr>
<tr>
<td>Particulate Matter (Primary)</td>
<td>PM\textsubscript{10}</td>
<td>1.97</td>
<td>lbs/day</td>
<td>82</td>
<td>No</td>
</tr>
<tr>
<td>Particulate Matter (Primary)</td>
<td>PM\textsubscript{2.5}</td>
<td>1.91</td>
<td>lbs/day</td>
<td>82</td>
<td>No</td>
</tr>
</tbody>
</table>

\textsuperscript{1} Citation for this Calculation Sheet: EPA, May 2015, Technology Transfer Network Clearinghouse for Inventories & Emissions Factors
\textsuperscript{2} Mojave Desert Air Quality Management District
\textsuperscript{3} Accelware: Unit Converter, Parts/Million (Ppm) to Pounds/Gallon (US) Conversion Calculator
\textsuperscript{4} Accelware: Unit Converter, Pounds (lbs) to Tons (short US) Conversion Calculator
### Carbon Dioxide

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>NEI CO₂</th>
<th>CAS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>124-38-9</td>
</tr>
</tbody>
</table>

- **Primary Control**: UNCONTROLLED
- **Emission Factor**: 1.950E4 Lb per 1000 Gallons Gasoline Burned
- **Quality**: B
- **Formula**: \[
\text{Emission Rate} = \frac{1.950 \times 10^4 \text{ Lb}}{1000 \text{ Gallons Gasoline}}
\]
- **Notes**: The heating value for gasoline fuel is 126,000 BTU/gallon. This was used to convert from lbs/MMBTU.

### Carbon Monoxide

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>NEI CO</th>
<th>CAS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>630-08-0</td>
</tr>
</tbody>
</table>

- **Primary Control**: UNCONTROLLED
- **Emission Factor**: 7.900E3 Lb per 1000 Gallons Gasoline Burned
- **Quality**: D
- **Formula**: \[
\text{Emission Rate} = \frac{7.900 \times 10^3 \text{ Lb}}{1000 \text{ Gallons Gasoline}}
\]
- **Notes**: The heating value for gasoline fuel is 126,000 BTU/gallon. This was used to convert from lbs/MMBTU.
### Pollutant: Nitrogen Oxides (NOx)

**Primary Control:** UNCONTROLLED

**Emission Factor:** 2.050E2 Lb per 1000 Gallons Gasoline Burned

**Quality:** D

**References:**

**Formula:**
The heating value for gasoline fuel is 126,000 BTU/gallon. This was used to convert from lbs/MMBTU.

### Pollutant: PM10, Filterable

**Primary Control:** UNCONTROLLED

**Emission Factor:** 1.260E1 Lb per 1000 Gallons Gasoline Burned

**Quality:** D

**References:**

**Formula:**
All particulate is assumed to be <= 1um in size. The heating value for gasoline fuel is 126,000 BTU/gallon. This was used to convert from lbs/MMBTU.
Level 1  Internal Combustion Engines
Level 2  Commercial/Institutional
Level 3  Gasoline
Level 4  Reciprocating

POLLUTANT  PM2.5, filterable
Primary Control  UNCONTROLLED

Emission  1.26E1 Lb per 1000 Gallons Gasoline Burned
Quality  D  Emissions Factors Applicability


AP 42 Section  Chapter 3  Section 3.3
Formula
Notes  All particulate is assumed to be <= 1um in size. The heating value for gasoline fuel is 126,000 BTU/gallon. This was used to convert from lbs/MMBTU.

SCC 20300301
Level 1  Internal Combustion Engines
Level 2  Commercial/Institutional
Level 3  Gasoline
Level 4  Reciprocating

POLLUTANT  Sulfur oxides (SOx)
Primary Control  UNCONTROLLED

Emission  1.06E1 Lb per 1000 Gallons Gasoline
Factor  Burned
Quality  D  Emissions Factors Applicability


AP 42 Section  Chapter 3  Section 3.3
Formula
Notes  The heating value for gasoline fuel is 126,000 BTU/gallon. This was used to convert from lbs/MMBTU.
### Reciprocating Engine

<table>
<thead>
<tr>
<th>POLLUTANT</th>
<th>Total organic compounds (TOC)</th>
<th>NEI</th>
<th>CAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Control</td>
<td>UNCONTROLLED</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Emission Factor** 3.820E2 Lb per 1000 Gallons Gasoline Burned

**Quality** D  
**Emissions Factors Applicability**


**AP 42 Section** Chapter 3  Section 3.3

**Notes** Emission factor represents the sum of exhaust, evaporative, crankcase, and refueling emissions. The heating value for gasoline fuel is 126,000 BTU/gallon. This was used to convert from lbs/MMBTU.

---

### Gasoline

<table>
<thead>
<tr>
<th>SCC</th>
<th>20400401</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1</td>
<td>Internal Combustion Engines</td>
</tr>
<tr>
<td>Level 2</td>
<td>Engine Testing</td>
</tr>
<tr>
<td>Level 3</td>
<td>Reciprocating Engine</td>
</tr>
<tr>
<td>Level 4</td>
<td>Gasoline</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POLLUTANT</th>
<th>Volatile organic compounds (VOC)</th>
<th>NEI VOC</th>
<th>CAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Control</td>
<td>UNCONTROLLED</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Emission Factor** 1.480E2 Lb per 1000 Gallons Gasoline Burned

**Quality** U  
**Emissions Factors Applicability**

**References**

**AP 42 Section**

**Formula**

**Notes**
Biological Resource clearance surveys for soil sampling at test pit locations within the proposed Park Moabi Backwater in accordance with the Non-Exclusive Geological Sampling Permit P.R.C. 9283.

Laura Beth Sabin, Bureau of Reclamation Terrestrial Wildlife Biologist (GS-0486-12)
The proposed backwater at Park Moabi was visited by a Reclamation biologist on the dates of June 12-13, 2014 to prepare for biological clearance surveys prior to soil sampling at 15 test pit locations which was scheduled the week of June 23. Surveys were conducted on June 17-18, 2014.

Reconnaissance

The general purpose of the reconnaissance surveys was to see where habitat was dense and bird activity was high, and to delineate avoidance areas that could be recognized without intensive biological surveys. This information was used to determine if any test pit locations would have to wait to be sampled until after September 1, following the bird breeding season.

The California Natural Diversity Database was examined to see what California sensitive species have been known to occur in the area within and adjacent to the proposed backwater. There were occurrence records for the following species:

- flannel mouth sucker (*Catostomus latipinnis*) - habitat for this species did not occur within the proposed backwater
- mountain plover (*Charadrius montanus*) - species surveyed for but not detected
- Mojave desert tortoise (*Gopherus agassizii*) - desert tortoise surveys were conducted in upland scrub communities within the proposed backwater. No individuals or tortoise sign was observed.
- Gila woodpecker (*Melanerpes uropygialis*) - species surveyed for but not detected
- Desert bighorn sheep (*Ovis Canadensis nelsoni*) - species not detected
- Yuma clapper rail (*Rallus longirostris yumanensis*) - habitat for this species did not occur within the proposed backwater.
- Arizona Bell’s vireo (*Vireo bellii arizonae*) - species surveyed for but not detected.
- Razorback sucker (*Xyrauchen texanus*) - habitat for this species did not occur within the proposed backwater.
- Yellow-breasted chat (*Icteria virens*) - species detected within proposed backwater. Soil sampling will not be occurring by test pit locations where this species was located until after the breeding season.

On June 12, 2014, the Bureau of Reclamation Terrestrial Wildlife Biologist Laura Beth Sabin conducted reconnaissance surveys of the area where the test pit locations were located and the area where the excavator would be traveling (Appendix 1). Appendix 2 shows the area where the reconnaissance surveys took place. There were bird territories within the sections that contained the densest habitat including at least four yellow-breasted chat (*Icteria virens*) territories. The yellow-breasted chat is a California species of special concern. The number of bird territories
around test pit locations 6, 7, 9, 11 and 13 were high and the habitat was so dense that nests for those territories would be difficult to locate and buffer.

Species of birds observed during the general reconnaissance surveys were the Abert’s towhee (*Pipilo aberti*), black-tailed gnatcatcher (*Polioptila melanura*), Gambel’s quail (*Callipepla gambelii*), great-tailed grackle (*Quiscalus mexicanus*), lesser night hawk (*Chordeiles gundlachii*), mourning dove (*Zenaida macroura*), northern mockingbird (*Mimus polyglottos*), red-winged blackbird (*Agelaius phoeniceus*), verdin (*Auriparus flaviceps*), white-winged dove (*Zenaida asiatica*), and yellow-breasted chat. The number of individuals per species was not tallied because they could not be accurately counted during general reconnaissance surveys.

On June 13, 2014 according to the terms of the permit, all upland scrub communities within the proposed backwater were marked with flagging and GPS data was taken of the boundaries of each upland scrub patch. The data was uploaded into GIS software. Five upland patches were flagged and marked.

Based upon this information, the Biologist provided the following recommendations to the Reclamation project manager, which were then incorporated into the project design:

1. Soil sampling at test pit locations 6, 7, 9, 11 and 13 will not be conducted until after September 1 when the bird breeding season is over to ensure Reclamation is in compliance with the Migratory Bird Treaty Act and the terms of the California State Lands Commission Non-Exclusive Geological Sampling permit.
2. When conducting the soil sampling the excavators will avoid the five flagged upland scrub habitat patches. Species of plants present within the upland scrub patches were the blue palo verde (*Parkinsonia florida*), white bursage (*Ambrosia dumosa*), creosote (*Larrea tridentate*), honey mesquite (*Prosopis glandulosa*), and beaver tail cactus (*Opuntia basilaris*). Areas of bare desert concrete and sandy dunes were present within the proposed backwater.

**Biological Surveys**

On June 17, 2014, a bird survey was conducted within the areas of the proposed backwater that would be impacted by the soil sampling scheduled to begin the week of June 23, 2014. Appendix 2 shows the impact area where bird surveys were conducted on June 17. The impact area did not include the areas around test pit locations 6, 7, 9, 11 and 13 which were excluded from soil sampling until after September 1, 2014 following positive nesting observations during the reconnaissance surveys. The standard MSCP bird survey protocol was followed (Bart et al. 2010; GBBO 2013). Surveys started at sunrise and ended no later than 10:00 AM. The surveyor walked within 50 m of every point within the impact area. Birds detected were recorded along with any breeding evidence.
Birds detected within the impact area were the Abert’s towhee (*Pipilo aberti*), lesser night hawk (*Chordeiles gundlachii*), mourning dove (*Zenaida macroura*), white-winged dove (*Zenaida asiatica*) and black-tailed gnatcatcher (*Polioptila melanura*) (Table 1). The majority of birds were within family groups or were simply flying over the habitat. There were no signs of active nests. The habitat in the impact area was sparse enough that active nests would have been fairly easy to detect.

### Table 1. Bird species that were detected within the soil sampling impact area, June 17.

<table>
<thead>
<tr>
<th>Species</th>
<th>Number of individuals</th>
<th>Breeding evidence detected</th>
<th>Strong evidence of active nests within 200 ft (60 m) of test pits</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abert’s towhee</td>
<td>4 (one pair had two fledged young)</td>
<td>Family group</td>
<td>No</td>
<td>One family group was detected near test pit 5.</td>
</tr>
<tr>
<td>black-tailed gnatcatcher</td>
<td>8 to 11</td>
<td>Family group, singing males, independent juveniles</td>
<td>No</td>
<td>One family group near test pit 15 was confirmed. Two to four independent juvenile birds were detected throughout impact area. Two to three other singing males in impact area. No evidence of active nests.</td>
</tr>
<tr>
<td>lesser night hawk</td>
<td>2 (1 pair)</td>
<td>Pair</td>
<td>No</td>
<td>One pair within impact area.</td>
</tr>
<tr>
<td>mourning dove</td>
<td>2</td>
<td>None</td>
<td>No</td>
<td>Flyovers</td>
</tr>
<tr>
<td>white-winged dove</td>
<td>2</td>
<td>None</td>
<td>No</td>
<td>Flyovers</td>
</tr>
</tbody>
</table>

On June 18, 2014, presence/absence surveys were conducted for the Mojave Desert tortoise (*Gopherus agassizii*) within the upland scrub habitat adjacent to and within the proposed backwater. The surveys were conducted according to the United Fish and Wildlife Service 2010 desert tortoise pre-project survey protocol (USFWS 2010). Transects 10 meters apart were placed within the upland scrub habitat within the proposed backwater. One transect was placed
west of the boundary of the proposed backwater where there was some upland scrub habitat intermixed with large bluffs. All transects were parallel to the road (in accordance with the protocol for linear projects). Patches of upland habitat existed (< 0.5 ac) that were too small for transects; one hundred percent of those patches were surveyed. Transect and patch locations are shown in Appendix 2. The Biologist walked one mile per hour on the transects and looked for desert tortoises and desert tortoise sign. No desert tortoises or desert tortoise sign were detected. Surveys for burrowing owls (*Athene cunicularia*) and their burrows were conducted at the same time as the desert tortoise surveys. No burrowing owls or their burrows were detected so no further surveys were needed. In fact, few burrows for any species were detected at the site.

Native plant surveys were conducted within the impact area on June 17 and 18, 2014. Appendix 2 shows the area where native plant surveys were conducted. No native plants within the California Natural Diversity Database were detected. The plant and tree diversity within the project area was very low.

Based on the survey information no additional exclusion zones were identified. There were no signs of active nests or burrows. Since there were family groups and other birds foraging within the impact area. The recommendation to the Reclamation Project Manager was to keep the equipment running at low speeds and to minimize impact to existing vegetation as much as possible when conducting activities.

**Survey input into Worker Education Briefing**

Based upon the survey results, the following information was added to the worker education program to ensure no take or harassment of those species occurs during project activities:

1. Species information about yellow-breasted chat, Mojave desert tortoise, and migratory birds
2. Workers will be informed of the exclusion areas required by the Non-Exclusive Geological Sampling Permit P.R.C. 9283 and which test holes they will be able to sample in June 2014 and which will be excluded from project activities until after nesting season, September 1.

The worker education program agenda is outlined in Appendix 3.

**Literature Cited**


United States Fish and Wildlife Service 2010. Preparing for any action that may occur within the range of the Mohave Desert Tortoise (*Gopherus agassizi*). United States Fish and Wildlife Service.
Appendix 1. Proposed test pit locations and excavator tracks within the Park Moabi Proposed backwater. Soil sampling at test pit locations 6, 7, 9, 11, and 13 will not occur until after September 1, 2014.
Appendix 2. Locations of reconnaissance (June 12 and 13) and biological surveys (June 17 and 18).
Appendix 3. Worker Education Program for workers conducting soil sampling at the proposed Park Moabi Backwater the week of June 23.

Based upon the survey results, a worker education program was conducted at the site on June 23, 2014, to ensure no take or harassment of species of concern would occur during project activities. The program was conducted by Chris Dodge, a Wildlife Biologist for the Lower Colorado River Multi-Species Conservation Program. Mr. Dodge was approved by the California Department of Fish and Wildlife to conduct this training.

Three personnel working on the project were present for the worker education program. The workers were informed of the exclusion areas required by the Non-Exclusive Geological Sampling Permit P.R.C. 9283 and which test holes they would be able to sample in June 2014 and which would be excluded from project activities until after nesting season, September 1.

The education program covered other topics such as relevant legislation which may impact the work at the site including The Federal Endangered Species Act, The Migratory Bird Treaty Act, and the California Endangered Species Act. There were questions from the workers, about the Migratory Bird Treaty Act, due to the fact that most birds occurring on the site are covered by the Act. The provisions of the Act that protect all parts of the birds including feathers and other body parts were discussed in further detail. There was specific discussion of the identification of the Yellow-breasted Chat, as it is a species covered under the California Endangered Species Act that was found breeding in parts of the site. Avoidance measures for the desert tortoise were also discussed with the workers in order to prevent any accidental injuries occurring to any desert tortoise that may be encountered at the site, although none have been detected.

Education Briefing Outline:

- Areas that are flagged where construction activity should be avoided
  - Reasons for avoidance of these areas
    - Upland habitat for protection of the desert tortoise
    - Areas located near breeding birds of concern
  - Endangered Species Act
    - Protections and responsibilities
  - Migratory Bird Treaty Act
    - Protections and responsibilities
  - California Endangered Species Act
    - Expanded list of species from that of the ESA
    - Bird species of concern known to occur in the area
      - Yellow-breasted Chat
  - Desert Tortoise avoidance measures.
Ms. Lesley Fitzpatrick  
Aquatic Animals Recovery Coordinator  
U.S. Fish and Wildlife Services  
Arizona Ecological Services Office  
2321 W. Royal Palm Road, Suite 103  
Phoenix, Arizona 85021

Subject: Mojave Valley Conservation Area

Dear Ms. Fitzpatrick:

The Bureau of Reclamation, as the implementing agency for the Lower Colorado Multi-Species Conservation Program (LCR MSCP), will be performing restoration on the Mojave Valley Conservation Area located 13 miles south of Needles, California. The intention of this project is to create an integrated mosaic of all four land cover types, although the focus is the creation of approximately 50 acres of connected backwater. Once the project is completed, it will be managed for covered species identified in the LCR MSCP Habitat Conservation Plan. The effects from the LCR MSCP component of this project were considered in the existing Biological Opinion for the LCR MSCP.

We are requesting your consultation and concurrence on the actions associated with the Mojave Valley Conservation Area Project. If you have questions, please contact me at 702-293-8555 or Ms. Laken Anderson at 702-293-8153. Thank you for your attention to our request.

Sincerely,

[Signature]

John Swett  
Program Manager  
Lower Colorado River  
Multi-Species Conservation Program

bc: LC-8000, LC-8400, LC-8416

WBR: LAnderson: geristobal: 12/30/2014: 702-293-8153  
January 28, 2015

Memorandum

To: Program Manager, Lower Colorado River Multi-Species Conservation Program, Bureau of Reclamation, Boulder City, Nevada

From: Field Supervisor

Subject: Mohave Valley Conservation Area

The Fish and Wildlife Service received your January 16, 2015, request for our concurrence with the inclusion of the Mojave Valley Conservation Area in San Bernardino County, California to fulfill a portion of the conservation requirements contained in the Lower Colorado River Multi-Species Conservation Program (LCR MSCP). Formal consultation on the effects to listed species, including the bonytail (Gila elegans), razorback sucker (Xyrauchen texanus), Yuma clapper rail (Rallus longirostris yumanensis), western yellow-billed cuckoo (Coccyzus americanus), and southwestern willow flycatcher (Empidonax traillii extimus) was completed on March 4, 2005. In the biological opinion, we assumed that creation of new habitats for covered species could have minor impacts on existing low-value habitats in the project area. Incidental take is provided in the biological opinion, and avoidance and minimization measures, particularly avoiding of the breeding season for covered bird species during construction activities, were also included. The project plan includes this measure.

Unless critical habitat for the western yellow-billed cuckoo is designated along the Colorado River, no additional consultation under the Endangered Species Act is required for the implementation of this conservation action. The March 4, 2005, biological opinion adequately covers the effects to the species and habitats that will result from construction.

Thank you for your continued dedication to successfully implementing the LCR MSCP. If there are any questions concerning this response, please contact Lesley Fitzpatrick at (602) 242-0210 (x236) or me.

[Signature]

W:\Lesley Fitzpatrick\Mojave Valley CA Concur LCR MSCP.docx.cgg
January 28, 2015

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W: Lesley Fitzpatrick/Mojave Valley CA Concur LCR MSCP.docx:egg
Authority: This California Endangered Species Act ("CESA") Incidental Take Permit ("permit") is issued by the Department of Fish and Game ("Department") pursuant to Fish and Game Code section 2081(b) and section 2081(c), and California Code of Regulations, title 14, subdivision 3, chapter 6, article 1, commencing with section 783. CESA prohibits the take of any species of wildlife that is included in the list of endangered species, the list of threatened species, or the list of candidate species. However, the Department may authorize, by permit, the take of such species if the conditions set forth in section 2081(b) and section 2081(c) are met. In 2003, the Legislature enacted legislation authorizing the Department to authorize the take of "fully protected" species from impacts attributable to the implementation of the Quantification Settlement Agreement and the IID Water Transfer Project. (Fish and Game Code, section 2081.7(a); Stats. 2003, Chapter 612.)

Permittees:

Agency Name: Bard Water District  
Mailing Address: 1473 Ross Road, Winterhaven, CA 92283-9715  
Telephone Number: 760-572-0704  
Contact Person: Ron Derma

Agency Name: Colorado River Board of California  
Mailing Address: 770 Fairmont Avenue, Suite 100, Glendale, CA 91203-1035  
Telephone Number: 818-543-4676  
Contact Person: Gerald R. Zimmerman

1Pursuant to Fish and Game Code section 86, "'Take' means hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture or kill."

2"Candidate species" are species of wildlife that have not yet been placed on the list of endangered species or the list of threatened species, but which are under formal consideration for listing pursuant to Fish and Game Code section 2074.2.
Agency Name: Coachella Valley Water District  
Mailing Address: P.O. Box 1058, Coachella CA 92236  
Telephone Number: 760-398-2651  
Contact Person: Steve Robbins

Agency Name: Imperial Irrigation District  
Mailing Address: P.O. Box 937, Imperial, CA 92251  
Telephone Number: 760-339-9477  
Contact Person: Jesse Silva

Agency Name: City of Los Angeles Department of Water and Power  
Mailing Address: 111 North Hope Street, Room 1121, Los Angeles, CA 90012  
Telephone Number: 213-367-0285  
Contact Person: Charles Holioway

Agency Name: The Metropolitan Water District of Southern California  
Mailing Address: P.O. Box 54153, Los Angeles, CA 90054-0153  
Telephone Number: 213-217-6242  
Contact Person: Laura Simonek

Agency Name: The City Of Needles  
Mailing Address: 817 Third Street, Needles, CA 92363-2933  
Telephone Number: 760-326-2113  
Contact Person: Richard Rowe

Agency Name: Palo Verde Irrigation District  
Mailing Address: 180 West Fourteenth Avenue, Blythe, CA 92225  
Telephone Number: 760-922-3144  
Contact Person: Ed Smith

Agency Name: San Diego County Water Authority  
Mailing Address: 4677 Overland Avenue, San Diego, CA 92123  
Telephone Number: 858-522-6752  
Contact Person: Laurence Purcell

Agency Name: Southern California Edison Company  
Mailing Address: 2244 Walnut Grove Avenue, Rosemead, CA 91770  
Telephone Number: 626-302-4459  
Contact Person: Nino Mascolo
Project location:

The project area includes the California portion of the Colorado River historical floodplain starting from the point at which it enters California extending downstream to the Northerly International Boundary ("NIB") with the Republic of Mexico. The project area also includes up to and including the full-pool elevation of Lake Havasu, which is defined by surface water elevation 450 feet National Geodetic Vertical Datum and corresponds to the top of the Parker Dam spillway gates (Bureau of Reclamation 1981). The historic floodplain includes all lands that are or have been affected by the meandering or regulated flows of the Colorado River, which historically have been confined by the change in elevation that forms the adjoining uplands within this segment of the lower Colorado River ("LCR").

The project area does not include the Imperial Irrigation District ("IID") Service Area, Coachella Valley Water District ("CVWD") Service Area, Metropolitan Water District’s ("MWD") Service Area, San Diego County Water Authority ("SDCWA") Service Area, the Salton Sea, or the Salton Sink. Impacts to these areas are outside the defined project area and are not covered by this permit.

The project area is divided into discrete reaches. A full description of all river reaches that comprise the Lower Colorado River Multi-Species Conservation Program ("LCR MSCP") planning area is provided in LCR MSCP Habitat Conservation Plan ("HCP") Chapter 1. The geographic scope of the project is the California portion of Reaches 3-6 of the LCR MSCP planning area. For use in the analysis of impacts of the covered activities, the project area has been divided to correspond to LCR MSCP river reaches 3-6:

- Reach 3—from Davis Dam (River Mile [RM] 276) to Parker Dam (RM 192.3), including Lake Havasu up to full-pool elevation;
- Reach 4—from Parker Dam (RM 192.3) to Adobe Ruin and Reclamation Cibola Gage (RM 87.3) at the lower end of Reclamation’s maintenance Cibola Division;
- Reach 5—from Reclamation Cibola Gage (RM 87.3) to Imperial Dam (RM 49.2); and
- Reach 6—from Imperial Dam (RM 49.2) to the NIB (RM 23.1).
Water surface elevation and river miles were determined from LCR Maps, Colorado River Frontwork & Levee System, Arizona-California (Bureau of Reclamation 1976).

Project background:

The Permittees, the Bureau of Reclamation ("Reclamation") the U.S. Fish and Wildlife Service ("Service"), other federal agencies, and agencies of the states of Arizona and Nevada have cooperatively developed the LCR MSCP. The LCR MSCP provides the federal take authorization for the California covered activities provided for in this permit. The LCR MSCP includes a Conservation Plan that defines the avoidance, minimization and conservation measures developed to mitigate impacts to covered species from implementation of LCR MSCP covered activities, including those covered in this permit. Because of its oversight responsibility for the Colorado River, Reclamation will be responsible for implementation of the LCR MSCP Conservation Plan.

Permittees, Reclamation and other federal agencies, and agencies of the States of Arizona and Nevada have entered into the LCR MSCP Funding and Management Agreement ("FMA"), dated April 2005. The FMA obligates Reclamation to manage and implement the terms of the LCR MSCP, the Section 10(a)(1)(B) incidental take permit issued by the Service, and the Biological Opinion issued by the Service for the LCR MSCP. The mitigation measures presented in the Conditions of Approval section of this permit for Riparian, Marsh, and Aquatic covered species are derived from the LCR MSCP Conservation Plan. The Conservation Plan provides mitigation to offset impacts for the federal and non-federal LCR MSCP covered activities under the federal Endangered Species Act. California covered activities and mitigation are a subset of these LCR MSCP covered activities and mitigation.

Reclamation, an agency of the United States, is not a Permittee, and in its role as implementing agency for the LCR MSCP, is not subject to the terms of this permit. For the Conditions of Approval in this permit that are implemented as part of the LCR MSCP, the Department will use reasonable efforts to coordinate its activities related to the oversight of this permit through the procedures established under the LCR MSCP.

Project description:

The project covered by this permit ("Covered Activities" or "Project") includes four categories of activities: 1) ongoing flow-related activities; 2) future flow-related activities; 3) non-flow-related activities; and 4) hydroelectric power activities. All of the Covered Activities would be implemented within the project area as defined in the "Project Location" section of this permit and take place for up to 50 years. Specific activities
associated with each of the four categories of Covered Activities are described in detail below.

A. Ongoing Flow-Related Covered Activities

Ongoing flow-related activities are: 1) diversion of up to 4.4 million acre-feet per year (maf) of California’s full annual entitlement according to the Law of the River; 2) generation of return flows by existing entitled Colorado River water users in California (excluding take associated with total maximum daily loads (“TMDL”) and water quality); and 3) additional diversions of water made available through California’s share of any unused apportionment and designated surpluses, plus volume of return flows as applicable. Of the entities that divert a portion of California’s 4.4 maf full annual entitlement only the following points of diversion and return flows are covered under this category of Covered Activities:

1.) City of Needles diversion from wells and return flows;
2.) The Metropolitan Water District of Southern California - all diversions and return flows through operation of the Whitsett Pumping Plant and Colorado River Aqueduct facilities in Lake Havasu;
3.) Palo Verde Irrigation District (“PVID”) – all diversions at Palo Verde Diversion Dam and appurtenant works and features within the PVID. All return flows through the Palo Verde Outfall Drain sluiceways and spill channels, as well as other drain structures and features;
4.) Imperial Diversion Dam – all diversions at Imperial Dam including the desilting basins, appurtenant works and features, Pilot Knob Power Plant, and diversions into the All American Canal for delivery, and return flows (where appropriate) associated with:
   - Imperial Irrigation District
   - Coachella Valley Water District
   - Bard Water District component of the Yuma Project – Reservation Division
   - All diversions by the Imperial Irrigation District as operator of the Imperial Dam, Siphon Drop Power Plant and facilities, and the Pilot Knob Power Plant and facilities to deliver water to the Yuma County Water Users Association and to deliver portions of the Mexican Treaty obligation through the All American Canal and Siphon Drop.
5.) Lower Colorado Water Supply Project - The Project includes the diversion, use, and any associated return flow of up to a maximum of 10,000 afy of mainstream water (of which approximately 500 acre-feet of current use, and an anticipated 9,500 acre-feet of future use). Project water is intended to ensure that domestic water users using mainstream water within California are brought under contract with the Secretary of Interior pursuant to the Boulder Canyon Project Act and Lower Colorado Water Supply Act;

6.) Present perfected rights (PPRs)—identified in the Supreme Court Decree of 1964 in Arizona v. California (376 U.S. 340) and in the 1979, 1984 and 2000 U.S. Supreme Court Supplemental Decrees in Arizona v. California; and

7.) Other Colorado River contractors in California (as identified in Appendix G of the LCR MSCP Appendices) and legal mainstream Colorado River water diverters and their return flows.

B. Future Flow-Related Covered Activities

Future flow-related activities by California agencies are diversions, discharges, and return flows through existing facilities on the LCR associated with a change in point of diversion of up to 800,000 afy to the MWD Whitsett Pumping Plant diversion point at Lake Havasu. Those activities will result in a reduction of flow in reaches 4 and 5 (between Parker and Imperial Dam). The calculation of diversion is based on a total of 1.25 mafy diversions by MWD.

The future flow-related covered activities are: (1) the change in point of diversion and diversion of up to 200,000 afy of water from Imperial Dam to the MWD Whitsett Pumping Plant diversion point at Lake Havasu, pursuant to the Agreement for Transfer of Conserved Water by and between the Imperial Irrigation District and the San Diego County Water Authority, dated April 29, 1998, as amended (20,000 acre-feet are scheduled for transfer in 2004 based on a prescribed ramp-up schedule that would occur incrementally over a period of 10 to 20 years until the full amount is reached); (2) the change in point of diversion and diversion of up to 77,700 afy of water from Imperial Dam to the MWD Whitsett Pumping Plant diversion point at Lake Havasu transferred to the San Diego County Water Authority, as described in the Allocation Agreement among the United States of America, the Metropolitan Water District of Southern California, Coachella Valley Water District, Imperial Irrigation District, San Diego County Water Authority, the La Jolla, Pauma, Pala, Rincon, and San Pasqual Bands of Mission Indians, the San Luis Rey River Indian Water Authority, the City of Escondido, and Vista Irrigation District, dated October 10, 2003; and (3) the change in point of diversion and
diversion of up to 522,300 afy of water transferred to MWD at the MWD Whitsett Pumping Plant diversion point at Lake Havasu.

C. Non-Flow-Related Covered Activities

Non-flow-related activities involve operation, maintenance, and replacement (OM&R) activities associated with the daily routine operation of existing water diversion and conveyance facilities listed below. Operation means all activities associated with routine operation and management of all existing structures, features and facilities through which the Covered Activities are implemented. Maintenance means those routine activities that maintain the capacity and operational features of existing facilities through which the Covered Activities are implemented. Replacement means all activities associated with appropriate periodic repair and/or replacement of all existing structures, features and facilities, within the existing facility footprint, through which the Covered Activities are implemented.

The non-flow-related Covered Activities are:

1.) OM&R activities associated with the daily routine operation of PVID and BWD existing water diversion and conveyance facilities (canals and drains) that result in loss and/or degradation of submerged aquatic and/or emergent aquatic vegetation, including removing silt deposits, chaining, and repairing eroded sections along 313 miles of canals within PVID and BWD, and periodic chaining or dredging of 172 miles of drains by PVID and/or BWD to maintain flow capacity; and

2.) OM&R activities associated with all diversion facilities, and desilting facilities associated with Imperial Dam, not including the Laguna Division desilting works, in the project area through which the Covered Activities are implemented, including for example pumps, valves, gates, trash racks, machinery, and bankline protection. Inspection and routine maintenance activities are likely to occur on an annual basis. Repair and replacement activities will only be conducted on an as-need basis.

D. Hydroelectric Power Covered Activities

Hydroelectric power activities covered by this permit include only the contracting for, ordering of, and scheduling of hydroelectric power generated at the federally operated
dams along the Colorado River (e.g., Hoover Dam, Davis Dam, and Parker Dam) by California hydroelectric power contract holders. Electrical power generation at federally operated dams is a federal action, and therefore take of covered species resulting from hydropower generation (e.g. fish mortality from passing through the generator turbines) at the facilities is not covered by this permit.

Covered Species:

This permit covers the following species:

<table>
<thead>
<tr>
<th>Name</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fish</strong></td>
<td></td>
</tr>
<tr>
<td>1. Bonytail (Gila elegans)</td>
<td>Endangered</td>
</tr>
<tr>
<td>2. Razorback sucker (Xyrauchen texanus)</td>
<td>Endangered/Fully Protected</td>
</tr>
<tr>
<td>3. Flannelmouth sucker (Catostomus latipinnis)</td>
<td>unlisted</td>
</tr>
<tr>
<td><strong>Birds</strong></td>
<td></td>
</tr>
<tr>
<td>4. Yuma clapper rail (Rallus longirostris yumanensis)</td>
<td>Threatened/Fully Protected</td>
</tr>
<tr>
<td>5. California black rail (Laterallus jamaicensis coturniculus)</td>
<td>Threatened/Fully Protected</td>
</tr>
<tr>
<td>6. Western yellow-billed cuckoo (Coccyzus americanus occidentalis)</td>
<td>Endangered</td>
</tr>
<tr>
<td>7. Elf owl (Micrathene whitneyi)</td>
<td>Endangered</td>
</tr>
<tr>
<td>8. Gilded flicker (Colaptes chrysoides)</td>
<td>Endangered</td>
</tr>
</tbody>
</table>

3Refers to status under CESA. Under CESA, a species may be on the list of endangered species, the list of threatened species, or the list of candidate species. Species may also be designated as “fully protected” species under Fish and Game Code sections 3511, 4700, 5050, and 5515. All other species are “unlisted.”
9. Gila woodpecker (*Melanerpes uropygialis*) Endangered

10. Southwestern willow flycatcher (*Empidonax traillii extimus*) Endangered

11. Arizona Bell's vireo (*Vireo bellii arizonae*) Endangered

12. Western least bittern (*Ixobrychus exilis hesperis*) unlisted

13. Vermilion flycatcher (*Pyrocephalus rubinus*) unlisted

14. Sonoran yellow warbler (*Dendroica petechia sonorana*) unlisted

15. Summer tanager (*Piranga rubra*) unlisted

**Mammals**

16. Western red bat (*Lasiurus blossevillii*) unlisted

17. Western yellow bat (*Lasiurus xanthinus*) unlisted

18. Colorado River cotton rat (*Sigmodon arizonae plenus*) unlisted

These species and only these species are hereinafter referred to as “Covered Species.”

**IMPACT ASSESSMENT:**

This section identifies and describes the effects, within the Project area, of implementing the Covered Activities on Covered Species and their habitats. A stepwise process is used to estimate the level of “take” and impacts to the Covered Species. First, the habitat-based concept is used in defining and delineating Covered Species habitat. This involves the development of habitat models based on the likelihood for each land cover type to support a species’ habitat, and delineation of actual habitat within the project area. Second, an analysis of effects to habitat, defined by habitat models, and the Covered Species are presented for each category of covered activity. Changes in environmental conditions that determine and characterize the Covered Species habitat are described. The expected physical, chemical, and biological changes in the habitat provide the basis for assessing the effects on Covered Species.
Covered Species Habitats - Habitat Models

This section defines habitat for each of the Covered Species and describes the extent of existing habitat in the project area for species for which such information is available. To define and delineate Covered Species habitat, habitat models were developed using the best available information about the known or potential distribution of Covered Species habitat in the project area, and are defined either by:

- the likelihood for each land cover type to support a species (17 species), and
- delineation of actual habitat within the project area (one species).

With the exception of the southwestern willow flycatcher, all other Covered Species habitats have not been directly field delineated in the project area. The models define habitat for each Covered Species as the LCR MSCP land cover types that would be most likely to encompass the constituent elements of each Covered Species’ habitat within the river reaches where each species is known or assumed to occur. Several sources of information, including published manuscripts, technical references, and the various documents/impact assessments developed as part of the LCR MSCP were used to determine the physical and biological attributes associated with each of the LCR MSCP land cover types that can reasonably be correlated to represent Covered Species habitat. Occupied southwestern willow flycatcher habitat within salt cedar is used to represent the extent of suitable Covered Species habitat present in salt cedar cover types. All other occupied southwestern willow flycatcher habitat is included within the other land cover types. Habitat models are based on the land cover types described in Section 3.4 of the LCR MSCP HCP and information used to construct the LCR MSCP GIS land cover database. The land cover type classification system used in the LCR MSCP is derived from previous classifications developed by Anderson and Ohmart (1984b), Younker and Anderson (1986), Salas et al. (1996), and Ogden Environmental and Energy Services (1998).

Species habitat models are presented in Table 1. Application of the habitat models produced the calculated extent of existing habitat for Covered Species by land cover type in river reaches 4 and 5 of the project area and is presented in Table 2. For each Covered Species, the existing distribution of habitat, assessment of impacts on Covered Species habitat, and assessment of expected outcomes of implementing the Covered Activities with conservation measures is based on application of these models.
Table 1. Land cover types that provide habitat for Covered Species based on application of habitat models.

<table>
<thead>
<tr>
<th>i) Covered Species</th>
<th>Land Cover Types</th>
<th>Structural/Compositional Types</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mammals</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Western (desert) red bat <em>Lasius</em></td>
<td>Cottonwood-Willow</td>
<td>I, II</td>
</tr>
<tr>
<td><em>blossevillii</em></td>
<td>Honey Mesquite</td>
<td>III</td>
</tr>
<tr>
<td>Western yellow bat <em>Lasius</em></td>
<td>Cottonwood-Willow</td>
<td>I, II</td>
</tr>
<tr>
<td><em>xanthinus</em></td>
<td>Honey Mesquite</td>
<td>III</td>
</tr>
<tr>
<td>Colorado River cotton rat <em>Sigmodon</em></td>
<td>Marsh</td>
<td>I-VII</td>
</tr>
<tr>
<td><em>arizonae plenus</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Birds</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Western least bittern <em>Ixobrychus</em></td>
<td>Marsh</td>
<td>I-VII</td>
</tr>
<tr>
<td><em>exilis hesperis</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>California black rail <em>Laterallus</em></td>
<td>Marsh</td>
<td>I-VII</td>
</tr>
<tr>
<td><em>jamaicensis coturniculhus</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yuma clapper rail <em>Rallus</em></td>
<td>Marsh</td>
<td>I-VII</td>
</tr>
<tr>
<td><em>longirostris yumanensis</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Western yellow-billed cuckoo <em>Coocy</em></td>
<td>Cottonwood-Willow</td>
<td>I, II, III</td>
</tr>
<tr>
<td><em>zus americanus occidentalis</em></td>
<td>Salt Cedar</td>
<td>III</td>
</tr>
<tr>
<td><em>Salt Cedar/Screwbean Mesquite</em></td>
<td>III</td>
<td></td>
</tr>
<tr>
<td><em>Salt Cedar/Honey Mesquite</em></td>
<td>III</td>
<td></td>
</tr>
<tr>
<td><em>Honey Mesquite</em></td>
<td>III</td>
<td></td>
</tr>
<tr>
<td>Southwestern willow flycatcher <em>Empi</em></td>
<td>Cottonwood-Willow</td>
<td>I, III, IV</td>
</tr>
<tr>
<td><em>donax traitii extimus</em></td>
<td>Marsh</td>
<td>I, II, III, IV</td>
</tr>
<tr>
<td><em>Salt Cedar</em></td>
<td>III, IV, V, VI</td>
<td></td>
</tr>
<tr>
<td><em>Salt Cedar/Screwbean Mesquite</em></td>
<td>IV</td>
<td></td>
</tr>
<tr>
<td><em>Salt Cedar/Honey Mesquite</em></td>
<td>IV</td>
<td></td>
</tr>
<tr>
<td><em>Honey Masquite</em></td>
<td>III</td>
<td></td>
</tr>
<tr>
<td>Elf owl <em>Micrathene whitneyi</em></td>
<td>Cottonwood-Willow</td>
<td>I, II, III</td>
</tr>
<tr>
<td><em>Salt Cedar/Screwbean Mesquite</em></td>
<td>III</td>
<td></td>
</tr>
<tr>
<td><em>Salt Cedar/Honey Mesquite</em></td>
<td>III</td>
<td></td>
</tr>
<tr>
<td><em>Honey Masquite</em></td>
<td>III</td>
<td></td>
</tr>
<tr>
<td>Gilded flicker <em>Colaptes chrysoideis</em></td>
<td>Cottonwood-Willow</td>
<td>I, II, III</td>
</tr>
<tr>
<td><em>Honey Mesquite</em></td>
<td>III</td>
<td></td>
</tr>
<tr>
<td>Gila woodpecker</td>
<td>Cottonwood-Willow</td>
<td>I, II, III, IV</td>
</tr>
<tr>
<td><em>Salt Cedar</em></td>
<td>III</td>
<td></td>
</tr>
<tr>
<td>Covered Species</td>
<td>Land Cover Types</td>
<td>Structural/Compositional Types</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>---------------------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td><em>Melanerpes uropygialis</em></td>
<td>Salt Cedar/Screwbean</td>
<td>III, IV</td>
</tr>
<tr>
<td></td>
<td>Mesquite</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Salt Cedar/Honey</td>
<td>III, IV</td>
</tr>
<tr>
<td></td>
<td>Mesquite</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Honey Mesquite</td>
<td>III, IV</td>
</tr>
<tr>
<td><strong>Arizona Bell's vireo</strong></td>
<td>Cottonwood-Willow</td>
<td>III, IV</td>
</tr>
<tr>
<td><em>Vireo bellii arizonae</em></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Salt Cedar</td>
<td>III, IV</td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Salt Cedar/Screwbean</td>
<td>III, IV</td>
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<tr>
<td></td>
<td>Mesquite</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Salt Cedar/Honey</td>
<td>III, IV</td>
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<tr>
<td></td>
<td>Mesquite</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Honey Mesquite</td>
<td>III, IV</td>
</tr>
<tr>
<td><strong>Vermillion flycatcher</strong></td>
<td>Salt Cedar/Screwbean</td>
<td>III, IV</td>
</tr>
<tr>
<td><em>Pyrocephalus rubinus</em></td>
<td>Mesquite</td>
<td></td>
</tr>
<tr>
<td><strong>Sonoran yellow warbler</strong></td>
<td>Cottonwood-Willow</td>
<td>I-VI</td>
</tr>
<tr>
<td><em>Dendroica pelechias sonorana</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Salt Cedar</td>
<td>III, IV, V, VI</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Salt Cedar/Screwbean</td>
<td>IV</td>
</tr>
<tr>
<td></td>
<td>Mesquite</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Salt Cedar/Honey</td>
<td>IV</td>
</tr>
<tr>
<td></td>
<td>Mesquite</td>
<td></td>
</tr>
<tr>
<td><strong>Summer tanager</strong></td>
<td>Cottonwood-Willow</td>
<td>I,II</td>
</tr>
<tr>
<td><em>Piranga rubra</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fish</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bonytail</td>
<td>Aquatic</td>
<td>River, Reservoir, and Backwater</td>
</tr>
<tr>
<td><em>Gila elegans</em></td>
<td></td>
<td></td>
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<tr>
<td>Razorback sucker</td>
<td>Aquatic</td>
<td>River, Reservoir, and Backwater</td>
</tr>
<tr>
<td><em>Xyracuen texanu</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flannelmouth Sucker</td>
<td>Aquatic</td>
<td>River, Reservoir, and Backwater</td>
</tr>
<tr>
<td><em>Catostomus latipinnis</em></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Delineation of land cover type acreages that provide covered species habitat on the California side of river reaches 4 and 5. Extent of covered species habitat derived from application of habitat models.
### Land Cover Types

<table>
<thead>
<tr>
<th>Land Cover Types</th>
<th>Structural/Compositional Types</th>
<th>Extent of Covered Species Habitat (ac)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salt Cedar/Screwbean Mesquite</td>
<td>III, IV</td>
<td>2,333</td>
</tr>
<tr>
<td>Salt Cedar/Honey Mesquite</td>
<td>III, IV</td>
<td>1,319</td>
</tr>
<tr>
<td>Honey Mesquite</td>
<td>III, IV</td>
<td>114</td>
</tr>
<tr>
<td><strong>Total Riparian Habitat</strong></td>
<td></td>
<td><strong>4,938</strong></td>
</tr>
<tr>
<td>Marsh</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marsh</td>
<td>I-VII</td>
<td>2,927</td>
</tr>
<tr>
<td><strong>Total Marsh Habitat</strong></td>
<td></td>
<td><strong>2,927</strong></td>
</tr>
<tr>
<td>Aquatic</td>
<td>River, Reservoir, and Backwater</td>
<td>6,389</td>
</tr>
<tr>
<td><strong>Total Aquatic Habitat</strong></td>
<td></td>
<td><strong>6,389</strong></td>
</tr>
</tbody>
</table>

**Notes:**
- Total marsh habitat delineated from Table 3-11 of the LCR MSCP HCP. Assumed 50% of total habitat in reaches 4 and 5 is in California.
- Total aquatic habitat delineated from Table 3-11 of the LCR MSCP HCP. Assumed 50% of total habitat in reaches 4 and 5 is in California.

### Analysis of Impacts and Level of Take

#### A. Ongoing Flow-Related Covered Activities

The only “take” covered under the ongoing flow-related activity category is that which occurs as a result of entraining covered fish species (i.e., razorback sucker, bonytail, and flannelmouth sucker) at existing California diversion points (as identified in Appendix G of the LCR MSCP Appendices). For purposes of organization, the effects of entrainment caused by diversions associated with future flow-related Covered Activities are analyzed in this section, as well. With few exceptions, the majority of California’s full annual entitlement is diverted at Metropolitan’s Pumping Plant at Lake Havasu (Reach 3), PVID’s diversions at Palo Verde Diversion Dam in Reach 4, and at Imperial Dam in Reach 5.

**Bonytail**

*Entrainment Resulting From Ongoing Flow-Related Diversions*

Based on known entrainment of razorback suckers in water diversions (Bureau of Reclamation 1996), diversions from the LCR are likely to entrain the bonytail. The potential for entrainment of bonytail has increased in recent years as a result of stocking...
bonytail in LCR under federally authorized bonytail augmentation programs. There are relatively few diversions directly from the river segment of Reach 3, with the exception of the large diversion at Metropolitan's Whitsett Pumping Plant in Lake Havasu. The diversions from the river channel are small relative to river flow, and potential individual entrainment losses is assumed to be small; however, entrainment of bonytail could affect the population because of the low population numbers.

Entrainment Resulting From Future Flow-Related Diversions

Future diversions from Lake Havasu and the increased proportion of flow diverted in Reach 4 may increase entrainment losses of bonytail. Bonytail, especially larvae and juveniles, may be entrained in diversions. The number of fish entrained is a function of fish density within the area of diversion influence. Change in fish density within the area of influence is dependent on fish behavior and environmental conditions that are largely independent of the diversion (e.g., habitat abundance and quality). Any increase in entrainment of bonytail would likely be small.

Assuming that bonytail are reintroduced into Reaches 4 and 5, entrainment into the canals and other diversions (e.g., Senator Wash Reservoir) would result in impacts to the population. Canals at Headgate Rock Dam, Palo Verde Diversion Dam, and Imperial Dam divert most of the flow from the river. High diversions at Headgate Rock Dam and Palo Verde Diversion Dam would coincide with the potential occurrence of the planktonic larval life stage of bonytail in the summer, a period of potentially high entrainment vulnerability.

The number of bonytail that could be entrained is expected to increase with implementation of the LCR MSCP HCP Conservation Plan, which will include augmenting the existing population by stocking 620,000 bonytail in the LCR. Increasing the abundance of bonytail through LCR MSCP conservation measures to augment the existing population is expected to increase fish density and the number of fish potentially entrained in diversions.

Over the term of this Permit, it is estimated that entrainment of bonytail as a result of ongoing and future flow-related diversions will not exceed 1% percent of the projected bonytail population occurring in reaches 3, 4, and 5 following completion of bonytail augmentation measures required by this Permit. The projected bonytail population is derived from the most current population estimate of bonytail in reach 3 (3,000 fish), added to an expected 10% survivorship of the proposed 620,000 augmented fish.
Razorback Sucker

Entrainment Resulting From Ongoing Flow-Related Diversions

Diversions from the LCR may entrain razorback sucker. The potential for entrainment of razorback sucker has increased in recent years as a result of stocking razorback sucker in LCR under federally authorized razorback sucker augmentation programs. Razorback suckers have been observed in Senator Wash Reservoir, which may indicate entrainment with water diverted from the LCR. Razorback suckers observed in the reservoir, however, may also have been surviving fish from those stocked in the reservoir by CDFG between 1987 and 1990.

There are relatively few diversions directly from the river segment of Reach 3, with the exception of the large diversion at Metropolitan's Whitsett Pumping Plant in Lake Havasu. The diversions from the river channel are small relative to river flow, and potential individual entrainment losses is assumed to be small; however, entrainment of razorback sucker could affect the population because of the low population numbers.

Entrainment of razorback sucker from the river in Reaches 4 and 5 into the canals and other diversions (e.g., Senator Wash Reservoir) would result in impacts to the population. Canals at Headgate Rock Dam, Palo Verde Diversion Dam, and Imperial Dam divert most of the flow from the river. High diversions at Headgate Rock Dam and Palo Verde Diversion Dam would coincide with the potential occurrence of the planktonic larval life stage of razorback sucker in the summer, a period of potentially high entrainment vulnerability.

Entrainment Resulting From Future Flow-Related Diversions

Future diversions from Lake Havasu and the increased proportion of flow diverted in Reach 4 may increase entrainment losses of razorback sucker. Razorback sucker, especially larvae and juveniles, may be entrained in diversions. The number of fish entrained is a function of fish density within the area of diversion influence. Change in fish density within the area of influence is dependent on fish behavior and environmental conditions that are largely independent of the diversion (e.g., habitat abundance and quality). Any increase in entrainment of razorback sucker would likely be small.

The increase in the proportion of flow diverted from the river with implementation of future flow-related covered activities could increase the number of razorback sucker entrained into the canals. Entrainment into the canals is assumed to result in an impact to the population. The level of entrainment of razorback suckers in Reach 5 is not
expected to increase from existing conditions because nearly all of the river flow in this reach is diverted at Imperial Dam, and diversions to Senator Wash Reservoir will not change.

The number of razorback suckers that could be entrained is expected to increase with implementation of the LCR MSCP HCP Conservation Plan, which will include augmenting the existing population by stocking 660,000 razorback suckers in the LCR. Increasing the abundance of razorback suckers through LCR MSCP conservation measures to augment the existing population is expected to increase fish density and the number of fish potentially entrained in diversions.

Over the term of this permit, it is estimated that entrainment of razorback sucker as a result of ongoing and future flow-related diversions will not exceed 1% percent of the projected razorback sucker population occurring in reaches 3, 4, and 5 following completion of razorback augmentation measures required by this permit. The projected razorback sucker population is derived from the most current population estimate of razorback suckers in reaches 3, 4, and 5 (8,600 fish), added to an expected 10% survivorship of the proposed 660,000 augmented fish.

**Flannelmouth Sucker**

Only Reach 3 supports flannelmouth sucker.

*Entrainment Resulting From Ongoing Flow-Related Diversions*

Diversions from the LCR may entrain flannelmouth sucker. There are relatively few diversions directly from the river segment of Reach 3, with the exception of the large diversion at Metropolitan’s Whitsett Pumping Plant in Lake Havasu. The diversions from the river channel are small relative to river flow, and potential individual entrainment losses is assumed to be small; however, entrainment of flannelmouth sucker could affect the population because of the low population numbers.

*Entrainment Resulting From Future Flow-Related Diversions*

Future diversions from Lake Havasu may increase entrainment losses of flannelmouth sucker. Flannelmouth sucker, especially larvae and juveniles, may be entrained in diversions. The number of fish entrained is a function of fish density within the area of diversion influence. Change in fish density within the area of influence is dependent on fish behavior and environmental conditions that are largely independent of the diversion.
(e.g., habitat abundance and quality). Any increase in entrainment of flannelmouth sucker would likely be small.

Over the term of this permit, it is estimated that entrainment of flannelmouth sucker as a result of ongoing and future flow-related diversions will not exceed 1% percent of the flannelmouth sucker population occurring in reach 3. The flannelmouth sucker population is derived from the most current population estimate of flannelmouth suckers in reach 3 (8,000 fish).

B. Future Flow-Related Covered Activities

Future flow-related activities by California agencies are diversions, discharges, and return flows through existing facilities on the LCR associated with a change in point of diversion of up to 0.8 million acre feet per year (maf) at the MWD Whitsett Pumping Plant diversion point at Lake Havasu. Effects to Covered Species from diverting the 0.8 maf associated with future flow-related activities are included within the diversion of the 4.4 maf analyzed above. California's 0.8 maf changes in point of diversion is part of the 1.574 maf change in point of diversion covered in the LCR MSCP HCP that will result in flow and ground water reductions in reaches 4 and 5. Implementation of the 1.574 maf change in point of diversion will have impacts on California Covered Species, however, only the impacts attributable to California's 0.8 maf change in point of diversion are covered by this permit. To calculate California's impacts caused by the 0.8 maf change in point of diversion, it is assumed that California's contribution to impacts is 50.8% of the total impacts caused by the 1.574 maf change in point of diversion.

Within the land cover types and when sufficient species habitat information is available, the changes in environmental conditions specific to each species' habitat are assessed to determine the affected habitat area. Limited information reduced the ability to precisely quantify the effects for many species. Where information is minimal, worst-case assumptions provide an overestimate of adverse effects on species and are assumed to err for the benefit of the Covered Species. For example, where information on specific environmental conditions that characterize habitat for a species is lacking, the assumed impact is the degradation or loss of all the acreage of the land cover types that are assumed to provide habitat for the species even though only a portion of the land cover type may provide habitat. Although this "worst-case" assumption may result in an overestimate of the actual effects on the species, it is based on the best available scientific information.

In the discussion that follows, the effects of California's 0.8 maf change in point of
diversion on Covered Species and their habitat (as defined by habitat models) in Reaches 4 and 5 is presented below.

**Reaches 4 and 5**

The 0.8 mafy change in point of diversion will cause a reduction in flows and lower groundwater levels in the river between Parker and Imperial Dams (Reaches 4 and 5). The reduction in flows and ground water elevations has the potential to reduce riparian, marsh, and aquatic land cover area that provides Covered Species habitat. This analysis of effects on backwater, marsh, and riparian land cover type habitat areas is used to assess the effects of changes in points of diversions on the extent of Covered Species habitats in Reaches 4 and 5. First, changes in environmental conditions that determine and characterize the Covered Species habitat are described. Second, the expected physical, chemical, and biological changes in the habitat provide the basis for assessing the effects on Covered Species.

The effects of California’s 0.8 mafy change in point of diversion on Covered Species habitat in Reaches 4 and 5 are summarized in Table 3. Effects from California’s 0.8 mafy change in point of diversion on Covered Species habitat constitutes 50.8% of the total effects on Covered Species habitat expected to occur from implementing the 1.574 mafy change in point of diversion covered under the LCR MSCP HCP.

**Table 3. Summary of estimated extent of Covered Species habitat affected in California with implementation of Lower Colorado River Multi-Species Conservation Program Habitat Conservation Plan (LCR MSCP HCP) 1.574 million acre feet per year (mafy) and California’s 0.8 mafy portion of the 1.574 mafy change in point of diversion.**

<table>
<thead>
<tr>
<th>Covered Species Habitat</th>
<th>Acres of Covered Species Habitat in Reaches 4 &amp; 5 Affected by the LCR MSCP 1.574 mafy Change in Point of Diversion</th>
<th>Acres of Covered Species Habitat in Reaches 4 &amp; 5 Affected by California’s 0.8 mafy Portion of the 1.574 mafy Change in Point of Diversion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Riparian Habitat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cottonwood-Willow I-VI</td>
<td>626</td>
<td>318</td>
</tr>
<tr>
<td>Salt Cedar I-VI</td>
<td>546</td>
<td>277</td>
</tr>
<tr>
<td>Salt Cedar/Screwbean Mesquite III, IV</td>
<td>2,333</td>
<td>1,185</td>
</tr>
<tr>
<td>Salt Cedar/Honey Mesquite III, IV</td>
<td>1,319</td>
<td>670</td>
</tr>
<tr>
<td>Honey Mesquite III, IV</td>
<td>114</td>
<td>58</td>
</tr>
<tr>
<td>Marsh Habitat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marsh I-VII that provides Yuma clapper rail and western least bittern habitat</td>
<td>75</td>
<td>38</td>
</tr>
<tr>
<td>Covered Species Habitat</td>
<td>Acres of Covered Species Habitat in Reaches 4 &amp; 5 Affected by the LCR MSCP 1.574 mafy Change in Point of Diversion</td>
<td>Acres of Covered Species Habitat in Reaches 4 &amp; 5 Affected by California's 0.8 mafy Portion of the 1.574 mafy Change in Point of Diversion</td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Marsh I-VII that provides California black rail habitat</td>
<td>28</td>
<td>14</td>
</tr>
<tr>
<td>Marsh I-VII that provides Colorado River cotton rat habitat</td>
<td>57</td>
<td>29</td>
</tr>
<tr>
<td><strong>Aquatic Habitat</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>River and backwater that provides razorback sucker and bonytail chub habitat</td>
<td>191</td>
<td>97</td>
</tr>
</tbody>
</table>

Notes:

a  Affected Colorado River cotton rat habitat acreage is subsumed under the affected acreage of Yuma clapper rail and western least bittern, and California black rail habitat.

i. Effects on Riparian Habitat

The reduction in river flow attributable to future flow-related Covered Activities may lower groundwater levels under several thousand acres of lands adjacent to the river. Stands of riparian land cover type with the appropriate structure listed in Table 2 are assumed to provide habitat for the following species: southwestern willow flycatcher, western yellow-billed cuckoo, elf owl, gilded flicker, Gila woodpecker, vermilion flycatcher, Arizona Bell's vireo, Sonoran yellow warbler, summer tanager, western red bat, and western yellow bat ("Riparian Covered Species").

Reductions in river flow and surface area, and the lowering of groundwater elevations under areas supporting riparian land cover types in Table 2 ("Riparian Habitat") most likely will result in the degradation or loss of the vegetation or would remove or degrade environmental conditions that determine and characterize the constituent elements of habitat for Riparian Covered Species. Reductions in flow and groundwater elevations in Reaches 4 and 5 will result in the loss and/or degradation of: 1) 318 acres of cottonwood-willow I-VI, 2) 277 acres of salt cedar III-VI, 3) 1,185 acres of Salt Cedar/Screwbean Mesquite III, IV, 4) 670 acres of Salt Cedar/Honey Mesquite III, IV, and 5) 58 acres of Honey Mesquite III, IV that provide Riparian Covered Species habitat (Table 4). The types of effects to Riparian Habitat that could be expected by groundwater and river surface reductions are discussed in the following paragraphs followed by the expected effects to Riparian Covered Species.
Table 4. Summary of estimated extent of covered species habitat lost or degraded (impacts) in California as a result of California's 0.8 million acre feet per year (maf) change in point of diversion and non-flow-related covered activities

<table>
<thead>
<tr>
<th>Covered Species Habitat</th>
<th>Non-Flow Impacts (ac)</th>
<th>Change in Point of Diversion Impacts (ac)</th>
<th>Total Impacts on Species Habitat (ac)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Riparian Habitat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cottonwood-Willow I-VI</td>
<td>0</td>
<td>318</td>
<td>318</td>
</tr>
<tr>
<td>Salt Cedar I-VI</td>
<td>0</td>
<td>277</td>
<td>277</td>
</tr>
<tr>
<td>Salt Cedar/Screwbean Mesquite III, IV</td>
<td>0</td>
<td>1,185</td>
<td>1,185</td>
</tr>
<tr>
<td>Salt Cedar/Honey Mesquite III, IV</td>
<td>0</td>
<td>670</td>
<td>670</td>
</tr>
<tr>
<td>Honey Mesquite III, IV</td>
<td>0</td>
<td>58</td>
<td>58</td>
</tr>
<tr>
<td><strong>Total Riparian Habitat Impacts</strong></td>
<td></td>
<td></td>
<td><strong>2,508</strong></td>
</tr>
<tr>
<td>Marsh Habitat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marsh I-VII that provides Yuma clapper rail and western least bittern habitat</td>
<td>56</td>
<td>38</td>
<td>94</td>
</tr>
<tr>
<td>Marsh I-VII that provides California black rail habitat</td>
<td>28</td>
<td>14</td>
<td>42</td>
</tr>
<tr>
<td>Marsh I-VII that provides Colorado River cotton rat habitat</td>
<td>0</td>
<td>29a</td>
<td>29a</td>
</tr>
<tr>
<td><strong>Total Marsh Habitat Impacts</strong></td>
<td></td>
<td></td>
<td><strong>136</strong></td>
</tr>
<tr>
<td>Aquatic Habitat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>River and backwater that provides razorback sucker and bonytail chub habitat</td>
<td>0</td>
<td>97</td>
<td>97</td>
</tr>
<tr>
<td><strong>Total Aquatic Habitat Impacts</strong></td>
<td></td>
<td></td>
<td><strong>97</strong></td>
</tr>
</tbody>
</table>

Notes:

a Affected Colorado River cotton rat habitat acreage is subsumed under the affected acreage of Yuma clapper rail and western least bittern, and California black rail habitat.

**Cottonwood-Willow Riparian Habitats**

The extent and quality of cottonwood-willow land cover would be expected to decline relative to existing conditions. In the next 50 years, losses in the extent, vigor, and recruitment of cottonwood-willow land cover types, or further degradation of environmental conditions within existing stands are anticipated as a result of flow and groundwater elevation reductions downstream from Parker Dam. This would inhibit the future establishment of cottonwood-willow that could provide suitable nesting habitats when mature.

The extent of cottonwood-willow riparian habitats or the number of individual cottonwood and willow trees could be reduced along river segments of Reaches 4 and 5 because of mortality associated with lower groundwater levels. Presuming groundwater
elevations do not drop below the root zone, saplings and mature trees will likely survive
the gradual change in groundwater level because their roots are expected to grow
downward at rates commensurate with the rate of groundwater lowering (Jones and
Stokes 2001). However, the potential growth rate of cottonwood and willow roots does
not insure high success in response to rapidly declining water tables. This is because
floodplain soils in the arid southwest often consist of coarse-textured alluvium that does
not readily maintain the moist soil continuum necessary for inducing deeper rooting
(Stromberg et al. 1992). Therefore, direct loss of existing cottonwood and willow trees
attributable to ground water reductions cannot be precisely determined because
baseline groundwater elevations are unknown and the reduction in groundwater
elevation will occur over an extended period (i.e., 30 or more years) (Jones and Stokes
2001).

Groundwater reduction can cause direct loss or affect factors such as height, foliage
area, canopy mortality, leaf size and number, and xylem water potential of cottonwoods
and willows. Loss of tall and mature trees will result in limiting nesting sites for cavity
and upper canopy nesting species. Loss of high foliage density in the upper canopy will
affect midsummer canopy-nesting species by reducing shading and evapotranspiration
that would buffer high midsummer ambient temperatures, thus possibly hindering
nesting efforts of these species (Hunter et al. 1985, Hunter et al. 1987).

The ability for cottonwood-willow stands to naturally regenerate may be reduced where
groundwater levels drop sufficiently to preclude future establishment and growth of
seedlings. Studies from the Hassayampa River indicate that Fremont cottonwood
seedlings naturally established on suitable surfaces within 0.2–1.0 meter (0.7–3.3 feet)
of groundwater. The studies indicate that the highest success of seedling recruitment
occurred where groundwater is within 0.2–0.4 meter (0.7–1.3 feet) of the ground surface
(Stromberg 1993). Consequently, cottonwood-willow stands in locations where flow
reductions drop groundwater levels below 1 meter (3 feet) from the soil surface during
the growing season may no longer be able to regenerate. In addition, existing
cottonwood-willow stands could be permanently lost to wildfires where groundwater
levels drop sufficiently to preclude regeneration of burned stands. Reduced
groundwater elevation may also increase the difficulty of future restoration of
cottonwood-willow land cover.

Reduction in groundwater levels could also affect the composition of understory
vegetation in cottonwood-willow stands (Stromberg et. al. 1996). Studies along the
Hassayampa and San Pedro Rivers show that streamside herbaceous vegetation was
associated with mean groundwater depths of 0.30–0.45 meter (1.0–1.5 feet) (Richter
1993 and Stromberg et. al. 1996). Where lower groundwater elevations affect the
composition understory vegetation, micro-habitat conditions (e.g., higher temperature,
lower humidity), percent plant cover, and the type and biomass of invertebrate production in cottonwood-willow stands would be expected to change. Structure and food web support for Riparian Covered Species that forage on flying insects would be substantially reduced in cottonwood-willow stands that currently have saturated soils or pond water during some periods, but which would no longer have these conditions following a reduction in groundwater elevation.

**Salt Cedar Riparian Habitats**

With implementation of future flow-related activities, the quality of some saltcedar stands would be expected to decline relative to baseline conditions. Future flow-related activities could affect saltcedar land cover by lowering mean groundwater elevations, and by reducing the frequency of flood events in Reaches 4 and 5.

Lowered groundwater elevations could be sufficient to adversely affect micro-habitat conditions (e.g., higher temperature, lower humidity) and the type and biomass of invertebrate production in some saltcedar stands. Effects on micro-climate and food web support are likely to be greatest in saltcedar stands that currently have saturated soils or pond water during some periods, but which would no longer have these conditions following a reduction in groundwater elevation. Removing standing water and/or moist soils from a site may affect the abundance, distribution, occupancy, prey base, and nesting success of Riparian Covered Species.

**Honey Mesquite and Mesquite Mixed Riparian Habitats**

Mesquite owe their existence to shallow alluvial water tables (Stromberg 1993). Reduced instream flows and groundwater elevations in Reaches 4 and 5 could inhibit the future establishment of honey mesquite, and screwbean mesquite that could provide suitable nesting habitats when mature. In the next 50 years, losses in the extent, vigor, and recruitment of honey mesquite, screwbean mesquite along the LCR are anticipated as a result of lower surface and groundwater elevations downstream from Parker Dam (Jones and Stokes 2001).

The extent of honey mesquite and mesquite mixed riparian habitats or the number of individual mesquite trees could be reduced along river segments of Reaches 4 and 5 because of mortality associated with lower groundwater levels. Presuming groundwater elevations do not drop below the root zone, saplings and mature trees will likely survive the gradual change in groundwater level because their roots are expected to grow downward at rates commensurate with the rate of groundwater lowering (Jones and Stokes 2001). However, the high potential growth rate of mesquite roots does not insure high success in response to rapidly declining water tables. This is because
floodplain soils in the arid southwest often consist of coarse-textured alluvium that does not readily maintain the moist soil continuum necessary for inducing deeper rooting (Stromberg et al. 1992). Therefore, direct loss of existing mesquite trees attributable to ground water reductions cannot be precisely determined because baseline groundwater elevations are unknown and the reduction in groundwater elevation will occur over an extended period (i.e., 30 or more years) (Jones and Stokes 2001).

The ability for mesquite trees to naturally regenerate may be compromised where groundwater levels drop sufficiently to preclude future establishment and growth of seedlings. Floodplains where depth to the water table ranges from 1 to 2 m (3.3–6.6 feet) and in close proximity to the primary channel (less than 35 m [155 feet]) provide optimal conditions for mesquite recruitment (Stromberg et al. 1991, Stromberg 1993). Consequently, regeneration of mesquite in some stands could be adversely affected as a result of groundwater reductions. As a result, mesquite stands in locations where flow reductions drop groundwater levels below 2 m (6 feet) from the soil surface during the growing season may no longer be able to regenerate. In addition, existing mesquite and mesquite mixed stands or the number of individual mesquite trees could be permanently lost to wildfires where groundwater levels drop sufficiently to preclude regeneration of burned stands.

Water stress caused by further ground water reduction may cause substantial decline in the vegetative and reproductive productivity of mesquite (Mooney et al. 1977, Felker et al. 1983, Nilsen et al. 1984). Stromberg et al. (1996) found that small groundwater declines may affect factors such as size and productivity. As a result it would be expected to incur cascading effects on higher trophic levels, such decreased abundance of mesquite flowers and fruits followed by a reduction in insects and insectivores (Kingsover et al. 1977, Simpson et al. 1977).

Reduction in flow and groundwater levels could also affect the tree species composition, structural characteristics, and composition of understory shrub and herbaceous plant associations in mesquite and mesquite mixed stands (Stromberg et al. 1991, Stromberg et al. 1996). Flow reductions may exacerbate flow buffering to the point where instream flows are no longer capable of flushing accumulated salts from many parts of the lower Colorado River bank. This greatly increases the likelihood that salts will accumulate to the extent that salinity will negatively affect establishment and growth rates of native riparian species (Briggs 1996). Pinckney (1992) noted in his review of revegetation projects along the lower Colorado River that most native riparian species of this region have low tolerances to salt. As a result, increased soil salinity would be expected to cause reduced recruitment and restricted plant growth affecting both plant species composition and structural characteristics within mesquite and mesquite mixed riparian habitat.
Moisture availability has strong influences on size and growth rate of mature mesquite (Stromberg 1993). Within riparian zones, several structural traits of mesquite stands including canopy height and vegetation volume, have been shown to vary continuously with depth to groundwater (Meinzer 1927, Stomberg et al. 1992, Stromberg 1993). Stromberg et al. (1996) found that small changes in groundwater decline may affect factors such as height, foliage area, canopy mortality, leaf size and number, and xylem water potential. Thus, continued groundwater declines would be expected to affect the health and structural characteristics of existing and new stands.

Groundwater declines are also expected to change the composition of understory shrub and herbaceous plant associations. Studies show that streamside herbaceous vegetation was associated with mean groundwater depths of 0.30–0.45 m (1.0–1.5 feet) (Richter 1993, Stromberg et al. 1996). In addition, lower groundwater elevations could affect the recruitment rates of all or some of the shrub species, including arrow weed, quailbrush, four-winged saltbush, allscale, wolfberry, or inkweed (Younker and Andersen 1986). Because seedlings of some plant species can establish at lower groundwater elevations than seedlings of other species, lowering the groundwater elevation could change the composition of herbaceous and understory shrub vegetation in some existing and/or new stands over the long term. Where lower groundwater elevations affect the composition understory vegetation, microhabitat conditions (e.g. higher temperature, lower humidity), percent plant cover, and the type and biomass of invertebrate production in mesquite and mesquite mixed stands would be expected to change. Structure and food web support, in mesquite and mesquite mixed stands that currently support moist soil conditions (i.e. higher groundwater elevations, periodically inundated, etc.) during some periods, but which would no longer have these conditions following a reduction in flow and groundwater elevations, would be most affected (Jones and Stokes 2001). Moisture in the soils provides the proper humidity, ground cover, solar protection, and supports the diversity and abundance of prey species (e.g., insects). As such, changes in points of diversion may adversely affect nesting success and suitability of occupied habitat if groundwater and river surface elevations lower sufficiently to remove surface water or moist soil conditions.

In addition, groundwater and flow reduction may preclude the regeneration, impede the growth or growth rates, or cause a reduction in canopy vegetation volume of honey and screwbean mesquite, thereby changing both species composition and structural characteristics within stands. Groundwater reduction can cause direct loss or affect factors such as height, foliage area, canopy mortality, leaf size and number, and xylem water potential of honey and screwbean mesquite. Loss of tall and mature trees will result in limiting nesting sites for cavity and upper canopy nesting species. Loss of high foliage density in the upper canopy will affect midsummer canopy-nesting species by
reducing shading and evapotranspiration that would buffer high midsummer ambient temperatures, thus possibly hindering nesting efforts of these species (Hunter et al. 1985, Hunter et al. 1987). As a result this would affect nesting success and suitability of occupied habitat.

Implementation of Future Flow-related Covered Activities will have adverse impacts to the physical and biological characteristics of riparian habitat supported within plant communities dominated or co-dominated by mesquite land cover types. Based on the best available information, mesquite and mesquite mixed communities support habitat for the following species: Western yellow-billed cuckoo, Elf owl, gilded flicker, Gila woodpecker, Vermilion flycatcher, Arizona bell’s vireo, Sonoran yellow warbler, Western red bat, and Western yellow bat. These species extensively use and depend on mesquite plant communities to fulfill critical life history requirements. The California side of the lower Colorado River lies at the western edge of the Elf owl, gilded flicker, Gila woodpecker, Vermilion flycatcher, Arizona bell’s vireo, Sonoran Yellow warbler, Western red bat, and Western yellow bat geographic range. Consequently, the continued existence of these species in California is seriously threatened by further loss and/or degradation of breeding habitat located at the western edge of their range and represents a significant loss of habitat within California.

Southwestern Willow Flycatcher

Occupied southwestern willow flycatcher nesting habitat occurs along all reaches of the project area, and migrants are widespread in all reaches of the LCR (McKernan and Braden 2001). Habitats occupied by nesting southwestern willow flycatchers can vary from site to site based on the species composition of vegetation, elevation, patchiness, humidity, temperatures, standing water and soil moisture, proximity to suitable foraging areas, and other factors (USBR 2000, Jones & Stokes 2000, McKernan and Braden 2000). Occupied southwestern willow flycatcher habitat is defined as “a contiguous area with consistent physical and biotic characteristics where territorial males or pairs of flycatchers have been documented during previous breeding seasons (generally after June 15) at least once since 1996, assuming the habitat has not been degraded or otherwise altered in the interim; if a portion of the contiguous habitat is or was used, the entire contiguous area is considered occupied” (USBR 2000).

Future changes in points of diversion may adversely affect the southwestern willow flycatcher in reaches 4 and 5. Regionally significant occurrences of the southwestern willow flycatcher occur between Parker and Imperial Dams. Future flow and groundwater reductions may cause the loss of a large proportion of this regionally significant southwestern willow flycatcher population. In 2000, there were 13 pairs in
Reaches 4 and 5, and the majority of these pairs could be adversely affected due to loss of standing water or moist soils in their nesting territories. Of the 1,460 acres of occupied willow flycatcher habitat between Parker and Imperial Dams 909 acres are located within California (USFWS 2001). Removing standing water and/or moist soils from a site may affect the abundance, distribution, occupancy, prey base, and nesting success of southwestern willow flycatchers. Also, such changes may affect the future extent of suitable flycatcher migration habitat.

Changes in points of diversion will reduce instream flows and groundwater elevations in Reaches 4 and 5, which could inhibit the future establishment of cottonwoods and willows that could provide suitable southwestern willow flycatcher nesting habitats when mature. In the next 50 years, losses in the extent, vigor, and recruitment of cottonwood-willow land cover types along the LCR or further degradation of environmental conditions are anticipated as a result of lower surface and groundwater elevations downstream from Parker Dam.

Loss of habitat or degradation of environmental conditions within habitat will increase competition for limited nesting habitat and resources, forcing individuals to nest in suboptimal habitat. This may result in higher rates of mortality associated with predation, starvation, hatching failure, and adverse weather conditions. Defending a territory is also costly in terms of energy and time, and can interfere with courtship, mating, feeding, and rearing young, decreasing the probability of survival and decreasing reproductive success.

Structure and food web support, in riparian stands that currently support moist soil conditions (i.e. higher groundwater elevations, periodically inundated, etc.) during some periods, but which would no longer have these conditions following a reduction in flow and groundwater elevations, could be lost or substantially degraded (Jones and Stokes 2001). Moisture in the soils supports the diversity and abundance of prey species (e.g., insects) essential in supporting insectivores. Where lower groundwater elevations affect the composition understory vegetation, microhabitat conditions (e.g. higher temperature, lower humidity), percent plant cover, and the type and biomass of invertebrate production in riparian stands would be expected to degrade. Reductions in flow and ground water elevations could degrade the forage base reducing survival rates. The degradation of the food chain could result in starvation, increased vulnerability to disease and predation, increased chick death, and desertion.

Groundwater reduction can cause direct loss or affect factors such as foliage area, canopy mortality, leaf size and number, and xylem water potential of riparian forest. Loss of high foliage density in the canopy will affect midsummer nesting activities, by reducing shading and evapotranspiration that would buffer high midsummer ambient
temperatures. Environmental conditions within nesting habitat will be further degraded where lower groundwater elevations affect the composition of understory vegetation, microhabitat conditions (e.g., higher temperature, lower humidity), and percent plant cover. Moisture in the soils provides the proper humidity, ground cover, and solar protection. Loss or degradation of high foliage density, understory vegetation, microhabitat conditions, or moisture in soil could result in higher mortality rates attributed to hatching failure, desertion, and adverse weather conditions (Hunter et al. 1985, Hunter et al. 1987).

**Western Yellow-Billed Cuckoo**

Occupied western yellow-billed cuckoo nesting habitat is present in Reaches 3, 4, and 5 of the project area. Because of its large extent and mosaic of riparian vegetation, the Bill Williams River NWR, adjacent to the LCR MSCP planning area, has historically been a stronghold for western yellow-billed cuckoos in the southwest, and it currently supports the largest population in western Arizona or southeastern California. Since 1996, nesting pairs have also been found along the LCR at Cibola NWR (Reach 4), Imperial NWR and Picacho State Recreation Area (Reach 5) (Halterman pers. comm), and at Eherenberg (Reach 4).

Occupied western yellow-billed cuckoo habitats are present in these Reaches, and lowering of groundwater elevations as a result of changing points of diversion would likely adversely affect suitable western yellow-billed cuckoo habitat in Reaches 4 and 5. Lowering groundwater may affect occupied western yellow-billed cuckoo habitats at Cibola NWR and Eherenberg in Reach 4, and at Imperial NWR and Picacho State Recreation Area in Reach 5. If moist soils are removed from a site, it may affect the abundance, distribution, occupancy, prey base, and nesting success of western yellow-billed cuckoos there. Changes in points of diversion will reduce instream flows and groundwater elevations in Reaches 4 and 5, which could inhibit the future establishment of suitable western yellow-billed cuckoo nesting habitats. Also, such changes may affect the future extent of suitable cuckoo migration habitat.

Loss of habitat or degradation of environmental conditions within that habitat will increase competition for limited nesting habitat and resources, forcing individuals to nest in suboptimal habitat. This may result in higher rates of mortality associated with predation, starvation, hatching failure, and adverse weather conditions. Defending a territory is also costly in terms of energy and time, and can interfere with courtship, mating, feeding, and rearing young, decreasing the probability of survival and decreasing reproductive success.
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In addition, groundwater and flow reduction may preclude the regeneration, or impede the growth or growth rates of cottonwoods, Goodding’s willow, and honey and screwbean mesquite thereby changing both species composition and structural characteristics within forest stands. The loss of tall and mature trees will result in limiting nesting sites, especially for upper canopy and cavity nesting species. The reduction in growth or growth rates could affect foliage height diversity reducing the number of foraging layers and available nest sites. Loss of these habitat characteristics could increase competition for limited nesting sites, especially for upper canopy and cavity nesting species, forcing many individuals to nest in suboptimal habitat, which may result in higher rates of mortality associated with predation, starvation, hatching failure, and adverse weather conditions.
Elf Owl

The elf owl is only known to nest in stretches of Reaches 3 and 4 of the project area. Because of its large extent and mosaic of riparian vegetation, the Bill Williams River NWR, adjacent to the LCR MSCP planning area, has been a stronghold for elf owls along the LCR. During 1987, elf owls were also found along the LCR at the Fort Mojave area, Headrock Gate Dam, Wilson Road 2 km east of highway 95, Waterwheel Camp 21 km north of Blythe, Aha Quin trailer park 18 km north of Blythe, near Ehrenberg, Walter's Camp and elsewhere in Cibola NWR (Reach 4) and Picacho State Recreation Area (Reach 5) (Halterman et al. 1989).

Changes in points of diversion may adversely affect the elf owl in reach 4. Effects of future flow-related activities on occupied and suitable nesting and migration habitats along the LCR may occur from reducing instream flows and lowering surface and groundwater elevations. Lowering groundwater elevations can adversely affect elf owls by causing direct loss of occupied or suitable nesting habitat. In addition to the potential for direct loss of nesting habitat, a loss of surface water or moist soil conditions associated with lowering groundwater elevations could also affect the abundance, distribution, occupancy, prey base, and nesting success of elf owls.

Changes in points of diversion will reduce instream flows and groundwater elevations in Reach 4, which could inhibit the future establishment of cottonwoods, willows, and mesquite that could provide suitable elf owl nesting habitats when mature. In the next 50 years, losses in the extent, vigor, and recruitment of cottonwood-willow and mesquite land cover along the LCR are anticipated because of lower surface and groundwater elevations downstream from Parker Dam.

Loss of habitat or degradation of environmental conditions within habitat will increase competition for limited nesting habitat and resources, forcing individuals to nest in suboptimal habitat. This may result in higher rates of mortality associated with predation, starvation, hatching failure, and adverse weather conditions. Defending a territory is also costly in terms of energy and time, and can interfere with courtship, mating, feeding, and rearing young, decreasing the probability of survival and decreasing reproductive success.

