

RECLAMATION

Managing Water in the West

Draft Environmental Assessment

Upland Wash Sediment Control Project



U.S. Department of the Interior
Bureau of Reclamation
Yuma Area Office
Yuma, Arizona

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Mission Statements

The U.S. Department of the Interior protects America's natural resources and heritage, honors our cultural and tribal communities, and supplies the energy to power our future.

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.

Environmental Assessment

Upland Wash Sediment Control Project

Prepared by

**United States Department of the Interior
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Acronyms and Abbreviations

AGFD	Arizona Game and Fish Department
APE	Area of Potential Effect
BMPs	Best Management Practices
BLM	Bureau of Land Management
CFR	Code of Federal Regulations
CRFWLS	Colorado River Front Work and Levee System
CVCA	Cibola Valley Conservation Area
CWA	Clean Water Act
EA	Environmental Assessment
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FONSI	Finding of No Significant Impact
ITAs	Indian Trust Assets
LCR	Lower Colorado River
MSCP	Multi-Species Conservation Program
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO _x	Nitrogen Oxides
NRHP	National Register of Historic Places
NWR	National Wildlife Refuge
O ₃	Ozone
O&M	Operation and Maintenance
OHWM	Ordinary High Water Mark
PM ₁₀	Particulate Matter that is 10 microns in diameter or less
POLs	Petroleum, Oil, and Lubricants
PVER	Palo Verde Ecological Reserve
Reclamation	Bureau of Reclamation
River	Colorado River
RM	River Mile
SHPO	State Historic Preservation Office
US	United States
USFWS	United States Fish and Wildlife Service
USACE	United States Army Corps of Engineers
VOCs	Volatile Organic Compounds
YAO	Yuma Area Office
YCR	Yuma clapper rail

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1.0 Purpose of and Need for Proposed Action

1.1 Introduction

The Bureau of Reclamation (Reclamation) has prepared this environmental assessment (EA) to evaluate potential impacts associated with the proposed upland wash fans sediment control project. This EA was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 (42 UCS 4321 et seq.), the Council on Environmental Quality regulations (40 CFR 1500-1508) for implementing NEPA, and the Department of the Interior's NEPA Regulations (43 CFR Part 46), and Reclamation Manual NEPA Policy (ENV P03). Reclamation is the lead Federal agency pursuant to NEPA.

1.2 Location

Six sites have been identified along the lower Colorado River (LCR), in the vicinity of Blythe, California. The project is located in the Parker and Palo Verde Divisions of the LCR. The project sites lie on both the Arizona and California sides of the river in La Paz and Riverside Counties, at approximate River Miles 105.7 and 105.9 for Gould Wash South site, 106.5 for Gould Wash North site, 107.4 for Mule Wash South site, 110.1 for Mule Wash North site, 142.8 for Paradise Point Wash site and 151.7 for Quien Sabe Wash site. See Figures 1 through 3 for project locations.

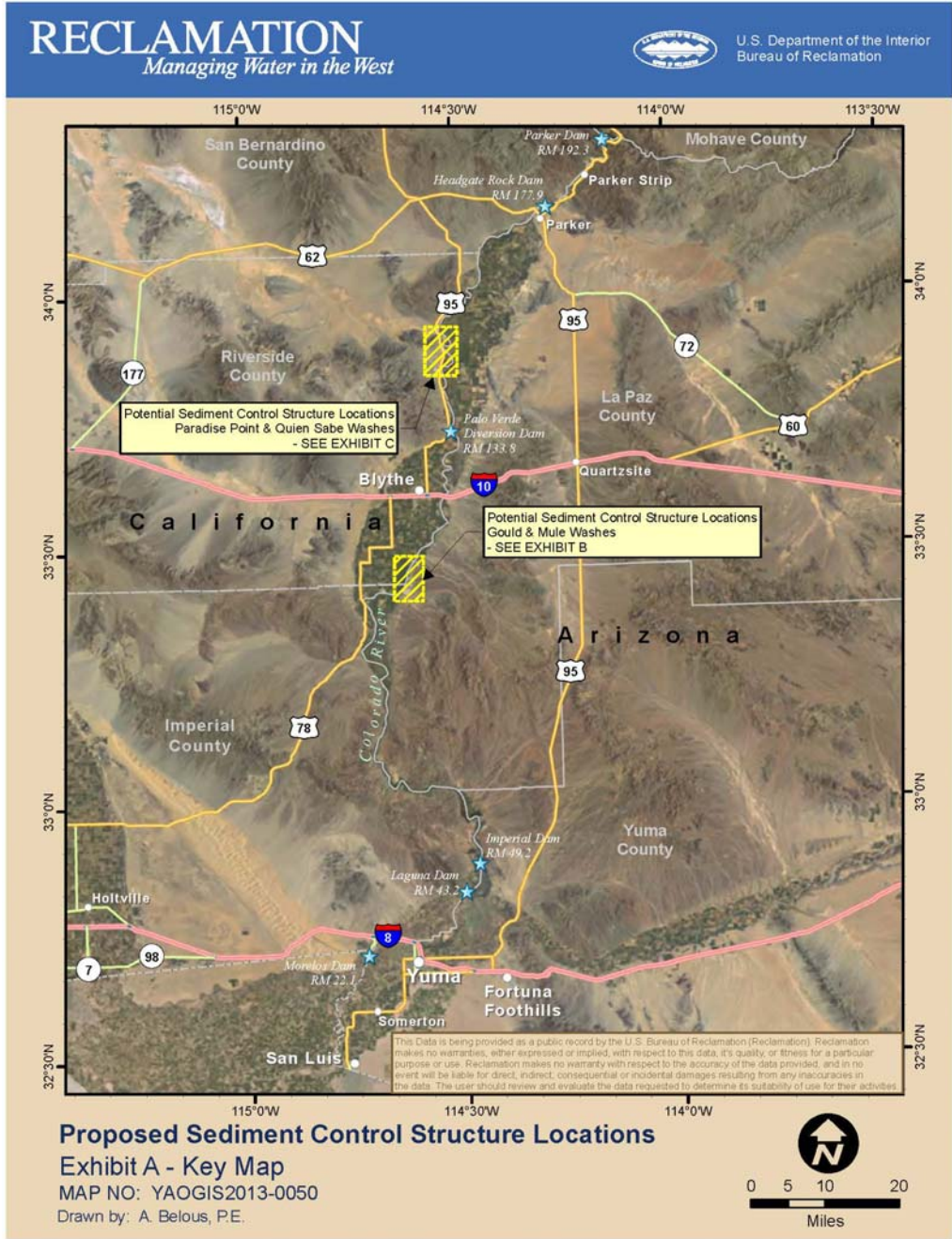
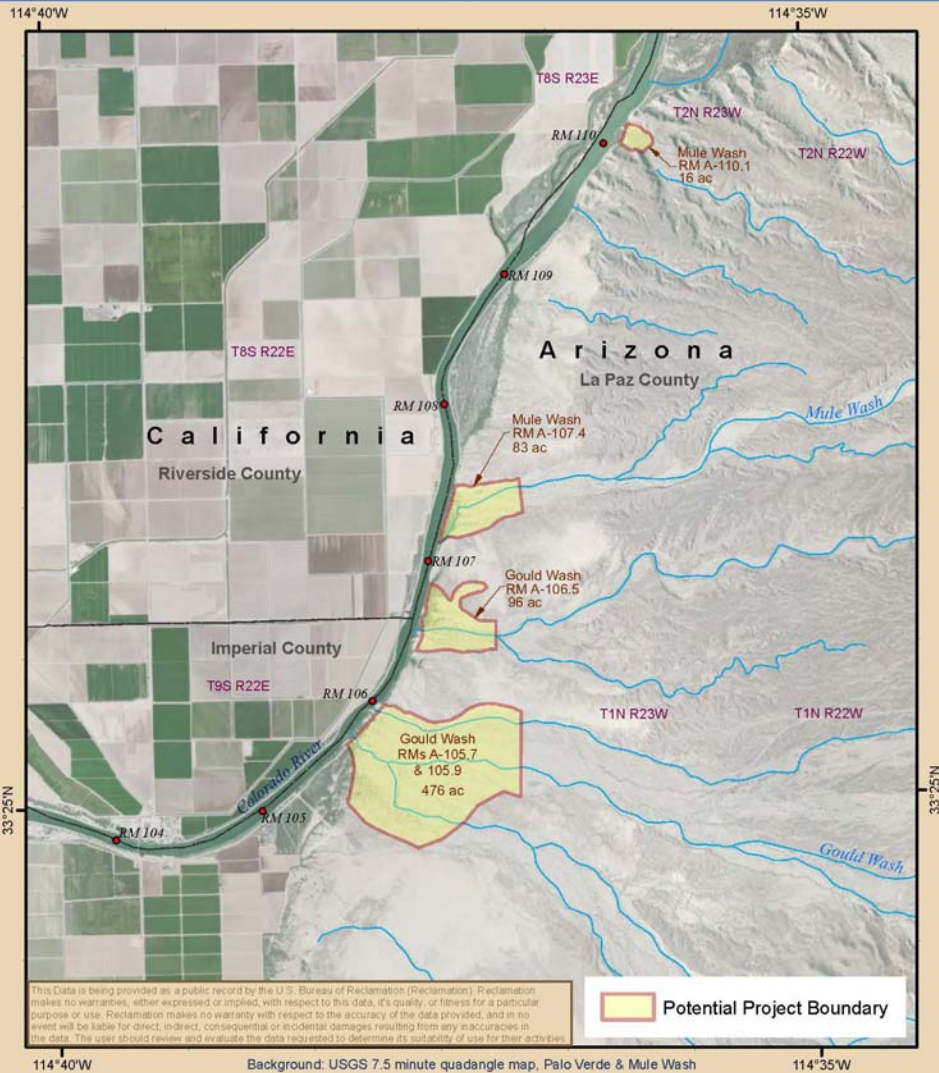


Figure 1. Location Map



Potential Sediment Control Structure Locations
Exhibit B - Gould & Mule Washes
MAP NO: YAOGIS2013-0051
Drawn by: A. Belous, P.E.
Revised 12/23/2014

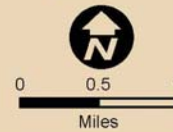


Figure 2. Site Map – Arizona sites area of potential effect (APE).

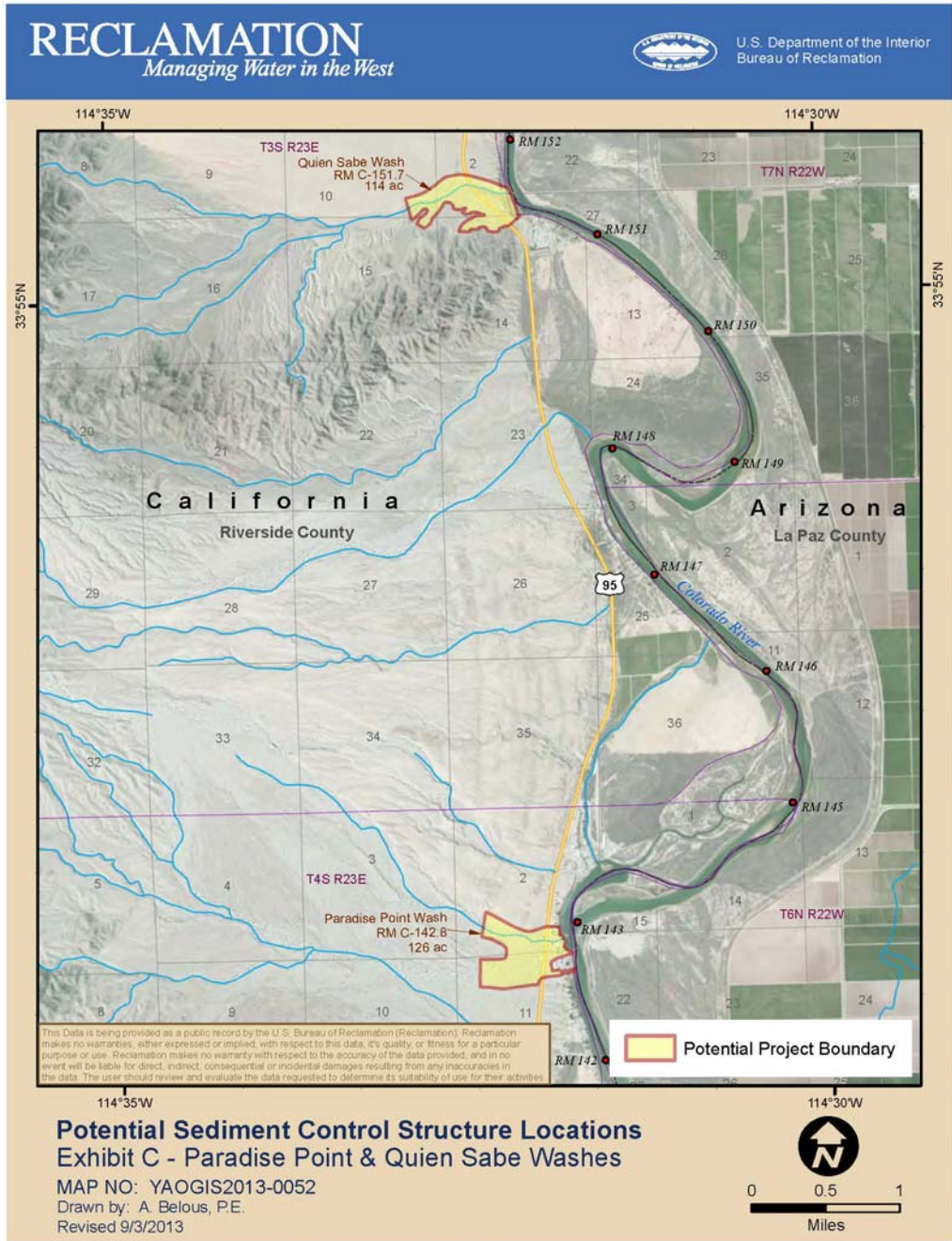


Figure 3. Site Map – California sites APE.



Photo 1. Quien Sabe Wash site (RM 151.7) facing west.



Photo 2. Quien Sabe Wash site facing east. Note Colorado River in background.



Photo 3. Paradise Point Wash site (RM 142.8) facing west.



Photo 4. Paradise Point Wash site facing east towards Colorado River.



Photo 5. Mule Wash (RM 110.1) site facing east.



Photo 6. Mule Wash South (RM 107.4) site facing east.



Photo 7. Mule Wash South (RM 107.4) site facing southeast from bluff to north.



Photo 8. Gould Wash North (RM 106.5) site facing east. Note off road vehicle impacts to wash area.



Photo 9. Gould Wash South (RM 105.7) site facing east.



Photo 10. Gould Wash South (RM 105.7) site facing east.

1.3 Background

Rainfall events have the potential to cause flooding within normally dry washes along the Colorado River (River). Wash flows can transport large volumes of sediment which are deposited into the River channel in the form of wash fans. United States Bureau of Reclamation (Reclamation) personnel identified several large wash fans at the outlets of the Quien Sabe, Paradise Point, Mule, and Gould Washes in southwestern Arizona and southeastern California. Over the past 14 years, Reclamation has periodically removed sediment from these locations. Sediment amounts ranged from 2,500 cubic yards up to 16,000 cubic yards of material. These wash fans have reduced the channel capacity of the River, caused localized sedimentation issues, and are directing concentrated, high-velocity flows towards opposing banklines and bankline structures. Bankline structures are vital to protect adjacent private, tribal, and public lands and facilities. Currently, the River does not possess sufficient stream power to transport all sizes of wash fan material downstream to maintain a clear channel to ensure continued and reliable water operations. If not removed, the wash fans will increase in size causing flows to further impinge upon opposing banklines, possibly resulting in bank failure and damage to adjacent lands and facilities. Wash fans could also pose navigational hazards to the general public, who use the river system for recreational purposes.

Reclamation obtains permits and routinely deploys heavy equipment within river channel boundaries to remove large wash fans. With constrained budgets, fish and wildlife considerations, permitting requirements, and a limited timeframe for removal (November through January), it has become a heightened challenge to address and remove wash fans in this manner.

1.4 Purpose and Need

Reclamation needs a solution to decrease the maintenance activity involving wash fans along the River. Reclamation proposes to reduce or eliminate wash fan deposition by constructing upland sediment control structures. The purpose of constructing upland control structures is to capture upland sediment before it reaches the River channel, therefore reducing the amount of maintenance required to operate the river efficiently and effectively. Capturing and controlling sediment prior to its introduction into the River has the potential to minimize channel constrictions, thus maintaining more efficient channel capacities for water delivery. Reducing wash fan deposits within the River channel should lessen the need to deploy heavy equipment into the River channel to conduct removal operations, minimizing impacts to bankline soils, aquatic species, and riparian vegetation.

1.5 Determinations to be Made

This EA will be distributed to appropriate decision-makers within Reclamation for review to determine whether a Finding of No Significant Impact (FONSI) is appropriate. This decision will be based on a determination that all potential impacts are either not significant or can be reduced to not significant levels through the implementation of mitigation measures. If any potential impacts are considered significant and cannot be avoided or reduced to not significant levels, the preparation and processing of an Environmental Impact Statement is required.

2.0 Alternatives Considered

This chapter describes the alternatives considered for the proposed Upland Wash Sediment Control Project activities. It includes the Proposed Action and No Action alternatives.

2.1 No Action Alternative

NEPA guidelines require that an EA evaluate the “No Action” alternative in addition to the Proposed Action. The no action alternative provides a basis for comparison of the environmental consequences of the Proposed Action. In this EA, the no action alternative assumes that the Project would not occur and the selected wash fans would be removed and maintained in the current manner.

Under the No Action alternative, upland wash sediment control structures would not be constructed and the river would continue to be maintained with heavy equipment by removing material after it enters the River.

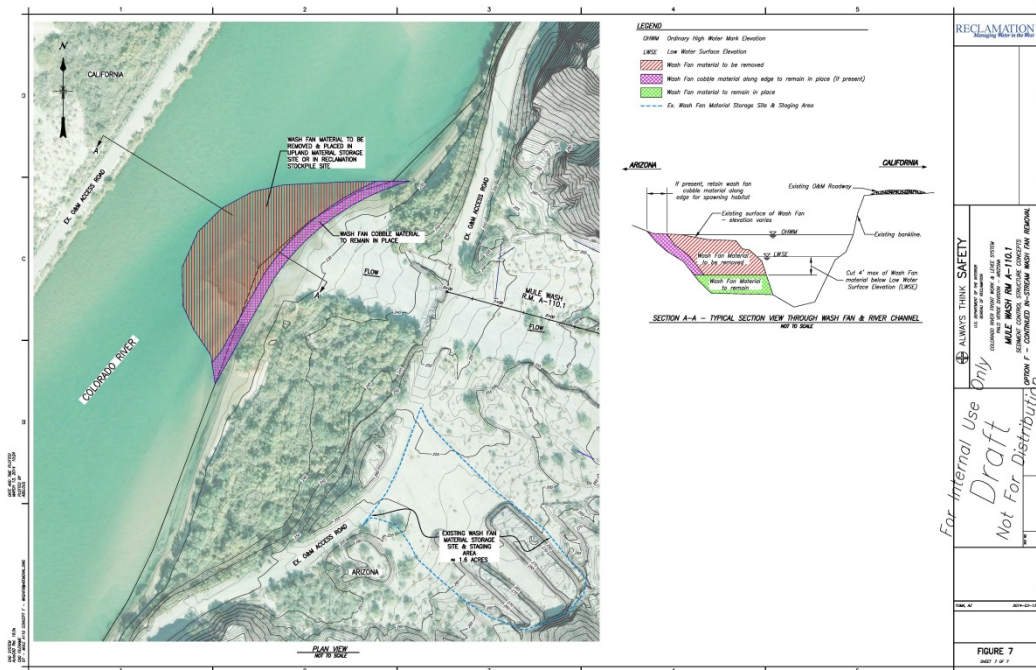


Figure 4. In Stream Removal

2.2 Proposed Site Action

2.2.1 Alternative A - Debris Fences

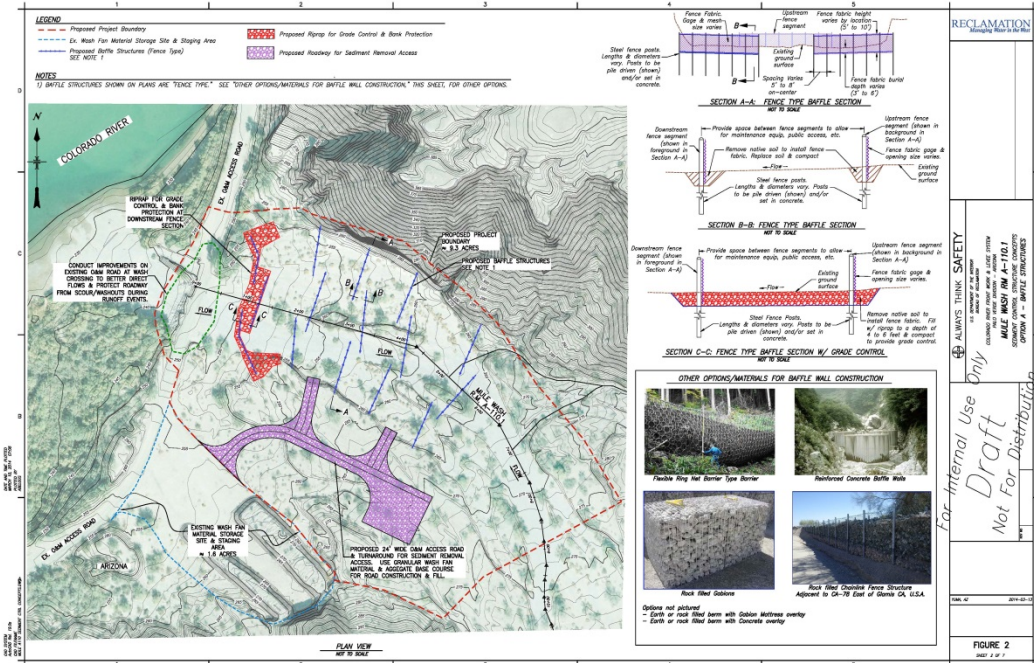


Figure 5. Debris Fence, Mule Wash Site

Six sites have been identified for construction of upland sediment control structures. However, of the six sites, three have been selected for implementation, Mule Wash north located at RM 110.1, Paradise Point located at RM 142.8, and Quien Sabe located at RM 151.7. These three wash areas were selected based on higher critical needs for protecting adjacent banklines and adjacent facilities.