Structure and food web support, in riparian stands that currently support moist soil conditions (i.e. higher groundwater elevations, periodically inundated, etc.) during some periods, but which would no longer have these conditions following a reduction in flow and groundwater elevations, could be lost or substantially degraded (Jones and Stokes 2001). Moisture in the soils supports the diversity and abundance of prey species (e.g., insects) essential in supporting insectivores. Where lower groundwater elevations affect
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Groundwater reduction can cause direct loss or affect factors such as foliage area, canopy mortality, leaf size and number, and xylem water potential of riparian forest. Loss of high foliage density in the canopy will affect midsummer nesting activities, by reducing shading and evapotranspiration that would buffer high midsummer ambient temperatures. Environmental conditions within nesting habitat will be further degraded where lower groundwater elevations affect the composition understory vegetation, microhabitat conditions (e.g. higher temperature, lower humidity), and percent plant cover. Moisture in the soils provides the proper humidity, ground cover, and solar protection. Loss or degradation of high foliage density, understory vegetation, microhabitat conditions, or moisture in soil could result in higher mortality rates attributed to hatching failure, desertion, and adverse weather conditions (Hunter et al. 1985, Hunter et al. 1987).

In addition, groundwater and flow reduction may preclude the regeneration, or impede the growth or growth rates of cottonwoods, Goodding's willow, and honey and screwbean mesquite thereby changing both species composition and structural characteristics within forest stands. The loss of tall and mature trees will result in limiting nesting sites, especially for upper canopy and cavity nesting species. The reduction in growth or growth rates could affect foliage height diversity reducing the number of foraging layers and available nest sites. Loss of these habitat characteristics could increase competition for limited nesting sites, especially for upper canopy and cavity nesting species, forcing many individuals to nest in suboptimal habitat, which may result in higher rates of mortality associated with predation, starvation, hatching failure, and adverse weather conditions.

**Gilded Flicker**

The gilded flicker is declining in California because of the loss and degradation of mature riparian forests and saguaro along the LCR (Garrett and Dunn 1981; CDFG 1991; Rosenberg et al. 1991). Adjacent to the LCR MSCP planning area, the gilded flicker is still fairly common at Bill Williams River NWR, especially in adjacent desert uplands with saguaro. It is rare elsewhere, with small numbers persisting at Fort Mojave, the Colorado River Indian Reservation, Topock Marsh, Lake Havasu, near
Ehrenberg, between Imperial and Laguna Dams, and at Cibola and NWRs (McKernan and Braden 2001).

Changes in points of diversion may adversely affect the gilded flicker in Reaches 4 and 5. Effects of these activities would adversely affect the gilded flicker in Reaches 4 and 5 by reducing the extent of woody riparian land cover types or degrading environmental conditions within existing occupied sites used by the species. The reduction of instream flows and groundwater elevations could inhibit the future establishment of suitable gilded flicker nesting habitats in future years.

Loss of habitat or degradation of environmental conditions within habitat will increase competition for limited nesting habitat and resources, forcing individuals to nest in suboptimal habitat. This may result in higher rates of mortality associated with predation, starvation, hatching failure, and adverse weather conditions. Defending a territory is also costly in terms of energy and time, and can interfere with courtship, mating, feeding, and rearing young, decreasing the probability of survival and decreasing reproductive success.

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In addition, groundwater and flow reduction may preclude the regeneration, or impede the growth or growth rates of cottonwoods, Goodding’s willow, and honey and screwbean mesquite thereby changing both species composition and structural characteristics within forest stands. The loss of tall and mature trees will result in limiting nesting sites, especially for upper canopy and cavity nesting species. The reduction in growth or growth rates could affect foliage height diversity reducing the number of foraging layers and available nest sites. Loss of these habitat characteristics could increase competition for limited nesting sites, especially for upper canopy and cavity nesting species, forcing many individuals to nest in suboptimal habitat, which may result in higher rates of mortality associated with predation, starvation, hatching failure, and adverse weather conditions.

Gila Woodpecker

The Gila woodpecker is declining in California because of the loss and degradation of mature riparian forests and saguaro along the LCR (Garrett and Dunn 1981; CDFG 1991; Rosenberg et al. 1991). They are now limited to several localities along the LCR between Needles and Yuma (CDFG 1991) in Reaches 3–6.

Changes in points of diversion may adversely affect the Gila woodpecker in Reaches 4 and 5. Effects of these activities would adversely affect the Gila woodpecker in Reaches 4 and 5 by reducing the extent of woody riparian land cover types or degrading environmental conditions within existing occupied sites used by the species. The reduction of instream flows and groundwater elevations could inhibit the future establishment of suitable Gila woodpecker nesting habitats in future years.

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In addition, groundwater and flow reduction may preclude the regeneration, or impede the growth or growth rates of cottonwoods, Goodding's willow, and honey and screwbean mesquite thereby changing both species composition and structural characteristics within forest stands. The loss of tall and mature trees will result in limiting nesting sites, especially for upper canopy and cavity nesting species. The reduction in growth or growth rates could affect foliage height diversity reducing the number of foraging layers and available nest sites. Loss of these habitat characteristics could increase competition for limited nesting sites, especially for upper canopy and cavity nesting species, forcing many individuals to nest in suboptimal habitat, which may result in higher rates of mortality associated with predation, starvation, hatching failure, and adverse weather conditions.

**Vermilion Flycatcher**

Most nesting pairs of vermilion flycatchers remaining along the LCR occur at Bill Williams River Delta. Other areas where nesting flycatchers have been consistently observed in low numbers include the Blythe Golf Course, Clark Ranch, Parker Dam residences, and Willow Valley Estates (Rosenberg et al. 1991). Open water may be an important nesting habitat component because of the emergence of aquatic insects for
prey, as vermilion flycatchers are often observed foraging just above water (Ehrlich et al. 1988).

Changes in points of diversion may adversely affect the vermilion flycatcher in Reaches 4 and 5. Effects of these activities would adversely affect the vermilion flycatcher in Reaches 4 and 5 by reducing the extent of woody riparian land cover types or degrading environmental conditions within existing occupied sites used by the species. The reduction of instream flows and groundwater elevations could inhibit the future establishment of suitable vermilion flycatcher nesting habitats in future years.

Loss of habitat or degradation of environmental conditions within habitat will increase competition for limited nesting habitat and resources, forcing individuals to nest in suboptimal habitat. This may result in higher rates of mortality associated with predation, starvation, hatching failure, and adverse weather conditions. Defending a territory is also costly in terms of energy and time, and can interfere with courtship, mating, feeding, and rearing young, decreasing the probability of survival and decreasing reproductive success.

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In addition, groundwater and flow reduction may preclude the regeneration, or impede the growth or growth rates of cottonwoods, Goodding’s willow, and honey and screwbean mesquite thereby changing both species composition and structural characteristics within forest stands. The loss of tall and mature trees will result in limiting nesting sites, especially for upper canopy and cavity nesting species. The reduction in growth or growth rates could affect foliage height diversity reducing the number of foraging layers and available nest sites. Loss of these habitat characteristics could increase competition for limited nesting sites, especially for upper canopy and cavity nesting species, forcing many individuals to nest in suboptimal habitat, which may result in higher rates of mortality associated with predation, starvation, hatching failure, and adverse weather conditions.

**Arizona Bell’s Vireo**

The Bell’s vireo is only known to nest in Reaches 3-5 of the project area. Occupied Bell’s vireo habitat is present at Lake Havasu NWR (Reach 3), Cibola NWR and Ehrenberg (Reach 4), Picacho State Recreation Area (Reach 5), and adjacent to the LCR MSCP planning area at the Bill Williams River NWR. In the project area, suitable Bell’s vireo nesting habitat is near water or areas that maintain surface water or moist soil conditions during the breeding season (Rosenberg et al. 1991).

Changes in points of diversion may adversely affect the Arizona Bell’s vireo in Reaches 4 and 5. Effects of these activities would adversely affect the Arizona Bell’s vireo in Reaches 4 and 5 by reducing the extent of woody riparian land cover types or degrading environmental conditions within existing occupied sites used by the species. The reduction of instream flows and groundwater elevations could inhibit the future establishment of suitable Arizona Bell’s vireo nesting habitats in future years.

Loss of habitat or degradation of environmental conditions within habitat will increase competition for limited nesting habitat and resources, forcing individuals to nest in suboptimal habitat. This may result in higher rates of mortality associated with predation, starvation, hatching failure, and adverse weather conditions. Defending a territory is also costly in terms of energy and time, and can interfere with courtship, mating, feeding, and rearing young, decreasing the probability of survival and decreasing reproductive success.

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In addition, groundwater and flow reduction may preclude the regeneration, or impede the growth or growth rates of cottonwoods, Goodding’s willow, and honey and screwbean mesquite thereby changing both species composition and structural characteristics within forest stands. The loss of tall and mature trees will result in limiting nesting sites, especially for upper canopy and cavity nesting species. The reduction in growth or growth rates could affect foliage height diversity reducing the number of foraging layers and available nest sites. Loss of these habitat characteristics could increase competition for limited nesting sites, especially for upper canopy and cavity nesting species, forcing many individuals to nest in suboptimal habitat, which may result in higher rates of mortality associated with predation, starvation, hatching failure, and adverse weather conditions.

**Sonoran Yellow Warbler**

Occupied Sonoran yellow warbler nesting habitat occurs along all reaches of the project area, and migrants are widespread in all reaches of the LCR. From 1996 to 1999, nesting by this subspecies was documented at Virgin River, Pahrangat, Meadow Valley,
Grand Canyon National Park, Topock Marsh, Topock Gorge, Lake Havasu, Bill Williams River NWR, Ehrenberg, Walker Lake, and Picacho State Recreation Area (McKernan and Braden 2001). This is a common nesting species along the Colorado River above Hoover Dam (Brown 1988; SWCA 1995; Sogge et al. 1998; Spence et al. 1998).

Changes in points of diversion may adversely affect the yellow warbler in Reaches 4 and 5. Effects of these activities would adversely affect the yellow warbler in Reaches 4 and 5 by reducing the extent of woody riparian land cover types or degrading environmental conditions within existing occupied sites used by the species. The reduction of instream flows and groundwater elevations could inhibit the future establishment of suitable yellow warbler nesting habitats in future years.

Loss of habitat or degradation of environmental conditions within habitat will increase competition for limited nesting habitat and resources, forcing individuals to nest in suboptimal habitat. This may result in higher rates of mortality associated with predation, starvation, hatching failure, and adverse weather conditions. Defending a territory is also costly in terms of energy and time, and can interfere with courtship, mating, feeding, and rearing young, decreasing the probability of survival and decreasing reproductive success.

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**Summer Tanager**

Summer tanagers nest primarily in tall cottonwood-willow forests along rivers and streams. In the project area, well-developed stands of cottonwood-willow (e.g., structural types I and II) can support 20–30 birds per 40 ha (100 ac) (Rosenberg et al. 1991).

Changes in points of diversion may adversely affect the summer tanager in Reaches 4 and 5. Effects of these activities would adversely affect the summer tanager in Reaches 4 and 5 by reducing the extent of woody riparian land cover types or degrading environmental conditions within existing occupied sites used by the species. The reduction of instream flows and groundwater elevations could inhibit the future establishment of suitable summer tanager nesting habitats in future years.

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In addition, groundwater and flow reduction may preclude the regeneration, or impede the growth or growth rates of cottonwoods, Goodding's willow, and honey and screwbean mesquite thereby changing both species composition and structural characteristics within forest stands. The loss of tall and mature trees will result in limiting nesting sites, especially for upper canopy and cavity nesting species. The reduction in growth or growth rates could affect foliage height diversity reducing the number of foraging layers and available nest sites. Loss of these habitat characteristics could increase competition for limited nesting sites, especially for upper canopy and cavity nesting species, forcing many individuals to nest in suboptimal habitat, which may result in higher rates of mortality associated with predation, starvation, hatching failure, and adverse weather conditions.
Western Red Bat

The western red bat is migratory but may be a year-round resident throughout the project area, particularly along the lower reaches of the LCR. Known roosts include tree foliage of cottonwood and other riparian trees, leafy shrubs, and herbs.

Changes in points of diversion may adversely affect the western red bat in Reaches 4 and 5. Lowering of groundwater elevations could reduce the extent of existing cottonwood-willow land cover. Lowering of groundwater elevations could change the microclimate conditions and the extent of cottonwood-willow and other woody riparian land cover types used by western red bat for roosting and foraging. The existing extent of cottonwood-willow land cover could be reduced in the long-term if groundwater elevations are not sufficient to allow regeneration of existing stands. Depending on the type of riparian vegetation that would replace lost stands, these effects could result in a reduction in the number and abundance of trees suitable for roosting and in the diversity of insect prey available to this species for food, with potential adverse effects on this bat's reproductive capacity and survival.

Western Yellow Bat

The western yellow bat is migratory but is likely a year-round resident along all reaches of the Colorado River within the project area. The distribution of this species is not well known, but it has been found in association with Washington fan palms at Yuma and in broad-leaved riparian areas along the Bill Williams River (Hoffmeister 1986, AGFD 1996a). It is expected to occur at locations where palms have been planted along the Colorado River (Cockrum et al. 1996). Yellow bats have also been reported roosting in introduced palms at Lake Havasu City (Brown 1996).

Changes in points of diversion may adversely affect the western yellow bat in Reaches 4 and 5. Lowering of groundwater elevations could reduce the extent of existing cottonwood-willow land cover. Lowering of groundwater elevations could change the microclimate conditions and the extent of cottonwood-willow and other woody riparian land cover types used by western yellow bat for roosting and foraging. The existing extent of cottonwood-willow land cover could be reduced in the long-term if groundwater elevations are not sufficient to allow regeneration of existing stands. Depending on the type of riparian vegetation that would replace lost stands, these effects could result in a reduction in the number and abundance of trees suitable for roosting and in the diversity of insect prey available to this species for food, with potential adverse effects on this bat's reproductive capacity and survival.

In addition, lowered groundwater elevations could result in loss of backwater marsh and
open water areas that support large number of insects used by these bats for foraging.

ii. Effects on Marsh Habitat

Marsh is present in all river reaches of the project area and provides habitat for the Yuma clapper rail, California black rail, western least bittern, and Colorado River cotton rat ("Marsh Covered Species"). Marsh vegetation grows:

- along the margins of isolated and connected backwaters, the main and side channels of the LCR, and reservoir coves;
- behind dams on the mainstem of the river;
- on wildlife refuges that are managed to maintain marsh; and
- in drains and canals that maintain sufficient water to support the establishment and growth of emergent vegetation.

Based on supporting hydrology, two types of marsh are present in the project area: 1) marshes that are directly connected to the river or that are groundwater dependent; and 2) marshes that have been formed by reservoirs or impoundments (e.g., Lake Mead, Lake Havasu, Mittry Lake) (Bureau of Reclamation 1996). The frequency and rate of reservoir fluctuations will be similar to baseline conditions, so future flow-related activities will not cause effects to marshes supported by reservoirs.

The quality and extent of some marsh land cover in the project area are expected to decline relative to existing conditions with implementation of future flow-related Covered Activities. Future flow-related Covered Activities will result in the degradation or loss of emergent aquatic vegetation or would remove or degrade environmental conditions that determine and characterize the constituent elements of habitat for Marsh Covered Species. Reductions in flow, river surface area, and groundwater levels in Reaches 4 and 5 will result in the loss of 38 acres of marsh that provides Yuma clapper rail and western least bittern habitat, 14 acres of marsh that provides California black rail habitat, and 29 acres of Colorado River cotton rat habitat (subsumed under the Yuma clapper rail, western least bittern, and California black rail habitat) (Table 4). The types of effects that could be expected if groundwater and river surface elevations are lowered sufficiently include:

- a change in marsh plant composition (e.g., replacement of cattail by common reed);
- a conversion of marsh land cover to woody riparian land cover types;
- an increase in plant density and extent, resulting in the loss of open water;
- a change in marsh function (e.g., change in invertebrate communities, species
composition, or production); and

- desiccation of emergent vegetation in drains and canals if water conveyed through a drain or canal is not sufficient to maintain the vegetation.

An increase in the range of daily fluctuations in surface water elevations in marshes with changes in points of diversion also could affect the quality of habitat provided for some Marsh Covered Species (e.g., lower water levels could reduce the availability of cover and food for Yuma clapper rails) (U.S. Fish and Wildlife Service 2001).

**Yuma Clapper Rail**

Marshes that have developed with construction of reservoirs have created substantial areas of habitat for the Yuma clapper rail (Rosenberg et al. 1991), and occupied nesting habitat is present in Reach 1 and Reaches 3–7. Since 1996, rails have been found along the LCR at the Virgin River Delta and Las Vegas Wash (Reach 1), Havasu NWR and the Bill Williams Delta (Reach 3), Cibola NWR (Reach 4), Picacho State Recreation Area and Imperial NWR (Reach 5), and Mittry Lake (Reach 6) (McKernan and Braden 1999, USFWS 2001).

Changes in points of diversion may adversely affect the Yuma clapper rail in Reaches 4 and 5. Lowering groundwater elevations will affect Yuma clapper rail habitat that is dependent on river stage elevation and managed wetlands. Lowering groundwater elevations could cause direct loss of these habitats through desiccation, fragmentation, or severe reduction in area of habitat patches. Lowered groundwater elevations could also make it more difficult in the future to restore habitat by providing surface water in marshes that are structurally suitable, but that lack surface water during the breeding season. Marshes formed by reservoirs (i.e., Cibola NWR [Reach 4], and Imperial NWR [Reach 5]) will not be affected by changes in river stage. Effects of lowering groundwater elevations on occupied habitats would vary, depending on bank and underwater topography, water levels, water management policy for wildlife, and rates of changes in groundwater elevations.

Changes in points of diversion will also reduce instream flows and surface water elevations in Reaches 4 and 5, which could inhibit the future establishment or maintenance of marsh outside of the channel and backwater areas.

**California Black Rail**

Marshes that have developed with construction of reservoirs have created substantial areas of habitat for California black rail (Rosenberg et al. 1991). Occupied nesting habitat is present in Reaches 3–6 of the LCR. Black rails have been observed at the
Bill Williams River Delta (Reach 3), Cibola NWR (Reach 4), Imperial NWR (Reach 5), and Mittry Lake (Reach 6) (Rosenberg et al. 1991). Annual fluctuation in water levels, shallow water depth, and high-stem densities are important factors in determining habitat suitability for black rails (Eddleman et al. 1994, Rosenberg et al. 1991).

Changes in points of diversion may adversely affect the California black rail in Reaches 4 and 5. Lowering groundwater elevations will affect suitable habitat that is dependent on river stage elevation and managed wetlands. Lowering groundwater elevations could cause direct loss of these habitats through desiccation, fragmentation, or severe reduction in area of habitat patches. Lowered groundwater elevations could also make it more difficult in the future to restore habitat by providing surface water in marshes that are structurally suitable, but that lack surface water during the breeding season. Marshes formed by reservoirs (i.e., Cibola NWR [Reach 4], and Imperial NWR [Reach 5]) will not be affected by changes in river stage. Effects of lowering groundwater elevations on occupied habitats would vary, depending on bank and underwater topography, water levels, water management policy for wildlife, and rates of changes in groundwater elevations.

Changes in points of diversion will also reduce instream flows and surface water elevations in Reaches 4 and 5, which could inhibit the future establishment or maintenance of marsh outside of the channel and backwater areas.

**Western Least bittern**

Marshes that have developed with construction of reservoirs have created substantial areas of habitat for western least bitterns (Rosenberg et al. 1991). Occupied least bittern habitat is present in Reaches 1, 3, 4, 5, 6, and 7. Relatively large numbers of western least bitterns are present at Topock Marsh.

Changes in points of diversion may adversely affect the western least bittern in Reaches 4 and 5. Lowering groundwater elevations will affect suitable habitat that is dependent on river stage elevation and managed wetlands. Lowering groundwater elevations could cause direct loss of these habitats through desiccation, fragmentation, or severe reduction in area of habitat patches. Lowered groundwater elevations could also make it more difficult in the future to restore habitat by providing surface water in marshes that are structurally suitable, but that lack surface water during the breeding season. Marshes formed by reservoirs (i.e., Cibola NWR [Reach 4], and Imperial NWR [Reach 5]) will not be affected by changes in river stage. Effects of lowering groundwater elevations on occupied habitats would vary, depending on bank and underwater topography, water levels, water management policy for wildlife, and rates of changes in groundwater elevations.
Changes in points of diversion will also reduce instream flows and surface water elevations in Reaches 4 and 5, which could inhibit the future establishment or maintenance of marsh outside of the channel and backwater areas.

**Colorado River cotton rat**

The Colorado River cotton rat inhabits narrow bands of mesic herbaceous vegetation along the Colorado River in Reaches 3 and 4 of the LCR from Topock Marsh to Ehrenberg (Hoffmeister 1986). The subspecies is also found in association with irrigated croplands in some areas (Hoffmeister 1986). Trapping success for this subspecies occurs most often in areas dominated by common reed (Zimmerman pers. comm.).

Changes in points of diversion may adversely affect the Colorado River cotton rat. These activities could result in the loss of occupied habitat if river stage and groundwater elevations drop sufficiently to reduce the extent of mesic herbaceous vegetation associated with backwaters and marshes.

**iii. Effects on Aquatic Habitat**

Reservoirs, river, and backwater areas ("Aquatic Habitat") provide habitat for the razorback sucker and bonytail. Future changes in points of diversion will cause a change on aquatic environments and affect water depth, river surface area, water temperature, and contaminant concentration. Reductions in flow, water depth, river surface area in Reaches 4 and 5 will result in the loss of 97 acres of razorback sucker and bonytail habitat (Table 4). Although the bonytail is known only to exist in the mainstem and connected backwaters in Reach 3 and High Levee Pond in Reach 4, it may be reintroduced into Reaches 4 and 5 in future years under the LCR MSCP or other programs.

A qualitative assessment of potential effects from implementing changes in points of diversion is discussed for selected environmental conditions followed by the expected effects to razorback sucker and bonytail chub.

**Reservoirs**

Future flow-related activities will not measurably affect reservoir conditions in Reach 4 and 5.

**River**

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The river edge, riffles, and side channels may be substantially affected by the future flow-related Covered Activities. Depending on site-specific channel morphology, reduced depth in association with ongoing daily flow fluctuation could affect stranding of fish and desiccate fish eggs and aquatic organisms in or on the substrate. The level of existing stranding and desiccation and how flow variability at a lower surface elevation interacts with channel morphology are currently unknown. However, the reduced river depth, in combination with ongoing daily flow fluctuation, could increase stranding losses and desiccation relative to the existing condition.

The reduction in flow with implementation of Covered Activities is not expected to measurably affect water temperature. Given that variability in reservoir storage and water surface elevation would be the same as for existing conditions for Lake Havasu, the temperature of the discharge from Parker Dam with implementation of future flow-related covered activities would be similar to temperature for existing conditions. Lower flow with implementation of future flow-related Covered Activities would not affect downstream water temperatures because temperatures reach ambient conditions in the pool created by Headgate Rock Dam.

**Backwater**

Open water and emergent vegetation components of backwaters provide habitat for the Yuma clapper rail, western least bittern, California black rail, bonytail, and razorback sucker. The level of effect of flow-related Covered Activities on backwaters varies, depending on the connection to the river. A reduction in river flow would affect backwater water depth, surface area, flow continuity, and contaminant concentration. The reduced depth of connected backwaters could increase stranding mortality for fish and desiccate aquatic organisms in and on the substrate within the affected backwaters. Backwaters that are directly connected to the river are more sensitive to river flow changes than are backwaters dependent on groundwater elevation only. For connected backwaters, the additional temporary reduction in depth and surface area associated with daily minimum flows could increase stranding losses, displacement of small juveniles from nursery habitat and cover, and desiccation of aquatic organisms and fish eggs relative to the existing condition.

**Razorback Sucker**

Implementation of changes in points of diversion are likely to adversely affect razorback sucker in Reaches 4 and 5, including created habitat at High Levee Pond. Reduced flow in Reaches 4 and 5 could reduce spawning and rearing habitat availability, increase stranding losses, and increase contaminant concentrations that could adversely affect survival, growth, and reproduction.
Razorback suckers require clean gravel in shallow areas of quiet water for spawning during January through April/May (Langhorst and Marsh 1986). Lower river surface elevations relative to baseline conditions would increase the potential to expose spawning habitat and desiccate exposed eggs. Reduced frequency and duration of spawning habitat availability may reduce the frequency of individual spawning success. Reduced spawning habitat availability may adversely affect the success of razorback sucker spawning activities, further contributing to conditions that currently are insufficient to sustain razorback sucker population abundance (USFWS 2001).

Larvae and juvenile razorback sucker use protected warm and shallow water that is generally more productive than deeper areas. Lower water levels may reduce the frequency and duration of rearing habitat availability (USFWS 2001). Connected backwaters and low velocity channel types, such as pool edges and side channels, provide rearing habitat for larval and juvenile razorback sucker. Stocked razorbacks show a preference for backwaters over the main channel habitats (Gurtin and Bradford 2000). Backwaters are warmer and more productive than the main river channel, potentially supporting faster growth rates. In addition, backwaters with emergent vegetation provide cover and potential refuges from predators. Reduced flow, and subsequent shallower depth, could reduce rearing habitat area in the river and backwaters. Reduced flow may also increase stranding losses where daily flow variability isolates and subsequently desiccates occupied habitat.

Reduction of instream flows and surface elevations may also affect razorback sucker habitat. Habitat conditions for non-native fish species could improve as a result of reduced periods of high turbidity. Access to temporary refuge from predation and feeding areas provided by temporarily inundated edge during high flows may also be reduced. The loss of habitat and increased predation and competition by non-native species could have an adverse effect on razorback sucker.

Reduced river flow with implementation of Covered Activities could also affect razorback sucker and their created habitat in High Levee Pond. Lower river surface elevation could reduce flow through the created habitat, resulting in reduced habitat area and adversely affecting water quality. Reduced water surface elevation in the created habitat, depending on the time of year, could directly reduce spawning and rearing habitat availability. In addition, lower water surface elevation could promote establishment of marsh plant species. The establishment of emergent marsh could permanently reduce available spawning and rearing habitat area. Effects on water quality are difficult to predict. Stagnation in the created habitat, combined with increased nutrient levels concentrated as surface area is reduced, could reduce
dissolved oxygen to levels detrimental to incubating eggs and rearing larvae. Recruitment success could be reduced.

Environmental conditions in the reservoirs behind Palo Verde Diversion Dam, Headgate Rock Dam, Imperial Dam, and in Senator Wash Reservoir would be relatively unchanged. Implementation of changes in points of diversion would not increase adverse effects on razorback suckers and their habitat in the reservoirs.

**Bonytail**

Bonytail have been extirpated from all riverine areas of the LCR (HCP, Chapter 2). Bonytail occur in Lake Mohave and are likely present in Lake Havasu. Designated critical habitat for bonytail extends from Hoover Dam to Parker Dam (Reaches 2 and 3), excluding the river segment from Parker Dam to the northern boundary of Havasu NWR.

Effects of implementing changes in points of diversion described for razorback sucker are assumed to apply to bonytail if reintroduced to Reaches 4 and 5. Reduced river flow would also affect bonytail and their created habitat in High Levee Pond in the same manner as described for razorbacks.

**C. Non-Flow-Related Covered Activities**

*Effects of PVID and BWD Non-Flow-Related Covered Activities*

Non-flow-related activities associated with the daily routine operation of PVID and BWD existing water diversion and conveyance facilities include: 1) removing silt deposits, chaining, and repairing eroded sections along 313 miles of canals; and 2) periodic chaining or dredging of 172 miles of drains to maintain flow capacity. PVID's and BWD's non-flow-related covered activities will result in loss and/or degradation of submerged aquatic and/or emergent aquatic vegetation, which will affect Marsh Covered Species and their habitat within the footprint of these activities. Annual removal of up to 42 acres of emergent aquatic vegetation that provides habitat for Marsh Covered Species will be conducted in different locations. Clearing of up to 42 acres of Marsh Covered Species habitat may have temporary impacts since vegetation is expected to reestablish within two years along the cleared portions of the drains and canals.

The primary impact mechanisms for non-flow-related activities are physical and biological disturbance. Physical disturbance is the removal or displacement of vegetation, topsoil, substrate, or overburden or the placement of topsoil, substrate,
spoil, processed waste, or other material. The physical disturbance associated with non-flow-related Covered Activities that could affect Marsh Covered Species primarily could result from operation of equipment to periodically remove (e.g., dredging) marsh vegetation from drains. Physical disturbance usually results from activities with a specific footprint, where the disturbance occurs within a specifiable area and time frame. The extent of species habitat affected can generally be quantified before the occurrence of the activity. Operation of equipment to implement the non-flow-related activities described above will result in the temporary removal of existing habitat for Marsh Covered Species. In addition to direct effects on environmental conditions, activities causing physical disturbance potentially introduce contaminants into the air, soil, and water. Potential contaminants include fertilizers, pesticides, paint, and petroleum products. The introduction of contaminants generally occurs during ongoing disturbance, such as occurs with construction and maintenance activities. Activities at intervals shorter than 1 year that introduce contaminants potentially have adverse effects on survival and growth, cumulatively affecting abundance, distribution, and production of species populations.

Non-flow-related activities would result in biological disturbance - the intentional or unintentional removal or displacement of Covered Species. Biological disturbances associated with these activities could be manifested in the location where the activities are undertaken or on adjacent lands. Biological disturbance may be temporary or permanent and includes effects on behavior. For example, operation of equipment in habitat occupied by Marsh Covered Species could cause direct mortality. In addition, noise and visual disturbances associated with operation of equipment could cause Marsh Covered Species to move from the area of disturbance which may result in nest abandonment, or predation.

Effects of MWD, PVID, and IID Non-Flow-Related Covered Activities

Non-flow-related activities include periodic maintenance of pumps, valves and gates, cleaning and repair/replacement of trash racks, and repair and replacement of motors at MWD, PVID, and IID existing diversion facilities. Bankline stabilization (e.g., through placement of rip rap) may also occur. Non-flow-related activities may result in temporary displacement of individual bonytail, razorback sucker, and flannelmouth sucker (“Aquatic Covered Species”). Biological disturbances associated with these activities could be manifested in the location where the activities are undertaken or in adjacent habitat areas. Biological disturbance may be temporary or permanent and includes effects on behavior and habitat use patterns. For example, although it is unlikely, cleaning and repair/replacement of trash racks when Aquatic Covered Species are present could cause direct mortality. In addition, noise and visual disturbances...
associated with operation of equipment may alter habitat use patterns and cause them to move from the area of disturbance, which could result in higher rates of predation.

D. Hydroelectric Power Covered Activities

Hydroelectric power activities covered by this permit include only the contracting for, ordering of, and scheduling of hydroelectric power generated at the federally operated dams along the Colorado River (e.g., Hoover Dam, Davis Dam, and Parker Dam) by California hydroelectric power contract holders. Electrical power generation itself is not a Covered Activity. Electrical power generation and the take of Covered Species resulting from hydropower generation (e.g. fish mortality from passing through the generator turbines) are not covered by this permit.

Existing daily fluctuations resulting from the contracting for, ordering of, and scheduling of hydroelectric power generated at the federally operated dams along the Colorado River will continue to occur over the term of the permit.

There is a small likelihood that existing and future water-level fluctuations resulting from the contracting for, ordering of, and scheduling of hydroelectric power will strand bonytail or razorback suckers. The incised nature of much of the river channel does not allow for the shallow side channels that pose the highest risk. Gravel and sand banks and bars in the channel are surrounded by deep water and fish in the vicinity can easily access these safe areas. Use of shallow gravel banks for spawning does have a risk of desiccation of eggs, and there is some degree of risk to backwater nursery habitats. However, there are considerable areas of gravel banks and backwaters that remain submerged even under the lowest water levels, and provide suitable spawning and nursery habitats. There is a risk of fish using shallow areas that could become exposed due to water level fluctuations that translates into the potential for incidental take. Based on the analysis above, this amount of take is likely to be small.

Effective date and expiration date of permit:

This permit shall be executed in duplicate original form and shall become effective between the Department and each permittee once a duplicate original is acknowledged by that applicant (see below) and returned to the Department. Unless renewed by the Department, this permit’s authorization to take the Covered Species shall expire on April 30, 2055. In the event the Permittees apply to renew this permit, the Department shall take into consideration and give credit for all of the Conditions of Approval in this permit.
Incidental take authorization:

The Department authorizes the Permittees, their employees, contractors and agents to take Covered Species incidentally in carrying out the project, subject to the limitations described in this section and the conditions of approval identified below. This permit does not authorize any intentional take of Covered Species, take of Covered Species from activities outside the scope of the project as described above, or take of Covered Species resulting from a permit violation.

The permit authorizes the incidental take of each Covered Species that is currently listed as a threatened or endangered species pursuant to CESA, or is a candidate for such listing. For any Covered Species that is not listed or a candidate for listing under CESA at the time this permit is issued ("unlisted Covered Species"), incidental take will be authorized as of the date the species is accepted as a candidate species pursuant to Fish and Game Code section 2074.2, or is listed as threatened or endangered pursuant to Fish and Game Code section 2076.5, provided the Department confirms in writing that substantial evidence demonstrates the permit continues to meet the standards in Fish and Game Code section 2081(b) and (c), and in the California Code of Regulations, Title 14, section 783.4 for that species. In the event the Department confirms there is evidence demonstrating the standards are still being met, no amendment of the permit will be required and incidental take of the previously unlisted Covered Species is authorized by this permit. If the Department cannot confirm that permit issuance standards are still being met, Permittees will need to apply for an amendment to this permit or for a new or amended permit if it needs to obtain take authorization for the previously unlisted Covered Species. In considering such an application, the Department will accept and give due consideration to the minimization and mitigation measures in this permit, and will make reasonable efforts to review and process the application to ensure, to the extent it can consistent with CESA, that take authorization for the previously unlisted Covered Species is provided in a timely manner.

Fully protected species

Section 2081.7 Finding - Fully protected species

Section 2081.7 of the Fish and Game Code allows the Department to authorize the take of fully protected species for impacts attributable to the QSA if certain conditions are met. The QSA legislation defines QSA broadly to include “any QSA-related program that delivers water at the intake of the Metropolitan Water District of Southern California’s Colorado River Aqueduct.” (Stats. 2002, ch. 617, §1(a).) The Department
may authorize the take of fully protected species for impacts to "...the quantity and quality of water flowing in the Colorado River, the habitat sustained by those flows, and the collection of that water for delivery to authorized users." (Fish & G. Code § 2081.7(a).) Under Fish and Game Code section 2081.7, the following conditions must be met for the Department to authorize the take of fully protected species:

"...

(b) The Quantification Settlement Agreement is executed by the appropriate parties on or before October 12, 2003;

(c) The department has determined that the appropriate agreements have been executed to address environmental impacts at the Salton Sea that include enforceable commitments requiring all of the following:

(1) Imperial Irrigation District to transfer 800,000 acre-feet of conserved water, by conservation methods selected by the Imperial Irrigation District, to the Department of Water Resources on a mutually agreed upon schedule in exchange for payment of one hundred seventy-five dollars ($175) per acre-foot. The price shall be adjusted for inflation on an annual basis.

(2) Imperial Irrigation District to transfer up to 800,000 additional acre-feet of conserved water, by conservation methods selected by the Imperial Irrigation District, to the Department of Water Resources during the first 15 years of the Quantification Settlement Agreement on the schedule established for the mitigation water that was previously to be transferred to the San Diego Water Authority, or on a mutually agreed upon schedule, at no cost for the water in addition to the payment for the water from the mitigation fund described in paragraph (1) of subdivision (b) of Section 3 of Senate Bill 654 of the 2003–04 Regular Session.

(3) As a condition to acquisition of the water described in paragraph (1), the Department of Water Resources shall be responsible for any environmental impacts, including Salton Sea salinity, related to use or transfer of that water. As a condition to acquisition of the water described in paragraph (2), the Department of Water Resources shall be responsible for environmental impacts related to Salton Sea salinity that are related to the use or transfer of that water.

(4) The Metropolitan Water District of Southern California (MWD) to purchase up to 1.6 million acre-feet of the water provided in accordance with paragraphs (1) and (2) from the Department of Water Resources at a price of not less than two hundred fifty dollars ($250) per acre-foot on a mutually agreed upon schedule. The price shall be adjusted for inflation on an annual basis. The Department of Water Resources shall deposit all proceeds from the sale of
water pursuant to this paragraph, after deducting costs and reasonable administrative expenses, into the Salton Sea Restoration Fund.

(5) The Metropolitan Water District of Southern California to pay not less than twenty dollars ($20) per acre-foot for all special surplus water received by MWD as a result of reinstatement of access to that water under the Interim Surplus Guidelines by the United States Department of Interior subtracting any water delivered to Arizona as a result of a shortage. The money shall be paid into the Salton Sea Restoration Fund. The price shall be adjusted for inflation on an annual basis. Metropolitan Water District of Southern California shall receive a credit against future mitigation obligations under the Lower Colorado River Multi-Species Conservation Plan for any funds provided under this paragraph to the extent that those funds are spent on projects that contribute to the conservation or mitigation for species identified in the Lower Colorado River Multi-Species Conservation Plan and that are consistent with the preferred alternative for Salton Sea restoration.

(6) Coachella Valley Water District, Imperial Irrigation District, and San Diego County Water Authority to pay a total of thirty million dollars ($30,000,000) to the Salton Sea Restoration Fund as provided in paragraph (2) of subdivision (b) of Section 3 of Senate Bill 654 of the 2003-04 Regular Session.

(d) All of the following conditions are met:

(1) The requirements of subdivision (b) and (c) of Section 2081 are satisfied as to the species for which take is authorized.

(2) The take authorization provides for the development and implementation, in cooperation with federal and state agencies, of an adaptive management process for monitoring the effectiveness of, and adjusting as necessary, the measures to minimize and fully mitigate the impacts of the authorized take. The adjusted measures are subject to Section 2052.1.

(3) The take authorization provides for the development and implementation in cooperation with state and federal agencies of an adaptive management process that substantially contributes to the long-term conservation of the species for which take is authorized."

(Fish & G. Code § 2081.7)

Pursuant to the above-referenced criteria governing the issuance of an incidental take permit which authorizes the take of a fully protected species, the Department hereby makes the findings set forth below for the LCR MSCP Project:

1. The QSA was executed by October 12, 2003.
2. The following appropriate agreements have been entered into that satisfy the
requirements of 2081.7(c):

- Agreement between the Imperial Irrigation District and the Department of Water Resources for the Transfer of Colorado River Water (dated October 10, 2003)
- Agreement between the Metropolitan Water District of Southern California and the Department of Water Resources for the Transfer of Colorado River Water (dated October 10, 2003)
- Agreement between the Metropolitan Water District of Southern California and the California Department of Fish and Game for the Payment by Metropolitan of Twenty Dollars per Acre-Foot of Special Surplus Colorado River Water Received by Metropolitan (dated October 10, 2003)
- Agreement among the California Department of Fish and Game, the Coachella Valley Water District, the Imperial Irrigation District, and the San Diego County Water Authority for Creation and Funding of a Quantification Settlement Agreement Joint Powers Authority Agreement (dated October 10, 2003)

3. The requirements of subdivision (b) and (c) of section 2081 have been met.

4. The take authorization provides for the development and implementation, in cooperation with federal and state agencies, of an adaptive management process for monitoring the effectiveness of, and adjusting as necessary, the measures to minimize and fully mitigate the impacts of the authorized take. (See Conditions of Approval 3(c)(iii) and 3(d)(iii) and 3(e)(iii)).

5. The take authorization provides for the development and implementation in cooperation with the state and federal agencies of an adaptive management process that substantially contributes to the long-term conservation of the species for which take is authorized. (See Condition of Approval 4).

Conditions of Approval:

The Department's issuance of this permit and Permittees' authorization to take the Covered Species are subject to Permittees' compliance with and implementation of the following conditions of approval.

1) Permittees shall comply with all applicable state, federal, and local laws in existence on the effective date of this permit or adopted thereafter.

2) Permittees shall fully implement and adhere to conditions of this permit within the time frames set forth in Attachment 1, the Mitigation Monitoring and Reporting Program (MMRP).
3) Permittees shall fully implement and adhere to the following conditions:

a) **General Provisions:**

i) Permittees shall provide Department representatives with reasonable access to the Project site and mitigation lands under its control, and shall otherwise fully cooperate with Department efforts to verify compliance with or effectiveness of mitigation measures.

ii) Notwithstanding any expiration date on this permit's take authorization, Permittees' obligations under this permit do not end until the Department accepts the Final Mitigation Report as complete.

iii) Permittees shall cause the LCR MSCP Program Manager to consult with the Department on the implementation of the mitigation measures provided as Conditions of Approval in this Permit. For mitigation measures in the LCR MSCP that are identical to the Conditions of Approval in this permit, the Permittees shall cause Reclamation to implement those measures to ensure compliance with this permit. To the extent that mitigation measures in this permit differ from those contained in the LCR MSCP documents, Permittees remain responsible for implementation of those Conditions of Approval.

iv) For terms and conditions of this permit that are implemented outside of California, Permittees shall cause Reclamation to coordinate the development of the Replacement Habitat Restoration and Management Plans and the Monitoring, Research, and Adaptive Management Plans. Input from the Department will be sought in conjunction with the Service and the other state resource agencies on the implementation and management activities associated with the conservation and restoration sites.

v) The Permittees shall consult with the Department, and receive the Department's concurrence on the implementation of LCR MSCP activities conducted in California and provided as Conditions of Approval in this Permit. The Permittees shall also receive the Department's concurrence regarding implementation of any Conditions of Approval in this permit that are not included in the LCR MSCP. For habitat creation activities within California, Permittees shall cause Reclamation to prepare the Replacement Habitat Restoration and Management Plans (Conditions of Approval 3(c)(ii), 3(d)(ii), and 3(e)(ii)) and the Monitoring, Research, and Adaptive Management Plans (Conditions of Approval 3(c)(iii), 3(d)(iii), and 3(e)(iii)), consistent with the terms of the LCR MSCP and this permit, and
those plans shall be submitted to the Department for review and approval. Although Reclamation is not a signatory to this permit, it is the desire of the Permittees and the Department that the implementation of all LCR MSCP activities within California by Reclamation shall be accomplished in a manner that will satisfy Conditions of Approval of this permit. To that end, the Permittees and the Department shall employ their best efforts to consult and coordinate with Reclamation and the Service at all stages of development and implementation of LCR MSCP activities conducted in California to ensure to the extent possible that measures in furtherance of the LCR MSCP are also in compliance with similar Conditions of Approval of this permit. Such consultation and coordination includes participation by the Permittees and the Department on the LCR MSCP Steering Committee established by agreement among the LCR MSCP participants. Permittees shall also cause to be submitted information to the Department regarding proposed habitat acquisitions within California. The Department shall review and respond to the submitted plans, or to a proposed acquisition of mitigation habitat, within 60 days of receipt. If the Department does not approve of a proposed activity or plan, the Regional Manager shall consult with Permittees and/or Reclamation about the reasons for that disapproval. The Department’s approval shall not be unreasonably withheld, and the basis for any disapproval will be limited to situations where the Department has a reasonable basis to conclude that the proposed activity or plan will not meet the standards required under Fish and Game Code section 2081(b) and (c). If the Department fails to respond to the submittal of a proposed plan or a proposed activity within 60 days, that plan or activity shall be deemed approved.

vi) Habitat established within California as mitigation required under this permit shall be protected in perpetuity.

b) Notification and Reporting:

i) Within 90 days of issuance of the permit, Permittees shall designate a representative responsible for communications with the Department and for overseeing compliance with this permit. The Department shall be notified in writing of the representative’s name, business address, and telephone number, and shall be notified in writing if a substitute representative is designated.

ii) Permittees shall immediately notify the Department in writing if it determines
that it is not in compliance with any condition of approval of this permit, including but not limited to any actual or anticipated failure to implement mitigation measures within the time periods indicated in this permit and/or Attachment 1, the MMRP.

iii) Beginning with issuance of the permit and continuing for the life of the Project, Permittees shall provide the Department an annual Status Report. The due date shall be agreed upon by Permittees and the Department. The Annual Status Report shall include, at a minimum: 1) a general description of the status of the Project, and effects on Covered Species; 2) a copy of the table in the MMRP with notes showing the current implementation status of each mitigation measure; 3) a description of the habitat creation, restoration and monitoring actions conducted over the last year; 4) a summary of the monitoring and research activities undertaken during the previous year; 5) results and analyses of the monitoring and research data; 6) an assessment of the effectiveness of each completed or partially completed mitigation measure in minimizing and compensating for Project impacts; 7) a summary of the marsh acres impacted by non-flow related activities; and 8) other applicable information.

iv) No later than 180 days after completion of the Project, including completion of all mitigation measures, Permittees shall provide the Department with a Final Mitigation Report. The Final Mitigation Report shall be prepared by a knowledgeable, experienced biologist and shall include, at a minimum: 1) a copy of the table in the MMRP with notes showing when each of the mitigation measures was implemented; 2) all available information about Project-related incidental take of species covered in the Permit; 3) information about other Project impacts on the species covered in the Permit; 4) an assessment of the effectiveness of the Permit’s conditions of approval in minimizing and compensating for Project impacts; 5) recommendations on how mitigation measures might be changed to more effectively minimize and mitigate the impacts of future projects on the species; and 6) any other pertinent information, including the level of take associated with the Project.

v) Permittees shall notify the Department within three working days if a Covered Species is found dead or injured and the death or injury is reasonably attributable to a Covered Activity. A written notification will be made within five calendar days and will include the date, time, and location of the discovered animal/carcass, the expected cause of injury or death and any other pertinent information. Injured animals will be transported to a veterinarian or certified wildlife care facility and the Department informed of Incidental Take Permit No. 2081-2005-008-06
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the final disposition of any surviving animal(s). All dead specimen(s)/carcass(es) shall be submitted to an appropriate federal or state wildlife agency or to educational/research institutions possessing the appropriate state and federal permits. If deposition to a wildlife agency or an institution is not practicable, the carcass will be marked, photographed, and left in the field.

c) Riparian Covered Species (southwestern willow flycatcher, western red bat, western yellow bat, yellow-billed cuckoo, elf owl, gilded flicker, Gila woodpecker, vermilion flycatcher, Arizona Bell’s vireo, Sonoran yellow warbler, and summer tanager)

i) Pursuant to the terms and conditions of the LCR MSCP, Permittees shall cause to be created/restored, managed, and maintained 7,260 acres of new replacement Riparian Covered Species breeding habitat (the “Riparian Replacement Habitat”) consisting of 5,940 acres of cottonwood/willow land cover in LCR MSCP reaches 1-7 and 1,320 acres of honey mesquite land cover in LCR MSCP reaches 1-7. The Riparian Replacement Habitat shall be designed and managed to support cottonwood/willow I-IV and honey mesquite III that provides breeding habitat for the Riparian Covered Species. The Riparian Replacement Habitat shall meet the minimum requirements for achieving habitat creation objectives for each Riparian Covered Species, as specified in Table 5-3 of the LCR MSCP HCP.

ii) Permittees shall cause to be developed and implemented, in coordination with the Department, a comprehensive restoration, maintenance, monitoring, and reporting plan (“Riparian Replacement Habitat Management Plan”) for each site used to create/restore the 7,260 acres of Riparian Replacement Habitat. The Permittees shall cause the Riparian Replacement Habitat Management Plan to be submitted to the Department within one year of site selection for each site for review and approval consistent with section 3(a)(v) of the permit if the land is within California, and for review and comment consistent with section 3(a)(iv) of this permit if the land is outside of California. To ensure that high quality and fully functioning Riparian Replacement Habitat is created/restored, the following information, design, and management criteria, subject to adjustment through the monitoring, research, and adaptive management plan, shall be required as part of the Management Plan:

- Location of Riparian Replacement Habitat;
o Planting plan (including species composition and layout) of the Riparian Replacement Habitat;

o Grading and other construction activities required to create and implement the Riparian Replacement Habitat;

o Long-term management practices needed to manage the Riparian Replacement Habitat;

o Vegetation and species use monitoring of Riparian Replacement Habitat;

o Success criteria and the actions Permittees will take if the success criteria are not met;

o Riparian Replacement Habitat minimum and maximum patch size criteria;

o Riparian Replacement Habitat patches will be located close to each other or to existing tracts of riparian forest and situated in a manner that will maximize continuity with other riparian land cover types;

o Designs of the Riparian Replacement Habitats will emphasize creation of nesting habitat within 200 feet of standing or slow-moving water or moist surface soils (suitable insect-productive foraging habitats) and will include creation of suitable habitat edges that are preferred by the Covered Riparian species;

o Riparian Replacement Habitat will include provisions for supporting moist surface soils and standing or slow-moving water required by the species within their territories during the breeding season (may extend from March through September along the LCR). Maintaining these conditions will involve creation of canals and shallow swales that permanently or seasonally maintain surface water or moist surface soil conditions. Because the actual period that moist soils or ponded or slow-moving water conditions must be present to support successful reproduction is not well understood, watering of restored habitat will be managed adaptively to determine periods when water must be present to support reproduction;

o Canals and shallow swales will be created to the extent necessary to dissect blocks of restored cottonwood-willow that will be wide enough (estimated to be at least 25 feet) to create interior forest-edge conditions necessary to support Riparian Replacement Habitat, create the microrelief...
and soil moisture conditions necessary to support a diversity of understory
plant species, and supply irrigation water;

- Riparian Replacement Habitat will be designed and actively managed to
  support a vigorous plant community that will support multiple layers, seral
  stages, and age cohorts of trees;

- Mounds and depressions will be created to the extent necessary in
  Riparian Replacement Habitat to establish some topographic diversity that
  will also provide habitat diversity by increasing plant and insect prey
  species diversity; and

- Any additional habitat creation concepts described in Section 5.4.3,
  5.4.3.1, and 5.4.3.2 of the LCR MSCP HCP that the Department deems
  necessary.

iii) Permittees shall cause to be developed and implemented, in cooperation with
federal and state agencies, a comprehensive monitoring, research, and
adaptive management plan (MRA Plan) for monitoring the effectiveness of,
and adjusting as necessary, the measures to minimize and fully mitigate the
impacts of the authorized take of the Riparian Covered Species for which take
is authorized. The Permittees shall cause the MRA Plan to be submitted to
the Department within two years of permit issuance, for review and approval
consistent with section 3(a)(v) of the permit. Information collected as part of
the MRA Plan will be used to determine the types and frequency of
management actions that may be required to maintain habitat conditions
(e.g., maintenance of desired stand structure over time).

iv) Creation/restoration of the Riparian Replacement Habitat within California
shall be located on land approved by the Department consistent with section
3(a)(v) of this permit with a minimum of 2,614 acres of the 7,260 replacement
acres located within California in LCR MSCP reaches 3, 4, 5, and/or 6. The
2,614 replacement acres in California shall consist of 1,566 acres
cottonwood/willow I-IV and 1,048 acres of honey mesquite III. The Riparian
Replacement Habitat within California will be created to meet the schedule for
establishment in Section 5.10 of the LCR MSCP HCP.

v) Riparian Replacement Habitat land purchased in fee title by the LCR MSCP
within California shall be transferred to the Department, in a form approved by
the Department’s Office of General Counsel, by the end of the term of this
permit. The Department shall manage any LCR MSCP transferred lands in compliance with and for the benefit of the LCR MSCP in perpetuity.

d) Marsh Covered Species (Yuma clapper rail, California black rail, western least bittern, and Colorado River cotton rat)

i) Permittees shall cause to be created/restored, managed, and maintained 512 acres of new replacement Marsh Covered Species breeding habitat ("Marsh Replacement Habitat") along the lower Colorado River in reaches 3-7. The Marsh Replacement Habitat shall be designed and managed to support breeding habitat for the Marsh Covered Species. The Marsh Replacement Habitat shall meet the minimum requirements for achieving habitat creation objectives for each Marsh Covered Species, as specified in Table 5-3 of the LCR MSCP HCP.

ii) Permittees shall cause to be developed and implemented, in coordination with the Department, a comprehensive restoration, maintenance, monitoring, and reporting plan ("Marsh Replacement Habitat Management Plan") for each site used to create/restore the 512 acres of Marsh Replacement Habitat. The Permittees shall cause the Marsh Replacement Habitat Management Plan to be submitted to the Department within two years of site selection for each site for review and approval consistent with section 3(a)(v) of the permit for land within California, and for review and comment consistent with section 3(a)(iv) of the permit for land outside of California. To ensure that high quality and fully functioning Marsh Replacement Habitat is created/restored, the following information, design, and management criteria, subject to adjustment through the monitoring, research, and adaptive management plan, shall be required as part of the Management Plan:

o Location of Marsh Replacement Habitat;

o Planting plan (including species composition and layout) of Marsh Replacement Habitat;

o Grading and other construction activities required to create and implement the Marsh Replacement Habitat;

o Long-term management practices needed to manage the Marsh Replacement Habitat;
o Vegetation and species use monitoring of Marsh Replacement Habitat;

o Success criteria and the actions Permittees will take if the success criteria are not met;

o Marsh Replacement Habitat minimum and maximum patch size criteria;

o Created/restored Marsh Replacement Habitat patches will be located near occupied Marsh Covered Species, or situated in a manner that will maximize continuity with other marsh land cover types.

o Marshes created/restored to provide habitat for Marsh Covered Species will be designed and managed to provide an integrated mosaic of emergent aquatic vegetation types, water depths, and open water areas. Vegetation cover will be dominated by *Typha spp.* and *Scirpus spp.*, interspersed with open water and mudflats and managed to maintain its function as species habitat.

o Yuma clapper rail habitat will be provided by patches of bulrush and cattails interspersed with small patches of open water that maintain water depths appropriate for this species (no more than 12 inches).

o California black rail habitat will be directed toward restoring moist-soil marshes that support a predominance of three-square bulrush with suitable water depths (i.e. equal to or less than 1 inch deep) to replicate conditions present at Mittry Lake and Bill Williams Delta that support the species; and

o Any additional habitat creation concepts described in Section 5.4.3, and 5.4.3.3 of the LCR MSCP HCP that the Department deems necessary.

iii) Permittees shall cause to be developed and implemented, in cooperation with federal and state agencies, a comprehensive monitoring, research, and adaptive management plan (MRA Plan) for monitoring the effectiveness of, and adjusting as necessary, the measures to minimize and fully mitigate the impacts of the authorized take of the Marsh Covered Species for which take is authorized. The Permittees shall cause the MRA Plan to be submitted to the Department within two years of permit issuance for review and approval consistent with section 3(a)(v) of the permit. Information collected as part of the MRA Plan will be used to determine the types and frequency of management actions that may be required to maintain habitat conditions.
(e.g., maintenance of desired marsh structure over time).

iv) Creation/restoration of the Marsh Replacement Habitat within California shall be located in areas approved by the Department consistent with section 3(a)(v) of this permit with a minimum of 240 acres of the 512 replacement acres located within California in reaches 3, 4, 5, and/or 6. Of the 240 acres in California, 170 acres shall be designed and managed to provide habitat for the Yuma clapper rail and western least bittern, and 70 acres shall be designed and managed to provide habitat for the California black rail. The 240 acres shall also support at least 58 acres of Colorado River cotton rat habitat. The Marsh Replacement Habitat within California will be created to meet the schedule for establishment in Section 5.10 of the LCR MSCP HCP.

v) Marsh Replacement Habitat purchased in fee title by the LCR MSCP within California shall be transferred to the Department in a form approved by the Department's Office of General Counsel, by the end of the term of this permit. The Department shall manage any LCR MSCP transferred lands in compliance with and for the benefit of the LCR MSCP.

vi) PVID and BWD shall submit to the Department a map of the drains and canals that are routinely maintained as described in the section of this permit entitled "Non-Flow-Related Covered Activities." During the breeding season for Marsh Covered Species, PVID and BWD shall not perform maintenance of drains and canals in which submerged aquatic or emergent aquatic vegetation is present. However, PVID and BWD may, under emergency conditions, undertake the work reasonably necessary to prevent personal injury or property damage such as field flooding due to breaks in drains, bank sloughing, and clogged siphons.

vii) PVID and BWD will keep an annual running total of Marsh Covered Species habitat removed that will count towards the allowable removal acreage, and this information will be available upon Department request. PVID and BWD shall submit an annual status report to the Department by December 31st of each year. The annual status report must include the locations of drains and canals that have been maintained during the year, and acreage of habitat removed during the current year.
e) Aquatic Covered Species (razorback sucker, bonytail chub, and flannelmouth sucker):

i) Permittees shall cause to be created/restored, managed, and maintained 360 acres of new replacement Aquatic Covered Species breeding habitat ("Backwater Replacement Habitat") along the lower Colorado River in reaches 1-6. The Backwater Replacement Habitat shall be designed and managed to support breeding habitat for the Aquatic Covered Species. The Backwater Replacement Habitat shall meet the minimum requirements for achieving habitat creation objectives for each Aquatic Covered Species, as specified in Table 5-3 of the LCR MSCP HCP.

ii) Permittees shall cause to be developed and implemented, in coordination with the Department, a comprehensive restoration, maintenance, monitoring, and reporting plan ("Backwater Replacement Habitat Management Plan") for each site used to create/restore the 360 acres of Backwater Replacement Habitat. The Permittees shall cause the Backwater Replacement Habitat Management Plan to be submitted to the Department within one year of site selection for each site for review and approval consistent with section 3(a)(v) of the permit for land within California, and for review and comment consistent with section 3(a)(iv) of the permit for land outside of California. To ensure that high quality and fully functioning Backwater Replacement Habitat is created/restored, the following information, design, and management criteria, subject to adjustment through the monitoring, research, and adaptive management plan, shall be required as part of the Management Plan:

- Location of Backwater Replacement Habitat;
- Design and planting plan (including species composition and layout) of the Backwater Replacement Habitat;
- Dredging, grading, and other construction activities required to create and implement the Backwater Replacement Habitat;
- Long-term management practices needed to manage and maintain the Backwater Replacement Habitat;
- Vegetation and species use monitoring of Backwater Replacement Habitat;
Success criteria and the actions Permittees will take if the success criteria are not met;

Created/restored backwaters will meet a rating of good for fish, using the rating system developed by Holden et al. in 1986. This rating system provides a way to rank the quality of backwater habitat for fish and wildlife, based on several parameters, including water quality;

Backwater Replacement Habitat will be designed with water depth, vegetation, and substrate characteristics that provide the constituent elements of Aquatic Covered Species habitat and, to the extent possible, provide surface and groundwater hydrology in support of existing or created/restored habitat for the riparian and marsh covered species;

Connected backwaters will be designed to provide the environmental conditions necessary to support adult or subadult razorback sucker, and bonytail;

Created/restored Backwater Replacement Habitat will be combined with creation/restoration of Riparian and Marsh Replacement Habitats to provide a mosaic of land cover types;

Backwater Replacement Habitat will be designed to provide for the establishment of bulrush and cattails along the edges;

Backwaters, integral to flycatcher breeding habitat, will be designed and managed to maintain standing water and moist soils during the southwestern willow flycatcher breeding season; and

Any additional habitat creation concepts described in Section 5.4.3, and 5.4.3.4 of the LCR MSCP HCP that the Department deems necessary.

Permittees shall cause to be developed and implemented, in cooperation with federal and state agencies, a comprehensive monitoring, research, and adaptive management plan (MRA Plan) for monitoring the effectiveness of, and adjusting as necessary, the measures to minimize and fully mitigate the impacts of the authorized take of the Aquatic Covered Species for which take is authorized. The Permittees shall cause the MRA Plan to be submitted to the Department within one year of permit issuance for review and approval consistent with section 3(a)(v) of the permit. Information collected as part of the MRA Plan will be used to determine the types and frequency of
management actions that may be required to maintain habitat conditions (e.g., maintenance of desired backwater conditions over time).

iv) Creation/Restoration of the Backwater Replacement Habitat within California shall be located in areas approved by the Department consistent with section 3(a)(v) of the permit with a minimum of 194 acres of the 360 replacement acres located within California in reaches 3, 4, 5, and/or 6. Backwater Replacement Habitat within California will be created to meet the schedule for establishment in Section 5.10 of the LCR MSCP HCP.

v) Backwater Replacement Habitat purchased in fee title by the LCR MSCP within California shall be transferred to the Department in a form approved by the Department's Office of General Counsel, by the end of the term of this permit. The Department shall manage any LCR MSCP transferred lands in compliance with and for the benefit of the LCR MSCP.

vi) Permittees shall cause the stocking of 660,000 razorback suckers (at least 12 inches in length) and 620,000 bonytail (at least 12 inches in length) in the LCR. At least 270,000 razorback suckers and 200,000 bonytail shall be stocked in reaches 4 and 5. Permittees shall cause to be developed and implemented, in cooperation with the Department, a “Fish Augmentation Plan” that sets forth stocking rates and locations, research and monitoring activities, conditions and criteria under which fish augmentation may cease, and alternative measures to minimize and fully mitigate for the authorized incidental take in the event that fish augmentation measures cease. The Permittees shall cause the Fish Augmentation Plan to be submitted to the Department for review and approval consistent with section 3(a)(v) of the permit. Stocking of razorback suckers and bonytail may cease and other mitigation measures implemented if, through monitoring and research results, the Department determines consistent with section 3(a)(v) that: 1) stocking efforts have resulted in adequate numbers of adults to provide genetic refuge or to create a self-sustaining population; 2) conservation actions other than stocking would be more effective in contributing to the recovery of the species; 3) conditions are not conducive to the survival of stocked fish; 4) biological or other factors warrant cessation of stocking; or 5) other conditions and criteria as set forth in the Fish Augmentation Plan are met. In accordance with the Fish Augmentation Plan, funds not expended for the fish augmentation program would be directed toward other mitigation measures that would fully mitigate for authorized incidental take. Alternative mitigation measures, to be implemented within one year of cessation of stocking, will include, at a minimum, the following:
• Stock fewer, but larger fish. This approach would be appropriate, for example, if monitoring indicates that stocking larger fish would substantially increase survivorship.

• Establish fish in additional created isolated backwaters that could be maintained free of non-native predators/competitors. This approach may be appropriate if survivorship of stocked fish is substantially impaired by non-native predator/competitors or the quality of mainstem river habitat conditions.

• If augmentations are not succeeding, fund additional directed research to identify causative factors and develop and implement appropriate measures that could be implemented to improve the success of species conservation efforts. This approach would be appropriate if the causative factors are not identified through the augmentation-related monitoring program.

4) Subject to the availability of funds as described in Section 2081.7(d)(3) of the Fish and Game Code, the Department, in cooperation with state and federal agencies, shall develop and implement an adaptive management process that substantially contributes to the long-term conservation of the species for which take is authorized. Additional procedures and measures may be necessary to meet this standard. Subject to the appropriation of funds, preparation of this additional adaptive management program and implementation of the program is the responsibility of the Department, but does not modify Permittees’ responsibilities under sections 3(c)(iii), 3(d)(ii), and 3(e)(iii) above to develop and implement an adaptive management process.

5) Permittees shall provide an endowment and enhancement fee of $295.00 per acre (in 2005 dollars) to the Department for each acre of habitat that is transferred to the Department in fee title at the time of such title transfer, and for Department lands dedicated to the LCR MSCP. Interest from this amount shall be available for the operation, management and protection of the lands transferred to or owned by the Department, and may be spent on reasonable administrative overhead, biological monitoring, improvements to carrying capacity, law enforcement measures, and any other action designed to protect or improve the habitat values of the lands. The endowment principal shall not be drawn upon unless such withdrawal is deemed necessary by the Department to ensure the continued viability of the species on the lands. Monies received by the Department pursuant to this provision shall be deposited in a special deposit account established pursuant to Government Code §16370. The Department may pool the endowment with other endowments for the operation, management and protection of lands for local populations of the Covered
Species. The Department shall manage any LCR MSCP land transferred to the Department in fee, and for Department lands dedicated to the LCR MSCP, in compliance with and for the benefit of the LCR MSCP and consistent with the Department's mission statement.

6) The Department recently purchased approximately 1,300 acres known as the Travis Ranch within the plan area, which will be available for purposes of habitat creation and protection in conjunction with the LCR MSCP and the Department's mission. The Permittees shall commit to directing a portion of the LCR MSCP funding for restoring, creating, and managing Covered Species habitat on Department lands dedicated to the MSCP. Restoration efforts on Department lands shall require Department approval and shall be initiated within 5 years of issuance of this Permit. Creation of up to 1300 acres of Covered Species habitat on Department lands shall be accomplished in accordance with this permit and will count toward the requirements for creation of Replacement Habitat(s) as specified in this Permit.

7) For any land that is transferred to the Department under the terms of this permit, Permittees shall:

   a) Transfer fee title to the lands to the Department under terms approved by the Department's Office of the General Counsel.

   b) Provide a recent preliminary title report, initial hazardous materials survey report, and other necessary documents (see Attachment 2). All documents conveying the lands and all conditions of title are subject to the approval of the Department, the Department of General Services and, if applicable, the Fish and Game Commission.

   c) Reimburse the Department for reasonable expenses incurred during title and documentation review, expenses incurred from other state agency reviews and overhead related to transfer of lands to the Department. The Department estimates that this Project will create an additional cost to the Department of no more than $3,000 for every fee title deed or easement processed.

8) This permit may be amended as required by law if the Department determines that continued implementation of the Project under existing permit conditions would jeopardize the continued existence of a Covered Species or if the Department determines, after consultation with Permittees, that changed biological conditions necessitate a permit amendment to ensure that impacts to the Covered Species are minimized and fully mitigated.
9) The Department may suspend this permit as to any Permittee if such Permittee is not in compliance with the conditions of this permit and/or any funding agreement entered into to provide funds to implement the Conditions of Approval in this permit or to prevent the illegal take of an endangered, threatened, or candidate species through a Covered Activity. Notwithstanding the foregoing, the Department shall not suspend this permit without first: (1) notifying the affected Permittee in writing that this permit may be subject to suspension including a statement of the deficiencies that must be corrected by the Permittee, and (2) providing the affected Permittee an opportunity to correct the deficiencies. Notwithstanding the above, if the Department determines that the continued implementation of the Project under existing permit conditions would jeopardize the continued existence of Covered Species, or if required by statutory enactments subsequent to the issuance of the permit, the Department may suspend the permit as to that action immediately.

A suspension of the permit shall be limited to a specific action, covered species, or portion of the plan area. In the event of a partial suspension, the portion of this permit not subject to the suspension shall remain in full force and effect. Procedures applicable to any suspension shall be in accordance with the suspension process pursuant to California Code of Regulations, title 14, section 783.7.

Any action to revoke any privileges under this permit shall be limited so as to address the discrete action or inaction, or statutory enactment that has resulted in the revocation, to the extent consistent with the species protection purposes of the permit. A revocation may be applicable to only one of the Permittees. In the event of a partial revocation, the portion of this permit not subject to the revocation shall remain in full force and effect. When the Department believes there are valid grounds for suspending or revoking a permit, the Permittee shall be notified in writing of the proposed suspension or revocation. In no case shall a proposed revocation notice be issued prior to 60 days from the notice to prevent or remedy a violation.

10) In the event that any Permittee shall permanently discontinue a Covered Activity, the Permittee shall return this permit to the Department with a written statement surrendering this permit for cancellation. This permit shall be deemed cancelled only upon a determination by the Department that sufficient compliance to the conditions of the permit have been made to mitigate for take of Covered Species that occurred pursuant to the terms of this permit before its surrender. Upon surrender of this permit, no further take of the Covered Species associated with Covered Activities by the Permittee shall be authorized.
11) The total cost of the LCR MSCP over its 50-year term is six hundred twenty-six million dollars ($626,000,000). Permittees have entered into a Funding and Management Agreement dated April 2005 with other participating state and federal LCR MSCP agencies. Under that agreement, the federal government has agreed to pay 50% of the total program cost. The Permittees have agreed to pay 50% of the non-federal program cost. Each year during the term of the LCR MSCP, the Permittees shall provide funding for their share of the total cost of the LCR MSCP as specified in the California Cost Share Agreement dated April 2005. Such annual funding will be provided no later than the beginning of the fiscal year, or such later date as provided by the LCR MSCP budget or work plan.

Compliance with Other Laws

This permit contains the Department’s requirements for the project pursuant to CESA. This permit does not necessarily create an entitlement to proceed with the project. The Permittees are responsible for complying with all other applicable state, federal, and local laws.

Notices

Written notices, reports and other communications relating to this permit shall be delivered to the Department by first class mail at the following addresses, or at addresses the Department may subsequently provide the Permittees:

Original to: Regional Manager
Department of Fish and Game
4665 Lampson Ave., Suite J
Los Alamitos, CA 90720

Copy to: Department of Fish and Game
Eastern Sierra and Inland Deserts Region
P.O. Box 2160
Blythe, CA 92226

General Counsel
Department of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814
And: Habitat Conservation Planning Branch
Department of Fish and Game
1416 Ninth Street, Suite 1260
Sacramento, CA 95814

Attachments:

ATTACHMENT 1 Mitigation Monitoring and Reporting Program

ATTACHMENT 2 Habitat Management Lands Acquisition Checklist;
PLFAF form

ISSUED BY THE CALIFORNIA DEPARTMENT OF FISH AND GAME
on April 4, 2005.

L. RYAN BRODDRICK, Director

Approval as to form:

Michael R. Valentine
General Counsel

Incidental Take Permit
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ACKNOWLEDGMENT

The undersigned applicant acknowledges receipt of this permit and, by signing, accepts and agrees to comply with all terms and conditions of the permit.

By: ___________________________ Date: 
Name: 
Title: 

By: ___________________________ Date: 
Name: 
Title: 

By: ___________________________ Date: 
Name: 
Title: 

By: ___________________________ Date: 
Name: 
Title: 

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ACKNOWLEDGMENT

The undersigned applicant acknowledges receipt of this permit and, by signing, accepts and agrees to comply with all terms and conditions of the permit.

BARD WATER DISTRICT

By: Ron Derma
   General Manager

Date: 4/12/05

Address for Notices:
Ron Derma
Bard Water District
1473 Ross Road
Winterhaven, CA 92283-9715
Fax: (760) 572-0183

[Signatures continued on next page]
ACKNOWLEDGMENT

The undersigned applicant acknowledges receipt of this permit and, by signing, accepts and agrees to comply with all terms and conditions of the permit.

CITY OF NEEDLES

By: [Signature]
Richard D. Rowe
City Manager

Date: 4/12/05

Address for Notices:
Richard D. Rowe
City of Needles
817 Third Street
Needles, CA 92363-2933
Fax: (760) 326-6765

[Signatures continued on next page]
ACKNOWLEDGMENT

The undersigned applicant acknowledges receipt of this permit and, by signing, accepts and agrees to comply with all terms and conditions of the permit.

COACHELLA VALLEY WATER DISTRICT

By:  
Steven B. Robbins  
General Manager—Chief Engineer

Date: 4/16/05

Address for Notices:  
Steven B. Robbins  
Coachella Valley Water District  
Post Office Box 1058  
Coachella, CA 92236  
Fax: (760) 398-3711

[Signatures continued on next page]
ACKNOWLEDGMENT

The undersigned applicant acknowledges receipt of this permit and, by signing, accepts and agrees to comply with all terms and conditions of the permit.

COLORADO RIVER BOARD OF CALIFORNIA

By: [Signature]
Gerald Zimmerman
Executive Director

Date: 4/13/2005

Address for Notices:
Gerald R. Zimmerman
Colorado River Board of California
770 Fairmont Avenue, Suite 100
Glendale, CA 91203-1035
Fax: (818) 543-4685

[Signatures continued on next page]
ACKNOWLEDGMENT

The undersigned applicant acknowledges receipt of this permit and, by signing, accepts and agrees to comply with all terms and conditions of the permit.

IMPERIAL IRRIGATION DISTRICT

By: [Signature]
Jesse P. Silva
General Manager

Date: 4-13-05

Address for Notices:
Jesse P. Silva
Imperial Irrigation District
Post Office Box 937
Imperial, CA 92251
Fax: (760) 482-9611

[Signatures continued on next page]
ACKNOWLEDGMENT

The undersigned applicant acknowledges receipt of this permit and, by signing, accepts and agrees to comply with all terms and conditions of the permit.

THE METROPOLITAN WATER DISTRICT
OF SOUTHERN CALIFORNIA

By: Laura Simonek
Manager, Environmental Planning Team

Date: April 8, 2005

Address for Notices:
Laura Simonek
Environmental Planning Team
The Metropolitan Water District of Southern California
700 North Alameda Street
Los Angeles, CA 90012
Fax: (213) 217-5620

[Signatures continued on next page]
ACKNOWLEDGMENT

The undersigned applicant acknowledges receipt of this permit and, by signing, accepts and agrees to comply with all terms and conditions of the permit.

PALO VERDE IRRIGATION DISTRICT

By: [Signature]
Edward W. Smith
General Manager

Date: 4/12/05

Address for Notices:
Edward W. Smith
Palo Verde Irrigation District
180 West Fourteenth Avenue
Blythe, CA 92225
Fax: (760) 922-8294

[Signatures continued on next page]
ACKNOWLEDGMENT

The undersigned applicant acknowledges receipt of this permit and, by signing, accepts and agrees to comply with all terms and conditions of the permit.

SAN DIEGO COUNTY WATER AUTHORITY

By:  
Laurence Purcell  
Water Resources Manager

Date:  April 11, 2005

Address for Notices:
Laurence Purcell  
San Diego County Water Authority  
4677 Overland Avenue  
San Diego, CA 92123  
Fax: (858) 268-7881

[Signatures continued on next page]
ACKNOWLEDGMENT

The undersigned applicant acknowledges receipt of this permit and, by signing, accepts and agrees to comply with all terms and conditions of the permit.

SOUTHERN CALIFORNIA EDISON COMPANY

By: ____________________________
John R. Fielder
Senior Vice President, Regulatory Policy & Affairs

Date: ___________ 4/19/05 ___________

Address for Notices:
Nino J. Mascolo
Southern California Edison Company
2244 Walnut Grove Avenue
Rosemead, CA 91770
Fax: (626) 302-1926

[Signatures continued on next page]
ACKNOWLEDGMENT

The undersigned applicant acknowledges receipt of this permit and, by signing, accepts and agrees to comply with all terms and conditions of the permit.

SOUTHERN CALIFORNIA PUBLIC POWER AUTHORITY

By:  
William D. Carnahan  
Executive Director

Date: __________________________

Address for Notices:
William D. Carnahan  
Southern California Public Power Authority  
225 S. Lake Avenue, Suite 1250  
Pasadena, CA 91101  
Fax: (626) 793-9461
ACKNOWLEDGMENT

The undersigned applicant acknowledges receipt of this permit and, by signing, accepts and agrees to comply with all terms and conditions of the permit.

DEPARTMENT OF WATER AND POWER OF THE CITY OF LOS ANGELES

By: Ronald F. Deaton
    General Manager

Date: July 5, 2005

Address for Notices:
    Mohammed Beshir
    City of Los Angeles Department of Water and Power
    111 North Hope Street, Room 1044
    Los Angeles, CA 90012
    Phone: (213) 367-0237
ATTACHMENT 1

DEPARTMENT OF FISH AND GAME
MITIGATION MONITORING AND REPORTING PROGRAM (MMRP)

CALIFORNIA INCIDENTAL TAKE PERMIT NO. 2081-2005-008-06
PERMITTEE: CALIFORNIA WATER AND POWER AGENCIES
PROJECT: LOWER COLORADO RIVER MULTI-SPECIES CONSERVATION PROGRAM

PURPOSE OF THE MMRP

The purpose of the MMRP is to ensure that the impact minimization and mitigation measures required by the Department of Fish and Game (Department) for the above-referenced project are properly implemented, and thereby to ensure compliance with section 2081(b) of the Fish and Game Code and section 21081.6 of the Public Resources Code. A table summarizing the mitigation measures required by the Department is attached. This table is a tool for use in monitoring and reporting on implementation of mitigation measures, but the descriptions in the table do not supersede the mitigation measures set forth in the California Incidental Take Permit (Permit) and in attachments to the Permit, and the omission of a permit requirement from the attached table does not relieve the Permittee of the obligation to ensure the requirement is performed.

OBLIGATIONS OF PERMITTEE

Mitigation measures must be implemented within the time periods indicated in the table that appears below. Permittee has the primary responsibility for monitoring compliance with all mitigation measures and for reporting to the Department on the progress in implementing those measures. These monitoring and reporting requirements are set forth in the Permit itself and are summarized at the front of the attached table.

VERIFICATION OF COMPLIANCE, EFFECTIVENESS

The Department may, at its sole discretion, verify compliance with any mitigation measure or independently assess the effectiveness of any mitigation measure.
TABLE OF MITIGATION MEASURES

The following items are identified for each mitigation measure: Mitigation Measure, Source, Implementation Schedule, Responsible Party, and Status/Date/Initials. The "Mitigation Measure" column summarizes the mitigation requirements of the Permit. The "Source" column identifies the Permit document that sets forth the mitigation measure. The "Implementation Schedule" column shows the date or phase when each mitigation measure will be implemented. The "Responsible Party" column identifies the person or agency that is primarily responsible for implementing the mitigation measure. The "Status/Date/Initials" column shall be completed by the Permittee during preparation of each Status Report and the Final Mitigation Report, and must identify the implementation status of each mitigation measure, the date that status was determined, and the initials of the person determining the status.
<table>
<thead>
<tr>
<th>Mitigation Measure</th>
<th>Source</th>
<th>Implementation Schedule</th>
<th>Responsible Party</th>
<th>Status / Date / Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permittees shall comply with all applicable state, federal, and local laws in existence on the effective date of this permit or adopted thereafter.</td>
<td>Permit</td>
<td>Entire project</td>
<td>Permittees</td>
<td></td>
</tr>
<tr>
<td>The Department may, at its sole discretion, verify compliance with any mitigation measure or independently assess the effectiveness of any mitigation measure.</td>
<td>MMRF</td>
<td>Entire project</td>
<td>Department of Fish and Game</td>
<td></td>
</tr>
<tr>
<td>Permittees shall fully cooperate with the Department in its efforts to verify compliance with or effectiveness of mitigation measures.</td>
<td>MMRF</td>
<td>Entire project</td>
<td>Permittees</td>
<td></td>
</tr>
<tr>
<td>Permittees shall immediately notify the Department in writing if they determine that they are not in compliance with any condition of approval of the permit, including but not limited to any actual or anticipated failure to implement mitigation measures within the time periods indicated in the permit and/or this MMRP.</td>
<td>Permit</td>
<td>Entire project</td>
<td>Permittees</td>
<td></td>
</tr>
<tr>
<td>The Department accepts the Final Mitigation Report as complete.</td>
<td>Permit</td>
<td>Post-project</td>
<td>Department of Fish and Game</td>
<td></td>
</tr>
<tr>
<td>Permittees shall cause the LCR MSCP Program Manager to consult with the Department on the implementation of the mitigation measures provided as Conditions of Approval in the Permit. For mitigation measures in the LCR MSCP that are identical to the Conditions of Approval in the permit, the Permittees shall cause Reclamation to implement those measures to ensure compliance with the permit. To the extent that mitigation measures in the permit differ from those contained in the LCR MSCP documents, Permittees remain responsible for implementation of those Conditions of Approval.</td>
<td>Permit</td>
<td>Entire project</td>
<td>Permittees</td>
<td></td>
</tr>
<tr>
<td>For terms and conditions of the permit that are implemented outside of California, Permittees shall cause Reclamation to coordinate the development of the Replacement Habitat Restoration and Management Plans and the Monitoring, Research, and Adaptive Management Plans. Input from the Department will be sought in conjunction with the Service and the other state resource agencies on the implementation and management activities associated with the conservation and restoration sites.</td>
<td>Permit</td>
<td>Entire project</td>
<td>Permittees</td>
<td></td>
</tr>
</tbody>
</table>
The Permittees shall consult with the Department, and receive the Department’s concurrence on the implementation of LCR MSCP habitat creation activities conducted in California and provided as Conditions of Approval in the Permit. The Permittees shall also receive the Department’s concurrence for any Conditions of Approval in the permit that are not included in the LCR MSCP. For habitat creation activities within California, Permittees shall cause Reclamation to prepare the Replacement Habitat Restoration and Management Plans (Conditions of Approval 3(c)(ii), 3(d)(ii), and 3(e)(iii)) and the Monitoring, Research, and Adaptive Management Plans (Conditions of Approval 3(c)(iii), 3(d)(iii), and 3(e)(iii)), consistent with the terms of the LCR MSCP and the permit, and those plans shall be submitted to the Department for review and approval. Although Reclamation is not a signatory to this permit, it is the desire of the Permittees and the Department that the implementation of all LCR MSCP activities within California by Reclamation shall be accomplished in a manner that will satisfy Conditions of Approval of this permit. To that end, the Permittees and the Department shall employ their best efforts to consult and coordinate with Reclamation and the Service at all stages of development and implementation of LCR MSCP activities conducted in California to ensure to the extent possible that measures in furtherance of the LCR MSCP are also in compliance with similar Conditions of Approval of this permit. Such consultation and coordination includes participation by the Permittees and the Department on the LCR MSCP Steering Committee established by agreement among the LCR MSCP participants. Permittees shall also cause to be submitted information to the Department regarding proposed habitat acquisitions within California. The Department shall review and respond to the submitted plans, or to a proposed acquisition of mitigation habitat, within 60 days of receipt. If the Department does not approve of a proposed activity or plan, the Regional Manager shall consult with Permittees and/or Reclamation about the reasons for that disapproval. The Department’s approval shall not be unreasonably withheld, and the basis for any disapproval will be limited to situations where the Department has a reasonable basis to conclude that the proposed activity or plan will not meet the standards required under Fish and Game Code sections 2081(b) and (c). If the Department fails to respond to the submittal of a proposed plan or a proposed activity within 60 days, that plan or activity shall be deemed approved.