The remaining wash sites will be implemented at later dates after the first three sites have been constructed and evaluated. Site specific analysis and follow-up coordination and consultations with resource and regulatory agencies will be conducted at a future date when the three remaining upland wash areas are proposed for construction.

Debris Barriers

Debris barriers are used to capture or reduce the volume of sediment, cobbles, large rocks, boulders and floating debris that are entrained by high-velocity flows. The structures are set perpendicular to the direction of flow and extend across the entire width of the channel. In general one or more debris barriers are placed in series to capture material. Examples include debris fences and debris barrier walls.

Debris Fences

Debris fences are permeable, fence type barriers used to dissipate the energy of sediment and debris laden flood flows. The two types of debris fences discussed herein are rigid and flexible debris fences.

Rigid Debris Fences

Rigid debris fences are constructed using vertical posts that are set in concrete foundations or are pile driven. Diameters and post thickness vary depending on flow velocities and expected impacts from entrained debris. The posts may or may not be interlinked using fence fabric and/or wire mesh.

Advantages from a river management perspective are: the structures do not impound water and allow smaller debris to pass through and enter the river channel, which provide spawning habit for fish.

Selection of fence fabric, post dimensions, and foundation design require careful analyses as these features are subject to failure due to high velocities and entrained debris. Heavy gage coated steel posts or piles similar to those used in “open grid-type check dams” are recommended as they have proven to be effective, durable measures.



Photo 11. A debris rack/fence (no fence fabric) used to capture material upstream of a culvert. Photo courtesy of the Federal Highway Administration.

<http://www.fhwa.dot.gov/engineering/hydraulics/pubs/04016/hec0905.cfm>

Flexible Debris Fences

High-strength flexible ring-net barriers are a form of flexible fencing that is used to capture debris and mudflow deposits while allowing pore water and smaller sediments to pass through. The performance of these structures was analyzed in areas of the Pyreneese in Erill and Portaine, Spain. The results indicated that the barriers were able to sustain debris volumes of about 25,000 cubic-meters (33,000 cubic-yards) from multiple events (Geobrugg AG, 2010). According to Geobrugg AG, use of this option versus traditional concrete structures yields a cost-savings of about 30 to 50 percent.

Advantages from a river management perspective are: the structures do not impound water and allow smaller debris to pass through and enter the river channel, which provide spawning habit for fish.



Photo 12. A flexible ring-net barrier that is impounding debris. Notice the sediment laden water that is passing through the structure. Source: <http://www.geobrugg.com>

Debris Barrier Walls

Debris barrier walls are constructed across canyon mouths in Southern California in areas subject to mudslides. The walls are typically constructed using large timbers supported by rails set in a concrete foundation. Many of these structures were placed as temporary measures; however, it was documented that both filled and unfilled barriers as old as 15-years, were observed to be in good condition in the San Gabriel Mountains near Glendora, California (United States Army Corps of Engineers (USACE) 1993).



Photo 13: Debris Barrier Wall in Southern California.
Source: USACE (1993) Assessment of Structural Flood-Control Measures on Alluvial Fans

2.2.1.1 Construction Activities (Mule Wash North RM 110.1)

Structures will be constructed in order to capture sediment behind the fences. Fences would be constructed by driving poles and stringing a wire mesh fence along its length (see Figure 5).

Debris fence structures are proposed to be approximately five feet tall with one and half feet below existing grade and three and a half feet above existing grade placed perpendicular to the flow of the stream. Fences are designed to be approximately 100 feet long varying in lengths between 96 and 128 feet with a width of under six inches. A total of 15 debris fence structures will be placed within the Mule Wash North site. Each fence will be supported by metal poles 20 feet long spaced at eight foot intervals. Poles are proposed to be driven approximately 15 feet deep with five feet of poles supporting fence with approximately three and a half feet of pole above existing grade. Variations in the number and size of fences may vary from site to site but the main design features will be used at each site. Trenches for fencing will be backfilled with native material. Some vegetation grubbing will be required but will be minimized to the extent practical. No riparian trees or wetland vegetation will be impacted.

Bankline headwalls are a component of the proposed structure. Riprap will be buried in trenches two feet deep with one foot of material exposed for a total depth of three feet of riprap along bankline headwalls. This feature will serve as grade control, bank protection and access road. Approximately 1,600 cubic yards of riprap will be placed.

The site also incorporates the improvement of existing access roads to bring materials to the sites and access the wash areas. Some sections of the road will be built above grade with fill, while other sections will be cut into grade. Lengths of roads would be about 500 feet in length and 24 feet wide. Existing roads and trails, including staging area will be established outside the wash areas.

In addition, staging areas for equipment and refueling will be established within the access roads. Staging areas will encompass an approximate area of 200 by 200 feet. Staging area would be located away from the wash area. Accumulated material will be placed in upland sites.

Equipment expected to be used during construction activities will be dozers, excavators, crane, haul trucks, water trucks, and service trucks.

2.2.1.2 Maintenance Activities

Once construction activities are completed, Reclamation will perform operation and maintenance (O&M) activities on the facilities periodically, as needed, to maintain function of the structures. O&M activities would consist of the periodic removal of accumulated sediment from behind the structures, repair of fence structures, and upgrades to existing access roads. Material removed will be used for improving and/or rebuilding access roads in the area.

2.2.2 Alternative B - Check Dams

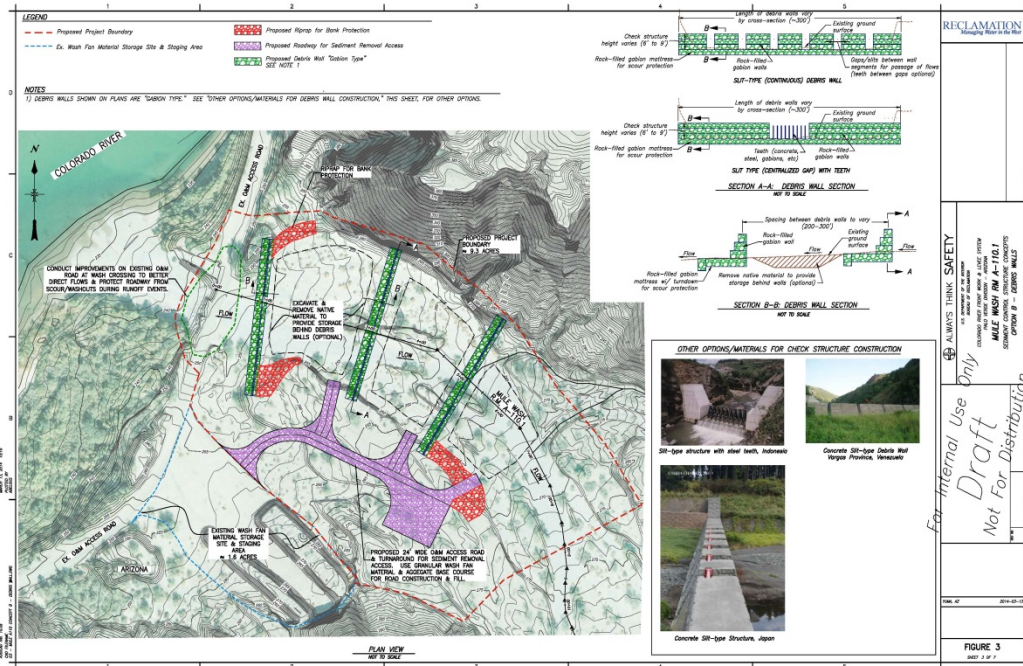


Figure 6. Check Dam

Closed-type (continuous) and open-type (discontinuous) are two types of check dams that are being considered for installation within ephemeral tributaries of the Lower Colorado River. The following subsections discuss both types of check dams as well as construction materials.

Closed-Type (Continuous) Check Dam

Closed-type check dams are installed across the width of ephemeral stream channels and are usually placed in series. The structures reduce the energy of flash flood flows and in doing such, capture material entrained within. Closed check dams are commonly used to control debris flows in Southern California, Colorado, Italy, Spain, Switzerland, Japan and other countries within the Asian-Pacific. Due to the continuous close-type construction, all material is impounded behind the structure unless flows overtop the notched weir. Material captured may be removed via heavy equipment and placed in temporary material storage sites for future use. The structures are generally equipped with downstream toe protection and/or energy dissipation measures.

昭和42年災害前後の住吉川五助堰堤(上流側から)



Photo 14. Closed-type concrete check dam in Sumiyoshi River, Rokko Mountain, Japan, 1967.
Source: Mizuyama, T (2008) Structural Countermeasures for Debris Flow Disasters

Discontinuous Open-Type Check Dams

Discontinuous open-type check dams extend across the width of the channel; however, unlike close-type check dams these structures have one or more vertical openings that extend from the base of the dam, upward to the overflow weir elevation. The openings allow power water and smaller debris to flow through the structures while trapping larger debris behind them. Like closed type check dams, these structures are usually placed in series. Open-type check dams are commonly used to control debris flows in Japan and other countries within the Asian-Pacific. From a river management perspective, open-type check dams are preferred over closed-type check dams as they have the potential to allow smaller cobbles to pass through and enter the river channel, thus providing material for fish spawning habitat. Material captured behind these check dams may be removed via heavy equipment and placed in temporary material storage sites for future use. The structures are generally equipped with downstream toe protection and/or energy dissipation measures.

General types of open-type check dams are slit-type and grid-type shown in Figure 6.



Photo 15. Slit-type check dam in Vargas Province, Venezuela
Source: <http://www.sabo-int.org/projects/venezuela.html>



Photo 16. Open grid-type check dam
Source: Mizuyama, T (2008) *Structural Countermeasures for Debris Flow Disasters*

Check Dam Material Options

Options for construction include loose-rock, wire-rock (gabion), mass concrete, and reinforced concrete, and masonry. Reclamation will focus on the gabions and reinforced concrete options.

Rock-and-Wire (Gabions)

Rock-and-wire structures, also known as gabions, are wire mesh baskets filled with rock, crushed concrete, or other suitable materials to form flexible, permeable, monolithic structures.

Past experience in Los Angeles area water sheds proved that rock-and-wire structures are more durable than loose-rock structures; however, there were cases where continuous impacts from entrained debris broke the wire mesh causing

failures of these structures. The New Year's Eve Flood of 1934 resulted in the numerous failures, which led to their abandonment.

Despite this type of event, gabions continue to be used throughout the world for applications such as check dams, channel lining, and retaining walls. Manufacturing methods have improved and options such as heavy gage wire, double twisted hexagonal mesh, and different grades of protective coatings exist. Gabions are both permeable and flexible and can conform better to settlement than loose rock, concrete, or masonry type structures. Past failures during the New Year's Eve Flood of 1934 did not elaborate on whether or not downstream toe protection was provided. In the event that gabions were used, rock-filled Reno mattresses would be placed downstream of the check dams to protect against undercutting.