Habitat established within California as mitigation required under this permit shall be protected in perpetuity.

Within 90 days of issuance of the permit, Permittees shall designate a representative responsible for communications with the Department and for overseeing compliance with this permit. The Department shall be notified in writing of the representative’s name, business address, and telephone number, and shall be notified in writing if a substitute representative is designated.
<table>
<thead>
<tr>
<th>Mitigation Measure</th>
<th>Source</th>
<th>Implementation Schedule</th>
<th>Responsible Party</th>
<th>Status / Date / Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beginning with issuance of the permit and continuing for the life of the Project, Permittees shall provide the Department an annual Status Report. The due date shall be agreed upon by Permittees and the Department. The Annual Status Report shall include, at a minimum: 1) a general description of the status of the Project, and effects on Covered Species; 2) a copy of the table in the MMRP with notes showing the current implementation status of each mitigation measure; 3) a description of the habitat creation, restoration and monitoring actions conducted over the last year; 4) a summary of the monitoring and research activities undertaken during the previous year; 5) results and analyses of the monitoring and research data; 6) an assessment of the effectiveness of each completed or partially completed mitigation measure in minimizing and compensating for Project impacts; 7) a summary of the marsh acres impacted by non-flow related activities; and 8) other applicable information.</td>
<td>Permit</td>
<td>Entire project</td>
<td>Permittees</td>
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<tr>
<td>No later than 180 days after completion of the Project, including completion of all mitigation measures, Permittees shall provide the Department with a Final Mitigation Report. The Final Mitigation Report shall be prepared by a knowledgeable, experienced biologist and shall include, at a minimum: 1) a copy of the table in the MMRP with notes showing when each of the mitigation measures was implemented; 2) all available information about Project-related incidental take of species covered in the Permit; 3) information about other Project impacts on the species covered in the Permit; 4) an assessment of the effectiveness of the Permit's conditions of approval in minimizing and compensating for Project impacts; 5) recommendations on how mitigation measures might be changed to more effectively minimize and mitigate the impacts of future projects on the species; and 6) any other pertinent information, including the level of take associated with the Project.</td>
<td>Permit</td>
<td>Post-project</td>
<td>Permittees</td>
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<tr>
<td>Permittees shall notify the Department within three working days if a Covered Species is found dead or injured and the death or injury is reasonably attributable to a Covered Activity. A written notification will be made within five calendar days and will include the date, time, and location of the discovered animal/carcass, the expected cause of injury or death and any other pertinent information. Injured animals will be transported to a veterinarian or certified wildlife care facility and the Department informed of the final disposition of any surviving animal(s). All dead specimen(s)/carcass(es) shall be submitted to an appropriate federal or state wildlife agency or to educational/research institutions possessing the appropriate state and federal permits. If deposition to a wildlife agency or an institution is not practicable, the carcass will be marked, photographed, and left in the field.</td>
<td>Permit</td>
<td>Entire project</td>
<td>Permittees</td>
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<tr>
<td>Pursuant to the terms and conditions of the LCR MSCP, Permittees shall cause to be created/restored, managed, and maintained 7,260 acres of new replacement Riparian Covered Species breeding habitat (the &quot;Riparian Replacement Habitat&quot;) consisting of 5,940 acres of cottonwood/willow land cover in LCR MSCP reaches 1-7 and 1,320 acres of honey mesquite land cover in LCR MSCP reaches 1-7. The Riparian Replacement Habitat shall be designed and managed to support cottonwood/willow I-IV and honey mesquite III that provides breeding habitat for the Riparian Covered Species. The Riparian Replacement Habitat shall meet the minimum requirements for achieving habitat creation objectives for each Riparian Covered Species, as specified in Table 5-3 of the LCR MSCP HCP.</td>
<td>Permit</td>
<td>Entire Project</td>
<td>Permittees</td>
<td></td>
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<tr>
<td>Mitigation Measure</td>
<td>Source</td>
<td>Implementation Schedule</td>
<td>Responsible Party</td>
<td>Status / Date / Initials</td>
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<tr>
<td>15 Permits shall cause to be developed and implemented, in coordination with the Department, a comprehensive restoration, maintenance, monitoring, and reporting plan (&quot;Riparian Replacement Habitat Management Plan&quot;) for each site used to create/restore the 7,260 acres of Riparian Replacement Habitat. The Permits shall cause the Riparian Replacement Habitat Management Plan to be submitted to the Department within one year of site selection for each site for review and approval consistent with section 3(a)(v) of the permit if the land is within California, and for review and comment consistent with section 3(a)(iv) of the permit if the land is outside of California.</td>
<td>Permit</td>
<td>Entire project</td>
<td>Permits</td>
<td></td>
</tr>
<tr>
<td>16 Permits shall cause to be developed and implemented, in cooperation with federal and state agencies, a comprehensive monitoring, research, and adaptive management plan (MRA Plan) for monitoring the effectiveness of, and adjusting as necessary, the measures to minimize and fully mitigate the impacts of the authorized take of the Riparian Covered Species for which take is authorized. The Permits shall cause the MRA Plan to be submitted to the Department within two years of permit issuance, for review and approval consistent with section 3(a)(v) of the permit. Information collected as part of the MRA Plan will be used to determine the types and frequency of management actions that may be required to maintain habitat conditions (e.g., maintenance of desired stand structure over time).</td>
<td>Permit</td>
<td>July 5, 2007</td>
<td>Permits</td>
<td></td>
</tr>
<tr>
<td>17 Riparian Replacement Habitat shall be monitored and adaptively managed over time to determine the types and frequency of management actions that may be required to maintain habitat conditions (e.g., maintenance of desired stand structure over time). The Permits shall conduct surveys and research, as appropriate, to collect information necessary to better define the covered species' habitat requirements and to design and manage fully functioning Riparian Replacement Habitat.</td>
<td>Permit</td>
<td>Entire project</td>
<td>Permits</td>
<td></td>
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<tr>
<td>18 Creation/restoration of the Riparian Replacement Habitat within California shall be located on land approved by the Department consistent with section 3(a)(v) of the permit with a minimum of 2,614 acres of the 7,260 replacement acres located within California in LCR MSCP reaches 3, 4, 5, and/or 6. The 2,614 replacement acres in California shall consist of 1,566 acres cottonwood/willow I-IV and 1,048 acres of honey mesquite II. The Riparian Replacement Habitat within California will be created to meet the schedule for establishment in Section 5.10 of the LCR MSCP HCP.</td>
<td>Permit</td>
<td>Entire project</td>
<td>Permits</td>
<td></td>
</tr>
<tr>
<td>19 Permits shall cause to be created/restored, managed, and maintained 512 acres of new replacement Marsh Covered Species breeding habitat (&quot;Marsh Replacement Habitat&quot;) along the lower Colorado River in reaches 3-7. The Marsh Replacement Habitat shall be designed and managed to support breeding habitat for the Marsh Covered Species. The Marsh Replacement Habitat shall meet the minimum requirements for achieving habitat creation objectives for each Marsh Covered Species, as specified in Table 5-3 of the LCR MSCP HCP.</td>
<td>Permit</td>
<td>Entire project</td>
<td>Permits</td>
<td></td>
</tr>
<tr>
<td>20 Permits shall cause to be developed and implemented, in coordination with the Department, a comprehensive restoration, maintenance, monitoring, and reporting plan (&quot;Marsh Replacement Habitat Management Plan&quot;) for each site used to create/restore the 512 acres of Marsh Replacement Habitat. The Permits shall cause the Marsh Replacement Habitat Management Plan to be submitted to the Department within two years of site selection for each site for review and approval consistent with section 3(a)(v) of the permit for land within California, and for review and comment consistent with section 3(a)(iv) of the permit for land outside of California.</td>
<td>Permit</td>
<td>Within two years of site selection for each site</td>
<td>Permits</td>
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<tr>
<td>Mitigation Measure</td>
<td>Source</td>
<td>Implementation Schedule</td>
<td>Responsible Party</td>
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<tr>
<td>21. Permittees shall cause to be developed and implemented, in cooperation with federal and state agencies, a comprehensive monitoring, research, and adaptive management plan (MRA Plan) for monitoring the effectiveness of, and adjusting as necessary, the measures to minimize and fully mitigate the impacts of the authorized take of the Marsh Covered Species for which take is authorized. The Permittees shall cause the MRA Plan to be submitted to the Department within two years of permit issuance for review and approval consistent with section 3(a)(v) of the permit. Information collected as part of the MRA Plan will be used to determine the types and frequency of management actions that may be required to maintain habitat conditions (e.g., maintenance of desired marsh structure over time).</td>
<td>Permit</td>
<td>July 5, 2007</td>
<td>Permittees</td>
<td></td>
</tr>
<tr>
<td>22. Marsh Replacement Habitat will be monitored and adaptively managed over time to determine the types and frequency of management actions that may be required to maintain habitat conditions (e.g., maintenance of desired stand structure over time). The Permittees shall conduct surveys and research, as appropriate, to collect information necessary to better define the species' habitat requirements and to design and manage fully functioning Marsh Replacement Habitat.</td>
<td>Permit</td>
<td>Entire project</td>
<td>Permittees</td>
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</tr>
<tr>
<td>23. Creation/restoration of the Marsh Replacement Habitat within California shall be located in areas approved by the Department consistent with section 3(a)(v) of the permit with a minimum of 240 acres of the 512 replacement acres located within California in reaches 3, 4, 5, and/or 6. Of the 240 acres in California, 170 acres shall be designed and managed to provide habitat for the Yuma clapper rail and western least bittern, and 70 acres shall be designed and managed to provide habitat for the California black rail. The 240 acres shall also support at least 58 acres of Colorado River cotton rat habitat. The Marsh Replacement Habitat within California will be created to meet the schedule for establishment in Section 5.10 of the LCR MSCP HCP.</td>
<td>Permit</td>
<td>Entire project</td>
<td>Permittees</td>
<td></td>
</tr>
<tr>
<td>24. PVID and BWD shall submit to the Department a map of the drains and canals that are routinely maintained as described in the section of the permit entitled &quot;Non-Flow-Related Covered Activities.&quot; During the breeding season for Marsh Covered Species, PVID and BWD shall not perform maintenance of drains and canals in which submerged aquatic or emergent aquatic vegetation is present. However, PVID and BWD may, under emergency conditions, undertake the work reasonably necessary to prevent personal injury or property damage such as field flooding due to breaks in drains, bank sloughing, and clogged siphons.</td>
<td>Permit</td>
<td>Entire project</td>
<td>Permittees</td>
<td></td>
</tr>
<tr>
<td>25. PVID and BWD will keep an annual running total of Marsh Covered Species habitat removed that will count towards the allowable removal acreage, and this information will be available upon Department request. PVID and BWD shall submit an annual status report to the Department by December 31st of each year. The annual status report must include the locations of drains and canals that have been maintained during the year, and acreage of habitat removed during the current year.</td>
<td>Permit</td>
<td>Entire project</td>
<td>Permittees</td>
<td></td>
</tr>
<tr>
<td>26. Permittees shall cause to be created/restored, managed, and maintained 360 acres of new replacement Aquatic Covered Species breeding habitat (&quot;Backwater Replacement Habitat&quot;) along the lower Colorado River in reaches 1-6. The Backwater Replacement Habitat shall be designed and managed to support breeding habitat for the Aquatic Covered Species. The Backwater Replacement Habitat shall meet the minimum requirements for achieving habitat creation objectives for each Aquatic Covered Species, as specified in Table 5-3 of the LCR MSCP HCP.</td>
<td>Permit</td>
<td>Entire project</td>
<td>Permittees</td>
<td></td>
</tr>
<tr>
<td>Mitigation Measure</td>
<td>Source</td>
<td>Implementation Schedule</td>
<td>Responsible Party</td>
<td>Status / Date / Initials</td>
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<tr>
<td>27 Permittees shall cause to be developed and implemented, in coordination with the Department, a comprehensive restoration, maintenance, monitoring, and reporting plan (&quot;Backwater Replacement Habitat Management Plan&quot;) for each site used to create/restore the 360 acres of Backwater Replacement Habitat. The Permittees shall cause the Backwater Replacement Habitat Management Plan to be submitted to the Department within one year of site selection for each site for review and approval consistent with section 3(a)(v) of the permit for land within California, and for review and comment consistent with section 3(a)(iv) of the permit for land outside of California.</td>
<td>Permit</td>
<td>Within one year of site selection for each site</td>
<td>Permittees</td>
<td></td>
</tr>
<tr>
<td>28 Permittees shall cause to be developed and implemented, in cooperation with federal and state agencies, a comprehensive monitoring, research, and adaptive management plan (MRA Plan) for monitoring the effectiveness of, and adjusting as necessary, the measures to minimize and fully mitigate the impacts of the authorized take of the Aquatic Covered Species for which take is authorized. The Permittees shall cause the MRA Plan to be submitted to the Department within one year of permit issuance for review and approval consistent with section 3(a)(v) of the permit. Information collected as part of the MRA Plan will be used to determine the types and frequency of management actions that may be required to maintain habitat conditions (e.g., maintenance of desired backwater conditions over time).</td>
<td>Permit</td>
<td>July 5, 2006</td>
<td>Permittees</td>
<td></td>
</tr>
<tr>
<td>29 Backwater Replacement Habitat will be monitored and adaptively managed over time to determine the types and frequency of management actions that may be required to maintain habitat conditions (e.g., maintenance of desired stand structure over time). The Permittees shall conduct surveys and research, as appropriate, to collect information necessary to better define the species' habitat requirements and to design and manage fully functioning Backwater Replacement Habitat.</td>
<td>Permit</td>
<td>Entire project</td>
<td>Permittees</td>
<td></td>
</tr>
<tr>
<td>30 Creation/restoration of the Backwater Replacement Habitat within California shall be located in areas approved by the Department consistent with section 3(a)(v) of the permit with a minimum of 194 acres of the 360 replacement acres located within California in reaches 3, 4, 5, and/or 6. Backwater Replacement Habitat within California will be created to meet the schedule for establishment in Section 5.10 of the LCR MSCP HCP.</td>
<td>Permit</td>
<td>Entire project</td>
<td>Permittees</td>
<td></td>
</tr>
<tr>
<td>31 Permittees shall cause the stocking of 600,000 razorback suckers (at least 12 inches in length) and 620,000 bonytail (at least 12 inches in length) in the LCR. At least 270,000 razorback suckers and 200,000 bonytail shall be stocked in reaches 4 and 5. Permittees shall cause to be developed and implemented, in cooperation with the Department, a &quot;Fish Augmentation Plan&quot; that sets forth stocking rates and locations, research and monitoring activities, conditions and criteria under which fish augmentation may cease, and alternative measures to minimize and fully mitigate for the authorized incidental take in the event that fish augmentation measures cease. The Permittees shall cause the Fish Augmentation Plan to be submitted to the Department for review and approval consistent with section 3(a)(v) of the permit.</td>
<td>Permit</td>
<td>As determined in the Fish Augmentation Plan</td>
<td>Permittees/Department of Fish and Game</td>
<td></td>
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<tr>
<td>Mitigation Measure</td>
<td>Source</td>
<td>Implementation Schedule</td>
<td>Responsible Party</td>
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<td>32. Permittees shall provide an endowment and enhancement fee of $295.00 per acre (in 2005 dollars) to the Department for each acre of habitat that is transferred to the Department in fee title at the time of such title transfer, and for Department lands dedicated to the LCR MSCP. Interest from this amount shall be available for the operation, management and protection of the lands transferred to or owned by the Department, and may be spent on reasonable administrative overhead, biological monitoring, improvements to carrying capacity, law enforcement measures, and any other action designed to protect or improve the habitat values of the lands. The endowment principal shall not be drawn upon unless such withdrawal is deemed necessary by the Department to ensure the continued viability of the species on the lands. Monies received by the Department pursuant to this provision shall be deposited in a special deposit account established pursuant to Government Code §16370. The Department may pool the endowment with other endowments for the operation, management and protection of lands for local populations of the Covered Species. The Department shall manage any LCR MSCP land transferred to the Department in fee and for Department lands dedicated to the LCR MSCP, in compliance with and for the benefit of the LCR MSCP and consistent with the Department's mission statement.</td>
<td>Permit</td>
<td>At the time of transfer for land within California, and for Department land dedicated to the LCR MSCP</td>
<td>Permittees</td>
<td></td>
</tr>
<tr>
<td>33. The permit may be amended as required by law if the Department determines that continued implementation of the Project under existing permit conditions would jeopardize the continued existence of a Covered Species or if the Department determines, after consultation with Permittees, that changed biological conditions necessitate a permit amendment to ensure that impacts to the Covered Species are minimized and fully mitigated.</td>
<td>Permit</td>
<td>Entire project</td>
<td>Permittees/ Department of Fish and Game</td>
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</tbody>
</table>
HABITAT MANAGEMENT LANDS ACQUISITION CHECKLIST

The following checklist is provided for your convenience and to expedite Department processing of your Habitat Management Lands acquisition proposal. This list indicates the appropriate real estate documents which must be provided to the Department of Fish and Game so that review and formal acceptance can be accomplished. Any land acquisition processing requests that are incomplete when received will be returned.

- Proposed Lands for Acquisition Form (PLFAF)  
  (forward to Region for approval; Region will send to Realty Services Coordinator)

- Hazardous Materials Site Assessment Report  
  (an existing report may be used, but it must be less than two years old)

- Preliminary Title Report(s) for subject property  
  (an existing title policy is not acceptable)

- Grant Deed or Easement Deed  
  (deed must be an original, signed and acknowledged, or a certified copy thereof)

- County Assessor Parcel Map(s) for subject property

- Site Location Map  
  (site location with property boundaries outlined on a USGS 1:24,000 scale Topographic Quadrangle Map)

The Region will forward the PLFAF to the Lands and Natural Areas Program (LNAP) Realty Services Coordinator and request that LNAP process the land acquisition for formal acceptance. With the exception of the PLFAF, all documents listed above should be submitted directly to the Realty Services Coordinator at the following address:

Mr. Richard Jackson  
Department of Fish and Game  
Lands and Facilities Branch  
1416 - 9th Street  
Sacramento, CA 95814

" For some transactions, additional documents may be required, such as documents to support title exceptions or to explain title encumbrances. These additional documents may be requested by the Realty Services Coordinator during his review.

" Please note that the Project Applicant is responsible for all land acquisition costs, including title document costs, escrow fees, recording fees, title insurance premiums, other escrow-related fees or costs, and costs incurred by the Department of Fish and Game and the Department of General Services in reviewing and approving the documents.
PROPOSED LANDS FOR ACQUISITION FORM ("PLFAF")

TO: Regional Representative

________________________________________________________

________________________________________________________

Facsimile:

FROM:__________________________________________________

________________________________________________________

________________________________________________________

Applicant proposes that the following parcel of land be considered for approval by the Department as suitable for purposes of habitat management lands to replace the adverse environmental impacts of the Project:

<table>
<thead>
<tr>
<th>Section</th>
<th>Township</th>
<th>Range</th>
<th>Number of Acres</th>
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</table>

Current Legal Owner(s)

________________________________________________________

Signature of legal owner(s) granting access rights to Department for biological review of land:

________________________________________________________

Please check one:
This parcel is located within the __________________________________________
This parcel is not located within the __________________________________________
Explanation:________________________________________________________________

________________________________________________________

APPROVED ___ By:_________________________ DATE:_________________________
REJECTED ___ Region
Explanation:________________________________________________________________

________________________________________________________
A PHASE I CULTURAL RESOURCES INVESTIGATION FOR THE PROPOSED OHV AREA-PARK MOABI REGIONAL PARK TRAIL IMPROVEMENTS, SAN BERNARDINO COUNTY, CALIFORNIA

Prepared for:
LILBURN CORPORATION
Attn: Michael Perry
1905 Business Center Drive
San Bernardino, California 92408

Prepared by:
McKENNA et al.
6008 Friends Avenue
Whittier, California 90601-3724
(562) 696-3852

Author and Principal Investigator: Jeanette A. McKenna, MA/RPA
with contributions by: Kristina Lindgren

Job No. 04-11-06-1520
June 3, 2011
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INTRODUCTION

San Bernardino County Regional Parks Department, California, is proposing to define, improve, and maintain off highway vehicle trails (OHV) within Park Moabi Regional Park on the Colorado River, San Bernardino County. The “Open Use” area within the park consists of approximately 100 acres and the OHV trails are designed to link the various areas of open use. The trails are referred to as “Limited Use” areas. At this time, the improvements are limited to areas within the Regional Park. McKenna et al. (Appendix A) initiated this cultural resources investigation at the request of Lilburn Corporation, San Bernardino. This report presents the results of the investigations for compliance with the California Environmental Quality Act (CEQA), as amended.

LOCATION AND PROJECT DESCRIPTION

Park Moabi Regional Park is located on the western bank of the Colorado River, just north of Interstate 40 and the National Trails Highway (Figure 1). This area is cross-referenced as being within: 1) Township 7 North, Range 24 East, and portions of Sections 5 and 6; 2) Township 7 North, Range 23 East, and portions of Section 1; and 3) Township 8 North, Range 23 East, and portions of Section 36 (Figure 2).
Figure 1. General Location of Park Moabi Regional Park and the Current Project Area.
Figure 2. Specific Location of Park Moabi Regional Park (USGS Whale Mountain Quadrangle (rev. 1975)).
The project area is accessed off Interstate 40 at Park Moabi Road. The proposed project will involve the definition, improvement, and maintenance of off highway vehicle trails (OHV) within the park (Figure 3).

Figure 3. Defined Areas for Improvements within Park Moabi Regional Park.
As illustrated in Figure 3, the areas of improvement addressed in this report are located in the western portion of the Park – mainly west of the main access road (Park Moabi Road). There are a number of support facilities planned (six purple blocks); paved roads (black); established OHV trails (green); and areas currently designated as “open space” that will be converted to “closed space.”

Park Moabi Regional Park is also located opposite the existing Havasu National Wildlife Refuge (McKenna 2009:1-2). Landmarks identified in the general area include Topock Bay, Topock Marsh, the Mojave Valley, Red Rock Bridge, and the alignments of Interstate 40/Route 66. The City of Needles is located approximately eight miles northwest of Park Moabi. Elevations within the project area average 510 feet above mean sea level (460 to 560 feet above mean sea level).

The San Bernardino County Regional Parks Department’s RFP states:

The Moabi OHV Area and trails were utilized previously between 1985 and 2001 for park campers and visitors, and is proposed to be reestablished in the same locations. The OHV Area includes a central location for staging and open OHV riding, plus a network of access trails that link camping and park facilities to the central OHV area. Trails are defined by signage to promote safe usage and sustainable enforcement, control and maintenance.

ENVIRONMENTAL SETTING

The project area is located in the easternmost extent of San Bernardino County and the Mojave Desert (Norris and Webb 1990:221). This area is associated with northern portions of the Colorado Desert and separated from the Mojave Desert by evidence of geological events dating to the late Cenozoic. Citing Norris and Webb (1990:220):

“The Mojave Desert occupies about 65,000 square kilometers (25,000 square miles) of southeastern California … It is landlocked, enclosed on the southwest by the San Andreas fault and the Transverse Ranges and on the north and northeast by the Garlock fault, the Tehachapi Mountains, and the Basin and Range. The Nevada state line and the Colorado River form the arbitrary eastern boundary [of the Desert], although the province actually extends into southern Nevada and western Arizona. The San
Bernardino/Riverside county line is designated as the southern boundary … The desert itself is a Cenozoic feature, perhaps formed as early as the Oligocene, presumably from movements related to the San Andreas and Garlock faults and their predecessors. Prior to the development of the Garlock, the Mojave was part of the Basin and Range and shares Basin and Range history possibly through the first part of the Miocene … Today the region is dominated by broad alleviated basins that are mostly aggrading surfaces receiving, nonmarine continental deposits from adjacent uplands. The deposits are burying the old topography, which was previously more mountainous.”

Data provided through the Natural History Museum of Los Angeles County (McLeod 2004) described the project area as consisting of surface deposits of “… Quaternary Aluvium derived from the Colorado River and Lake Havasu.” McLeod (2004) describes the area surrounding Park Moabi Regional Park as follows:

“In the lowest lying areas bordering the Colorado River there [are] mostly dune sands, while the slightly more elevated areas have Quaternary lake deposits or even dissected terrace deposits in the highest elevations. In the recent dune sands, it is highly unlikely that there would be any fossil remains. In the lake deposits or the terrace deposits there might be fossil vertebrate remains typical of the Late Pleistocene fauna, but we have no vertebrate localities anywhere nearby from these or similar deposits.”

Scott (2010) provided additional data for the area. He noted the area is associated with the Chemehuevi Formation, which consists of clays and silts as well as cross-bedded sands capped by river gravels. The Chemehuevi Formation is highly sensitive for the presence of paleontological specimens, including extinct horse and camel.

The Park is dominated by eroding hillsides and sand dunes. The average rainfall is 3.90 inches per year, supporting vegetation that includes the creosote bush (Laerrae divaricata tridentate), ocotillo (Fouquieria spendens), brittlebush (Encelia farinose), desert holly (Atriplex hymenelytra), and barrel cactus (Echinocactus acanthodes; see Budinger 2001; Blackburn and Anderson 1993). Fauna in the area includes deer and mountain sheep along with smaller mammals and numerous species of reptiles and snakes.
CULTURE HISTORY BACKGROUND

Archaeological data has proven that human beings have occupied the Mojave/Colorado Desert regions for at least 13,000 years. The project area, located between Blythe and Needles, is geographically and ethnographically associated with the Chemehuevi, a branch of the larger and more diverse population of Southern Paiutes (Kelly and Fowler 1986:368). The majority of the Chemehuevi occupied lands along the Colorado River and surrounding mountain areas (e.g. the Chemehuevi Mountains).

In general, the Chemehuevi occupied areas between Blythe and Needles to points as far west as Twenty-Nine Palms. The Chemehuevi bordered the traditional territory of the Mojave Indians of the Colorado River (Kendall 1983:9; Stewart 1983:55).

The Chemehuevi are Uto-Aztecanspeakers who, as a larger population, occupied territory ranging from southern Utah and Nevada, California, and western Arizona. Bordering the Colorado River, the most southern “band” of Chemehuevi was strongly influenced by the neighboring Mojaves (Kelly and Fowler 1986:368). Citing Kelly and Fowler (1986: 370 and 386):

“...The Chemehuevi ... traveled widely and had amicable contact not only with Shoshone but also the Kawaiisu, Serrano, Vanyume, Cahuilla, and Diegueño. The Chemehuevi were in direct contact with several Yuman peoples. It was said that generations ago, before the Chemehuevi and Las Vegas separated and [the] Chemehuevi acquired separate identity, they exterminated the Desert Mohave and thereafter moved into much of the territory they left vacant (see Kroeber 1959; Roth 1976). Occasionally, the Chemehuevi joined the Mohaves and Quechan in skirmishes with the Cocopa and Halchidoma and intermittently were at war with the Mohave themselves (Roth 1976).

“...The Chemehuevi ... took over much of Mohave culture: vocabulary, floodplain farming and some associated crops, the covered house in modified form, basic features of the song series, emphasis on dreams, and a complex of elements related to warfare (Laird 1976). A few specific Mohave traits adopted were the squared metate, balsas, ferrying pots, ceramic forms and ornaments, paddle-and-anvil pottery techniques, and hair dye.
“Archaeological manifestations of the Southern Paiute {Chemehuevi], principally in the form of brownware pottery and certain types of twisted basketry, are in evidence in the western part of the region no earlier than A.D. 1000 to 1200. This suggests a rather late movement of these peoples into their present territory, coincident with the proposed spread of other Numic-speaking peoples into the rest of the Great Basin ... (Gunnerson 1962; Euler 1964; Madsen 1975; Fowler and Fowler 1981).”

Although the Spanish explorers entered the Southwest in the 1540s, contact with the Colorado River tribes was not significant until the late 1700s (Euler 1966). Between the 1800s and 1850s, impacts increased with the acquisition of California by the United States and the westward expansion of the post-Civil War years in the 1860s. Eventually, reservation lands were established to confine the remaining populations. The Colorado River community of Blythe was named for Thomas H. Blythe, a San Francisco capitalist and native of Wales. Needles was originally a station on the Atlantic and Pacific Railroad (later the Santa Fe Railway) established in 1883. Between Blythe and Needles is the Chemehuevi Mountains and Indian Reservation. Citing Gudde (1969: 61), the Chemehuevi Valley/Mountains/Reservation is described as:

“... A Shoshonean tribe, apparently an offshoot of the Paiute” (Hodge), is repeatedly mentioned by this name in Spanish and early American times under a great variety of Spellings. The modern version was established by Whipple in 1853 (Pac. R.R. Report, Vol. III, Pt. 3, p. 16): Chemehuevi (form a Paiute informant) or Chemehuevitz (from a Yuma). In 1904 the Geological Survey dropped the –s, possibly believing that the ending –l indicates a plural.

“Topock” is a term derived from the Mojave Indian word “ahatopok,” meaning “bridge” (Gudde 1969:342); Desert Magazine 1941; Primer Publishers n.d.:44; Granger 1983: 620). The same area has been referred to as “Red Rock” (Gudde 1969:342), a reference to the surrounding rock outcroppings and the color of the nearby rocks (Casebier 1987).

Park Moabi Regional Park is one of the many parks supervised by the San Bernardino County Regional Parks Department, a Division of the County Public Works Department. The existing park provides camping, youth activities, horseback riding, fishing, swimming, and a variety of other land and water recreational activities (Wildernet 2005).
METHODOLOGY

McKenna et al. completed the following tasks in addressing the proposed project at Park Moabi Regional Park:

1. Supplemental Archaeological Records Search: this research was originally completed through the San Bernardino County Museum Archaeological Information Center in 2010 (McKenna 2010). McKenna et al. supplemented the earlier research by obtaining copies of the many site forms prepared by Applied Earthworks (2004) and others, emphasizing the studies completed within and around the park area (Appendix B).

2. Historic Background Research: this research was conducted by McKenna et al. through the review of previous studies, including the earlier research by McKenna et al. for the expansion of the Moabi Park (McKenna 2004) and the improvements at Pirate’s Cove (McKenna 2010); a review of general histories for the area; review of historic maps and photographs; and an assessment of the historic land uses in the area;

3. Native American Consultation: McKenna et al. contacted the Native American Heritage Commission in Sacramento and requested data on known resources in the area. McKenna et al. also received a listing of local Native American representatives and forwarded letters to each (December 15, 2009). These letters requested information on the project area and any concerns the local representatives may have with respect to the project area. A second set of letters was sent in June 9, 2010, when the approval for the field survey was received. Copies of all correspondence are presented in Appendix C. The current project was initiated less than one year since the 2010 studies and, therefore, McKenna et al. applied the earlier correspondence to this current investigation.

4. Paleontological Overview: a paleontological overview was acquired through the Natural History Museum of Los Angeles County and used to place the project area in a context to assess the relative sensitivity of the area to yield paleontological specimens. A supplemental overview was obtained through the San Bernardino County Museum, Division of Geological Sciences (2010), to insure adequate coverage and understanding of the area (Appendix D).
5. **Field Survey**: an intensive archaeological field survey of the Park Moabi project area was completed by Jeanette A. McKenna (M.A. and Principal Investigator for McKenna et al.) and Kristina Lindgren (B.A. and Archaeological Associate at McKenna et al.). This survey was conducted between May 13 and May 16, 2011. McKenna et al. surveyors were provided access to the survey area via permission from the on-site Park Rangers and the area was surveyed systematically on foot, whenever possible. When vegetation of landforms prevented systematic surveying, access was on an “as accessible” basis. The surveyors avoiding occupied camp grounds, but visually inspected all other accessible areas. Field notes (on file, McKenna et al.) and a photographic record (Appendix E) were maintained over the course of the investigations. All previously recorded resources and newly identified resources were recorded on the appropriate California Department of Parks and Recreation 523 forms (Appendix F).

6. **Report Preparation**: this report was prepared in manner consistent with the data requirements of the Archaeological Resource Management Reports (ARMR), as prepared by the Office of Historic Preservation, Sacramento, and as required for compliance with the California Environmental Quality Act (CEQA), as amended.

**PREVIOUS RESEARCH**

A standard archaeological records search was completed through the San Bernardino County Museum Archaeological Information Center (Appendix B). In summarizing the data available at the time of this writing, a minimum of ten (10) area-specific and six (6) general overviews have been completed within one mile radius of the project area (Table 1). These studies showed that approximately one-third of the Park was previously surveyed as part of the much larger Topock Compressor Station studies (Douglas et al. 2004; McDougall and Horne 2007).

As a result of the 2004 study by Douglas et al. and the 2007 McDougall and Horne survey (and other studies completed nearby), a minimum of 61 prehistoric archaeological sites; 12 pending archaeological sites; 14 prehistoric isolates; 6 historic archaeological sites; 1 pending historic archaeological site; various historic structure locations; 2 National Register of Historic Places listed properties; 2 National Register of Historic Places eligible properties; and 1 California Historic Landmark were identified. The greater majority of prehistoric archaeological sites were recorded as a result of the 2007 survey and were located within the area directly south of the Pirate Cove peninsula (between I-40 and the Colorado River).
Table 1. Cultural Resources Investigations Completed within One Mile of the Project Area.

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<th>Report No.</th>
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<td>1060892</td>
<td>Gallegos et al. 1980</td>
<td>Mojave and Colorado Desert Region Overview</td>
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<td>1060991</td>
<td>Norris 1980</td>
<td>Lower Colorado River Systems Overview</td>
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<td>1061069</td>
<td>Warren et al. 1981</td>
<td>Colorado Desert Planning Units Overview</td>
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<td>1061190</td>
<td>Swarthout &amp; Drover 1981</td>
<td>Lower Colorado River Valley Overview</td>
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<td>1062585</td>
<td>Stone 1991</td>
<td>Lower Colorado River Overview</td>
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<td>1062878</td>
<td>Bonine 1993</td>
<td>The Mohave Indians (Thesis) Overview</td>
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<td>1060331</td>
<td>Fryman 9176</td>
<td>Park Moabi Motorcycle Race Course Yes</td>
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<td>1060808</td>
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<td>Reynolds 1979</td>
<td>So. Cal. Gas Co. Pipeline Corridors Yes</td>
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<td>1060810</td>
<td>Weber 1979</td>
<td>So. Cal. Gas Co. Pipeline Alternatives Yes</td>
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<td>1061050</td>
<td>Middleton 1980</td>
<td>Stockpile Sites, River Front and Levee Yes</td>
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<td>1061561</td>
<td>Van Bueren 1986</td>
<td>Topock Evaporative Pond Project Yes</td>
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<td>1061659</td>
<td>Peyton 1987</td>
<td>Ground Drawings, Lower Colorado Yes</td>
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<td>1063869</td>
<td>Love 2000</td>
<td>AT&amp;T Wireless Site No</td>
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<td>1064609</td>
<td>Douglas et al. 2004</td>
<td>Topock Compression Station Yes</td>
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<tr>
<td>1066497</td>
<td>McDougall and Horne 2007</td>
<td>Topock Compression Station Yes</td>
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Resources specifically identified with Park Moabi Regional Park are presented in Table 2. These resources include forty (40) prehistoric archaeological sites; three (3) historic archaeological sites; and six (6) isolates. Of the prehistoric sites and/or isolates, data has identified four (4) intaglio sites; eighteen (18) lithic scatters; fifteen (15) lithic reduction sites or quarries; two (2) pot busts; one (1) sherd scatter; one (1) hearth; three (3) isolated artifacts; and two (2) small debitage scatters. In a visual examination of the resource locations, it appears the many sites identified in the areas east of the Park Moabi access road may represent an extended use area with multiple loci rather than individual sites.

The historic period resources identified in the area include historic roads (e.g. National Trail Highway, Route 66, etc.); railroad alignments; building foundations; and refuse scatters. Consideration should also be given to the presence of the Havasu Lake National Wildlife Refuge, the Park Moabi Regional Park, itself; and any other evidence of the late historic/early modern use of the area as a recreation facility (pre-1965).

Overall, Park Moabi Regional Park is considered relatively sensitive for historic period resources, as well.
Table 2. Cultural Resources Identified within Park Moabi Regional Park, San Bernardino County, California.

<table>
<thead>
<tr>
<th>Resource No.</th>
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<td>36-002910(H)</td>
<td>Numerous Old National Trails Highway</td>
<td>Relocated</td>
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<tr>
<td>36-005237</td>
<td>Not Identified Intaglio Site (NRHP)</td>
<td>Mismapped</td>
<td></td>
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<td></td>
<td>Farrugia et al. 2004 Intaglio Site</td>
<td>Relocated</td>
<td></td>
</tr>
<tr>
<td>36-011700</td>
<td>Spaulding &amp; Harmon 2004 Lithic Scatter</td>
<td>Outside</td>
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<td></td>
<td>Farrugia et al. 2004 Site Enlarged by Update</td>
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<td>36-011869</td>
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<td>36-011872</td>
<td>Gothar 2004 Quarry Site</td>
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<td>36-011873</td>
<td>Gothar 2004 Lithic and Ceramic Scatter</td>
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<td>36-011874</td>
<td>Gothar 2004 Lithic Reduction Site</td>
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<td>36-011875</td>
<td>Gothar 2004 Lithic Scatter</td>
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<td>36-011876</td>
<td>Gothar 2004 Lithic Scatter</td>
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<td>36-011877</td>
<td>Gothar &amp; Farrugia 2004 Sparse Lithic Scatter</td>
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<td>36-011879</td>
<td>Gothar &amp; Farrugia 2004 Lithic Quarry and Reduction Site</td>
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<td>36-011880</td>
<td>Gothar &amp; Farrugia 2004 Lithic Scatter</td>
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<td>36-011881</td>
<td>Farrugia &amp; Gothar 2004 Intaglio</td>
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<td>Farrugia &amp; Gothar 2004 Lithic Reduction Site</td>
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<td>36-011883</td>
<td>Farrugia &amp; Gothar 2004 Pot Bust (17 sherds)</td>
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<td>36-011884</td>
<td>Gothar &amp; Farrugia 2004 Quarry Site</td>
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<td>36-011886</td>
<td>Farrugia et al. 2004 Quartzite Debitage</td>
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<td>36-011887</td>
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<td>36-011888</td>
<td>Farrugia et al. 2004 Lithic Scatter</td>
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<td>36-011889</td>
<td>Farrugia et al. 2004 Lithic Reduction Site</td>
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<td>36-011890</td>
<td>Farrugia et al. 2004 Lithic Reduction Site</td>
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<td>36-011891</td>
<td>Farrugia et al. 2004 Lithic Reduction Site</td>
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<td>36-011892</td>
<td>Farrugia et al. 2004 Sparse Lithic Scatter</td>
<td>Outside</td>
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<td>36-011893</td>
<td>Farrugia et al. 2004 Lithic Scatter</td>
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<td>36-011894</td>
<td>Farrugia et al. 2004 Lithic Reduction Site</td>
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<td>36-011895</td>
<td>Farrugia et al. 2004 Lithic Reduction Site</td>
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<td>36-011896</td>
<td>Farrugia et al. 2004 Lithic Scatter</td>
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<td>36-011897</td>
<td>Farrugia et al. 2004 Sparse Lithic Scatter</td>
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<td>36-011901</td>
<td>Farrugia et al. 2004 Sparse Lithic Scatter</td>
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<td>36-011904</td>
<td>Farrugia et al. 2004 Lithic Reduction Site</td>
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<td>36-011909(H)</td>
<td>Farrugia et al. 2004 Historic Refuse Scatter</td>
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<td>36-011912</td>
<td>Farrugia et al. 2004 Lithic Reduction Site</td>
<td>Relocated</td>
<td></td>
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<td>36-011917</td>
<td>Farrugia et al. 2004 Intaglios (4)</td>
<td>Inside</td>
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<td>36-011918</td>
<td>Farrugia et al. 2004 Rock Ring (Hearth?)</td>
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<td>36-011928</td>
<td>Farrugia et al. 2004 Lithic Reduction Site</td>
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<tr>
<td>36-011927</td>
<td>Farrugia et al. 2004 Lithic Scatter (re-deposited)</td>
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<td>36-011928</td>
<td>Farrugia et al. 2004 Lithic Reduction Site</td>
<td>Outside</td>
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</tr>
<tr>
<td>36-011934</td>
<td>Farrugia et al. 2004 Sparse Lithic Scatter</td>
<td>Outside</td>
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</table>
RESULTS OF THE INVESTIGATIONS

The Project Area and Coverage

The project area was found to be well defined by waterfront, fence lines, topography, and landmarks (e.g. roads, railroad r-o-w, use areas). The main access road (Park Moabi Road) was accessed from Interstate 40 and various areas within the Park were accessed from existing paved access roads, including a segment of the historic Route 66.

The McKenna et al. survey consisted of an intensive level of pedestrian survey in accessible areas west of Park Moabi Road and a sampling of areas east of Park Moabi Road. The survey was designed to address areas not included in the earlier studies of Douglas et al. in 2004 and McDougall and Horne in 2007 (predominantly east of Park Moabi Road). An emphasis was placed on the areas of existing trails and designated areas of support facilities, although areas between these locations were also covered.

Illustrated in Figure 4, there is a significant difference in landforms between areas east of Park Moabi Road and west of Park Moabi Road. In this case, the terraces east of Park Moabi Road appear to be intact and with minimal evidence of disturbances. In contrast, the areas west of Park Moabi Road have been intensively impacted. Due west of Park Moabi Road is a large settlement pond surrounded by an area of extensive grading. Further west is the Park refuse area (highly disturbed), areas of flooding, and areas that have been used as borrow pits (likely associated with the development and/or maintenance of the railroad alignment. To the very northwest, the Park reflects more natural dunes with fewer disturbances. The existing trail is well defined and accessible both from the north and south.

Table 2. Cultural Resources Identified within Park Moabi Regional Park, San Bernardino County, California (cont’d.).

<table>
<thead>
<tr>
<th>Resource No.</th>
<th>Citation</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>36-011935(H)</td>
<td>Farrugia et al. 2004</td>
<td>Retaining Wall</td>
<td>Relocated</td>
</tr>
<tr>
<td>36-012506</td>
<td>Not Identified</td>
<td>Intaglio</td>
<td>Outside</td>
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<td>36-020381</td>
<td>Farrugia 2004</td>
<td>Milling Slab</td>
<td>Outside</td>
</tr>
<tr>
<td>36-020383</td>
<td>Farrugia &amp; Gothar 2004</td>
<td>Rhyolite Core</td>
<td>Outside</td>
</tr>
<tr>
<td>36-020385</td>
<td>Farrugia et al. 2004</td>
<td>Hearth Feature</td>
<td>Inside</td>
</tr>
<tr>
<td>36-020386</td>
<td>Gothar 2004</td>
<td>Hearth Feature</td>
<td>Inside</td>
</tr>
<tr>
<td>36-020387</td>
<td>Farrugia et al. 2004</td>
<td>Pot Bust (5 sherds)</td>
<td>Inside</td>
</tr>
<tr>
<td>36-020392</td>
<td>Farrugia et al. 2004</td>
<td>Quartzite Flake</td>
<td>Outside</td>
</tr>
</tbody>
</table>
Native American Consultation

McKenna et al. conducted Native American consultation by contacting the Native American Heritage Commission in Sacramento and requesting data on religious or sacred sites within or near the project area and obtaining a listing of local Native American representatives wishing to comment on any projects in the area. The initial request was made on December 15, 2009, and followed up on December 21, 2009 (see Appendix...
C). The Native American Heritage Commission files confirmed the presence of significant cultural resources in the immediate area – a reference to CA-SBR-219 and the presence of the Topock Maze complex. The Commission also referenced the relative sensitivity for the area to yield additional evidence of significant resources, interpreted as sensitive for additional rock art features (intaglias).

McKenna et al. sent letters to the local Native American representatives listed by the Commission. The letters identified the project and noted that no field survey was included at this level of investigation. As of January 8, 2009, McKenna et al. has received no written responses to the inquiries. One phone call was received from Nora McDowell, Cultural Resources Coordinator for the Fort Mojave Indian Tribe. Ms. Otero was requesting information on the Lead Agency, the extent of the current investigations, and SB-18 consultation, should the project warrant government-to-government consultation. McKenna et al. sent a second set of letters prior to the scheduling of the field survey conducted in June of 2010. No additional responses were received as a result of the June consultation. To date, no additional responses have been received with respect to any studies within Park Moabi Regional Park. Nonetheless, with a potential for additional significant resources in the area, further consultation may be required in the future.

Paleontological Overview

An initial paleontological overview for the Park Moabi Regional Park area was completed in 2004 by the Natural History Museum of Los Angeles County (see McKenna 2004). A similar request for information was made to the San Bernardino County Museum. Based on the 2004 data, the project area is comprised of Quaternary alluvial deposits derived from the nearby Colorado River and Lake Havasu. Citing Dr. McLeod, “... the lowest lying areas bordering the Colorado River ... mostly sand dunes ... have Quaternary lake deposits or even dissected terrace deposits ... it is highly unlikely that there would be any fossil remains ... we have no vertebrate fossil localities anywhere nearby from these or similar deposits.”

The response from the San Bernardino County Museum (January, 2010) confirmed the general area may be sensitive for paleontological resources, but not in the areas of recent sand dunes. Rather, paleontological sensitivity is associated with the Chemehuevi Formation clays and silts underlying the more recent alluvial sand deposits of the Colorado River. Based on the findings of both McLeod (2004) and Scott (2010), any excavations into somewhat elevated areas (outside the dunes) may yield evidence of fossil specimens and should be monitored. The proposed improvements within Park Moabi
Regional Park are not expected to exceed the relative depths of the recent alluvium and, therefore, no adverse impact to paleontological resources is expected.

**Cultural Resources**

Previous research identified three archaeological sites and three archaeological isolates within the current project area (a portion of Park Moabi Regional Park), including: 36-002910(H), 36-011909(H), 36-011917, 36-011918, 36-020385, 36-020386, and 36-020387.

*Previously Recorded Resources*

**36-002910(H)**

36-002910(H) is cross-referenced as CA-SBR-2910(H) and as the National Old Trails Highway/Route 66 (NHRP-E-OHP-3926). It has been recorded numerous times by various individuals at different locations across San Bernardino County. Basically, National Old Trails Highway/Route 66 enters California at the Colorado River crossing south of Park Moabi Regional Park and has, in places, been replaced by the modern Interstate 40 alignment. Abandoned or bypassed segments of the historic roadway are still present in some areas and have been demolished or redeveloped in other areas. At the time of this study, 36-002910(H) had been identified as a National Register of Historic Places resource, a California Historical Resource; and a California Historical Landmark (No. 781). The recognition on the National Old Trails Monument (on file, San Bernardino County Museum Archaeological Information Center) reads:

> Besides U.S. Highway 66 at the east side of Needles, a plaque, erected in 1923, commemorates the completion of the last portion of the National Old Trails Highway across the continental United States.

> The monument indicates the desert crossing that was used by prehistoric Indians, by historic Indians, especially Mojaves, and pathfinders such as Garces in 1776 and Jedediah Smith in 1826 and 1827. The boulder in which the plaque is set came from Granite Springs near Needles, and is marked by ancient petroglyphs.

> The western section of the National Old Trails Highway was opened between 1911 and 1914. Much of the history of San Bernardino County has
been made along this trail. The general route of the present U.S. Highway 66 was originally a Mojave travel and trade trail from the Colorado River to the California coast. The first white men to whom it was shown were Father Garces, the Franciscan missionary, and Jedediah Smith, an American trapper. In 1854, also guided by Mojaves, Lt. Whipple surveyed it as a possible railroad route. Later, following much the same route, the Old Government Road was opened. Army forts were built at intervals along this road, and soldiers patrolled sections of it, for protection of immigrants, wagon freighters, and mail carriers traveling to and from California.

Today the Santa Fe Railroad and U.S. Highway 66 parallel portions of the ancient trail.

In the area of Needles and Park Moabi Regional Park, National Old Trails Highway/Route 66 has been recorded by Gallegos (1977), Van Bueren (1986), Gothar et al. 2004, and McDougall (2008). Gallegos noted this resource as being “… one of the earliest modern trans-United States automobile routes …” dating to ca. 1911. He described the 1911-1914 segment between Needles and Essex as a paved, two-lane state maintained highway (Smith, Burr, and Haenszel n.d.). Van Bueren (1986) described National Old Trails Highway/Route 66 within Park Moabi as:

… a portion of old Highway 66 represented by a deteriorating asphalt alignment and segments of cement-mortared slate gutters … the future location of Route 66 was first surveyed by the War Department in response to the westward migration brought about by the Gold Rush of 1849, as part of a network of federal wagon roads ... this wagon road became one of the best travelled overland routes from Chicago to Santa Monica, and was soon paralleled by a railroad line built through the Topock area in 1893 ... In 1926 the road, which had gradually been improved over the years, was officially designated as U.S. Route 66 (Pew 1977:26). By 1932 Route 66 was completely paved and its various segments connected into a continuous highway. It was a major migration route to California during the Dust Bowl of the Depression.

Van Bueren’s map illustrates his segment of National Old Trails Highway as being north of the BNSF Railroad alignment and east of Park Moabi Road – essentially in the vicinity of 36-011909(H) and paralleling the current alignment of Interstate 40.
In 2004, Gothar et al. recorded National Old Trails Highway/Route 66 within and adjacent to Park Moabi Regional Park. They noted four sections:

1) Between Park Moabi Road and the southern terminus of the Old Trails Arch Bridge (1916-1947);

2) A 200 foot segment between Interstate 40 and the BNSF railroad alignment;

3) Between Interstate 40 and the PGE Compressor Station;

4) Paralleling Park Moabi Road, north of the BNSF railroad alignment.

Of the four segments identified by Gothar et al., only Section 4 is located within the current project area. Gothar et al. (2004:2) states:

Section 4 is a north-south oriented, 1,000 ft segment located immediately west and roughly parallel to Park Moabi Rd. north of the BNSF Railroad right-of-way. This segment had been cut into the steep eastern bank of a very broad wash and is partially covered with sediments pushed downslope (west) from the construction of Park Moabi Rd. The roadbed has a buried gas pipeline entrenched along its western edge, and two power poles impact the road as well. Remnants of a cement and stone water diversion structure (Feature 1) are located on the eastern side of the roadbed at a point where a large erosional rill intersects. The southern end of Section 4 begins at Park Moabi Rd. west of the two prominent water tanks and terminates on the north end in the wash near the edge of some sedimentation ponds.

The site record filed by McDougall (2008) involves a segment of National Old Trails Highway/Route 66 outside the current project area and outside the boundaries of Park Moabi Regional Park. This section is located south of Interstate 40 and southeast of Park Moabi Road at Interstate 40.

As summarized above, the various segments of National Old Trails Highway/Route 66 are disjointed, have been identified both north and south of the current Interstate 40
alignment, and are present in various forms, including paved and unpaved, improved and deteriorated conditions.

The current USGS Whale Mountain Quadrangle (rev. 1975) illustrated the location of National Old Trails Highway as running along the western side of Interstate 40 until it veers east until it is interrupted by Interstate 40. To the immediate west and east of Interstate 40, the Trail is identified as a dirt road. When the Trail passes under the SF/BNSF railroad alignment, it appears as a paved road running through Park Moabi, exiting the park at its northeastern corner. The segments identified by the four site records presented above are not included in the mapped alignment.

In addition, a review of maps specifically pertaining to the alignments of National Old Trails Highway and Route 66 (there are places where these two alignments deviate from one another) show the main alignment running through Park Moabi, crossing the Colorado River near the eastern extent of the peninsula, and continuing into Arizona and the Town of Oatman. Later, Route 66 is realigned to run directly to Kingman via Interstate 40.

The recent survey by McKenna et al. identified the mapped National Old Trails Highway/Route 66 alignment within Moabi Park. This alignment enters the park near the SF/BNSF Railroad alignment, crosses at the Park's Trailer Park, continues past Park Moabi Road, and continues east, exiting the park near the Colorado River (Figure 5). The road alignment within the park is paved (for the most part) and, at Park Moabi Road, Route 66 is marked on the pavement (asphalt; Figure 6).

The alignments identified by Van Bueren in 1986, Gothar et al. in 2004, and McDougall in 2008 appear to be auxiliary roads or utility roads, not the historic alignment identified as National Old Trails Highway/Route 66. In the case of the Van Bueren alignment, this dirt road alignment fronts the railroad alignment and is associated with a buried pipeline, suggesting it is an access road. The segments identified by Gothar appear to be more directly related to the development of Park Moabi and/or the Wildlife Refuge.

The proposed trail development will involve portions of historic National Old Trails Highway, a National Register of Historic Places site, a California Register of Historical Resources site, a California Historical Landmark, and a roadway still in use. Therefore, any impacts to this alignment may result in an adverse environmental impact, depending on the nature of the improvements. McKenna et al. has concluded the adverse impacts will occur unless the improvements can be completed in a way that does not result in the loss of the resource. The avoidance of impacts can be addressed through project design.
Figure 5. National Old Trails Highway Crossing Park Moabi.

Figure 6. Existing National Old Trails Highway/Route 66 in Park Moabi (at Park Moabi Road, facing east).
36-011909(H)

36-011909(H) was recorded by Farrugia et al. as an “... early-to-mid 1900’s trash dump located in an area apparently excavated for the purpose of dumping refuse.” This site was recorded at UTMs 727174 Easting/3844568 Northing. This area is located relatively close to the proposed serving facility east of Park Moabi Road, north of Interstate 40, south of the BN&SF railroad alignment, and at the entrance to Park Moabi Regional Park.

McKenna et al. relocated this site at the coordinates noted by Farrugia et al. and concurs with the description of the site. This relatively dense concentration of cans, glass, and ceramics is “L” shaped and within a depression that appears to have been excavated to receive the materials. There is some evidence that materials were burned or a burning was attempted, resulting in the loss of many can labels and any cardboard, paper, or wood that may have been present. The concentration was dominated by the cans. Little glass and/or ceramics were identified (Figures 7 and 8).

In visually inspecting this deposit, McKenna et al. noted the presence of some maker marks on some of the ceramics. These marks included those of Wallace, Carr, Shenango, and Buffalo China. Limited research identified potential dates of manufacturing for these items as follows:

- Wallace China: 1931-1964, 1947
- Shenango China: 1901-1949, 1925
- Buffalo China: 1925, 1925

The can concentration is dominated by institutional sized cans, indicating the feeding of a relatively large number of people for a brief period or a smaller group for a longer period. The cans are predominantly sanitary cans (post-1917), with some condensed milk cans and utility cans. The remnants of camp stoves indicates outdoor cooking, likely in a work camp setting. The china is industrial hotel ware with no evidence of decoration or personal design.

Based on this scant data, the depositional period for this deposit ranges from 1925 to 1947, suggesting this is a Depression Era deposit and associated with a work camp along the railroad alignment, Route 66, and/or the early park development. Given the location, the remains are likely associated with a work groups associated with either the
Figure 7. Overview of 36-011909(H), facing South/Southwest).

Figure 8. Example of Material from 36-011909(H).
railroad or highway. In any case, these remains are not unique or significant and any removal or disturbances to these remains will not result in any adverse environmental impact. They have been recorded and no further studies are warranted at this time.

36-011917

36-011917 was recorded by Farrugia et al. in 2004 and described as “… four small circular, prehistoric desert intaglios located on a desert pavement surface atop a northeast-southwest trending bajada ridgetop that slopes gently to the east. The intaglios range from approximately 2.0 m to 2.8 m in diameter, and appear as cleared, narrow circular paths within the desert pavement. No cultural materials were observed within the immediate vicinity of the intaglios. Tire tracks have impacted each intaglio to some extent.” These features were located at UTMs 0727545 Easting/3845042 Northing and mapped in the area of the south of the Trailer Park and north of the railroad alignment. An intensive survey of this area (Figure 9) showed the area to be highly disturbed and no evidence of the four circular features was found. These features may have been destroyed by additional use of the area and/or subsequent erosion from the impacts to the desert pavement.

Figure 9. Overview of Area Associated with 36-11917 (facing Northwest).
In any case, these features were not relocated and were likely destroyed sometime between 2004 and 2011. Therefore, McKenna et al. has concluded that no adverse impacts to these features will occur as a result of the proposed improvements. The features were not mapped along any of the proposed trail routes and the failure to relocate the site confirms no impacts are expected.

If these features are relocated in some other location and are confirmed to be prehistoric intaglios, they would be considered significant cultural resources requiring protection.

36-011918

36-011918 was recorded by Farrugia et al. in 2004 at UTM 0727490 Easting/3844952 Northing. This location is only 50 meters from 36-011917 (see above) and the site is described as “… a prehistoric rock ring feature consisting of a single-coursed, circular alignment of schist/rocks 2.3 m in diameter on a desert pavement surface … No cultural materials were found in association with the rock ring feature.” This feature is adjacent to a small drainage.

McKenna et al. attempted to relocate this feature using the reported UTM coordinates. No evidence of the feature was found. This location, as noted for 36-011917, is highly disturbed by erosion with evidence of bulldozing and/or clearance. Based on the negative findings, McKenna et al. has concluded that this site/feature no longer exists or is located elsewhere. At this time, McKenna et al. has concluded the site has been destroyed. In any case, the site is not located along any of the proposed trail routes and would not have been impacted by any trail development activities. Therefore, the project will not result in any adverse impacts to this site. If the site is relocated at a later date, a reassessment of impacts may be required.

36-020385

Isolate 36-020385 was recorded by Farrugia et al. in 2004 and described as an isolated hearth “… of unknown antiquity.” This feature (which should have been recorded as a feature or site) was mapped as being located south of the BNSF railroad alignment, west of Park Moabi Road, and at UTM coordinates 0727402 Easting/3844775 Northing. This area is within the southwestern quarter of Section 6 (T7N, R24E). Farrugia et al. (2004:1) described the feature as “… a group of about 20 fire-altered schist and granitic rocks in a 65 cm diameter that appears to be an eroded fire hearth of unknown antiquity …” and in an area disturbed by a bulldozer blade.
McKenna et al. was unable to relocate this feature. The UTMs were used to identify the general area (Figure 10), but no evidence of the feature was evident. The area was found to be highly disturbed by erosion and grading and McKenna et al. concluded this feature no longer exists.

![Figure 10. General Area of 36-020385 (facing East/Northeast).](image)

**36-020386**

36-020386 was recorded by Gothar in 2004 and described as an isolated rock ring “… of unknown antiquity.” This feature was further described as “… a collapsed rock campfire ring … composed of approximately 35 rocks … [M]ost of the rocks are granitic, although a few are of schist. The cluster of rocks measures 1.0 x 1.2 m and does not appear to be stacked. The central part of the rick feature is devoid of rocks. None of the rock appear to be fire altered.” This feature was recorded as being located at UTM coordinates 0727433 Easting/3844669 Northing, approximately 100 meters south/south-east of 36-020385 (see above).
McKenna et al. was unable to relocate this feature. The area of the UTM was examined, but no evidence of the feature, as described, was located. Given disturbances to the area, McKenna et al. concluded this feature no longer exists.

36-020387

36-020387 was recorded by Farrugia et al. in 2004 and described as consisting of “… five pieces of prehistoric ceramic that appear to be derived from a single vessel.” The sherds were also described as orange/red to brown with quartz temper. The UTM coordinates for this resource were 0727553 Eating/3844693 Northing. This location is northeast of 36-020386 (see above) and also within the general area of significant disturbance. McKenna et al. did not relocate these sherds. The area associated with the UTM has been impacted by flooding/runoff and mechanical clearing. McKenna et al. has concluded the sherds may still be in the area, but relocated and possibly buried by the movement of sands resulting from runoff and/or grading.

Recently Recorded Resources

The McKenna et al. survey of the current project area within Park Moabi Regional Park resulted in the identification of three resources: Park Moabi Regional Park, itself; the Santa Fe Railroad (BNSF); and one isolated prehistoric sherd.

Park Moabi Regional Park

Park Moabi Regional Park is a public facility supervised by the San Bernardino County Regional Parks Department and, historically, part of the larger Havasu National Wildlife Refuge. The Refuge was established in 1941 and under the jurisdiction of the United States Fish and Wildlife Service. Park Moabi was carved out of the Refuge, essentially placing the Refuge in the Arizona and the public access area in California. Park Moabi was developed prior to 1971 and has been subjected to numerous phases of improvement and development since then. The peninsula (Pirate’s Cove) is a man-made feature that was developed in conjunction with the establishment of the marina and boat ramps. Other improvements/features identified within the Park include:

- Roadways (paved and unpaved)
- Fence Post and Fence Lines
- Drainages/Buried Pipes/Culverts
- Buried Utilities
• Transmission Poles and Lines
• Trailer Court
• Campsites with Restrooms, etc.
• Boat Ramps with Utilities (e.g. Gas Pumps)
• Storage Yard

• Sewage Treatment Pond(s)
• Water Tanks
• Condos and Restaurant
• Store and Rental Offices
• Picnic Areas
• Playground

The Park is fully accessible and in regular use. The proposed improvements will be limited to areas within the defined Park boundaries and, for the most part, limited to areas west of Park Moabi Road. The proposed project will not involve the removal of any amenities (buildings or features), but will require access along existing roadways (paved and unpaved; Figure 11).

Figure 11. Example of Existing Roadway in Park Moabi (BLM Road 4012) and Proposed for Trail Improvements (facing East).

Park Moabi is an important recreational facility in San Bernardino County, but is essentially a modern facility that has been in a constant state of alterations, improvement, and change. The currently proposed improvements will be minimal, by comparison. Mc-
Kenna et al. has concluded that, although the Park is constantly used and considered a positive addition to the County park system, it does not meet the minimum requirements for recognition as a historical resource, as defined in CEQA. Individual elements or sites/features within the Park, such as CA-SBR-5237 (an intaglio site listed in the National Register of Historic Places) and CA-SBR-2910H (National Old Trails Highway/Route 66 (Figure 12), also listed in the National Register of Historic Places), are significant resources and adverse impacts must be avoided.

![Figure 12. Historic Route 66 on River Frontage within Park Moabi – with Modern Improvements within the Park (facing South).](image)

**Santa Fe Railway (BNSF)**

The Santa Fe Railway (Atchison Topeka & Santa Fe Railway, now the Burlington Northern Santa Fe Railroad) was originally founded to connect the mid-west (Kansas) with the trading center in Santa Fe, New Mexico (ca. 1859-1860). Plans for the railroad were delayed by the Civil War, but activities commenced in 1868 with the initial purchases of property for right-of-way. Construction into Colorado was underway by 1875. The railway was complete to Albuquerque by 1880. In the meantime, the construction
of the Atlantic & Pacific Railroad line was completed to Needles, California, turning south to connect with Yuma (ca. 1893).

The logo used on the overpass at Park Moabi (Figure 13) is indicative of the post-1901 logo (Berkman 1988:29), suggesting this portion of the railroad alignment was completed between 1893 and 1901. The bridge supporting this crossing is marked 1942, indicating a rebuilding of the bridge to allow continued use of the overpass and the highway.

![Figure 13. Santa Fe Crossing at National Old Trails Highway (facing South).](image)

The Santa Fe Railway merged with the Burlington Northern Railroad in 1995. Improvements along the rail line were evident by the presence of modern replacement rails along the alignment and debris adjacent to the railroad berm (Figure 14).

Although this alignment runs through Park Moabi, the proposed trail improvements will not impact the railroad alignment. Therefore, McKenna et al. has concluded the proposed project will have no adverse impact on the BNSF railroad alignment and no further studies are warranted.
Isolated Prehistoric Artifact

An isolated brownware sherd was identified in the dunes between BLM Road 4012 and the campsites on the peninsula. This sherd was identified at UTM coordinates 0726626 Easting/3847058 Northing and within soft sand dunes (Figure 15). This small sherd measured 3.6 cm x 3.2 cm x .5 cm and appears to have been water worn. No other items were identified in the area and this isolated sherd is not considered a significant resource. No further studies are warranted with respect to this item.

SUMMARY AND RECOMMENDATIONS

The recent investigations of Park Moabi Regional Park, San Bernardino County, California, was conducted to assess the potential impacts proposed improvements may have on known cultural resources within the project area. In this case, the project area is predominantly west of Park Moabi Road, but also includes one area near the entrance of the park, east of Park Moabi Road (see Figure 3). McKenna et al. conducted the necessary background research and field investigations to insure all identified resources have been adequately recorded and assessed with respect to the proposed
project. This level of research included an updated archaeological records search, a review of Native American consultation and paleontological overviews,

![Figure 15. Isolated Sherd in Sand Dunes.](image)

Research confirmed the area within and surrounding Park Moabi is sensitive for the presence of both prehistoric and historic cultural resources. The Topock Intaglios are nearby and other rock art (intaglios) have been recorded within the Park. The historic alignment(s) of National Old Trails Highway/Route 66 also cross the Park. Research identified numerous prehistoric and historic archaeological resources within and adjacent to the Park.

With respect to the specific project area addressed in this report, a total of six previously recorded resources: 36-002910(H), National Old Trails Highway/Route 66; 36-011909(H), historic refuse concentration; 36-011917 (four rock rings), 36-011918 (one rock ring); 36-020385, hearth; 36-020386, rock ring; and 36-020387, pot bust, have been recorded in or adjacent to the current project area.

Of these, only 36-002910(H) and 36-011909(H) were relocated. The remaining four resources were either destroyed, mapped in the wrong location, or were not recognized as described in the field. In any case, the recorded locations of these four resources
will not be impacted by the proposed improvements and, therefore, no adverse impacts are anticipated. Likewise, Site 36-011909(H) was relocated, but the recent assessed determined this refuse concentration was of no historical significance. The deposit, dating to the Great Depression, has been interpreted as the remains of a work camp associated with the railroad or road developments in the area. No unique or significant artifacts were associated with the refuse and this site has been well documented. No further studies are warranted with respect to 36-011909(H).

Resources recently recorded include: Park Moabi Regional Park, the Santa Fe/BNSF Railroad alignment, and an isolated prehistoric brownware sherd. Of these, McKenna et al. has determined the Park is interesting, but does not rise to the level of recognition as a historical resource as defined in CEQA. The majority of improvements within the Park are modern and represent 1970s through 2000s improvements. While there are some significant cultural resources within the Park, the Park, itself, is not considered significant.

Likewise, the isolated ceramic brownware sherd is not a significant find. This relatively small sherd was found in an area of sand dunes and exhibited considerable water wear, indicating it has been tossed by water (the Colorado River or runoff) for a considerable amount of time and is not in its original location. This artifact is not associated with any other materials and cannot be dated other than to suggest a prehistoric origin (it may also be a historic ceramic). McKenna et al. recorded this artifact and no further studies are warranted.

The Santa Fe/BNSF railroad alignment within Park Moabi dates between 1893 and 1901, with continued improvements and use until today (2011 and into the future). The bridge crossing over National Old Trails Highway/Route 66 dates to 1942. This railroad alignment is part of the greater transcontinental railroad system that played a significant role in the successful development of the West. As such, this railroad alignment would qualify as a significant historical resource under CEQA Criterion 1, an association with “…events that have made a significant contribution to the broad patterns of California’s history and cultural heritage.” This resource would also qualify for listing in the National Register of Historic Places under Criterion A, “… associated with events that have made a significant contribution to the broad patterns of our history.”

In summary, McKenna et al. has concluded that there are a minimum of nine (9) cultural resources within or adjacent to the current project area. Of these, only two are of any concern: National Old Trails Highway/Route 66 (36-002910(H) and the Santa Fe/BNSF railroad. The project will have no impact on the railroad alignment. It will, however, involve areas along historic National Old Trails Highway/Route 66, which is already listing
in the National Register of Historic Resources. As a listed property, this resource is also eligible for listing in the California Register of Historical Resources, is an identified California Historical Landmark, and is still used within the Park. As a listed property, this resource requires protection from adverse environmental impacts. To protect this resource, the proposed project should be designed to avoid any adverse impacts. This can be done by avoiding impacts to the existing pavement(s) and by placing any signage or supporting facilities off the existing pavement(s). If avoidance is not possible, any project-related impacts should be kept to a minimum and designed in a manner that does not negate the recognition of the alignment as the historic National Old Trails Highway/Route 66.

There is a very low potential for any evidence of paleontological resources within the project area. Therefore, no mitigation measures are needed with respect to paleontological resources.

At this time, McKenna et al. see no reason to require archaeological monitoring of the proposed improvements. If the project description changes, this issue may require reassessment.

If, at any time, evidence of previously unidentified resources are identified within the project area, these resources will require assessment. If human remains are identified, the County Coroner must be notified within 24 hours and permitted to assess the remains. If the remains are determined to be of Native American origin, the Most Likely Descendant (MLD) will be identified by the Native American Heritage Commission and the remains will be handled, through consultation between the County, Archaeological Consultant, and MLD, in a manner consistent with State law and the concerns of the Native American representative(s).

* * * * * * * * * * * * * * *

Any questions or comments regarding this study should be directed to the author, Jeanette A. McKenna, Principal Investigator, McKenna et al., Whittier, California.

Jeanette A. McKenna, Principal, McKenna et al. Date
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APPENDIX A:
Professional Qualifications
JEANETTE A. McKENNA
Owner and Principal Investigator
McKenna et al., Whittier CA

Ms. McKenna specializes in the field of Cultural Resource Management: prehistoric archaeology, historic archaeology, and history. She is a past member of the Board of Directors for the Society of Professional Archaeologists (SOPA 1993-97) and was certified by the Society to conduct both prehistoric and historic archaeological studies. Ms. McKenna was on the Board of Directors for SOPA when the Society established the Registry of Professional Archaeologists (RPA) and has been a Registered Professional Archaeologist since 1998. Ms. McKenna has over 33 years of professional experience as an archaeologist/cultural resource manager and has participated on over 1500 projects. The majority of her work has been conducted as a Field Director, Project Manager, and/or Principal Investigator throughout California and the Greater Southwest.

TECHNICAL CAPABILITIES

- Vast experience in the greater Southwest, Great Basin, and Southern California regions. Familiar with the full range of cultural resource investigations and has completed projects within the public and private sectors, including environmental management firms, planning and engineering firms, and State and federal agencies.

- Active in the discipline of Cultural Resource Management since 1976; over 30 years of professional experience in Southern California, Arizona, and Nevada.

- Particular interest in the desert regions of California and Arizona, with specializations in the Proto-historic and Historic Contact Periods.

- Considerable experience in dealing with prehistoric cultural remains and working directly with Native American groups in archaeological training programs (through Arizona State University and the Southern California Indian Center, Garden Grove).

SELECTED PROJECT EXPERIENCE

- Historic Architectural Studies for Renovation and Restoration of the Greek Theatre, Los Angeles CA

- Evaluation of Cultural Resources within the Burbank and West Hollywood Redevelopment Project Areas, Los Angeles County, CA

- Historic Property Survey for the City of Whittier, Los Angeles County, CA

- Archaeological Investigations and Resource Evaluations for the Proposed Cajon Pipeline, San Bernardino and Los Angeles Counties, CA

- Archaeological Class I Investigations for the Proposed Mojave Pipeline, San Bernardino County, CA

- Cultural Resources Investigations (Phases I, II, III, and Mitigation Monitoring) for the RIX/SARI Projects, Santa Ana Watershed Project Authority (SAWPA), San Bernardino and Riverside Counties, CA

- Phase I, II, and III Archaeological Investigations for the County Sanitation Districts of Los Angeles County, Puente Hills Landfill Solid Waste Management Facility Expansion Project, Whittier, CA

- Archaeological Mitigation Program, The Phoenix Indian School Track Site Project. Arizona State University Office of Cultural Resource Management and the Bureau of Indian Affairs, Phoenix, AZ

- Archaeological and Testing Program for the Hidden Valley Golf Course and Van Buren Golf Course Properties, Riverside County, CA

- Cultural Resources Overview Studies for the Annexation of Unincorporated County Lands to the City of Ontario, CA

- Historic Property Survey Reports: Warner Bros. Main Lot Ranch Lot Properties, Burbank, CA

- Historic Archaeological Investigations for L.A. County Sheriff’s Facility, Lancaster, CA.

EDUCATION AND AFFILIATIONS

B.A., Anthropology, 1977, CSU Fullerton
M.A., Anthropology, 1982, CSU Fullerton
Lambda Alpha Lambda Honors Society
Post Graduate Studies, Arizona St. Univ., 1982-85
Post Graduate Studies, UC Riverside, 1991-92
Certification Program: CEQA, Land Use and Environmental Planning, UC Riverside, 1997-98
Society of Professional Archaeologists (SOPA)
Certification: Field/ Prehistoric Archaeology and Historical Archaeology (1984 to Present)
Registry of Professional Archaeologists (RPA)
Board of Directors, Society of Professional Archaeologists 1993-1997 (American Society of Conservation Archaeologists Representative)
BLM California Permit
BLM Arizona State Permit
Riverside County Registration No. 161
Arizona State Museum Antiquities Permit (renewable)
Curation Agreement, San Bernardino County Museum
AND Arizona State University
APPENDIX B:
Archaeological Records Search
December 7, 2009

San Bernardino County Museum
Archaeological Information Center
Attn: Robin Laska
2024 Orange Tree Lane
Redlands, California 92374

RE: Standard Archaeological Records Check.

Dear Robin:

Please complete a standard archaeological records check for the property identified on the attached map (USGS Whale Mountain Quad). The project area is on a 90 acre manmade peninsula in Park Moabi. The project is for a proposed 250 space RV Park. Please complete the research for a one mile radius, remaining on the Whale Mountain USGS.

Please let me know if you have any questions or comments.

Thanks,

Jeanette A. McKenna, Principal
McKenna et al.
15 December 2009

Jeanette McKenna
McKenna et al
6008 Friends Ave
Whittier, CA 90601-3724

(562) 696-3852

HISTORICAL RESOURCES RECORD SEARCH: Park Moabi

In response to your request for information dated 7 December 2009, a records search has been conducted for the above project on USGS Whale Mtn 7.5' quad.

Historical Resources:

Prehistoric Archaeological Resources:
61 prehistoric archaeological sites
12 pending prehistoric archaeological sites
0 prehistoric districts
14 prehistoric isolates

Historic Archaeological Resources (sites older than 50 years of age):
6 historic archaeological sites
1 pending historic archaeological sites
0 historic structures
0 historic districts
0 historic isolates
7 possible historic structure/archaeological site locations determined from historic maps (maps checked): Thompson, 1917/20, 1929; Beasley, 1892; Blackburn, 1932; Perris, 1896; Kremmerer, 1925; AAA-various; USGS Needles, 1902/3; USGS Sawtooth Range, 1950.

Cultural Landscapes:
0 cultural Landscapes

Ethnic Resources:
0 ethnic resources

Heritage Properties (designated by State and Federal commissions):
2 National Register Listed Properties
2 National Register Eligible Properties
1 California Historic Landmarks
0 California Points of Historic Interest
PREVIOUS HISTORICAL RESOURCE INVESTIGATIONS:

Historical resource reports for the project area include:

- 10 Area-specific survey reports
- 6 General area overviews

In addition to the Center's historical resources files, the following publications, manuscripts or correspondence also were consulted:

- **1988** Five Views: An Ethnic Sites Survey for California.
  
  California Historical Landmarks.
  
  California Points of Historical Interest.
- **2009** Determinations of Eligibility—Records entered into the OHP computer file—received quarterly.
- **2009** Directory of Historic Properties—Records entered into the OHP computer file of historic resources—received quarterly.

SENSITIVITY OF PROJECT AREA FOR HISTORICAL RESOURCES:

Based upon the above information, available historical records and maps, and comparisons with similar environmental localities, the sensitivity assessment for this project area is:

- Prehistoric Archaeological Resources: High
- Historic Archaeological Resources: Low
- Historic Resources: Low
- Cultural Landscapes: Unknown
- Ethnic Resources: Unknown

**Comments:** Potential for Prehistoric Archaeological Resources based on sites found in the APE.
RECOMMENDATIONS:

In order to minimally comply with CEQA, NEPA and/or Section 106 of the National Historic Preservation Act, a field survey should be conducted by a qualified professional for historical resources within portions of the project area not previously surveyed for such resources. A list of qualified professionals can be found at www.chrisinfo.org.

A CEQA Initial Study of "MAYBE" for potential adverse environmental impact to historical resources is warranted unless it can be documented by a qualified professional that NO resources older than 45 years in age exist on the property. Implementation of the above recommendation(s) will ensure that existing historical resources will be inventoried and evaluated, and that appropriate mitigation measures will be recommended to avoid adverse impacts.

If appropriate mitigation measures are not proposed for significant historical resources within the project area, then subsequent destruction of these resources may violated the California Environmental Quality Act, Nation Environmental Policy Act, National Historic Preservation Act, California codes or various local government ordinances.

If prehistoric or historic artifacts over 50 years in age area encountered during land modification, than activities in the immediate area of the finds should be halted and an on-site inspection should be performed immediately by a qualified archaeologist. This professional will be able to assess the find, determine its significance, and make recommendations for appropriate mitigation measures within the guidelines of the California Environmental Quality Act and/or the Federal National Environmental Policy Act.

If human remains are encountered on the property, then the San Bernardino County Coroner's Office MUST be contacted within 24 hours of the find, and all work should be halted until a clearance is given by that office and any other involved agencies. Contact the County Coroner at 175 South Lena Road, San Bernardino, CA 92415-0037 or (909) 387-2543, or (760) 955-8535 in Victorville, or (760) 365-1668 in Yucca Valley or (760) 326-4825 in Needles.

The County of San Bernardino requests that historical resource data and artifacts collected within this project area be permanently curated at a repository within the County. Per a State Historical Resources Commission motion dated 7 Feb 1992, the repository selected should consider 36 CFR 79, Curation of Federally-owned and Administered Archaeological Collection; Final Rule, as published Federal Register, 12 Sept 1990, or a later amended for, for archival collection standards.

If you have any further questions, please, contact me at (909) 307-2669 x 255, Monday through Friday between 8 AM and 4 PM.

Robin E. Laska
Assistant Center Coordinator
Document No.: 1060892
GALLEGOSS, DENNIS, EMMA LOU DAVIS, GARY LOWE, FRANK NORRIS, AND JAY THESKEN
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REDLANDS, CA 92374.
Last Update: 01/17/89 Cataloged by: WRO-CA-03 on 01/17/89

Document No.: 1060991
NORRIS, FRANK B.
1980 HISTORICAL AND ARCHITECTURAL RESOURCES WITHIN THE LOWER COLORADO
RIVER SYSTEM. WESTEC SERVICES, INC. SUBMITTED TO DEPARTMENT OF THE
INTERIOR. UNPUBLISHED REPORT ON FILE AT S.B. CO. MUSEUM, 2024 ORANGE
TREE LANE, REDLANDS, CA 92374.
Last Update: 02/01/89 Cataloged by: WRO-CA-03 on 02/01/89

Document No.: 1061069
WARREN, ELIZABETH VON TILL, ROBERT H. CRABTREE, CLAUDE N. WARREN, MARTH
KNACK, AND RICHARD MCCARTHY
1981 A CULTURAL RESOURCES OVERVIEW OF THE COLORADO DESERT PLANNING UNITS.
ELIZABETH VON TILL WARREN ET AL. SUBMITTED TO BUREAU OF LAND MANAGEMENT
- RIVERSIDE OFFICE. UNPUBLISHED REPORT ON FILE AT S.B. CO. MUSEUM, 2024
ORANGE TREE LANE, REDLANDS, CA 92374.
Last Update: 02/24/89 Cataloged by: WRO-CA-03 on 02/24/89

Document No.: 1061190
SWARTHOUT, JEANNE AND CHRISTOPHER E. DROVER
1981 FINAL REPORT FOR AN ARCHAEOLOGICAL OVERVIEW FOR THE LOWER COLORADO
RIVER VALLEY, ARIZONA, NEVADA, AND CALIFORNIA: REACH 3, DAVIS DAM TO THE
INTERNATIONAL BORDER. MUSEUM OF NORTHERN ARIZONA. SUBMITTED TO BUREAU
OF RECLAMATION. CONTRACT NO. 9-07-30-X0035. UNPUBLISHED REPORT ON FILE
AT S.B. CO. MUSEUM, 2024 ORANGE TREE LANE, REDLANDS, CA 92374.
Last Update: 03/20/89 Cataloged by: WRO-CA-03 on 03/20/89

Document No.: 1062585
STONE, CONNIE L.
1991 THE LINEAR OASIS: MANAGING CULTURAL RESOURCES ALONG THE LOWER
COLORADO RIVER. BUREAU OF LAND MANAGEMENT. SUBMITTED TO UNKNOWN.
UNPUBLISHED REPORT ON FILE AT S.B. CO. MUSEUM, 2024 ORANGE TREE LANE,
REDLANDS, CA 92374.
Last Update: 01/14/93 Cataloged by: WRO-CA-03 on 12/29/92

Document No.: 1062878
BONINE, KATHLEEN ANNE
1993 CULTURE CONTACT CHANGE AND CONTINUITY: THE MOHAVE INDIANS. M.A.
THESIS. CAL STATE SAN BERNARDINO.
Last Update: 10/06/94 Cataloged by: WRO-CA-03 on 10/04/94
1976 AN ARCHAEOLOGICAL SURVEY OF THE PROPOSED PARK MOABI MOTORCYCLE RACE
COURSE PROJECT AREA, SAN BERNARDINO COUNTY, CALIFORNIA. ARIZONA STATE
UNIVERSITY. SUBMITTED TO BUREAU OF LAND MANAGEMENT. UNPUBLISHED REPORT
ON FILE AT S.B. CO. MUSEUM, 2024 ORANGE TREE LANE, REDLANDS, CA 92374.