Advantages of the gabion method include permeability of the structure walls, flexibility and strength, and the accessibility/availability of fill material (rock from stockpile sites and/or recycled material from wash fan material storage sites). Gabions are a viable option and are recommended for consideration.



Photo 17. Gabion check dam in Moranbah, Queensland, Australia. Notice the Reno-mattress placed downstream of the check structure for scour protection. Photo by Prospect Contractors, Australia. http://www.prospectcontractors.com.au/anglo_coal.html

Reinforced Concrete

Construction of reinforced concrete check dams entails setting forms, placing and tying reinforcing steel, and placing concrete to create continuous impervious walls across the washes of concern. The walls require a continuous, reinforced concrete footing and a scour protection pad with a turned down edge to prevent head-cutting and failure.

Parameters such as the size and spacing of reinforcing steel, wall and footing thicknesses, and the height and length of the structures would vary at each site and would depend on variables such as topography and hydraulic conditions. As discussed in the previous section, Japan has an interest in using reinforced concrete versus mass concrete since it is more capable of withstand impacts from entrained debris.

Large quantities of concrete and reinforcing steel are not stocked at Reclamation's Yuma Area Office and would require procurement. Concrete trucks and equipment would need to be deployed to the sites and in some remote areas access may be difficult and not cost effective. Despite some of these challenges reinforced concrete walls have been used successfully and are a possible alternative.

2.2.2.1 Construction Activities

Check structure debris walls would be constructed out of gabion baskets formed by using wire baskets and filling them with rocks of various sizes. A notch or comb design will be implemented on the top edge of the debris wall to capture large sediments such as rocks or boulders, allowing smaller particles to continue downstream over or through the structure.

Check dam structures will consist of a series of wire gabion baskets that will be filled with rock. The fill material for gabion baskets would be obtained from existing stockpiles at each project area. The gabions will be stacked and wired together to form a continuous water permeable structure that will span the wash channel. Intermittent gaps between the check structure segments will allow passage of flows.

The structures will be located near the mouth, the midway point, and the upper most section of each wash in order to capture sediment from rain storm events. Spacing between check structures will be approximately 200 and 300 feet apart. To address concerns that structures are not undercut by flood water, the gabion foundation of each structure will be installed on a one foot thick, nine foot wide gabion mattress installed by trenching below the existing grade of the wash channel. In situ materials will provide a stable base for structure construction, however any unsuitable base materials found will be removed and replaced with compacted granular backfill. Because the structures will be constructed to span the wash channels, the trenches dug for their foundation may vary between 300 and 400 feet long and after they are filled with rock they will be approximately 10 feet wide.

Equipment expected to be used during construction activities will be dozers, excavators, crane, haul trucks, water trucks, and service trucks.

Headwalls, access roads and road crossings will be similar to debris fence design in 2.2.1.1.

2.2.2.2 Maintenance Activities

Once construction activities are completed, Reclamation will perform O&M activities on the facilities periodically, as needed, to maintain function of the structures. O&M activities would consist of removal of accumulated sediment from behind the structures, repair of structures, and upgrades to existing access roads. Accumulated material will be placed in upland sites. Material removed will be used for improving/rebuilding access roads in the area.

2.2.3 Alternative C – Flexible Approach

Reclamation's third alternative, Alternative C or Flexible approach, entails using a combination of the two above mentioned structure types at each location depending on site characteristics and watershed drainage.

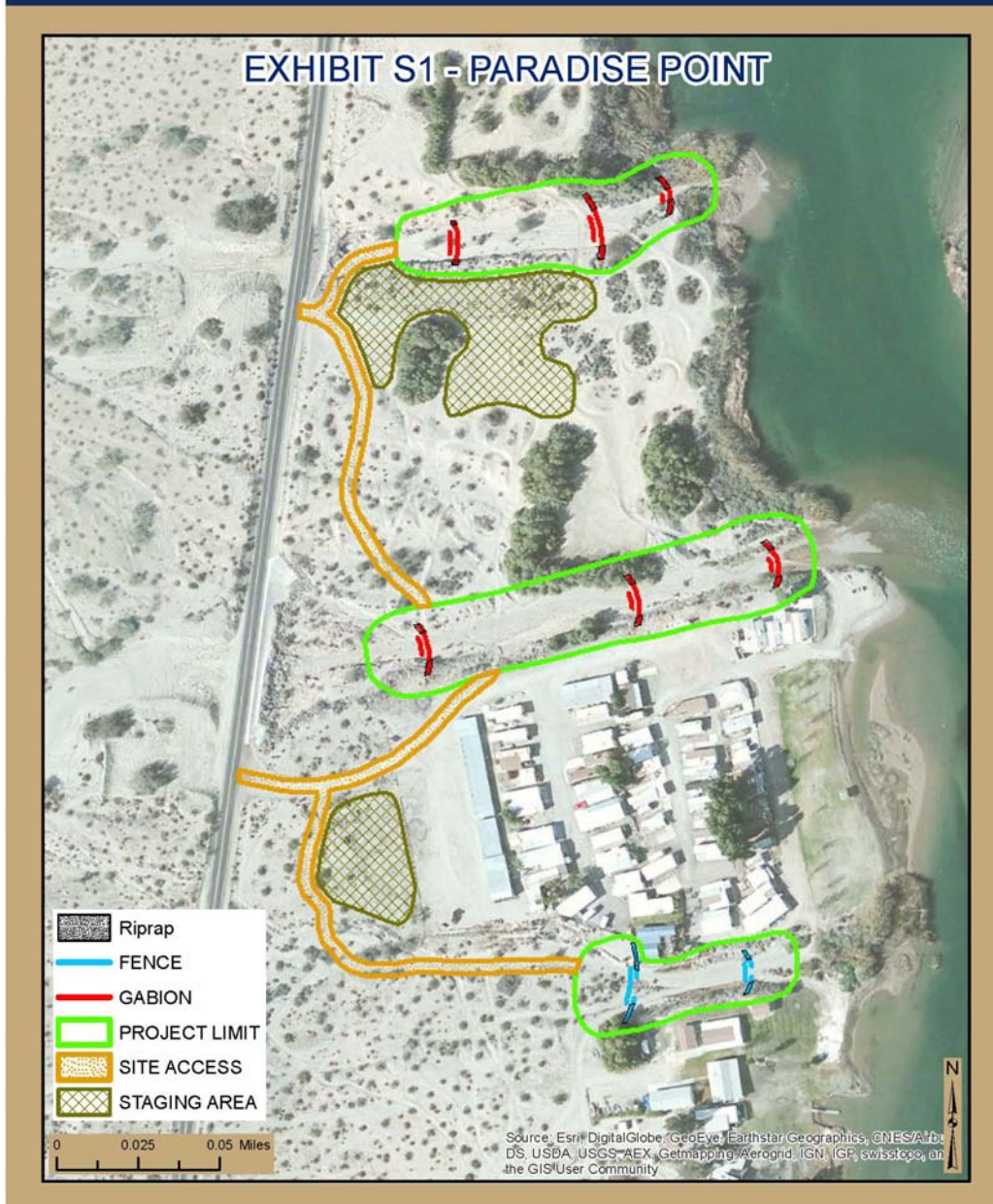


Figure 7. Paradise Point Wash site

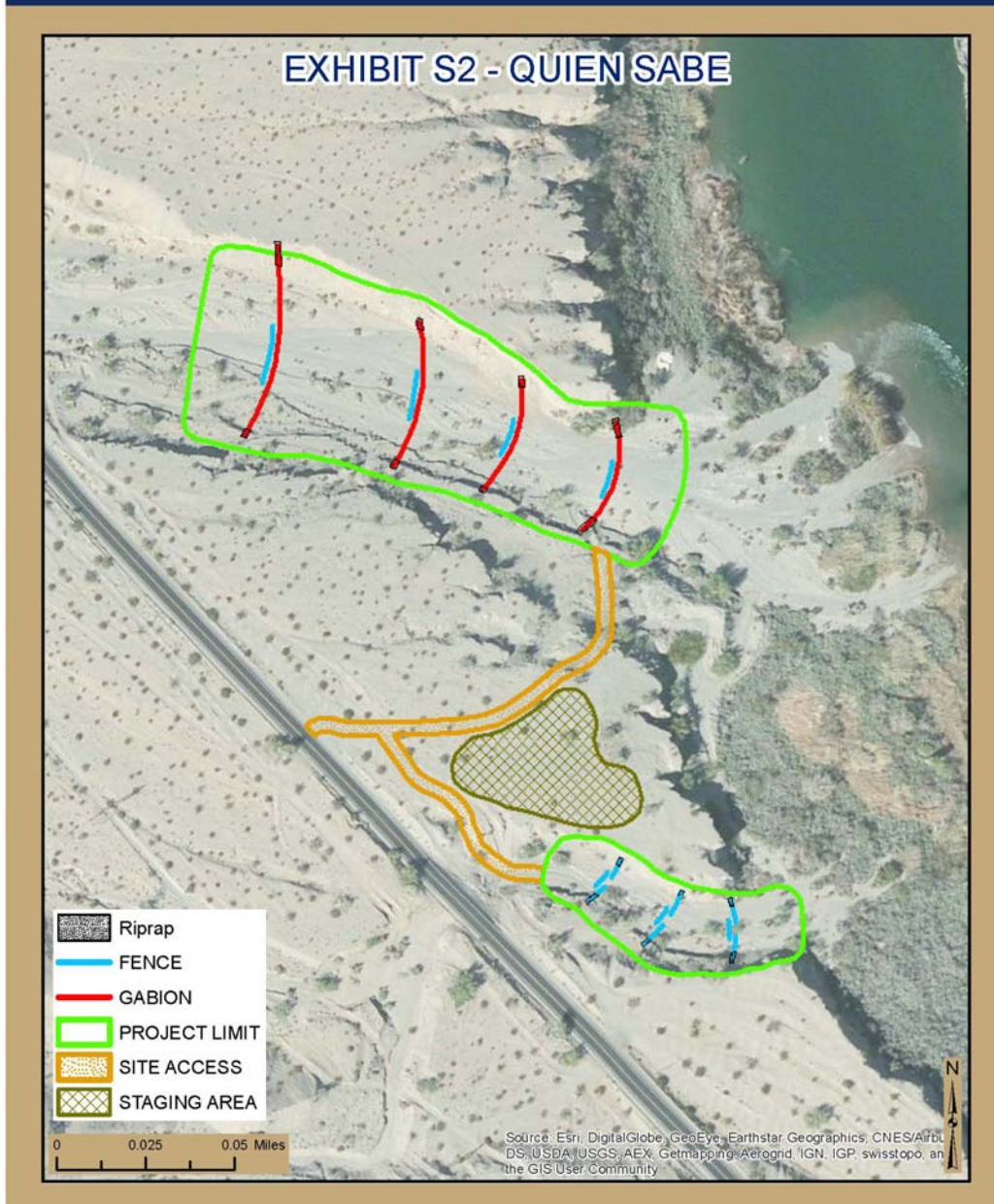


Figure 8. Quien Sabe Wash site

2.2.3.1 Construction Activities (Paradise Point and Quien Sabe)

Paradise Point Wash will consist of installing a series of gabion and debris fences within the wash area (see Figure 7). Twelve gabion and six debris fence sediment control structures will be installed within three separate fingers of the wash. In order to minimize impacts to higher upland areas, all construction activities will be conducted between Highway 95 and the river. Gabion structures lengths will vary between a minimum of 12 feet and a maximum of 107 feet. After the gabion

structures are filled with rock, their average width will be six feet (above grade). Approximately 1,214 cubic yards of riprap will be used as fill material for the gabion structures. Debris fence lengths will vary between a minimum of 14 feet and a maximum of 59 feet. Debris fence structures are proposed to be approximately 7 feet tall with 1 foot below existing grade and 6 feet above existing grade placed perpendicular to the flow of the stream. In order to prevent erosion, bank protection (riprap) will be placed at the end points of each structure that abuts the wash banks. A total of 144 cubic yards of riprap will be used for bank protection.

Quien Sabe Wash will also consist of installing a series of gabion and debris fences within the wash area see Figure 8. Four gabion and 13 debris fence sediment control structures will be installed within two separate fingers of the wash. In order to minimize impacts to higher upland areas, all construction activities will be conducted between Highway 95 and the river. Gabion structures lengths will vary between a minimum of 178 feet and a maximum of 250 feet. After the gabion structures are filled with rock, their average width will be six feet above existing grade. Approximately 1,666 cubic yards of riprap will be used to fill the gabion structures. Debris fence lengths will vary between a minimum of 24 feet and a maximum of 80 feet. Debris fence structures are proposed to be approximately 7 feet tall with 1 foot below existing grade and 6 feet above existing grade placed perpendicular to the flow of the stream. In order to prevent erosion, bank protection (riprap) will be placed at the end points of each structure that abuts the wash bank. A total of 116 cubic yards of riprap will be used for bank protection. Please see Figure 9 for cross sections of gabion and debris fence structures to be used at Paradise Point and Quien Sabe.

Equipment expected to be used during construction activities will be; Dozers, excavators, crane, haul trucks, water trucks, and service trucks.

Access roads and road crossings will be similar to debris fence design in 2.2.1.1

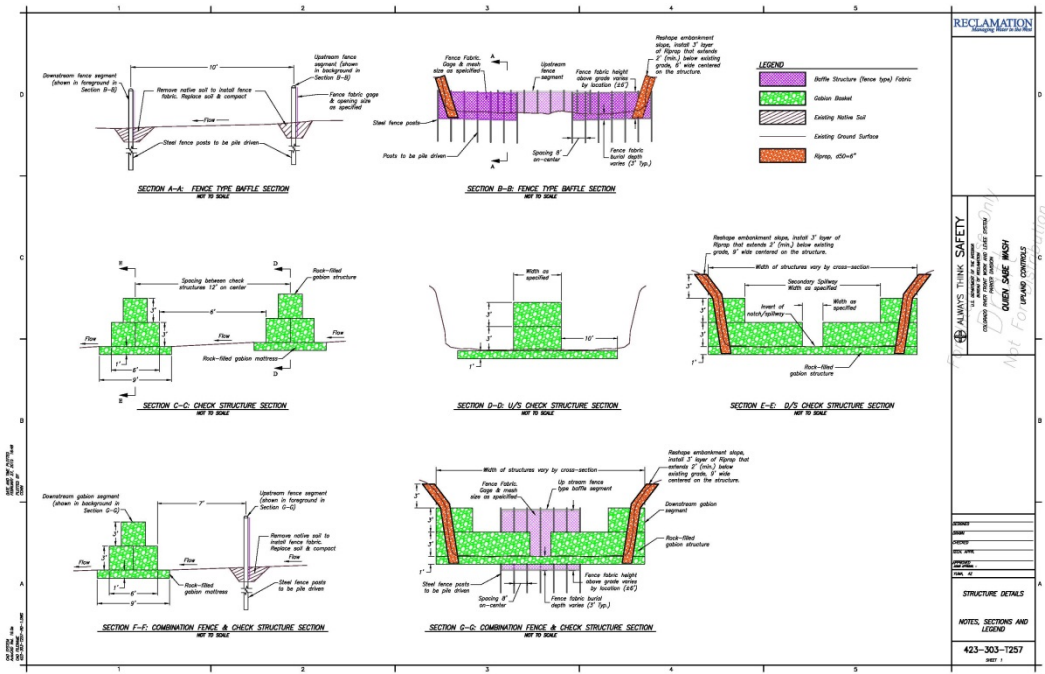


Figure 9. Structure Cross Sections

2.2.3.2 Maintenance Activities

Once construction activities are completed, Reclamation will perform O&M on the facilities periodically, as needed, to maintain function of the structures. O&M activities would consist of removal of accumulated sediment from behind the structures, repair of fence structures, and upgrades to existing access roads.

2.3 Actions Considered but Eliminated for Detailed Analysis

2.3.1 Debris Basins

The primary focus of debris basins is to trap sediment and debris transported by flash flood flows. Velocities quickly decrease upon entering the basins due to the enlarged cross-sectional area, resulting in the capture of said material and the temporary detention of flood waters. Basins are generally placed near the apex of debris fans or in confined sections of stream channels or canyons. The two types of basins discussed herein are permanent and non-permanent debris basins.

Permanent Debris Basins

Permanent debris basins consist of a large excavated basin with either an armored earthen berm or large wall (concrete or gabions) located at the basin's downstream end, which extends across the entire width of the channel. A perforated/slotted riser is installed within the basin to allow floodwaters to drain out of the basin at a

controlled rate. In the event of excessively high-flows, an overflow weir with spillway are commonly installed to channel said flows downstream. If highly erosive flows and head-cutting are a concern at the upstream end of the basin an improved intake channel made of concrete or lined with gabions may be installed. A flood control channel on the outlet of the basin is generally installed to protect the outlet channel from highly erosive “clear” flows.

Debris basins analyzed within the USACE report entitled “Assessment of Structural Flood-Control Measures on Alluvial Fans” (USACE, 1993) were shown to perform well and were, in general, successful flood and debris control methods.

From a river management and environmental standpoint the trapping efficiency of basins may be too high. In general basins capture all sizes of material and do not allow transport of smaller cobbles downstream that are beneficial for fish spawning habitat.

Debris basins are not recommended on smaller washes that can be controlled by other measures such as check dams, debris fencing, baffles, and/or brake structures. Basins should be used as a last resort and be placed in locations where debris flows have the potential to result in serious river channel impacts, failure of critical infrastructure, and/or loss of lives. Additionally, this action was eliminated due to its larger surface ground disturbance area for construction and maintenance activities.

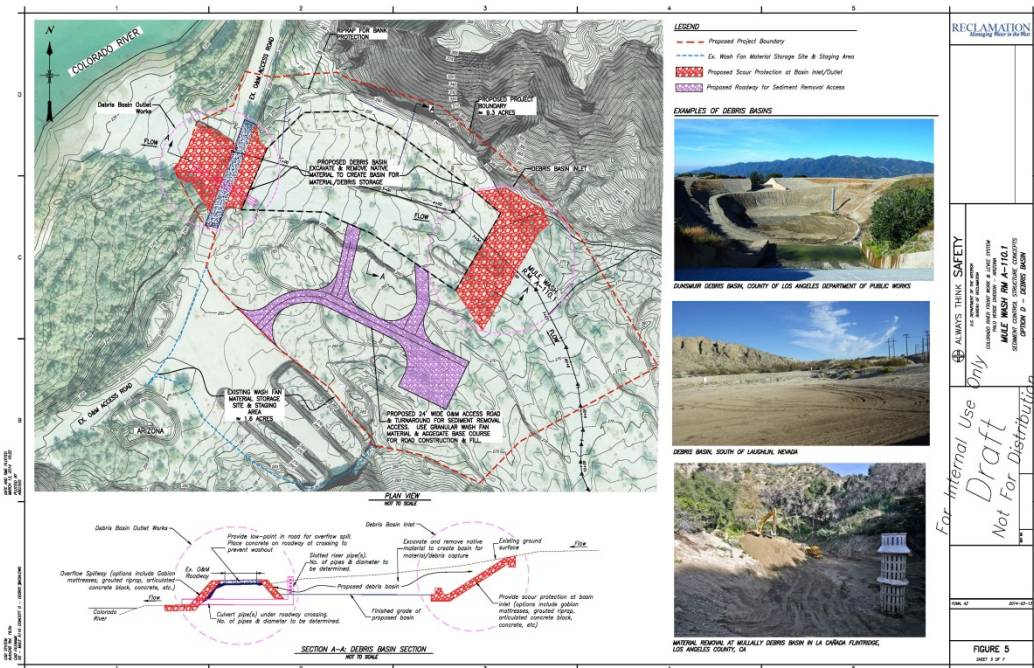


Figure 10. Debris Basin concept



Photo 18. Dunsmuir Debris Basin, Los Angeles County, California.

Temporary Debris Basins

Temporary debris basins are frequently used within Southern California watersheds after fires (USACE 1993). Installation of this measure involves excavating a pit or basin to capture a portion of the material transported during events. Riprap or another hard method for grade control may be required downstream of the basins to provide scour protection. In general this would not be installed as a “stand-alone method” and would be used in conjunction with debris barriers, check dams and/or baffles in order to provide additional storage volume behind them.

Temporary stand-alone basins were excavated at the Gould and Mule Wash sites located approximately 15 miles south of Ehrenberg, Arizona, in approximately 2006. The basins were successful at capturing sediment; however, they were undersized and quickly filled after subsequent flash flood events.

If installed within the ephemeral tributaries of the Colorado River, the purpose of these temporary basins would not be to capture all material, but to instead reduce the volume deposited in the form of wash fans, thus reducing the frequency and need to deploy heavy equipment within River channel boundaries.

2.3.2 River Jetties

This option entails the in-water construction of river jetties along banklines opposite the wash fans. The jetties would protect the bankline immediately across from the channel; however, it would only transfer the sediment and debris issues

downstream. Installation of this measure would require placement of fill material within the River channel. This action would permanently impact the surface water area of the River. Said jetties would also require periodic freshening of riprap material to protect the jetties from high velocities and a channel bed that was prone to down cutting. This alternative was therefore eliminated from consideration.