Last Update: 12/22/1988

1978 AN ARCHAEOLOGICAL ASSESSMENT OF THE PROPOSED PIPELINE ROUTE IN THE
VICINITY OF NEEDLES, CALIFORNIA. SAN BERNARDINO COUNTY MUSEUM
ASSOCIATION. SUBMITTED TO SOUTHERN CALIFORNIA GAS COMPANY. UNPUBLISHED
REPORT ON FILE AT S.B. CO. MUSEUM, 2024 ORANGE TREE LANE, REDLANDS, CA
92374.

Last Update: 01/12/1989

1979 CULTURAL RESOURCES SURVEY: SOUTHERN CALIFORNIA GAS COMPANY,
ALTERNATE B PIPELINE CORRIDORS, NEEDLES AREA, SAN BERNARDINO COUNTY,
CALIFORNIA. SAN BERNARDINO COUNTY MUSEUM ASSOCIATION. SUBMITTED TO
SOUTHERN CALIFORNIA GAS COMPANY. UNPUBLISHED REPORT ON FILE AT S.B. CO.
MUSEUM, 2024 ORANGE TREE LANE, REDLANDS, CA 92374.
1979 AN ARCHAEOLOGICAL AND PALEONTOLOGICAL ASSESSMENT OF THE SOUTHERN CALIFORNIA GAS COMPANY'S ALTERNATE PIPELINE ROUTES IN THE VICINITY OF NEEDLES, CALIFORNIA. SAN BERNARDINO COUNTY MUSEUM ASSOCIATION. SUBMITTED TO SOUTHERN CALIFORNIA GAS COMPANY. UNPUBLISHED REPORT ON FILE AT S.B. CO. MUSEUM, 2024 ORANGE TREE LANE, REDLANDS, CA 92374.

1980 CULTURAL RESOURCES INVESTIGATION OF FOURTEEN PROPOSED STOCKPILE SITES, COLORADO RIVER FRONT WORK AND LEVEE SYSTEM, CALIFORNIA. J.G. MIDDLETON. SUBMITTED TO BUREAU OF RECLAMATION - LOWER COLORADO REGION OFFICE. UNPUBLISHED REPORT ON FILE AT S.B. CO. MUSEUM, 2024 ORANGE TREE LANE, REDLANDS, CA 92374.

1986 TOPOCK EVAPORATION POND PROJECT: INTENSIVE CULTURAL RESOURCES SURVEY. INFOTEC RESEARCH, INC. SUBMITTED TO PACIFIC GAS AND ELECTRIC COMPANY. UNPUBLISHED REPORT ON FILE AT S.B. CO. MUSEUM, 2024 ORANGE TREE LANE, REDLANDS, CA 92374.
Keywords: PREHISTORIC (1), HISTORIC (1), ARCHAEOLOGICAL RECONNAISSANCE REPORT (1), ROAD (1), CHALCEDONY QUARRY (1), QUARTZITE QUARRY (1), FLAKED LITHICS (3), QUARTZITE (3), CHALCEDONY (3), STONE DISK (3), MOJAVE DESERT (4), COLORADO RIVER (4), USGS TOPOCK 7.5' QUAD (4), USGS WHALE MOUNTAIN 7.5' QUAD (4), CA-SBR-5523 (4), CA-SBR-5524H (4), 86-4.2 (7)

Document No.: 1061659

PEYTON, PAIGE M.

1987 GROUND DRAWINGS OF THE LOWER COLORADO RIVER: AN ANALYSIS OF TECHNIQUE, CONTEXT, AND DESIGN. PAIGE M. PEYTON. SUBMITTED TO CALIFORNIA STATE UNIVERSITY AT SAN BERNARDINO. UNPUBLISHED REPORT ON FILE AT S.B. CO. MUSEUM, 2024 ORANGE TREE LANE, REDLANDS, CA 92374.


Document No.: 1063869

LOVE, BRUCE

2000 IDENTIFICATION AND EVALUATION OF HISTORIC PROPERTIES: AT&T WIRELESS SITE C989.2 IN PARK MOABI, SAN BERNARDINO COUNTY, CA. 15PP. CRM TECH. SUBMITTED TO TOM DODSON ASSOCIATES. UNPUBLISHED REPORT ON FILE AT S.B. CO. MUSEUM, 2024 ORANGE TREE LANE, REDLANDS, CA 92374.

Last Update: 05/19/2005 Cataloged by: WRO-CA-03 on 05/19/2005

Keywords: ARCHAEOLOGICAL RECONNAISSANCE REPORT (1), 1 ACRE (4), COLORADO RIVER (4), MOJAVE DESERT (4), NO RESOURCES (4), USGS WHALE MOUNTAIN 7.5'
Cultural Resources Investigations for

Interim Measures No. 3: Topock Compressor Station Expanded Groundwater Extraction and Treatment System

San Bernardino County, California

Prepared for

Pacific Gas and Electric Company

August 2004

Prepared by

CH2MILL
2485 Natomas Park Drive, Suite 600
Sacramento, California 95833
Authors: Douglas M. Davy, Ph.D.; W. Geoffrey Spaulding, Ph.D; Robin McClintock; and Raena Ballantyne; CH2M Hill, 2485 Natomas Park Drive, Suite 600, Sacramento, California 95833

Date: August 2004

Title: Cultural Resources Investigations for Interim Measures No. 3: Topock Compressor Station Expanded Groundwater Extraction and Treatment System, San Bernardino County, California

Submitter: Pacific Gas & Electric Company, San Francisco, California

Submitted to: United States Bureau of Land Management (BLM), Lake Havasu Field Office, Lake Havasu City, Arizona, and the California Department of Toxic Substances Control, Sacramento, California

Permit No.: BLM Cultural Resource Use Permit AZ-000277

USGS Quad: Topock and Whale Mountain 7.5-minute quadrangles

Acreage: Area surveyed: 155 acres (100 private, 55 public)

Keywords: San Bernardino County, geoglyph, intaglio, Topock Maze, Route 66, National Old Trails Road, lithic scatter
Archaeological and Historical Investigations
Third Addendum: Survey of the Original and Expanded APE
for
Topock Compressor Station
Site Vicinity
San Bernardino County, California
Mohave County, Arizona

Prepared for
Pacific Gas and Electric Company

May 2007

Prepared by
Applied EarthWorks
3292 E. Florida Avenue, Suite A
Hemet, California 92544
National Archaeological Database Information:

Authors: Dennis McDougall and Melinda Horne, M.A., RPA
Applied EarthWorks, Inc., 3292 E. Florida Avenue, Suite A, Hemet, California 92544

Date: May 2007

Title: Archaeological and Historical Resources Investigations, Third Addendum: Survey of the Original and Expanded APE, for Interim Measures No. 3: Topock Compressor Station Expanded Groundwater Extraction and Treatment System, San Bernardino County, California, and Mohave County, Arizona

Submitter: Pacific Gas & Electric Company, San Francisco, California

Submitted to: United States Bureau of Land Management (BLM), Lake Havasu Field Office, Lake Havasu City, Arizona

Permit No.: BLM Cultural Resource Use Permit AZ-000286

USGS Quad: Topock and Whale Mountain 7.5-minute quadrangles

Acreage: Area surveyed: 1,815 acres

Keywords: San Bernardino County, Mohave County, National Old Trails Road, Historical Route 66, Workman's El Rancho Colorado Roadhouse, Historical Refuse Scatter, Atlantic & Pacific/AT&SF Railroad, Prehistoric Trail, Topock Maze, Intaglio, Rock Ring, Assay and Reduction Station, Lithic Quarry, Complex Lithic Scatter, Rock Shelter, Temporary Camp, Rock Alignment, Ceramic Scatter, Hunting Blind, Isolate Artifact
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EARTH FIGURES OF THE CALIFORNIA-ARIZONA COLORADO RIVER BASIN

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- Site D-4 (SBR-1076) - KUNCHANA B
  D2 - SBR-5239
  D3 - 1075 - KUNCHANA
  D4 - 1077 - KUNCHANA
  D7 - 1078 - KUNCHANA D
  D9 - 1080 - KUNCHANA F
  D10 - SBR-341

X D-11 SBR-5237
X D-12 SBR-943 - BEAL ANTHRO

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**Note:**
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- 10/15/09: Hector - McLean
- 7/15/09: Harkness - McLean
- 6/15/09: Toteck - McDonald
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APPENDIX C:
Native American Consultation
LOCAL GOVERNMENT TRIBAL CONSULTATION LIST REQUEST

NATIVE AMERICAN HERITAGE COMMISSION

DATE: December 7, 2009

915 Capitol Mall, Room 364
Sacramento, California 95814
(916) 653-4082
(916) 657-5390 Fax

Project Title: **Pirate Cove Peninsula, Park Moabi, San Bernardino County, California**

Local Government/Lead Agency: **San Bernardino County**

Contact Person: **McKenna et al., (Attn: Jeanette A. McKenna)**

Street Address: **6008 Friends Avenue**

City: **Whittier, California** Zip: **90601-3724**

Phone: **(562) 696-3852** Fax: **(562) 693-4059**

Specific Area Subject to Proposed Action

County: **San Bernardino County**

City/Community: **Park Moabi Regional Park, Needles, California**

Local Action Type:

- **X** Pre-planning Outreach Activity

Project Description:

Development of 90 acres of the man-made peninsula, to allow for 250 RV spaces.

**X** SACRED LANDS FILE SEARCH AND NATIVE AMERICAN CONTACTS LIST REQUEST

*Information Below is Required for a Sacred Lands File Search*

USGS Quadrangle Name: **Whale Mountain (rev. 1983)**

Township **7 North** Range **24 East** Section(s) **Section 5 and 6**
December 15, 2009

Jeanette A. McKenna
McKenna et al.
6008 Friends Avenue
Whittier, CA 90601-3724

VIA FAX: 562-693-4059
# of Pages: 3

RE: SB 18 Tribal Consultation; Pirate Cove Peninsula, Park Moabi; San Bernardino County.

Dear Ms. McKenna:

Government Code §65352.3 requires local governments to consult with California Native American tribes identified by the Native American Heritage Commission (NAHC) for the purpose of protecting, and/or mitigating impacts to cultural places. Attached is a consultation list of tribes with traditional lands or cultural places located within the requested plan amendment boundaries.

As a part of consultation, the NAHC recommends that local governments conduct record searches through the NAHC and California Historic Resources Information System (CHRIS) to determine if any cultural places are located within the area(s) affected by the proposed action. NAHC Sacred Lands File requests must be made in writing. All requests must include county, USGS quad map name, township, range and section. Local governments should be aware, however, that records maintained by the NAHC and CHRIS are not exhaustive, and a negative response to these searches does not preclude the existence of a cultural place. A tribe may be the only source of information regarding the existence of a cultural place.

If you receive notification of change of addresses and phone numbers from Tribes, please notify me. With your assistance we are able to assure that our consultation list contains current information.

If you have any questions, please contact me at (916) 653-4040.

Sincerely,

[Signature]

Katy Sanchez
Program Analyst

Attachment
December 21, 2009

Jeanette A. McKenna
McKenna et al.
6008 Friends Avenue
Whittier, CA 90601-3724

Sent by Fax: 562-693-4059
Number of Pages: 3

Re: Proposed Private Cove Peninsula, Park Moab Regional Park; San Bernardino County.

Dear Ms. McKenna

A record search of the sacred lands file has failed to indicate the presence of Native American cultural resources in the immediate project area. The absence of specific site information in the sacred lands file does not indicate the absence of cultural resources in any project area. Other sources of cultural resources should also be contacted for information regarding known and recorded sites.

Enclosed is a list of Native Americans individuals/organizations who may have knowledge of cultural resources in the project area. The Commission makes no recommendation or preference of a single individual, or group over another. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. I suggest you contact all of those indicated, if they cannot supply information, they might recommend others with specific knowledge. If a response has not been received within two weeks of notification, the Commission requests that you follow-up with a telephone call to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from any of these individuals or groups, please notify me. With your assistance we are able to assure that our lists contain current information. If you have any questions or need additional information, please contact me at (916) 653-4040.

Sincerely,

Katy Sanchez
Program Analyst
Native American Contact
San Bernardino County
December 21, 2009

Fort Mojave Indian Tribe
Tim Williams, Chairperson
500 Merriman Ave   Mojave
Needles , CA 92363
(760) 629-4591
(760) 629-5767 Fax

Fort Mojave Indian Tribe
Esadora Evanston, Environmental Coordinator
500 Merriman Ave   Mojave
Needles , CA 92363
region9epa@ftmojave.com
(760) 326-1112
(760) 629-4591
(760) 629-5767 Fax

Colorado River Reservation
Michael Tsosie, Cultural Contact
Route 1, Box 23-B   Mojave
Parker , AZ 85344 Chemehuevi
synt@rraz.net
(928) 669-9211
(928) 669-5675 Fax

AhahMaKev Cultural Society, Fort Mojave Indian
Linda Otero, Director
P.O. Box 5990   Mojave
Mohave Valley AZ 86440
lindaotero@fortmojave.com
(928) 768-4475
(928) 768-7996 Fax

Fort Mojave Indian Tribe
Nora McDowell, Cultural Resources Coordinator
500 Merriman Ave   Mojave
Needles , CA 92363
g.goforth@fortmojave.com
(760) 629-4591
(760) 629-5767 Fax
Native American Tribal Consultation List
County of San Bernardino
December 21, 2009

San Manuel Band of Mission Indians
James Ramos, Chairperson
26568 Community Center Drive Serrano
Highland, CA 92346
(909) 864-8933
(909) 864-3724 - FAX

Morongo Band of Mission Indians
Robert Martin, Chairperson
12700 Pumarra Road Cahuilla
Banning, CA 92220 Serrano
Robert_Martin@morongo.org
(951) 849-8807
(951) 755-5200

Twenty-Nine Palms Band of Mission Indians
Darrell Mike, Chairperson
46-200 Harrison Place
Coachella, CA 92236 Chemehuevi
tribal-epa@worldnet.att.net
(760) 775-5566

Serrano Nation of Indians
Goldie Walker
8588 Valaria Drive Serrano
Highland, CA 92346
(909) 862-9883

Chemehuevi Reservation
Charles Wood, Chairperson
P.O. Box 1976 Chemehuevi
Chemehuevi Valley CA 92363
chemehuevi@yahoo.com
(760) 858-4301

Fort Mojave Indian Tribe
Tim Williams, Chairperson
500 Merriman Ave Mojave
Needles, CA 92363
(760) 629-4591

Colorado River Reservation
Michael Tsosie, Cultural Contact
Route 1, Box 23-B Mojave
Parker, AZ 85344 Chemehuevi
symi@raz.net
(928) 669-9211

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5067.94 of the Public Resources Code and Section 5067.93 of the Public Resources Code.

This list is applicable only for consultation with Native American tribes under Government Code Section 65352.3.
December 15, 2009

Fort Mojave Indian Tribe
Attn: Tim Williams, Chairperson
500 Merriman Avenue
Needles, California 92363

RE: Pirate Cover Peninsula RV Parking Developments, Moabi Park, San Bernardino County, CA.

Mr. Williams:

McKenna et al. is initiating cultural resources research for the proposed development of RV parking on Pirates Cove Peninsula, Moabi Park, San Bernardino County, California. I received your name and contact information from the Native American Heritage Commission, Sacramento. Please note that at this time, the research is limited to an archaeological records search, Native American consultation, and a paleontological overview. No field work has been scheduled.

The archaeological records search has identified the project area as being within an area of relatively high sensitivity for prehistoric and historic cultural resources. The Pirate Cove Peninsula is reported to be a man-made (or man-altered) landform on the Colorado River (within Moabi Park) and the proposed improvements have been identified as the development of approximately 250 RV parking spaces on the 90 acre peninsula. The development of the RV parking spaces will require some alteration of the current surface, the installation of some infrastructure (buried), and additional use of the overall area. To date, there is no record of the peninsula being previously surveyed for cultural resources and the origin of the materials for the development of the peninsula is currently unknown. Please review the attached map and provide me with any information you may have regarding this area and the presence/absence of cultural resources. Please respond in writing for our records and inclusion in our documentation to the County.

Sincerely,

Jeanette A. McKenna
Jeanette A. McKenna, Principal
McKenna et al.
June 9, 2010

Fort Mojave Indian Tribe
Attn: Tim Williams, Chairperson
500 Merriman Avenue
Needles, California 92363

RE: Pirate Cover Peninsula RV Parking Developments, Moabi Park, San Bernardino County, CA.

Mr. Williams:

On December 15, 2009, McKenna et al. informed you that investigations for the proposed development of RV parking facilities on Pirates Cove Peninsula, Moabi Park, San Bernardino County, California, were being initiated. At that time, the investigations were limited and did not include the physical survey of the project area. McKenna et al. is now in the process of initiating the field survey and will be preparing a supplemental technical report for compliance with the California Environmental Quality Act (CEQA), as amended.

The archaeological records search has identified the project area as being within an area of relatively high sensitivity for prehistoric and historic cultural resources. The development of the RV parking spaces will require some alteration of the current surface, the installation of some infrastructure (buried), and additional use of the overall area.

Please let me know of any information pertaining to this project area that you would like cited or referenced in my technical report. Please response in writing for our records and inclusion in our documentation to the County.

Sincerely,

Jeanette A. McKenna
Jeanette A. McKenna, Principal
McKenna et al.
December 15, 2009

AhaMaKav Cultural Society, Fort Mojave
Attn: Linda Otero, Director
P.O. Box 5990
Mohave Valley, Arizona 86440

RE: Pirate Cover Peninsula RV Parking Developments, Moabi Park, San Bernardino County, CA.

Ms. Otero:

McKenna et al. is initiating cultural resources research for the proposed development of RV parking on Pirates Cove Peninsula, Moabi Park, San Bernardino County, California. I received your name and contact information from the Native American Heritage Commission, Sacramento. Please note that at this time, the research is limited to an archaeological records search, Native American consultation, and a paleontological overview. No field work has been scheduled.

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Sincerely,

Jeanette A. McKenna
Jeanette A. McKenna, Principal
McKenna et al.
December 15, 2009

San Manuel Band of Mission Indians
Attn: James Ramos, Chairperson
26569 Community Center Drive
Highland, California 92346

RE: Pirate Cove Peninsula RV Parking Developments, Moabi Park, San Bernardino County, CA.

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McKenna et al.
June 9, 2010

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Sincerely,

Jeanette A. McKenna
Jeanette A. McKenna, Principal
McKenna et al.
McKenna et al.
History/Archaeology/Historic Architecture/Paleontology

Jeanette A. McKenna, MA
Registered Prof. Archaeologist
Owner and Principal Investigator

December 15, 2009

Fort Mojave Indian Tribe
Attn: Nora McDowell, Cultural Resources Coordinator
500 Merriman Avenue
Needles, California 92363

RE: Pirate Cover Peninsula RV Parking Developments, Moabi Park, San Bernardino County, CA.

Ms. McDowell:

McKenna et al. is initiating cultural resources research for the proposed development of RV parking on Pirates Cove Peninsula, Moabi Park, San Bernardino County, California. I received your name and contact information from the Native American Heritage Commission, Sacramento. Please note that at this time, the research is limited to an archaeological records search, Native American consultation, and a paleontological overview. No field work has been scheduled.

The archaeological records search has identified the project area as being within an area of relatively high sensitivity for prehistoric and historic cultural resources. The Pirate Cove Peninsula is reported to be a man-made (or man-altered) landform on the Colorado River (within Moabi Park) and the proposed improvements have been identified as the development of approximately 250 RV parking spaces on the 90 acre peninsula. The development of the RV parking spaces will require some alteration of the current surface, the installation of some infrastructure (buried), and additional use of the overall area. To date, there is no record of the peninsula being previously surveyed for cultural resources and the origin of the materials for the development of the peninsula is currently unknown. Please review the attached map and provide me with any information you may have regarding this area and the presence/absence of cultural resources. Please respond in writing for our records and inclusion in our documentation to the County.

Sincerely,

Jeanette A. McKenna
Jeanette A. McKenna, Principal
McKenna et al.
June 9, 2010

Fort Mojave Indian Tribe
Attn: Nora McDowell, Cultural Resources Coordinator
500 Merriman Avenue
Needles, California 92363

RE: Pirate Cover Peninsula RV Parking Developments, Moabi Park, San Bernardino County, CA.

Ms. McDowell:

On December 15, 2009, McKenna et al. informed you that investigations for the proposed development of RV parking facilities on Pirates Cove Peninsula, Moabi Park, San Bernardino County, California, were being initiated. At that time, the investigations were limited and did not include the physical survey of the project area. McKenna et al. is now in the process of initiating the field survey and will be preparing a supplemental technical report for compliance with the California Environmental Quality Act (CEQA), as amended.

The archaeological records search has identified the project area as being within an area of relatively high sensitivity for prehistoric and historic cultural resources. The development of the RV parking spaces will require some alteration of the current surface, the installation of some infrastructure (buried), and additional use of the overall area.

Please let me know of any information pertaining to this project area that you would like cited or referenced in my technical report. Please response in writing for our records and inclusion in our documentation to the County.

Sincerely,

Jeanette A. McKenna
Jeanette A. McKenna, Principal
McKenna et al.
McKenna et al.
History/Archaeology/Historic Architecture/Paleontology

Jeanette A. McKenna, MA
Registered Prof. Archaeologist
Owner and Principal Investigator

December 15, 2009

Twenty-Nine Palms Band of Mission Indians
Attn: Darrell Mike, Chairperson
46-200 Harrison Place
Coachella, California 92236

RE: Pirate Cover Peninsula RV Parking Developments, Moabi Park, San Bernardino County, CA.

Mr. Mike:

McKenna et al. is initiating cultural resources research for the proposed development of RV parking on Pirates Cove Peninsula, Moabi Park, San Bernardino County, California. I received your name and contact information from the Native American Heritage Commission, Sacramento. Please note that at this time, the research is limited to an archaeological records search, Native American consultation, and a paleontological overview. No field work has been scheduled.

The archaeological records search has identified the project area as being within an area of relatively high sensitivity for prehistoric and historic cultural resources. The Pirate Cove Peninsula is reported to be a man-made (or man-altered) landform on the Colorado River (within Moabi Park) and the proposed improvements have been identified as the development of approximately 250 RV parking spaces on the 90 acre peninsula. The development of the RV parking spaces will require some alteration of the current surface, the installation of some infrastructure (buried), and additional use of the overall area. To date, there is no record of the peninsula being previously surveyed for cultural resources and the origin of the materials for the development of the peninsula is currently unknown. Please review the attached map and provide me with any information you may have regarding this area and the presence/absence of cultural resources. Please response in writing for our records and inclusion in our documentation to the County.

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McKenna et al.
June 9, 2010

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Attn: Darrell Mike, Chairperson  
46-200 Harrison Place  
Coachella, California 92236

RE: Pirate Cover Peninsula RV Parking Developments, Moabi Park, San Bernardino County, CA.

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The archaeological records search has identified the project area as being within an area of relatively high sensitivity for prehistoric and historic cultural resources. The development of the RV parking spaces will require some alteration of the current surface, the installation of some infrastructure (buried), and additional use of the overall area.

Please let me know of any information pertaining to this project area that you would like cited or referenced in my technical report. Please response in writing for our records and inclusion in our documentation to the County.

Sincerely,

Jeanette A. McKenna
Jeanette A. McKenna, Principal
McKenna et al.
December 15, 2009

Chemehuevi Reservation
Attn: Charles Wood, Chairperson
P.O. Box 1976
Chemehuevi Valley, California 92363

RE: Pirate Cover Peninsula RV Parking Developments, Moabi Park, San Bernardino County, CA.

Mr. Wood:

McKenna et al. is initiating cultural resources research for the proposed development of RV parking on Pirates Cove Peninsula, Moabi Park, San Bernardino County, California. I received your name and contact information from the Native American Heritage Commission, Sacramento. Please note that at this time, the research is limited to an archaeological records search, Native American consultation, and a paleontological overview. No field work has been scheduled.

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Sincerely,

Jeanette A. McKenna
Jeanette A. McKenna, Principal
McKenna et al.
June 9, 2010

Fort Mojave Indian Tribe
Attn: Esadora Evanston, Environmental Coordinator
500 Merriman Avenue
Needles, California 92363

RE: Pirate Cover Peninsula RV Parking Developments, Moabi Park, San Bernardino County, CA.

Ms. Evanston:

On December 15, 2009, McKenna et al. informed you that investigations for the proposed development of RV parking facilities on Pirates Cove Peninsula, Moabi Park, San Bernardino County, California, were being initiated. At that time, the investigations were limited and did not include the physical survey of the project area. McKenna et al. is now in the process of initiating the field survey and will be preparing a supplemental technical report for compliance with the California Environmental Quality Act (CEQA), as amended.

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December 15, 2009

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Sincerely,

Jeanette A. McKenna
Jeanette A. McKenna, Principal
McKenna et al.
December 15, 2009

Colorado River Reservation
Attn: Michael Tsosie, Cultural Contact
Route 1, Box 23-B
Parker, Arizona 85344

RE: Pirate Cove Peninsula RV Parking Developments, Moabi Park, San Bernardino County, CA.

Mr. Tsosie:

McKenna et al. is initiating cultural resources research for the proposed development of RV parking on Pirates Cove Peninsula, Moabi Park, San Bernardino County, California. I received your name and contact information from the Native American Heritage Commission, Sacramento. Please note that at this time, the research is limited to an archaeological records search, Native American consultation, and a paleontological overview. No field work has been scheduled.

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Sincerely,

Jeanette A. McKenna, Principal
McKenna et al.

6008 Friends Avenue, Whittier, California 90601-3724   email = jmckena@earthlink.net
(562) 696-3852 OFFICE   (562) 693-4059 FAX   (562) 754-7712 CELL
June 9, 2010

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Attn: Michael Tsosie, Cultural Contact
Route 1, Box 23-B
Parker, Arizona 85344

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Sincerely,

Jeanette A. McKenna
Jeanette A. McKenna, Principal
McKenna et al.
December 15, 2009

Morongo Band of Mission Indians
Attn: Robert Martin, Chairperson
11581 Potrero Road
Banning, California 92220

RE: Pirate Cove Peninsula RV Parking Developments, Moabi Park, San Bernardino County, CA.

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Jeanette A. McKenna
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McKenna et al.

6008 Friends Avenue, Whittier, California 90601-3724    email = jmckena@earthlink.net
(562) 696-3852 OFFICE    (562) 693-4059 FAX    (562) 754-7712 CELL
Morongo Band of Mission Indians  
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11581 Potrero Road  
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Sincerely,

Jeanette A. McKenna
Jeanette A. McKenna, Principal
McKenna et al.
December 15, 2009

Serrano Nation of Indians
Attn: Goldie Walker
6588 Valariz Drive
Highland, California 92246

RE: Pirate Cover Peninsula RV Parking Developments, Moabi Park, San Bernardino County, CA.

Ms. Walker:

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Jeanette A. McKenna, Principal
McKenna et al.
McKenna et al.
History/Archaeology/Historic Architecture/Paleontology

Jeanette A. McKenna, MA
Registered Prof. Archaeologist
Owner and Principal Investigator

June 9, 2010

Serrano Nation of Indians
Attn: Goldie Walker
6588 Valariz Drive
Highland, California 92246

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Sincerely,

Jeanette A. McKenna
Jeanette A. McKenna, Principal
McKenna et al.
APPENDIX D:
Paleontological Overview
December 7, 2009

Dr. Eric Scott
San Bernardino County Museum
Paleontology Section
2024 Orange Tree Lane
Redlands, California 92374

RE: Paleontological Overview.

Dear Dr. McLeod:

Please provide me with a standard paleontological overview for the area identified on the attached map. In this case, the project involves a 90 acre man-made peninsula off the Colorado River in the boundaries of Park Moabi outside Needles, San Bernardino County, (Township 7 North, Range 24 East, Section 5 and 6) This is located on the Whale Mountain USGS Quadrangle. If you have any questions, please feel to call me at your convenience. Please send your billing to my address in Whittier (see below).

Sincerely,

Jeanette A. McKenna, Principal
McKenna et al.
McKenna et al.
6008 Friends Avenue
Whittier, California 90601 3724

Attn: Jeanette A. McKenna

re: Palaeontological resources for the proposed Park Moabi expansion along the Colorado River in San Bernardino County, (Sect. 1, T 7 N, R 23 E; Sect. 5-6, T 7 N, R 24 E; Sect. 36, T 8 N, R 23 E), project area

Dear Jeanette:

I have conducted a thorough search of our paleontology collection records for the locality and specimen data for the proposed Park Moabi expansion along the Colorado River in San Bernardino County, (Sect. 1, T 7 N, R 23 E; Sect. 5-6, T 7 N, R 24 E; Sect. 36, T 8 N, R 23 E), project area as outlined on the sections of the Whale Mountain and Topock USGS topographic quadrangle maps that you sent to me on 26 October 2004. We do not have any fossil vertebrate localities that lie directly within the proposed project boundaries, nor do we have any localities nearby from the same or similar sedimentary deposits as occur in the proposed project area.

The entire proposed project area has surface deposits of Quaternary Alluvium derived from the Colorado River and Lake Havasu. In the lowest lying areas bordering the Colorado River there mostly dune sands, while the slightly more elevated areas have Quaternary lake deposits or even dissected terrace deposits in the highest elevations. In the Recent dune sands, it is highly unlikely that there would be any fossil remains. In the lake deposits or the terrace deposits there might be fossil vertebrate remains typical of the Late Pleistocene fauna, but we have no vertebrate fossil localities anywhere nearby from these or similar deposits.

Excavations in the dune sands or marsh areas bordering the Colorado River, including in the proposed expansion area of the park, almost certainly will not encounter any fossils. Excavations in the Quaternary lake or terrace deposits in the somewhat elevated area of the proposed project area, however, might possibly uncover significant fossil vertebrates of Quaternary [Late Pleistocene] age. Any substantial subsurface excavation in the elevated portions of the proposed project area, therefore, should be monitored closely to quickly and professionally recover any fossil remains discovered while not impeding construction activities. Any fossils recovered during mitigation should be deposited in an accredited and permanent scientific institution for the benefit of current
and future generations. Additional fossil locality information may be available through the records of the San Bernardino County Museum in Redlands.

This record search covers only the vertebrate paleontology records of the Natural History Museum of Los Angeles County. It is not intended to be a thorough paleontological survey of the proposed project area covering other institutional records, a literature survey, or any potential on-site survey.

Sincerely,

[Signature]

Samuel A. McLeod, Ph.D.
Vertebrate Paleontology

enclosure: invoice
26 January 2010

McKenna et al.
attn: Jeanette A. McKenna, Principal
6008 Friends Avenue
Whittier, CA 90601-3724

re: PALEONTOLOGY LITERATURE / RECORDS REVIEW, PARK MOABI PROPERTY, EASTERN MOJAVE DESERT, SAN BERNARDINO COUNTY, CALIFORNIA

Dear Ms. McKenna,

The Division of Geological Sciences of the San Bernardino County Museum (SBCM) has completed a literature review and records search for the above-named property in the Colorado River/Park Moabi region of San Bernardino County, California. Specifically, the proposed project property is located in portions of sections 5 and 6, Township 7 North, Range 24 East, San Bernardino Base and Meridian, as seen on the Whale Mountain, California 7.5' United States Geological Survey topographic quadrangle map (1971 edition).

Based upon previous geologic mapping (Bishop, 1963), the proposed Park Moabi property is situated on Holocene (recent) alluvium. Your cover letter indicates that the project is located on a human-made peninsula; if this is correct, then this Holocene alluvium may be better termed artificial fill. In either case, this alluvium has low potential to contain significant nonrenewable paleontologic resources, and so is assigned low paleontologic sensitivity.

For this review, I conducted a search of the Regional Paleontologic Locality Inventory (RPLI) at the SBCM. The results of this search indicate that no previously known paleontologic resource localities are recorded by the SBCM from within the proposed study area. However, two localities, SBCM 1.39.2 and 1.39.4, are recorded within 2 miles south of the proposed property; these localities yielded fossil root casts and microvertebrate bones of presumed Pleistocene age from the Chemehuevi Formation. The proximity of this locality to the proposed study area demonstrates the paleontologic potential of the Chemehuevi Formation in this region. It is not known if sediments of the Chemehuevi Formation are present at depth within the boundaries of the proposed study area; if so, these sediments would have high paleontologic sensitivity.

Sediments of the Chemehuevi Formation are green to buff laminated clays and silts as well as crossbedded sands, capped by river gravels. The Chemehuevi Formation consists of numerous very
similar fluvial sequences comprised of vertical and lateral facies assemblages, typical of a large river such as the Colorado River and its floodplain. The juxtaposition of these similar sequences has resulted from multiple episodes of deep incision followed by channel and floodplain aggradation (House and others, 2002). The Chemehuevi Formation has high potential to contain significant nonrenewable paleontologic resources subject to adverse impact by development-related excavation (Newberry, 1861; Longwell and others, 1965; Agenbroad and others, 1992). Exposures in the Needles area have yielded fossil remains of extinct mammoth (*Mammuthus* sp.). Additionally, Jefferson (1991) reported fossils of extinct horse (*Equus* sp.) and camel (*Camelops* sp.) from the Needles area. These fossils were deposited during the Pleistocene Epoch, between approximately 1.8 million years ago and 11,000 years ago. Pleistocene sediments from throughout the eastern Mojave Desert have proven to be abundantly fossiliferous (Jefferson, 1991, 1992; Reynolds and Reynolds, 1992; Agenbroad and others, 1992; Scott and others, 2006; Scott and Cox, 2008).

**Recommendations**

The results of the literature review and the check of the RPLI at the SBCM demonstrate that excavation in recent alluvium (whether deposited by humans or naturally) has low potential to adversely impact fossil resources. These sediments are assigned low paleontologic sensitivity. No program to mitigate adverse impacts to significant nonrenewable paleontologic resources is recommended for these recent sediments at this time.

However, should these sediments overlie subsurface deposits of the fossiliferous Chemehuevi Formation, and should this formation be encountered and excavated during development, a qualified vertebrate paleontologist would need to develop a program to mitigate impacts to significant nonrenewable paleontologic resources. This program must include curation of recovered resources (Scott and others, 2004) and be consistent with the provisions of the California Environmental Quality Act (Scott and Springer, 2003), as well as with regulations currently implemented by the County of San Bernardino and the proposed guidelines of the Society of Vertebrate Paleontology.

The County of San Bernardino (Development Code §82.20.040) defines a qualified vertebrate paleontologist as meeting the following criteria:

**Education:** An advanced degree (Masters or higher) in geology, paleontology, biology or related disciplines (exclusive of archaeology).

**Professional experience:** At least five years professional experience with paleontologic (not including cultural) resources, including the collection, identification and curation of the resources.

The County of San Bernardino (Development Code §82.20.030) requires that paleontologic mitigation programs include, but not be limited to:

(a) **Field survey before grading.** In areas of potential but unknown sensitivity, field surveys before grading shall be required to establish the need for paleontologic monitoring.
(b) Monitoring during grading. A project that requires grading plans and is located in an area of known fossil occurrence, or that has been demonstrated to have fossils present in a field survey, shall have all grading monitored by trained paleontologic crews working under the direction of a qualified professional, so that fossils exposed during grading can be recovered and preserved. Paleontologic monitors shall be equipped to salvage fossils as they are unearthed, to avoid construction delays, and to remove samples of sediments that are likely to contain the remains of small fossil invertebrates and vertebrates. Monitors shall be empowered to temporarily halt or divert equipment to allow removal of abundant or large specimens. Monitoring is not necessary if the potentially-fossiliferous units described for the property in question are not present, or if present are determined upon exposure and examination by qualified paleontologic personnel to have low potential to contain fossil resources.

(c) Recovered specimens. Qualified paleontologic personnel shall prepare recovered specimens to a point of identification and permanent preservation, including washing of sediments to recover small invertebrates and vertebrates. Preparation and stabilization of all recovered fossils is essential in order to fully mitigate adverse impacts to the resources.

(d) Identification and curation of specimens. Qualified paleontologic personnel shall identify and curate specimens into the collections of the Division of Geological Sciences, San Bernardino County Museum, an established, accredited museum repository with permanent retrievable paleontologic storage. These procedures are also essential steps in effective paleontologic mitigation and CEQA compliance. The paleontologist must have a written repository agreement in hand prior to the initiation of mitigation activities. Mitigation of adverse impacts to significant paleontologic resources is not considered complete until curation into an established museum repository has been fully completed and documented.

(e) Report of findings. Qualified paleontologic personnel shall prepare a report of findings with an appended itemized of specimens. A preliminary report shall be submitted and approved before granting of building permits, and a final report shall be submitted and approved before granting of occupancy permits. The report and inventory, when submitted to the appropriate Lead Agency along with confirmation of the curation of recovered specimens into the collections of the San Bernardino County Museum, will signify completion of the program to mitigate impacts to paleontologic resources.

References


Please do not hesitate to contact us with any additional questions you may have.

Sincerely,

Eric Scott, Curator of Paleontology
Division of Geological Sciences
San Bernardino County Museum
APPENDIX E:
Photographic Record
View of CA-SBR-11935H, Plank and Wood Post Fencing (Southeast; May, 2011).

View of CA-SBR-11935H, Plank and Wood Post Fencing (East; May, 2011).
View of CA-SBR-11935H, Plank and Wood Post Fencing (Southwest; May, 2011).

Wood Post of CA-SBR-11935H (West; May 2011).
Wood Post with Overgrown Vegetation (East; May, 2011).

Wood Post with Double Poles on Hill in Background (East; May 2011).
Can Found Near Base of CA-SBR-11935H (South; May, 2011).

Overview of CA-SBR-11935H
Gravel Access to Route 66, Indicated by Camper in Background (Northeast; May, 2011).

Route 66 (West; May, 2011).
Route 66 (East; May, 2011).

Route 66 Painted Near Intersection of National Trails Highway and Park Moabi Road (East; May, 2011).
Street Signage at Intersection of National Trails Highway and Park Moabi Road (Northwest; May, 2011).

Relocation of Site CA-SBR 11909H (Northeast; May, 2011).
Detail of Cans in CA-SBR-11909H (Northeast; May, 2011).

Detail of Cans and Ceramics in CA-SBR-11909H (North; May, 2011).
Detail of Baking Powder Can (North; May, 2011).

Detail of Ball Mason Jar (May, 2011).
Overview of CA-SBR-11909H (East/Northeast; May, 2011).

Archeological Crew Member in Center of Site CA-SBR-11909H (North; May, 2011).
West End of CA-SBR-11909H (Northeast; May, 2011).

Survey Marker East of Park Moabi Road (South; May, 2011).
Gate at South End of Road 4012 (Northwest; May, 2011).
Dumped Gladding McBean Bricks on Southwest Shoulder of Access Road 4012 (Southwest; May 2011).

Dumped Gladding McBean Bricks (Southwest; May, 2011).
Gladding McBean Bricks (Southwest; May 2011).

Berm of Soil on South Side of OHV Trail 4012 (West; May 2011).
Berm on South Side of OHV Trail 4012 (Southwest; May 2011).

Overview of OHV Trail 4012, Looking Towards Access Gate (Southeast; May 2011).
Erosion on East Side of Trail (Southeast; May, 2011).

Gas Pipeline Marker on West Side of OHV 4012 (Northwest; May, 2011).
Gas Pipeline Marker and Closed Route Marker on West Side of Trail (Northwest; May, 2011).

Telephone Marker on West Side (West; May, 2011).
Overview of OHV Trail 4012 with Telephone Line (South; May 2011).

Piled Rocks Near West Side of OHV Trail 4012 (South; May 2011).
Overview from OHV 4012 (East; May 2011).

Stratigraphy on Hills Near Railroad, Southwest of OHV Trail 4012 (West; May, 2011).
Looking Towards Railroad Tracks West of OHV Trail 4012 (West; May, 2011).

Soil and Gravel Piles in Cleared Areas East of OHV Trail 4012 (May, 2011).
Remains of Old Fence Line West of Trail (West; May, 2011).

Telephone Line as it Crosses Trail (South/Southeast; May, 2011).
Remains of Fenced Area East of OHV Trail 4012 (Northeast; May, 2011).

Pressure Gage Station on West Side of OHV 4012 (Northwest; May, 2011).
Detail of Pressure Gage Station (Southeast; May, 2011).

Overview Towards Wood Posts of Fenced Area (Southeast; May 2011).
Vegetation and Stratigraphy of Hills to Northwest of OHV Trail 4012; May 2011.

Overview of Vegetation and Stratigraphy of Hills Northwest of Trail (Northwest; May, 2011).
Gravel Piles East of Trail (Southeast; May, 2011).

Vegetation and Rock Piles West of Trail (Northwest; May, 2011).
Broken Tarred Rock Dumped East of Trail (Northwest; May, 2011).

Cleared Area and Large Rock Pile Northeast of OHV Trail 4012 (Northeast; May, 2011).
Cleared Area North of Large Rock Pile (Southeast; May, 2011).

North End of OHV Trail 4012, Near Northern Park Moabi Boundary (South; May, 2011).
Potential OHV - Serving Facility Near North Park Boundary (Southeast; May, 2011).

Marker for OHV 4012 at North End of Trail (South; May, 2011).
Inside Park Boundary West of OHV Trail 4012 (south; May, 2011).

Kerosene Lamp Base on Top of Wood Post of Fence Line West of Trail (Detail; May, 2011).
Kerosene Lamp Base on top of Wood Post (South; May, 2011).

Concrete Culvert on West Side of OHV Trail 4012 (East; May, 2011).
Detail of Concrete Culvert (Northeast; May, 2011).

OHV Trail 4014E (Southeast; May, 2011).
Bees Under Wood Ramada off OHV Trail 4014E (Southeast; May, 2011).

North Sand Dune Area Between North End of OHV Trail 4012 and Peninsula Road (South; May 2011).
Sand Dunes Between Peninsula Road and OHV Trail 4012 (South; May, 2011).

Isolate 1, Found in Sand Dune (Detail; May, 2011).
Isolate 1 Found in Sand Dune (Detail; May, 2011).

Open Graded Area North of Large Rock Pile and East of OHV Trail 4012 (South; May, 2011.)
Open Graded Area South of Large Rock Pile (East; May, 2011).

Graded Area, with View Toward OHV Trail 4012 (West; May, 2011).
Sand Dunes Adjacent to OHV Trail 4012 (West, May, 2011).

Sand Dunes Southeast of Large Rock Pile (Northwest; May, 2011).
San Dune Area Southeast of Large Rock Pile (Northwest; May, 2011).

Sand Dunes Between Peninsula Road and OHV Trail 4012 (South, May, 2011).
Vegetation in Sand Dunes (Southwest; May, 2011).

Vegetation in Sand Dunes (Northwest; May, 2011).
Open Sand Dune Area, with View Toward OHV Trail 4012 (Southwest; May, 2011).

Open Sand Dune Area (Northwest; May, 2011).
Sand Dunes with Vegetation (North; May, 2011).

Heavy Vegetation South of Peninsula Road (Northwest; May, 2011).
Vegetation and Sand Dune, Looking Towards OHV Trail 4012 (West; May, 2011).

Tracks in Sand Showing Offroad Vehicle Use in Sand Dune Area (Southwest; May, 2011).
Dune Area Adjacent to Peninsula Road (South; May, 2011).

Wildlife Tracks in Sand (Detail, May, 2011).
Moonrise Over River

Overview from Intersection of OHV Trail 4012 and 4016H (Southwest; May, 2011).
Looking Down OHV Trail 4016H (South; May, 2011).

Wood Posts in Gravel Area West of OHV Trail 4016H (Southwest; May, 2011).
Fence Line Marking East-West Boundary Wet of OHV Trail 4016 (West; May, 2011).

Wood Gate Marking Park Boundary Corner (West; May, 2011).
Fence Line North-South (South; May, 2011).

Railroad Spike Bucket Near Wood Gate Marker (Detail; May, 2011).
Fence Line on Hill Top (West; May, 2011).

View from Fence Line on Top of Hill Southwest; May, 2011).
Open Area with Gravel and Sand From Top of Hill with Fence Line (Southeast; May, 2011).

View Towards Wood Gate Marker (East; May, 2011).
Broken China Plate (Detail; May, 2011).
Broken Dumped Clay Pipe (South; May, 2011).

Broken Dumped Clay Pipe (Southeast; May, 2011).
Maker Marks on Clay Pipes (Detail; May, 2011).
Overview from Top of Railroad Bed, View Toward National Old Trails Road (South; May, 2011).

Overview Toward National Old Trails Road (Southeast; May, 2011).
View Towards Park from Railroad (East; May, 2011).

View Towards South Park Area from Railroad (North; May, 2011).
West Topock Underpass Over National Old Trails Road (Southwest; May, 2011).

Detail of West Topock Underpass Sign (Northwest; May, 2011).
Detail of 1942 Date Stamp in Cement of Overpass (Northwest; May, 2011).

Detail of Underpass (Northwest; May, 2011).
NATIONAL OLD TRAILS ROAD FROM WEST TOPOCK UNDERPASS (SOUTHWEST; MAY, 2011).

DETAIL OF S.B. COUNTY SURVEY MARKER NEAR NATIONAL OLD TRAILS ROAD (MAY, 2011).
Overview of Survey Marker (Southwest; May, 2011).

View of South Park Moabi Area (Southeast; May, 2011).
Berm with Concrete Southeast of National Old Trails Road (North; May, 2011).

2008 Spelled Out with Metal Debris Near Berm and Railroad (north; May, 2011).
Drainage Underneath Railroad Bed (North; May, 2011).

OHV Trail 4014D Looking Toward National Old Trails Road and Railroad (Southeast; May, 2011).
Survey Area South of Trailer Park, Near OHV Trail 4014D (North, MAy, 2011).

View Along OHV Trail 4014D (Northwest; May, 2011).
Debris South of Trailer Storage Yard (Northwest; May, 2011).

Dumped Debris South of Trailer Storage Yard (North; May, 2011).
Debris South of Trailer Storage Yard (Northwest; May, 2011).

Concreted Drainage Berm South of Trailer Storage Area (North; May, 2011).
Overview of Concreted Berm (Southwest; May, 2011).

Cleared Area Near Concreted Berm (Northeast; May, 2011).
Brush Dump Area, Northwest of Concreted Berm (Northwest; May, 2011).

Brush Dump Area with Additional Debris (West; May, 2011).
Brush Dump Area, Looking Towards Trailer Storage Yard (North; May, 2011).

Recently Deposited Brush (Northwest; May, 2011).
Detail of Brush Dump Sign (Northwest; May, 2011).

Overview of Relocated Site 36-011928 (East; May, 2011).
Rock Cairn with Cross on Ridge West of Site CA-SBR-11928 (North; May, 2011).

Relocated Site 36-SBR-11912, with GPS Unit in Center (Southwest; May, 2011).
Relocated Site CA-SBR-11912 with GPS in Center (East; May, 2011).

View from Site CA-SBR-11912 (West; May, 2011).
Detail of Hammerstone Located with Site CA-SBR-5237 (Southwest; May, 2011).
Detail of Hammerstone Located within CA-SBR-5237 (West; May, 2011).

Three Wooden Cross on Concrete Platform Located Southwest of CA-SBR-5237 (Southeast).
Overview Towards CA-SBR-5237 (Northeast; May, 2011).

Overview from Three Crosses, Looking Towards Park Moabi (Northwest; May, 2011).
Overview from Three Cross, Looking Towards River and Park Moabi Road (West; May 2011).

View from Three Cross Towards Road into Cleared Area (Southwest; May, 2011).
View from Three Crosses (South; May, 2011).

View from Three Cross (Southeast; May, 2011).
APPENDIX F:
California DPR Forms
P1. Identifier: Isolate Park Moabi Regional Park

*P2. Location: Park Moabi ☐ Not for Publication X Unrestricted
*a. County: San Bernardino and (P2c, P2e, and P2b or P2d. Attach a Location Map as necessary.)
*b. USGS 7.5' Quad Whale Mountain Date 1925 T 8N ; R 23E ; of of Sec. ; (see below) S.B. B.M.
c. Address Not Applicable City Needles Zip NA
d. UTM: (Give more than one for large and/or linear resources) Zone 11 (see Continuation Sheet)
e. Other Locational Data: (e.g., parcel #, directions to resource, elevation, etc., as appropriate)

West bank of the Colorado River; Township 7 North, Range 24 East, and portions of Sections 5 and 6; Township 7 North, Range 23 East, and portions of Section 1; Township 8 North, Range 23 East, and portions of Section 36.

*P3a. Description: (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries)

San Bernardino County Regional Park – Park Moabi Regional Park; east of Needles on the Colorado River. Camping and Recreational Park with some permanent housing and support facilities.

*P3b. Resource Attributes: (List attributes and codes) HP-25 (Park; County Recreational Facility)

*P4. Resources Present: ☐ Building ☐ Structure ☐ Object X Site ☐ District ☐ Element of District ☐ Other (Isolates, etc.)

P5a. Photograph or Drawing (Photograph required for buildings, structures, and objects.)

P5b. Description of Photo: (view, date, accession #) May, 2011

*P6. Date of Construction/Age and Source
X Historic ☐ Prehistoric ☐ Both
(Mostly considered modern)

*P7. Owner and Address:
San Bernardino County Regional Park Department
777 East Rialto Avenue
San Bernardino, CA 92415-0763

*P8. Recorded by: (Name, affiliation, and address)
Jeanette A. McKenna (McKenna et al.)
6008 Friends Avenue
Whittier, California 90601-3724
(562) 696-3852 (562)

*P9. Date Recorded: June 3, 2011

*P10. Survey Type: Phase I Survey

*P11. Report Citation: (Cite survey report and other sources, or enter "none").) McKenna, Jeanette A. (2011) – A Phase I Cultural Resources Investigation for the Proposed OHV Area- Park Moabi Regional Park Trail Improvements, San Bernardino County, California. On file, McKenna et al., Whittier, California.

*Attachments: NONE X Location Map X Continuation Sheet ☐ Building, Structure, and Object Record ☐ Archaeological Record ☐ District Record ☐ Linear Feature Record ☐ Milling Station Record ☐ Rock Art Record ☐ Artifact Record ☐ Photograph Record X Other (List): Aerial Photo
State of California
DEPARTMENT OF PARKS AND RECREATION
LOCATION MAP

Page 2 of 7
* Resource Name or # (Assigned by recorder) Job 1520 Park Moabi Regional Park
*Name of Map Whale Mountain *Scale 1:24,000 *Date of Map 1975
State of California
DEPARTMENT OF PARKS AND RECREATION
CONTINUATION SHEET

* Resource Name or # (Assigned by recorder) Job 1520 Park Moabi Regional Park

DPR523H (Revised McKenna et al. 7/09)
Park Moabi Regional Park

Park Moabi Regional Park is a public facility supervised by the San Bernardino County Regional Parks Department and, historically, part of the larger Havasu National Wildlife Refuge. The Refuge was established in 1941 and under the jurisdiction of the United States Fish and Wildlife Service. Park Moabi was carved out of the Refuge, essentially placing the Refuge in the Arizona and the public access area in California. Park Moabi was developed prior to 1971 and has been subjected to numerous phases of improvement and development since then. The peninsula (Pirate’s Cove) is a man-made feature that was developed in conjunction with the establishment of the marina and boat ramps. Other improvements/features identified within the Park include:

- Roadways (paved and unpaved)
- Fence Post and Fence Lines
- Drainages/Buried Pipes/Culverts
- Buried Utilities
- Transmission Poles and Lines
- Trailer Court
- Campsites with Restrooms, etc.
- Boat Ramps with Utilities (e.g. Gas Pumps)
- Storage Yard
- Sewage Treatment Pond(s)
- Water Tanks
- Condos and Restaurant
- Store and Rental Offices
- Picnic Areas
- Playground
The Park is fully accessible and in regular use. The proposed improvements will be limited to areas within the defined Park boundaries and, for the most part, limited to areas west of Park Moabi Road. The proposed project will not involve the removal of any amenities (buildings or features), but will require access along existing roadways (paved and unpaved).

Example of Existing Roadway in Park Moabi (BLM Road 4012) and Proposed for Trail Improvements (facing East).
Historic Route 66 on River Frontage within Park Moabi – with Modern Improvements within the Park (facing South).

Park Moabi is an important recreational facility in San Bernardino County, but is essentially a modern facility that has been in a constant state of alterations, improvement, and change. The currently proposed improvements will be minimal, by comparison. McKenna et al. has concluded that, although the Park is constantly used and considered a positive addition to the County park system, it does not meet the minimum requirements for recognition as a his
torical resource, as defined in CEQA. Individual elements or sites/features within the Park, such as CA-SBR-5237 (an intaglio site listed in the National Register of Historic Places) and CA-SBR-2910H (National Old Trails Highway/Route 66, also listed in the National Register of Historic Places), are significant resources and adverse impacts must be avoided.
Job 1520 AT&SF/BNSF Railroad Alignment

**P1. Identifier:** Burlington Northern Santa Fe Railroad

**P2. Location:** Park Moabi

- **a. County:** San Bernardino
- **b. USGS 7.5' Quad:** Whale Mountain
- **c. Address:** Not Applicable
- **d. UTM:** Zone 11
- **e. Other Locational Data:** West end in Park = 0726394 Easting/3844526 Northing; east end in Park = 0728938 Easting/3844526.

**P3a. Description:** Historic alignment of Atchison Topeka & Santa Fe Railway; now the Burlington Northern Santa Fe Railroad. See attached discussion.

**P3b. Resource Attributes:** HP-17 (Train track alignment)

**P4. Resources Present:** 

- **Site**

**P5a. Photograph or Drawing:** (Photograph required for buildings, structures, and objects.)

**P5b. Description of Photo:** see attached

**P6. Date of Construction/Age and Source:**

- **Prehistoric**

**P7. Owner and Address:**

San Bernardino County Regional Park Department
777 East Rialto Avenue
San Bernardino, CA 92415-0763

**P8. Recorded by:** Jeanette A. McKenna (McKenna et al.)
6008 Friends Avenue
Whittier, California 90601-3724
(562) 696-3852

**P9. Date Recorded:** June 3, 2011

**P10. Survey Type:** Phase I Survey

**P11. Report Citation:** McKenna, Jeanette A. (2011) – A Phase I Cultural Resources Investigation for the Proposed OHV Area- Park Moabi Regional Park Trail Improvements, San Bernardino County, California. On file, McKenna et al., Whittier, California.
**Resource Name or #** *(Assigned by recorder)*  
**Job 1520 AT&SF/BNSF Railroad Alignment**

**L1. Historic and/or Common Name**  
**Burlington Northern Santa Fe Railroad**

**L2.a. Portion Described:**  
[ ] Entire Resource  
[ ] Segment  
[ ] Point Observation  
**Designation:**

- **b. Location of point or segment:** (Provide UTM coordinates, legal description, and any other useful locational data. Show the area has been field inspection on a Location Map.)
  
  A portion of this trans-continental railroad crossed through the western/southern portions of Park Moabi Regional Park. UTM at west end of Park = 0726394 Easting/3844536 Northing; UTM at eastern end of Park = 0728938 Easting/3844536 Northing.

**L3. Description:** (Describe construction details, materials, and artifacts found at this segment/point. Provide plans/sections as appropriate.)

- The segment of the Atchison Topeka & Santa Fe Railway/Burlington Northern Santa Fe Railroad passing through Park Moabi Regional Park, San Bernardino County, California.

**L4. Dimensions:** (in feet for historic features and meters for prehistoric features)

- **a. Top Width** 40 Feet (+/-)
- **b. Bottom Width** 100 Feet (+/-)
- **c. Height or Depth** Depending on berm
- **d. Length of Segment** 2 miles near park/100s outside of park

**L4e. Sketch of Cross-Section (include scale):**

- **See Attached**

**L5. Associated Resources:**

- Bridge crossings (2 in area);
- Berm elevating and leveling railroad tracks;
- 2 paralleling track alignments;
- Misc. maintenance debris (e.g. spikes and plates).

**L6. Setting:** (Describe natural features, landscape characteristics, slope, etc., as appropriate):

- Western bank of Colorado River; southern portion of Park Moabi Regional Park; desert dunes with constructed berm.

**L8a. Photograph, Map or Drawing**  
**See attached**

**L8b. Description of Photo, Map, or Drawing** (View, scale, etc.)  
**See attached**

**L9. Remarks**

- Railroad alignment is protected and will not be impacted by any activities within the Park

**L10. Form Prepared by** (Name, affiliation, and address):

- Jeanette A. McKenna (McKenna et al.  
  6008 Friends Avenue  
  Whittier, California 90601  
  (562) 696-3852

**L11. Date:** June 3, 2011

Alignment is intact and operational. There will be no impacts to this feature/resource.
State of California
DEPARTMENT OF PARKS AND RECREATION
LOCATION MAP

* Resource Name or # (Assigned by recorder)  Job 1520 AT&SF/BNSF Railroad Alignment
*Name of Map  Whale Mountain  
*Scale 1:24,000  *Date of Map 1975

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DPR523G (Revised McKenna et al. 7/09 )
* = Required Information
Santa Fe Railway (BNSF)

The Santa Fe Railway (Atchison Topeka & Santa Fe Railway, now the Burlington Northern Santa Fe Railroad) was originally founded to connect the mid-west (Kansas) with the trading center in Santa Fe, New Mexico (ca. 1859-1860). Plans for the railroad were delayed by the Civil War, but activities commenced in 1868 with the initial purchases of property for right-of-way. Construction into Colorado was underway by 1875. The railway was complete to Albuquerque by 1880. In the meantime, the construction of the Atlantic & Pacific Railroad line was completed to Needles, California, turning south to connect with Yuma (ca. 1893).

The logo used on the overpass at Park Moabi is indicative of the post-1901 logo (Berkman1988:29), suggesting this portion of the railroad alignment was completed between 1893 and 1901. The bridge supporting this crossing is marked 1942, indicating a rebuilding of the bridge to allow continued use of the overpass and the highway.

The Santa Fe Railway merged with the Burlington Northern Railroad in 1995. Improvements along the rail line were evident by the presence of modern replacement rails along the alignment and debris adjacent to the railroad berm.

Although this alignment runs through Park Moabi, the proposed trail improvements will not impact the railroad alignment. Therefore, McKenna et al. has concluded the proposed project will have no adverse impact on the BNSF railroad alignment and no further studies are warranted.
Santa Fe Crossing at National Old Trails Highway (facing South).
BNSF Railroad Alignment(s) Atop Berm within Park Moabi.
Identifier: Isolate 1 (Brownware Sherd)

Location: Park Moabi

*P3a. Description: (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries)

An isolated brownware sherd was identified in the dunes between BLM Road 4012 and the campsites on the peninsula. This sherd was identified at UTM coordinates 0726626 Easting/3847058 Northing and within soft sand dunes. This small sherd measured 3.6 cm x 3.2 cm x .5 cm and appears to have been water worn. No other items were identified in the area and this isolated sherd is not considered a significant resource. No further studies are warranted with respect to this item.

*P3b. Resource Attributes: (List attributes and codes) AP-16 (Isolated Artifact)

*P4. Resources Present: ☐ Building ☐ Structure ☐ Object ☐ Site ☐ District ☐ Element of District ☐ Other (Isolates, etc.)

*P5a. Photograph or Drawing (Photograph required for buildings, structures, and objects.)

*P5b. Description of Photo: (view, date, accession #)

*P6. Date of Construction/Age and Source

☐ Historic ☒ Prehistoric ☐ Both

*P7. Owner and Address:
San Bernardino County
Regional Park Department
777 East Rialto Avenue
San Bernardino, CA 92415-0763

*P8. Recorded by: (Name, affiliation, and address)
Jeanette A. McKenna (McKenna et al.)
6008 Friends Avenue
Whittier, California 90601-3724
(562) 696-3852 (562)

*P9. Date Recorded: June 3, 2011

*P10. Survey Type: Phase I Survey

*P11. Report Citation: (Cite survey report and other sources, or enter "none"). McKenna, Jeanette A. (2011) – A Phase I Cultural Resources Investigation for the Proposed OHV Area- Park Moabi Regional Park Trail Improvements, San Bernardino County, California. On file, McKenna et al., Whittier, California.

*Attachments: NONE ☒ Location Map ☐ Continuation Sheet ☐ Building, Structure, and Object Record ☐ Archaeological Record ☐ District Record ☐ Linear Feature Record ☐ Milling Station Record ☐ Rock Art Record ☐ Artifact Record ☐ Photograph Record ☐ Other (List):
Location Map

* Resource Name or # (Assigned by recorder)  Job 1520 Park Moabi Isolate 1
*Name of Map  Whale Mountain
*Scale  1:24,000
*Date of Map  1975

State of California  DEPARTMENT OF PARKS AND RECREATION
LOCATION MAP

Page 2 of 2

DPR523G (Revised McKenna et al. 7/09 )  * = Required Information
36-002910(H)

36-002910(H) is cross-referenced as CA-SBR-2910(H) and as the National Old Trails Highway/Route 66 (NHRP-E-OHP-3926). It has been recorded numerous times by various individuals at different locations across San Bernardino County. Basically, National Old Trails Highway/Route 66 enters California at the Colorado River crossing south of Park Moabi Regional Park and has, in places, been replaced by the modern Interstate 40 alignment. Abandoned or bypassed segments of the historic roadway are still present in some areas and have been demolished or redeveloped in other areas. At the time of this study, 36-002910(H) had been identified as a National Register of Historic Places resource, a California Historical Resource; and a California Historical Landmark (No. 781). The recognition on the National Old Trails Monument (on file, San Bernardino County Museum Archaeological Information Center) reads:

Besides U.S. Highway 66 at the east side of Needles, a plaque, erected in 1923, commemorates the completion of the last portion of the National Old Trails Highway across the continental United States.

The monument indicates the desert crossing that was used by prehistoric Indians, by historic Indians, especially Mojaves, and pathfinders such as Garces in 1776 and Jedediah Smith in 1826 and 1827. The boulder in which the plaque is set came from Granite Springs near Needles, and is marked by ancient petroglyphs.

The western section of the National Old Trails Highway was opened between 1911 and 1914. Much of the history of San Bernardino County has been made along this trail. The general route of the present U.S. Highway 66 was originally a Mojave travel and trade trail from the Colorado River to the California coast. The first white men to whom it was shown were Father Garces, the Franciscan missionary, and Jedediah Smith, an
American trapper. In 1854, also guided by Mojaves, Lt. Whipple surveyed it as a possible railroad route. Later, following much the same route, the Old Government Road was opened. Army forts were built at intervals along this road, and soldiers patrolled sections of it, for protection of immigrants, wagon freighters, and mail carriers traveling to and from California.

Today the Santa Fe Railroad and U.S. Highway 66 parallel portions of the ancient trail.

In the area of Needles and Park Moabi Regional Park, National Old Trails Highway/Route 66 has been recorded by Gallegos (1977), Van Bueren (1986), Gothar et al. 2004, and McDougall (2008). Gallegos noted this resource as being “… one of the earliest modern trans-United States automobile routes …" dating to ca. 1911. He described the 1911-1914 segment between Needles and Essex as a paved, two-lane state maintained highway (Smith, Burr, and Haenszel n.d.). Van Bueren (1986) described National Old Trails Highway/Route 66 within Park Moabi as:

… a portion of old Highway 66 represented by a deteriorating asphalt alignment and segments of cement-mortared slate gutters … the future location of Route 66 was first surveyed by the War Department in response to the westward migration brought about by the Gold Rush of 1849, as part of a network of federal wagon roads ... this wagon road became one of the best travelled overland routes from Chicago to Santa Monica, and was soon paralleled by a railroad line built through the Topock area in 1893 … In 1926 the road, which had gradually been improved over the years, was officially designated as U.S. Route 66 (Pew 1977:26). By 1932 Route 66 was completely paved and its various segments connected into a continuous highway. It was a major migration route to California during the Dust Bowl of the Depression.
Van Bueren’s map illustrates his segment of National Old Trails Highway as being north of the BNSF Railroad alignment and east of Park Moabi Road – essentially in the vicinity of 36-011909(H) and paralleling the current alignment of Interstate 40.

In 2004, Gothar et al. recorded National Old Trails Highway/Route 66 within and adjacent to Park Moabi Regional Park. They noted four sections:

1) Between Park Moabi Road and the southern terminus of the Old Trails Arch Bridge (1916-1947);

2) A 200 foot segment between Interstate 40 and the BNSF railroad alignment;

3) Between Interstate 40 and the PGE Compressor Station;

4) Paralleling Park Moabi Road, north of the BNSF railroad alignment.

Of the four segments identified by Gothar et al., only Section 4 is located within the current project area. Gothar et al. (2004:2) states:

Section 4 is a north-south oriented, 1,000 ft segment located immediately west and roughly parallel to Park Moabi Rd. north of the BNSF Railroad right-of-way. This segment had been cut into the steep eastern bank of a very broad wash and is partially covered with sediments pushed down-slope (west) from the construction of Park Moabi Rd. The roadbed has a buried gas pipeline entrenched along its western edge, and two power poles impact the road as well. Remnants of a cement and stone water diversion structure (Feature 1) are located on the eastern side of the roadbed at a point where a large erosional rill.
intersects. The southern end of Section 4 begins at Park Moabi Rd. west of the two prominent water tanks and terminates on the north end in the wash near the edge of some sedimentation ponds.

The site record filed by McDougall (2008) involves a segment of National Old Trails Highway/Route 66 outside the current project area and outside the boundaries of Park Moabi Regional Park. This section is located south of Interstate 40 and southeast of Park Moabi Road at Interstate 40.

As summarized above, the various segments of National Old Trails Highway/Route 66 are disjointed, have been identified both north and south of the current Interstate 40 alignment, and are present in various forms, including paved and unpaved, improved and deteriorated conditions.

The current USGS Whale Mountain Quadrangle (rev. 1975) illustrated the location of National Old Trails Highway as running along the western side of Interstate 40 until it veers east until it is interrupted by Interstate 40. To the immediate west and east of Interstate 40, the Trail is identified as a dirt road. When the Trail passes under the SF/BNSF railroad alignment, it appears as a paved road running through Park Moabi, exiting the park at its northeastern corner. The segments identified by the four site records presented above are not included in the mapped alignment.

In addition, a review of maps specifically pertaining to the alignments of National Old Trails Highway and Route 66 (there are places where these two alignments deviate from one another) show the main alignment running through Park Moabi, crossing the Colorado River near the eastern extent of the peninsula, and continuing into Arizona and the Town of Oatman. Later, Route 66 is realigned to run directly to Kingman via Interstate 40.
The recent survey by McKenna et al. identified the mapped National Old Trails Highway/Route 66 alignment within Moabi Park. This alignment enters the park near the SF/BNSF Railroad alignment, crosses at the Park's Trailer Park, continues past Park Moabi Road, and continues east, exiting the park near the Colorado River. The road alignment within the park is paved (for the most part) and, at Park Moabi Road, Route 66 is marked on the pavement (asphalt).
The alignments identified by Van Bueren in 1986, Gothar et al. in 2004, and McDougall in 2008 appear to be auxiliary roads or utility roads, not the historic alignment identified as National Old Trails Highway/Route 66. In the case of the Van Bueren alignment, this dirt road alignment fronts the railroad alignment and is associated with a buried pipeline, suggesting it is an access road. The segments identified by Gothar appear to be more directly related to the development of Park Moabi and/or the Wildlife Refuge.
The proposed trail development will involve portions of historic National Old Trails Highway, a National Register of Historic Places site, a California Register of Historical Resources site, a California Historical Landmark, and a roadway still in use. Therefore, any impacts to this alignment may result in an adverse environmental impact, depending on the nature of the improvements. McKenna et al. has concluded the adverse impacts will occur unless the improvements can be completed in a way that does not result in the loss of the resource. The avoidance of impacts can be addressed through project design.
36-011909(H)

36-011909(H) was recorded by Farrugia et al. as an “… early-to-mid 1900’s trash dump located in an area apparently excavated for the purpose of dumping refuse.” This site was recorded at UTMs 727174 Easting/3844568 Northing. This area is located relatively close to the proposed serving facility east of Park Moabi Road, north of Interstate 40, south of the BN&SF railroad alignment, and at the entrance to Park Moabi Regional Park.

McKenna et al. relocated this site at the coordinates noted by Farrugia et al. and concurs with the description of the site. This relatively dense concentration of cans, glass, and ceramics is “L” shaped and within a depression that appears to have been excavated to receive the materials. There is some evidence that materials were burned or a burning was attempted, resulting in the loss of many can labels and any cardboard, paper, or wood that may have been present. The concentration was dominated by the cans. Little glass and/or ceramics were identified.

In visually inspecting this deposit, McKenna et al. noted the presence of some maker marks on some of the ceramics. These marks included those of Wallace, Carr, Shenango, and Buffalo China. Limited research identified potential dates of manufacturing for these items as follows:

- Wallace China 1931-1964 1947
- Carr China 1916-1952 1935
- Shenango China 1901-1949 1925
- Buffalo China 1925 1925

The can concentration is dominated by institutional sized cans, indicating the feeding of a relatively large number of people for a brief period or a smaller group for a longer period. The cans are predominantly sanitary cans (post-1917), with some condensed milk...
cans and utility cans. The remnants of camp stoves indicates outdoor cooking, likely in a work camp setting. The china is industrial hotel ware with no evidence of decoration or personal design.

Based on this scant data, the depositional period for this deposit ranges from 1925 to 1947, suggesting this is a Depression Era deposit and associated with a work camp along the railroad alignment, Route 66, and/or the early park development. Given the location, the remains are likely associated with a work groups associated with either the railroad or highway. In any case, these remains are not unique or significant and any removal or disturbances to these remains will not result in any adverse environmental impact. They have been recorded and no further studies are warranted at this time.

Overview of 36-011909(H), facing South/Southwest).
Example of Material from 36-011909(H).
36-011917 was recorded by Farrugia et al. in 2004 and described as “... four small circular, prehistoric desert intaglios located on a desert pavement surface atop a northeast-southwest trending bajada ridgetop that slopes gently to the east. The intaglios range from approximately 2.0 m to 2.8 m in diameter, and appear as cleared, narrow circular paths within the desert pavement. No cultural materials were observed within the immediate vicinity of the intaglios. Tire tracks have impacted each intaglio to some extent.” These features were located at UTM 0727545 Easting/3845042 Northing and mapped in the area of the south of the Trailer Park and north of the railroad alignment. An intensive survey of this area showed the area to be highly disturbed and no evidence of the four circular features was found. These features may have been destroyed by additional use of the area and/or subsequent erosion from the impacts to the desert pavement.

In any case, these features were not relocated and were likely destroyed sometime between 2004 and 2011. Therefore, McKenna et al. has concluded that no adverse impacts to these features will occur as a result of the proposed improvements. The features were not mapped along any of the proposed trail routes and the failure to relocate the site confirms no impacts are expected.

If these features are relocated in some other location and are confirmed to be prehistoric intaglios, they would be considered significant cultural resources requiring protection.
36-011918

36-011918 was recorded by Farrugia et al. in 2004 at UTMs 0727490 Easting/3844952 Northing. This location is only 50 meters from 36-011917 (see above) and the site is described as “… a prehistoric rock ring feature consisting of a single-coursed, circular alignment of schist/rocks 2.3 m in diameter on a desert pavement surface … No cultural materials were found in association with the rock ring feature.” This feature is adjacent to a small drainage.

McKenna et al. attempted to relocate this feature using the reported UTM coordinates. No evidence of the feature was found. This location, as noted for 36-011917, is highly disturbed by erosion with evidence of bulldozing and/or clearance. Based on the negative findings, McKenna et al. has concluded that this site/feature no longer exists or is located elsewhere. At this time, McKenna et al. has concluded the site has been destroyed. In any case, the site is not located along any of the proposed trail routes and would not have been impacted by any trail development activities. Therefore, the project will not result in any adverse impacts to this site. If the site is relocated at a later date, a reassessment of impacts may be required.
Isolate 36-020385 was recorded by Farrugia et al. in 2004 and described as an isolated hearth “… of unknown antiquity.” This feature (which should have been recorded as a feature or site) was mapped as being located south of the BNSF railroad alignment, west of Park Moabi Road, and at UTM coordinates 0727402 Easting/3844775 Northing. This area is within the southwestern quarter of Section 6 (T7N, R24E). Farrugia et al. (2004:1) described the feature as “… a group of about 20 fire-altered schist and granitic rocks in a 65 cm diameter that appears to be an eroded fire hearth of unknown antiquity …” and in an area disturbed by a bulldozer blade.

McKenna et al. was unable to relocate this feature. The UTMs were used to identify the general area, but no evidence of the feature was evident. The area was found to be highly disturbed by erosion and grading and McKenna et al. concluded this feature no longer exists.
36-020386

36-020386 was recorded by Gothar in 2004 and described as an isolated rock ring “… of unknown antiquity.” This feature was further described as “… a collapsed rock campfire ring … composed of approximately 35 rocks … [M]ost of the rocks are granitic, although a few are of schist. The cluster of rocks measures 1.0 x 1.2 m and does not appear to be stacked. The central part of the rick feature is devoid of rocks. None of the rock appear to be fire altered.” This feature was recorded as being located at UTM coordinates 0727433 Easting/3844669 Northing, approximately 100 meters south/southeast of 36-020385.

McKenna et al. was unable to relocate this feature. The area of the UTMs was examined, but no evidence of the feature, as described, was located. Given disturbances to the area, McKenna et al. concluded this feature no longer exists.
36-020387

36-020387 was recorded by Farrugia et al. in 2004 and described as consisting of “… five pieces of prehistoric ceramic that appear to be derived from a single vessel.” The sherds were also described as orange/red to brown with quartz temper. The UTM coordinates for this resource were 0727553 Eating/3844693 Northing. This location is northeast of 36-020386 and also within the general area of significant disturbance. McKenna et al. did not relocate these sherds. The area associated with the UTMs has been impacted by flooding/runoff and mechanical clearing. McKenna et al. has concluded the sherds may still be in the area, but relocated and possibly buried by the movement of sands resulting from runoff and/or grading.
May 21, 2014

John Swett
Bureau of Reclamation
Lower Colorado River Regional Office
Multi-Species Conservation Program
P.O. Box 61470
Boulder City, NV 89006-1470

RE: Mojave Valley Backwater Conservation Area Project: 15 Test Pits.

Dear Mr. Swett:

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), Bureau of Reclamation (Reclamation) is seeking my comments regarding the delineation of the Area of Potential Effects (APE), adequacy of identification efforts, and a Finding of No Historic Properties Affected for the project.

Reclamation is working with the U.S. Fish and Wildlife Service to establish a backwater habitat in compliance with Section 7 of the Endangered Species Act for the Lower Colorado River Multi-Species Conservation Program. The backwater habitat is proposed to be constructed on the California side of the Colorado River just north of Park Moapi Regional Park and is currently being used for recreational boating, camping and off-road vehicles. The sediments in this area are dredged material from the Colorado River so the quality and type of sediments is unknown. Reclamation proposes to excavate fifteen backhoe trenches to determine the suitability of the location to support a backwater habitat.

The Area of Potential Effects (APE) lies approximately thirteen miles south of Needles, California, between river miles 236 and 237 and includes trenches, access roads and spoils piles. The vertical APE for the fifteen three by four foot trenches will be excavated to a maximum twenty-five feet in depth; however due to the high water table excavation will likely stop at approximately ten feet in depth.

In addition to your letter received April 21, 2014, you have submitted the Project Setting and Cultural Resources Summary for Mojave Valley Backwater Conservation Area Project; 15 Test Pits, as evidence of your efforts to identify and evaluate historic properties in the project APE.

Archival research was conducted of Reclamation cultural resource files. No previously recorded archaeological resources were identified within the APE. Pedestrian surface survey was conducted in 2011 during improvements to Park Moabi Regional Park. No cultural resources were identified in the project APE. Native American consultation has been ongoing. On March
28, 2014 project specific consultation included contact with the Native American Heritage Commission and Native American tribes and individuals likely to have knowledge of sites of religious or cultural significance to them in the project area via letters and follow-up calls (March – May 2013). No such properties were identified through consultation efforts.

Pursuant to 36 CFR §800.4(d)(1) Reclamation has determined there will be No Historic Properties Affected by the proposed project. Based on your identification efforts, I concur with the Finding of No Historic Properties Affected. Identification efforts are sufficient and I also have no objections to the delineation of the APE, as depicted in the supporting documentation.

I look forward to continuing consultation on the Mojave Valley Backwater Conservation Area Project. Be advised that under certain circumstances, such as unanticipated discovery or a change in project description, Reclamation 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 regarding archaeological resources, please contact Associate State Archaeologist, Kim Tanksley at (916) 445-7035 or by email at kim.tanksley@parks.ca.gov.

Sincerely,

Carol Roland-Nawi, PhD
State Historic Preservation Officer
APPENDIX J
March 28, 2014

Mr. Mark C. Slaughter, Archaeologist

U.S. Bureau of Reclamation, Lower Colorado Regional Office
500 Fir Street
Boulder City, NV 89006-1470

Sent by FAX to: 702-293-8418
No. of Pages: 3

RE: Sacred Lands File Search and Native American Contacts list for the "Mojave Valley Backwater Conservation Area Project (Data Collection via 19 backhoe pits to Collect Groundwater & Soil Samples);" located near the Topock Gorge above the City of Needles on the California side of the Colorado River County, California

Dear Mr. Slaughter:

The Native American Heritage Commission (NAHC) has reviewed the above referenced project. The National Environmental Policy Act (NEPA 42 U.S.C 4321-4335) and Section 106 of the National Historic Preservation Act (16 U.S.C 470 et seq.), 33 CFR Part 330 and 36 CFR Part 800.14(b) require consultation with culturally affiliated Native American tribes to determine if the proposed project may have an adverse impact on cultural resources. To adequately comply with this provision and mitigate project-related impacts on archaeological resources, the Commission notes the following:

Contact has been made to the Native American Heritage Commission (NAHC) for:

- A list of appropriate and culturally affiliated Native American Contacts for consideration as consulting parties regarding the project site, pursuant to 36 CFR, Part 800. w(c )/(2), has been provided and is attached to this letter.

- A Sacred Lands File search failed to identify Native American traditional cultural places or properties in the USGS coordinates provided (e.g. ‘area of potential effect’ or APE.). Note that lack of additional surface evidence of archeological resources does not preclude their subsurface existence once ground-breaking activity begins. If that occurs, the NAHC suggests that inadvertent discoveries of human remains comply with California Health & Safety Code 7050.5 and Public Resources Code Section 5097.98 and coordinate with the NAHC. Federal NAGPRA may apply if on federal land. This project site is considered culturally sensitive by local tribes.

If you have any questions, please do not hesitate to contact me.

Sincerely,

Dave Singleton,
Program Analyst

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STATE OF CALIFORNIA

NATIVE AMERICAN HERITAGE COMMISSION
1550 Harbor Boulevard, Suite 100
West Sacramento, CA 95691
(916) 373-3715
Fax (916) 373-5471
www.nahc.ca.gov
e-mail: ds_nahc@pacbell.net
Twenty-Nine Palms Band of Mission Indians
Darrell Mike, Chairperson
Coachella, CA 92236

Joseph R. Benitez (Mike)
P.O. Box 1829
Indio, CA 92201
(760) 347-0488
(760) 408-4089 - cell

Chemehuevi Reservation
Edward Smith, Chairperson
P.O. Box 1976
Chemehuevi Valley, CA 92363

Fort Mojave Indian Tribe
Timothy Williams, Chairperson
Needles, CA 92363

Colorado River Indian Tribe
Dennis Patch, Chairman
Parker, AZ 85344

AhaMaKav Cultural Society, Fort Mojave Indian
Linda Otero, Director
P.O. Box 5990
Mohave Valley, AZ 86440

San Manuel Band of Mission Indians
Daniel McCarthy, M.S., Director-CRM Dept.
Highland, CA 92346

Fort Mojave Indian Tribe
Nora McDowell, Aha Makav Society
P.O. Box 5990
Needles, CA 92363

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of the statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5087.94 of the Public Resources Code and Section 5097.96 of the Public Resources Code.