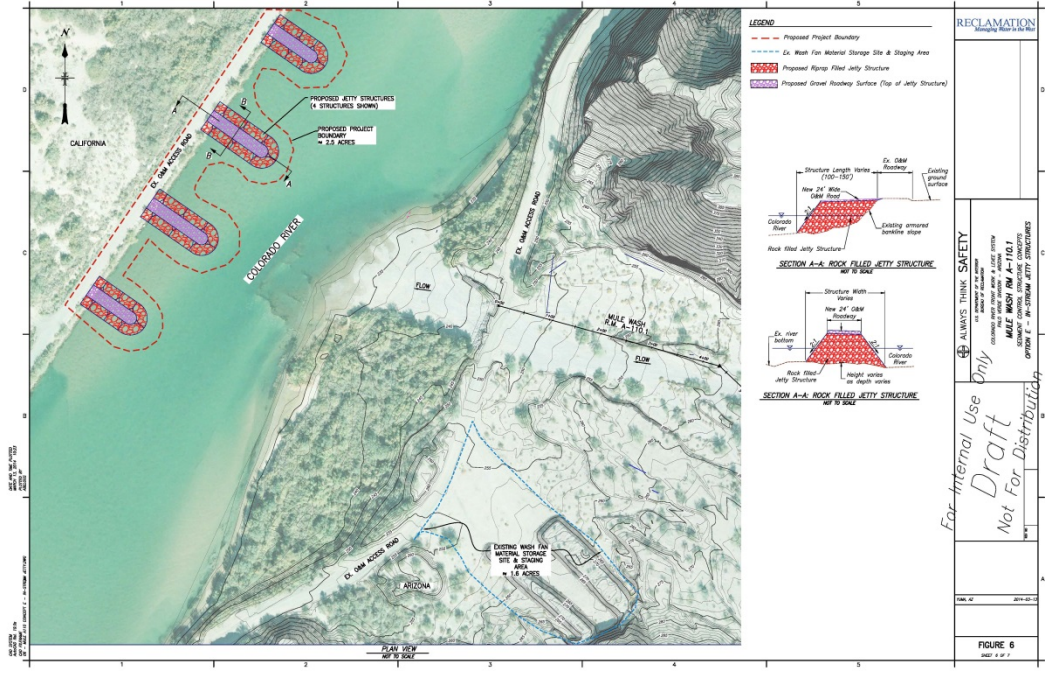


Figure 11. River Jetties concept

3.0 Affected Environment

This section describes the existing environmental resources in the project area that may be affected by the proposed action and the No Action alternative, if implemented. It also serves as the baseline for the comparisons of alternatives. The following critical elements of the human environment are not present or would not be affected by the alternatives; therefore, they will not be addressed in this EA: Geology, Population, and Recreation.

3.1 Land Use

3.1.1 Affected Environment

All sites are located on Federal lands Withdrawn for project purposes by Reclamation. Sites proposed to be located in California are adjacent to the Colorado River Indian Tribes (CRIT) Reservation. State Highway 95 runs through the project area in the California side. Sites in Arizona are bordered by State of Arizona or BLM lands. A Reclamation access road runs through the sites on the Arizona side.

3.1.2 Environmental Consequences

No Action – Under this alternative, use and status of the land would not change.

Proposed Action – There would be no change in land use or status. Management of adjacent lands would not be impacted.

3.1.3 Management and Mitigation Measures

No mitigation measures are proposed. Reclamation will coordinate with appropriate land management agencies prior to construction.

3.2 Air Quality

3.2.1 Affected Environment

The two sites proposed for California are located within the Mojave Desert Air Quality Management District. The four sites proposed for Arizona are located within La Paz County and outside the nearest PM₁₀ non-attainment area located near Yuma, Arizona.

The Clean Air Act, as amended in 1990, requires EPA to set National Ambient Air Quality Standards (NAAQS) for wide-spread pollutants from numerous and diverse sources considered harmful to public health and the environment. Imperial County is designated by the EPA as a Moderate Nonattainment Area for the 1997 8-Hour Ozone (O₃) NAAQS. PM₁₀ is defined as particulate matter that

is 10 micrometers in diameter or smaller. A portion of Imperial County, not including the project area, is designated as a Serious Nonattainment Area for the PM₁₀ NAAQS. A portion of Yuma County, not including the project area, is designated as a Moderate Nonattainment Area for the PM₁₀ NAAQS. The project areas are designated as being in attainment for all other NAAQS.

3.2.2 Environmental Consequences

No Action - Under the No Action Alternative air quality in the area would not change from its present readings.

Impacts common to all action alternatives – Construction activities associated with the proposed action have the potential to release small amounts of ozone precursors such as nitrogen oxides (NO_x) or volatile organic compounds (VOCs) from vehicle and machine exhaust. Ground disturbance associated with the movement of dirt and other dry material has the potential to generate dust, resulting in an increase in PM₁₀ emissions.

3.2.3 Management and Mitigation Measures

Best Management Practices (BMPs) would be followed to limit dust and PM₁₀ emissions, including at a minimum:

- Vehicle and equipment traffic would be limited to paved or graveled roads as much as possible.
- Vehicle speed shall not exceed 15 miles per hour within the construction limits.
- Where equipment traffic, excavation, or demolition is required outside of paved or graveled roads, water or soil binders would be applied to exposed surfaces.
- Equipment should be properly maintained to minimize exhaust emissions, and equipment idling would be limited.
- Ground disturbing activities would cease temporarily when wind speeds at the site exceed 20 miles per hour.

3.3 Biological Resources

3.3.1 Affected Environment

The sites where the project structures are proposed to be located are heavily disturbed by off road vehicles, roads, and intermittent high water events. The Mule and Gould Wash areas are used for accessing the river and camping spots. The Paradise and Quien Sabe Wash areas are located adjacent to several River Recreational Vehicle resorts. No wetland vegetation is present within the upland wash areas, see photos 1 thru 10. Vegetation along the lower Colorado River armored banks consists of linear phragmites with intermittent clusters of cattail/bulrush along the shorelines, and saltcedar with some mesquite (*Prosopis spp.*) along the upper banks. Only a few scattered riparian trees exist in the area,

mostly along the banks of the Colorado River, however a few Gooding's willow trees exist within the following backwaters areas: C-10 (Ehlers) located across the River (California side) from Mule and Gould Wash areas, and the Aha Quin backwater area located between the Paradise Point and Quien Sabe Washes in California. Upland vegetation common to all areas are Palo Verde, Smoketree, saltcedar (*Tamarix chinensis*), arrowweed (*Pluchea sericea*), quailbush (*Atriplex lentiformis*) and some scattered mesquite (*Prosopis pubescens*) in the upland areas.

Desert wash riparian vegetation provide habitat for common mammals such as coyote (*Canis latrans*), bobcat (*Felis rufus*), desert cottontail (*Sylvilagus audubonii*), several species of rodents and bats, striped skunk (*Mephitis mephitis*), and raccoon (*Procyon lotor*) (Anderson and Ohmart 1984). The Colorado River corridor provides important habitat for migratory birds, both upland species and waterfowl, as well as habitat for resident species. Common birds include various egrets, herons, and owls, Gambel's quail (*Callipepla gambelii*), white-winged dove (*Zenaida asiatica*), mourning dove (*Zenaida macroura*), flycatchers, and woodpeckers. Reptiles and amphibians are represented by several species of lizards, snakes, toads, and frogs, many of which are native to the area. Other species known to occur in the adjacent areas are the desert bighorn sheep (*Ovis canadensis nelsoni*), great egret, least bittern (*Ixobrychus exilis*), and the western burrowing owl (*Athene cunicularia hypugaea*).

Federally listed threatened or endangered wildlife species potentially occurring in the vicinity of the project area were identified using information from the United States Fish and Wildlife Service (USFWS) (endangered species list by county) for Riverside County and La Paz County.

There are six federally listed threatened, endangered, or candidate species which may occur in the vicinity of the project area:

Razorback sucker (*Xyrauchen texanus*) – The razorback sucker was listed as an endangered species on October 23, 1991. Historically, the razorback sucker inhabited the Colorado River and its tributaries from Wyoming to the Gulf of California. Most razorback suckers in the LCR Multi-Species Conservation Program (MSCP) planning area are currently restricted to Lake Mohave, with smaller populations occurring in the Colorado River below Davis Dam, Lake Mead, and Senator Wash Reservoir (Bradford and Vlach 1995). Critical habitat was designated for the razorback sucker on April 20, 1994, and, within the LCR MSCP planning area, includes Lake Mead to its full-pool elevation; the River between Hoover Dam and Davis Dam, including Lake Mohave to its full-pool elevation; and the River and 100-year floodplain between Parker Dam and Imperial Dam. Razorback suckers are found in the Palo Verde Division near the A-7 and A-10 backwaters, however information about the use of the wash fans formed by any of the washes impacted by this project are unknown. MSCP is not

actively stocking or monitoring razorback suckers in this area. All project activities would be conducted away from the main River channel.

Southwestern willow flycatcher (*Empidonax traillii extimus*) – The southwestern willow flycatcher was proposed for listing in 1993 and was federally listed as an endangered species in February 27, 1995. The USFWS designated critical habitat on October 19, 2005. Throughout its range, the southwestern willow flycatcher is a riparian obligate, insectivore that breeds in summer along rivers, streams, and other wetlands where dense willow, cottonwood, saltcedar, or other similarly structured riparian vegetation occurs (USFWS 2002). No suitable habitat exists for nesting Southwestern willow flycatcher within the project areas. The backwater areas C-10 and Aha Quin are located away from the project sites.

Yuma clapper rail (*Rallus longirostris yumanensis*) – The Yuma clapper rail is listed as an endangered species and threatened under the California Endangered Species Act. There is no designated critical habitat. In the US, the Yuma clapper rail is associated primarily with freshwater marshes, with the highest densities of this subspecies occurring in mature stands of dense to moderately dense cattails and bulrushes. In the LCR MSCP planning area, Yuma clapper rail populations are considered regionally significant. Population centers for this subspecies include Imperial Division, Imperial National Wildlife Refuge (NWR), Cibola NWR, Mitty Lake, West Pond, Bill Williams River Delta, Topock Gorge, and Topock Marsh (LCR MSCP, 2004b). No habitat exists for Yuma clapper rail within the project areas. The proposed project will not impact wetland vegetation.

Yellow-billed cuckoo (*Coccyzus americanus*) - The yellow-billed cuckoo is a USFWS candidate species for listing under the endangered species act (ESA) and is listed as endangered under California ESA. Western yellow-billed cuckoos require structurally complex riparian habitats with tall trees and a dense woody vegetative understory (Haltermann 1991, Hughes 1999). No habitat for yellow-billed cuckoo exists within the project areas.

Desert tortoise (*Gopherus agassizii*) - The Mojave population was listed as a threatened species on April 2, 1990, and critical habitat was designated in 1994. The Mohave population of desert tortoise occurs primarily within the creosote, shadscale, blackbush, and Joshua tree series of Mojave desert scrub and the lower Colorado River Valley subdivision of Sonoran desert scrub. Optimal habitat has been characterized as creosote bush scrub in which precipitation ranges from two to eight inches, diversity of perennial plants is relatively high, and production of ephemerals is high (Luckenbach 1982, Turner and Brown 1982, and Turner 1982). Soils must be friable enough for digging of burrows, but firm enough so that burrows do not collapse. In Arizona, the Mojave population generally occupies desert scrub communities in the basins and bajadas but is also found on rocky slopes and is typically found below elevations of 4,000 feet.

In California, the Mojave population is typically associated with gravelly flats or sandy soils with some clay, but are occasionally found in windblown sand or in rocky terrain and occur below sea level to an elevation of 7,300 feet, but the most favorable habitat occurs at elevations of approximately 1,000 to 3,000 feet (Luckenbach 1982). There is no critical habitat for the Mohave desert tortoise near the proposed California project sites. Project impacts for both of the sites located in California will be limited to a highly disturbed area that has been segmented by Highway 95 and the river.

The preferred habitat for the Sonoran population of the desert tortoise in Arizona is primarily rocky hillsides and bajadas of Mojave and Sonoran desert scrub but may encroach into desert grasslands, juniper woodland, and interior chaparral habitats. Sonoran populations are found from approximately 1,000 feet to 7,800 feet in elevation. The proposed wash areas are heavily impacted by off road vehicle use, adjacent development, and periodic flash flooding.

3.3.2 Environmental Consequences

No Action - Under the No Action Alternative, no structures would be constructed. There would be no impacts to biological resources from the construction of new facilities, however impacts from in stream removal of wash fans would remain. These impacts could include indirect impacts to razorback sucker and other fish from removing wash fan material from the Colorado River. In stream removal of wash fans has the potential to remove the entire wash fan, leaving less gravel and cobble rock material used for spawning fish. Impacts from in stream removal can be minimized by conducting work outside of the razorback sucker spawning season. No other impacts to wildlife would occur.

Proposed Action – The proposed project would have minimal impact to vegetation and wildlife in the project areas. The construction footprints proposed for the six project areas are heavily impacted by high water flows in the washes, off road vehicle use, roads, and other maintenance activities such as stockpiling of wash fan material removed during previous in stream activities. The majority of the proposed construction limits are devoid of vegetation.

Construction limits for the first three sites proposed for construction are: Mule Wash North (RM 110.1) 10 acres, Paradise Point Wash (RM 142.8) 20 acres, and Quien Sabe (RM 151.7) 32 acres. Construction limits for the three remaining sites Mule Wash south (RM 107.4), Gould Wash North (RM 106.5), and Gould Wash South (RM 105.9) will be determined at a later date.

Total permanent surface area impacts for Mule Wash North associated with the placement of debris fencing, improvements to existing access roads, establishing a staging area, and placing riprap bank protection will be approximately two acres.

Total permanent surface area impacts for the Paradise Point Wash associated with the placement of gabion and debris fence structures, improvements to access roads, establishing a staging area, and placing riprap bank protection will be approximately three acres.

Total permanent surface area impacts for the Quien Sabe Wash associated with the placement of gabion and debris fencing, improvements to access roads, establishing a staging area, and placing riprap bank protection will be approximately one acre.

Temporary impacts associated with O&M activities will consist of periodically removing accumulated sediments from behind the control structures.

Ground dwelling small mammals, birds and reptiles may be temporarily impacted by vehicle use and the moving of materials during construction. These impacts are temporary and localized and will be inconsequential once construction of the facilities is completed. Maintenance of the facilities may also cause short term, localized disturbances from vehicles and other equipment used to remove material behind structures or to repair or maintain structures damaged by storm events. No riparian or wetland habitat will be disturbed. Some upland desert wash habitat may be impacted; however, any native trees and shrubs located within the construction area will be avoided to the extent practical.

Beneficial impacts to razorback sucker could exist by eliminating large quantities of sediment/sand entering the river, reducing habitat available for spawning fish. Large rocks would not likely make it past sediment control structures, however smaller sized rocks, cobble, and gravels would make it to the river, providing spawning habitat in the form of gravel bars that would likely be submerged by river flows. In stream removal of wash fans would be reduced, providing benefits to fish by not impacting river habitat with the frequency and magnitude that exists with current methods.

3.3.3 Management and Mitigation Measures

The following avoidance and minimization measures would be implemented when constructing the upland structures:

- Project construction limits and activities will be restricted to highly disturbed areas in order to avoid and minimize impacts to native vegetation and wildlife to the extent practical.
- All construction areas will target areas closest to the River and existing roads (Highway 95 and bankline access roads) in order to minimize impacts to undisturbed desert wash riparian vegetation located in higher upland areas.
- Staging areas and improvements to access roads would be limited to previously disturbed areas and located away from the main wash area.

- All construction equipment will be cleaned and free of plant parts before moving into construction sites.
- Trash and food materials will be properly contained within vehicles or closed refuse bins while on site, and will be regularly removed from the construction site for proper disposal.
- Worker training will be provided to construction personnel prior to commencing activities on resource protection measures.
- In coordination with the USACE, USFWS and state wildlife agencies, cobble material removed from behind the upland structures during maintenance activities may be placed along the river shorelines to enhance fish spawning habitat in the area.

By avoiding direct impacts to wetland, riparian, and riverine habitats, and limiting construction impacts to previously disturbed areas, impacts to listed species will be beneficial, insignificant or discountable.

3.4 Cultural Resources

3.4.1 Affected Environment

The National Historic Preservation Act (NHPA) establishes national policy for protecting significant cultural resources that are defined as “historic properties” under 36 CFR 60.4. NHPA Section 106 (36 CFR §800) requires that Federal agencies consider and evaluate the effect that Federal projects may have on historic properties under their jurisdiction. The area of potential effect for this undertaking includes the locations noted in Section 2.2 (above).

Cultural Resources Surveys were conducted on all proposed sites. For Arizona proposed project locations within the four parcels located south of Interstate 10 a Class III cultural resources survey inventory was performed. This inventory covered 671 acres between the four parcels, see Figure 2 for APE. The inventory resulted in eight new cultural sites and eight isolated occurrences. Two previously recorded sites were also identified.

For California proposed facilities, 240 acres were inventoried within two parcels located north of Interstate 10 along Highway 95 and adjacent to the west side of the Colorado River (see Figure 3 for APE). The inventory did not result in the identification of cultural sites or historic properties. The effort did record 11 isolated occurrences, none of which are eligible for inclusion to the National Register of Historic Places (NRHP) and no further management is considered.

3.4.2 Environmental Consequences

In accordance with 36 CFR Part 800.5 Reclamation has applied the criteria of adverse effect to historic properties subject to the No Action and Proposed Action Alternative to determine if they would directly or indirectly alter any of the characteristics of historic properties that qualify them for inclusion in the NRHP.

No Action - Under the No Action Alternative, no structures would be built. This alternative would maintain the current status of the sites located within the project boundaries identified in the Cultural Resources Survey Report.

Proposed Action - The effects to the sites identified in the Cultural Resources Survey Report will not be adverse.

3.4.3 Management and Mitigation Measures

In accordance with 36 CFR Part 800.5 Reclamation has applied the criteria of adverse effect to historic properties to determine if the Proposed Action would directly or indirectly alter any of the characteristics of historic properties that qualify them for inclusion in the NRHP. Based on our findings of no adverse effect, no mitigation measures are proposed. Construction activities will be designed to avoid and minimize impacts to cultural resources by limiting project activities to previously disturbed areas. Consultation with the State Historic Preservation Officer (SHPO) under Section 106 of the NHPA will be conducted prior to implementing the Proposed Action.

If during the course of any activities associated with the implementation of the Proposed Action any sites, buildings, structures, or objects not addressed in this assessment are discovered, activities will cease in the vicinity of the resource. Reclamation's Environmental Group Manager and project archaeologist will be notified immediately. Reclamation shall ensure that the stipulations of 36 CFR Part 800.11 are satisfied before activities in the vicinity of the previously unidentified property resume.

3.5 Indian Trust Assets

3.5.1 Affected Environment

Indian Trust Assets (ITAs) are legal interests in property held in trust by the US for Indian tribes or individuals, or property in which the US is charged by law to protect for Indian tribes or individuals. In accordance with the Indian Trusts Fund Management Reform Act of 1994, as amended, all the Department of the Interior agencies, including Reclamation, are responsible for protecting ITAs from adverse impacts resulting from their programs and activities. In cooperation with tribes, Federal agencies must inventory and evaluate assets, and mitigate or compensate for adverse impacts to the asset. While most ITAs are located on reservation lands, they may also be located off-reservation. Examples of ITAs include, but are not limited to, land, minerals, rights to hunt, fish, and gather, and water rights.

3.5.2 Environmental Consequences

Reclamation departmental policy requires the agency to address potential impacts to ITAs even if impacts are found to be non-significant. The proposed structures in California are located near the CRIT Reservation.

Trust Lands

The Proposed Action is not located on ITA lands; the nearest tribal lands are located directly across the Colorado River from the project areas in California. There are no tribal residences and/or facilities within the project area.

Water Rights

Currently, the CRIT Reservation possesses present Decreed rights to use Colorado River water.

Hunting, Fishing, and Gathering Rights

The Colorado River and its tributaries provide habitat for sensitive fish and wildlife species, especially in the riparian woodlands and marshes. Some members of the tribe still collect a variety of plants, which are eaten as well as used for medicinal and ceremonial purposes, and in traditional craft production (LCR MSCP 2004c).

3.5.2.1 No Action Alternative

Under the No Action Alternative, construction of the structures would not take place. Therefore, no change to Federal actions will occur that could result in an adverse effect to identified ITAs.

3.5.2.2 Proposed Action

Trust Lands

The Proposed Action will not interfere with any Trust Lands. The project is not located on Trust Lands and does not prevent the use or management of any tribal or Trust Lands.

Water Rights

The Proposed Action will not interfere with Colorado Indian Tribes Reservation's reserved water rights. The Proposed Action will not result in a change to any tribal water right, or to the diversion or delivery of tribal water entitlements.

Hunting, Fishing, and Gathering Rights

The Proposed Action will not interfere with any hunting, fishing or gathering rights which could be exercised by any tribe.

3.5.3 Management and Mitigation Measures

No mitigation measures are proposed.

3.6 Environmental Justice and Socio-Economic Conditions

3.6.1 Affected Environment

Executive Order (EO) 12898 requires Federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the US.

Minority populations include all persons identified by the Census of Population and Housing to be of Hispanic or Latino Origin, as well as, non-Hispanic persons who are African American, American Indian and Alaska Native, Native Hawaiian or other Pacific Islander.

Low-income populations are those that fall within the annual statistical poverty thresholds from the Bureau of the Census for the 2010 Census. The definition of poverty is dependent on the size of the family. For example, the poverty threshold for a family of three is \$17,374; whereas, \$22,314 is the threshold for a family of four (U.S. Census Bureau 2010b). If the total income of a person's family is less than the threshold appropriate for that family, then the person is considered as being below the poverty level. Information on total population, minority population, and poverty status for La Paz and Riverside Counties and Blythe, CA is provided in Table 1.

Table 1

Location	Total Population	Percent Minority	Percent Population Living Below Poverty Level
La Paz County, AZ	20,489	39.7	20.2
Riverside County, CA	2,189,641	19.3	15.6
Blythe, CA	20,817	40.5	16.1

Source: US Census Bureau 2010a

3.6.2 Environmental Consequences

No Action - Under the No Action Alternative, the project will not take place. Therefore, no Federal actions will occur that could result in a disproportionately high and adverse effect on the health or environment of minority or low-income populations.

Proposed Action - Implementation of the Proposed Action Alternatives would not disproportionately affect the minority and impoverished population in the area. Based on the analysis for air quality, water resources, and hazardous materials in this EA, changes resulting from implementing the project will not result in

proportionately high and adverse impacts to the environment or to the health of low-income and minority populations.

3.6.3 Management and Mitigation Measures

No mitigation measures are proposed for the environmental justice and socio-economic conditions section.