This list is only applicable for contacting locative Americans with regard to cultural resources for the proposed Mojave Valley Backwater Conservation Area Data Collection (of Groundwater and Soil Samples) Project; located near the Tock Gorge near the Fort Mojave Indian Reservation on the California side of the Colorado River; San Bernardino County, California.
Native American Contacts
San Bernardino County California
March 28, 2014

Ah-Mut-Pipa Foundation
Preston J. Arrow-weed
P.O. Box 160
Bard, CA 92222
Quechan
Kurneyaay

MOAPA Band of Paiutes
William Anderson, Chairperson
P.O. Box 340
Moapa, NV 89025
Paiute
www.moapabandofpaiute-nsn.gov

Ernest H. Siva
Morongo Band of Mission Indians Tribal Elder
Serrano
Banning, CA 92220
Cahuilla

Pahrump Paiute Tribe
Richard Arnold, Chairperson
P.O. Box 3411
Pahrump, NV 89041-Paiute

Las Vegas Paiute Tribe
Attn: Cultural Resources Department
Paiute
Las Vegas, NV 89106

Twenty-Nine Palms Band of Mission Indians
Anthony Madrigal, Jr., THPO Officer
Chemehuevi
Coachella, CA 92236

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of the statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local American with regard to cultural resources for the proposed Mojave Valley Backwater Conservation Area Data Collection (of Groundwater and Soil Samples) Project; located near the Tock Gorge near the Fort Mojave Indian Reservation on the California side of the Colorado River; San Bernardino County, California.
APPENDIX K
LC-8000
ENV-3.00

JUL 31 2015

CERTIFIED - RETURN RECEIPT REQUESTED

Ms. Julianne Polanco
California State Historic Preservation Officer
1725 23rd Street, Suite 100
Sacramento, CA 95816

Subject: Mohave Valley Conservation Area Project, BUR_2014_0421_001

Dear Ms. Polanco:

In May 2014, the Bureau of Reclamation (Reclamation) consulted with your office regarding the Mohave Valley Conservation Area (MVCA) Project (BUR_2014_0421_001). This consultation was undertaken for pits used to evaluate sediments to see if the area was suitable to re-establish native vegetation within a 50 acre parcel of land. Based on the positive results from this work, Reclamation proposes to construct a backwater within the Conservation Area, and continuing consultation with your office.

This project is being undertaken to partially fulfill commitments of the Lower Colorado River Multi-Species Conservation Program; this program balances the use of the Colorado River water resources with the conservation of native species and their habitats. The project will provide backwater habitat for the flannelmouth sucker (Castotomus latipinnis) and two endangered species of native Colorado River fish, the razorback sucker (Xyrauchen texanus) and the bonytail chub (Gila elegans). The habitat will also benefit numerous migratory bird species.

The Area of Potential Effect (APE) is 50 acres on the Lower Colorado River near Needles, California, within the northern portion of Moabi Regional Park and northwest of Topock, Arizona (Enclosure 1 and 2). The site is approximately 13 miles south of Needles, California, between river miles 237 and 236, San Bernardino County, Section 6, Township 7 N, and Range 24 E. The activities planned for the parcel are grading and contouring the land, creating a backwater channel, and adding water control structures at the inlet and outlet of the project area (Enclosure 2). All excavated sediments will remain within the project boundaries.

The MVCA lands are composed of sediment spoils from dredging efforts conducted by Reclamation. Dredging of the Colorado River upstream of Topock Gorge has been done by Reclamation to prevent flooding. Reclamation mechanically dredged the river sediments and deposited the dredge spoil materials at the river’s margins. Sediments accumulate downstream
of the Mohave Valley, upstream of Topock Gorge, often prohibiting river navigation, leading to upstream flooding, and inadequate water delivery to downstream users.

In previous consultation with your office, Reclamation presented cultural resource identification efforts undertaken for the MVCA. To summarize, a site files search indicated that no previously recorded archaeological resources were within the APE. A pedestrian surface survey conducted in 2011 during improvements to the adjacent Park Moabi Regional Park indicated that there were no cultural resources in the project APE.

Tribal consultation letters were mailed on May 20, 2015 (Enclosure 3). One reply has been received from the Hopi Tribe (Enclosure 4). On March 28, 2014, Reclamation contacted the Native American Heritage Commission (Enclosure 5) and individual tribal letters were also mailed at that time; no properties were identified during all of these consultation efforts.

Per 36 CFR §800.4(d)(1) Reclamation has determined there will be no historic properties affected by the project. Should you have questions about this project, please contact me at 702-293-8555 or at jswett@usbr.gov and/or Mr. Mark C. Slaughter at 702-293-8143 or at mslaughter@usbr.gov.

Sincerely,

[Signature]

John Swett
Program Manager
Lower Colorado River
Multi-Species Conservation Program

Enclosures - 5
bc: LC-2633, LC-8000, LC-8400, LC-8416
(w/o encl to each)

Chrono
Daily

WBR:MSlaughter:gcristobal:07/28/2015:702-293-8143
http://lcrmsepsp/sites/MSCP/8000/Shared Documents/Correspondence/Document
Tracker/Restoration Group/L Anderson/SHPO Letter Mohave Valley Ecological Back Water Project Area (LA).docx
Enclosure 1. Mojave Valley Backwater Conservation Area Project Location.
Enclosure 3. Tribal Mailing List

Edward D. “Tito” Smith, Chairman
Chemehuevi Indian Tribe
P. O. Box 1976, Havasu Lake, CA 92363

Sherry Cordova, Chairperson
Cocopah Indian Tribe
Somerton, AZ 85350

H. Jill McCormick, Cultural Resource Manager
Cocopah Indian Tribe
Somerton, AZ 85350

Wilene Fisher-Holt, Tribal Historic Preservation Officer
Colorado River Indian Tribes
Parker AZ 85344

Timothy Williams, Chairman
Fort Mohave Indian Tribe
Needles, CA 92363

Linda Otero, Director, Ahamakav Cultural Society
Fort Mohave Indian Tribe
P. O. Box 5990, Mohave Valley, AZ 86440

Leigh Kuwanwiswima, Director, Cultural Preservation Office
Hopi Tribe of Arizona
P. O. Box 123, Kykotsmovi, AZ 86039

Loretta Jackson-Kelly, Tribal Historic Preservation Officer
Hualapai Tribe
P. O. Box 310, Peach Springs, AZ 86434

John Bathke, Quechan Tribal Historic Preservation Officer
Fort Yuma Quechan Tribe
P. O. Box 1899, Yuma, AZ 85366-1899

United States Department of the Interior

BUREAU OF RECLAMATION
Lower Colorado Regional Office
P.O. Box 61470
Boulder City, NV 89006-1470

MAY 20, 2015

IN REPLY REFER TO:
LC-8000
ENV-3.00

CERTIFIED - RETURN RECEIPT REQUESTED

Ms. Leigh Kuwanwiswima
Director
Cultural Preservation Office
Hopi Tribe of Arizona
P. O. Box 123
Kykotsmovi, AZ 86039

Subject: Mohave Valley Backwater Conservation Area Project

Dear Ms. Kuwanwiswima:

In May 2014, the Bureau of Reclamation consulted with your office about the Mohave Valley Backwater Conservation Area (MVCA). The earlier consultation was for the excavation pits to see if the location could be used to re-establish vegetation native to the Colorado River. Based on the results of this work, Reclamation proposes to construct a backwater within the conservation area.

The project is being undertaken to help fulfill commitments of the Lower Colorado River Multi-Species Conservation Program (LCR MSCP); this program balances the use of the Colorado River water resources with the conservation of native species and their habitats. The MVCA project will provide habitat for the flannelmouth sucker (Catostomus latipinnis), the razorback sucker (Xyrauchen texanus) and the bonytail chub (Gila elegans). The habitat will also benefit numerous migratory bird species.

The 50 acres of connected backwater habitat is on the lower Colorado River near Needles, California, within Meahol Regional Park, northwest of Topock, Arizona (see Enclosure 1). The proposed conservation area is approximately 13 miles south of Needles, California, between river miles 237 and 236, San Bernardino County, Section 6, Township 7 N, and Range 24 E.

The MVCA lands are composed of sediment spoils from dredging efforts conducted by Reclamation. Dredging of the Colorado River upstream of Topock Gorge has been done by Reclamation to prevent flooding. Reclamation mechanically dredged the river sediments and deposited the dredge spoil materials at the river’s margins.
No previously recorded archaeological sites have been identified in the project area. A recent pedestrian surface survey conducted in 2011 for the expansion of the facilities at Park Moabi Regional Park did not identify sites in the project area.

As shown in Enclosure 2, creation of the MVCA backwater involves mechanical excavation, planting of MSCP native land cover types, creation of a gravel boat ramp, and construction of two water control structures. All excavated materials will remain on site, along the northeastern portion of the project area. Reclamation biologists will monitor the site, and signs will be used to educate the public and define public access.

Should you have questions regarding the project, please contact me at 702-293-8555 or at jswett@usbr.gov and/or Mr. Mark C. Slaughter at 702-293-8143 or at Mslaughter@usbr.gov.

Sincerely,

John Swett
Program Manager
Lower Colorado River
Multi-Species Conservation Program

Enclosures

[Identical Letters Sent To:

Mr. Edward D. "Tito" Smith
Chairman
Chemeuhuevi Indian Tribe
P. O. Box 1976
Havasu Lake, CA 92363

Ms. Sherry Cordova
Chairperson
Cocopah Indian Tribe
Somerton, AZ 85350

Ms. H. Jill McCormick
Cultural Resource Manager
Cocopah Indian Tribe
Somerton, AZ 85350

Ms. Wilene Fisher-Holt
Tribal Historic Preservation Officer
Colorado River Indian Tribes
Parker AZ 85344]

March 28, 2014

Mr. Mark C. Slaughter, Archaelogist

U.S. Bureau of Reclamation, Lower Colorado Regional Office
500 Fir Street
Boulder City, NV 89005-1470

Sent by FAX to: 702-293-8418

No. of Pages: 3

RE: Sacred Lands File Search and Native American Contacts list for the “Mojave Valley Backwater Conservation Area Project (Data Collection via 19 backoe pits to Collect Groundwater & Soil Samples)” located near the Topock Gorge above the City of Needles on the California side of the Colorado River County, California

Dear Mr. Slaughter,

The Native American Heritage Commission (NAHC) has reviewed the above referenced project. The National Environmental Policy Act (NEPA 42 U.S.C 4321-4335) and Section 106 of the National Historic Preservation Act (16 U.S.C. 470 et seq.), 33 CFR Part 330 and 36 CFR Part 800.14(b) require consultation with culturally affiliated Native American tribes to determine if the proposed project may have an adverse impact on cultural resources. To adequately comply with this provision and mitigate project-related impacts on archaeological resources, the Commission notes the following:

Contact has been made to the Native American Heritage Commission (NAHC) for:

- A list of appropriate and culturally affiliated Native American Contacts for consideration as consulting parties regarding the project site, pursuant to 36 CFR, Part 800.4(c)(2), has been provided and is attached to this letter.

- A Sacred Lands File search failed to identify Native American traditional cultural places or properties in the USGS coordinates provided (e.g. ‘area of potential effect’ or APE). Note that lack of additional surface evidence of archaeological resources does not preclude their subsurface existence once ground-breaking activity begins. If that occurs, the NAHC suggests that inadvertent discoveries of human remains comply with California Health & Safety Code 7050.5 and Public Resources Code Section 5097.98 and coordinate with the NAHC. Federal NAGPRA may apply if on federal land. This project site is considered culturally sensitive by local tribes.

If you have any questions, please do not hesitate to contact me.

Sincerely,

Dave Dingstien
Program Analyst

[Signature]
Native American Contacts
San Bernardino County California
March 26, 2014

Twenty-Nine Palms Band of Mission Indians
Derrell Mike, Chairperson
Coachella, CA 92236

Colorado River Indian Tribe
Dennis Pitch, Chairman
Parker, AZ 85344

Joseph R. Benitez (Mike)
P.O. Box 1829
Indio, CA 92201

AhaMaKav Cultural Society, Fort Mojave Indian
Linda Otero, Director
P.O. Box 5990
Mohave Valley, AZ 86440

Chemehuevi Reservation
Edward Smith, Chairperson
P.O. Box 1976
Chemehuevi Valley, CA 92363

San Manuel Band of Mission Indians
Daniel McCarthy, M.S., Director-CRM Dept.
Highland, CA 92346

Fort Mojave Indian Tribe
Timothy Williams, Chairperson
Needles, CA 92363

Fort Mojave Indian Tribe
Nora McDowell, Aha Makav Society
P.O. Box 5990
Needles, CA 92363

This list is current as of the date of this document.

Distribution of this list does not relieve any person of the statutory responsibility as defined in Section 7059.5 of the Health and Safety Code, Section 5897.94 of the Public Resources Code and Section 6297.98 of the Public Resources Code.

This list is only applicable for contacting locative Americans with regard to cultural resources for the proposed Mojave Valley Backwater Conservation Area Data Collection (for Groundwater and Soil Samples) Project, located near the Yucca Gorge near the Fort Mojave Indian Reservation on the California side of the Colorado River. San Bernardino County, California.
Native American Contacts
San Bernardino County California
March 28, 2014

Ah-Mut-Pipa Foundation
Preston J. Arrowwood
P.O. Box 193
Bard, CA 92222

MOAPA Band of Paiutes
William Anderson, Chairperson
P.O. Box 940
Moapa, NV 89025
www.moapabandofpaitue-nsn.gov

Ernest H. Siva
Morongo Band of Mission Indians Tribal Elder
Pahrump, Paiute Tribe
Banning, CA 92220
Richard Arnold, Chairperson
P.O. Box 3411
Pahrump, NV 89041

Las Vegas Paiute Tribe
Attn: Cultural Resources Department
Las Vegas, NV 89106

Twenty-Nine Palms Band of Mission Indians
Anthony Madrigal, Jr., THPO Officer
Coachella, CA 92236

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of the statutory responsibility as defined in Section 7065.6 of the Health and Safety Code, Section 6097.94 of the Public Resources Code and Section 6097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources for the proposed Mojave Valley Backwater Conservation Area Data Collection (of Groundwater and Soil Sampling) Project, located near the Tuck Gorge near the Fort Mojave Indian Reservation on the California side of the Colorado River; San Bernardino County, California.
September 1, 2015

In reply refer to: BUR_2014_0421_001

Mr. John Swett
Bureau of Reclamation
Lower Colorado River Regional Office
Multi-Species Conservation Program
P.O. Box 61470
Boulder City, NV 89006-1470

Re: National Historic Preservation Act (NHPA) Section 106 Consultation for the Mohave Valley Conservation Area Project (BUR_2014_0421_001)

Dear Mr. Swett:

Thank you for your letter dated July 31, 2015, requesting my review and comment with regard to the proposed Mohave Valley Conservation Area (MVCA) Project on the Lower Colorado river near Needles, California. The Bureau of Reclamation (Reclamation) is continuing consultation with me pursuant to Section 106 of the National Historic Preservation Act and its implementing regulations found at 36 CFR Part 800 (as amended 8-05-04), for the construction above mentioned undertaking. Along with your consultation letter, you also provided the following documents:

- Mohave Valley Backwater Conservation Area Project APE maps,
- Tribal Mailing list,
- Hopi Tribe Response, and

In May of 2014, Reclamation consulted with my office regarding the MVCA. This initial consultation was undertaken regarding the excavation of 15 test pits used to evaluate sediments within the project area to determine if the area was suitable to re-establish native vegetation with a 50 acre parcel of land. At that time, my office found your identification efforts sufficient, had no objections to the delineated APE, and concurred with your Finding of No Historic Properties Affected.

Reclamation is continuing consultation with my office regarding the proposed construction of a backwater within the Conservation Area. The project is being undertaken to partially fulfill commitments of the Lower Colorado River Multi-Species Conservation Program. In addition to providing habitat for migratory birds, the project will provide backwater habitat for the flannelmouth sucker (*Castotomus latipinnis*) and two endangered species of native Colorado River fish, the razorback sucker (*Xyranchen texanus*) and the bonytail chub (*Gila elegans*). The activities planned within the project area include grading and contouring the land, creating a backwater channel, and adding water control structures at the inlet and outlet of the project area (as illustrated in the provided technical documents). All excavated sediments will remain with the project boundaries.
Reclamation has determined that the area of potential effects (APE) for this undertaking is the entire 50 acre project area on the lower Colorado River, within the northern portion of Moabi Regional Park (as illustrated in the provided technical documents) and includes all ground-disturbing activities associated with project implementation, construction staging areas, and access routes.

Archival research was conducted of Reclamation cultural resource files. No previously recorded archaeological resources were identified with the APE. A pedestrian surface survey was conducted in 2011 during improvements to Moabi Regional Park. No cultural resources were identified in the project APE. Reclamation initiated tribal consultation in May, 2015 and no potential historic properties were identified through your Native American consultation efforts.

As a result of the identification efforts, no historic properties were identified in the APE and, pursuant to 36 CFR 800.4(d)(1), Reclamation has found that no historic properties will be affected by the proposed undertaking. Reclamation is requesting my review and comment on the delineation of the APE, their efforts to identify historic properties, and is seeking my concurrence with their finding that the proposed undertaking will result in no historic properties affected. After reviewing your submission I have the following comments:

- Pursuant to 36 CFR 800.4(a)(1), I have no objections to the APE as defined.
- Pursuant to 36 CFR 800.4(b), I find that Reclamation has made a reasonable and good faith effort to identify historic properties within the area of potential effects.
- Pursuant to 36 CFR 800.4(d)(1)(i), I do not object with your finding of no historic properties affected for this undertaking.

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

Sincerely,

Julianne Polanco
State Historic Preservation Officer
Ms. Linda Otero  
Director  
Ahahakav Cultural Society  
Fort Mohave Indian Tribe  
P. O. Box 5990  
Mohave Valley, AZ  86440

Subject: Mohave Valley Backwater Conservation Area Project

Dear Ms. Otero:

In May 2014, the Bureau of Reclamation consulted with your office about the Mohave Valley Backwater Conservation Area (MVCA). The earlier consultation was for the excavation pits to see if the location could be used to re-establish vegetation native to the Colorado River. Based on the results of this work, Reclamation proposes to construct a backwater within the conservation area.

The project is being undertaken to help fulfill commitments of the Lower Colorado River Multi-Species Conservation Program (LCR MSCP); this program balances the use of the Colorado River water resources with the conservation of native species and their habitats. The MVCA project will provide habitat for the flannelmouth sucker (*Castotomus latipinnis*), the razorback sucker (*Xyrachuen texanus*) and the bonytail chub (*Gila elegans*). The habitat will also benefit numerous migratory bird species.

The 50 acres of connected backwater habitat is on the lower Colorado River near Needles, California, within Moabi Regional Park, northwest of Topock, Arizona (see Enclosure 1). The proposed conservation area is approximately 13 miles south of Needles, California, between river miles 237 and 236, San Bernardino County, Section 6, Township 7 N, and Range 24 E.

The MVCA lands are composed of sediment spoils from dredging efforts conducted by Reclamation. Dredging of the Colorado River upstream of Topock Gorge has been done by Reclamation to prevent flooding. Reclamation mechanically dredged the river sediments and deposited the dredge spoil materials at the river’s margins.
No previously recorded archaeological sites have been identified in the project area. A recent pedestrian surface survey conducted in 2011 for the expansion of the facilities at Park Moabi Regional Park did not identify sites in the project area.

As shown in Enclosure 2, creation of the MVCA backwater involves mechanical excavation, planting of MSCP native land cover types, creation of a gravel boat ramp, and construction of two water control structures. All excavated materials will remain on site, along the northeastern portion of the project area. Reclamation biologists will monitor the site, and signs will be used to educate the public and define public access.

Should you have questions regarding the project, please contact me at 702-293-8555 or at jswett@usbr.gov and/or Mr. Mark C. Slaughter at 702-293-8143 or at mslaughter@usbr.gov.

Sincerely,

[Signature]

John Swett
Program Manager
Lower Colorado River
Multi-Species Conservation Program

Enclosures

Identical Letters Sent To:

Mr. Edward D. “Tito” Smith
Chairman
Chemehuevi Indian Tribe
P. O. Box 1976
Havasu Lake, CA 92363

Ms. Sherry Cordova
Chairperson
Cocopah Indian Tribe
Somerton, AZ 85350

Ms. H. Jill McCormick
Cultural Resource Manager
Cocopah Indian Tribe
Somerton, AZ 85350

Ms. Wilene Fisher-Holt
Tribal Historic Preservation Officer
Colorado River Indian Tribes
Parker AZ 85344
Mr. Timothy Williams  
Chairman  
Fort Mohave Indian Tribe  
Needles, CA  92363

Ms. Loretta Jackson-Kelly  
Tribal Historic Preservation Officer  
Hualapai Tribe  
P. O. Box 310  
Peach Springs, AZ  86434

Ms. Leigh Kuwanwiswma  
Director  
Cultural Preservation Office  
Hopi Tribe of Arizona  
P. O. Box 123  
Kykotsmovi, AZ  86039

Mr. John Bathke  
Quechan Tribal Historic Preservation Officer  
Fort Yuma Quechan Tribe  
P. O. Box 1899  
Yuma, AZ  85366-1899
Enclosure 1. Mojave Valley Backwater Conservation Area Project Location.
Ms. Leigh Kuwanwiswma  
Director  
Cultural Preservation Office  
Hopi Tribe of Arizona  
P. O. Box 123  
Kykotsmovi, AZ 86039

Subject: Mohave Valley Backwater Conservation Area Project

Dear Ms. Kuwanwiswma:

In May 2014, the Bureau of Reclamation consulted with your office about the Mohave Valley Backwater Conservation Area (MVCA). The earlier consultation was for the excavation pits to see if the location could be used to re-establish vegetation native to the Colorado River. Based on the results of this work, Reclamation proposes to construct a backwater within the conservation area.

The project is being undertaken to help fulfill commitments of the Lower Colorado River Multi-Species Conservation Program (LCR MSCP); this program balances the use of the Colorado River water resources with the conservation of native species and their habitats. The MVCA project will provide habitat for the flannelmouth sucker (*Castotomus latipinnis*), the razorback sucker (*Xyrauchen texanus*) and the bonytail chub (*Gila elegans*). The habitat will also benefit numerous migratory bird species.

The 50 acres of connected backwater habitat is on the lower Colorado River near Needles, California, within Moabi Regional Park, northwest of Topock, Arizona (see Enclosure 1). The proposed conservation area is approximately 13 miles south of Needles, California, between river miles 237 and 236, San Bernardino County, Section 6, Township 7 N, and Range 24 E.

The MVCA lands are composed of sediment spoils from dredging efforts conducted by Reclamation. Dredging of the Colorado River upstream of Topock Gorge has been done by Reclamation to prevent flooding. Reclamation mechanically dredged the river sediments and deposited the dredge spoil materials at the river’s margins.
No previously recorded archaeological sites have been identified in the project area. A recent pedestrian surface survey conducted in 2011 for the expansion of the facilities at Park Moabi Regional Park did not identify sites in the project area.

As shown in Enclosure 2, creation of the MVCA backwater involves mechanical excavation, planting of MSCP native land cover types, creation of a gravel boat ramp, and construction of two water control structures. All excavated materials will remain on site, along the northeastern portion of the project area. Reclamation biologists will monitor the site, and signs will be used to educate the public and define public access.

Should you have questions regarding the project, please contact me at 702-293-8555 or at jswett@usbr.gov and/or Mr. Mark C. Slaughter at 702-293-8143 or at mslaughter@usbr.gov.

Sincerely,

[Signature]

John Swett
Program Manager
Lower Colorado River
Multi-Species Conservation Program

Enclosures

Identical Letters Sent To:

Mr. Edward D. “Tito” Smith
Chairman
Chemehuevi Indian Tribe
P. O. Box 1976
Havasu Lake, CA 92363

Ms. Sherry Cordova
Chairperson
Cocopah Indian Tribe
[Redacted]
Somerton, AZ 85350

Ms. H. Jill McCormick
Cultural Resource Manager
Cocopah Indian Tribe
[Redacted]
Somerton, AZ 85350

Ms. Wilene Fisher-Holt
Tribal Historic Preservation Officer
Colorado River Indian Tribes
[Redacted]
Parker AZ 85344
APPENDIX N
Subject: Notification of the Mohave Valley Conservation Area Backwater Project

Dear Mr./Ms. «Last_Name»:

California State Lands Commission (CSLC) staff is providing this letter to notify you of the proposed Mohave Valley Conservation Area Backwater Project (Project), for which we are preparing an Environmental Assessment and Mitigated Negative Declaration (EA/MND) jointly with the Bureau of Reclamation (Reclamation). A new California law known as “Assembly Bill (AB) 52” (Chapter 532, Statutes of 2014) effective on July 1, 2015, makes changes to the California Environmental Quality Act (CEQA) regarding tribal cultural resources and consultation with California Native American Tribes who have previously requested to be notified of projects in the geographic area traditionally and culturally affiliated with that tribe. While we have no written requests from any tribes for the area associated with this Project, we wish to engage with tribes proactively to ensure you have the opportunity to provide meaningful input on the Project’s potential effects. You will also receive a separate notice when the EA/MND is released for a 30-day public review and comment period.

Information collected and investigations conducted for the EA/MND analysis indicate there are no known tribal cultural resources in the area that would be affected by the Project. Reclamation conducted a pedestrian surface survey in 2011 that did not identify archaeological sites in the Project area. Reclamation also sent notification of the proposed Project pursuant to federal consultation provisions on or around May 20, 2015. In addition, a Sacred Lands File search conducted by the Native American Heritage Commission (NAHC) did not identify Native American traditional cultural places or properties in the Project area, although it noted that the project site may be considered “culturally sensitive” by local tribes.

Please review the proposed Project components, described below. If you have any questions, or wish to discuss the Project, please contact Jennifer DeLeon at tribal.liaison@slc.ca.gov, or at (916) 574-0748. CSLC staff also encourages you to visit...
the NAHC’s AB 52 resource page at http://nahc.ca.gov/codes/, where you can find a sample letter requesting notification of future CEQA projects, along with other information.

The proposed Project consists of activities on an approximately 149-acre portion of a vacant parcel along the Colorado River (River) between River Miles 237 and 236, and is composed largely of sediment spoils from past dredging activities by Reclamation on the River. It is located on the historic floodplain of the River within the Moabi Regional Park (Park), about 13 miles south of Needles, California, in San Bernardino County (see Enclosure 1). The proposed Project site is currently being used as an Off-Highway Vehicle recreation area.

The CSLC is considering issuance of a lease to the California Department of Fish and Wildlife (CDFW), as the State partner for implementing the Lower Colorado River Multi-Species Conservation Program (MSCP). It is anticipated that the lease will be considered by the CSLC at a formal public hearing in Sacramento on December 18, 2015. The Lower Colorado River MSCP balances the use of the River water resources with the conservation of native species and their habitats. Reclamation would create the Project as the federal partner implementing the Lower Colorado River MSCP.

The proposed Project would reconnect the River by excavating soil to create 50 acres of backwater channel and associated backwater habitat to contribute to the habitat restoration requirements identified in the Lower Colorado River MSCP. All excavated material would remain onsite, along the northeastern portion of the Project area (see Enclosure 2). The Project would provide habitat for flannelmouth sucker (Castrotomus latipinnis), razorback sucker (Xyrauchen texanus), and bonytail chub (Gila elegans), and would also benefit numerous migratory bird species. The proposed Project would be carried out in the following four phases:

- **Phase 1 – Vegetation Clearing:** Reclamation would manually (using hand tools) and mechanically (using machinery) remove and break down vegetation debris into manageable pieces that would be buried onsite (see Enclosure 2).

- **Phase 2 – Excavation and Construction:** Reclamation would excavate the backwater channel and construct water control structures and a gravel boat ramp before allowing water into the proposed Project site. The 1.2 million cubic yards of dry excavated compacted fill would be used to bury the broken down vegetation debris (from Phase 1) onsite (see Enclosure 2).

- **Phase 3 – Establishment/Re-Vegetation:** Reclamation would till the soil along the contours of the backwater channel, and plant native vegetation as recommended in the Habitat Conservation Plan for the Lower Colorado River MSCP.

- **Phase 4 – Habitat Management, Operations, and Maintenance:** Reclamation would draft and implement a Mohave Valley Backwater Restoration Development and Monitoring Plan to address habitat/vegetation management, operation and
maintenance of the constructed facilities, and anticipated maintenance dredging to keep the backwater channel at a depth of 10 feet.

Again, if you have any questions, please feel free to contact me or my tribal liaison at your convenience. You may also contact the Project staff lead, Afifa Awan, by phone at (916) 574-1891 or via email at Afifa.Awan@slc.ca.gov.

Sincerely,

JENNIFER LUCCHESI
Executive Officer

Enclosures:
1. Project Location
2. Project Site Plan

cc:
A. Awan
J. DeLeon
P. Griggs
P. Huber

Identical Letters Sent To:
Ahramakav Cultural Society, Fort Mohave Indian Tribe
Ah-Mut_Pipa Foundation
Benitez (Mike), J.
California Native American Heritage Commission
Chemehuevi Indian Tribe
Cocopah Indian Tribe
Colorado River Indian Tribes
Fort Mohave Indian Tribe
Fort Yuma Quechan Tribe
Hopi Tribe of Arizona
Hualapai Tribe
Las Vegas Paiute Tribe
MOAPA Band of Paiutes
Morongo Band of Mission Indians
Pathrump Paiute Tribe
San Manuel Band of Mission Indians
Twenty-Nine Palms Band of Mission Indians
Enclosure 1: Project Location
Enclosure 2: Project Site Plan
MOHAVE VALLEY CONSERVATION AREA
WETLAND INVESTIGATION
DRAFT REPORT
San Bernardino County, California

May 2015

Prepared for:
US Bureau of Reclamation
Lower Colorado Region
LC-2633
PO Box 61470
Boulder City, Nevada 89006

Prepared by:
BIO-WEST, Inc.
1063 West 1400 North
Logan, Utah 84321
DEFINITIONS

**Alluvial deposits**: Land formations at the base of mountains where fast-flowing streams meet relatively flat surfaces, such as basin floors or broad valleys. As the gradient abruptly decreases, streams deposit gravel, sand, and other sediments.

**Depth-to-soil saturation**: The depth at which the pores between soil particles are filled with water.

**Drainage patterns**: A network of intermittent or perennial channels formed by local geological and soil characteristics.

**Hydric soils**: Soils that are flooded, ponded, or saturated long enough during the growing season to develop anaerobic conditions in the upper part of the soil profile. These conditions can develop from continuous saturation during as little as 5 percent of the growing season.

**Ordinary high-water mark**: On the shoreline of a body of water, the line or marking established by the fluctuations of water and indicated by physical characteristics such as a clear and natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, and/or other indicators appropriate for the surrounding area.

**Waters of the United States**: “All waters that are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; All interstate waters including interstate wetlands; All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation, or destruction of which could affect interstate or foreign commerce...Wetlands adjacent to waters (other than waters that are themselves wetlands) identified above.” (Definition taken from 33 CFR, Part 328.3.) “Adjacent” is defined as bordering, contiguous, or neighboring.

**Wetlands**: “Areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.” (Definition taken from 33 CFR, Part 328.3).

**Limits of jurisdiction in nontidal waters:**

1. in the absence of adjacent wetlands, the jurisdiction extends to the ordinary high-water mark;

2. when adjacent wetlands are present, the jurisdiction extends beyond the ordinary high-water mark to the limit of the adjacent wetlands;

3. when the Water of the United States consists only of wetlands, the jurisdiction extends to the limit of the wetland (taken from 33 CFR, Part 328.3).
1.0 INTRODUCTION

The US Bureau of Reclamation (Reclamation) contracted BIO-WEST, Inc. (BIO-WEST), to complete a wetland delineation of the Mohave Valley Conservation Area Project Area (Project Area) as part of the application for a Clean Water Act Section 404 permit. Reclamation plans to obtain a Nationwide Permit 27 (Wetland and Riparian Restoration and Creation Activities) to complete habitat restoration at the Project Area as part of the Lower Colorado River Multi-Species Conservation Program.

The Project Area is located approximately 13 miles south of the town of Needles in Mohave Valley, California (Figure 1). The northeastern corner of the Project Area is adjacent to the west bank of the Colorado River. The Project Area covers 167.2 acres in Section 36 Township 8 North Range 23 East, Section 31 Township 8 North Range 24 East, Section 6 Township 7 North Range 24 East, and Section 1 Township 7 North Range 23 East (San Bernardino Meridian) (Figure 2). Approximate coordinates in the center of the Project Area are 34°44′07.20″ North and 114°31′17.26″ West.

2.0 METHODS

A Project Area inspection was conducted March 17–19, 2015, to delineate jurisdictional wetland boundaries. Wetland boundaries were identified in accordance with the U.S. Army Corps of Engineers Wetlands Delineation Manual (Manual) (Environmental Laboratory 1987) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Environmental Laboratory 2008). The routine determination method for areas larger than 5 acres was used to delineate the Project Area. The three-parameter approach (hydrology, soils, and vegetation) was typically implemented to make boundary determinations. In areas where one or more wetland parameters may have been absent or misleading, the area was mapped using mainly soil characteristics, depressional landscape position, remnant hydrophytic vegetation, and/or persistent hydrological indicators, as specified by the Manual.

Using the routine wetland delineation method described in the Manual (Environmental Laboratory 1987), a baseline was established parallel to the eastern Project Area boundary along the existing Colorado River and the historic Colorado River channel. This baseline runs the entire length of the Project Area and is approximately 5,700 feet long from north to south (Appendix A). The baseline was divided into six segments. Transect starting points were located at the midpoint of each baseline segment, spaced approximately 800 feet apart, and positioned from the north end of the established baseline moving south. The transect lines were oriented northeast to southwest running the entire width of the Project Area and were between 644 and 2,188 feet long.

Sample observation points along each transect were located where changes in vegetation communities were observed. In areas determined to represent wetland-upland interfaces, paired sample points were established to document conditions on either side of the wetland-upland boundary. Observation points were located as close to the transect lines as possible, but in some cases barriers such as impenetrable stands of dense vegetation offset the observation points from...
Figure 1. Project Area location map.

Driving Directions: From Needles, California, travel on I-40 East. Follow I-40 East to Park Moabi Road. Take the Park Moabi Road Exit 153. Travel North 0.6 mile to the Pirate Cove Resort and Marina. Turn left and continue to follow Park Moabi Road 0.1 mile to the security gate. The Project area is 0.5 mile northwest of the security gate.
Figure 2. Project Area map.
the transect lines. Observation point data were recorded on standard Arid West Supplement data sheets (Appendix B).

The presence or absence of hydrological indicators was noted at each observation point. The determination of wetland hydrology was based on the presence of at least one positive primary indicator or two positive secondary indicators of a prolonged period of saturation. Primary hydrology indicators include surface water, high water table, soil saturation, nonriverine watermarks, nonriverine sediment deposits, nonriverine drift deposits, surface soil cracks, inundation visible on aerial imagery, water-stained leaves, salt crust, biotic crust, aquatic invertebrates, hydrogen sulfide odor, oxidized rhizospheres along living root channels, presence of reduced iron, and recent iron reduction in plowed soils. Secondary hydrology indicators include riverine water marks, riverine sediment deposits, riverine drift deposits, drainage patterns, dry season water table, thin muck surface, crayfish burrows, saturation visible on aerial imagery, shallow aquitard, and hydrophytic results from the facultative-neutral test. Environmental changes and the topographic position of the sample points relative to observed water tables were also noted.

When possible, soil pits were dug at each sample point to a depth of 18 inches to characterize soil profiles and soil/water conditions. At least one positive hydric soil indicator was required at each sample point to classify a soil as hydric. For example, soils in prolonged anaerobic conditions undergo chemical reduction, thereby producing lighter soil colors. During the field survey, the colors of the soil profile matrix and mottles were identified using Munsell® soil color charts (Kollmorgen Instruments 1990). Soil horizonation, texture, moisture content, and depth-to-soil saturation and/or standing water were noted. The presence or absence of particulate organic matter, organic matter staining, concretions, mottling, and gleying was also noted. Selected soils samples were collected for laboratory analysis. These samples consisted of a mixture of the upper 18 inches of soil within a sample pit. The samples were labeled, iced, and shipped to a certified laboratory for analysis.

The Natural Resources Conservation Service Web Soil Survey website (NRCS 2015) indicated that Project Area soils were not mapped; therefore, this resource could not be used during the delineation. Significant portions of the Project Area contain a surface salt crust and salt concretions within the soil. According to the US Army Corps of Engineers (USACE), “In the Arid West, salt content is a common cause of high soil pH” (Environmental Laboratory 2008). In areas containing a salt crust and/or salt concretions within the soil, determination of hydric soils followed guidance provided in the Regional Supplement of the Corps of Engineers Wetland Delineation Manual: Arid West Region (specifically, Problematic Hydric Soils, Section 1, Moderately to Very Strongly Alkaline Soils) (Environmental Laboratory 2008). According to this guidance, redoxomorphic features may not form in alkaline wetland soils. The most common example of this noted on the Project Area is the lack of a sufficiently reduced soil matrix. Specifically, Project Area wetland soils commonly form distinct or prominent soil mottling; however, the matrix chroma of these soils is not low enough to meet the F3 reduced matrix or the S5 sandy redox hydric soil indicators. In these situations the presence of soil mottling, wetland vegetation, and wetland hydrology, as well as landscape position, was used to determine the status of a particular observation point.
For a site to be classified as having hydrophytic vegetation, dominant plant species must have certain characteristics. On the data forms in Appendix B, BIO-WEST recorded the tree species that occurred within a 50-foot radius of each sample point. The shrub and herbaceous layer species that occurred within a 5-foot radius of each sample point were recorded. Absolute cover of each species was visually estimated and recorded. Species composing 20 percent or more of the total areal cover per stratum were considered dominant, following the guideline of the USACE’s 50/20 rule (Environmental Laboratory 1987). The wetland-indicator status of vegetation observed was noted according to the *U.S. Army Corps of Engineers National Wetlands Plant List* (Lichvar et al. 2014).

Of the dominant plant species recorded, more than 50 percent must have an indicator status of facultative (33–67 percent probability of occurring in wetlands), facultative wetland (greater than 67–99 percent probability of occurring in wetlands), or obligate wetland (greater than 99 percent probability of occurring in wetlands) for a site to be classified as having hydrophytic vegetation for wetland delineation purposes.

Thirty-three sample points were established to characterize existing hydrological, soil, and vegetative conditions within the Project Area. In some cases, paired sample points were collected away from established transect lines to determine the extent of wetland boundaries. The sample points were marked in the field by pink pin flags labeled “WETLAND DELINEATION” with the sample point number written on the flag. Photos of sample points were taken during the Project Area inspection (Appendix C).

Based on the sample point data, wetland boundaries were determined and marked in the field with plastic flagging tape. The delineated wetland boundaries and sample points were surveyed using a GPS with submeter accuracy. The survey data were downloaded into a computer-aided drafting and design program to produce a map showing the delineated wetland boundaries, sample point locations, and wetland acreage as depicted in Appendix A.

### 3.0 GENERAL CONDITIONS

The Project Area was inspected during March 2015. Vegetation in the Project Area was actively growing and identifiable with the exception of a few small herbaceous plants. Vegetation within the Project Area was dominated by shrub arrowweed (*Pluchea sericea*) and saltcedar (*Tamarix* sp.). The Project Area consists of upland shrub communities, barren upland sand dunes, and wetland swales associated with the historic Colorado River channel. The Project Area has been altered by construction of roadways around the entire perimeter. The Project Area is located within the historic floodplain of the Colorado River but does not appear to have been flooded by the river in many decades due to upstream control of river levels. Wetland hydrology appeared to be driven by surface precipitation and/or a high groundwater table. Soil textures ranged from fine sand to clay loam or silt, depending on topographic location. Areas with a salt crust surface were present within the Project Area, and soils commonly contained mottles and sometimes salt concretions.
4.0 WETLAND INVESTIGATION FINDINGS

4.1 Vegetation

Plant communities found in the Project Area included upland shrub, perennial emergent wetland, and seasonally flooded shrub wetland. Vegetation diversity was low and the majority of the Project Area was dominated by stands of arrowweed or woody shrub dominated by saltcedar. A few pockets of screwbean mesquite (*Prosopis pubescens*) were observed within the Project Area. The emergent wetland located at the southern end of the Project Area is dominated by cattail (*Typha latifolia*) with small pockets of alkali bulrush (*Schoenoplectus maritimus*). The emergent wetland exhibited a thin band of coyote willow (*Salix exigua*) around some areas of the wetland perimeter. The dominant plant species observed in the Project Area are included in Table 1.

Table 1. Dominant plant species observed in the Project Area.

<table>
<thead>
<tr>
<th>COMMON NAME</th>
<th>SCIENTIFIC NAME</th>
<th>INDICATOR STATUSa</th>
</tr>
</thead>
<tbody>
<tr>
<td>shrub arrowweed</td>
<td><em>Pluchea sericea</em></td>
<td>FACW</td>
</tr>
<tr>
<td>saltcedar</td>
<td><em>Tamarix sp.</em></td>
<td>FAC</td>
</tr>
<tr>
<td>screwbean mesquite</td>
<td><em>Prosopis pubescens</em></td>
<td>FAC</td>
</tr>
<tr>
<td>cattail</td>
<td><em>Typha latifolia</em></td>
<td>OBL</td>
</tr>
</tbody>
</table>

a FACW = facultative wetland species, FAC = facultative species, and OBL = obligate wetland species.

The majority of the uplands in the Project Area were dominated by saltcedar and shrub arrowweed with occasional occurrences of screwbean mesquite. Wetlands in the Project Area were dominated by saltcedar, shrub arrowweed, and cattail, and usually occurred in depressional swale areas.

Vegetation communities in the Project Area fell within the following three categories:

- **Seasonally Flooded Shrub Wetland**
  These areas were dominated by shrub arrowweed and saltcedar and contained alkaline soils. Some shrub wetlands contained dense stands of shrub arrowweed. Saltcedar and shrub arrowweed alternated in dominance and some locations contain homogenous stands. These wetlands occurred as low swales within the landscape and were usually bordered by berms and quickly transitioned to uplands. Numerous ephemeral washes drained into these wetlands from the offsite hills west of the Project Area.

- **Perennial Emergent Wetland**
  This wetland community was dominated by cattails and contains pockets of alkali bulrush. Coyote willows were found along parts of the perimeter of the wetland in a thin band.

- **Weedy Shrub Upland**
  These upland vegetation communities included saltcedar flats, shrub arrowweed sandbars, and disturbed areas such as roadside fill slopes.
4.2 Soils

Wetlands within the Project Area contained a surface salt crust and sometimes salt concretions within the soil. According to USACE, “[i]n the Arid West, salt content is a common cause of high soil pH” (Environmental Laboratory 2008). In areas containing a salt crust and/or salt concretions within the soil, determination of hydric soils followed guidance provided in the Regional Supplement of the Corps of Engineers Wetland Delineation Manual: Arid West Region (specifically, Problematic Hydric Soils, Section 1, Moderately to Very Strongly Alkaline Soils) (Environmental Laboratory 2008). According to this guidance, redoxomorphic features may not form in alkaline wetland soils. The most common example of this in the Project Area was the lack of a sufficiently reduced soil matrix. Project Area wetland soils commonly formed distinct or prominent soil mottling; however, the matrix chroma of these soils was not always low enough to meet the F3 reduced matrix or the S5 sandy redox hydric soil indicators. In these situations the presence of soil mottling, wetland vegetation, and wetland hydrology, as well as landscape position, was used to determine the status of a particular observation point. In wetland soils where redoxomorphic features were apparent, hydric soil indicators included depleted matrix and sandy redox.

4.3 Hydrology

The current course of the Colorado River borders the Project Area to the east. The river is incised within the current channel and a roadway berm separates the river from most of the Project Area, preventing surface flooding of the Project Area by the river. The majority of the Project Area wetlands appear to be seasonally flooded by ephemeral washes that drain into the Project Area from the offsite hills to the west. These wetlands are depressional swales located between upland communities. These wetland swales appear to be remnant river floodplain areas and possibly historic river channels. The emergent wetland at the south side of the Project Area is a depressional swale that is flooded by an existing backwater connected to the Colorado River. The emergent wetland appears to be continuously flooded. Hydrologic indicators observed in Project Area wetlands include saturated soils, surface water flooding, surface salt crust, and surface soil cracks.

4.4 Wetlands

The Project Area contains two seasonally flooded shrub wetlands and one perennially flooded emergent wetland as identified in Table 2. Project Area wetlands include swales that appear to be remnant Colorado River floodplain features. Saltcedar and shrub arrowweed were the dominant wetland vegetation, ranging from moderately dense to dense stands. A perennial emergent wetland is located at the southern end of the Project Area. The emergent wetland is connected to a surface backwater of the Colorado River. The investigation revealed 33.8 total acres of wetlands within the Project Area. Project Area wetlands are illustrated as individual polygons in Appendix A and the centroid locations of these polygons are listed in Table 3.
### Table 2. Project Area wetland summary.

<table>
<thead>
<tr>
<th>WETLAND ID (APPENDIX A)</th>
<th>WETLAND TYPE</th>
<th>ACRES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wetland A</td>
<td>Seasonally Flooded Shrub</td>
<td>0.2</td>
</tr>
<tr>
<td>Wetland B</td>
<td>Seasonally Flooded Shrub</td>
<td>31.7</td>
</tr>
<tr>
<td>Wetland C</td>
<td>Perennially Flooded Emergent</td>
<td>1.9</td>
</tr>
<tr>
<td><strong>Total Wetland Area</strong></td>
<td></td>
<td>33.8</td>
</tr>
</tbody>
</table>

### Table 3. Wetland locations in the Project Area.

<table>
<thead>
<tr>
<th>WETLAND POLYGON IDENTIFIERa</th>
<th>CENTROID LOCATION (LATITUDE/LONGITUDE [WGS 1984b])</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Latitude North</td>
<td>Longitude West</td>
</tr>
<tr>
<td>A</td>
<td>114.525307°</td>
<td>34.738611°</td>
</tr>
<tr>
<td>B</td>
<td>114.522694°</td>
<td>34.733892°</td>
</tr>
<tr>
<td>C</td>
<td>114.519053°</td>
<td>34.731283°</td>
</tr>
</tbody>
</table>

a Appendix A.  
b World Geodetic System.

### 5.0 SOIL SAMPLING RESULTS

Seventy-eight soil samples were collected during the wetland investigation. Sixty-eight of these samples were collected from Project Area wetlands and 10 were collected from Project Area uplands. The samples were placed on ice and taken to the Utah State University Analytical Laboratory for analysis. Analysis included soil pH, salts (ECe), phosphorus (P), potassium (K), texture-by-feel, nitrogen in the nitrate form (NO3-N), zinc (Zn), iron (Fe), copper (Cu), manganese (Mn), sulfate sulfur (SO4-S), and organic matter. The soil sampling results are included in Appendix D.

### 6.0 CONCLUSIONS AND RECOMMENDATIONS

The investigation revealed 133.4 acres of uplands and 33.8 acres of seasonally flooded shrub wetland and perennially flooded emergent wetland within the Project Area. The wetlands in the Project Area have the necessary characteristics to be considered jurisdictional water bodies that can be regulated by USACE. However, the USACE has final jurisdiction over determining whether a water body or wetland is subject to interstate commerce and is, therefore, a “Water of the United States.”
7.0 REFERENCES


APPENDIX A: TRANSECT AND WETLAND LOCATION
MAP SET
Bureau of Reclamation
Mohave Valley Conservation Area
Wetland Delineation
Detail Map 1

Date: April 16, 2015

Project Area Boundary at Ordinary High Water Mark of the Colorado River

Wetland A Shrub/Scrub = 0.2 ac
Wetland B Shrub/Scrub = 31.7 ac
Wetland C Emergent = 1.9 ac

Total Wetland Area = 33.8 ac
Total Upland Area = 133.4 ac
Total Project Area = 167.2 ac

Wetland A Shrub/Scrub = 0.2 ac
Wetland B Shrub/Scrub = 31.7 ac
Wetland C Emergent = 1.9 ac

Total Wetland Area = 33.8 ac
Total Upland Area = 133.4 ac
Total Project Area = 167.2 ac
Bureau of Reclamation
Mohave Valley Conservation Area
Wetland Delineation
Detail Map 2

Date: April 16, 2015

Project Area Summary

- Wetland A Shrub/Scrub = 0.2 ac
- Wetland B Shrub/Scrub = 31.7 ac
- Wetland C Emergent = 1.9 ac

- Total Wetland Area = 33.8 ac
- Total Upland Area = 133.4 ac
- Total Project Area = 167.2 ac
APPENDIX B: ARID WEST SUPPLEMENT DATA SHEETS
WETLAND DELINEATION FORM – Arid West Region

Project/Site: Mohave Valley Wetlands
City/County: Needles/San Bernardino
Applicant/Owner: BOR
State: CA
Investigator(s): BT, MC
Landform (hillslope, terrace, etc.): Floodplain
Local Relief (concave, convex, none): convex
Subregion (LRR): D
Sampling Date: 3/17/2015
Section, Township, Range: S36 T8N R23E
Soil Map Unit Name: Not mapped
NWI Classification: Upland
Datum: NAD 83

Are climatic/hydrologic conditions on the site typical for this time of year? Yes
Are vegetation, soil, or hydrology significantly disturbed? No
Are vegetation, soil, or hydrology naturally problematic? No

Are “normal circumstances” present? Yes

SUMMARY OF FINDINGS – Attach map showing sampling point locations, transects, important features, etc.

Is hydrophytic vegetation present? Yes
Is wetland hydrology present? No
Is the sampled area within a wetland? No

Remarks:

VEGETATION – Use scientific names of plants.

<table>
<thead>
<tr>
<th>Tree Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Dominance Test Worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sapling/Shrub</td>
<td>5’ radius</td>
<td></td>
<td></td>
<td></td>
<td>Number of dominant species that are OBL, FACW, or FAC: 2 (A)</td>
</tr>
<tr>
<td>1. Pluchea sericea</td>
<td></td>
<td>30</td>
<td>Y</td>
<td>FACW</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover =</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Herb Stratum</th>
<th>Plot size: 5’ radius</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Prevalence Index Worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Poa sp.</td>
<td></td>
<td>15</td>
<td>Y</td>
<td>FAC</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover =</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Woody Vine</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Hydrophytic vegetation present?</th>
<th>Remarks:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover =</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

% bare ground in herb stratum: 85%
% cover of biotic crust: N/A

REMARKS:

1. Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
## SOIL

### Profile Description

(Describe to the depth needed to document the indicator or confirm the absence of indicators.)

### MATRIX

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Color (moist)</th>
<th>%</th>
<th>Color (moist)</th>
<th>%</th>
<th>Type</th>
<th>Location</th>
<th>Texture</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 0-8 in</td>
<td>10 YR 5/3</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sand</td>
<td>1/8&quot; crust on top</td>
</tr>
<tr>
<td>2. 8-15 in</td>
<td>10 YR 4/3</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Moist sand</td>
<td>5% clay inclusion</td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Type: C= concentration, D=depletion, RM=reduced matrix, CS=covered or coated sand grains. Location: PL=pore lining, M=matrix.

### REDOX FEATURES

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Color (moist)</th>
<th>%</th>
<th>Color (moist)</th>
<th>%</th>
<th>Type</th>
<th>Location</th>
<th>Texture</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Hydric Soil Indicators

(Applicable to all LRRs, unless otherwise noted.)

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Indicator Type</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Histosol</td>
<td>Sandy Redox (S5)</td>
<td></td>
</tr>
<tr>
<td>Black Histic (A3)</td>
<td>Stripped Matrix (S6)</td>
<td></td>
</tr>
<tr>
<td>Hydrogen Sulfide (A4)</td>
<td>Loamy Mucky Mineral (F1)</td>
<td></td>
</tr>
<tr>
<td>Stratified Layers (A5)</td>
<td>Depleted Matrix (F3)</td>
<td></td>
</tr>
<tr>
<td>1 cm Muck (A9) (LRR C)</td>
<td>Redox Dark Surface (F6)</td>
<td></td>
</tr>
<tr>
<td>Depleted below Surface (A12)</td>
<td>Depleted Dark Surface (F7)</td>
<td>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.</td>
</tr>
<tr>
<td>Thick Dark Surface (A12)</td>
<td>Redox Depressions (F8)</td>
<td></td>
</tr>
<tr>
<td>Sandy Mucky Mineral (S1)</td>
<td>Vernal Pools (F9)</td>
<td></td>
</tr>
<tr>
<td>Sandy Gleyed Matrix (S4)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Restrictive Layer (if present):

<table>
<thead>
<tr>
<th>Type</th>
<th>Depth (inches)</th>
<th>Hydric Soil Present?</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

### HYDROLOGY

### Wetland Hydrology Indicators

<table>
<thead>
<tr>
<th>Primary Indicators (minimum of one required; check all that apply)</th>
<th>Secondary Indicators (two or more required)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water (A1)</td>
<td>Salt Crust (B11)</td>
</tr>
<tr>
<td>High Water Table (A2)</td>
<td>Biotic Crust (B12)</td>
</tr>
<tr>
<td>Saturation (A3)</td>
<td>Aquatic Invertebrates (B13)</td>
</tr>
<tr>
<td>Water Marks (B1) (Nonriverine)</td>
<td>Hydrogen Sulfide Odor (C1)</td>
</tr>
<tr>
<td>Sediment Deposits (B2) (Nonriverine)</td>
<td>Oxidized Rhizospheres along Living Roots (C3)</td>
</tr>
<tr>
<td>Drift Deposits (B3) (Nonriverine)</td>
<td>Presence of Reduced Iron (C4)</td>
</tr>
<tr>
<td>Surface Soil Cracks (B6)</td>
<td>Recent Iron Reduction in Tilled Soils (C6)</td>
</tr>
<tr>
<td>Inundation Visible on Aerial Imagery (B7)</td>
<td>Other (Explain in Remarks)</td>
</tr>
<tr>
<td>Water-Stained Leaves (B9)</td>
<td></td>
</tr>
</tbody>
</table>

### Field Observations:

<table>
<thead>
<tr>
<th>Surface Water Present?</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Table Present?</td>
<td>No</td>
</tr>
<tr>
<td>Saturation Present?</td>
<td>No</td>
</tr>
</tbody>
</table>

Describe Recorded Data (stream, gauge, monitoring well, aerial photos, previous inspections) if available:

### Remarks:
**WETLAND DELINEATION FORM – Arid West Region**

| Project/Site: | Mohave Wetlands |
| City/County: | Needles/San Bernardino |
| Applicant/Owner: | BOR |
| State: | CA |
| Sampling Date: | 3/17/2015 |
| Investigator(s): | BT, MC |
| Landform (hillslope, terrace, etc.): | Floodplain |
| Local Relief (concave, convex, none): | Concave |
| Slope (%): | 2 |
| Subregion (LRR): | D |
| UTM X: | 114,524037 |
| UTM Y: | 34,741952 |
| Datum: | NAD 83 |
| Soil Map Unit Name: | Not mapped |
| NWI Classification: | Upland |

**Are climatic/hydrologic conditions on the site typical for this time of year?** Yes   **(If no, explain in Remarks.)**

**Are vegetation, soil, or hydrology significantly disturbed?** No

**Are “normal circumstances” present?** Yes

**Are vegetation, soil, or hydrology naturally problematic?** No   **(If needed, explain any answers in Remarks.)**

**SUMMARY OF FINDINGS – Attach map showing sampling point locations, transects, important features, etc.**

- Is hydrophytic vegetation present? Yes
- Are hydric soils present? No
- Is wetland hydrology present? No   **Is the sampled area within a wetland?** No

**Remarks:**

**VEGETATION – Use scientific names of plants.**

<table>
<thead>
<tr>
<th>Tree Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sapling/Shrub Stratum</td>
<td>5’ radius</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Pluchea sericea</td>
<td></td>
<td>10</td>
<td>Y</td>
<td>FACW</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover =</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Herb Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Poa sp.</td>
<td></td>
<td>3</td>
<td>Y</td>
<td>FAC</td>
</tr>
<tr>
<td>2. Unknown</td>
<td></td>
<td>1</td>
<td>Y</td>
<td>NA</td>
</tr>
<tr>
<td>Total Cover =</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Woody Vine</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover =</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| % bare ground in herb stratum: | 96% |
| % cover of biotic crust: |

**Dominance Test Worksheet:**

Number of dominant species that are OBL, FACW, or FAC: 2  **(A)**

Total number of dominant species across all strata: 2  **(B)**

Percent of dominant species that are OBL, FACW, or FAC: 100  **(A/B)**

**Prevalence Index Worksheet:**

Total % Cover of: Multiply by:

- OBL species x 1
- FACW species x 2
- FAC species x 3
- FACU species x 4
- UPL species x 5

Column Totals:

Prevalence Index = B/A =

**Hydrophytic Vegetation Indicators:**

1. X Dominance test is >50%

2. Prevalence index is <3.0

3. Morphological adaptations (Provide supporting data in Remarks or on a separate sheet.)

4. Problematic hydrophytic vegetation (explain)

5. Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic vegetation present?** Yes

**Remarks:**

% bare ground in herb stratum: 96%
### Soil Profile Description
(Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>MATRIX</th>
<th>SOIL PROFILE DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>C= concentration, D=depletion, RM=reduced matrix, CS=covered or coated sand grains.</td>
</tr>
<tr>
<td>Location</td>
<td>PL=pore lining, M=matrix.</td>
</tr>
<tr>
<td>REOXY FEATURES</td>
<td>HYDRIE SOIL INDICATORS: (Applicable to all LRRs, unless otherwise noted.)</td>
</tr>
<tr>
<td>Depth (inches)</td>
<td>Color (moist)</td>
</tr>
<tr>
<td>1. 0-4 in</td>
<td>10YR 6/4</td>
</tr>
<tr>
<td>2. 4-8 in</td>
<td>10 YR 6/3</td>
</tr>
<tr>
<td>3.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td></td>
</tr>
</tbody>
</table>

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

### Restrictive Layer (if present):
Type:
Depth (inches):
Remarks:

**Hydric Soil Present?** No

### HYDROLOGY

<table>
<thead>
<tr>
<th>PRIMARY INDICATORS</th>
<th>SECONDARY INDICATORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water (A1)</td>
<td>Salt Crust (B11)</td>
</tr>
<tr>
<td>High Water Table (A2)</td>
<td>Biotic Crust (B12)</td>
</tr>
<tr>
<td>Saturation (A3)</td>
<td>Aquatic Invertebrates (B13)</td>
</tr>
<tr>
<td>Water Marks (B1) (Nonriverine)</td>
<td>Hydrogen Sulfide Odor (C1)</td>
</tr>
<tr>
<td>Sediment Deposits (B2) (Nonriverine)</td>
<td>Oxidized Rhizospheres along Living Roots (C3)</td>
</tr>
<tr>
<td>Drift Deposits (B3) (Nonriverine)</td>
<td>Presence of Reduced Iron (C4)</td>
</tr>
<tr>
<td>Surface Soil Cracks (B6)</td>
<td>Recent Iron Reduction in Tillied Soils (C6)</td>
</tr>
<tr>
<td>Inundation Visible on Aerial Imagery (B7)</td>
<td>Shallow Aquitard (D3)</td>
</tr>
<tr>
<td>Water-Stained Leaves (B9)</td>
<td>FAC-Neutral Test</td>
</tr>
</tbody>
</table>

### Field Observations:
Surface Water Present? No Depth (inches):
Water Table Present? No Depth (inches):
Saturation Present? No Depth (inches):

**Wetland Hydrology Present?** No

Describe Recorded Data (stream, gauge, monitoring well, aerial photos, previous inspections) if available:

Remarks:
**WETLAND DELINEATION FORM – Arid West Region**

**Project/Site:** Mohave Wetlands  
**City/County:** Needles/San Bernardino  
**Applicant/Owner:** BOR  
**State:** CA  
**Investigator(s):** BT, MC  
**Landform (hillslope, terrace, etc.):** Rock fill  
**Local Relief (concave, convex, none):** None  
**Subregion (LRR):** D  
**Slope (%):** 0  
**Soil Map Unit Name:** Not mapped  
**NWI Classification:** Upland  
**Are climatic/hydrologic conditions on the site typical for this time of year?** Yes  
**Are vegetation, soil, or hydrology significantly disturbed?** No  
**Are “normal circumstances” present?** Yes  
**Are vegetation, soil, or hydrology naturally problematic?** No  
**Is hydrophytic vegetation present?** Yes  
**Is the sampled area within a wetland?** No  
**Are hydric soils present?** No  
**Are wetland hydrology present?** No  
**Remarks:** This area is some type of gravel stockpile area that is disturbed.

**SUMMARY OF FINDINGS – Attach map showing sampling point locations, transects, important features, etc.**

<table>
<thead>
<tr>
<th>Are hydrophytic vegetation present?</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are hydric soils present?</td>
<td>No</td>
</tr>
<tr>
<td>Is wetland hydrology present?</td>
<td>No</td>
</tr>
</tbody>
</table>

**Vegetation – Use scientific names of plants.**

<table>
<thead>
<tr>
<th>Tree Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Prevalence Index Worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sapling/Shrub Stratum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Herb Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Hydrophytic Vegetation Indicators:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Poa sp.</td>
<td></td>
<td>10 y FAC</td>
<td></td>
<td></td>
<td>X Dominance test is &gt;50%</td>
</tr>
<tr>
<td>2. Unknown</td>
<td></td>
<td>5 Y NA</td>
<td></td>
<td></td>
<td>Prevalence index is &lt;3.0</td>
</tr>
<tr>
<td>3. Descurainia sophia</td>
<td></td>
<td>1 N UPL</td>
<td></td>
<td></td>
<td>Morphological adaptations</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(Provide supporting data in Remarks or on a separate sheet.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Problematic hydrophytic vegetation (explain)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Woody Vine</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Hydrophytic vegetation present?</th>
<th>Remarks:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>
### Profile Description:
(Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>MATRIX</th>
<th>REDOX FEATURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth (inches)</td>
<td>Color (moist)</td>
</tr>
<tr>
<td>1. 0-2 in</td>
<td>10 YR 5/3</td>
</tr>
</tbody>
</table>

1. **Type:** C = concentration, D = depletion, RM = reduced matrix, CS = covered or coated sand grains.
2. **Location:** PL = pore lining, M = matrix.

**Hydric Soil Indicators:** (Applicable to all LRRs, unless otherwise noted.)

- Histosol
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5) (LRR C)
- 1 cm Muck (A9) (LRR D)
- Depleted below Surface (A12)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)

<table>
<thead>
<tr>
<th>soils</th>
<th>indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Histosol</td>
<td>Sandy Redox (S5)</td>
</tr>
<tr>
<td>Histic Epipedon (A2)</td>
<td>Stripped Matrix (S6)</td>
</tr>
<tr>
<td>Black Histic (A3)</td>
<td>Loamy Mucky Matrix (F1)</td>
</tr>
<tr>
<td>Hydrogen Sulfide (A4)</td>
<td>Loamy Gleyed Matrix (F2)</td>
</tr>
<tr>
<td>Stratified Layers (A5) (LRR C)</td>
<td>Depleted Matrix (F3)</td>
</tr>
<tr>
<td>1 cm Muck (A9) (LRR D)</td>
<td>Redox Dark Surface (F6)</td>
</tr>
<tr>
<td>Depleted below Surface (A12)</td>
<td>Depleted Dark Surface (F7)</td>
</tr>
<tr>
<td>Thick Dark Surface (A12)</td>
<td>Redox Depressions (F8)</td>
</tr>
<tr>
<td>Sandy Mucky Mineral (S1)</td>
<td>Vernal Pools (F9)</td>
</tr>
<tr>
<td>Sandy Gleyed Matrix (S4)</td>
<td></td>
</tr>
</tbody>
</table>

**Hydric Soil Present?** No

**Restrictive Layer (if present):**
- Type:
- Depth (inches):

Remarks: Point is in a rock pile/fill area

### HYDROLOGY

**Wetland Hydrology Indicators:**

<table>
<thead>
<tr>
<th>Primary Indicators (minimum of one required; check all that apply)</th>
<th>Secondary Indicators (two or more required)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water (A1)</td>
<td>Salt Crust (B11)</td>
</tr>
<tr>
<td>High Water Table (A2)</td>
<td>Biotic Crust (B12)</td>
</tr>
<tr>
<td>Saturation (A3)</td>
<td>Aquatic Invertebrates (B13)</td>
</tr>
<tr>
<td>Water Marks (B1) (Nonriverine)</td>
<td>Hydrogen Sulfide Odor (C1)</td>
</tr>
<tr>
<td>Sediment Deposits (B2) (Nonriverine)</td>
<td>Oxidized Rhizospheres along Living Roots (C3)</td>
</tr>
<tr>
<td>Drift Deposits (B3) (Nonriverine)</td>
<td>Presence of Reduced Iron (C4)</td>
</tr>
<tr>
<td>Surface Soil Cracks (B6)</td>
<td>Recent Iron Reduction in Tilled Soils (C6)</td>
</tr>
<tr>
<td>Inundation Visible on Aerial Imagery (B7)</td>
<td>Other (Explain in Remarks)</td>
</tr>
<tr>
<td>Water-Stained Leaves (B9)</td>
<td></td>
</tr>
</tbody>
</table>

**Field Observations:**

- Surface Water Present? No Depth (inches):
- Water Table Present? No Depth (inches):
- Saturation Present? No Depth (inches): Wetland Hydrology Present? No

Describe Recorded Data (stream, gauge, monitoring well, aerial photos, previous inspections) if available:

Remarks:
### WETLAND DELINEATION FORM – Arid West Region

**Project/Site:** Mohave Wetlands  
**Applicant/Owner:** BOR  
**Investigator(s):** BT, MC  
**Landform (hillslope, terrace, etc.):** Floodplain  
**Subregion (LRR):** D  
**Soil Map Unit Name:** Not mapped  
**Wetland Hydrology Present:** No  
**Is hydrophytic vegetation present?** Yes  
**Is the sampled area within a wetland?** No

#### SUMMARY OF FINDINGS – Attach map showing sampling point locations, transects, important features, etc.

- Are climatic/hydrologic conditions on the site typical for this time of year? Yes  
- Are vegetation, soil, or hydrology significantly disturbed? No  
- Are "normal circumstances" present? Yes

#### VEGETATION – Use scientific names of plants.

**Tree Stratum**  
<table>
<thead>
<tr>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Prevalence Index Worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Sapling/Shrub Stratum**  
<table>
<thead>
<tr>
<th>Plot size: 5' radius</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Hydrophytic Vegetation Indicators:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pluchea sericea</td>
<td>65</td>
<td>Y</td>
<td>FACW</td>
<td>X Dominance test is &gt;50%</td>
</tr>
<tr>
<td>2. Tamarix sp.</td>
<td>1</td>
<td>N</td>
<td>FAC</td>
<td>Prevalence index is &lt;3.01</td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td>Morphological adaptations (provide supporting data in Remarks or on a separate sheet.)</td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td>Problematic hydrophytic vegetation (explain)</td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td>Hydrophytic vegetation present? Yes</td>
</tr>
<tr>
<td><strong>Total Cover = 66</strong></td>
<td></td>
<td></td>
<td></td>
<td>Remarks: Lots of dead organic debris but no herb layer</td>
</tr>
</tbody>
</table>

**Herb Stratum**  
<table>
<thead>
<tr>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Hydrophytic vegetation present?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Woody Vine**  
<table>
<thead>
<tr>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

% bare ground in herb stratum: 100
% cover of biotic crust: 0
### SOIL

**Profile Description:** (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

**MATRIX**

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Color (moist)</th>
<th>%</th>
<th>Color (moist)</th>
<th>%</th>
<th>Type</th>
<th>Location</th>
<th>Texture</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 0-2 in</td>
<td>10 YR 5/4</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sand</td>
<td></td>
</tr>
<tr>
<td>2. 2-10 in</td>
<td>10 YR 6/4</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sand</td>
<td></td>
</tr>
<tr>
<td>3. 10 +</td>
<td>10 YR 6/4</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sand</td>
<td></td>
</tr>
</tbody>
</table>

1. Type: C= concentration, D=depletion, RM=reduced matrix, CS=covered or coated sand grains.  
   Location: PL=pore lining, M=matrix.

**Hydric Soil Indicators:** (Applicable to all LRRs, unless otherwise noted.)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Type</th>
<th>Location</th>
<th>Texture</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Histosol</td>
<td></td>
<td>1 cm Muck (A9) (LRR C)</td>
<td>Sand</td>
<td></td>
</tr>
<tr>
<td>Histic Epipedon (A2)</td>
<td>Stripped Matrix (S6)</td>
<td>2 cm Muck (A10) (LRR B)</td>
<td>Sand</td>
<td></td>
</tr>
<tr>
<td>Black Histic (A3)</td>
<td>Loamy Mucky Matrix (F1)</td>
<td>Reduced Vertic (F18)</td>
<td>Sand</td>
<td></td>
</tr>
<tr>
<td>Hydrogen Sulfide (A4)</td>
<td>Loamy Gleyed Matrix (F2)</td>
<td>Red Parent Material (TF2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stratified Layers (A5) (LRR C)</td>
<td>Depleted Matrix (F3)</td>
<td>Other (Explain in Remarks)</td>
<td>Sand</td>
<td></td>
</tr>
<tr>
<td>1 cm Muck (A9) (LRR D)</td>
<td>Redox Dark Surface (F6)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depleted below Surface (A12)</td>
<td>Depleted Dark Surface (F7)</td>
<td>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.</td>
<td>Sand</td>
<td></td>
</tr>
<tr>
<td>Thick Dark Surface (A12)</td>
<td>Redox Depressions (F8)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sandy Mucky Mineral (S1)</td>
<td>Vernal Pools (F9)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sandy Gleyed Matrix (S4)</td>
<td>Vernal Pools (F9)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Restrictive Layer (if present):**

<table>
<thead>
<tr>
<th>Type</th>
<th>Depth (inches)</th>
<th>Remarks</th>
<th>Hydric Soil Present?</th>
<th>No</th>
</tr>
</thead>
</table>

**HYDROLOGY**

**Wetland Hydrology Indicators:**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Type</th>
<th>Depth (inches)</th>
<th>Remarks</th>
<th>Wetland Hydrology Present?</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water (A1)</td>
<td>Salt Crust (B11)</td>
<td></td>
<td></td>
<td>Water Marks (B1) (Riverine)</td>
<td></td>
</tr>
<tr>
<td>High Water Table (A2)</td>
<td>Biotic Crust (B12)</td>
<td></td>
<td></td>
<td>Sediment Deposits (B2) (Riverine)</td>
<td></td>
</tr>
<tr>
<td>Saturation (A3)</td>
<td>Aquatic Invertebrates (B13)</td>
<td></td>
<td></td>
<td>Drift Deposits (B3) (Riverine)</td>
<td></td>
</tr>
<tr>
<td>Water Marks (B1) (Nonriverine)</td>
<td>Hydrogen Sulfide Odor (C1)</td>
<td></td>
<td></td>
<td>Drainage Patterns (B10)</td>
<td></td>
</tr>
<tr>
<td>Sediment Deposits (B2) (Nonriverine)</td>
<td>Oxidized Rhizospheres along Living Roots (C3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drift Deposits (B3) (Nonriverine)</td>
<td>Presence of Reduced Iron (C4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface Soil Cracks (B6)</td>
<td>Recent Iron Reduction in Tilled Soils (C6)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inundation Visible on Aerial Imagery (B7)</td>
<td>Other (Explain in Remarks)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water-Stained Leaves (B9)</td>
<td></td>
<td></td>
<td></td>
<td>Shallow Aquitard (D3)</td>
<td></td>
</tr>
</tbody>
</table>

**Field Observations:**

| Surface Water Present? | No | Depth (inches): | | | |
| Water Table Present?  | No | Depth (inches): | | | |
| Saturation Present?   | No | Depth (inches): | | Wetland Hydrology Present? | No |

Describe Recorded Data (stream, gauge, monitoring well, aerial photos, previous inspections) if available:

**Remarks:**
### WETLAND DELINEATION FORM – Arid West Region

**Project/Site:** Mohave Wetlands  
**City/County:** Needles/San Bernardino  
**State:** CA  
**Sampling Date:** 3/17/2015  
**Applicant/Owner:** BOR  
**State:** CA  
**Sampling Point:** 5

| Landform (hillslope, terrace, etc.) | Sand dune  
| Local Relief (concave, convex, none) | Convex  
| Slope (%): | 4  

| Subregion (LRR): | D  
| UTM X: | -114.523863  
| UTM Y: | 34.738692  
| Datum: | NAD 83

| Soil Map Unit Name: | Not mapped  
| NWI Classification: | Upland

### SUMMARY OF FINDINGS – Attach map showing sampling point locations, transects, important features, etc.

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are climatic/hydrologic conditions on the site typical for this time of year?</td>
<td>Yes</td>
</tr>
<tr>
<td>Are vegetation, soil, or hydrology significantly disturbed?</td>
<td>No</td>
</tr>
<tr>
<td>Are vegetation, soil, or hydrology significantly disturbed?</td>
<td>No</td>
</tr>
<tr>
<td>Are hydric soils present?</td>
<td>No</td>
</tr>
<tr>
<td>Are “normal circumstances” present?</td>
<td>Yes</td>
</tr>
<tr>
<td>Are vegetation, soil, or hydrology naturally problematic?</td>
<td>No</td>
</tr>
</tbody>
</table>

### VEGETATION – Use scientific names of plants.

#### Tree Stratum

<table>
<thead>
<tr>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total Cover =**

#### Sapling/Shrub Stratum

<table>
<thead>
<tr>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pluchea sericea</td>
<td>5</td>
<td>Y</td>
<td>FACW</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total Cover = 5%**

#### Herb Stratum

<table>
<thead>
<tr>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total Cover =**

#### Woody Vine

<table>
<thead>
<tr>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total Cover =**

### Remarks:

- Lots of dead Pluchea

---

**Hydrophytic Vegetation Indicators:**

- X Dominance test is >50%
- Prevalence index is <3.0
- Morphological adaptations (provide supporting data in Remarks or on a separate sheet.)
- Problematic hydrophytic vegetation (explain)

### Hydrophytic vegetation present? Yes

### Remarks:

- % bare ground in herb stratum: 100
- % cover of biotic crust: 100
**SOIL**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>MATRIX</th>
<th>REDOX FEATURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth (inches)</td>
<td>Color (moist)</td>
</tr>
<tr>
<td>1. 0-18</td>
<td>10 YR 6/3</td>
</tr>
<tr>
<td>2.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
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<tr>
<td>4.</td>
<td></td>
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<tr>
<td>5.</td>
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<td>6.</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td></td>
</tr>
</tbody>
</table>

¹Type: C= concentration, D=depletion, RM=reduced matrix, CS=covered or coated sand grains. ²Location: PL=pore lining, M=matrix.

**Hydric Soil Indicators:** (Applicable to all LRRs, unless otherwise noted.)

- Histosol
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5) (LRR C)
- 1 cm Muck (A9) (LRR D)
- Depleted below Surface (A12)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)

```
<table>
<thead>
<tr>
<th>Type</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 cm Muck (A9) (LRR C)</td>
<td>1 cm Muck (A9) (LRR C)</td>
</tr>
<tr>
<td>2 cm Muck (A10) (LRR B)</td>
<td>2 cm Muck (A10) (LRR B)</td>
</tr>
<tr>
<td>Reduced Vertic (F18)</td>
<td>Reduced Vertic (F18)</td>
</tr>
<tr>
<td>Red Parent Material (TF2)</td>
<td>Red Parent Material (TF2)</td>
</tr>
<tr>
<td>Other (Explain in Remarks)</td>
<td>Other (Explain in Remarks)</td>
</tr>
</tbody>
</table>
```

**Restrictive Layer (if present):**

<table>
<thead>
<tr>
<th>Type</th>
<th>Depth (inches):</th>
<th>Hydric Soil Present?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No</td>
</tr>
</tbody>
</table>

**HYDROLOGY**

**Wetland Hydrology Indicators:**

<table>
<thead>
<tr>
<th>Primary Indicators (minimum of one required; check all that apply)</th>
<th>Secondary Indicators (two or more required)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water (A1)</td>
<td>Salt Crust (B11)</td>
</tr>
<tr>
<td>High Water Table (A2)</td>
<td>Biotic Crust (B12)</td>
</tr>
<tr>
<td>Saturation (A3)</td>
<td>Aquatic Invertebrates (B13)</td>
</tr>
<tr>
<td>Water Marks (B1) (Nonriverine)</td>
<td>Hydrogen Sulfide Odor (C1)</td>
</tr>
<tr>
<td>Sediment Deposits (B2) (Nonriverine)</td>
<td>Oxidized Rhizospheres along Living Roots (C3)</td>
</tr>
<tr>
<td>Drift Deposits (B3) (Nonriverine)</td>
<td>Presence of Reduced Iron (C4)</td>
</tr>
<tr>
<td>Surface Soil Cracks (B6)</td>
<td>Recent Iron Reduction in Tilled Soils (C6)</td>
</tr>
<tr>
<td>Inundation Visible on Aerial Imagery (B7)</td>
<td>Other (Explain in Remarks)</td>
</tr>
<tr>
<td>Water-Stained Leaves (B9)</td>
<td></td>
</tr>
</tbody>
</table>

**Field Observations:**

| Surface Water Present? | No | Depth (inches): |
| Water Table Present? | No | Depth (inches): |
| Saturation Present? | No | Depth (inches): |

Wetland Hydrology Present? No

Describe Recorded Data (stream, gauge, monitoring well, aerial photos, previous inspections) if available:

Remarks:
WETLAND DELINEATION FORM – Arid West Region

Project/Site: Mohave Wetlands
City/County: Needles/San Bernardino
State: CA
Sampling Date: 3/17/2015
Applicant/Owner: BOR
State: CA
Sampling Point: 6
Investigator(s): BT, MC
Section, Township, Range: S36 T8N R23E

Landform (hillslope, terrace, etc.): Floodplain
Local Relief (concave, convex, none): Concave
Slope (%): 2
Subregion (LRR): D
Landform (hillslope, terrace, etc.): Floodplain
Local Relief (concave, convex, none): Concave
Slope (%): 2
Subregion (LRR): D

Soil Map Unit Name: Not mapped
NWI Classification: Upland
Are climatic/hydrologic conditions on the site typical for this time of year? Yes
(JIf no, explain in Remarks.)
Are vegetation, soil, or hydrology significantly disturbed? No
Are “normal circumstances” present? Yes
Are vegetation, soil, or hydrology naturally problematic? No
(if needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach map showing sampling point locations, transects, important features, etc.

Is hydrophytic vegetation present? Yes
Are hydric soils present? Yes
Is wetland hydrology present? Yes

Remarks: Marginal wetland point within an old floodplain of the Colorado River.

VEGETATION – Use scientific names of plants.

<table>
<thead>
<tr>
<th>Tree Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2.</td>
<td></td>
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<tr>
<td>3.</td>
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<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover  =</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sapling/Shrub Stratum</th>
<th>Plot size: 5’ radius</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Prevalence Index Worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pluchaea sericea</td>
<td>50</td>
<td>Y</td>
<td>FACW</td>
<td></td>
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</tr>
<tr>
<td>2.</td>
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<tr>
<td>3.</td>
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<tr>
<td>4.</td>
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<tr>
<td>5.</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover = 50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Herb Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2.</td>
<td></td>
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<td>3.</td>
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<td>4.</td>
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<td>5.</td>
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<td>6.</td>
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<td>7.</td>
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<tr>
<td>8.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover  =</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Woody Vine</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover =</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

% bare ground in herb stratum: 100
% cover of biotic crust:

Hydrophytic vegetation present? Yes

Remarks:
### SOIL

**Profile Description:** (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>MATRIX</th>
<th>REDOX FEATURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth (inches)</td>
<td>Color (moist)</td>
</tr>
<tr>
<td>0-10</td>
<td>10 YR 5/3</td>
</tr>
<tr>
<td>10+</td>
<td>10 YR 6/2</td>
</tr>
</tbody>
</table>

1. **Type:** C= concentration, D=depletion, RM=reduced matrix, CS=covered or coated sand grains. 2. **Location:** PL=pore lining, M=matrix.

#### Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Histosol</td>
<td></td>
</tr>
<tr>
<td>Histic Epipedon (A2)</td>
<td>X Striped Matrix (S6)</td>
</tr>
<tr>
<td>Black Histic (A3)</td>
<td>Loamy Mucky Mineral (F1)</td>
</tr>
<tr>
<td>Hydrogen Sulfide (A4)</td>
<td>Loamy Gleyed Matrix (F2)</td>
</tr>
<tr>
<td>Stratified Layers (A5) (LRR C)</td>
<td>Depleted Matrix (F3)</td>
</tr>
<tr>
<td>1 cm Muck (A9) (LRR D)</td>
<td>Redox Dark Surface (F6)</td>
</tr>
<tr>
<td>Depleted below Surface (A12)</td>
<td>Depleted Dark Surface (F7)</td>
</tr>
<tr>
<td>Thick Dark Surface (A12)</td>
<td>Redox Depressions (F8)</td>
</tr>
<tr>
<td>Sandy Mucky Mineral (S1)</td>
<td>Vernal Pools (F9)</td>
</tr>
<tr>
<td>Sandy Gleyed Matrix (S4)</td>
<td></td>
</tr>
</tbody>
</table>

#### Restrictive Layer (If present):

- **Type:**
- **Depth (inches):**
- **Remarks:**

#### HYDROLOGY

**Wetland Hydrology Indicators:**

<table>
<thead>
<tr>
<th>Primary Indicators (minimum of one required; check all that apply)</th>
<th>Secondary Indicators (two or more required)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water (A1) X Salt Crust (B11)</td>
<td>Water Marks (B1) (Riverine)</td>
</tr>
<tr>
<td>High Water Table (A2)</td>
<td>Biotic Crust (B12)</td>
</tr>
<tr>
<td>Saturation (A3)</td>
<td>Aquatic Invertebrates (B13)</td>
</tr>
<tr>
<td>Water Marks (B1) (Nonriverine)</td>
<td>Hydrogen Sulfide Odor (C1)</td>
</tr>
<tr>
<td>Sediment Deposits (B2) (Nonriverine)</td>
<td>Oxidized Rhizospheres along Living Roots (C3)</td>
</tr>
<tr>
<td>Drift Deposits (B3) (Nonriverine)</td>
<td>Presence of Reduced Iron (C4)</td>
</tr>
<tr>
<td>Surface Soil Cracks (B6)</td>
<td>Recent Iron Reduction in Tilled Soils (C6)</td>
</tr>
<tr>
<td>Inundation Visible on Aerial Imagery (B7)</td>
<td>Other (Explain in Remarks)</td>
</tr>
<tr>
<td>Water-Stained Leaves (B9)</td>
<td>FAC-Neutral Test</td>
</tr>
</tbody>
</table>

#### Field Observations:

- **Surface Water Present?** No | **Depth (inches):**
- **Water Table Present?** No | **Depth (inches):**
- **Saturation Present?** No | **Depth (inches):**

#### Wetland Hydrology Present? Yes

Describe Recorded Data (stream, gauge, monitoring well, aerial photos, previous inspections) if available:

**Remarks:** Salt crust probably due to wicking.
**WETLAND DELINEATION FORM – Arid West Region**

- **Project/Site:** Mohave Wetlands
- **City/County:** Needles/San Bernardino
- **Applicant/Owner:** BOR
- **State:** CA
- **Sampling Date:** 3/17/2015
- **Investigator(s):** BT, MC
- **Landform:** Floodplain
- **Local Relief:** Concave
- **Subregion (LRR):** D
- **Soil Map Unit Name:** Not mapped
- **NWI Classification:** Freshwater emergent
- **Are climatic/hydrologic conditions on the site typical for this time of year?** Yes

**SUMMARY OF FINDINGS – Attach map showing sampling point locations, transects, important features, etc.**

- **Is hydrophytic vegetation present?** Yes
- **Is the sampled area within a wetland?** Yes
- **Are hydric soils present?** Yes
- **Is wetland hydrology present?** Yes

**Remarks:** Marginal Wetland point in the old floodplain of the Colorado River.

**VEGETATION – Use scientific names of plants.**

<table>
<thead>
<tr>
<th>Stratum</th>
<th>Plot size</th>
<th>Absolute % Cover</th>
<th>Dominant Species</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tree Stratum</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. N/A</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
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<tr>
<td>3.</td>
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<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Cover =</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sapling/Shrub Stratum</strong></td>
<td>Plot size: 5’ radius</td>
<td>Absolute % Cover</td>
<td>Dominant Species</td>
<td>Indicator Status</td>
</tr>
<tr>
<td>1. <em>Tamarix sp.</em></td>
<td></td>
<td></td>
<td>10</td>
<td>Y</td>
</tr>
<tr>
<td>2.</td>
<td></td>
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<td>3.</td>
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<td>4.</td>
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<td>5.</td>
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</tr>
<tr>
<td><strong>Total Cover =</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Herb Stratum</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. N/A</td>
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<tr>
<td>2.</td>
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<td>5.</td>
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<tr>
<td><strong>Total Cover =</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Woody Vine</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. N/A</td>
<td></td>
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<tr>
<td>2.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Total Cover =</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Remarks:**

- % bare ground in herb stratum: 100
- % cover of biotic crust: 100
### Soil Profile Description

Describe to the depth needed to document the indicator or confirm the absence of indicators.

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Color (moist)</th>
<th>%</th>
<th>Color (moist)</th>
<th>%</th>
<th>Type</th>
<th>Location</th>
<th>Texture</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4 in</td>
<td>10 YR 3/1</td>
<td>100</td>
<td>10 YR 5/8</td>
<td>20</td>
<td>C</td>
<td>M</td>
<td>Silt</td>
<td>Held together with fine, fibrous roots; lots of organic matter</td>
</tr>
<tr>
<td>4-12</td>
<td>10 YR 7/2</td>
<td>80</td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>1.</td>
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<td>2.</td>
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<td>7.</td>
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<td>8.</td>
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</tr>
</tbody>
</table>

1 Type: C= concentration, D=depletion, RM=reduced matrix, CS=covered or coated sand grains. 2 Location: PL=pore lining, M=matrix.

### Hydric Soil Indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Hydric Soil Present?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Histosol</td>
<td>Yes</td>
</tr>
<tr>
<td>Histic Epipedon (A2)</td>
<td></td>
</tr>
<tr>
<td>Black Histic (A3)</td>
<td></td>
</tr>
<tr>
<td>Hydrogen Sulfide (A4)</td>
<td></td>
</tr>
<tr>
<td>Stratified Layers (A5) (LRR C)</td>
<td></td>
</tr>
<tr>
<td>1 cm Muck (A9) (LRR D)</td>
<td></td>
</tr>
<tr>
<td>Depleted below Surface (A12)</td>
<td></td>
</tr>
<tr>
<td>Thick Dark Surface (A12)</td>
<td></td>
</tr>
<tr>
<td>Sandy Mucky Mineral (S1)</td>
<td></td>
</tr>
<tr>
<td>Sandy Gleyed Matrix (S4)</td>
<td></td>
</tr>
</tbody>
</table>

### Restrictive Layer (if present):

<table>
<thead>
<tr>
<th>Type</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hydric Soil Present? Yes</td>
</tr>
</tbody>
</table>

### Hydrology

#### Wetland Hydrology Indicators

<table>
<thead>
<tr>
<th>Primary Indicators (minimum of one required; check all that apply)</th>
<th>Secondary Indicators (two or more required)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water (A1)</td>
<td>Water Marks (B1) (Riverine)</td>
</tr>
<tr>
<td>High Water Table (A2)</td>
<td>Sediment Deposits (B2) (Riverine)</td>
</tr>
<tr>
<td>Saturation (A3)</td>
<td>Drift Deposits (B3) (Riverine)</td>
</tr>
<tr>
<td>Water Marks (B1) (Nonriverine)</td>
<td>Drainage Patterns (B10)</td>
</tr>
<tr>
<td>Sediment Deposits (B2) (Nonriverine)</td>
<td>Dry-Season Water Table (C2)</td>
</tr>
<tr>
<td>Drift Deposits (B3) (Nonriverine)</td>
<td>Crayfish burrows (C8)</td>
</tr>
<tr>
<td>Surface Soil Cracks (B6)</td>
<td>Saturation visible on Aerial Imagery (C9)</td>
</tr>
<tr>
<td>Inundation Visible on Aerial Imagery (B7)</td>
<td>Shallow Aquitard (D3)</td>
</tr>
<tr>
<td>Water-Stained Leaves (B9)</td>
<td>FAC-Aquitard (D3)</td>
</tr>
</tbody>
</table>

#### Field Observations:

<table>
<thead>
<tr>
<th>Surface Water Present?</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Table Present?</td>
<td>No</td>
</tr>
<tr>
<td>Saturation Present?</td>
<td>No</td>
</tr>
</tbody>
</table>

Describe Recorded Data (stream, gauge, monitoring well, aerial photos, previous inspections) if available:

Remarks:
**WETLAND DELINEATION FORM – Arid West Region**

<table>
<thead>
<tr>
<th>Project/Site:</th>
<th>Mohave Wetlands</th>
</tr>
</thead>
<tbody>
<tr>
<td>City/County:</td>
<td>Needles/San Bernardino</td>
</tr>
<tr>
<td>State:</td>
<td>CA</td>
</tr>
<tr>
<td>Sampling Date:</td>
<td>3/17/2015</td>
</tr>
<tr>
<td>Applicant/Owner:</td>
<td>BOR</td>
</tr>
<tr>
<td>Investigator(s):</td>
<td>BT, MC</td>
</tr>
<tr>
<td>Landform (hillslope, terrace, etc.):</td>
<td>Floodplain</td>
</tr>
<tr>
<td>Local Relief (concave, convex, none):</td>
<td>Concave</td>
</tr>
<tr>
<td>Subregion (LRR):</td>
<td>D</td>
</tr>
<tr>
<td>UTM X:</td>
<td>-114.525235</td>
</tr>
<tr>
<td>UTM Y:</td>
<td>34.738684</td>
</tr>
<tr>
<td>Datum:</td>
<td>NAD 83</td>
</tr>
<tr>
<td>Soil Map Unit Name:</td>
<td>Not mapped</td>
</tr>
<tr>
<td>NWI Classification:</td>
<td></td>
</tr>
</tbody>
</table>

**Are climatic/hydrologic conditions on the site typical for this time of year?** Yes

**Are vegetation, soil, or hydrology significantly disturbed?** No

**Are "normal circumstances" present?** No

**Are vegetation, soil, or hydrology naturally problematic?** No

**SUMMARY OF FINDINGS – Attach map showing sampling point locations, transects, important features, etc.**

**Is hydrophytic vegetation present?** No*

**Is the sampled area within a wetland?** Yes

**Are hydric soils present?** Yes

**Is wetland hydrology present?** Yes

**Remarks:** *ORV traffic; fill berm; no veg is present around point due to ORV traffic disturbance, but veg surrounding the point is tamarix

**VEGETATION – Use scientific names of plants.**

<table>
<thead>
<tr>
<th>Tree Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sapling/Shrub Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Herb Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Woody Vine</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Remarks:**

- *ORV traffic; fill berm; no veg is present around point due to ORV traffic disturbance, but veg surrounding the point is tamarix

**HERB STRATUM**

1. N/A

2. N/A

3. N/A

4. N/A

5. N/A

6. N/A

7. N/A

8. N/A

**WOODY VINE**

1. N/A

2. N/A

**SUMMARY**

- **% bare ground in herb stratum:** 100
- **% cover of biotic crust:**

---

*Remarks: No vegetation present within plot, but veg outside of ORV-disturbed area is tamarix sp.*
**SOIL**
Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>MATRIX</th>
<th>REDOX FEATURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth (inches)</td>
<td>Color (moist)</td>
</tr>
<tr>
<td>1. 0-6 in</td>
<td>10 YR 5/3</td>
</tr>
<tr>
<td>2. 6-12 in</td>
<td>10 YR 5/1</td>
</tr>
<tr>
<td>3. 12 +</td>
<td>10 YR 6/2</td>
</tr>
</tbody>
</table>

1 Type: C= concentration, D=depletion, RM=reduced matrix, CS=covered or coated sand grains. Location: PL=pore lining, M=matrix.

**Hydric Soil Indicators:** (Applicable to all LRRs, unless otherwise noted.)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Type</th>
<th>Depth (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Histosol</td>
<td>Sandy Redox (S5)</td>
<td>1 cm Muck (A9) (LRR C)</td>
</tr>
<tr>
<td>Histic Epipedon (A2)</td>
<td>Stripped Matrix (S6)</td>
<td>2 cm Muck (A10) (LRR B)</td>
</tr>
<tr>
<td>Black Histic (A3)</td>
<td>Loamy Mucky Mineral (F1)</td>
<td>Reduced Vertic (F18)</td>
</tr>
<tr>
<td>Hydrogen Sulfide (A4)</td>
<td>Loamy Gleyed Matrix (F2)</td>
<td>Red Parent Material (TF2)</td>
</tr>
<tr>
<td>Stratified Layers (A5) (LRR C)</td>
<td>X</td>
<td>Depleted Matrix (F3)</td>
</tr>
<tr>
<td>1 cm Muck (A9) (LRR D)</td>
<td>Redox Dark Surface (F6)</td>
<td>Other (Explain in Remarks)</td>
</tr>
<tr>
<td>Depleted below Surface (A12)</td>
<td>Depleted Dark Surface (F7)</td>
<td></td>
</tr>
<tr>
<td>Thick Dark Surface (A12)</td>
<td>Redox Depressions (F8)</td>
<td></td>
</tr>
<tr>
<td>Sandy Mucky Mineral (S1)</td>
<td>Vernal Pools (F9)</td>
<td></td>
</tr>
<tr>
<td>Sandy Gleyed Matrix (S4)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Restrictive Layer (if present):**

<table>
<thead>
<tr>
<th>Type</th>
<th>Depth (inches)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydric Soil Present?</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

**HYDROLOGY**

<table>
<thead>
<tr>
<th>Wetland Hydrology Indicators:</th>
<th>Secondary Indicators (two or more required)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Indicators (minimum of one required; check all that apply)</td>
<td>Secondary Indicators (two or more required)</td>
</tr>
<tr>
<td>Surface Water (A1)</td>
<td>Salt Crust (B11)</td>
</tr>
<tr>
<td>X High Water Table (A2)</td>
<td>Biotic Crust (B12)</td>
</tr>
<tr>
<td>X Saturation (A3)</td>
<td>Aquatic Invertebrates (B13)</td>
</tr>
<tr>
<td>Water Marks (B1) (Nonriverine)</td>
<td>Hydrogen Sulfide Odor (C1)</td>
</tr>
<tr>
<td>Sediment Deposits (B2) (Nonriverine)</td>
<td>Oxidized Rhizospheres along Living Roots (C3)</td>
</tr>
<tr>
<td>Drift Deposits (B3) (Nonriverine)</td>
<td>Presence of Reduced Iron (C4)</td>
</tr>
<tr>
<td>Surface Soil Cracks (B6)</td>
<td>Recent Iron Reduction in Tilled Soils (C6)</td>
</tr>
<tr>
<td>Inundation Visible on Aerial Imagery (B7)</td>
<td>Other (Explain in Remarks)</td>
</tr>
<tr>
<td>Water-Stained Leaves (B9)</td>
<td>FAC-Neutral Test</td>
</tr>
</tbody>
</table>

**Field Observations:**

| Surface Water Present? | No | Depth (inches): |
| Water Table Present? | Yes | Depth (inches): 12 |
| Saturation Present? | Yes | Depth (inches): 8 |

**Wetland Hydrology Present?** Yes

Describe Recorded Data (stream, gauge, monitoring well, aerial photos, previous inspections) if available:

Remarks:
WETLAND DELINEATION FORM – Arid West Region

Project/Site: Mohave Wetlands
Applicant/Owner: BOR
City/County: Needles/San Bernardino
Investigator(s): BT, MC
State: CA
Landform (hillslope, terrace, etc.): Sand dune
Local Relief (concave, convex, none): Concave
Subregion (LRR): D
Sampling Date: 3/18/2015
Section, Township, Range: S36 T8N R23E
Datum: NAD 83
Soil Map Unit Name: Not mapped
NWI Classification: Upland

Are climatic/hydrologic conditions on the site typical for this time of year? Yes
Are vegetation, soil, or hydrology significantly disturbed? No
Are “normal circumstances” present? Yes
Are vegetation, soil, or hydrology naturally problematic? No

SUMMARY OF FINDINGS – Attach map showing sampling point locations, transects, important features, etc.

Is hydrophytic vegetation present? Yes
Are hydric soils present? No
Is wetland hydrology present? No
Is the sampled area within a wetland? No

VEGETATION – Use scientific names of plants.

<table>
<thead>
<tr>
<th>Tree Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Prevalence Index Worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover =</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sapling/Shrub Stratum</td>
<td>Plot size: 5’ radius</td>
<td>Absolute % Cover</td>
<td>Dominant Species?</td>
<td>Indicator Status</td>
<td>Prevalence Index Worksheet:</td>
</tr>
<tr>
<td>1. Pluchea sericea</td>
<td></td>
<td>2</td>
<td>Y</td>
<td>FACW</td>
<td>Total % Cover of: Multiply by:</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>OBL species x 1</td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FACW species x 2</td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FAC species x 3</td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FACU species x 4</td>
</tr>
<tr>
<td>Total Cover = 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>UPL species x 5</td>
</tr>
<tr>
<td>Herb Stratum</td>
<td>Plot size: 5’ radius</td>
<td>Absolute % Cover</td>
<td>Dominant Species?</td>
<td>Indicator Status</td>
<td>Prevalence Index Worksheet:</td>
</tr>
<tr>
<td>1. Poa sp.</td>
<td></td>
<td>2</td>
<td>Y</td>
<td>FAC</td>
<td>Column Totals: Prevalence Index = B/A =</td>
</tr>
<tr>
<td>2. Unknown</td>
<td></td>
<td>1</td>
<td>Y</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Total Cover = 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Woody Vine</td>
<td>Plot size:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover =</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% bare ground in herb stratum:</td>
<td>97</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% cover of biotic crust:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SOIL
Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>MATRIX</th>
<th>REDOX FEATURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth (inches)</td>
<td>Color (moist)</td>
</tr>
<tr>
<td>1. 0-18 in</td>
<td>10 YR 6/4</td>
</tr>
</tbody>
</table>

1. Type: C= concentration, D=depletion, RM=reduced matrix, CS=covered or coated sand grains. Location: PL=pore lining, M=matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Type</th>
<th>Location</th>
<th>Texture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Histosol</td>
<td>Sandy Redox (S5)</td>
<td>1 cm Muck (A9) (LRR C)</td>
<td></td>
</tr>
<tr>
<td>Histic Epipedon (A2)</td>
<td>Stripped Matrix (S6)</td>
<td>2 cm Muck (A10) (LRR B)</td>
<td></td>
</tr>
<tr>
<td>Black Histic (A3)</td>
<td>Loamy Mucky Mineral (F1)</td>
<td>Reduced Vertic (F18)</td>
<td></td>
</tr>
<tr>
<td>Hydrogen Sulfide (A4)</td>
<td>Loamy Gleyed Matrix (F2)</td>
<td>Red Parent Material (TF2)</td>
<td></td>
</tr>
<tr>
<td>Stratified Layers (A5) (LRR C)</td>
<td>Depleted Matrix (F3)</td>
<td>Other (Explain in Remarks)</td>
<td></td>
</tr>
<tr>
<td>1 cm Muck (A9) (LRR D)</td>
<td>Redox Dark Surface (F6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depleted below Surface (A12)</td>
<td>Depleted Dark Surface (F7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thick Dark Surface (A12)</td>
<td>Redox Depressions (F8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sandy Mucky Mineral (S1)</td>
<td>Vernal Pools (F9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sandy Gleyed Matrix (S4)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Restrictive Layer (if present):
Type: 
Depth (inches): 
Hydric Soil Present? No
Remarks:

HYDROLOGY
Wetland Hydrology Indicators:

<table>
<thead>
<tr>
<th>Primary Indicators (minimum of one required; check all that apply)</th>
<th>Secondary Indicators (two or more required)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water (A1)</td>
<td>Salt Crust (B11)</td>
</tr>
<tr>
<td>High Water Table (A2)</td>
<td>Biotic Crust (B12)</td>
</tr>
<tr>
<td>Saturation (A3)</td>
<td>Aquatic Invertebrates (B13)</td>
</tr>
<tr>
<td>Water Marks (B1) (Nonriverine)</td>
<td>Hydrogen Sulfide Odor (C1)</td>
</tr>
<tr>
<td>Sediment Deposits (B2) (Nonriverine)</td>
<td>Oxidized Rhizospheres along Living Roots (C3)</td>
</tr>
<tr>
<td>Drift Deposits (B3) (Nonriverine)</td>
<td>Presence of Reduced Iron (C4)</td>
</tr>
<tr>
<td>Surface Soil Cracks (B6)</td>
<td>Recent Iron Reduction in Tilled Soils (C6)</td>
</tr>
<tr>
<td>Inundation Visible on Aerial Imagery (B7)</td>
<td>Other (Explain in Remarks)</td>
</tr>
<tr>
<td>Water-Stained Leaves (B9)</td>
<td></td>
</tr>
</tbody>
</table>

Field Observations:
Surface Water Present? No Depth (inches): 
Water Table Present? No Depth (inches): 
Saturation Present? No Depth (inches): 
Wetland Hydrology Present? No

Describe Recorded Data (stream, gauge, monitoring well, aerial photos, previous inspections) if available:

Remarks:
**WETLAND DELINEATION FORM – Arid West Region**

**Project/Site:** Mohave Wetlands  
**City/County:** Needles/San Bernardino  
**Applicant/Owner:** BOR  
**State:** CA  
**Sampling Date:** 3/18/2015  
**Investigator(s):** BT, MC  
**Landform (hillslope, terrace, etc.):** Floodplain  
**Local Relief (concave, convex, none):** Convex  
**Sampling Point:** 10  
**Subregion (LRR):** D  
**UTM X:** -114,522,137  
**UTM Y:** 34,735,555  
**Datum:** NAD 83  
**Soil Map Unit Name:** Not mapped  
**NWI Classification:** Upland  

**Are climatic/hydrologic conditions on the site typical for this time of year?** Yes

If no, explain in Remarks.

**Are vegetation, soil, or hydrology significantly disturbed?** No

**Are “normal circumstances” present?** Yes

If needed, explain any answers in Remarks.

---

**SUMMARY OF FINDINGS – Attach map showing sampling point locations, transects, important features, etc.**

| Is hydrophytic vegetation present? | Yes |
| Is hydric soils present?          | No  |
| Is wetland hydrology present?    | No  |

Is the sampled area within a wetland? No

Remarks:

---

**VEGETATION – Use scientific names of plants.**

<table>
<thead>
<tr>
<th>Tree Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover  =</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sapling/Shrub Stratum</th>
<th>Plot size: 5’ radius</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <em>Tamarix sp.</em></td>
<td></td>
<td>30</td>
<td>Y</td>
<td>FAC</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover = 30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Herb Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>3.</td>
<td></td>
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</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover  =</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Woody Vine</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover =</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

% bare ground in herb stratum: 100

% cover of biotic crust: 100

---

**Dominance Test Worksheet:**

Number of dominant species that are OBL, FACW, or FAC: 1 (A)

Total number of dominant species across all strata: 1 (B)

Percent of dominant species that are OBL, FACW, or FAC: 100 (A/B)

**Prevalence Index Worksheet:**

<table>
<thead>
<tr>
<th>Total % Cover of:</th>
<th>Multiply by:</th>
</tr>
</thead>
<tbody>
<tr>
<td>OBL species</td>
<td>x 1</td>
</tr>
<tr>
<td>FACW species</td>
<td>x 2</td>
</tr>
<tr>
<td>FAC species</td>
<td>x 3</td>
</tr>
<tr>
<td>FACU species</td>
<td>x 4</td>
</tr>
<tr>
<td>UPL species</td>
<td>x 5</td>
</tr>
</tbody>
</table>

Column Totals:

Prevalence Index = B/A =

**Hydrophytic Vegetation Indicators:**

1. X Dominance test is >50%
2. Prevalence index is <3.0
3. Morphological adaptations (Provide supporting data in Remarks or on a separate sheet.)
4. Problematic hydrophytic vegetation (explain)
5. Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
6. Hydrophytic vegetation present? Yes

**Remarks:** Bare ground with *Tamarix* litter
SOIL
Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>MATRIX</th>
<th>REDOX FEATURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth (inches)</td>
<td>Color (moist)</td>
</tr>
<tr>
<td>1. 0-18 in</td>
<td>10 YR 6/4</td>
</tr>
<tr>
<td>2.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td></td>
</tr>
</tbody>
</table>

¹Type: C= concentration, D=depletion, RM=reduced matrix, CS=covered or coated sand grains. ²Location: PL=pore lining, M=matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- Histosol
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5) (LRR C)
- 1 cm Muck (A9) (LRR D)
- Depleted below Surface (A12)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Loamy Mucky Mineral (F1)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Redox Dark Surface (F7)
- Vernal Pools (F9)

Restrictive Layer (if present):

Type:
Depth (inches):
Remarks: Hydric Soil Present? No

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)
- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1) (Nonriverine)
- Sediment Deposits (B2) (Nonriverine)
- Drift Deposits (B3) (Nonriverine)
- Surface Soil Cracks (B6)
- Inundation Visible on Aerial Imagery (B7)
- Water-Stained Leaves (B9)
- Salt Crust (B11)
- Biotic Crust (B12)
- Aquatic Invertebrates (B13)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres along Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Other (Explain in Remarks)
- Other (Explain in Remarks)
- Other (Explain in Remarks)

Secondary Indicators (two or more required)
- Water Marks (B1) (Riverine)
- Sediment Deposits (B2) (Riverine)
- Drift Deposits (B3) (Riverine)
- Dry-Season Water Table (C2)
- Drainage Patterns (B10)
- Crayfish burrows (C8)
- Saturation visible on Aerial Imagery (C9)
- Shallow Aquitard (D3)
- FAC-Neutral Test

Field Observations:

Surface Water Present? No
Water Table Present? No
Saturation Present? No

Depth (inches):

Wetland Hydrology Present? No

Describe Recorded Data (stream, gauge, monitoring well, aerial photos, previous inspections) if available:

Remarks:
WETLAND DELINEATION FORM – Arid West Region

Project/Site: Mohave Wetlands
City/County: Needles/San Bernardino
State: CA
Applicant/Owner: BOR
Sampling Date: 3/18/2015
Sampling Point: 11
Investigator(s): BT, MC
Landform (hillslope, terrace, etc.): Floodplain
Local Relief (concave, convex, none): Concave

<table>
<thead>
<tr>
<th>Subregion (LRR)</th>
<th>UTM X</th>
<th>UTM Y</th>
<th>Datum</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>-114,52293</td>
<td>34,735794</td>
<td>NAD 83</td>
</tr>
</tbody>
</table>

Soil Map Unit Name: Not mapped
NWI Classification: Freshwater emergent

Are climatic/hydrologic conditions on the site typical for this time of year? Yes
Are vegetation, soil, or hydrology significantly disturbed? No
Are vegetation, soil, or hydrology naturally problematic? No

SUMMARY OF FINDINGS – Attach map showing sampling point locations, transects, important features, etc.

Is hydrophytic vegetation present? Yes
Are hydric soils present? No
Is wetland hydrology present? No
Remarks: Seems to be in an old channel

VEGETATION – Use scientific names of plants.

<table>
<thead>
<tr>
<th>Stratum</th>
<th>Plot size</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Dominance Test Worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tree Stratum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>3.</td>
<td></td>
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<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover =</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sapling/Shrub Stratum</th>
<th>Plot size: 5’ radius</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Prevalence Index Worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pluchea sericea</td>
<td></td>
<td>40</td>
<td>Y</td>
<td>FACW</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
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<tr>
<td>4.</td>
<td></td>
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<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover = 40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Herb Stratum</th>
<th>Plot size</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Hydrophytic Vegetation Indicators:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2.</td>
<td></td>
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<tr>
<td>3.</td>
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<tr>
<td>4.</td>
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<td>5.</td>
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</tr>
<tr>
<td>Total Cover =</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Woody Vine</th>
<th>Plot size</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Hydrophytic vegetation present?</th>
<th>Remarks: Some woody Pluchea debris</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover =</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

% bare ground in herb stratum: 100
% cover of biotic crust: 100
SOIL
Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>MATRIX</th>
<th>REDOX FEATURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth (inches)</td>
<td>Color (moist)</td>
</tr>
<tr>
<td>----------------</td>
<td>--------------</td>
</tr>
<tr>
<td>1. 0-18 in</td>
<td>10 YR 5/4</td>
</tr>
<tr>
<td>2.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
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<tr>
<td>4.</td>
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<td>5.</td>
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<td>6.</td>
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<tr>
<td>7.</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td></td>
</tr>
</tbody>
</table>

1. Type: C= concentration, D=depletion, RM=reduced matrix, CS=covered or coated sand grains.
2. Location: PL=pore lining, M=matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- Histosol
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5) (LRR C)
- 1 cm Muck (A9) (LRR D)
- Depleted below Surface (A12)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Loamy Mucky Mineral (F1)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Redox Depressions (F8)
- Vernal Pools (F9)
- 1 cm Muck (A9) (LRR C)
- 2 cm Muck (A10) (LRR B)
- Reduced Vertic (F18)
- Red Parent Material (TF2)
- Other (Explain in Remarks)

Restrictive Layer (if present):
Type: Sand
Depth (inches): moist
Remarks: Hydric Soil Present? No

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1) (Nonriverine)
- Sediment Deposits (B2) (Nonriverine)
- Drift Deposits (B3) (Nonriverine)
- Surface Soil Cracks (B6)
- Inundation Visible on Aerial Imagery (B7)
- Water-Stained Leaves (B9)
- Salt Crust (B11)
- Biotic Crust (B12)
- Aquatic Invertebrates (B13)
- Hydrogen Sulfide Odor (C1)
- Oxygenized Rhizospheres along Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Other (Explain in Remarks)

Secondarily Indicators (two or more required)

- Water Marks (B1) (Riverine)
- Sediment Deposits (B2) (Riverine)
- Drift Deposits (B3) (Riverine)
- Drainage Patterns (B10)
- Dry-Season Water Table (C2)
- Crayfish burrows (C8)
- Saturation visible on Aerial Imagery (C9)
- Shallow Aquitard (D3)
- FAC-Neutral Test

Field Observations:

Surface Water Present? No
Water Table Present? No
Saturation Present? No

Depth (inches):

Wetland hydrology must be present, unless disturbed or problematic.

Remarks:

Describe Recorded Data (stream, gauge, monitoring well, aerial photos, previous inspections) if available:

Remarks:
WETLAND DELINEATION FORM – Arid West Region

Project/Site: Mohave Wetlands
City/County: Needles/San Bernardino
State: CA
Sampling Date: 3/18/2015

Applicant/Owner: BOR
State: CA
Sampling Point: 12

Investigator(s): BT, MC
Section, Township, Range: S36 T8N R23E

Landform (hillslope, terrace, etc.): Floodplain
Local Relief (concave, convex, none): Concave
Slope (%): 0

Subregion (LRR): D
UTM X: -114.524047
UTM Y: 34.735333
Datum: NAD 83

Soil Map Unit Name: Not mapped
NWI Classification: Freshwater emergent

Are climatic/hydrologic conditions on the site typical for this time of year? Yes (If no, explain in Remarks.)

Are vegetation, soil, or hydrology significantly disturbed? No
Are “normal circumstances” present? Yes
Are vegetation, soil, or hydrology naturally problematic? No (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach map showing sampling point locations, transects, important features, etc.

Is hydrophytic vegetation present? Yes
Is the sampled area within a wetland? Yes
Are hydric soils present? Yes
Is wetland hydrology present? Yes

Remarks: The soil was marginal but this is obviously an old channel in the floodplain of the Colorado river, exhibited strong hydrology.

VEGETATION – Use scientific names of plants.

<table>
<thead>
<tr>
<th>Tree Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Dominance Test Worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2.</td>
<td></td>
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<tr>
<td>3.</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sapling/Shrub Stratum</th>
<th>Plot size: 5’ radius</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Prevalence Index Worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Tamarix sp.</td>
<td></td>
<td>10</td>
<td>Y</td>
<td>FAC</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover =</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Herb Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Hydrophytic Vegetation Indicators:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X Dominance test is &gt;50%</td>
</tr>
</tbody>
</table>
| 2.           |            |                  |                   |                   | Prevalence index is <3.0
Morphological adaptations (Provide supporting data in Remarks or on a separate sheet.) |
| 3.           |            |                  |                   |                   | Problematic hydrophytic vegetation (explain) |
| 4.           |            |                  |                   |                   | Hydrophytic vegetation present? Yes |
| 5.           |            |                  |                   |                   | Remarks: Lots of dead standing Tamarix |
| 6.           |            |                  |                   |                   |                                   |
| 7.           |            |                  |                   |                   |                                   |
| 8.           |            |                  |                   |                   |                                   |
| Total Cover  |            |                  |                   |                   |                                   |

% bare ground in herb stratum: 100
% cover of biotic crust:
### SOIL

**Profile Description:** (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>MATRIX</th>
<th>REDOX FEATURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth (inches)</td>
<td>Color (moist) %</td>
</tr>
<tr>
<td>1. 0-1 in</td>
<td>10 YR 6/2 100</td>
</tr>
<tr>
<td>2. 1-14 in</td>
<td>10 YR 4/3 80</td>
</tr>
<tr>
<td>3. 14+ in</td>
<td>10 YR 6/2 95</td>
</tr>
</tbody>
</table>

1Type: C= concentration, D=depletion, RM=reduced matrix, CS=covered or coated sand grains. 2Location: PL=pore lining, M=matrix.

**Hydric Soil Indicators:** (Applicable to all LRRs, unless otherwise noted.)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Histosol</td>
<td>X Sandy Redox (S5)</td>
</tr>
<tr>
<td>Histic Epipedon (A2)</td>
<td>Stripped Matrix (S6)</td>
</tr>
<tr>
<td>Black Histic (A3)</td>
<td>Loamy Mucky Mineral (F1)</td>
</tr>
<tr>
<td>Hydrogen Sulfide (A4)</td>
<td>Loamy Gleyed Matrix (F2)</td>
</tr>
<tr>
<td>Stratified Layers (A5) (LRR C)</td>
<td>Depleted Matrix (F3)</td>
</tr>
<tr>
<td>1 cm Muck (A9) (LRR D)</td>
<td>Redox Dark Surface (F6)</td>
</tr>
<tr>
<td>Depleted below Surface (A12)</td>
<td>Depleted Dark Surface (F7)</td>
</tr>
<tr>
<td>Thick Dark Surface (A12)</td>
<td>Redox Depressions (F8)</td>
</tr>
<tr>
<td>Sandy Mucky Mineral (S1)</td>
<td>Vernal Pools (F9)</td>
</tr>
<tr>
<td>Sandy Gleyed Matrix (S4)</td>
<td></td>
</tr>
</tbody>
</table>

**Restrictive Layer (if present):**

<table>
<thead>
<tr>
<th>Type</th>
<th>Depth (inches)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydric Soil Present?</td>
<td>Yes</td>
<td>The soil exhibits many distinct mottles and the chroma is very close to a 2 so we called this a hydric soil. Saline soils could be interfering or preventing normal redox reactions.</td>
</tr>
</tbody>
</table>

**HYDROLOGY**

**Wetland Hydrology Indicators:**

<table>
<thead>
<tr>
<th>Primary Indicators (minimum of one required; check all that apply)</th>
<th>Secondary Indicators (two or more required)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water (A1)</td>
<td>Salt Crust (B11)</td>
</tr>
<tr>
<td>High Water Table (A2)</td>
<td>Biotic Crust (B12)</td>
</tr>
<tr>
<td>Saturation (A3)</td>
<td>Aquatic Invertebrates (B13)</td>
</tr>
<tr>
<td>Water Marks (B1) (Nonriverine)</td>
<td>Hydrogen Sulfide Odor (C1)</td>
</tr>
<tr>
<td>Sediment Deposits (B2) (Nonriverine)</td>
<td>Oxidized Rhizospheres along Living Roots (C3)</td>
</tr>
<tr>
<td>Drift Deposits (B3) (Nonriverine)</td>
<td>Presence of Reduced Iron (C4)</td>
</tr>
<tr>
<td>X Surface Soil Cracks (B6)</td>
<td>Recent Iron Reduction in Tilled Soils (C6)</td>
</tr>
<tr>
<td>Inundation Visible on Aerial Imagery (B7)</td>
<td>Other (Explain in Remarks)</td>
</tr>
<tr>
<td>Water-Stained Leaves (B9)</td>
<td></td>
</tr>
</tbody>
</table>

**Field Observations:**

| Surface Water Present? | No | Depth (inches): |
| Water Table Present? | No | Depth (inches): |
| Saturation Present? | No | Depth (inches): |

**Wetland Hydrology Present?** Yes

Describe Recorded Data (stream, gauge, monitoring well, aerial photos, previous inspections) if available:

Remarks: Swale or channel
**WETLAND DELINEATION FORM – Arid West Region**

- **Project/Site:** Mohave Wetlands
- **City/County:** Needles/San Bernardino
- **State:** CA
- **Sampling Date:** 3/18/2015
- **Applicant/Owner:** BOR
- **Sampling Point:** 13
- **Investigator(s):** BT, MC
- **Landform (hillslope, terrace, etc.):** Slope
- **Local Relief (concave, convex, none):** Convex
- **Subregion (LRR):** D
- **Soil Map Unit Name:** Not mapped
- **NWI Classification:** Upland

**SUMMARY OF FINDINGS – Attach map showing sampling point locations, transects, important features, etc.**

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are climatic/hydrologic conditions on the site typical for this time of year?</td>
<td>Yes</td>
</tr>
<tr>
<td>Are vegetation, soil, or hydrology significantly disturbed?</td>
<td>No</td>
</tr>
<tr>
<td>Are vegetation, soil, or hydrology naturally problematic?</td>
<td>No</td>
</tr>
<tr>
<td>Are “normal circumstances” present?</td>
<td>No</td>
</tr>
<tr>
<td><strong>Is hydrophytic vegetation present?</strong></td>
<td>No</td>
</tr>
<tr>
<td><strong>Is the sampled area within a wetland?</strong></td>
<td>No</td>
</tr>
</tbody>
</table>

**VEGETATION – Use scientific names of plants.**

<table>
<thead>
<tr>
<th>Stratum</th>
<th>Plot size</th>
<th>Absolute % Cover</th>
<th>Dominant Species</th>
<th>Indicator Status</th>
<th>Dominance Test Worksheet</th>
<th>Prevalence Index Worksheet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tree Stratum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. N/A</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0 (A)</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0 (B)</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0 (A/B)</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0 (A/B)</td>
<td></td>
</tr>
<tr>
<td>Total Cover = 0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sapling/Shrub Stratum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. N/A</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0 (A)</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0 (B)</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0 (A/B)</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0 (A/B)</td>
<td></td>
</tr>
<tr>
<td>Total Cover = 0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Herb Stratum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Unknown weed</td>
<td></td>
<td>1</td>
<td>N</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0 (A/B)</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0 (A/B)</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0 (A/B)</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0 (A/B)</td>
<td></td>
</tr>
<tr>
<td>Total Cover = 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Woody Vine</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. N/A</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0 (A/B)</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0 (A/B)</td>
<td></td>
</tr>
<tr>
<td>Total Cover = 0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Remarks:**

- VEGETATION – Use scientific names of plants.

- **Tree Stratum:**
  - Plot size: N/A
  
- **Sapling/Shrub Stratum:**
  - Plot size: N/A
  
- **Herb Stratum:**
  - Plot size: 5' radius

- **Woody Vine:**
  - Plot size: N/A

- **Hydrophytic Vegetation Indicators:**
  - Dominance test is >50%
  - Prevalence index is <3.0
  - Morphological adaptations
  - Problematic hydrophytic vegetation

- **Hydrophytic vegetation present?** No

- **Remarks:**

### Table for Absolute % Cover

<table>
<thead>
<tr>
<th>Tree Stratum</th>
<th>Absolute % Cover</th>
<th>Dominant Species</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2.</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3.</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4.</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total Cover</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

### Table for Sapling/Shrub Stratum

<table>
<thead>
<tr>
<th>Absolute % Cover</th>
<th>Dominant Species</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N</td>
<td>NA</td>
</tr>
<tr>
<td>2.</td>
<td>0</td>
<td>0 (A)</td>
</tr>
<tr>
<td>3.</td>
<td>0</td>
<td>0 (B)</td>
</tr>
<tr>
<td>4.</td>
<td>0</td>
<td>0 (A/B)</td>
</tr>
<tr>
<td>Total Cover = 0</td>
<td></td>
<td></td>
</tr>
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</table>

### Table for Herb Stratum

<table>
<thead>
<tr>
<th>Absolute % Cover</th>
<th>Dominant Species</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N</td>
<td>NA</td>
</tr>
<tr>
<td>2.</td>
<td>0</td>
<td>0 (A/B)</td>
</tr>
<tr>
<td>3.</td>
<td>0</td>
<td>0 (A/B)</td>
</tr>
<tr>
<td>4.</td>
<td>0</td>
<td>0 (A/B)</td>
</tr>
<tr>
<td>5.</td>
<td>0</td>
<td>0 (A/B)</td>
</tr>
<tr>
<td>Total Cover = 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table for Woody Vine

<table>
<thead>
<tr>
<th>Absolute % Cover</th>
<th>Dominant Species</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N</td>
<td>NA</td>
</tr>
<tr>
<td>2.</td>
<td>0</td>
<td>0 (A/B)</td>
</tr>
<tr>
<td>Total Cover = 0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **% bare ground in herb stratum:** 99
- **% cover of biotic crust:**
SOIL
Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>MATRIX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth (inches)</td>
</tr>
<tr>
<td>1. 0-2 in</td>
</tr>
<tr>
<td>2. 2-6 in</td>
</tr>
<tr>
<td>3. 6in +</td>
</tr>
<tr>
<td>4.</td>
</tr>
<tr>
<td>5.</td>
</tr>
<tr>
<td>6.</td>
</tr>
<tr>
<td>7.</td>
</tr>
<tr>
<td>8.</td>
</tr>
</tbody>
</table>

1. Type: C= concentration, D=depletion, RM=reduced matrix, CS=covered or coated sand grains.
2. Location: PL=pore lining, M=matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- Histosol
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5) (LRR C)
- 1 cm Muck (A9) (LRR D)
- Depleted below Surface (A12)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)

- Sandy Redox (S5)
- Stripped Matrix (S6)
- Loamy Mucky Mineral (F1)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Redox Dark Surface (F7)
- Vernal Pools (F9)

Restrictive Layer (if present):
Type:
Depth (inches):
Remarks:

Hydric Soil Present? No

HYDROLOGY
Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)
- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1) (Nonriverine)
- Sediment Deposits (B2) (Nonriverine)
- Drift Deposits (B3) (Nonriverine)
- Surface Soil Cracks (B6)
- Inundation Visible on Aerial Imagery (B7)
- Water-Stained Leaves (B9)

Secondary Indicators (two or more required)
- Salt Crust (B11)
- Biotic Crust (B12)
- Aquatic Invertebrates (B13)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres along Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Other (Explain in Remarks)
- FAC-Neutral Test

Field Observations:
Surface Water Present? No Depth (inches):
Water Table Present? No Depth (inches):
Saturation Present? No Depth (inches):

Wetland Hydrology Present? No

Describe Recorded Data (stream, gauge, monitoring well, aerial photos, previous inspections) if available:
Remarks:
**WETLAND DELINEATION FORM – Arid West Region**

<table>
<thead>
<tr>
<th>Project/Site:</th>
<th>Mohave Wetlands</th>
<th>City/County: Needles/San Bernardino</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicant/Owner:</td>
<td>BOR</td>
<td>State: CA</td>
</tr>
<tr>
<td>Investigator(s):</td>
<td>BT, MC</td>
<td>Sampling Date: 3/18/2015</td>
</tr>
<tr>
<td>Landform (hillslope, terrace, etc.):</td>
<td>Floodplain</td>
<td>Local Relief (concave, convex, none): Concave</td>
</tr>
<tr>
<td>Subregion (LRR):</td>
<td>D</td>
<td>Datum: NAD 83</td>
</tr>
<tr>
<td>Soil Map Unit Name:</td>
<td>Not mapped</td>
<td>NWI Classification: Freshwater emergent</td>
</tr>
</tbody>
</table>

**Sampling Date:** 3/18/2015

**City/County:** Needles/San Bernardino

**Investigator(s):** BT, MC

**Landform (hillslope, terrace, etc.):** Floodplain

**Local Relief (concave, convex, none):** Concave

**Subregion (LRR):** D

**Soil Map Unit Name:** Not mapped

**NWI Classification:** Freshwater emergent

---

**SUMMARY OF FINDINGS – Attach map showing sampling point locations, transects, important features, etc.**

Are climatic/hydrologic conditions on the site typical for this time of year? Yes

Are vegetation, soil, or hydrology significantly disturbed? No

Are hydrophytic vegetation present? Yes

Is the sampled area within a wetland? Yes

Is hydric soils present? Yes

Is wetland hydrology present? Yes

Remarks: Marginal soils but this is obviously a swale that surface water flows through and ponds in.

---

**VEGETATION – Use scientific names of plants.**

<table>
<thead>
<tr>
<th>Tree Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Prevalence Index Worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sapling/Shrub Stratum</td>
<td>5’ radius</td>
<td>Absolute % Cover</td>
<td>Dominant Species?</td>
<td>Indicator Status</td>
<td>Prevalence Index Worksheet:</td>
</tr>
<tr>
<td>1. Tamarix sp.</td>
<td>15</td>
<td>Y</td>
<td>FAC</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Herb Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Column Totals:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unknown weed</td>
<td>2</td>
<td>Y</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Woody Vine</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Hydrophytic Vegetation Indicators:</th>
</tr>
</thead>
</table>

**Remarks:**

- Hydrophytic vegetation present? Yes

---

| % bare ground in herb stratum: | 98
| % cover of biotic crust: |
### Soil Profile Description

**Matrix**

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Color (moist)</th>
<th>%</th>
<th>Color (moist)</th>
<th>%</th>
<th>Type</th>
<th>Location</th>
<th>Texture</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 0-1 in</td>
<td>10 YR 5/3</td>
<td>100</td>
<td>10 YR 5/6</td>
<td>5</td>
<td>C</td>
<td>RC</td>
<td>Sand</td>
<td>Very moist</td>
</tr>
<tr>
<td>2. 1-6 in</td>
<td>10 YR 5/2</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Loam</td>
<td></td>
</tr>
<tr>
<td>3. 6-18 in</td>
<td>10 YR 5/3</td>
<td>95</td>
<td>10 YR 5/6</td>
<td>5</td>
<td>C</td>
<td>RC</td>
<td>Clay</td>
<td>Surface crust</td>
</tr>
</tbody>
</table>

1. Type: C= concentration, D=depletion, RM=reduced matrix, CS=covered or coated sand grains. Location: PL=pore lining, M=matrix.

### Hydric Soil Indicators

*Applicable to all LRRs, unless otherwise noted.*

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Histosol</td>
<td>X Sandy Redox (S5)</td>
</tr>
<tr>
<td>Histic Epipedon (A2)</td>
<td>Stripped Matrix (S6)</td>
</tr>
<tr>
<td>Black Histic (A3)</td>
<td>Loamy Mucky Mineral (F1)</td>
</tr>
<tr>
<td>Hydrogen Sulfide (A4)</td>
<td>Loamy Gleyed Matrix (F2)</td>
</tr>
<tr>
<td>Stratified Layers (A5) (LRR C)</td>
<td>Depleted Matrix (F3)</td>
</tr>
<tr>
<td>1 cm Muck (A9) (LRR D)</td>
<td>Redox Dark Surface (F6)</td>
</tr>
<tr>
<td>Depleted below Surface (A12)</td>
<td>Depleted Dark Surface (F7)</td>
</tr>
<tr>
<td>Thick Dark Surface (A12)</td>
<td>Redox Depressions (F8)</td>
</tr>
<tr>
<td>Sandy Mucky Mineral (S1)</td>
<td>Vernal Pools (F9)</td>
</tr>
<tr>
<td>Sandy Gleyed Matrix (S4)</td>
<td></td>
</tr>
</tbody>
</table>

### Restrictive Layer (if present):

- **Type:**
- **Depth (inches):**
- **Hydric Soil Present?** Yes
- **Remarks:** Soil is very close to meeting depleted matrix and sandy redox, saline conditions may be preventing normal redox reactions.

### Hydrology

#### Wetland Hydrology Indicators

<table>
<thead>
<tr>
<th>Primary Indicators (minimum of one required; check all that apply)</th>
<th>Secondary Indicators (two or more required)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water (A1)</td>
<td>Water Marks (B1) (Riverine)</td>
</tr>
<tr>
<td>High Water Table (A2)</td>
<td>Sediment Deposits (B2) (Riverine)</td>
</tr>
<tr>
<td>Saturation (A3)</td>
<td>Drift Deposits (B3) (Riverine)</td>
</tr>
<tr>
<td>Water Marks (B1) (Nonriverine)</td>
<td>Oxidized Rhizospheres along Living Roots (C3)</td>
</tr>
<tr>
<td>Sediment Deposits (B2) (Nonriverine)</td>
<td>Presence of Reduced Iron (C4)</td>
</tr>
<tr>
<td>Drift Deposits (B3) (Nonriverine)</td>
<td>Drainage Patterns (B10)</td>
</tr>
<tr>
<td>Inundation Visible on Aerial Imagery (B7)</td>
<td>Dry-Season Water Table (C2)</td>
</tr>
<tr>
<td>Water-Stained Leaves (B9)</td>
<td>Crayfish burrows (C8)</td>
</tr>
</tbody>
</table>

#### Field Observations

- **Surface Water Present?** No
- **Water Table Present?** No
- **Saturation Present?** No

**Wetland Hydrology Present?** Yes

**Remarks:** Obvious surface flow in this area during rain events.

Describe Recorded Data (stream, gauge, monitoring well, aerial photos, previous inspections) if available:

**Remarks:**
**WETLAND DELINEATION FORM – Arid West Region**

**Project/Site:** Mohave Wetlands  
**City/County:** Needles/San Bernardino  
**Sampling Date:** 3/18/2015  
**Applicant/Owner:** BOR  
**State:** CA  
**Sampling Point:** 15  
**Investigator(s):** BT, MC  
**Subregion (LRR):** D  
**UTM X:** -114.523487  
**UTM Y:** 34.732638  
**Datum:** NAD 83  

**Landform (hillslope, terrace, etc.):** Dredge fill slope  
**Local Relief (concave, convex, none):** Slope (%): 1  
**Soil Map Unit Name:** Not mapped  
**NWI Classification:** Upland  

**Are climatic/hydrologic conditions on the site typical for this time of year?** Yes  
**Are vegetation, soil, or hydrology significantly disturbed?** Yes  
**Are “normal circumstances” present?** Yes  
**Are vegetation, soil, or hydrology naturally problematic?** No  

**SUMMARY OF FINDINGS – Attach map showing sampling point locations, transects, important features, etc.**  
**Is hydrophytic vegetation present?** No  
**Are hydric soils present?** No  
**Is wetland hydrology present?** No  
**Is the sampled area within a wetland?** No  
**Remarks:** Large fill slope pushed into wetland

**VEGETATION – Use scientific names of plants.**

<table>
<thead>
<tr>
<th>Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Dominance Test Worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tree Stratum</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
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<tr>
<td><strong>Total Cover =</strong></td>
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</tr>
<tr>
<td><strong>Sapling/Shrub Stratum</strong></td>
<td>Plot size:</td>
<td>Absolute % Cover</td>
<td>Dominant Species?</td>
<td>Indicator Status</td>
<td>Prevalence Index Worksheet:</td>
</tr>
<tr>
<td>1. N/A</td>
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<tr>
<td><strong>Total Cover =</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Herb Stratum</strong></td>
<td>Plot size:</td>
<td>Absolute % Cover</td>
<td>Dominant Species?</td>
<td>Indicator Status</td>
<td>Hydrophytic Vegetation Indicators:</td>
</tr>
<tr>
<td>1. N/A</td>
<td></td>
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<tr>
<td><strong>Total Cover =</strong></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Woody Vine</strong></td>
<td>Plot size:</td>
<td>Absolute % Cover</td>
<td>Dominant Species?</td>
<td>Indicator Status</td>
<td>Hydrophytic vegetation present?</td>
</tr>
<tr>
<td>1. N/A</td>
<td></td>
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<td>2.</td>
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<tr>
<td><strong>Total Cover =</strong></td>
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</tr>
</tbody>
</table>

% bare ground in herb stratum: 100  
% cover of biotic crust:

---

1. Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
SOIL
Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>MATRIX</th>
<th>REDOX FEATURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth (inches)</td>
<td>Color (moist)</td>
</tr>
<tr>
<td>1. 0-12 in</td>
<td>10 YR 5/4</td>
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<tr>
<td>2.</td>
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<tr>
<td>3.</td>
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<td>4.</td>
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<td>5.</td>
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<tr>
<td>6.</td>
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<tr>
<td>7.</td>
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<tr>
<td>8.</td>
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</tr>
</tbody>
</table>

1 Type: C= concentration, D=depletion, RM=reduced matrix, CS=covered or coated sand grains. 2 Location: PL=pore lining, M=matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Histosol</td>
<td>Sandy Redox (S5)</td>
</tr>
<tr>
<td>Histic Epipedon (A2)</td>
<td>Stripped Matrix (S6)</td>
</tr>
<tr>
<td>Black Histic (A3)</td>
<td>Loamy Mucky Mineral (F1)</td>
</tr>
<tr>
<td>Hydrogen Sulfide (A4)</td>
<td>Reduced Vertic (F18)</td>
</tr>
<tr>
<td>Stratified Layers (A5) (LRR C)</td>
<td>Depleted Matrix (F3)</td>
</tr>
<tr>
<td>1 cm Muck (A9) (LRR D)</td>
<td>Redox Dark Surface (F6)</td>
</tr>
<tr>
<td>Depleted below Surface (A12)</td>
<td>Depleted Dark Surface (F7)</td>
</tr>
<tr>
<td>Thick Dark Surface (A12)</td>
<td>Redox Depressions (F8)</td>
</tr>
<tr>
<td>Sandy Mucky Mineral (S1)</td>
<td>Vernal Pools (F9)</td>
</tr>
<tr>
<td>Sandy Gleyed Matrix (S4)</td>
<td></td>
</tr>
</tbody>
</table>

Restrictive Layer (if present):

Type: Depleted
Depth (inches): 2
Remarks: Other (Explain in Remarks)

Hydric Soil Present? No

HYDROLOGY

Wetland Hydrology Indicators:

<table>
<thead>
<tr>
<th>Primary Indicators (minimum of one required; check all that apply)</th>
<th>Secondary Indicators (two or more required)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water (A1)</td>
<td>Salt Crust (B11)</td>
</tr>
<tr>
<td>High Water Table (A2)</td>
<td>Biotic Crust (B12)</td>
</tr>
<tr>
<td>Saturation (A3)</td>
<td>Aquatic Invertebrates (B13)</td>
</tr>
<tr>
<td>Water Marks (B1) (Nonriverine)</td>
<td>Hydrogen Sulfide Odor (C1)</td>
</tr>
<tr>
<td>Sediment Deposits (B2) (Nonriverine)</td>
<td>Oxidized Rhizospheres along Living Roots (C3)</td>
</tr>
<tr>
<td>Drift Deposits (B3) (Nonriverine)</td>
<td>Presence of Reduced Iron (C4)</td>
</tr>
<tr>
<td>Surface Soil Cracks (B6)</td>
<td>Recent Iron Reduction in Tilled Soils (C6)</td>
</tr>
<tr>
<td>Inundation Visible on Aerial Imagery (B7)</td>
<td>Other (Explain in Remarks)</td>
</tr>
<tr>
<td>Water-Stained Leaves (B9)</td>
<td>FAC-Neutral Test</td>
</tr>
</tbody>
</table>

Field Observations:

Surface Water Present? No
Water Table Present? No
Saturation Present? No

Wetland Hydrology Present? No

Describe Recorded Data (stream, gauge, monitoring well, aerial photos, previous inspections) if available:

Remarks:
WETLAND DELINEATION FORM – Arid West Region

Project/Site: Mohave Wetlands  
City/County: Needles/San Bernardino  
State: CA  
Sampling Date: 3/18/2015

Applicant/Owner: BOR  
State: CA  
Sampling Point: 16

Investigator(s): BT, MC  
Section, Township, Range: S1 T7N R23E

Landform (hillslope, terrace, etc.): Floodplain  
Local Relief (concave, convex, none): Concave  
Slope (%): 1

Subregion (LRR): D  
UTM X: -114.523348  
UTM Y: 34.732662  
Datum: NAD 83

Soil Map Unit Name: Not mapped  
NWI Classification: Freshwater emergent

Are climatic/hydrologic conditions on the site typical for this time of year? Yes  
(If no, explain in Remarks.)

Are vegetation, soil, or hydrology significantly disturbed? No  
Are “normal circumstances” present? Yes

Are vegetation, soil, or hydrology naturally problematic? No  
(If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach map showing sampling point locations, transects, important features, etc.

Is hydrophytic vegetation present? Yes

Are hydric soils present? Yes

Is wetland hydrology present? Yes  
Is the sampled area within a wetland? Yes

Remarks: Marginal soils but this is obviously a swale that surface water flows through and ponds in.

VEGETATION – Use scientific names of plants.

<table>
<thead>
<tr>
<th>Tree Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Dominance Test Worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
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<td>2.</td>
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<tr>
<td>Total Cover</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Sapling/Shrub Stratum</th>
<th>Plot size: 5’ radius</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Prevalence Index Worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Tamarix sp.</td>
<td></td>
<td>5</td>
<td>Y</td>
<td>FAC</td>
<td></td>
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<tr>
<td>2.</td>
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<td>4.</td>
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<tr>
<td>5.</td>
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</tr>
<tr>
<td>Total Cover = 5</td>
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</tbody>
</table>

Herb Stratum  
Plot size:  

<table>
<thead>
<tr>
<th>Herb Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Column Totals:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
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<tr>
<td>Total Cover</td>
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</tbody>
</table>

Woody Vine  
Plot size:  

<table>
<thead>
<tr>
<th>Woody Vine</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Hydrophytic vegetation present?</th>
<th>Remarks:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
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<td>2.</td>
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<tr>
<td>Total Cover</td>
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</tbody>
</table>

% bare ground in herb stratum: 100

% cover of biotic crust:
SOIL
Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>MATRIX</th>
<th>REDOX FEATURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth (inches)</td>
<td>Color (moist) %</td>
</tr>
<tr>
<td>1. 0-3 in</td>
<td>10 YR 6/3 100</td>
</tr>
<tr>
<td>2. 3-12 in</td>
<td>10 YR 5/3 90</td>
</tr>
<tr>
<td>3. 12-18 in</td>
<td>10 YR 6/2 95</td>
</tr>
</tbody>
</table>

1.Type: C= concentration, D=depletion, RM=reduced matrix, CS=covered or coated sand grains. 2.Location: PL=pore lining, M=matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

| Hydric Soil Indicators | Restricted Layer (if present): Type:Depth (inches):Hydric Soil Present?Remarks:
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Histosol</td>
<td>Sandy Redox (S5)</td>
<td>1 cm Muck (A9) (LRR C)</td>
</tr>
<tr>
<td>Histic Epipedon (A2)</td>
<td>Stripped Matrix (S6)</td>
<td>2 cm Muck (A10) (LRR B)</td>
</tr>
<tr>
<td>Black Histic (A3)</td>
<td>Loamy Mucky Mineral (F1)</td>
<td>Reduced Vertic (F18)</td>
</tr>
<tr>
<td>Hydrogen Sulfide (A4)</td>
<td>Loamy Gleyed Matrix (F2)</td>
<td>Red Parent Material (TF2)</td>
</tr>
<tr>
<td>Stratified Layers (A5) (LRR C)</td>
<td>X Depleted Matrix (F3)</td>
<td>Other (Explain in Remarks)</td>
</tr>
<tr>
<td>1 cm Muck (A9) (LRR D)</td>
<td>Redox Dark Surface (F6)</td>
<td>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.</td>
</tr>
<tr>
<td>Depleted below Surface (A12)</td>
<td>Depleted Dark Surface (F7)</td>
<td></td>
</tr>
<tr>
<td>Thick Dark Surface (A12)</td>
<td>Redox Depressions (F8)</td>
<td></td>
</tr>
<tr>
<td>Sandy Mucky Mineral (S1)</td>
<td>Vernal Pools (F9)</td>
<td></td>
</tr>
<tr>
<td>Sandy Gleyed Matrix (S4)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Restrictive Layer (if present):
Type:Depth (inches):Hydric Soil Present?Remarks:
Salt concentrations, soil is very close to meeting depleted matrix, saline conditions may be preventing normal redox reactions.

HYDROLOGY
Wetland Hydrology Indicators:
Primary Indicators (minimum of one required; check all that apply)Secondary Indicators (two or more required)

<table>
<thead>
<tr>
<th>Primary Indicators</th>
<th>Secondary Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water (A1)</td>
<td>Salt Crust (B11)</td>
</tr>
<tr>
<td>High Water Table (A2)</td>
<td>Biotic Crust (B12)</td>
</tr>
<tr>
<td>Saturation (A3)</td>
<td>Aquatic Invertebrates (B13)</td>
</tr>
<tr>
<td>Water Marks (B1) (Nonriverine)</td>
<td>Hydrogen Sulfide Odor (C1)</td>
</tr>
<tr>
<td>Sediment Deposits (B2) (Nonriverine)</td>
<td>Oxidized Rhizospheres along Living Roots (C3)</td>
</tr>
<tr>
<td>Drift Deposits (B3) (Nonriverine)</td>
<td>Presence of Reduced Iron (C4)</td>
</tr>
<tr>
<td>X Surface Soil Cracks (B6)</td>
<td>Recent Iron Reduction in Tilled Soils (C6)</td>
</tr>
<tr>
<td>Inundation Visible on Aerial Imagery (B7)</td>
<td>Other (Explain in Remarks)</td>
</tr>
<tr>
<td>Water-Stained Leaves (B9)</td>
<td></td>
</tr>
</tbody>
</table>

Field Observations:
Surface Water Present?No Depth (inches): |
Water Table Present?No Depth (inches): |
Saturation Present?No Depth (inches): |

Wetland Hydrology Present?Yes

Describe Recorded Data (stream, gauge, monitoring well, aerial photos, previous inspections) if available:
Remarks:
**WETLAND DELINEATION FORM – Arid West Region**

**Project/Site:** Mohave Wetlands  
**City/County:** Needles/San Bernardino  
**Applicant/Owner:** BOR  
**State:** CA  
**Sampling Date:** 3/18/2015

**Investigator(s):** BT, MC  
**Landform (hillslope, terrace, etc.):** Floodplain  
**Local Relief (concave, convex, none):** None  
**Subregion (LRR):** D  
**Soil Map Unit Name:** Not mapped  
**NWI Classification:** Freshwater emergent

---

**Are climatic/hydrologic conditions on the site typical for this time of year?** Yes

**Are vegetation, soil, or hydrology significantly disturbed?** No

**Are "normal circumstances" present?** Yes

**Are vegetation, soil, or hydrology naturally problematic?** No

---

**SUMMARY OF FINDINGS – Attach map showing sampling point locations, transects, important features, etc.**

- **Is hydrophytic vegetation present?** Yes
- **Are hydric soils present?** Yes
- **Is wetland hydrology present?** Yes

**Is the sampled area within a wetland?** Yes

**Remarks:**

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**VEGETATION – Use scientific names of plants.**

<table>
<thead>
<tr>
<th>Stratum</th>
<th>Plot size</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Dominance Test Worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tree Stratum</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1. N/A</td>
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<td>2.</td>
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<tr>
<td>Total Cover =</td>
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</tr>
<tr>
<td>Sapling/Shrub Stratum</td>
<td>5’ radius</td>
<td>Absolute % Cover</td>
<td>Dominant Species?</td>
<td>Indicator Status</td>
<td>Prevalence Index Worksheet:</td>
</tr>
<tr>
<td>1. <em>Tamarix sp.</em></td>
<td></td>
<td>5</td>
<td>Y</td>
<td>FAC</td>
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<td>2.</td>
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<tr>
<td>Total Cover = 5</td>
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<tr>
<td>Herb Stratum</td>
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<tr>
<td>1. N/A</td>
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<tr>
<td>Total Cover =</td>
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<td></td>
</tr>
<tr>
<td>Woody Vine</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
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<tr>
<td>2.</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover =</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**% bare ground in herb stratum:** 100  
**% cover of biotic crust:**

---

**Prevalence Index Worksheet:**

- Column Totals:
  - *Prevalence Index = B/A =*

**Hydrophytic Vegetation Indicators:**

- *Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.*

**Remarks:**

---

**Number of dominant species that are OBL, FACW, or FAC:** 1

**Total number of dominant species across all strata:** 1

**Percent of dominant species that are OBL, FACW, or FAC:** 100

---

**Hydrophytic vegetation present?** Yes

**Remarks:**

---
**SOIL**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>MATRIX</th>
<th>REDOX FEATURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth (inches)</td>
<td>Color (moist)</td>
</tr>
<tr>
<td>1. 0-1 in</td>
<td>10 YR 6/2</td>
</tr>
<tr>
<td>2. 2-18 in</td>
<td>10 YR 5/2</td>
</tr>
<tr>
<td>3.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td></td>
</tr>
</tbody>
</table>

Type: C= concentration, D=depletion, RM=reduced matrix, CS=covered or coated sand grains. Location: PL=pore lining, M=matrix.

**Hydric Soil Indicators:** (Applicable to all LRRs, unless otherwise noted.)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Depth (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Histosol</td>
<td>1 cm Muck (A9) (LRR C)</td>
</tr>
<tr>
<td>Histic Epipedon (A2)</td>
<td>2 cm Muck (A10) (LRR B)</td>
</tr>
<tr>
<td>Black Histic (A3)</td>
<td>Reduced Vertic (F18)</td>
</tr>
<tr>
<td>Hydrogen Sulfide (A4)</td>
<td>Red Parent Material (TF2)</td>
</tr>
<tr>
<td>Stratified Layers (A5) (LRR C)</td>
<td>Other (Explain in Remarks)</td>
</tr>
<tr>
<td>1 cm Muck (A9) (LRR D)</td>
<td>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.</td>
</tr>
<tr>
<td>Depleted below Surface (A12)</td>
<td>Redox Depressions (F8)</td>
</tr>
<tr>
<td>Thick Dark Surface (A12)</td>
<td>Vernal Pools (F9)</td>
</tr>
<tr>
<td>Sandy Mucky Mineral (S1)</td>
<td></td>
</tr>
<tr>
<td>Sandy Gleyed Matrix (S4)</td>
<td></td>
</tr>
</tbody>
</table>

**Restrictive Layer (if present):**

<table>
<thead>
<tr>
<th>Type</th>
<th>Depth (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hydric Soil Present? Yes</td>
</tr>
</tbody>
</table>

Remarks:

**HYDROLOGY**

**Wetland Hydrology Indicators:**

<table>
<thead>
<tr>
<th>Primary Indicators (minimum of one required; check all that apply)</th>
<th>Secondary Indicators (two or more required)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water (A1)</td>
<td>X Salt Crust (B11)</td>
</tr>
<tr>
<td>High Water Table (A2)</td>
<td>Biotic Crust (B12)</td>
</tr>
<tr>
<td>Saturation (A3)</td>
<td>Aquatic Invertebrates (B13)</td>
</tr>
<tr>
<td>Water Marks (B1) (Nonriverine)</td>
<td>Hydrogen Sulfide Odor (C1)</td>
</tr>
<tr>
<td>Sediment Deposits (B2) (Nonriverine)</td>
<td>Oxidized Rhizospheres along Living Roots (C3)</td>
</tr>
<tr>
<td>Drift Deposits (B3) (Nonriverine)</td>
<td>Presence of Reduced Iron (C4)</td>
</tr>
<tr>
<td>X Surface Soil Cracks (B6)</td>
<td>Drainage Patterns (B10)</td>
</tr>
<tr>
<td>Inundation Visible on Aerial Imagery (B7)</td>
<td>Dry-Season Water Table (C2)</td>
</tr>
<tr>
<td>Water-Stained Leaves (B9)</td>
<td>Crayfish burrows (C8)</td>
</tr>
</tbody>
</table>

| X | Recent Iron Reduction in Tilled Soils (C6) |
| | Saturation visible on Aerial Imagery (C9) |
| | Other (Explain in Remarks) |
| | Shallow Aquitard (D3) |
| | FAC-Neutral Test |

**Field Observations:**

| Surface Water Present? No | Depth (inches): |
| Water Table Present? No | Depth (inches): |
| Saturation Present? No | Depth (inches): |

Wetland Hydrology Present? Yes

Describe Recorded Data (stream, gauge, monitoring well, aerial photos, previous inspections) if available:

Remarks:
**WETLAND DELINEATION FORM – Arid West Region**

**Project/Site:** Mohave Wetlands  
**City/County:** Needles/San Bernardino  
**Applicant/Owner:** BOR  
**Investigator(s):** BT, MC  
**Landform (hillslope, terrace, etc.):** Floodplain  
**Sampling Date:** 3/18/2015  
**State:** CA  
**Subregion (LRR):** D  
**Soil Map Unit Name:** Not mapped  
**NWI Classification:** Freshwater emergent

**Remarks:** Vegetation is all dead but did appear to be vegetated with hydrophytic vegetation in the past.

### VEGETATION – Use scientific names of plants.

<table>
<thead>
<tr>
<th>Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Dominance Test Worksheet:</th>
<th>Prevalence Index Worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tree Stratum</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. N/A</td>
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<tr>
<td>2.</td>
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<td>3.</td>
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<tr>
<td>4.</td>
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</tr>
<tr>
<td><strong>Total Cover =</strong></td>
<td></td>
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</tr>
<tr>
<td><strong>Sapling/Shrub Stratum</strong></td>
<td></td>
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</tr>
<tr>
<td>1. N/A</td>
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<td>2.</td>
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<td><strong>Total Cover =</strong></td>
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<tr>
<td><strong>Herb Stratum</strong></td>
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<tr>
<td>1. N/A</td>
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<td>3.</td>
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<td><strong>Total Cover =</strong></td>
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</tr>
<tr>
<td><strong>Woody Vine</strong></td>
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<tr>
<td>1. N/A</td>
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<td>2.</td>
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<tr>
<td><strong>Total Cover =</strong></td>
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</tr>
</tbody>
</table>

**Remarks:** Lots of dead *Pluchea sericea* stems laying across the ground; point is in a channel feature, all the *Pluchea* in the channel are dead

---

**Summary of Findings:**

Is hydrophytic vegetation present? Yes
Are hydric soils present? Yes
Is wetland hydrology present? Yes

**Is the sampled area within a wetland?** Yes

---

**Soil Map Unit Name:** Not mapped
**NWI Classification:** Freshwater emergent

---

**Remarks:** Vegetation is all dead but did appear to be vegetated with hydrophytic vegetation in the past.
# Soil Profile Description

**SOIL**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Color (moist)</th>
<th>%</th>
<th>Color (moist)</th>
<th>%</th>
<th>Type</th>
<th>Location</th>
<th>Texture</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 0-1/2 in</td>
<td>10 YR 6/3</td>
<td>100</td>
<td>10 YR 6/6</td>
<td>5</td>
<td>C</td>
<td>M</td>
<td>Clay</td>
<td>Surface crust</td>
</tr>
<tr>
<td>2. ½-12 in</td>
<td>10 YR 5/2</td>
<td>95</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Moist with salt concentrations</td>
</tr>
<tr>
<td>3.</td>
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<td>7.</td>
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<td>8.</td>
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<td></td>
</tr>
</tbody>
</table>

1. **Type:** C= concentration, D=depletion, RM=reduced matrix, CS=covered or coated sand grains.  
2. **Location:** PL=pore lining, M=matrix.

## Hydric Soil Indicators

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- Histosol
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5) (LRR C)
- 1 cm Muck (A9) (LRR D)
- Depleted below Surface (A12)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Loamy Mucky Mineral (F1)
- Loamy Gleyed Matrix (F2)
- Redox Depressions (F8)
- Vernal Pools (F9)

## Restrictive Layer (if present):

- **Type:**
- **Depth (inches):**
- **Remarks:**

## Hydric Soil Present? Yes

## HYDROLOGY

### Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1) (Nonriverine)
- Sediment Deposits (B2) (Nonriverine)
- Drift Deposits (B3) (Nonriverine)
- X Surface Soil Cracks (B6)
- Inundation Visible on Aerial Imagery (B7)
- Water-Stained Leaves (B9)
- Salt Crust (B11)
- Biotic Crust (B12)
- Aquatic Invertebrates (B13)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres along Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Other (Explain in Remarks)
- Other (Explain in Remarks)

Secondary Indicators (two or more required)

- Water Marks (B1) (Riverine)
- Sediment Deposits (B2) (Riverine)
- Drift Deposits (B3) (Riverine)
- Drainage Patterns (B10)
- Dry-Season Water Table (C2)
- Oxidized Rhizospheres along Living Roots (C3)
- Presence of Reduced Iron (C4)
- Clay burrows (C8)
- Shallow Aquitard (D3)
- FAC-Neutral Test

### Field Observations:

- Surface Water Present? No
- Water Table Present? No
- Saturation Present? No

- **Depth (inches):**

### Wetland Hydrology Present? Yes

Describe Recorded Data (stream, gauge, monitoring well, aerial photos, previous inspections) if available:

## Remarks:
**WETLAND DELINEATION FORM – Arid West Region**

**Project/Site:** Mohave Wetlands  
**City/County:** Needles/San Bernardino  
**State:** CA  
**Sampling Date:** 3/18/2015  
**Applicant/Owner:** BOR  
**Section, Township, Range:** S1 T7N R23E  
**Sampling Point:** 19  
**Investigator(s):** BT, MC  
**Landform (hillslope, terrace, etc.):** Hillslope  
**Local Relief (concave, convex, none):** Convex  
**Subregion (LRR):** D  
**Soil Map Unit Name:** Not mapped  
**NWI Classification:** Upland  
**Soil Map Unit Name:** Not mapped  
**Datum:** NAD 83  
**Are climatic/hydrologic conditions on the site typical for this time of year?** Yes  
**Are vegetation, soil, or hydrology significantly disturbed?** No  
**Are “normal circumstances” present?** Yes  
**Are vegetation, soil, or hydrology naturally problematic?** No  

**SUMMARY OF FINDINGS – Attach map showing sampling point locations, transects, important features, etc.**

| Is hydrophytic vegetation present? | Yes  
| Are hydric soils present? | No  
| Is wetland hydrology present? | No  

**Is the sampled area within a wetland?** No

**Remarks:**

**VEGETATION – Use scientific names of plants.**

<table>
<thead>
<tr>
<th>Tree Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Dominance Test Worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Number of dominant species that are OBL, FACW, or FAC: 1 (A)</td>
</tr>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total number of dominant species across all strata: 1 (B)</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Percent of dominant species that are OBL, FACW, or FAC: 100 (A/B)</td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Prevalence Index Worksheet:</td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total % Cover of:</td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Multiply by:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sapling/Shrub Stratum</th>
<th>Plot size: 5' radius</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Prevalence Index Worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pluchea sericea</td>
<td></td>
<td>10</td>
<td>Y</td>
<td>FACW</td>
<td>Column Totals:</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Prevalence Index = B/A =</td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total % Cover of:</td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Multiply by:</td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>OBL species x 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FACW species x 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FAC species x 3</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td>FACU species x 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>UPL species x 5</td>
</tr>
<tr>
<td>Total Cover = 10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Hydrophtic Vegetation Indicators:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X Dominance test is &gt;50%</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td>Prevalence index is &lt;3.0</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Morphological adaptations (Provide supporting data in Remarks or on a separate sheet.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Problematic hydrophytic vegetation (explain)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Herb Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Hydrophytic vegetation present?</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Woody Vine</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Remarks:</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| % bare ground in herb stratum: | 100 |
| % cover of biotic crust:      |     |
SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>MATRIX</th>
<th>REDOX FEATURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth (inches)</td>
<td>Color (moist)</td>
</tr>
<tr>
<td>1. 0-1/2 in</td>
<td>10 YR 2/1</td>
</tr>
<tr>
<td>2. ½-15</td>
<td>10 YR 6/6</td>
</tr>
<tr>
<td>3.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td></td>
</tr>
</tbody>
</table>

*Type: C= concentration, D=depletion, RM=reduced matrix, CS=covered or coated sand grains. Location: PL=pore lining, M=matrix.*

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Histosol</td>
<td>Sandy Redox (S5)</td>
</tr>
<tr>
<td>Histic Epipedon (A2)</td>
<td>Stripped Matrix (S6)</td>
</tr>
<tr>
<td>Black Histic (A3)</td>
<td>Loamy Mucky Mineral (F1)</td>
</tr>
<tr>
<td>Hydrogen Sulfide (A4)</td>
<td>Reduced Vertic (F18)</td>
</tr>
<tr>
<td>Stratified Layers (A5) (LRR C)</td>
<td>Red Parent Material (TF2)</td>
</tr>
<tr>
<td>1 cm Muck (A9) (LRR C)</td>
<td>Other (Explain in Remarks)</td>
</tr>
<tr>
<td>Depleted below Surface (A12)</td>
<td>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.</td>
</tr>
<tr>
<td>Thick Dark Surface (A12)</td>
<td>Vernal Pools (F9)</td>
</tr>
<tr>
<td>Sandy Mucky Mineral (S1)</td>
<td></td>
</tr>
<tr>
<td>Sandy Gleyed Matrix (S4)</td>
<td></td>
</tr>
</tbody>
</table>

Restrictive Layer (if present):

<table>
<thead>
<tr>
<th>Type</th>
<th>Depth (inches)</th>
<th>Hydric Soil Present?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No</td>
</tr>
</tbody>
</table>

Remarks: Fill slope from the road

HYDROLOGY

Wetland Hydrology Indicators:

<table>
<thead>
<tr>
<th>Primary Indicators (minimum of one required; check all that apply)</th>
<th>Secondary Indicators (two or more required)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water (A1)</td>
<td>Salt Crust (B11)</td>
</tr>
<tr>
<td>High Water Table (A2)</td>
<td>Biotic Crust (B12)</td>
</tr>
<tr>
<td>Saturation (A3)</td>
<td>Aquatic Invertebrates (B13)</td>
</tr>
<tr>
<td>Water Marks (B1) (Nonriverine)</td>
<td>Hydrogen Sulfide Odor (C1)</td>
</tr>
<tr>
<td>Sediment Deposits (B2) (Nonriverine)</td>
<td>Oxidized Rhizospheres along Living Roots (C3)</td>
</tr>
<tr>
<td>Drift Deposits (B3) (Nonriverine)</td>
<td>Presence of Reduced Iron (C4)</td>
</tr>
<tr>
<td>Surface Soil Cracks (B6)</td>
<td>Recent Iron Reduction in Tilled Soils (C6)</td>
</tr>
<tr>
<td>Inundation Visible on Aerial Imagery (B7)</td>
<td>Other (Explain in Remarks)</td>
</tr>
<tr>
<td>Water-Stained Leaves (B9)</td>
<td>FAC-Neutral Test</td>
</tr>
</tbody>
</table>

Field Observations:

<table>
<thead>
<tr>
<th>Surface Water Present?</th>
<th>No</th>
<th>Depth (inches):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Table Present?</td>
<td>No</td>
<td>Depth (inches):</td>
</tr>
<tr>
<td>Saturation Present?</td>
<td>No</td>
<td>Depth (inches):</td>
</tr>
</tbody>
</table>

Wetland Hydrology Present? No

Describe Recorded Data (stream, gauge, monitoring well, aerial photos, previous inspections) if available:

Remarks:
**WETLAND DELINEATION FORM – Arid West Region**

Project/Site: Mohave Wetlands  
City/County: Needles/San Bernardino  
Sampling Date: 3/18/2015

Applicant/Owner: BOR  
State: CA  
Sampling Point: 20

Investigator(s): BT, MC  
Section, Township, Range: S36 T8N R23E

Landform (hillslope, terrace, etc.): Sand dune  
Local Relief (concave, convex, none): Convex  
Slope (%): 1

Subregion (LRR):  
Sample Points: 20

Investigator(s): BT, MC  
Section, Township, Range: S36 T8N R23E

Slope (%): 1

Subregion (LRR):  
Sample Points: 20

Investigator(s): BT, MC  
Section, Township, Range: S36 T8N R23E

Soil Map Unit Name: Not mapped  
NWI Classification: Upland

**SUMMARY OF FINDINGS – Attach map showing sampling point locations, transects, important features, etc.**

- Is hydrophytic vegetation present?  Yes (If no, explain in Remarks.)
- Are hydric soils present?  No
- Is wetland hydrology present?  No
- Is the sampled area within a wetland?  No

**VEGETATION – Use scientific names of plants.**

<table>
<thead>
<tr>
<th>Tree Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Dominance Test Worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
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<td></td>
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<tr>
<td>3.</td>
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<tr>
<td>4.</td>
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<td></td>
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<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover =</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sapling/Shrub Stratum</th>
<th>Plot size: 5’ radius</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Prevalence Index Worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pluchea sericea</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
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<tr>
<td>3.</td>
<td></td>
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<tr>
<td>4.</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover = 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Herb Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Hydrophytic Vegetation Indicators:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
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<tr>
<td>3.</td>
<td></td>
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<tr>
<td>4.</td>
<td></td>
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<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover =</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Woody Vine</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Hydrophytic vegetation present?</th>
<th>Remarks:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover =</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

% bare ground in herb stratum: 100  
% cover of biotic crust:
SOIL
Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>MATRIX</th>
<th>REDOX FEATURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth (inches)</td>
<td>Color (moist)</td>
</tr>
<tr>
<td>0-15 in</td>
<td>10 YR 6/4</td>
</tr>
<tr>
<td>2.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td></td>
</tr>
</tbody>
</table>

1. Type: C= concentration, D=depletion, RM=reduced matrix, CS=covered or coated sand grains. 2. Location: PL=pore lining, M=matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- Histosol
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5) (LRR C)
- 1 cm Muck (A9) (LRR D)
- Depleted below Surface (A12)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)

Restrictive Layer (if present):

Type:
Depth (inches):

Remarks:

Hydric Soil Present? No

HYDROLOGY

Wetland Hydrology Indicators:

<table>
<thead>
<tr>
<th>Primary Indicators (minimum of one required; check all that apply)</th>
<th>Secondary Indicators (two or more required)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water (A1)</td>
<td>Salt Crust (B11)</td>
</tr>
<tr>
<td>High Water Table (A2)</td>
<td>Biotic Crust (B12)</td>
</tr>
<tr>
<td>Saturation (A3)</td>
<td>Aquatic Invertebrates (B13)</td>
</tr>
<tr>
<td>Water Marks (B1) (Nonriverine)</td>
<td>Hydrogen Sulfide Odor (C1)</td>
</tr>
<tr>
<td>Sediment Deposits (B2) (Nonriverine)</td>
<td>Oxidized Rhizospheres along Living Roots (C3)</td>
</tr>
<tr>
<td>Drift Deposits (B3) (Nonriverine)</td>
<td>Presence of Reduced Iron (C4)</td>
</tr>
<tr>
<td>Surface Soil Cracks (B6)</td>
<td>Recent Iron Reduction in Tilled Soils (C6)</td>
</tr>
<tr>
<td>Inundation Visible on Aerial Imagery (B7)</td>
<td>Other (Explain in Remarks)</td>
</tr>
<tr>
<td>Water-Stained Leaves (B9)</td>
<td>FAC-Neutral Test</td>
</tr>
</tbody>
</table>

Field Observations:

Surface Water Present? No
Water Table Present? No
Saturation Present? No

Wetland Hydrology Present? No

Describe Recorded Data (stream, gauge, monitoring well, aerial photos, previous inspections) if available:

Remarks:
WETLAND DELINEATION FORM – Arid West Region

Project/Site: Mohave Wetlands
City/County: Needles/San Bernardino
State: CA
Sampling Date: 3/18/2015
Applicant/Owner: BOR
State: CA
Sampling Point: 21
Investigator(s): BT, MC
Section, Township, Range: S1 T7N R23E
Landform (hillslope, terrace, etc.): Floodplain
Local Relief (concave, convex, none): Convex
Slope (%): 3
Subregion (LRR): D
UTM X: -114.521374
UTM Y: 34.734464
Datum: NAD 83
Soil Map Unit Name: Not mapped
NWI Classification: Upland
Are climatic/hydrologic conditions on the site typical for this time of year? Yes
Are vegetation, soil, or hydrology significantly disturbed? No

SUMMARY OF FINDINGS – Attach map showing sampling point locations, transects, important features, etc.

Is hydrophytic vegetation present? Yes
Are wetland hydrology present? No

Remarks:

VEGETATION – Use scientific names of plants.

<table>
<thead>
<tr>
<th>Tree Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Dominance Test Worksheet:</th>
<th>Prevalence Index Worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sapling/Shrub Stratum</td>
<td>Plot size: 5’ radius</td>
<td>Absolute % Cover</td>
<td>Dominant Species?</td>
<td>Indicator Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Pluchea sericea</td>
<td>5</td>
<td>Y</td>
<td>FACW</td>
<td>Total % Cover of:</td>
<td>Multiply by:</td>
<td></td>
</tr>
<tr>
<td>2. Tamarix sp.</td>
<td>10</td>
<td>Y</td>
<td>FAC</td>
<td>OBL species</td>
<td>x 1</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td>FACW species</td>
<td>x 2</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td>FAC species</td>
<td>x 3</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td>FACU species</td>
<td>x 4</td>
<td></td>
</tr>
<tr>
<td>Herb Stratum</td>
<td>Plot size:</td>
<td>Absolute % Cover</td>
<td>Dominant Species?</td>
<td>Indicator Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Woody Vine</td>
<td>Plot size:</td>
<td>Absolute % Cover</td>
<td>Dominant Species?</td>
<td>Indicator Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

% bare ground in herb stratum: 100
% cover of biotic crust:

Hydrophytic vegetation present? Yes

Remarks: Lot of litter

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
### SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

#### MATRIX

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Color (moist)</th>
<th>%</th>
<th>Color (moist)</th>
<th>%</th>
<th>Type</th>
<th>Location</th>
<th>Texture</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 0-18 in</td>
<td>10 YR 6/4</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sand</td>
<td>Moist at 3 in</td>
</tr>
<tr>
<td>2.</td>
<td></td>
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<tr>
<td>3.</td>
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<td>4.</td>
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<td>5.</td>
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<tr>
<td>6.</td>
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<tr>
<td>7.</td>
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<tr>
<td>8.</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. **Type:** C= concentration, D=depletion, RM=reduced matrix, CS=covered or coated sand grains.

#### REDOX FEATURES

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Color (moist)</th>
<th>%</th>
<th>Color (moist)</th>
<th>%</th>
<th>Type</th>
<th>Location</th>
<th>Texture</th>
<th>Remarks</th>
</tr>
</thead>
</table>

#### Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted)

- **Histosol**
- **Sandy Redox (S5)**  
- **1 cm Muck (A9) (LRR C)**

- **Histic Epipedon (A2)**
- **Stripped Matrix (S6)**
- **2 cm Muck (A10) (LRR B)**

- **Black Histic (A3)**
- **Loamy Mucky Mineral (F1)**
- **Reduced Vertic (F18)**

- **Hydrogen Sulfide (A4)**
- **Loamy Gleyed Matrix (F2)**
- **Red Parent Material (TF2)**

- **Stratified Layers (A5) (LRR C)**
- **Depleted Matrix (F3)**
- **Other (Explain in Remarks)**

- **1 cm Muck (A9) (LRR D)**
- **Redox Dark Surface (F6)**

- **Depleted below Surface (A12)**
- **Depleted Dark Surface (F7)**

- **Thick Dark Surface (A12)**
- **Redox Depressions (F8)**

- **Sandy Mucky Mineral (S1)**
- **Vernal Pools (F9)**

#### Restrictive Layer (if present):

- **Type:**
- **Depth (inches):**

#### HYDROLOGY

### Wetland Hydrology Indicators:

- **Primary Indicators** (minimum of one required; check all that apply)
  - Surface Water (A1)
  - High Water Table (A2)
  - Saturation (A3)
  - Water Marks (B1) (Nonriverine)
  - Sediment Deposits (B2) (Nonriverine)
  - Drift Deposits (B3) (Nonriverine)
  - Surface Soil Cracks (B6)
  - Inundation Visible on Aerial Imagery (B7)
  - Water-Stained Leaves (B9)

- **Secondary Indicators** (two or more required)
  - Salt Crust (B11)
  - Biotic Crust (B12)
  - Aquatic Invertebrates (B13)
  - Hydrogen Sulfide Odor (C1)
  - Oxidized Rhizospheres along Living Roots (C3)
  - Presence of Reduced Iron (C4)
  - Recent Iron Reduction in Tilled Soils (C6)
  - Other (Explain in Remarks)
  - FAC-Neutral Test

### Field Observations:

- **Surface Water Present?** No
- **Water Table Present?** No
- **Saturation Present?** No

#### Describe Recorded Data (stream, gauge, monitoring well, aerial photos, previous inspections) if available:

#### Remarks:
**WETLAND DELINEATION FORM – Arid West Region**

**Project/Site:** Mohave Wetlands

**City/County:** Needles/San Bernardino

**Applicant/Owner:** BOR

**State:** CA

**Investigator(s):** BT, MC

**Sampling Date:** 3/18/2015

**Landform (hillslope, terrace, etc.):** Old channel

**Local Relief (concave, convex, none):** Concave

**Subregion (LRR):** D

**UTM X:** -114.521782

**UTM Y:** 34.734037

**Datum:** NAD 83

**Soil Map Unit Name:** Not mapped

**NWI Classification:** Freshwater emergent

---

**SUMMARY OF FINDINGS – Attach map showing sampling point locations, transects, important features, etc.**

Are climatic/hydrologic conditions on the site typical for this time of year? **Yes**

Are vegetation, soil, or hydrology significantly disturbed? **No**

Are vegetation, soil, or hydrology naturally problematic? **No**

Are “normal circumstances” present? **Yes**

Is hydrophytic vegetation present? **Yes**

Is the sampled area within a wetland? **Yes**

Is hydric soils present? **Yes**

Is wetland hydrology present? **Yes**

Remarks:

**VEGETATION – Use scientific names of plants.**

<table>
<thead>
<tr>
<th>Tree Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2.</td>
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<tr>
<td>3.</td>
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<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total Cover =**

<table>
<thead>
<tr>
<th>Sapling/Shrub Stratum</th>
<th>Plot size: 5’ radius</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <em>Tamarix sp.</em></td>
<td></td>
<td>5</td>
<td>Y</td>
<td>FAC</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total Cover = 5**

<table>
<thead>
<tr>
<th>Herb Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Woody Vine</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total Cover =**

% bare ground in herb stratum: **100**

% cover of biotic crust:

---

**Dominance Test Worksheet:**

- Number of dominant species that are OBL, FACW, or FAC: **1 (A)**
- Total number of dominant species across all strata: **1 (B)**
- Percent of dominant species that are OBL, FACW, or FAC: **100 (A/B)**

**Prevalence Index Worksheet:**

- Total % Cover of OBL species: **x 1**
- Total % Cover of FACW species: **x 2**
- Total % Cover of FAC species: **x 3**
- Total % Cover of FACU species: **x 4**
- Total % Cover of UPL species: **x 5**

**Column Totals:**

- Prevalence Index = **B/A**

**Hydrophytic Vegetation Indicators:**

- X Dominance test is >50%
- Prevalence index is <3.0
- Morphological adaptations (Provide supporting data in Remarks or on a separate sheet.)
- Problematic hydrophytic vegetation (explain)

**Remarks:** Lots of *Tamarix* litter

---

**Remarks:** (If no, explain in Remarks.)

**Remarks:** (If needed, explain any answers in Remarks.)

---

**Remarks:**

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**Remarks:**

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**Remarks:**

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**Remarks:**

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**Remarks:**

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**Remarks:**

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**Remarks:**

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**Remarks:**

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**Remarks:**

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**Remarks:**

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**Remarks:**

---

**Remarks:**

---

**Remarks:**

---

**Remarks:**

---
SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>MATRIX</th>
<th>REDOX FEATURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth (inches)</td>
<td>Color (moist)</td>
</tr>
<tr>
<td>0-12 in</td>
<td>10 YR 4/2</td>
</tr>
</tbody>
</table>

1 Type: C= concentration, D=depletion, RM=reduced matrix, CS=covered or coated sand grains. 2 Location: PL=pore lining, M=matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

| Histosol | Sandy Redox (S5) | 1 cm Muck (A9) (LRR C) |
| Histic Epipedon (A2) | Stripped Matrix (S6) | 2 cm Muck (A10) (LRR B) |
| Black Histic (A3) | Loamy Mucky Mineral (F1) | Reduced Vertic (F18) |
| Hydrogen Sulfide (A4) | Loamy Gleyed Matrix (F2) | Red Parent Material (TF2) |
| Stratified Layers (A5) (LRR C) | X | Depleted Matrix (F3) |
| 1 cm Muck (A9) (LRR D) | Redox Dark Surface (F6) | Other (Explain in Remarks) |
| Depleted below Surface (A12) | Depleted Dark Surface (F7) | |
| Thick Dark Surface (A12) | Redox Depressions (F8) | |
| Sandy Mucky Mineral (S1) | Vernal Pools (F9) | |
| Sandy Gleyed Matrix (S4) | | |

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

<table>
<thead>
<tr>
<th>Primary Indicators (minimum of one required; check all that apply)</th>
<th>Secondary Indicators (two or more required)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water (A1)</td>
<td>Salt Crust (B11)</td>
</tr>
<tr>
<td>High Water Table (A2)</td>
<td>Biotic Crust (B12)</td>
</tr>
<tr>
<td>Saturation (A3)</td>
<td>Aquatic Invertebrates (B13)</td>
</tr>
<tr>
<td>Water Marks (B1) (Nonriverine)</td>
<td>Hydrogen Sulfide Odor (C1)</td>
</tr>
<tr>
<td>Sediment Deposits (B2) (Nonriverine)</td>
<td>Oxidized Rhizospheres along Living Roots (C3)</td>
</tr>
<tr>
<td>Drift Deposits (B3) (Nonriverine)</td>
<td>Presence of Reduced Iron (C4)</td>
</tr>
<tr>
<td>Surface Soil Cracks (B6)</td>
<td>Recent Iron Reduction in Tilled Soils (C6)</td>
</tr>
<tr>
<td>Inundation Visible on Aerial Imagery (B7)</td>
<td>Other (Explain in Remarks)</td>
</tr>
<tr>
<td>Water-Stained Leaves (B9)</td>
<td></td>
</tr>
</tbody>
</table>

Field Observations:

| Surface Water Present? | No | Depth (inches): |
| Water Table Present? | Yes | Depth (inches): 2 inches |
| Saturation Present? | Yes | Depth (inches): Surface |

Wetland Hydrology Present? Yes

Describe Recorded Data (stream, gauge, monitoring well, aerial photos, previous inspections) if available:

Remarks: Surface water pool with cattails about 10 ft away
**WETLAND DELINEATION FORM – Arid West Region**

**Project/Site:** Mohave Wetlands  
**City/County:** Needles/San Bernardino  
**State:** CA  
**Sampling Date:** 3/18/2015

**Applicant/Owner:** BOR  
**Section, Township, Range:** S1 T7N R23E

**Landform (hillslope, terrace, etc.):** Floodplain  
**Local Relief (concave, convex, none):** Convex  
**Slope (%):** 1

**Subregion (LRR):** D  
**UTM X:** -114.521617  
**UTM Y:** 34.734052  
**Datum:** NAD 83

**Investigator(s):** BT, MC

**Soil Map Unit Name:** Not mapped  
**NWI Classification:** Freshwater emergent

Are climatic/hydrologic conditions on the site typical for this time of year? Yes (If no, explain in Remarks.)

Are vegetation, soil, or hydrology significantly disturbed? No

Are “normal circumstances” present? Yes

Are vegetation, soil, or hydrology naturally problematic? No (If needed, explain any answers in Remarks.)

**SUMMARY OF FINDINGS – Attach map showing sampling point locations, transects, important features, etc.**

Is hydrophytic vegetation present? Yes

Is the sampled area within a wetland? No

Are hydric soils present? No

Are wetland hydrology present? No

**Remarks:**

### VEGETATION – Use scientific names of plants.

<table>
<thead>
<tr>
<th>Stratum</th>
<th>Plot size</th>
<th>Absolute % Cover</th>
<th>Dominant Species</th>
<th>Indicator Status</th>
<th>Dominance Test Worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tree Stratum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Number of dominant species that are OBL, FACW, or FAC: 1 (A)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total number of dominant species across all strata: 1 (B)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Percent of dominant species that are OBL, FACW, or FAC: 100 (A/B)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Plot size: 5' radius</th>
<th>Absolute % Cover</th>
<th>Dominant Species</th>
<th>Indicator Status</th>
<th>Prevalence Index Worksheet:</th>
</tr>
</thead>
</table>
1. **Tamarix sp.** | 50   | Y    | FAC  | Total % Cover of: Multiply by: |
2. **Pluchea sericea** | 5      | N    | FACW | OBL species x 1 |

<table>
<thead>
<tr>
<th>Column Totals:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevalence Index = B/A =</td>
</tr>
<tr>
<td>Hydrophytic Vegetation Indicators:</td>
</tr>
<tr>
<td>X Dominance test is &gt;50%</td>
</tr>
<tr>
<td>Prevalence index is &lt;3.0</td>
</tr>
<tr>
<td>Morphological adaptations (Provide supporting data in Remarks or on a separate sheet.)</td>
</tr>
<tr>
<td>Problematic hydrophytic vegetation (explain)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Woody Vine</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species</th>
<th>Indicator Status</th>
<th>Remarks: Covered with <em>Tamarix</em> litter</th>
</tr>
</thead>
</table>
1. **N/A** |          |                  |                  |                  |                                      |
2. |          |                  |                  |                  |                                      |

% bare ground in herb stratum: 100

% cover of biotic crust:
SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>Matrix</th>
<th>Redox Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth (inches)</td>
<td>Color (moist)</td>
</tr>
<tr>
<td>1. 0-1/2 in</td>
<td>-</td>
</tr>
<tr>
<td>2. ½-5 in</td>
<td>10 YR 5/4</td>
</tr>
<tr>
<td>3. 5-12 in</td>
<td>10 YR 4/4</td>
</tr>
</tbody>
</table>

1. Type: C= concentration, D=depletion, RM=reduced matrix, CS=covered or coated sand grains. Location: PL=pore lining, M=matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

| Histosol | Sandy Redox (S5) | 1 cm Muck (A9) (LRR C) |
| Histic Epipedon (A2) | Stripped Matrix (S6) | 2 cm Muck (A10) (LRR B) |
| Black Histic (A3) | Loamy Mucky Mineral (F1) | Reduced Vertic (F18) |
| Hydrogen Sulfide (A4) | Loamy Gleyed Matrix (F2) | Red Parent Material (TF2) |
| Stratified Layers (A5) (LRR C) | Depleted Matrix (F3) | Other (Explain in Remarks) |
| 1 cm Muck (A9) (LRR D) | Redox Dark Surface (F6) |
| Depleted below Surface (A12) | Depleted Dark Surface (F7) |
| Thick Dark Surface (A12) | Redox Depressions (F8) |
| Sandy Mucky Mineral (S1) | Vernal Pools (F9) |
| Sandy Gleyed Matrix (S4) |

Restrictive Layer (if present):

<table>
<thead>
<tr>
<th>Type</th>
<th>Depth (inches)</th>
<th>Hydric Soil Present?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No</td>
</tr>
</tbody>
</table>

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

<table>
<thead>
<tr>
<th>Primary Indicators (minimum of one required; check all that apply)</th>
<th>Secondary Indicators (two or more required)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water (A1)</td>
<td>Water Marks (B1) (Riverine)</td>
</tr>
<tr>
<td>High Water Table (A2)</td>
<td>Sediment Deposits (B2) (Riverine)</td>
</tr>
<tr>
<td>Saturation (A3)</td>
<td>Aquatic Invertebrates (B13)</td>
</tr>
<tr>
<td>Water Marks (B1) (Nonriverine)</td>
<td>Drift Deposits (B3) (Riverine)</td>
</tr>
<tr>
<td>Sediment Deposits (B2) (Nonriverine)</td>
<td>Drainage Patterns (B10)</td>
</tr>
<tr>
<td>Drift Deposits (B3) (Nonriverine)</td>
<td>Oxidized Rhizospheres along Living Roots (C3)</td>
</tr>
<tr>
<td>Surface Soil Cracks (B6)</td>
<td>Presence of Reduced Iron (C4)</td>
</tr>
<tr>
<td>Inundation Visible on Aerial Imagery (B7)</td>
<td>Crayfish burrows (C8)</td>
</tr>
<tr>
<td>Water-Stained Leaves (B9)</td>
<td>Saturation visible on Aerial Imagery (C9)</td>
</tr>
<tr>
<td></td>
<td>Shallow Aquitard (D3)</td>
</tr>
<tr>
<td></td>
<td>FAC-Neutral Test</td>
</tr>
</tbody>
</table>

Field Observations:

<table>
<thead>
<tr>
<th>Surface Water Present?</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Table Present?</td>
<td>No</td>
</tr>
<tr>
<td>Saturation Present?</td>
<td>No</td>
</tr>
</tbody>
</table>

Wetland Hydrology Present? No

Describe Recorded Data (stream, gauge, monitoring well, aerial photos, previous inspections) if available:

Remarks:
**WETLAND DELINEATION FORM – Arid West Region**

**Project/Site:** Mohave Wetlands  
**City/County:** Needles/San Bernardino  
**State:** CA  
**Sampling Date:** 3/18/2015  
**Applicant/Owner:** BOR  
**Sampling Point:** 24  
**Investigator(s):** BT, MC  
**Landform (hillslope, terrace, etc.):** Floodplain  
**Local Relief (concave, convex, none):** Concave  
**Subregion (LRR):** D  
**Datum:** NAD 83  
**Soil Map Unit Name:** Not mapped  
**NWI Classification:** Freshwater emergent  

**Are climatic/hydrologic conditions on the site typical for this time of year?** Yes (If no, explain in Remarks.)

**Are vegetation, soil, or hydrology significantly disturbed?** No

**Are “normal circumstances” present?** Yes

**Are vegetation, soil, or hydrology naturally problematic?** No (If needed, explain any answers in Remarks.)

**SUMMARY OF FINDINGS – Attach map showing sampling point locations, transects, important features, etc.**

**Is hydrophytic vegetation present?** Yes

**Are hydric soils present?** Yes

**Is wetland hydrology present?** Yes

**Remarks:**

**VEGETATION – Use scientific names of plants.**

<table>
<thead>
<tr>
<th>Tree Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th><strong>Dominance Test Worksheet:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Number of dominant species that are OBL, FACW, or FAC: 1 (A)</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total number of dominant species across all strata: 1 (B)</td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Percent of dominant species that are OBL, FACW, or FAC: 100 (A/B)</td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Prevalence Index Worksheet:</strong></td>
</tr>
<tr>
<td>Sapling/Shrub Stratum</td>
<td>Plot size: 5’ radius</td>
<td>Absolute % Cover</td>
<td>Dominant Species?</td>
<td>Indicator Status</td>
<td><strong>Prevalence Index Worksheet:</strong></td>
</tr>
<tr>
<td>1. Pluchea sericea</td>
<td>40</td>
<td>Y</td>
<td>FACW</td>
<td>Total % Cover of:</td>
<td>Multiply by:</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>OBL species x 1</td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FACW species x 2</td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FAC species x 3</td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FACU species x 4</td>
</tr>
<tr>
<td>6.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>UPL species x 5</td>
</tr>
</tbody>
</table>

**Herb Stratum**

<table>
<thead>
<tr>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Woody Vine**

<table>
<thead>
<tr>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**% bare ground in herb stratum:** 100

**% cover of biotic crust:**

**Remarks:** Lots of dead Pluchea stems and litter...
### SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>MATRIX</th>
<th>REDOX FEATURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth (inches)</td>
<td>Color (moist)</td>
</tr>
<tr>
<td>0-1/4 in</td>
<td>10 YR 5/2</td>
</tr>
<tr>
<td>1/4-15 in</td>
<td>10 YR 5/6</td>
</tr>
</tbody>
</table>

1. Type: C= concentration, D=depletion, RM=reduced matrix, CS=covered or coated sand grains. 2. Location: PL=pore lining, M=matrix.

### Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Type</th>
<th>Location</th>
<th>Texture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Histosol</td>
<td>X</td>
<td>Sandy Redox (S5)</td>
<td></td>
</tr>
<tr>
<td>Histic Epipedon (A2)</td>
<td></td>
<td>Stripped Matrix (S6)</td>
<td></td>
</tr>
<tr>
<td>Black Histic (A3)</td>
<td></td>
<td>Loamy Mucky Mineral (F1)</td>
<td>Reduced Vertic (F18)</td>
</tr>
<tr>
<td>Hydrogen Sulfide (A4)</td>
<td></td>
<td>Loamy Gleyed Matrix (F2)</td>
<td>Red Parent Material (TF2)</td>
</tr>
<tr>
<td>Stratified Layers (A5) (LRR C)</td>
<td></td>
<td>Depleted Matrix (F3)</td>
<td>Other (Explain in Remarks)</td>
</tr>
<tr>
<td>1 cm Muck (A9) (LRR D)</td>
<td></td>
<td>Redox Dark Surface (F6)</td>
<td></td>
</tr>
<tr>
<td>Depleted below Surface (A12)</td>
<td></td>
<td>Depleted Dark Surface (F7)</td>
<td></td>
</tr>
<tr>
<td>Thick Dark Surface (A12)</td>
<td></td>
<td>Redox Depressions (F8)</td>
<td></td>
</tr>
<tr>
<td>Sandy Mucky Mineral (S1)</td>
<td></td>
<td>Vernal Pools (F9)</td>
<td></td>
</tr>
<tr>
<td>Sandy Gleyed Matrix (S4)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Restrictive Layer (if present):**

Type: 
Depth (inches): 
Remarks: Hydric Soil Present? Yes

### HYDROLOGY

### Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply) | Secondary Indicators (two or more required)
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water (A1)</td>
<td>X Salt Crust (B11)</td>
</tr>
<tr>
<td>High Water Table (A2)</td>
<td>Biotic Crust (B12)</td>
</tr>
<tr>
<td>Saturation (A3)</td>
<td>Aquatic Invertebrates (B13)</td>
</tr>
<tr>
<td>Water Marks (B1) (Nonriverine)</td>
<td>Hydrogen Sulfide Odor (C1)</td>
</tr>
<tr>
<td>Sediment Deposits (B2) (Nonriverine)</td>
<td>Oxidized Rhizospheres along Living Roots (C3)</td>
</tr>
<tr>
<td>Drift Deposits (B3) (Nonriverine)</td>
<td>Presence of Reduced Iron (C4)</td>
</tr>
<tr>
<td>Surface Soil Cracks (B6)</td>
<td>Recent Iron Reduction in Tilled Soils (C6)</td>
</tr>
<tr>
<td>Inundation Visible on Aerial Imagery (B7)</td>
<td>Other (Explain in Remarks)</td>
</tr>
<tr>
<td>Water-Stained Leaves (B9)</td>
<td>X</td>
</tr>
</tbody>
</table>

### Field Observations:

Surface Water Present? No | Depth (inches): 
Water Table Present? No | Depth (inches): 
Saturation Present? No | Depth (inches): 
Wetland Hydrology Present? Yes

Describe Recorded Data (stream, gauge, monitoring well, aerial photos, previous inspections) if available:

Remarks: Minor salt crust
**WETLAND DELINEATION FORM – Arid West Region**

**Project/Site:** Mohave Wetlands

**City/County:** Needles/San Bernardino

**Applicant/Owner:** BOR

**State:** CA

**Investigator(s):** BT, MC

**Sampling Date:** 3/18/2015

**Landform (hillslope, terrace, etc.):** Slope

**Local Relief (concave, convex, none):** Convex

**Slope (%):** 2

**Subregion (LRR):** D

**Soil Map Unit Name:** Not mapped

**NWI Classification:** Upland

**Are climatic/hydrologic conditions on the site typical for this time of year?** Yes

((If no, explain in Remarks.)

**Are vegetation, soil, or hydrology significantly disturbed?** No

**Are “normal circumstances” present?** Yes

**Are vegetation, soil, or hydrology naturally problematic?** No

((If needed, explain any answers in Remarks.)

**SUMMARY OF FINDINGS – Attach map showing sampling point locations, transects, important features, etc.**

**Is hydrophytic vegetation present?** Yes

**Is the sampled area within a wetland?** No

**Are hydric soils present?** No

**Are wetland hydrology present?** No

**Remarks:**

**VEGETATION – Use scientific names of plants.**

<table>
<thead>
<tr>
<th>Tree Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Dominance Test Worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover =</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sapling/Shrub Stratum</th>
<th>Plot size: 5’ radius</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Prevalence Index Worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pluchea sericea</td>
<td></td>
<td>25</td>
<td>Y</td>
<td>FACW</td>
<td>Total % Cover of:</td>
</tr>
<tr>
<td>2. Tamarix sp.</td>
<td></td>
<td>2</td>
<td>N</td>
<td>FAC</td>
<td>Multiply by:</td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>OBL species x 1</td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FACW species x 2</td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FAC species x 3</td>
</tr>
<tr>
<td>Total Cover = 27</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Herb Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Hydrophytic Vegetation Indicators:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X Dominance test is &gt;50%</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover =</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Woody Vine</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Remarks:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover =</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

% bare ground in herb stratum: 0

% cover of biotic crust:
### Soil Profile Description

**Profile Description:** (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Color (moist)</th>
<th>%</th>
<th>Color (moist)</th>
<th>%</th>
<th>Type</th>
<th>Location</th>
<th>Texture</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 0-8 in</td>
<td>10 YR 6/4</td>
<td>100</td>
<td>10 YR 6/8</td>
<td>30</td>
<td>C</td>
<td>RC</td>
<td>Sand</td>
<td></td>
</tr>
<tr>
<td>2. 8-15 in</td>
<td>10 YR 6/4</td>
<td>70</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Type: C= concentration, D=depletion, RM=reduced matrix, CS=covered or coated sand grains.
2. Location: PL=pore lining, M=matrix.

### Hydric Soil Indicators

(Applicable to all LRRs, unless otherwise noted.)

- Histosol
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5) (LRR C)
- 1 cm Muck (A9) (LRR D)
- Depleted below Surface (A12)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- sandy Redox (S5)
- Stripped Matrix (S6)
- Loamy Mucky Mineral (F1)
- Loamy Gleyed Matrix (F2)
- Reduced Vertic (F18)
- Red Parent Material (TF2)
- Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

- Type:
- Depth (inches):

**Hydric Soil Present?** No

**Restrictions:**

Marginal

### Hydrology

**Wetland Hydrology Indicators:**

<table>
<thead>
<tr>
<th>Primary Indicators (minimum of one required; check all that apply)</th>
<th>Secondary Indicators (two or more required)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water (A1)</td>
<td>Salt Crust (B11)</td>
</tr>
<tr>
<td>High Water Table (A2)</td>
<td>Biotic Crust (B12)</td>
</tr>
<tr>
<td>Saturation (A3)</td>
<td>Aquatic Invertebrates (B13)</td>
</tr>
<tr>
<td>Water Marks (B1) (Nonriverine)</td>
<td>Hydrogen Sulfide Odor (C1)</td>
</tr>
<tr>
<td>Sediment Deposits (B2) (Nonriverine)</td>
<td>Oxidized Rhizospheres along Living Roots (C3)</td>
</tr>
<tr>
<td>Drift Deposits (B3) (Nonriverine)</td>
<td>Presence of Reduced Iron (C4)</td>
</tr>
<tr>
<td>Surface Soil Cracks (B6)</td>
<td>Recent Iron Reduction in Tilled Soils (C6)</td>
</tr>
<tr>
<td>Inundation Visible on Aerial Imagery (B7)</td>
<td>Other (Explain in Remarks)</td>
</tr>
<tr>
<td>Water-Stained Leaves (B9)</td>
<td></td>
</tr>
<tr>
<td>Water Marks (B1) (Riverine)</td>
<td>Water Marks (B1) (Riverine)</td>
</tr>
<tr>
<td>Sediment Deposits (B2) (Riverine)</td>
<td>Sediment Deposits (B2) (Riverine)</td>
</tr>
<tr>
<td>Drift Deposits (B3) (Riverine)</td>
<td>Drift Deposits (B3) (Riverine)</td>
</tr>
<tr>
<td>Drainage Patterns (B10)</td>
<td>Drainage Patterns (B10)</td>
</tr>
<tr>
<td>Dry-Season Water Table (C2)</td>
<td></td>
</tr>
<tr>
<td>Oxidized Rhizospheres along Living Roots (C3)</td>
<td></td>
</tr>
<tr>
<td>Recent Iron Reduction in Tilled Soils (C6)</td>
<td></td>
</tr>
<tr>
<td>Other (Explain in Remarks)</td>
<td></td>
</tr>
<tr>
<td>Shallow Aquitard (D3)</td>
<td></td>
</tr>
<tr>
<td>FAC-Neutral Test</td>
<td></td>
</tr>
</tbody>
</table>

**Field Observations:**

- **Surface Water Present?** No
- **Water Table Present?** No
- **Saturation Present?** No

**Wetland Hydrology Present?** No

**Describe Recorded Data (stream, gauge, monitoring well, aerial photos, previous inspections) if available:**

**Remarks:**
**WETLAND DELINEATION FORM – Arid West Region**

<table>
<thead>
<tr>
<th>Project/Site:</th>
<th>Mohave Wetlands</th>
</tr>
</thead>
<tbody>
<tr>
<td>City/County:</td>
<td>Needles/San Bernardino</td>
</tr>
<tr>
<td>Sampling Date:</td>
<td>3/18/2015</td>
</tr>
<tr>
<td>Applicant/Owner:</td>
<td>BOR</td>
</tr>
<tr>
<td>State:</td>
<td>CA</td>
</tr>
<tr>
<td>Sampling Point:</td>
<td>26</td>
</tr>
<tr>
<td>Investigator(s):</td>
<td>BT, MC</td>
</tr>
<tr>
<td>Landform (hillslope, etc.):</td>
<td>Basin/depression</td>
</tr>
<tr>
<td>Local Relief:</td>
<td>Concave</td>
</tr>
<tr>
<td>Slope (%):</td>
<td>0</td>
</tr>
<tr>
<td>Subregion (LRR):</td>
<td>D</td>
</tr>
<tr>
<td>UTM X:</td>
<td>-114.525432</td>
</tr>
<tr>
<td>UTM Y:</td>
<td>34.736264</td>
</tr>
<tr>
<td>Datum:</td>
<td>NAD 83</td>
</tr>
<tr>
<td>Soil Map Unit Name:</td>
<td>Not mapped</td>
</tr>
<tr>
<td>NWI Classification:</td>
<td>Upland</td>
</tr>
</tbody>
</table>

**SUMMARY OF FINDINGS – Attach map showing sampling point locations, transects, important features, etc.**

Is hydrophytic vegetation present? Yes
Are hydric soils present? Yes
Is wetland hydrology present? Yes

**Remarks:** OHV have significantly disturbed this area, it was considered a wetland because it clearly contains standing water for significant prolonged periods based on hydrology indicators.

**VEGETATION – Use scientific names of plants.**

<table>
<thead>
<tr>
<th>Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Dominance Test Worksheet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tree Stratum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
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<tr>
<td>3.</td>
<td></td>
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<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover =</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sapling/Shrub</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover =</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Herb Stratum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
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<td></td>
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<tr>
<td>3.</td>
<td></td>
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<tr>
<td>4.</td>
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<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover =</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Woody Vine</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover =</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

% bare ground in herb stratum: 100
% cover of biotic crust:

*Hydrophytic vegetation indicators:*
- Dominance test is >50%
- Prevalence index is <3.0¹
- Morphological adaptations¹ (Provide supporting data in Remarks or on a separate sheet.)
- X Problematic hydrophytic vegetation¹ (explain)

¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Remarks:** OHV use is extreme enough to kill all veg & prevent new veg colonization – without disturbance would likely be *Tamarix* dominated.
### SOIL

#### Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>MATRIX</th>
<th>REDOX FEATURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth (inches)</td>
<td>Color (moist)</td>
</tr>
<tr>
<td>1. 0-2 in</td>
<td>10 YR 6/3</td>
</tr>
<tr>
<td>2. 2-15 in</td>
<td>10 YR 5/3</td>
</tr>
</tbody>
</table>

1. **Type:** C = concentration, D = depletion, RM = reduced matrix, CS = covered or coated sand grains.

2. **Location:** PL = pore lining, M = matrix.

#### Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

<table>
<thead>
<tr>
<th>Type</th>
<th>Location</th>
<th>Texture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Histosol</td>
<td>Sandy Redox (S5)</td>
<td></td>
</tr>
<tr>
<td>Histic Epipedon (A2)</td>
<td>Stripped Matrix (S6)</td>
<td></td>
</tr>
<tr>
<td>Black Historic (A3)</td>
<td>Loamy Mucky Mineral (F1)</td>
<td></td>
</tr>
<tr>
<td>Hydrogen Sulfide (A4)</td>
<td>Loamy Gleyed Matrix (F2)</td>
<td></td>
</tr>
<tr>
<td>Stratified Layers (A5) (LRR C)</td>
<td>Depleted Matrix (F3)</td>
<td></td>
</tr>
<tr>
<td>1 cm Muck (A9) (LRR D)</td>
<td>Redox Dark Surface (F6)</td>
<td></td>
</tr>
<tr>
<td>Depleted below Surface (A12)</td>
<td>Depleted Dark Surface (F7)</td>
<td></td>
</tr>
<tr>
<td>Thick Dark Surface (A12)</td>
<td>Redox Depressions (F8)</td>
<td></td>
</tr>
<tr>
<td>Sandy Mucky Mineral (S1)</td>
<td>Vernal Pools (F9)</td>
<td></td>
</tr>
<tr>
<td>Sandy Gleyed Matrix (S4)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Restrictive Layer (if present):

<table>
<thead>
<tr>
<th>Type</th>
<th>Depth (inches)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>OHV have mixed the soil profile and created significantly disturbed conditions that are likely preventing hydric soil indicators.</td>
</tr>
</tbody>
</table>

#### HYDROLOGY

#### Wetland Hydrology Indicators:

<table>
<thead>
<tr>
<th>Primary Indicators (minimum of one required; check all that apply)</th>
<th>Secondary Indicators (two or more required)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water (A1)</td>
<td>Salt Crust (B11)</td>
</tr>
<tr>
<td>High Water Table (A2)</td>
<td>Biotic Crust (B12)</td>
</tr>
<tr>
<td>Saturation (A3)</td>
<td>Aquatic Invertebrates (B13)</td>
</tr>
<tr>
<td>Water Marks (B1) (Nonriverine)</td>
<td>Hydrogen Sulfide Odor (C1)</td>
</tr>
<tr>
<td>Sediment Deposits (B2) (Nonriverine)</td>
<td>Oxidized Rhizospheres along Living Roots (C3)</td>
</tr>
<tr>
<td>Drift Deposits (B3) (Nonriverine)</td>
<td>Presence of Reduced Iron (C4)</td>
</tr>
<tr>
<td>X Surface Soil Cracks (B6)</td>
<td>Recent Iron Reduction in Tilled Soils (C6)</td>
</tr>
<tr>
<td>Inundation Visible on Aerial Imagery (B7)</td>
<td>Other (Explain in Remarks)</td>
</tr>
<tr>
<td>Water-Stained Leaves (B9)</td>
<td></td>
</tr>
</tbody>
</table>

#### Field Observations:

| Surface Water Present? | No | Depth (inches): |
| Water Table Present? | No | Depth (inches): |
| Saturation Present? | No | Depth (inches): |

#### Wetland Hydrology Present? Yes

#### Describe Recorded Data (stream, gauge, monitoring well, aerial photos, previous inspections) if available:

**Remarks:** Clearly floods at some point – OHV tracks clearly indicate mud, salt has wicked up a line of wooden fence posts
WETLAND DELINEATION FORM – Arid West Region

Project/Site: Mohave Wetlands
City/County: Needles/San Bernardino
Sampling Date: 3/18/2015
Applicant/Owner: BOR
State: CA
Sampling Point: 27
Investigator(s): BT, MC
Section, Township, Range: S1 T7N R23E
Landform (hillslope, terrace, etc.): Floodplain
Local Relief (concave, convex, none): Concave
Slope (%): 1
Subregion (LRR): D
UTM X: -114,520286
UTM Y: 34.732271
Datum: NAD 83
Soil Map Unit Name: Not mapped
NWI Classification: Freshwater emergent

Are climatic/hydrologic conditions on the site typical for this time of year? Yes
(If no, explain in Remarks.)
Are vegetation, soil, or hydrology significantly disturbed? No
Are “normal circumstances” present? Yes
Are vegetation, soil, or hydrology naturally problematic? No
(If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach map showing sampling point locations, transects, important features, etc.

Is hydrophytic vegetation present? Yes
Is the sampled area within a wetland? Yes
Are hydric soils present? Yes
Are wetland hydrology present? Yes
Remarks: Marginal soils and hydrology but the soil did exhibit significant redox features and the area appears to hold standing water for prolonged periods.

VEGETATION – Use scientific names of plants.

Tree Stratum Plot size: Absolute % Cover Dominant Species? Indicator Status
1. N/A
2.
3.
4.
Total Cover =

Sapling/Shrub Stratum Plot size: Absolute % Cover Dominant Species? Indicator Status
1. Pluchea sericea
2.
3.
4.
5.
Total Cover = 5

Herb Stratum Plot size: Absolute % Cover Dominant Species? Indicator Status
1. N/A
2.
3.
4.
5.
6.
7.
8.
Total Cover =

Woody Vine Plot size: Absolute % Cover Dominant Species? Indicator Status
1. N/A
2.
Total Cover =

% bare ground in herb stratum: 100

Hydrophytic vegetation present? Yes
Remarks:

Hydrophytic vegetation indicators:
Dominance Test Worksheet:

Prevalence Index Worksheet:

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
SOIL
Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>DEPTH (inches)</th>
<th>Color (moist)</th>
<th>%</th>
<th>Color (moist)</th>
<th>%</th>
<th>Type</th>
<th>Location</th>
<th>Texture</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1/4 in</td>
<td>10 YR 4/3</td>
<td>100</td>
<td>10 YR 6/8</td>
<td>25</td>
<td>C</td>
<td>M</td>
<td>Sand</td>
<td>Very moist</td>
</tr>
<tr>
<td>3-16 in</td>
<td>10 YR 5/3</td>
<td>75</td>
<td>10 YR 6/8</td>
<td>25</td>
<td>C</td>
<td>M</td>
<td>Sand</td>
<td>Very moist</td>
</tr>
</tbody>
</table>

1. Type: C= concentration, D=depletion, RM=reduced matrix, CS=covered or coated sand grains. 2. Location: PL=pore lining, M=matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Cross Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Histosol</td>
<td>X Sandy Redox (S5)</td>
</tr>
<tr>
<td>Histic Epipedon (A2)</td>
<td>Stripped Matrix (S6)</td>
</tr>
<tr>
<td>Black Histic (A3)</td>
<td>Loamy Mucky Mineral (F1)</td>
</tr>
<tr>
<td>Hydrogen Sulfide (A4)</td>
<td>Loamy Gleyed Matrix (F2)</td>
</tr>
<tr>
<td>Stratified Layers (A5) (LRR C)</td>
<td>Depleted Matrix (F3)</td>
</tr>
<tr>
<td>1 cm Muck (A9) (LRR D)</td>
<td>Redox Dark Surface (F6)</td>
</tr>
<tr>
<td>Depleted below Surface (A12)</td>
<td>Depleted Dark Surface (F7)</td>
</tr>
<tr>
<td>Thick Dark Surface (A12)</td>
<td>Redox Depressions (F8)</td>
</tr>
<tr>
<td>Sandy Mucky Mineral (S1)</td>
<td>Vernal Pools (F9)</td>
</tr>
<tr>
<td>Sandy Gleyed Matrix (S4)</td>
<td></td>
</tr>
</tbody>
</table>

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present): Type: Depth (inches): Hydric Soil Present? Yes

Remarks: Marginal hydric soils but there are prominent redox features, base chroma color may be affected by saline soils.

HYDROLOGY
Wetland Hydrology Indicators:

<table>
<thead>
<tr>
<th>Primary Indicators (minimum of one required; check all that apply)</th>
<th>Secondary Indicators (two or more required)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water (A1)</td>
<td>Water Marks (B1) (Riverine)</td>
</tr>
<tr>
<td>High Water Table (A2)</td>
<td>Sediment Deposits (B2) (Riverine)</td>
</tr>
<tr>
<td>Saturation (A3)</td>
<td>Aquatic Invertebrates (B13)</td>
</tr>
<tr>
<td>Water Marks (B1) (Nonriverine)</td>
<td>Drift Deposits (B3) (Riverine)</td>
</tr>
<tr>
<td>Sediment Deposits (B2) (Nonriverine)</td>
<td>Drainage Patterns (B10)</td>
</tr>
<tr>
<td>Drift Deposits (B3) (Nonriverine)</td>
<td>Oxidized Rhizospheres along Living Roots (C3)</td>
</tr>
<tr>
<td>X Surface Soil Cracks (B6)</td>
<td>Presence of Reduced Iron (C4)</td>
</tr>
<tr>
<td>Inundation Visible on Aerial Imagery (B7)</td>
<td>Recent Iron Reduction in Tilled Soils (C6)</td>
</tr>
<tr>
<td>Water-Stained Leaves (B9)</td>
<td>Saturation visible on Aerial Imagery (C9)</td>
</tr>
<tr>
<td></td>
<td>Shallow Aquitard (D3)</td>
</tr>
<tr>
<td></td>
<td>FAC-Neutral Test</td>
</tr>
</tbody>
</table>

Field Observations:

<table>
<thead>
<tr>
<th>Surface Water Present?</th>
<th>No</th>
<th>Depth (inches):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Table Present?</td>
<td>No</td>
<td>Depth (inches):</td>
</tr>
<tr>
<td>Saturation Present?</td>
<td>No</td>
<td>Depth (inches):</td>
</tr>
</tbody>
</table>

Wetland Hydrology Present? Yes

Describe Recorded Data (stream, gauge, monitoring well, aerial photos, previous inspections) if available:

Remarks: Soil is very close to saturated at 20 in.
### WETLAND DELINEATION FORM – Arid West Region

**Project/Site:** Mohave Wetlands  
**Applicant/Owner:** BOR  
**Investigator(s):** BT, MC  
**Landform (hillslope, terrace, etc.):** Slope  
**Subregion (LRR):** D  
**Soil Map Unit Name:** Not mapped  

**Sampling Date:** 3/18/2015  
**City/County:** Needles/San Bernardino  
**State:** CA  
**Section, Township, Range:** S1 T7N R23E  
**Local Relief (concave, convex, none):** Convex  
**Datum:** NAD 83  

### Are climatic/hydrologic conditions on the site typical for this time of year?  
Yes (If no, explain in Remarks.)

### Are vegetation, soil, or hydrology significantly disturbed?  
No

### Are “normal circumstances” present?  
Yes

### Are vegetation, soil, or hydrology naturally problematic?  
No (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach map showing sampling point locations, transects, important features, etc.

| Is hydrophytic vegetation present? | Yes |  
| Are hydric soils present? | No |  
| Is wetland hydrology present? | No |  
| Is the sampled area within a wetland? | No |  

### Remarks:

#### VEGETATION – Use scientific names of plants.

<table>
<thead>
<tr>
<th>Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Dominance Test Worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tree</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Number of dominant species that are OBL, FACW, or FAC: 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total number of dominant species across all strata: 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Percent of dominant species that are OBL, FACW, or FAC: 100</td>
</tr>
</tbody>
</table>

#### Prevalence Index Worksheet:

<table>
<thead>
<tr>
<th>Total % Cover of:</th>
<th>Multiply by:</th>
</tr>
</thead>
<tbody>
<tr>
<td>OBL species</td>
<td>x 1</td>
</tr>
<tr>
<td>FACW species</td>
<td>x 2</td>
</tr>
<tr>
<td>FAC species</td>
<td>x 3</td>
</tr>
<tr>
<td>FACU species</td>
<td>x 4</td>
</tr>
<tr>
<td>UPL species</td>
<td>x 5</td>
</tr>
</tbody>
</table>

#### Total Cover =

#### Hydrophytic Vegetation Indicators:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>X Dominance test is &gt;50%</td>
<td></td>
</tr>
<tr>
<td>Prevalence index is &lt;3.0</td>
<td></td>
</tr>
<tr>
<td>Morphological adaptations (Provide supporting data in Remarks or on a separate sheet.)</td>
<td></td>
</tr>
<tr>
<td>Problematic hydrophytic vegetation (explain)</td>
<td></td>
</tr>
</tbody>
</table>

#### Remarks:

<table>
<thead>
<tr>
<th>Woody Vine</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Hydrophytic vegetation present?</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### % bare ground in herb stratum: 100

#### % cover of biotic crust:
### SOIL

#### Profile Description:
(Describe to the depth needed to document the indicator or confirm the absence of indicators.)

#### MATRIX

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Color (moist)</th>
<th>%</th>
<th>Color (moist)</th>
<th>%</th>
<th>Type</th>
<th>Location</th>
<th>Texture</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 0-10 in</td>
<td>10 YR 6/6</td>
<td>100</td>
<td>10 YR 5/8</td>
<td>20</td>
<td>C</td>
<td>M</td>
<td>Sand</td>
<td>Moist at 6 in</td>
</tr>
<tr>
<td>2. 10-16 in</td>
<td>10 YR 6/6</td>
<td>80</td>
<td>10 YR 5/8</td>
<td>20</td>
<td>C</td>
<td>M</td>
<td>Sand</td>
<td>Moist at 6 in</td>
</tr>
</tbody>
</table>

1. Type: C= concentration, D=depletion, RM=reduced matrix, CS=covered or coated sand grains. 2. Location: PL=pore lining, M=matrix.

#### Hydric Soil Indicators:
(Applicable to all LRRs, unless otherwise noted.)

- **Histosol**
- **Sandy Redox (S5)**
- **1 cm Muck (A9) (LRR C)**
- **Histic Epipedon (A2)**
- **Stripped Matrix (S6)**
- **2 cm Muck (A10) (LRR B)**
- **Black Historic (A3)**
- **Loamy Mucky Mineral (F1)**
- **Reduced Vertic (F18)**
- **Hydrogen Sulfide (A4)**
- **Loamy Gleyed Matrix (F2)**
- **Red Parent Material (TF2)**
- **Stratified Layers (A5) (LRR C)**
- **Depleted Matrix (F3)**
- **Other (Explain in Remarks)**
- **1 cm Muck (A9) (LRR D)**
- **Redox Dark Surface (F6)**
- **Depleted below Surface (A12)**
- **Depleted Dark Surface (F7)**
- **Thick Dark Surface (A12)**
- **Redox Depressions (F8)**
- **Sandy Mucky Mineral (S1)**
- **Vernal Pools (F9)**
- **Sandy Gleyed Matrix (S4)**

#### Restrictive Layer (if present):
- **Type:**
- **Depth (inches):**
- **Remarks:**

#### HYDROLOGY

#### Wetland Hydrology Indicators:

**Primary Indicators** (minimum of one required; check all that apply)

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1) (Nonriverine)
- Sediment Deposits (B2) (Nonriverine)
- Drift Deposits (B3) (Nonriverine)
- Surface Soil Cracks (B6)
- Inundation Visible on Aerial Imagery (B7)
- Water-Stained Leaves (B9)
- Salt Crust (B11)
- Biotic Crust (B12)
- Aquatic Invertebrates (B13)
- Oxygenated Rhizospheres along Living Roots (C3)
- Oxidized Rhizospheres along Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Other (Explain in Remarks)
- Water Marks (B1) (Riverine)
- Sediment Deposits (B2) (Riverine)
- Drift Deposits (B3) (Riverine)
- Drainage Patterns (B10)
- Dry-Season Water Table (C2)
- Shallow Aquitard (D3)
- FAC-Neutral Test

**Secondary Indicators** (two or more required)

- Water Marks (B1) (Riverine)
- Sediment Deposits (B2) (Riverine)
- Drift Deposits (B3) (Riverine)
- Drainage Patterns (B10)
- Dry-Season Water Table (C2)
- Shallow Aquitard (D3)
- FAC-Neutral Test

#### Field Observations:

- **Surface Water Present?** No
- **Depth (inches):**
- **Water Table Present?** No
- **Depth (inches):**
- **Saturation Present?** No
- **Depth (inches):**

**Wetland Hydrology Present?** No

**Describe Recorded Data** (stream, gauge, monitoring well, aerial photos, previous inspections) if available:

**Remarks:**
**WETLAND DELINEATION FORM – Arid West Region**

**Project/Site:** Mohave Wetlands  
**City/County:** Needles/San Bernardino  
**Applicant/Owner:** BOR  
**State:** CA  
**Investigator(s):** BT, MC  
**Landform (hillslope, terrace, etc.):** Floodplain  
**Local Relief (concave, convex, none):** Concave  
**Sampling Date:** 3/18/2015  
**Subregion (LRR):** D  
**Soil Map Unit Name:** Not mapped  
**NWI Classification:** Freshwater emergent

---

### SUMMARY OF FINDINGS – Attach map showing sampling point locations, transects, important features, etc.

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are climatic/hydrologic conditions on the site typical for this time of year?</td>
<td>Yes</td>
</tr>
<tr>
<td>Are vegetation, soil, or hydrology significantly disturbed?</td>
<td>No</td>
</tr>
<tr>
<td>Are “normal circumstances” present?</td>
<td>Yes</td>
</tr>
<tr>
<td>Are vegetation, soil, or hydrology naturally problematic?</td>
<td>No</td>
</tr>
</tbody>
</table>

---

### VEGETATION – Use scientific names of plants.

<table>
<thead>
<tr>
<th>Stratum</th>
<th>Plot size</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tree Stratum</td>
<td>Absolute % Cover</td>
<td>Dominant Species?</td>
<td>Indicator Status</td>
<td></td>
</tr>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sapling/Shrub Stratum</td>
<td>Plot size: 5’ radius</td>
<td>Absolute % Cover</td>
<td>Dominant Species?</td>
<td>Indicator Status</td>
</tr>
<tr>
<td>1. Pluchea sericea</td>
<td>30</td>
<td>Y</td>
<td>FACW</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Herb Stratum</td>
<td>Plot size:</td>
<td>Absolute % Cover</td>
<td>Dominant Species?</td>
<td>Indicator Status</td>
</tr>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

### Dominance Test Worksheet:

- Number of dominant species that are OBL, FACW, or FAC: 1 (A)
- Total number of dominant species across all strata: 1 (B)
- Percent of dominant species that are OBL, FACW, or FAC: 100 (A/B)

### Prevalence Index Worksheet:

- Total % Cover of:
  - OBL species x 1
  - FACW species x 2
  - FAC species x 3
  - FACU species x 4
  - UPL species x 5
- Column Totals:
  - Prevalence Index = B/A

### Hydrophytic Vegetation Indicators:

- X Dominance test is >50%
- Prevalence index is <3.0
- Morphological adaptations (Provide supporting data in Remarks or on a separate sheet.)
- Problematic hydrophytic vegetation
- Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

---

**Remarks:**

- Are hydrophytic vegetation present? Yes
- Are wetland hydrology present? No
- Is the sampled area within a wetland? No
- Is hydrophytic vegetation present? Yes
- Are hydric soils present? No
- % bare ground in herb stratum: 100
- % cover of biotic crust:
SOIL
Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>MATRIX</th>
<th>REDOX FEATURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth (inches)</td>
<td>Color (moist)</td>
</tr>
<tr>
<td>0-16 in</td>
<td>10 YR 6/4</td>
</tr>
<tr>
<td>2.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td></td>
</tr>
</tbody>
</table>

1 Type: C= concentration, D=depletion, RM=reduced matrix, CS=covered or coated sand grains. 2 Location: PL=pore lining, M=matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Histosol</td>
<td>Sandy Redox (S5)</td>
</tr>
<tr>
<td>Histic Epipedon (A2)</td>
<td>Stripped Matrix (S6)</td>
</tr>
<tr>
<td>Black Histic (A3)</td>
<td>Loamy Mucky Mineral (F1)</td>
</tr>
<tr>
<td>Hydrogen Sulfide (A4)</td>
<td>Loamy Gleyed Matrix (F2)</td>
</tr>
<tr>
<td>Stratified Layers (A5) (LRR C)</td>
<td>Depleted Matrix (F3)</td>
</tr>
<tr>
<td>1 cm Muck (A9) (LRR D)</td>
<td>Redox Dark Surface (F6)</td>
</tr>
<tr>
<td>Depleted below Surface (A12)</td>
<td>Depleted Dark Surface (F7)</td>
</tr>
<tr>
<td>Thick Dark Surface (A12)</td>
<td>Redox Depressions (F8)</td>
</tr>
<tr>
<td>Sandy Mucky Mineral (S1)</td>
<td>Vernal Pools (F9)</td>
</tr>
<tr>
<td>Sandy Gleyed Matrix (S4)</td>
<td></td>
</tr>
</tbody>
</table>

Restrictive Layer (if present):

Type:
Depth (inches):

Hydric Soil Present? No

Remarks:

HYDROLOGY
Wetland Hydrology Indicators:

<table>
<thead>
<tr>
<th>Primary Indicators (minimum of one required; check all that apply)</th>
<th>Secondary Indicators (two or more required)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water (A1)</td>
<td>Salt Crust (B11)</td>
</tr>
<tr>
<td>High Water Table (A2)</td>
<td>Biotic Crust (B12)</td>
</tr>
<tr>
<td>Saturation (A3)</td>
<td>Aquatic Invertebrates (B13)</td>
</tr>
<tr>
<td>Water Marks (B1) (Nonriverine)</td>
<td>Hydrogen Sulfide Odor (C1)</td>
</tr>
<tr>
<td>Sediment Deposits (B2) (Nonriverine)</td>
<td>Oxidized Rhizospheres along Living Roots (C3)</td>
</tr>
<tr>
<td>Drift Deposits (B3) (Nonriverine)</td>
<td>Presence of Reduced Iron (C4)</td>
</tr>
<tr>
<td>Surface Soil Cracks (B6)</td>
<td>Recent Iron Reduction in Tilled Soils (C6)</td>
</tr>
<tr>
<td>Inundation Visible on Aerial Imagery (B7)</td>
<td>Other (Explain in Remarks)</td>
</tr>
<tr>
<td>Water-Stained Leaves (B9)</td>
<td>FAC-Neutral Test</td>
</tr>
</tbody>
</table>

Field Observations:

Surface Water Present? No Depth (inches): 
Water Table Present? No Depth (inches): 
Saturation Present? No Depth (inches): 

Wetland Hydrology Present? No

Describe Recorded Data (stream, gauge, monitoring well, aerial photos, previous inspections) if available:

Remarks:
## WETLAND DELINEATION FORM – Arid West Region

**Project/Site:** Mohave Wetlands  
**City/County:** Needles/San Bernardino  
**State:** CA  
**Sampling Date:** 3/19/2015  
**Applicant/Owner:** BOR  
**Section, Township, Range:** S1 T7N R23E  
**Investigator(s):** BT, MC  
**Landform (hillslope, terrace, etc.):** Slope  
**Local Relief (concave, convex, none):** Convex  
**Subregion (LRR):** D  
**Soil Map Unit Name:** Not mapped  
**NWI Classification:** Upland  
**Datum:** NAD 83

### SUMMARY OF FINDINGS – Attach map showing sampling point locations, transects, important features, etc.

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is hydrophytic vegetation present?</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Are hydric soils present?</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Is wetland hydrology present?</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

**Is the sampled area within a wetland?** No

**Remarks:**

### VEGETATION – Use scientific names of plants.

<table>
<thead>
<tr>
<th>Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Prevalence Index Worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tree Stratum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. N/A</td>
<td></td>
<td>100</td>
<td>Y</td>
<td>FACW</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td>100</td>
<td>Y</td>
<td>FACW</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td>100</td>
<td>Y</td>
<td>FACW</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td>100</td>
<td>Y</td>
<td>FACW</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td>100</td>
<td>Y</td>
<td>FACW</td>
<td></td>
</tr>
<tr>
<td>Total Cover =</td>
<td></td>
<td>500</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sapling/Shrub Stratum</th>
<th>Plot size: 5' radius</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Prevalence Index Worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pluchea sericea</td>
<td>80</td>
<td>Y</td>
<td>FACW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>30</td>
<td>Y</td>
<td>FACW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>20</td>
<td>Y</td>
<td>FACW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>10</td>
<td>Y</td>
<td>FACW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>5</td>
<td>Y</td>
<td>FACW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover = 80</td>
<td></td>
<td>500</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Herb Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Hydrophytic Vegetation Indicators:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td>100</td>
<td>Y</td>
<td></td>
<td></td>
<td>X Dominance test is &gt;50%</td>
</tr>
<tr>
<td>2.</td>
<td>30</td>
<td>Y</td>
<td></td>
<td></td>
<td>Prevalence index is &lt;3.0&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>3.</td>
<td>20</td>
<td>Y</td>
<td></td>
<td></td>
<td>Morphological adaptations&lt;sup&gt;2&lt;/sup&gt; (Provide supporting data in Remarks or on a separate sheet.)</td>
</tr>
<tr>
<td>4.</td>
<td>10</td>
<td>Y</td>
<td></td>
<td></td>
<td>Problematic hydrophytic vegetation&lt;sup&gt;3&lt;/sup&gt; (explain)</td>
</tr>
<tr>
<td>5.</td>
<td>5</td>
<td>Y</td>
<td></td>
<td></td>
<td>Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.</td>
</tr>
<tr>
<td>Total Cover =</td>
<td>500</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Woody Vine</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Hydrophytic vegetation present?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td>100</td>
<td>Y</td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>2.</td>
<td>30</td>
<td>Y</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Remarks:**

% bare ground in herb stratum: 100
% cover of biotic crust:
**SOIL**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Color (moist)</th>
<th>%</th>
<th>Color (moist)</th>
<th>%</th>
<th>Type</th>
<th>Location</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 0-1</td>
<td>10 YR 4/4</td>
<td>100</td>
<td>10 YR 5/6</td>
<td>5</td>
<td>C</td>
<td>M</td>
<td>Sandy loam moist</td>
</tr>
<tr>
<td>2. 1-3</td>
<td>10 YR 5/3</td>
<td>95</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. 3-16 in</td>
<td>10 YR 5/6</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Type: C= concentration, D=depletion, RM=reduced matrix, CS=covered or coated sand grains. Location: PL=pore lining, M=matrix.

**Hydric Soil Indicators:** (Applicable to all LRRs, unless otherwise noted.)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Matrix Description</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Histosol</td>
<td>Sandy Redox (S5)</td>
<td>1 cm Muck (A9) (LRR C)</td>
</tr>
<tr>
<td>Histic Epipedon (A2)</td>
<td>Stripped Matrix (S6)</td>
<td>2 cm Muck (A10) (LRR B)</td>
</tr>
<tr>
<td>Black Histic (A3)</td>
<td>Loamy Mucky Mineral (F1)</td>
<td>Reduced Vertic (F18)</td>
</tr>
<tr>
<td>Hydrogen Sulfide (A4)</td>
<td>Loamy Gleyed Matrix (F2)</td>
<td>Red Parent Material (TF2)</td>
</tr>
<tr>
<td>Stratified Layers (A5) (LRR C)</td>
<td>Depleted Matrix (F3)</td>
<td>Other (Explain in Remarks)</td>
</tr>
<tr>
<td>1 cm Muck (A9) (LRR D)</td>
<td>Redox Dark Surface (F6)</td>
<td></td>
</tr>
<tr>
<td>Depleted below Surface (A12)</td>
<td>Redox Dark Surface (F7)</td>
<td></td>
</tr>
<tr>
<td>Thick Dark Surface (A12)</td>
<td>Redox Depressions (F8)</td>
<td></td>
</tr>
<tr>
<td>Sandy Mucky Mineral (S1)</td>
<td>Vernal Pools (F9)</td>
<td></td>
</tr>
<tr>
<td>Sandy Gleyed Matrix (S4)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Restrictive Layer (if present):**

Type: 

Depth (inches): Hydric Soil Present? No

Remarks: Close to hydric on redox features but no wetland hydrology indicators.

**HYDROLOGY**

**Wetland Hydrology Indicators:**

<table>
<thead>
<tr>
<th>Primary Indicators (minimum of one required; check all that apply)</th>
<th>Secondary Indicators (two or more required)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water (A1)</td>
<td>Salt Crust (B11)</td>
</tr>
<tr>
<td>High Water Table (A2)</td>
<td>Biotic Crust (B12)</td>
</tr>
<tr>
<td>Saturation (A3)</td>
<td>Aquatic Invertebrates (B13)</td>
</tr>
<tr>
<td>Water Marks (B1) (Nonriverine)</td>
<td>Hydrogen Sulfide Odor (C1)</td>
</tr>
<tr>
<td>Sediment Deposits (B2) (Nonriverine)</td>
<td>Oxidized Rhizospheres along Living Roots (C3)</td>
</tr>
<tr>
<td>Drift Deposits (B3) (Nonriverine)</td>
<td>Presence of Reduced Iron (C4)</td>
</tr>
<tr>
<td>Surface Soil Cracks (B6)</td>
<td>Recent Iron Reduction in Tilled Soils (C6)</td>
</tr>
<tr>
<td>Inundation Visible on Aerial Imagery (B7)</td>
<td>Other (Explain in Remarks)</td>
</tr>
<tr>
<td>Water-Stained Leaves (B9)</td>
<td>FAC-Neutral Test</td>
</tr>
</tbody>
</table>

**Field Observations:**

<table>
<thead>
<tr>
<th>Surface Water Present?</th>
<th>No</th>
<th>Depth (inches):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Table Present?</td>
<td>No</td>
<td>Depth (inches):</td>
</tr>
<tr>
<td>Saturation Present?</td>
<td>No</td>
<td>Depth (inches):</td>
</tr>
</tbody>
</table>

Wetland Hydrology Present? No

Describe Recorded Data (stream, gauge, monitoring well, aerial photos, previous inspections) if available:

Remarks:
WETLAND DELINEATION FORM – Arid West Region

Project/Site: Mohave Wetlands
City/County: Needles/San Bernadino
Applicant/Owner: BOR
State: CA
Sampling Date: 3/19/2015
Investigator(s): BT, MC
Section, Township, Range: S1 T7N R23E
Landform (hillslope, terrace, etc.): Floodplain
Local Relief (concave, convex, none): Concave
Subregion (LRR): D
Soil Map Unit Name: Not mapped
NWI Classification: Freshwater emergent

Are climatic/hydrologic conditions on the site typical for this time of year? Yes (If no, explain in Remarks.)
Are vegetation, soil, or hydrology significantly disturbed? No
Are vegetation, soil, or hydrology naturally problematic? No (If needed, explain any answers in Remarks.)

Is hydrophytic vegetation present? Yes
Are hydric soils present? Yes
Are wetland hydrology present? Yes
Is the sampled area within a wetland? Yes

SUMMARY OF FINDINGS – Attach map showing sampling point locations, transects, important features, etc.

Is hydrophytic vegetation present? Yes
Are hydric soils present? Yes
Is wetland hydrology present? Yes

Remarks:

VEGETATION – Use scientific names of plants.

<table>
<thead>
<tr>
<th>Tree Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Dominance Test Worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Number of dominant species that are OBL, FACW, or FAC: 4 (A)</td>
</tr>
<tr>
<td>Salix exigua</td>
<td>30</td>
<td>Y</td>
<td>FACW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pluchea sericea</td>
<td>20</td>
<td>Y</td>
<td>FAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tamarix sp.</td>
<td>20</td>
<td>Y</td>
<td>FAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover = 70</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sapling/Shrub Stratum</th>
<th>Plot size: 5' radius</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Prevalence Index Worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typha latifolia</td>
<td>2</td>
<td>Y</td>
<td>OBL</td>
<td>Column Totals:</td>
<td></td>
</tr>
<tr>
<td>Total Cover = 2</td>
<td></td>
<td></td>
<td></td>
<td>Prevalence Index = B/A =</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Herb Stratum</th>
<th>Plot size: 5' radius</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Hydrophytic Vegetation Indicators:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typha latifolia</td>
<td>2</td>
<td>Y</td>
<td>OBL</td>
<td>X Dominance test is &gt;50%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Prevalence index is &lt;3.0¹</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Morphological adaptations² (Provide supporting data in Remarks or on a separate sheet.)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Problematic hydrophytic vegetation³ (explain)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.</td>
<td></td>
</tr>
<tr>
<td>Woody Vine</td>
<td></td>
<td></td>
<td></td>
<td>Hydrophytic vegetation present? Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Remarks: Lots of woody deadfall</td>
<td></td>
</tr>
</tbody>
</table>

% bare ground in herb stratum: 98
% cover of biotic crust:
### SOIL

**Profile Description:** (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

#### MATRIX

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Color (moist)</th>
<th>%</th>
<th>Color (moist)</th>
<th>%</th>
<th>Type</th>
<th>Location</th>
<th>Texture</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 0-12 in</td>
<td>10 YR 4/1</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sand with gravel</td>
<td>Strong Hydrogen Sulfide Odor</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Type: C= concentration, D=depletion, RM=reduced matrix, CS=covered or coated sand grains. 2. Location: PL=pore lining, M=matrix.

#### Redox Features

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Color (moist)</th>
<th>%</th>
<th>Color (moist)</th>
<th>%</th>
<th>Type</th>
<th>Location</th>
<th>Texture</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 0-12 in</td>
<td>10 YR 4/1</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sand with gravel</td>
<td>Strong Hydrogen Sulfide Odor</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>7.</td>
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<td></td>
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</tr>
<tr>
<td>8.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Hydric Soil Indicators:** (Applicable to all LRRs, unless otherwise noted.)

- Histosol
- Histic Epipedon (A2)
- Black Histic (A3)
- X Hydrogen Sulfide (A4)
- Stratified Layers (A5) (LRR C)
- 1 cm Muck (A9) (LRR D)
- Depleted below Surface (A12)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Restrictive Layer (if present):**

- Type: 
- Depth (inches): 
- Remarks: Strong hydrogen sulfide odor indicating anaerobic conditions.

---

### HYDROLOGY

#### Wetland Hydrology Indicators:

**Primary Indicators** (minimum of one required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- Water Marks (B1) (Nonriverine)
- Sediment Deposits (B2) (Nonriverine)
- Drift Deposits (B3) (Nonriverine)
- Surface Soil Cracks (B6)
- Inundation Visible on Aerial Imagery (B7)
- Water-Stained Leaves (B9)

**Secondary Indicators** (two or more required)

- Salt Crust (B11)
- Aquatic Invertebrates (B13)
- Oxidized Rhizospheres along Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Other (Explain in Remarks)
- Presence of Reduced Iron (C4)
- Drainage Patterns (B10)
- Dry-Season Water Table (C2)
- Crayfish burrows (C8)
- Shallow Aquitard (D3)
- FAC-Neutral Test

**Field Observations:**

- Surface Water Present? Yes
- Depth (inches): 4
- Water Table Present? Yes
- Depth (inches): 3
- Saturation Present? Yes
- Depth (inches): Surface

**Wetland Hydrology Present?** Yes

**Remarks:** Part of backwater coming in from river

---

*Note: Additional indicators and observations may be recorded in the Remarks section.*
WETLAND DELINEATION FORM – Arid West Region

Project/Site: Mohave Wetlands
Applicant/Owner: BOR
City/County: Needles/San Bernardino
State: CA
Investigator(s): BT, MC
Landform (hillslope, terrace, etc.): Hillslope
Local Relief (concave, convex, none): Convex
Subregion (LRR): D
Sampling Point: 32
Datum: NAD 83
City/County: Needles/San Bernardino
Applicant/Owner: BOR
State: CA
Sampling Date: 3/19/2015

Soil Map Unit Name: Not mapped
NWI Classification:

Are climatic/hydrologic conditions on the site typical for this time of year? Yes
(If no, explain in Remarks.)
Are vegetation, soil, or hydrology significantly disturbed? No
Are “normal circumstances” present? Yes
Are vegetation, soil, or hydrology naturally problematic? No
(If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach map showing sampling point locations, transects, important features, etc.

Is hydrophytic vegetation present? Yes
Are hydric soils present? No
Is wetland hydrology present? No
Is the sampled area within a wetland? No

Remarks:

VEGETATION – Use scientific names of plants.

<table>
<thead>
<tr>
<th>Tree Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Prevalence Index Worksheet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sapling/Shrub Stratum</td>
<td>Plot size: 5' radius</td>
<td>Absolute % Cover</td>
<td>Dominant Species?</td>
<td>Indicator Status</td>
<td>Prevalence Index Worksheet</td>
</tr>
<tr>
<td>1. Pluchea sericea</td>
<td></td>
<td>10</td>
<td>Y</td>
<td>FACW</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover =</td>
<td></td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Herb Stratum</th>
<th>Plot size: 5' radius</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Prevalence Index Worksheet</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Poa sp.</td>
<td></td>
<td>1</td>
<td>Y</td>
<td>FAC</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover =</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Woody Vine</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Prevalence Index Worksheet</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover =</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

% bare ground in herb stratum: 99
% cover of biotic crust:
SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Color (moist)</th>
<th>%</th>
<th>Color (moist)</th>
<th>%</th>
<th>Type</th>
<th>Location</th>
<th>Texture</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-16 in</td>
<td>10 YR 6/4</td>
<td>90</td>
<td>10 YR 5/8</td>
<td>10</td>
<td>C</td>
<td>RC</td>
<td>Moist sand</td>
<td></td>
</tr>
</tbody>
</table>

1. Type: C= concentration, D=depletion, RM=reduced matrix, CS=covered or coated sand grains.  Location: PL=pore lining, M=matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

<table>
<thead>
<tr>
<th>Indicators</th>
<th>1 cm Muck (A9) (LRR C)</th>
<th>2 cm Muck (A10) (LRR B)</th>
<th>Reduced Vertic (F18)</th>
<th>Red Parent Material (TF2)</th>
<th>Other (Explain in Remarks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Histosol</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Histic Epipedon (A2)</td>
<td>Sandy Redox (S5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black Histic (A3)</td>
<td>Stripped Matrix (S6)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydrogen Sulfide (A4)</td>
<td>Loamy Mucky Mineral (F1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stratified Layers (A5) (LRR C)</td>
<td>Depleted Matrix (F3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 cm Muck (A9) (LRR D)</td>
<td>Redox Dark Surface (F6)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depleted below Surface (A12)</td>
<td>Depleted Dark Surface (F7)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thick Dark Surface (A12)</td>
<td>Redox Depressions (F8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sandy Mucky Mineral (S1)</td>
<td>Vernal Pools (F9)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sandy Gleyed Matrix (S4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Restrictive Layer (if present):

Type: Hydric Soil Present? No

Hydrology:

Wetland Hydrology Indicators:

<table>
<thead>
<tr>
<th>Primary Indicators</th>
<th>Secondary Indicators</th>
<th>Tertiary Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water (A1)</td>
<td>Salt Crust (B11)</td>
<td>Water Marks (B1) (Riverine)</td>
</tr>
<tr>
<td>High Water Table (A2)</td>
<td>Biotic Crust (B12)</td>
<td>Sediment Deposits (B2) (Riverine)</td>
</tr>
<tr>
<td>Saturation (A3)</td>
<td>Aquatic Invertebrates (B13)</td>
<td>Drift Deposits (B3) (Riverine)</td>
</tr>
<tr>
<td>Water Marks (B1) (Nonriverine)</td>
<td>Hydrogen Sulfide Odor (C1)</td>
<td>Drainage Patterns (B10)</td>
</tr>
<tr>
<td>Sediment Deposits (B2) (Nonriverine)</td>
<td>Oxidized Rhizospheres along Living Roots (C3)</td>
<td>Dry-Season Water Table (C2)</td>
</tr>
<tr>
<td>Drift Deposits (B3) (Nonriverine)</td>
<td>Presence of Reduced Iron (C4)</td>
<td>Crayfish burrows (C8)</td>
</tr>
<tr>
<td>Surface Soil Cracks (B6)</td>
<td>Recent Iron Reduction in Tilled Soils (C6)</td>
<td>Saturation visible on Aerial Imagery (C9)</td>
</tr>
<tr>
<td>Inundation Visible on Aerial Imagery (B7)</td>
<td>Other (Explain in Remarks)</td>
<td>Shallow Aquitard (D3)</td>
</tr>
<tr>
<td>Water-Stained Leaves (B9)</td>
<td>FAC-Neutral Test</td>
<td></td>
</tr>
</tbody>
</table>

Field Observations:

Surface Water Present? No  Depth (inches): No
Water Table Present? No  Depth (inches): No
Saturation Present? No  Depth (inches): No

Wetland Hydrology Present? No

Describe Recorded Data (stream, gauge, monitoring well, aerial photos, previous inspections) if available:

Remarks:
**WETLAND DELINEATION FORM – Arid West Region**

**Project/Site:** Mohave Wetlands  
**City/County:** Needles/San Bernadino  
**Applicant/Owner:** BOR  
**State:** CA  
**Sampling Date:** 3/19/2015

**Investigator(s):** BT, MC  
**Landform (hillslope, terrace, etc.):** Floodplain  
**Local Relief (concave, convex, none):** Concave  
**Subregion (LRR):** D

**Sampling Point:** 33  
**Section, Township, Range:** S1 T7N R23E  
**Datum:** NAD 83

**Soil Map Unit Name:** Not mapped  
**NWI Classification:** Freshwater emergent

**Are climatic/hydrologic conditions on the site typical for this time of year?** Yes  
**Are vegetation, soil, or hydrology significantly disturbed?** No  
**Are “normal circumstances” present?** Yes  
**Are vegetation, soil, or hydrology naturally problematic?** No

**SUMMARY OF FINDINGS – Attach map showing sampling point locations, transects, important features, etc.**

**Is hydrophytic vegetation present?** Yes  
**Are hydric soils present?** Yes  
**Is wetland hydrology present?** Yes  
**Is the sampled area within a wetland?** Yes

**Remarks:**

**VEGETATION – Use scientific names of plants.**

<table>
<thead>
<tr>
<th>Tree Stratum</th>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Dominance Test Worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover =</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sapling/Shrub Stratum</th>
<th>Plot size: 5’ radius</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Prevalence Index Worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <em>Pluchea sericea</em></td>
<td></td>
<td>25</td>
<td>Y</td>
<td>FACW</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover = 25</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Herb Stratum</th>
<th>Plot size: 5’ radius</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Hydrophytic Vegetation Indicators:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <em>Eleocharis palustris</em></td>
<td></td>
<td>70</td>
<td>Y</td>
<td>OBL</td>
<td>X Dominance test is &gt;50%</td>
</tr>
<tr>
<td>2. <em>Paspalum dilatatum</em></td>
<td></td>
<td>20</td>
<td>Y</td>
<td>FAC</td>
<td>Prevalence index is &lt;3.0¹</td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Morphological adaptations ³ (Provide supporting data in Remarks or on a separate sheet.)</td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Problematic hydrophytic vegetation ³ (explain)</td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Hydrophytic vegetation present? Yes</td>
</tr>
<tr>
<td>7.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover = 90</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**Woody Vine**  
<table>
<thead>
<tr>
<th>Plot size:</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Remarks:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cover =</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| % bare ground in herb stratum: | 10 |
| % cover of biotic crust: |

---

¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>MATRIX</th>
<th>REDOX FEATURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth (inches)</td>
<td>Color (moist)</td>
</tr>
<tr>
<td>1. 0-12 in</td>
<td>10 YR 5/2</td>
</tr>
<tr>
<td>2.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td></td>
</tr>
</tbody>
</table>

1 Type: C= concentration, D=depletion, RM=reduced matrix, CS=covered or coated sand grains. Location: PL=pore lining, M=matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- Histosol
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5) (LRR C)
- 1 cm Muck (A9) (LRR C)
- Depleted below Surface (A12)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)

Restrictive Layer (if present):

Type: 
Depth (inches): 
Remarks: Hydric Soil Present? Yes

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- Water Marks (B1) (Nonriverine)
- Sediment Deposits (B2) (Nonriverine)
- Drift Deposits (B3) (Nonriverine)
- Surface Soil Cracks (B6)
- Inundation Visible on Aerial Imagery (B7)
- Water-Stained Leaves (B9)

Secondary Indicators (two or more required)

- Salt Crust (B11)
- Biotic Crust (B12)
- Aquatic Invertebrates (B13)
- Oxidized Rhizospheres along Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Other (Explain in Remarks)
- Water Marks (B1) (Riverine)
- Sediment Deposits (B2) (Riverine)
- Drift Deposits (B3) (Riverine)
- Drainage Patterns (B10)
- Dry-Season Water Table (C2)
- Shallow Aquitard (D3)

Field Observations:

Surface Water Present? Yes
Depth (inches): 1-2

Water Table Present? Yes
Depth (inches): surface

Saturation Present? Yes
Depth (inches): surface

Wetland Hydrology Present? Yes

Describe Recorded Data (stream, gauge, monitoring well, aerial photos, previous inspections) if available:

Remarks:
APPENDIX C: SAMPLE POINT PHOTOS
Northeastern project boundary at the Colorado River.

Sample point 1.
Sample point 2.

Sample point 3.
Sample point 4.

Sample point 5.
Sample point 6.

Sample point 7.
Sample point 8.

Sample point 9.
Sample point 10.

Sample point 11.
Sample point 12.

Sample point 13.
Sample point 14.

Sample point 15.
Sample point 16.

Sample point 17.
Sample point 20.

Sample point 21.
Sample point 22.

Sample point 23.
Sample point 24.

Sample point 25.
Sample point 26.

Sample point 27.
Sample point 28.

Sample point 29.
Sample point 30.

Sample point 31.
Sample point 32.

Sample point 33.
APPENDIX D: SOIL SAMPLE LOCATION MAP AND SOIL SAMPLING REPORT

### Utah State University
**USU Analytical Laboratories**

Physical Address: 1541 North 800 East, North Logan
Mailing Address: 9400 Old Main Hill, Logan, UT 84322 – 9400
Phone: (435) 797 – 2217 • Fax: (435) 797 – 2117
Web: usual.usu.edu

4/17/2015

Bob Thomas
Bio-West, Inc.
1003 West 1400 North
Logan, UT 84321

Samples Received: 3/20/2015

<table>
<thead>
<tr>
<th>USU ID</th>
<th>Identification</th>
<th>Texture</th>
<th>pH</th>
<th>Salinity (ppm)</th>
<th>Phosphorus (ppm)</th>
<th>Potassium (ppm)</th>
<th>Nitrate-Nitrogen (ppm)</th>
<th>Zinc (ppm)</th>
<th>Iron (ppm)</th>
<th>Copper (ppm)</th>
<th>Manganese (ppm)</th>
<th>Sulfate-Sulfur (ppm)</th>
<th>Organic Matter (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0939</td>
<td>AW</td>
<td>Sand</td>
<td>8.5</td>
<td>23.6</td>
<td>4.9</td>
<td>99.8</td>
<td>15.6</td>
<td>0.37</td>
<td>4.38</td>
<td>3.34</td>
<td>0.50</td>
<td>459</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td>0940</td>
<td>AX</td>
<td>Sandy Loam</td>
<td>8.4</td>
<td>118</td>
<td>4.1</td>
<td>303</td>
<td>37.0</td>
<td>0.41</td>
<td>5.21</td>
<td>3.74</td>
<td>1.67</td>
<td>3315</td>
<td>1.1</td>
</tr>
<tr>
<td>0941</td>
<td>AY</td>
<td>Sandy Loam</td>
<td>8.2</td>
<td>74.0</td>
<td>6.5</td>
<td>280</td>
<td>21.0</td>
<td>0.44</td>
<td>8.03</td>
<td>3.92</td>
<td>2.47</td>
<td>696</td>
<td>1.0</td>
</tr>
<tr>
<td>0942</td>
<td>AZ</td>
<td>Sandy Loam</td>
<td>8.4</td>
<td>81.9</td>
<td>10.4</td>
<td>651</td>
<td>1.02</td>
<td>0.85</td>
<td>6.51</td>
<td>1.01</td>
<td>4.23</td>
<td>294</td>
<td>2.5</td>
</tr>
<tr>
<td>0943</td>
<td>BA</td>
<td>Sandy Loam</td>
<td>8.1</td>
<td>23.0</td>
<td>7.6</td>
<td>569</td>
<td>7.67</td>
<td>0.43</td>
<td>6.80</td>
<td>3.80</td>
<td>1.37</td>
<td>294</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td>0944</td>
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HYDROLOGY REPORT

For

NORTH PENINSULA IMPROVEMENTS FOR
PIRATE COVE RESORT & MARINA

SEPTEMBER, 2012

Prepared For:

Pirate Cove Resort and Marina
1100 London Bridge Road, Suite G102
Lake Havasu City, AZ 86404

Prepared By:

ARQ Engineering, LLC
Engineering & Survey
4440 S. Highway 95, Suite A
Fort Mohave, AZ 86426
(928) 758-3333

JOB NO. 7316-09

P:\3318-09 Pirate Cove\Hydrology\Peninsula North Hydrology Report Peninsula North 9-19-12.docx
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**Appendices**

- Appendix A - Localized FIRMette
- Appendix B – Drainage Basin Maps (Drainage Areas)
- Appendix C - NOAA Precipitation Data
- Appendix D - Pre/Post Drainage Calculations (AES HydroWIN 2012)

**Exhibits**

- Exhibit 1 - Pirate Cove Resort & Marina Location Map
- Exhibit 2 - Pirate Cove Resort & Marina South Peninsula Location Map
Introduction

This analysis was performed in support of the Pirate Cove Peninsula Master Development Plan for assessor’s parcel no. 0650-16-02-0000 and portions of 0650-15-01-0000 and 0650-15-08-0000, located in Sections 5 and 6, Township 27 North, Range 24 East, San Bernardino County, California. The project is within 1/2 mile to the north of Old Highway Route 66. Please see Vicinity Map on next page for more detail on site location.

FEMA Floodplain

According to the Federal Emergency Management Agency (FEMA), the Flood Insurance Rate Map indicates that the proposed project is located within Zone “X”. It is adjacent to Zone AE, which has a 100-year high water elevation of 464. The subject site is within FIRM Map No. 06071C5685H, revised August 28, 2008 (See Appendix A).

Existing Conditions

The subject area of interest currently is a developed recreational park with a paved road leading to the east end of the peninsula and several small structures. The property currently drains from southwest to northeast with few low areas to the northerly. The current drainage is not restrained from flowing Northeasterly to the Colorado River. The soils on the North Peninsula consist of very sandy to slightly silty sands and show no signs of riling or concentrated flows erosion. The Permeability of the soils is very high. Pavement and hard surface such as restroom structures, roadway, etc. present the only impervious surfaces.

Proposed Conditions

Proposed conditions will include reconfigured recreational vehicle pads, and relocation of the paved roadway, along with unpaved areas allocated for open space. The open space will include, but is not limited to, localized areas for retention/detention purposes. No significant increase in impervious area will result with the Redevelopment of the North Peninsula. See Drainage Basin Maps in Appendix B for more description. Some of the drainage will continue to sheet flow in a Northerly direction toward the Colorado River. Approximately 47% of the proposed total drainage will be collected at several low points and directed into retention basins to reduce the overall runoff, and volumes to far less than existing conditions.

Hydrologic Parameters

The San Bernardino County Hydrology Manual along with the Advanced Engineering Systems (AES) HydroWIN 2012, Computer Model Rational Method Analysis was used to calculate the flows. The San Bernardino County Hydrology Manual was used to calculate volumes for this development. The San Bernardino County Hydrology Manual, NOAA Atlas 14, Vol. 6 was used to obtain the precipitation depth for a 100-Year, 1 hour duration storm event. The 100-year, 1-hour duration precipitation used was 1.98 inches for this analysis. Initial Time of Concentration and intensity were calculated per AES Software. The NOAA precipitation data and San Bernardino Hydrology figures are found in Appendix C. The pre and post run-off calculations along with Table 1 that summarizes the overall pre/post drainage calculation results are found in Appendix D.
Retention Calculations (bottom 1.00’ of Basins)

Retention volumes were calculated using the San Bernardino Hydrology Manual. Six retention basins were incorporated into the grading plan to reduce developed peak flows, and volumes to significantly less than existing conditions. The post-developed and pre-developed peak flows were calculated using the San Bernardino Hydrology Manual as detailed in Appendix D. The retention volume summary is shown on Table 1 and is located in Appendix D.

Conclusions

Redevelopment of the site and the proposed grading plan allowed for the inclusion of several retention basins. The total retention volume proposed is 1.456 Acre feet will be provided in an effort to significantly reduce direct runoff into the Colorado River. This design will reduce peak flow, volume, velocities, as well as implement silt and debris control.

The existing condition has no provisions for retention of storm waters. The proposed redevelopment of the North Peninsula incorporates retention basins into the plan to reduce runoff to substantially less than what currently exists.

The existing condition total runoff volume is 1.038 ac-ft, all which is being discharged directly into the Colorado River system. Post-developed total runoff volume is 1.148 ac-ft, approximately 0.606 ac-ft of which will continue to be discharged to the Colorado River. Proposed run-off to be retained is 0.542 ac-ft. This amounts to a 42% reduction of runoff into the Colorado River over the existing condition, including the nominal increase from the redevelopment of the North Peninsula. Proposed retention is 1.792 ac-ft.
PIRATE COVE RESORT AND MARINA
NORTH PENINSULA
AT MOABI REGIONAL PARK
LOCATION MAP

EXHIBIT 2

ARQ ENGINEERING LLC
Engineering and Survey
APPENDIX A

LOCALIZED FIRMette
APPENDIX B

DRAINAGE BASINS MAPS
APPENDIX C

NOAA PRECIPITATION DATA
&
SAN BERNARDINO COUNTY HYROLOGY MANUAL FIGURES
# NOAA Atlas 14, Volume 6, Version 2

**Location name:** Needles, California, US*  
**Coordinates:** 34.7234, -114.5149  
**Elevation:** 553 ft*  
* source: Google Maps

## POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lilian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yeida, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzych, John Yanchan

NOAA, National Weather Service, Silver Spring, Maryland

### PF tabular

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**Duration:** 2-hr  
**Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates for a given duration and average recurrence interval will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.**

Please refer to NOAA Atlas 14 document for more information.

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### PF graphical
Maps & aerals

Small scale terrain

Precipitation Frequency Data Server

http://hdsc.nws.noaa.gov/hdsc/pfds/pfds_printpage.html?lat=34.7234&lo...
DESIGN STORM FREQUENCY = 100 YEARS
ONE HOUR POINT RAINFALL = 1.97 INCHES
LOG-LOG SLOPE = 50
PROJECT LOCATION = Pirate Cove Peninsula

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

INTENSITY - DURATION CURVES
CALCULATION SHEET
APPENDIX D

PRE/POST RUN-OFF DRAINAGE CALCULATIONS
(AES HydroWIN)
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<td>3.47</td>
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<tr>
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<td>462.5</td>
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<td>0.17</td>
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<td>NONE</td>
<td>0.032</td>
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<table>
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<tr>
<th>VOLUME PRE (AC-FT)</th>
<th>VOLUME POST (AC-FT)</th>
<th>PRE/POST DIFFERENCE</th>
<th>BASIN VOL CF</th>
<th>BASIN VOL AC-FT</th>
<th>TOTAL VOL TO COLO.</th>
<th>TOTAL VOL RETAINED</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.038</td>
<td>1.148</td>
<td>0.110</td>
<td>63412</td>
<td>1.456</td>
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<td>0.542</td>
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</table>
PRE REDEVELOPMENT RUN-OFF DRAINAGE CALCULATIONS
(AES HydroWIN)
PNH1PRE.RES
Pirate Cove Peninsula Improvements North
Pre-Developed
Basin 1

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Fort Mohave, AZ 86426
(928)758-3333

FILE NAME: PNH1PRE.DAT
TIME/DATE OF STUDY: 13:06 09/11/2012

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

--*TIME-OF-CONCENTRATION MODEL*--
USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 24.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.01
*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.5000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.9800

*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*

HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN-/ OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) HIKE FACTOR
=== ====== =========  =================  ======  ===== ====== ===== ========
1  30.0     20.0    0.018/0.018/0.020 0.67    2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
   as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
   *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 0.00 TO NODE 1.00 IS CODE = 21

>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FT) = 416.00
ELEVATION DATA: UPSTREAM(FT) = 468.50 DOWNSTREAM(FT) = 463.70

Tc = K*[LENGTH** 3.00]/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.281

Page 1
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.330

SUBAREA Tc AND LOSS RATE DATA(AMC I):

<table>
<thead>
<tr>
<th>DEVELOPMENT TYPE/ LAND USE</th>
<th>SCS SOIL GROUP</th>
<th>AREA (ACRES)</th>
<th>Fp (INCH/HR)</th>
<th>Ap (DECIMAL)</th>
<th>SCS</th>
<th>Tc (MIN.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NATURAL DESERT COVER</td>
<td>&quot;DESERT BRUSH&quot;</td>
<td>(40.0%)</td>
<td>2.38</td>
<td>0.61</td>
<td>1.000</td>
<td>64</td>
</tr>
<tr>
<td>COMMERCIAL</td>
<td>A</td>
<td>0.13</td>
<td>1.33</td>
<td>0.100</td>
<td>17</td>
<td>8.28</td>
</tr>
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</table>

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.61
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.953
SUBAREA RUNOFF(CFS) = 10.72
TOTAL AREA(ACRES) = 2.51 PEAK FLOW RATE(CFS) = 10.72

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 2.5 TC(MIN.) = 8.28
EFFECTIVE AREA(ACRES) = 2.51 AREA-AVERAGED Fm(INCH/HR) = 0.59
AREA-AVERAGED Fp(INCH/HR) = 0.61 AREA-AVERAGED Ap = 0.953
PEAK FLOW RATE(CFS) = 10.72

END OF RATIONAL METHOD ANALYSIS
PNH2PRE.RES

Pirate Cove Peninsula Improvements North
Pre-Developed
Basin 2

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4440 S. Hwy 95, Ste. A
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(928)758-3333

FILE NAME: PNH2PRE.DAT
TIME/DATE OF STUDY: 13:47 09/11/2012

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

--*TIME-OF-CONCENTRATION MODEL*--
USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 24.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.01
*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.5000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.9800

*ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD *

*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*

<table>
<thead>
<tr>
<th>No.</th>
<th>Width</th>
<th>Crossfall</th>
<th>In-/Out-/Park-</th>
<th>Height</th>
<th>Width</th>
<th>Lip</th>
<th>Hike</th>
<th>Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30.0</td>
<td>20.0</td>
<td>0.018/0.018/0.020</td>
<td>0.67</td>
<td>2.00</td>
<td>0.0313</td>
<td>0.167</td>
<td>0.0150</td>
</tr>
</tbody>
</table>

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 0.00 TO NODE 1.00 IS CODE = 21

>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(Feet) = 122.00
ELEVATION DATA: UPSTREAM(Feet) = 468.40 DOWNSTREAM(Feet) = 462.90

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.859

<table>
<thead>
<tr>
<th>DEVELOPMENT TYPE/ LAND USE</th>
<th>SCS SOIL GROUP</th>
<th>AREA (ACRES)</th>
<th>Fp (INCH/HR)</th>
<th>Ap (DECIMAL)</th>
<th>SCS CN</th>
<th>Tc (MIN.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;DESERT BRUSH&quot;</td>
<td>&quot;DESERT BRUSH&quot;</td>
<td>0.41</td>
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<td>1.000</td>
<td>64</td>
<td>6.67</td>
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<tr>
<td>COMMERCIAL</td>
<td>&quot;COMMERCIAL&quot;</td>
<td>0.01</td>
<td>1.33</td>
<td>0.100</td>
<td>17</td>
<td>5.00</td>
</tr>
</tbody>
</table>

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.61
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.979

SUBAREA RUNOFF(CFS) = 2.37
TOTAL AREA(ACRES) = 0.42 PEAK FLOW RATE(CFS) = 2.37

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 0.4 TC(MIN.) = 5.00
EFFECTIVE AREA(ACRES) = 0.42 AREA-AVERAGED Fm(INCH/HR) = 0.60
AREA-AVERAGED Fp(INCH/HR) = 0.61 AREA-AVERAGED Ap = 0.979
PEAK FLOW RATE(CFS) = 2.37

END OF RATIONAL METHOD ANALYSIS
PNH3PRE.RES
Pirate Cove Peninsula Improvements North
Pre-Developed
Basin 3

-----------------------------------------------
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Fort Mohave, AZ 86426
(928)758-3333

-----------------------------------------------
FILE NAME: PNH3PRE.DAT
TIME/DATE OF STUDY: 13:51 09/11/2012
-----------------------------------------------

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
-----------------------------------------------

--*TIME-OF-CONCENTRATION MODEL*--
USER SPECIFIED STORM EVENT(YEAR) =  100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) =  24.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.01
*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.5000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.9800
*ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*

<table>
<thead>
<tr>
<th>NO.</th>
<th>HALF-</th>
<th>STREET-</th>
<th>CURB</th>
<th>GUTTER-</th>
<th>GEOMETRIES: MANNING</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>CROWN TO</td>
<td>CROSSFALL</td>
<td>SIDE</td>
<td>SIDE</td>
<td>WAY</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>30.0</td>
<td>20.0</td>
<td>0.018</td>
<td>0.018</td>
<td>0.020</td>
</tr>
</tbody>
</table>

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
   as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
  OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED*

-----------------------------------------------
FLOW PROCESS FROM NODE 0.00 TO NODE 1.00 IS CODE = 21

<<<<RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(Feet) = 307.00
ELEVATION DATA: UPSTREAM(Feet) = 468.50 DOWNSTREAM(Feet) = 466.00

\[ T_c = K \times (\text{LENGTH}^2 / \text{ELEVATION CHANGE})^{0.20} \]
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.863
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.470

SUBAREA TC AND LOSS RATE DATA(AMC I):

<table>
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<tr>
<th>DEVELOPMENT TYPE/ LAND USE</th>
<th>SCS SOIL GROUP</th>
<th>AREA (ACRES)</th>
<th>Fp (INCH/HR)</th>
<th>Ap (DECIMAL)</th>
<th>SCS</th>
<th>Tc (MIN.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;DESERT BRUSH&quot;</td>
<td>B</td>
<td>0.86</td>
<td>0.61</td>
<td>1.000</td>
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<td>13.58</td>
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<tr>
<td>COMMERCIAL</td>
<td>A</td>
<td>0.01</td>
<td>1.33</td>
<td>0.100</td>
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<td>7.86</td>
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SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.61
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.990
SUBAREA RUNOFF(CFS) = 3.81
TOTAL AREA(ACRES) = 0.87 PEAK FLOW RATE(CFS) = 3.81

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 0.9 Tc(MIN.) = 7.86
EFFECTIVE AREA(ACRES) = 0.87 AREA-AVERAGED Fm(INCH/HR)= 0.60
AREA-AVERAGED Fp(INCH/HR) = 0.61 AREA-AVERAGED Ap = 0.990
PEAK FLOW RATE(CFS) = 3.81

END OF RATIONAL METHOD ANALYSIS
PNH4PRE.RES
Pirate Cove Peninsula Improvements North
Pre-Developed
Basin 4

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(928)758-3333

FILE NAME: PNH4PRE.DAT
TIME/DATE OF STUDY: 13:55 09/11/2012

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

--*TIME-OF-CONCENTRATION MODEL*--
USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 24.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.01
*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.5000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.9800
*ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*

<table>
<thead>
<tr>
<th>NO.</th>
<th>HALF-CROWN TO STREET-CROSSFALL</th>
<th>STREET-CROSSFALL</th>
<th>CURB GUTTER-GEOMETRIES: MANNING</th>
<th>WIDTH</th>
<th>CROSSFALL</th>
<th>IN-/ OUT-/PARK- HEIGHT</th>
<th>WIDTH</th>
<th>LIP</th>
<th>HIKE</th>
<th>FACTOR</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>30.0</td>
<td>20.0</td>
<td>0.018/0.018/0.020</td>
<td>0.67</td>
<td>2.00</td>
<td>0.0313</td>
<td>0.167</td>
<td>0.0150</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED*

FLOW PROCESS FROM NODE 0.00 TO NODE 1.00 IS CODE = 21

>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(Feet) = 205.00
ELEVATION DATA: UPSTREAM(Feet) = 467.90 DOWNSTREAM(Feet) = 463.00
Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20

Page 1
PNH4PRE.RES

SUBAREA ANALYSIS USED MINIMUM TC(MIN.) = 5.394
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.604

SUBAREA TC AND LOSS RATE DATA(AMC 1):

<table>
<thead>
<tr>
<th>DEVELOPMENT TYPE/ LAND USE</th>
<th>SCS SOIL GROUP</th>
<th>AREA (ACRES)</th>
<th>Fp (INCH/HR)</th>
<th>Ap (DECIMAL)</th>
<th>SCS</th>
<th>TC (MIN.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;DESERT BRUSH&quot; (40.0%)</td>
<td>B</td>
<td>4.03</td>
<td>0.61</td>
<td>1.000</td>
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<td>9.31</td>
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<tr>
<td>COMMERCIAL</td>
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<td>1.33</td>
<td>0.100</td>
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<td>5.39</td>
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SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.62
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.895

SUBAREA RUNOFF(CFS) = 24.83
TOTAL AREA(ACRES) = 4.56
PEAK FLOW RATE(CFS) = 24.83

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 4.6
EFFECTIVE AREA(ACRES) = 4.56
AREA-AVERAGED Fp(INCH/HR) = 0.55
AREA-AVERAGED Ap = 0.895
PEAK FLOW RATE(CFS) = 24.83

END OF RATIONAL METHOD ANALYSIS
PNH5PRE.RES

Pirate Cove Peninsula Improvements North

Pre-Developed

Basin 5

*******************************************************************************************************
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FILE NAME: PNH5PRE.DAT
TIME/DATE OF STUDY: 13:58 09/11/2012

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 24.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.01
*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.5000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.9800
*ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*

<table>
<thead>
<tr>
<th>NO.</th>
<th>WIDTH</th>
<th>CROSSFALL</th>
<th>SIDE</th>
<th>LIP</th>
<th>HIKE</th>
<th>FACTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30.0</td>
<td>20.0</td>
<td>0.018/0.018/0.020</td>
<td>0.67</td>
<td>2.00</td>
<td>0.0313 0.167 0.0150</td>
</tr>
</tbody>
</table>

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
   as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 0.00 TO NODE 1.00 IS CODE = 21

>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<

INITIAL SUBAREA FLOW-LENGTH(Feet) = 345.00
ELEVATION DATA: UPSTREAM(Feet) = 467.90 DOWNSTREAM(Feet) = 463.00

\[ Tc = K \times [(\text{LENGTH}^2) / (\text{ELEVATION CHANGE})]^{0.20} \]
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.37
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.649

SUBAREA TC AND LOSS RATE DATA(AMC I):

<table>
<thead>
<tr>
<th>DEVELOPMENT TYPE/ LAND USE</th>
<th>SCS GROUP</th>
<th>AREA (ACRES)</th>
<th>Fp (INCH/HR)</th>
<th>Ap (DECIMAL)</th>
<th>SCS Tc</th>
</tr>
</thead>
<tbody>
<tr>
<td>NATURAL DESERT COVER</td>
<td>B</td>
<td>2.51</td>
<td>0.61</td>
<td>1.000</td>
<td>64</td>
</tr>
<tr>
<td>COMMERCIAL</td>
<td>A</td>
<td>0.01</td>
<td>1.33</td>
<td>0.100</td>
<td>17</td>
</tr>
</tbody>
</table>

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.61
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.996
SUBAREA RUNOFF(CFS) = 11.43
TOTAL AREA(ACRES) = 2.52 PEAK FLOW RATE(CFS) = 11.43

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 2.5 PEAK FLOW RATE(CFS) = 11.43
EFFECTIVE AREA(ACRES) = 2.52 AREA-AVERAGED Fm(INCH/HR) = 0.61
AREA-AVERAGED Fd(INCH/HR) = 0.61 AREA-AVERAGED Ap = 0.996
PEAK FLOW RATE(CFS) = 11.43

END OF RATIONAL METHOD ANALYSIS
PNH6PRE.RES
Pirate Cove Peninsula Improvements North
Pre-Developed
Basin 6

============================================================================
USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
--*TIME-OF-CONCENTRATION MODEL*--
USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 24.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.01
*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.5000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.9800
*ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*

<table>
<thead>
<tr>
<th>NO.</th>
<th>HALF-CROWN TO STREET-CROSSFALL (FT)</th>
<th>STREET-CROSSFALL (FT)</th>
<th>CURB GUTTER-GEOMETRIES: Manning Width (FT)</th>
<th>CROSSFALL IN-/OUT-/PARK- HEIGHT (FT)</th>
<th>WIDTH (FT)</th>
<th>LIP HEIGHT (FT)</th>
<th>HIKE FACTOR (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30.0</td>
<td>20.0</td>
<td>0.018/0.018/0.020</td>
<td>0.67</td>
<td>2.00</td>
<td>0.0313</td>
<td>0.167</td>
</tr>
</tbody>
</table>

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
   as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 0.00 TO NODE 1.00 IS CODE = 21

>>> RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(Feet) = 275.00
ELEVATION DATA: UPSTREAM(FEET) = 466.20 DOWNSTREAM(FEET) = 460.00

Tc = K*((LENGTH** 3.00)/(ELEVATION CHANGE))**0.20
<table>
<thead>
<tr>
<th>DEVELOPMENT TYPE/ LAND USE</th>
<th>SCS SOIL GROUP</th>
<th>AREA (ACRES)</th>
<th>Fp (INCH/HR)</th>
<th>Ap (DECIMAL)</th>
<th>SCS CN</th>
<th>Tc (MIN.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NATURAL DESERT COVER &quot;DESERT BRUSH&quot;</td>
<td>B</td>
<td>1.23</td>
<td>0.61</td>
<td>1.000</td>
<td>64</td>
<td>10.60</td>
</tr>
<tr>
<td>COMMERCIAL</td>
<td>A</td>
<td>0.01</td>
<td>1.33</td>
<td>0.100</td>
<td>17</td>
<td>6.14</td>
</tr>
</tbody>
</table>

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.61

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.993

SUBAREA RUNOFF(CFS) = 6.23

TOTAL AREA(ACRES) = 1.24  PEAK FLOW RATE(CFS) = 6.23

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 1.2  TC(MIN.) = 6.14
EFFECTIVE AREA(ACRES) = 1.24  AREA-AVERAGED Fm(INCH/HR)= 0.61
AREA-AVERAGED Fp(INCH/HR) = 0.61  AREA-AVERAGED Ap = 0.993
PEAK FLOW RATE(CFS) = 6.23

END OF RATIONAL METHOD ANALYSIS
PNH7PRE.RES
Pirate Cove Peninsula Improvements North
Pre-Developed
Basin 7

************************************************************************************
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ARQ Engineering, LLC
4440 S. Hwy 95, Ste. A
Fort Mohave, AZ 86426
(928)758-3333

----------------------------------------------------------------------------
FILE NAME: PNH7PRE.DAT
TIME/DATE OF STUDY: 14:03 09/11/2012
============================================================================
USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--*TIME-OF-CONCENTRATION MODEL*--
USER SPECIFIED STORM EVENT(YEAR) =  100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) =  24.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.01
*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.5000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.9800
*ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*

<table>
<thead>
<tr>
<th>NO.</th>
<th>WIDTH</th>
<th>CROSSFALL</th>
<th>IN-/OUT-/PARK-</th>
<th>HEIGHT</th>
<th>WIDTH</th>
<th>LIP</th>
<th>HIKE FACTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30.0</td>
<td>20.0</td>
<td>0.018/0.018/0.020</td>
<td>0.67</td>
<td>2.00</td>
<td>0.0313</td>
<td>0.167</td>
</tr>
</tbody>
</table>

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
   as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 0.00 TO NODE 1.00 IS CODE = 21

Flow process from node 0.00 to node 1.00 is code = 21

>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(Feet) = 483.00
ELEVATION DATA: UPSTREAM(Feet) = 468.00 DOWNSTREAM(Feet) = 464.00
Tc = K*[LENGTH** 3.00]/(ELEVATION CHANGE)**0.20

Page 1
SUBAREA ANALYSIS

MINIMUM \(T_c\) (MIN.) = 9.394

100 YEAR RAINFALL INTENSITY (INCH/HR) = 5.004

### SUBAREA TC AND LOSS RATE DATA (AMC I):

<table>
<thead>
<tr>
<th>DEVELOPMENT TYPE/ LAND USE</th>
<th>SCS SOIL GROUP</th>
<th>AREA (ACRES)</th>
<th>(F_p) (INCH/HR)</th>
<th>Area Average (F_p) (INCH/HR)</th>
<th>(A_p) (DECIMAL)</th>
<th>SCS</th>
<th>(T_c) (MIN.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;DESERT BRUSH&quot; (40.0%)</td>
<td>B</td>
<td>3.06</td>
<td>0.61</td>
<td>1.000</td>
<td>0.61</td>
<td>64</td>
<td>16.22</td>
</tr>
<tr>
<td>COMMERCIAL</td>
<td>A</td>
<td>0.01</td>
<td>1.33</td>
<td>0.100</td>
<td>0.61</td>
<td>17</td>
<td>9.39</td>
</tr>
</tbody>
</table>

**Subarea average pervious loss rate, \(F_p\) (INCH/HR) = 0.61**

**Subarea average pervious area fraction, \(A_p\) = 0.997**

**Subarea runoff (CFS) = 12.15**

**Total area (ACRES) = 3.07**

**Peak flow rate (CFS) = 12.15**

---

END OF STUDY SUMMARY:

**Total area (ACRES) = 3.1**

**TC (MIN.) = 9.39**

**Effective area (ACRES) = 3.07**

**Area-averaged \(F_m\) (INCH/HR) = 0.61**

**Area-averaged \(F_p\) (INCH/HR) = 0.61**

**Area-averaged \(A_p\) = 0.997**

**Peak flow rate (CFS) = 12.15**

---

END OF RATIONAL METHOD ANALYSIS
PNH8PRE.RES
Pirate Cove Peninsula Improvements North
Pre-Developed Basin 8

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Analysis prepared by:
ARQ Engineering, LLC
4440 S. Hwy 95, Ste. A
Fort Mohave, AZ 86426
(928)758-3333

FILE NAME: PNH8PRE.DAT
TIME/DATE OF STUDY: 14:06 09/11/2012

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 24.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.01
*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.5000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.9800

*ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*

<table>
<thead>
<tr>
<th>NO.</th>
<th>WIDTH</th>
<th>CROSSFALL</th>
<th>IN-</th>
<th>OUT-</th>
<th>PARK-</th>
<th>HEIGHT</th>
<th>WIDTH</th>
<th>LIP</th>
<th>HIKE</th>
<th>FACTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30.0</td>
<td>20.0</td>
<td>0.018/0.018/0.020</td>
<td>0.67</td>
<td>2.00</td>
<td>0.0313</td>
<td>0.167</td>
<td>0.0150</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED*

FLOW PROCESS FROM NODE 0.00 TO NODE 1.00 IS CODE = 21

THE FOLLOWING ANALYSIS WAS PERFORMED WITH THE FOLLOWING DATA:

INITIAL SUBAREA FLOW-LENGTH(FT) = 358.00
ELEVATION DATA: UPSTREAM(FT) = 467.00 DOWNSTREAM(FT) = 462.50

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20

Page 1
SUBAREA ANALYSIS USED MINIMUM TC(MIN.) = 7.666
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.539

SUBAREA TC AND LOSS RATE DATA(AMC I):

DEVELOPMENT TYPE/ LAND USE            SCS SOIL GROUP  AREA      Fp         Ap     SCS   TC

NATURAL DESERT COVER
"DESERT BRUSH" (40.0%) B        3.40      0.61     1.000    64   13.24
COMMERCIAL                 A        0.47      1.33     0.100    17    7.67

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.62
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.891
SUBAREA RUNOFF(CFS) = 17.37
TOTAL AREA(ACRES) = 3.87 PEAK FLOW RATE(CFS) = 17.37

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 3.9 TC(MIN.) = 7.67
EFFECTIVE AREA(ACRES) = 3.87 AREA-AVERAGED Fm(INCH/HR) = 0.55
AREA-AVERAGED Fp(INCH/HR) = 0.62 AREA-AVERAGED Ap = 0.891
PEAK FLOW RATE(CFS) = 17.37

END OF RATIONAL METHOD ANALYSIS
**PNH9PRE.RES**

Pirate Cove Peninsula Improvements North

Pre-Developed

Basin 9

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Fort Mohave, AZ 86426
(928)758-3333

FILE NAME: PNH9PRE.DAT
TIME/DATE OF STUDY: 14:09 09/11/2012

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 24.00
SPECIFIED PERCENT OF GRADIENTS(DEcimal) TO USE FOR FRICTION SLOPE = 0.01
"USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL"

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/Hour) vs. LOG(Tc;MIN)) = 0.5000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.9800

*ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*

<table>
<thead>
<tr>
<th>NO.</th>
<th>CROSSFALL</th>
<th>HEIGHT</th>
<th>WIDTH</th>
<th>LIP</th>
<th>HIKE</th>
<th>FACTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30.0</td>
<td>20.0</td>
<td>0.018</td>
<td>0.018</td>
<td>0.020</td>
<td>0.67</td>
</tr>
</tbody>
</table>

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
   as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED*

FLOW PROCESS FROM NODE 0.00 TO NODE 1.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FT) = 286.00
ELEVATION DATA: UPSTREAM(FT) = 467.00 DOWNSTREAM(FT) = 462.50

Tc = K*[(LENGTH**3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.700
* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 5.925

SUBAREA Tc AND LOSS RATE DATA (AMC I):

<table>
<thead>
<tr>
<th>DEVELOPMENT TYPE/ LAND USE</th>
<th>SCS SOIL GROUP</th>
<th>AREA (ACRES)</th>
<th>Fp (INCH/HR)</th>
<th>Ap (DECIMAL)</th>
<th>SCS Tc (MIN.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NATURAL DESERT COVER</td>
<td>&quot;DESERT BRUSH&quot;</td>
<td>(40.0%)</td>
<td>1.39</td>
<td>0.61</td>
<td>1.000</td>
</tr>
<tr>
<td>COMMERCIAL</td>
<td>A</td>
<td>0.17</td>
<td>1.33</td>
<td>0.100</td>
<td>17</td>
</tr>
</tbody>
</table>

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.62
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.902
SUBAREA RUNOFF (CFS) = 7.54
TOTAL AREA (ACRES) = 1.56 PEAK FLOW RATE (CFS) = 7.54

END OF STUDY SUMMARY:
TOTAL AREA (ACRES) = 1.6 TC (MIN.) = 6.70
EFFECTIVE AREA (ACRES) = 1.56 AREA-AVERAGED Fm (INCH/HR) = 0.56
AREA-AVERAGED Fp (INCH/HR) = 0.62 AREA-AVERAGED Ap = 0.902
PEAK FLOW RATE (CFS) = 7.54

END OF RATIONAL METHOD ANALYSIS
PNH10PRE.RES
Pirate Cove Peninsula Improvements North
Pre-Developed
Basin 10

************************************************************************************
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Analysis prepared by:
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Fort Mohave, AZ 86426
(928)758-3333
----------------------------------------------------------------------------
FILE NAME: PNH10PRE.DAT
TIME/DATE OF STUDY: 14:11 09/11/2012
============================================================================
USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
*TIME-OF-CONCENTRATION MODEL*
USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 24.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.01
*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.5000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.9800
*ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*
*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT- /PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (FT) (n)
=== ====== ========= ============== ========================
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150
GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
   as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED
******************************************************************************
FLOW PROCESS FROM NODE 0.00 TO NODE 1.00 IS CODE = 21

>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=================================================================================
INITIAL SUBAREA FLOW-LENGTH(Feet) = 325.00
ELEVATION DATA: UPSTREAM(Feet) = 467.00 DOWNSTREAM(Feet) = 463.00
Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
Page 1
SUBAREA ANALYSIS USED MINIMUM TC(MIN.) = 7.406
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.636

SUBAREA TC AND LOSS RATE DATA(AMC I):

<table>
<thead>
<tr>
<th>DEVELOPMENT TYPE/LAND USE</th>
<th>SCS SOIL GROUP</th>
<th>AREA (ACRES)</th>
<th>Fp (INCH/HR)</th>
<th>Ap (DECIMAL)</th>
<th>SCS</th>
<th>TC (MIN.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NATURAL DESERT COVER</td>
<td>B</td>
<td>2.67</td>
<td>0.61</td>
<td>1.000</td>
<td>64</td>
<td>12.79</td>
</tr>
<tr>
<td>&quot;DESERT BRUSH&quot;</td>
<td>(40.0%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMMERCIAL</td>
<td>A</td>
<td>0.01</td>
<td>1.33</td>
<td>0.100</td>
<td>17</td>
<td>7.41</td>
</tr>
</tbody>
</table>

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.61
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.997
SUBAREA RUNOFF(CFS) = 12.13

TOTAL AREA(ACRES) = 2.68
PEAK FLOW RATE(CFS) = 12.13

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 2.7
TC(MIN.) = 7.41
EFFECTIVE AREA(ACRES) = 2.68
AREA-AVERAGED Fm(INCH/HR) = 0.61
AREA-AVERAGED Fp(INCH/HR) = 0.61
AREA-AVERAGED Ap = 0.997
PEAK FLOW RATE(CFS) = 12.13

END OF RATIONAL METHOD ANALYSIS
PNH11PRE.RES

Pirate Cove Peninsula Improvements North

Pre-Developed

Basin 11

*****************************************************************************
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ARQ Engineering, LLC
4440 S. Hwy 95, Ste. A
Fort Mohave, AZ 86426
(928)758-3333

FILE NAME: PNH11PRE.DAT
TIME/DATE OF STUDY: 14:13 09/11/2012

============================================================================
USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================

--*TIME-OF-CONCENTRATION MODEL*--
USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 24.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.01

*SPECIAL LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.5000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.9800

*ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*

<table>
<thead>
<tr>
<th>NO.</th>
<th>WIDTH (FT)</th>
<th>CROSSFALL HEIGHT (FT)</th>
<th>LIP HEIGHT (FT)</th>
<th>HIKE FACTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30.0</td>
<td>20.0</td>
<td>0.018/0.018/0.020</td>
<td>0.67</td>
</tr>
</tbody>
</table>

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
   as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

*****************************************************************************
FLOW PROCESS FROM NODE 0.00 TO NODE 1.00 IS CODE = 21

>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(Feet) = 435.00
ELEVATION DATA: UPSTREAM(Feet) = 464.50 DOWNSTREAM(Feet) = 463.50

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20

Page 1
### Subarea Analysis Used Minimum Tc(Min.) = 11.640

*100 Year Rainfall Intensity(INCH/HR) = 4.495

#### Subarea TC and Loss Rate Data(AMC I):

<table>
<thead>
<tr>
<th>Development Type/ Land Use</th>
<th>SCS Soil Group</th>
<th>Area (Acres)</th>
<th>Fp(INCH/HR)</th>
<th>Ap</th>
<th>SCS</th>
<th>Tc(MIN.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Desert Cover</td>
<td>B</td>
<td>4.12</td>
<td>0.61</td>
<td>1.000</td>
<td>64</td>
<td>20.10</td>
</tr>
<tr>
<td>Commercial</td>
<td>A</td>
<td>0.01</td>
<td>1.33</td>
<td>0.100</td>
<td>17</td>
<td>11.64</td>
</tr>
</tbody>
</table>

**Subarea Average Pervious Loss Rate, Fp(INCH/HR) = 0.61**

**Subarea Average Pervious Area Fraction, Ap = 0.998**

**Subarea Runoff(CFS) = 14.45**

**Total Area(Acres) = 4.13**

**Peak Flow Rate(CFS) = 14.45**

---

**End of Study Summary:**

- **Total Area(Acres) = 4.1**
- **TC(Min.) = 11.64**
- **Effective Area(Acres) = 4.13**
- **Area-Averaged Fm(INCH/HR) = 0.61**
- **Area-Averaged Fp(INCH/HR) = 0.61**
- **Area-Averaged Ap = 0.998**
- **Peak Flow Rate(CFS) = 14.45**

---

**End of Rational Method Analysis**
PNH12PRE.RES
Pirate Cove Peninsula Improvements North
Pre-Developed
Basin 12

***************************************************************************************************
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4440 S. Hwy 95, Ste. A
Fort Mohave, AZ 86426
(928)758-3333

FILE NAME: PNH12PRE.DAT
TIME/DATE OF STUDY: 14:16 09/11/2012

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

--*TIME-OF-CONCENTRATION MODEL*--
USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 24.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.01
*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.5000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.9800

*ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*

<table>
<thead>
<tr>
<th>NO.</th>
<th>WIDTH</th>
<th>CROSSFALL</th>
<th>IN-/OUT-/PARK-</th>
<th>HEIGHT</th>
<th>WIDTH</th>
<th>LIP</th>
<th>HIKE</th>
<th>FACTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30.0</td>
<td>20.0</td>
<td>0.018/0.018/0.020</td>
<td>0.67</td>
<td>2.00</td>
<td>0.0313</td>
<td>0.167</td>
<td>0.0150</td>
</tr>
</tbody>
</table>

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
   as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
   *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
   *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED*

FLOW PROCESS FROM NODE 0.00 TO NODE 1.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(Feet) = 428.00
ELEVATION DATA: UPSTREAM(Feet) = 479.00 DOWNSTREAM(Feet) = 462.00

Tc = K*((LENGTH** 3.00)/(ELEVATION CHANGE))**0.20

Page 1
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.54
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.997

<table>
<thead>
<tr>
<th>DEVELOPMENT TYPE/ LAND USE</th>
<th>SCS SOIL GROUP</th>
<th>AREA (ACRES)</th>
<th>Fp (INCH/HR)</th>
<th>Ap (DECIMAL)</th>
<th>SCS</th>
<th>Tc (MIN.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;DESERT BRUSH&quot; (40.0%)</td>
<td>B</td>
<td>4.72</td>
<td>0.61</td>
<td>1.000</td>
<td>64</td>
<td>11.30</td>
</tr>
<tr>
<td>COMMERCIAL</td>
<td>A</td>
<td>0.78</td>
<td>1.33</td>
<td>0.100</td>
<td>17</td>
<td>6.54</td>
</tr>
</tbody>
</table>

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.62
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.872
SUBAREA RUNOFF(CFS) = 27.00
TOTAL AREA(ACRES) = 5.50
PEAK FLOW RATE(CFS) = 27.00

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 5.5 TC(MIN.) = 6.54
EFFECTIVE AREA(ACRES) = 5.50 AREA-AVERAGED Fm(INCH/HR) = 0.54
AREA-AVERAGED Fp(INCH/HR) = 0.62 AREA-AVERAGED Ap = 0.872
PEAK FLOW RATE(CFS) = 27.00

END OF RATIONAL METHOD ANALYSIS
PNH13PRE.RES
Pirate Cove Peninsula Improvements North
Pre-Developed
Basin 13

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(928)758-3333

FILE NAME: PNH13PRE.DAT
TIME/DATE OF STUDY: 14:18 09/11/2012

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--*TIME-OF-CONCENTRATION MODEL*--
USER SPECIFIED STORM EVENT(YEAR) =  100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) =  24.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.01
*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.5000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.9800

*ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

FLOW PROCESS FROM NODE 0.00 TO NODE 1.00 IS CODE = 21

INITIAL SUBAREA FLOW-LENGTH(Feet) = 286.00
ELEVATION DATA: UPSTREAM(Feet) = 467.20 DOWNSTREAM(Feet) = 462.00

\[ Tc = K \cdot \left[ \frac{(\text{LENGTH}^2)}{(\text{ELEVATION CHANGE})} \right]^{0.20} \]
<table>
<thead>
<tr>
<th>DEVELOPMENT TYPE/ LAND USE</th>
<th>SCS SOIL GROUP</th>
<th>AREA (ACRES)</th>
<th>Fp (INCH/HR)</th>
<th>Ap (DECIMAL)</th>
<th>SCS CN</th>
<th>Tc (MIN.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NATURE DESERT COVER</td>
<td>B</td>
<td>0.61</td>
<td>0.61</td>
<td>1.000</td>
<td>64</td>
<td>11.24</td>
</tr>
<tr>
<td>COMMERCIAL</td>
<td>A</td>
<td>0.20</td>
<td>1.33</td>
<td>0.100</td>
<td>17</td>
<td>6.51</td>
</tr>
</tbody>
</table>

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.63
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.778

SUBAREA RUNOFF(CFS) = 4.02
TOTAL AREA(ACRES) = 0.81 PEAK FLOW RATE(CFS) = 4.02

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 0.8 TC(MIN.) = 6.51
EFFECTIVE AREA(ACRES) = 0.81 AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.63 AREA-AVERAGED Ap = 0.778
PEAK FLOW RATE(CFS) = 4.02

END OF RATIONAL METHOD ANALYSIS
POST REDEVELOPMENT RUN-OFF DRAINAGE CALCULATIONS
(AES HydroWIN)
PNH1PST.RES
Pirate Cove Peninsula Improvements North
Post-Developed
Basin 1

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(928)758-3333

FILE NAME: PNH1PST.DAT
TIME/DATE OF STUDY: 14:37 09/11/2012

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

--*TIME-OF-CONCENTRATION MODEL*--
USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 24.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.01
*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.5000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.9800

*ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*

<table>
<thead>
<tr>
<th>NO.</th>
<th>WIDTH</th>
<th>CROWN TO STREET-CROSSFALL</th>
<th>STREET-CROSSFALL</th>
<th>CURB GUTTER-GEOMETRIES: MANNING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(FT)</td>
<td>(FT)</td>
<td>(FT)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>30.0</td>
<td>20.0</td>
<td>0.018/0.018/0.020</td>
<td>0.67</td>
</tr>
</tbody>
</table>

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
   as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*ft/SEC)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED*

FLOW PROCESS FROM NODE 0.00 TO NODE 1.00 IS CODE = 21

 GENERAL TOTAL FLOW(FT) = 416.00
 ELEVATION DATA: UPSTREAM(FT) = 468.50 DOWNSTREAM(FT) = 463.70
 Tc = K*[((LENGTH** 3.00)/(ELEVATION CHANGE))**0.20

Page 1
**PNH1PST.RES**

SUBAREA ANALYSIS USED MINIMUM TC(MIN.) = 8.281

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.330

SUBAREA TC AND LOSS RATE DATA(AMC I):

<table>
<thead>
<tr>
<th>DEVELOPMENT TYPE/ LAND USE</th>
<th>SCS SOIL GROUP</th>
<th>AREA (ACRES)</th>
<th>Fp (INCH/HR)</th>
<th>Ap (DECIMAL)</th>
<th>SCS CN</th>
<th>TC (MIN.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NATURAL DESERT COVER</td>
<td>&quot;DESERT BRUSH&quot;</td>
<td>(40.0%) B</td>
<td>2.31</td>
<td>0.61</td>
<td>1.000</td>
<td>64</td>
</tr>
<tr>
<td>COMMERCIAL</td>
<td>A</td>
<td>0.20</td>
<td>1.33</td>
<td>0.100</td>
<td>17</td>
<td>8.28</td>
</tr>
</tbody>
</table>

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.62

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.928

SUBAREA RUNOFF(CFS) = 10.75

TOTAL AREA(ACRES) = 2.51 PEAK FLOW RATE(CFS) = 10.75

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 2.5 TC(MIN.) = 8.28

EFFECTIVE AREA(ACRES) = 2.51 AREA-AVERAGED Fm(INCH/HR) = 0.57

AREA-AVERAGED Fd(INCH/HR) = 0.62 AREA-AVERAGED Ap = 0.928

PEAK FLOW RATE(CFS) = 10.75

END OF RATIONAL METHOD ANALYSIS
PNH2PST.RES

Pirate Cove Peninsula Improvements North
Post-Developed
Basin 2

******************************************************************************
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(928)758-3333

FILE NAME: PNH2PST.DAT
TIME/DATE OF STUDY: 14:41 09/11/2012

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

--"TIME-OF-CONCENTRATION MODEL"--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 24.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.01
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.5000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.9800

ANTICIPATED MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*

<table>
<thead>
<tr>
<th>NO.</th>
<th>HALF-CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING WIDTH CROSSFALL IN-/OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150</td>
</tr>
</tbody>
</table>

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
   as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 0.00 TO NODE 1.00 IS CODE = 21

>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FT) = 122.00
ELEVATION DATA: UPSTREAM(FT) = 468.40 DOWNSTREAM(FT) = 462.90

Tc = K*[(LENGTH**3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.859

**SUBAREA Tc AND LOSS RATE DATA(AMC I):**

<table>
<thead>
<tr>
<th>DEVELOPMENT TYPE/ LAND USE</th>
<th>SCS SOIL GROUP</th>
<th>AREA (ACRES)</th>
<th>Fp (INCH/HR)</th>
<th>Ap (DECIMAL)</th>
<th>SCS</th>
<th>Tc (MIN.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NATURAL DESERT COVER</td>
<td>&quot;DESERT BRUSH&quot;</td>
<td>B</td>
<td>0.27</td>
<td>0.61</td>
<td>1.000</td>
<td>64</td>
</tr>
<tr>
<td>COMMERCIAL</td>
<td>A</td>
<td>0.14</td>
<td>1.33</td>
<td>0.100</td>
<td>17</td>
<td>5.00</td>
</tr>
</tbody>
</table>

**SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.65**

**SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.693**

**SUBAREA RUNOFF(CFS) = 2.37**

**TOTAL AREA (ACRES) = 0.41**

**PEAK FLOW RATE (CFS) = 2.37**

============================================================================

**END OF STUDY SUMMARY:**

TOTAL AREA (ACRES) = 0.4

TC (MIN.) = 5.00

EFFECTIVE AREA (ACRES) = 0.41

AREA-AVERAGED Fm (INCH/HR) = 0.45

AREA-AVERAGED Fp (INCH/HR) = 0.65

AREA-AVERAGED Ap = 0.693

PEAK FLOW RATE (CFS) = 2.37

============================================================================

END OF RATIONAL METHOD ANALYSIS
PNH3PST.RES
Pirate Cove Peninsula Improvements North
Post-Developed
Basin 3

********************************************************************************
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Analysis prepared by:
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(928)758-3333

FILE NAME: PNH3PST.DAT
TIME/DATE OF STUDY: 10:31 09/13/2012

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 24.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.01
*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.5000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.9800

*ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*

| NO. | HALF- CROWN TO STREET-CROSSFALL | CURB GUTTER-GEOMETRIES: MANNING WIDTH CROSSFALL IN-/ OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR |
|-----|--------------------------------|-------------------------------------------------|---------------------------------------------|
| 1   | 30.0                          | 20.0                                            | 0.018/0.018/0.020 0.67    2.00 0.0313 0.167 0.0150 |

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
   as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 0.00 TO NODE 1.00 IS CODE = 21

>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<
USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

INITIAL SUBAREA FLOW-LENGTH(FeET) = 307.00
ELEVATION DATA: UPSTREAM(FeET) = 468.50 DOWNSTREAM(FeET) = 466.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.863
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.470

SUBAREA Tc AND LOSS RATE DATA:

<table>
<thead>
<tr>
<th>DEVELOPMENT TYPE/LAND USE</th>
<th>SCS SOIL GROUP</th>
<th>AREA (ACRES)</th>
<th>Fp (INCH/HR)</th>
<th>Ap (DECIMAL)</th>
<th>SCS Tc (MIN.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NATURAL DESERT COVER &quot;DESERT BRUSH&quot;</td>
<td>B</td>
<td>0.76</td>
<td>0.61</td>
<td>1.000</td>
<td>64</td>
</tr>
<tr>
<td>COMMERCIAL</td>
<td>A</td>
<td>0.11</td>
<td>1.33</td>
<td>0.100</td>
<td>17</td>
</tr>
</tbody>
</table>

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.62
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.886

TOTAL AREA(ACRES) = 0.87 PEAK FLOW RATE(CFS) = 3.85

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 0.9 TC(MIN.) = 7.86
EFFECTIVE AREA(ACRES) = 0.87 AREA-AVERAGED Fm(INCH/HR)= 0.55
AREA-AVERAGED Fp(INCH/HR) = 0.62 AREA-AVERAGED Ap = 0.886
PEAK FLOW RATE(CFS) = 3.85

END OF RATIONAL METHOD ANALYSIS
Analysis prepared by:

ARQ Engineering, LLC
4440 S. Hwy 95, Ste. A
Fort Mohave, AZ 86426
(928)758-3333

FILE NAME: PNH4PST.DAT
TIME/DATE OF STUDY: 14:48 09/11/2012

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) =  100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) =  24.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.01

*SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.5000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.9800

*ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*

HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN-/ OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (FT) (n)

<table>
<thead>
<tr>
<th></th>
<th>30.0</th>
<th>20.0</th>
<th>0.018/0.018/0.020</th>
<th>0.67</th>
<th>2.00</th>
<th>0.0313</th>
<th>0.167</th>
<th>0.0150</th>
</tr>
</thead>
</table>

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
   as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 0.00 TO NODE 1.00 IS CODE = 21

>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(Feet) = 205.00
ELEVATION DATA: UPSTREAM(Feet) = 467.90 DOWNSTREAM(Feet) = 463.00

Tc = K*[(LENGTH**2.00)/(ELEVATION CHANGE)]**0.20

SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.394
PNH4PST.RES

* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 6.604

SUBAREA TC AND LOSS RATE DATA (AMC I):

<table>
<thead>
<tr>
<th>DEVELOPMENT TYPE</th>
<th>SCS SOIL</th>
<th>AREA</th>
<th>Fp</th>
<th>Ap</th>
<th>SCS</th>
<th>TC</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAND USE</td>
<td>GROUP</td>
<td>(ACRES)</td>
<td>(INCH/HR)</td>
<td>DECIMAL</td>
<td>CN</td>
<td>(MIN.)</td>
</tr>
<tr>
<td>NATURAL DESERT COVER</td>
<td>&quot;DESERT BRUSH&quot;</td>
<td>(40.0%)</td>
<td>B</td>
<td>4.07</td>
<td>0.61</td>
<td>1.000</td>
</tr>
<tr>
<td>COMMERCIAL</td>
<td>A</td>
<td>0.49</td>
<td>1.33</td>
<td>0.100</td>
<td>17</td>
<td>5.39</td>
</tr>
</tbody>
</table>

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.62
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.903

SUBAREA RUNOFF (CFS) = 24.81
TOTAL AREA (ACRES) = 4.56 PEAK FLOW RATE (CFS) = 24.81

END OF STUDY SUMMARY:
TOTAL AREA (ACRES) = 4.6 TC (MIN.) = 5.39
EFFECTIVE AREA (ACRES) = 4.56 AREA-AVERAGED Fm (INCH/HR) = 0.56
AREA-AVERAGED Fp (INCH/HR) = 0.62 AREA-AVERAGED Ap = 0.903
PEAK FLOW RATE (CFS) = 24.81

END OF RATIONAL METHOD ANALYSIS
PNH5PST.RES

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Analysis prepared by:

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(928)758-3333

FILE NAME: PNH5PST.DAT
TIME/DATE OF STUDY: 14:51 09/11/2012

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 24.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.01
*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.5000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.9800

ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD

*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*

<table>
<thead>
<tr>
<th>NO.</th>
<th>WIDTH (FT)</th>
<th>CROSSFALL (FT)</th>
<th>SIDE / SIDE / WAY</th>
<th>STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING</th>
<th>HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30.0</td>
<td>20.0</td>
<td>0.018 / 0.018 / 0.020</td>
<td>0.67</td>
<td>2.00</td>
</tr>
</tbody>
</table>

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
   as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 0.00 TO NODE 1.00 IS CODE = 21

>>> RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

INITIAL SUBAREA FLOW-LENGTH(FT) = 345.00
ELEVATION DATA: UPSTREAM(FT) = 467.90 DOWNSTREAM(FT) = 463.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.371

Page 1
* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 5.649

SUBAREA Tc AND LOSS RATE DATA (AMC I):

<table>
<thead>
<tr>
<th>DEVELOPMENT TYPE/ LAND USE</th>
<th>SCS SOIL GROUP</th>
<th>AREA (ACRES)</th>
<th>Fp (INCH/HR)</th>
<th>Ap (DECIMAL)</th>
<th>SCS Tc (MIN.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NATURAL DESERT COVER &quot;DESSERT BRUSH&quot;</td>
<td>B</td>
<td>2.24</td>
<td>0.61</td>
<td>1.00</td>
<td>64</td>
</tr>
<tr>
<td>COMMERCIAL</td>
<td>A</td>
<td>0.27</td>
<td>1.33</td>
<td>0.10</td>
<td>17</td>
</tr>
</tbody>
</table>

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.62
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.903
SUBAREA RUNOFF (CFS) = 11.50

TOTAL AREA (ACRES) = 2.51
PEAK FLOW RATE (CFS) = 11.50

END OF STUDY SUMMARY:

TOTAL AREA (ACRES) = 2.5
TC (MIN.) = 7.37
EFFECTIVE AREA (ACRES) = 2.51
AREA-AVERAGED Fp (INCH/HR) = 0.62
AREA-AVERAGED Ap = 0.903
PEAK FLOW RATE (CFS) = 11.50

END OF RATIONAL METHOD ANALYSIS
Analysis prepared by:
ARQ Engineering, LLC
4440 S. Hwy 95, Ste. A
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(928)758-3333

FILE NAME: PNH6PST.DAT
TIME/DATE OF STUDY: 14:54 09/11/2012

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) =  100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) =  24.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.01
*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.5000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.9800

*ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*

<table>
<thead>
<tr>
<th>NO.</th>
<th>WIDTH (FT)</th>
<th>CROSSFALL IN-/OUT-/PARK-HIGH</th>
<th>HEIGHT (FT)</th>
<th>LIP (FT)</th>
<th>HIKE FACTOR</th>
<th>MANNING</th>
<th>CROSSFALL (FT)</th>
<th>GOVERING SIDE</th>
<th>WIDTH (FT)</th>
<th>PARK HEIGHT (FT)</th>
<th>SIDE</th>
<th>LIP (FT)</th>
<th>HIKE FACTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30.0</td>
<td>20.0</td>
<td>0.018/0.018/0.020</td>
<td>0.67</td>
<td>2.00 0.0313 0.167 0.0150</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
   as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED*

FLOW PROCESS FROM NODE 0.00 TO NODE 1.00 IS CODE = 21

INITIAL SUBAREA FLOW-LENGTH(FT) = 275.00
ELEVATION DATA: UPSTREAM(FT) = 466.20 DOWNSTREAM(FT) = 460.00

\[ Tc = K^*[(\text{LENGTH}**3.00)/(\text{ELEVATION CHANGE})]^{**0.20} \]

SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.138
PNH6PRE.RES

* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 6.191

SUBAREA Tc AND LOSS RATE DATA (AMC I):

<table>
<thead>
<tr>
<th>DEVELOPMENT TYPE/</th>
<th>SCS SOIL GROUP</th>
<th>AREA (ACRES)</th>
<th>Fp (INCH/HR)</th>
<th>Ap (DECIMAL)</th>
<th>SCS Tc (MIN.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAND USE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NATURAL DESERT COVER</td>
<td>B</td>
<td>1.11</td>
<td>0.61</td>
<td>1.000</td>
<td>64</td>
</tr>
<tr>
<td>&quot;DESERT BRUSH&quot; (40.0%)</td>
<td>A</td>
<td>0.13</td>
<td>1.33</td>
<td>0.100</td>
<td>17</td>
</tr>
</tbody>
</table>

SUBAREA AVERAGE PERVERIOUS LOSS RATE, Fp(INCH/HR) = 0.62

SUBAREA AVERAGE PERVERIOUS AREA FRACTION, Ap = 0.906

SUBAREA RUNOFF (CFS) = 6.28

TOTAL AREA (ACRES) = 1.24

PEAK FLOW RATE (CFS) = 6.28

============================================================================

END OF STUDY SUMMARY:

TOTAL AREA (ACRES) = 1.2
TC (MIN.) = 6.14

EFFECTIVE AREA (ACRES) = 1.24
AREA-AVERAGED Fm (INCH/HR) = 0.56

AREA-AVERAGED Fp (INCH/HR) = 0.62
AREA-AVERAGED Ap = 0.906

PEAK FLOW RATE (CFS) = 6.28

============================================================================

END OF RATIONAL METHOD ANALYSIS

♀
PNH7PST.RES

Pirate Cove Peninsula Improvements North
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******************************************************************************
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Analysis prepared by:
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4440 S. Hwy 95, Ste. A
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(928)758-3333

-----------------------------------------------------------------------------
FILE NAME: PNH7PST.DAT
TIME/DATE OF STUDY: 14:57 09/11/2012
-----------------------------------------------------------------------------
USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
-----------------------------------------------------------------------------
--"TIME-OF-CONCENTRATION MODEL"--
USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 24.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.01
*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.5000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.9800
*ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*
*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN-/ OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) HIKE (n)
=== ====== ========= ================ ====== ===== ======== ====== ======== ======== ======== ======== ======== ======== ===============
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
   as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 0.00 TO NODE 1.00 IS CODE = 21
-----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
-----------------------------------------------------------------------------
INITIAL SUBAREA FLOW-LENGTH(Feet) = 483.00
ELEVATION DATA: UPSTREAM(Feet) = 468.00 DOWNSTREAM(Feet) = 464.00
Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.394
Page 1
PNH7PST.RES

* 100 YEAR RAINFALL INTENSITY (INCH/HR) =  5.004

SUBAREA Tc AND LOSS RATE DATA (AMC I):

<table>
<thead>
<tr>
<th>DEVELOPMENT TYPE/ LAND USE</th>
<th>SCS SOIL GROUP</th>
<th>AREA (ACRES)</th>
<th>Fp (INCH/HR)</th>
<th>Ap (DECIMAL)</th>
<th>SCS Tc (MIN.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NATURAL DESERT COVER</td>
<td>&quot;DESERT BRUSH&quot; (40.0%)</td>
<td>B</td>
<td>2.69</td>
<td>0.61</td>
<td>1.000</td>
</tr>
<tr>
<td>COMMERCIAL</td>
<td></td>
<td>A</td>
<td>0.39</td>
<td>1.33</td>
<td>0.100</td>
</tr>
</tbody>
</table>

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.62
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.886
SUBAREA RUNOFF (CFS) = 12.35
TOTAL AREA (ACRES) = 3.08
PEAK FLOW RATE (CFS) = 12.35

END OF STUDY SUMMARY:
TOTAL AREA (ACRES) = 3.1
TC (MIN.) = 9.39
EFFECTIVE AREA (ACRES) = 3.08
AREA-AVERAGED Fm (INCH/HR) = 0.55
AREA-AVERAGED Fp (INCH/HR) = 0.62
AREA-AVERAGED Ap = 0.886
PEAK FLOW RATE (CFS) = 12.35

END OF RATIONAL METHOD ANALYSIS
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Analysis prepared by:
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4440 S. Hwy 95, Ste. A
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(928)758-3333

FILE NAME: PNH8PST.DAT
TIME/DATE OF STUDY: 14:59 09/11/2012

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

--*TIME-OF-CONCENTRATION MODEL*--
USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 24.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.01
*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.5000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.9800

*ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
<table>
<thead>
<tr>
<th>NO.</th>
<th>HALF-CROWN (FT)</th>
<th>STREET-CROSSFALL (FT)</th>
<th>CURB GUTTER-GEOMETRIES</th>
<th>MANNING</th>
<th>WIDTH</th>
<th>CROSSFALL</th>
<th>IN-/ OUT-/PARK- HEIGHT</th>
<th>WIDTH LIP</th>
<th>HIKE</th>
<th>FACTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30.0</td>
<td>20.0</td>
<td></td>
<td></td>
<td>0.018</td>
<td>0.018/0.020</td>
<td>0.67</td>
<td>2.00</td>
<td>0.0313</td>
<td>0.167</td>
</tr>
</tbody>
</table>

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
   as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*ft/ft)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 0.00 TO NODE 1.00 IS CODE = 21

>>>RAITONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

INITIAL SUBAREA FLOW-LENGTH(FT) = 358.00
ELEVATION DATA: UPSTREAM(FT) = 467.00 DOWNSTREAM(FT) = 462.50

Tc = K*[(LENGTH**3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.666

Page 1
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.539

SUBAREA Tc AND LOSS RATE DATA(AMC  I):

<table>
<thead>
<tr>
<th>DEVELOPMENT TYPE</th>
<th>SCS SOIL GROUP</th>
<th>AREA (ACRES)</th>
<th>Fp (INCH/HR)</th>
<th>Ap (DECIMAL)</th>
<th>SCS Tc (MIN.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NATURAL DESERT COVER</td>
<td>&quot;DESERT BRUSH&quot; (40.0%)</td>
<td>B</td>
<td>3.47</td>
<td>0.61</td>
<td>1.000</td>
</tr>
<tr>
<td>COMMERCIAL</td>
<td>A</td>
<td>0.39</td>
<td>1.33</td>
<td>0.100</td>
<td>17</td>
</tr>
</tbody>
</table>

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.62
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.909
SUBAREA RUNOFF(CFS) = 17.29
TOTAL AREA(ACRES) = 3.86 PEAK FLOW RATE(CFS) = 17.29

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 3.9 TC(MIN.) = 7.67
EFFECTIVE AREA(ACRES) = 3.86 AREA-AVERAGED Fm(INCH/HR) = 0.56
AREA-AVERAGED Fp(INCH/HR) = 0.62 AREA-AVERAGED Ap = 0.909
PEAK FLOW RATE(CFS) = 17.29

END OF RATIONAL METHOD ANALYSIS
PNH9PST.RES

Pirate Cove Peninsula Improvements North
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Analysis prepared by:
ARQ Engineering, LLC
4440 S. Hwy 95, Ste. A
Fort Mohave, AZ 86426
(928)758-3333

FILE NAME: PNH9PST.DAT
TIME/DATE OF STUDY: 15:10 09/11/2012

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 24.00
SPECIFIED PERCENT OF GRADIENTS(DEcimal) TO USE FOR FRICTION SLOPE = 0.01
*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.5000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.9800

*ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*

<table>
<thead>
<tr>
<th>NO.</th>
<th>HALF- CROWN TO STREET-CROSSFALL</th>
<th>CURB GUTTER-GEOMETRIES: MANNING Width</th>
<th>CROSSFALL IN- / OUT-/PARK- HEIGHT</th>
<th>WIDTH</th>
<th>LIP HIKE FACTOR</th>
<th>(n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30.0</td>
<td>20.0</td>
<td>0.018/0.018/0.020</td>
<td>0.67</td>
<td>2.00</td>
<td>0.0313 0.167 0.0150</td>
</tr>
</tbody>
</table>

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
   as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 0.00 TO NODE 1.00 IS CODE = 21

>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 286.00
ELEVATION DATA: UPSTREAM(FeET) = 467.00 DOWNSTREAM(FeET) = 462.50

Tc = K*[(LENGTH**3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.700

Page 1
* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 5.925

SUBAREA Tc AND LOSS RATE DATA (AMC I):

<table>
<thead>
<tr>
<th>DEVELOPMENT TYPE/ LAND USE</th>
<th>SCS SOIL GROUP</th>
<th>AREA (ACRES)</th>
<th>Fp (INCH/HR)</th>
<th>Ap (DECIMAL)</th>
<th>SCS</th>
<th>Tc (MIN.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NATURAL DESERT COVER</td>
<td>&quot;DESERT BRUSH&quot;</td>
<td>(40.0%)</td>
<td>1.41</td>
<td>0.61</td>
<td>1.000</td>
<td>64</td>
</tr>
<tr>
<td>COMMERCIAL</td>
<td>A</td>
<td>0.14</td>
<td>1.33</td>
<td>0.100</td>
<td>17</td>
<td>6.70</td>
</tr>
</tbody>
</table>

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.62
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.919
SUBAREA RUNOFF (CFS) = 7.48
TOTAL AREA (ACRES) = 1.55 PEAK FLOW RATE (CFS) = 7.48

END OF STUDY SUMMARY:
TOTAL AREA (ACRES) = 1.5 Tc (MIN.) = 6.70
EFFECTIVE AREA (ACRES) = 1.55 AREA-AVERAGED Fm (INCH/HR) = 0.57
AREA-AVERAGED Fp (INCH/HR) = 0.62 AREA-AVERAGED Ap = 0.919
PEAK FLOW RATE (CFS) = 7.48

END OF RATIONAL METHOD ANALYSIS
PNH10PST.RES

Pirate Cove Peninsula Improvements North
Post-Developed
Basin 10

*********************************************************************
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FILE NAME: PNH10PST.DAT
TIME/DATE OF STUDY: 15:13 09/11/2012

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT (YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE (INCH) = 24.00
SPECIFIED PERCENT OF GRADIENTS (DECIMAL) TO USE FOR FRICTION SLOPE = 0.01
*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
SLOPE OF INTENSITY DURATION CURVE (LOG(I;IN/HOUR) vs. LOG(Tc;MIN)) = 0.5000
USER SPECIFIED 1-HOUR INTENSITY (INCH/HOUR) = 1.9800

*ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*

<table>
<thead>
<tr>
<th>NO.</th>
<th>Width</th>
<th>Crossfall</th>
<th>In-/ Out-/ Park-</th>
<th>Height</th>
<th>Width</th>
<th>Lip</th>
<th>Hike Factor</th>
<th>Manning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30.0</td>
<td>20.0</td>
<td>0.018/0.018/0.020</td>
<td>0.67</td>
<td>2.00</td>
<td>0.0313</td>
<td>0.167</td>
<td>0.0150</td>
</tr>
</tbody>
</table>

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
   as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED*

FLOW PROCESS FROM NODE 0.00 TO NODE 1.00 IS CODE = 21

>>> RATIONAL METHOD INITIAL SUBAREA ANALYSIS <<<<<
>> USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA <<

INITIAL SUBAREA FLOW-LENGTH (FEET) = 325.00
ELEVATION DATA: UPSTREAM (FEET) = 467.00 DOWNSTREAM (FEET) = 463.00

Tc = K*[(LENGTH**3.00)/ELEVATION CHANGE]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.406

Page 1
* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 5.636

SUBAREA Tc AND LOSS RATE DATA (AMC I):

<table>
<thead>
<tr>
<th>DEVELOPMENT TYPE/ LAND USE</th>
<th>SCS SOIL GROUP</th>
<th>AREA (ACRES)</th>
<th>Fp (INCH/HR)</th>
<th>Ap (DECIMAL)</th>
<th>SCS Tc (MIN.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NATURAL DESERT COVER</td>
<td>&quot;DESERT BRUSH&quot; (40.0%)</td>
<td>B</td>
<td>2.41</td>
<td>0.61</td>
<td>1.000</td>
</tr>
<tr>
<td>COMMERCIAL</td>
<td>A</td>
<td>0.27</td>
<td>1.33</td>
<td>0.100</td>
<td>17</td>
</tr>
</tbody>
</table>

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.62
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.909
SUBAREA RUNOFF (CFS) = 12.24
TOTAL AREA (ACRES) = 2.68 PEAK FLOW RATE (CFS) = 12.24

END OF STUDY SUMMARY:
TOTAL AREA (ACRES) = 2.7 TC (MIN.) = 7.41
EFFECTIVE AREA (ACRES) = 2.68 AREA-AVERAGED Fm (INCH/HR) = 0.56
AREA-AVERAGED Fp (INCH/HR) = 0.62 AREA-AVERAGED Ap = 0.909
PEAK FLOW RATE (CFS) = 12.24

END OF RATIONAL METHOD ANALYSIS
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Analysis prepared by:
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(928)758-3333

FILE NAME: PNH11PST.DAT
TIME/DATA OF STUDY: 15:15 09/11/2012

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

--*TIME-OF-CONCENTRATION MODEL*--
USER SPECIFIED STORM EVENT(YEAR) =  100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) =  24.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.01
*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.5000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.9800
*ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*

<table>
<thead>
<tr>
<th>NO.</th>
<th>WIDTH</th>
<th>CROSSFALL</th>
<th>IN-</th>
<th>OUT-</th>
<th>SIDE</th>
<th>HEIGHT</th>
<th>WIDTH</th>
<th>LIP</th>
<th>HIKE</th>
<th>FACTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30.0</td>
<td>20.0</td>
<td>0.018</td>
<td>0.018</td>
<td>0.020</td>
<td>0.67</td>
<td>2.00</td>
<td>0.0313</td>
<td>0.167</td>
<td>0.0150</td>
</tr>
</tbody>
</table>

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
   as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
   *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
   *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 0.00 TO NODE 1.00 IS CODE = 21

>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(Feet) = 435.00
ELEVATION DATA: UPSTREAM(Feet) = 464.50 DOWNSTREAM(Feet) = 463.50

Tc = K*[(LENGTH**3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.640
* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 4.495

SUBAREA Tc AND LOSS RATE DATA (AMC I):

<table>
<thead>
<tr>
<th>DEVELOPMENT TYPE/ LAND USE</th>
<th>SCS SOIL GROUP</th>
<th>AREA (ACRES)</th>
<th>Fp (INCH/HR)</th>
<th>Ap (DECIMAL)</th>
<th>SCS</th>
<th>Tc (MIN.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NATURAL DESERT COVER</td>
<td>&quot;DESERT BRUSH&quot;</td>
<td>3.71</td>
<td>0.61</td>
<td>1.000</td>
<td>64</td>
<td>20.10</td>
</tr>
<tr>
<td>COMMERCIAL</td>
<td>A</td>
<td>0.43</td>
<td>1.33</td>
<td>0.100</td>
<td>17</td>
<td>11.64</td>
</tr>
</tbody>
</table>

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.62
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.907
SUBAREA RUNOFF (CFS) = 14.66

TOTAL AREA (ACRES) = 4.14 PEAK FLOW RATE (CFS) = 14.66

END OF STUDY SUMMARY:
TOTAL AREA (ACRES) = 4.1 TC (MIN.) = 11.64
EFFECTIVE AREA (ACRES) = 4.14 AREA-AVERAGED Fm (INCH/HR) = 0.56
AREA-AVERAGED Fp(INCH/HR) = 0.62 AREA-AVERAGED Ap = 0.907
PEAK FLOW RATE (CFS) = 14.66

END OF RATIONAL METHOD ANALYSIS
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4440 S. Hwy 95, Ste. A
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(928)758-3333

FILE NAME: PNH12PST.DAT
TIME/DATE OF STUDY: 15:18 09/11/2012

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

--*TIME-OF-CONCENTRATION MODEL*--
USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 24.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.01

USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.5000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.9800

*ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*

<table>
<thead>
<tr>
<th>NO.</th>
<th>HALF- CROWN TO STREET-CROSSFALL:</th>
<th>CURB GUTTER-GEOMETRIES:</th>
<th>MANNING WIDTH CROSSFALL</th>
<th>IN-/ OUT-/PARK- HEIGHT</th>
<th>WIDTH</th>
<th>LIP</th>
<th>HIKE FACTOR</th>
<th>(n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30.0</td>
<td>20.0</td>
<td>0.018/0.018/0.020</td>
<td>0.67</td>
<td>2.00</td>
<td>0.0313</td>
<td>0.167</td>
<td>0.0150</td>
</tr>
</tbody>
</table>

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
   as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 0.00 TO NODE 1.00 IS CODE = 21

>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(Feet) = 428.00
ELEVATION DATA: UPSTREAM(Feet) = 479.00 DOWNSTREAM(Feet) = 462.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.541
Page 1
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.997

SUBAREA Tc AND LOSS RATE DATA(AMC I):

<table>
<thead>
<tr>
<th>DEVELOPMENT TYPE/ LAND USE</th>
<th>SCS SOIL GROUP</th>
<th>AREA (ACRES)</th>
<th>Fp (INCH/HR)</th>
<th>Ap (DECIMAL)</th>
<th>SCS Tc (MIN.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NATURAL DESERT COVER &quot;DESERT BRUSH&quot;</td>
<td>B</td>
<td>4.89</td>
<td>0.61</td>
<td>1.000</td>
<td>64</td>
</tr>
<tr>
<td>COMMERCIAL</td>
<td>A</td>
<td>0.61</td>
<td>1.33</td>
<td>0.100</td>
<td>17</td>
</tr>
</tbody>
</table>

SUBAREA AVERAGE Pervious Loss Rate, Fp(INCH/HR) = 0.62
SUBAREA AVERAGE Pervious Area Fraction, Ap = 0.900
SUBAREA RUNOFF(CFS) = 26.93
TOTAL AREA(ACRES) = 5.50 PEAK FLOW RATE(CFS) = 26.93

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 5.50 TC(MIN.) = 6.54
EFFECTIVE AREA(ACRES) = 5.50 AREA-AVERAGED Fm(INCH/HR) = 0.56
AREA-AVERAGED Fp(INCH/HR) = 0.62 AREA-AVERAGED Ap = 0.900
PEAK FLOW RATE(CFS) = 26.93

END OF RATIONAL METHOD ANALYSIS
Analysis prepared by:

ARQ Engineering, LLC
4440 S. Hwy 95, Ste. A
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(928)758-3333

FILE NAME: PNH13PST.DAT
TIME/DATE OF STUDY: 15:20 09/11/2012

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
   as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*ft/FEET)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED*

FLOW PROCESS FROM NODE 0.00 TO NODE 1.00 IS CODE = 21
* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 6.012

<table>
<thead>
<tr>
<th>LAND USE</th>
<th>SCS SOIL GROUP</th>
<th>AREA (ACRES)</th>
<th>Fp (INCH/HR)</th>
<th>Ap (DECIMAL)</th>
<th>CN</th>
<th>Tc (MIN)</th>
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</thead>
<tbody>
<tr>
<td>NATURAL DESERT COVER</td>
<td>&quot;DESERT BRUSH&quot;</td>
<td>0.66</td>
<td>0.61</td>
<td>1.000</td>
<td>64</td>
<td>11.24</td>
</tr>
<tr>
<td>COMMERCIAL</td>
<td>A</td>
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<td>1.33</td>
<td>0.100</td>
<td>17</td>
<td>6.51</td>
</tr>
</tbody>
</table>

**SUBAREA RUNOFF (CFS) = 4.00**

**TOTAL AREA (ACRES) = 0.81**  
**PEAK FLOW RATE (CFS) = 4.00**

END OF STUDY SUMMARY:

**TOTAL AREA (ACRES) = 0.8**  
**TC (MIN) = 6.51**

**EFFECTIVE AREA (ACRES) = 0.81**  
**AREA-AVERAGED Fm (INCH/HR) = 0.52**

**AREA-AVERAGED Fp (INCH/HR) = 0.63**  
**AREA-AVERAGED Ap = 0.833**

**PEAK FLOW RATE (CFS) = 4.00**

END OF RATIONAL METHOD ANALYSIS
PRE/POST REDEVELOPMENT RUNOFF VOLUMES CALCULATIONS  
(SBC DRAINAGE MANUAL)
**Runoff volume Estimation**

The catchment yield fraction will be used to approximate the total runoff produced from a 24-hour duration precipitation event. The basis of this determination is the curve number approach which provides a rainfall-runoff relationship. This method is used per the San Bernardino County Drainage Manual.

\[ P_{2,24} = 1.19 \]
\[ P_{10,24} = 2.03 \] Using 5yr rainfall = 1.64
\[ P_{25,24} = 2.60 \] Using 10yr rainfall = 2.03
\[ P_{100,24} = 3.58 \] Using 25yr rainfall = 2.60

SCS CN for Pervious Areas - Natural Desert Cover “Desert Brush” 40% = 64

SCS CN for Impervious Areas - Commercial Development = 17

\[
S \text{ (Soil Capacity)} = \frac{1000}{CN} - 10  \\
I_a = (0.2)S
\]

\[
Y_1 = \frac{(P_{24}-I_a)^2}{(P_{24}-I_a+S)P_{24}}  \\
Y_2 = (Y_1 \times \text{area pervious%}) + (Y_1 \times \text{area impervious%})
\]

Volume = \( Y_2P_{24}A(0.0833) \)

**Example:**

BASIN A  
\( A = 1.12 \text{ac.} \)

\[ Y_2 = (0.117 \times 0.85) + (0.474 \times 0.15) = 0.171 \]

\[
CN \text{ PERV} = 64  \\
CN \text{ IMPERV} = 17
\]

\[ \text{AREA} \% \text{ PERVIOUS} = 0.85 \]
\[ \text{AREA} \% \text{ IMPERVIOUS} 0.15 \]

\[
S_{\text{perv}} = \frac{1000}{64} - 10 = 5.625  \\
S_{\text{imperv}} = \frac{1000}{17} - 10 = 48.823
\]

\[
I_{a\text{perv}} = (0.2)5.625 = 1.125  \\
I_{a\text{imperv}} = (0.2)48.823 = 9.765
\]

\[
Y_{1,\text{perv}} = \frac{(2.6-1.125)^2}{(2.6-1.125+5.625)2.6} = 0.117  \\
Y_{1,\text{imperv}} = \frac{(2.6-9.765)^2}{(2.6-9.765+48.823)2.6} = 0.474
\]

\[ V = (0.171)(2.6)(1.12)(0.0833) = 0.0415 \text{ Ac/ft} \]
PRE REDEVELOPMENT RUN-OFF VOLUME CALCULATIONS
(SBC Drainage Manual)
## PARK MOABI NORTH PENINSULA

### PIRATE COVE REDEVELOPMENT PROJECT

#### PARK MOABI - SAN BERNARDINO PARKS DEPARTMENT

**PRE-DEVELOPED CALCULATIONS FOR VOLUME**

**P = 2 YR, 24 HR**

**USING 2 YEAR RAINFALL**

---

### SAN BERNARDINO VOLUME CALCULATIONS

<table>
<thead>
<tr>
<th>BASIN ID</th>
<th>RAINFALL</th>
<th>SCS CN PRE</th>
<th>SCS CN PRE</th>
<th>AREA</th>
<th>AREA</th>
<th>SOIL CAPACITY</th>
<th>SOIL CAPACITY</th>
<th>la</th>
<th>la</th>
<th>YIELD</th>
<th>YIELD</th>
<th>SUB-AREA YIELD-PRE</th>
<th>VOLUME PRE</th>
<th>VOLUME PRE</th>
<th>AC/FT</th>
<th>CU/FT</th>
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<tbody>
<tr>
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<td>64</td>
<td>17</td>
<td>0.95</td>
<td>0.05</td>
<td>5.63</td>
<td>48.82</td>
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<td>9.76</td>
<td>0.001</td>
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<td>0.08</td>
<td>0.020</td>
<td>883.05</td>
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<tr>
<td>2</td>
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<td>17</td>
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<td>0.02</td>
<td>5.63</td>
<td>48.82</td>
<td>1.13</td>
<td>9.76</td>
<td>0.001</td>
<td>1.535</td>
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<td>0.002</td>
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<td>17</td>
<td>1.00</td>
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**P = 10 YR, 24 HR**

**Using 5 Year Rainfall**
## PARK MOABI NORTH PENINSULA
### PIRATE COVE REDEVELOPMENT PROJECT
#### PARK MOABI - SAN BERNARDINO PARKS DEPARTMENT

**PRE-DEVELOPED CALCULATIONS FOR VOLUME**

**P = 25 YR, 24 HR**

**USING 10 YEAR RAINFALL**

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**SAN BERNARDINO VOLUME CALCULATIONS**

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TOTAL POST 100 1.148 50003.78
September 21, 2015

John Swett
Program Manager
Lower Colorado River
Multi Species Conservation Program
Boulder City, NV

Subject: No Lake or Streambed Alteration Agreement Needed
Mohave Valley Conservation Area Backwater Project

Dear Mr. Swett:

The California Department of Fish and Wildlife (Department) has participated with the potential project applicant, the United States Bureau of Reclamation (USBR), in pre-application consultation regarding the proposed project to create back water habitat within the boundary of the Moabi Regional Park, between river miles 237 and 236. The Department and USBR considered the range of actions, potential alternatives, mitigation measures and any potential significant effects on the biological resources of the proposed project. We have determined that your project is not subject to the notification requirement in Fish and Game Code Section 1602, including payment of the notification fee.

The Department has also determined that your project will not substantially adversely affect an existing fish or wildlife resource. As a result, you will not need a Lake or Streambed Alteration Agreement for your project. You are responsible for complying with all applicable local, state, and federal laws in completing your work. A copy of this letter should be available at all times at the work site.

Please note that if you change your project so that it differs materially from the proposed project as described prior to September 21, 2015, you will need to initiate pre-application consultation or submit a Notification and corresponding fee to the Department.

Thank you for notifying us of your project. If you have any questions, please contact Richard Kim at (760) 922-6783 or Richard.Kim@wildlife.ca.gov.

Sincerely,

Chris Hayes
Deputy Regional Manager

Conserving California’s Wildlife Since 1870