3.7 Hazardous Materials or Solid Waste

3.7.1 Affected Environment

No hazardous materials are currently used or stored anywhere at the proposed structure location sites.

3.7.2 Environmental Consequences

No Action - Under this alternative Petroleum, Oils, and Lubricants (POLs) from maintenance vehicles have the potential to enter the river from in water wash fan removal activities.

Proposed Action – Under this alternative, waste POLs would be generated, in addition to standard waste created during continued operations.

The proposed improvements would potentially have a positive effect with regard to hazardous materials and solid waste by reducing the use of wheeled and tracked vehicles for in stream removal of wash fans, which have the potential to introduce small quantities of POLs found on construction vehicles.

3.7.3 Management and Mitigation Measures

Mitigation actions designed to limit the potential impact of hazardous materials or solid waste would be implemented according to State and Federal regulations. Other hazardous materials anticipated to be used during construction of the project are small volumes of petroleum hydrocarbons and their derivatives (for example, fuels, oils, lubricants, and solvents) required to operate the equipment used in the construction activities. These materials are those routinely associated with the operation and maintenance of heavy equipment or other support vehicles, including gasoline, diesel fuels, and hydraulic fluids.

- A site specific contingency spill plan should be developed and implemented. The plan should consist of reporting guidelines in the event of a spill, good housekeeping techniques, and employee training in the use of required equipment and proper handling of potentially hazardous materials.
- Hazardous materials used for this project would be contained within vessels engineered for safe storage.

- Staging areas for refueling of equipment would be located outside the wash area and away from the River to prevent any accidental fuel leakage from contaminating surface water, groundwater, or soils.

3.8 Noise

3.8.1 Affected Environment

Noise that currently exists in the area generally comes from river recreation (motor boats), farming operations, farming equipment, and vehicle travel along US Highway 95 in California and the levee road in Arizona. Residences in the general vicinity include the town of Cibola, the Water Wheel RV Park, and Aha Quin RV Park in California.

3.8.2 Environmental Consequences

No Action - In the No Action Alternative, current noise levels including noise from river recreation, highway, and farming operations would continue at the present levels.

Proposed Action - The use of equipment during the implementation of the project will slightly increase noise disturbance in the vicinity of where work is occurring. This could affect adjacent areas. Noise would be decreased by minimizing the frequency of using motorized equipment to remove large sediment fans from the River.

3.8.3 Management and Mitigation Measures

No mitigation measures are necessary because noise levels would continue to be consistent with current ongoing operations and adjacent recreational activities. Additionally, the project would be conducted in phases which will further minimize any excessive noise levels within the project area.

3.9 Water Resources

3.9.1 Affected Environment

The Colorado River is the nearest source of surface water in the area.

The U.S. Army Corps of Engineers (USACE), under Section 404 of the Clean Water Act (CWA), regulates the discharge of dredged, excavated, or fill material in wetlands, streams, rivers, and other US waters. The Colorado River and associated project wash areas are USACE jurisdictional areas identified within the project area.

3.9.2 Environmental Consequences

No Action – Implementation of the No Action Alternative would not entail any construction activity; therefore, no impacts to surface water, or jurisdictional waters would occur due to construction however in water removal of wash fans has the potential to impact the River itself temporarily.

Proposed Action – The Proposed Action Alternatives’ impacts on water resources are anticipated to be minimal, with no changes to water delivery operations. Project activities would be conducted in phases in order to ensure water delivery operations are not impacted. Potential impacts to surface water could include water quality degradation. Although highly unlikely, spills from construction activities could migrate into surface water conduits or infiltrate the groundwater, contaminating the source. If a spill were to occur, the impacts to water resources could be minimized with immediate response and clean-up procedures.

No construction components of the Proposed Action Alternatives would affect surface waters of the US, as no fill material will be discharged into the Colorado River.

3.9.3 Management and Mitigation Measures

- Coordination with the USACE and appropriate state water resource agency will be conducted prior to implementation of the project in order to obtain CWA Section 404 and 401 permit authorizations.
- During construction, no refueling equipment should be permitted within the River and/or the wash area.
- Staging areas will be located outside the wash areas.
- Upland structures will not divert flow.

3.10 Geology, and Soils

3.10.1 Affected Environment

The LCR area of Arizona, Nevada, and California is located in the lower portion of the Basin and Range geomorphic province, within the western Sonoran Desert. This area is characterized by numerous mountain ranges that rise abruptly from broad, plain-like valleys or basins. The basins are composed of silt-filled channels and alluvial fans, fan terraces, and floodplains, consisting of Quaternary sand, gravel, and conglomerate. Limited soil horizon development indicates young unstable alluvial and floodplain surfaces of late Holocene age, subject to periodic flooding, sedimentation, and dynamic alteration. The LCR generally consists of narrow stretches confined by resistant bedrock cliffs and bluffs and broad areas lined by low-lying alluvial floodplains. The active floodplain is bounded by steep, active slopes (escarpments), active sand dunes, and washes (arroyos). The floodplain has low relief and includes the stream channel and associated features such as point bars and abandoned channels or meanders. Sand splays, point bars,

and meander scrolls are typically underlain by coarse-grained alluvium, whereas broad shallow channels and backswamps are more clay-rich (Parsons et al. 1986).

The soils on the Colorado River floodplain are saline. The salinity is the result of accumulated salts from alluvial deposits and subsequent evaporation of soil moisture. The rainfall is not sufficient to leach these salts below the plant root zone; therefore, a continuing accumulation of salts occurs. These salts are primarily calcium, sodium, magnesium, chloride, and sulfate. An excessive amount of toxic salts in the soil can delay or prevent seed germination, decrease available water capacity, interfere with plant growth, and impede the movement of air and water through the soil.

3.10.2 Environmental Consequences

No Action - Under this alternative, there would be no changes to soils. Disturbances resulting from off road vehicle use and flash floods would continue as they are currently.

Proposed Action - Implementation of the Proposed Action Alternatives would disturb soils during construction and follow-up maintenance activities.

3.10.3 Management and Mitigation Measures

No mitigation measures proposed.

3.11 Visual Resources

3.11.1 Affected Environment

Visual resources consist of natural and manmade features that give a particular environment its aesthetic qualities. Landscape character is evaluated to assess whether the project will appear compatible with the existing features or would contrast noticeably with the setting and appear out of place. Visual sensitivity includes public values, goals, awareness, and concern regarding visual quality.

Visual resources within the project area generally include open space, agricultural areas, degraded wetland areas, and desert upland habitats located in and near the Colorado River floodplain. Prominent vegetation includes agricultural land and patches of desert scrub, salt cedar, and common reed. Other visible structures in the area consist of the recreational vehicle parks located along Highway 95 in California and river control structures (i.e. levees and bankline roads).

3.11.2 Environmental Consequences

No Action - Under the No Action Alternative, no changes would occur to the sites characteristics.

Proposed Action – Implementation of the Proposed Action Alternatives will not significantly impact the visual characteristics of the area. The structures are similar in height to surrounding vegetation and may eventually be covered by volunteer re-vegetation of the sites.

3.11.3 Management and Mitigation Measures

No mitigation measures proposed.

3.12 Floodplain

3.12.1 Affected Environment

The Colorado River Floodway Protection Act, Public Law 99-450, was signed into law on October 8, 1986. The Act calls for the establishment of a federally declared floodway from Davis Dam to the Southerly International Boundary between the United States and Mexico. In accordance with Section 5 (a) of the public law, Reclamation developed maps that show the floodplain for the LCR. In addition, EO 11988, Floodplain Management, May 24, 1977, requires avoiding or minimizing harm associated with the occupancy or modification of a floodplain. The base floodplain is an area expected to be inundated by floodwaters on the average of once in 100 years.

The Colorado River is also subject to flooding throughout the winter and spring season from rapid snowmelt in the upper Colorado River Watershed. The major flood control structures on the lower Colorado River are the Glen Canyon and Hoover Dams. The two water storage levels in these major reservoirs are regulated in association with the small reservoirs to provide flood protection, year-round water use, and hydro-electric power. In combination with these storage facilities, Reclamation has developed extensive levee systems along many parts of the river to ensure safe passage of water during periods of high flow.

3.11.2 Environmental Consequences

No Action - The No Action Alternative would not impact the integrity of the lower Colorado River floodplain.

Proposed Action - Implementation of the Proposed Action Alternatives would not impact the integrity of the lower Colorado River floodplain's flow regime.

3.12.3 Management and Mitigation Measures

No mitigation measures proposed.

3.13 Cumulative Effects of the Proposed Action

Cumulative effect is the impact on the environment that results from the incremental impacts of an action when added to other past, present, and

reasonably foreseeable future actions regardless of what agency (Federal or nonfederal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7). Several former, current and planned projects either located within or in the vicinity of the planning area and having the potential to impact common resources will be addressed in this section.

The Yuma Area Office's (YAO) Parker and Palo Verde Division Bankline Repairs

Under the Colorado River Front Work and Levee System (CRFWLS) Act of 1946 (as amended) Reclamation has responsibility along the lower Colorado River for flood control. The CRFWLS authorizes Reclamation to improve, stabilize, and maintain the river channel so that it can handle flows resulting from flood control operations and floods of local origin. In the Parker Division and Palo Verde Division, the following activities are continuous along the river: reinforcing bankline and levees, removing wash fans, maintaining river access roads, and conducting excavation activities to remove excess sediment along the river in critical areas in order to protect Reclamation facilities.

YAO's River Mile 165.5 Bankline Stabilization

Reclamation proposes to stabilize in the near future a reach of bankline (1,000 feet in length) along the lower Colorado River. Severe bankline erosion is presently occurring along the Arizona bankline upstream of the Agnes Wilson Bridge, at River Mile 165.0. Stabilization of the bankline will contain and prevent further erosion.

Stabilization activities will consist of placing approximately 10,000 cubic yards of material along the bankline. Of this total, about 3,000 cubic yards will be a gravel base material that will be placed prior to the placement of riprap material. Riprap material will be placed over the gravel base, starting at the toe of the bank and building up to the top of the bank. A total of 7,000 cubic yards of riprap material will be used.

The project area is located on the lower Colorado River (La Paz County), between Parker, Arizona, and Blythe, California.

YAO's Palo Verde Division Backwater Improvement Project

Reclamation conducts maintenance and improvement activities to five backwaters located along the lower Colorado River's Palo Verde Division, just south of Blythe, California.

1. A-7 backwater located on the Arizona side of the river between RM 120.5 to 117.3.

2. A-10 backwater located on the Arizona side of the river between RM 115.2 to 113.8.
3. C-5 backwater located on the California side of the river between RM 119.0 to 117.3.
4. C-8 backwater located on the California side of the river between RM 114.7 to 113.8.
5. C-10 backwater located on the California side of the river between RM 110.6 to 109.1

Reclamation has various maintenance requirements for the backwater sites mentioned above including: ensuring inlet/outlet structures are functioning properly for the benefit of fish and wildlife purposes. Rehabilitation activities consist of restoring existing inlet and outlet structures in order to improve water circulation through the backwaters. Existing structures are not conveying sufficient flow through the backwaters due to being plugged with sediment.

MSCP's Palo Verde Ecological Reserve

The Palo Verde Ecological Reserve (PVER) encompasses more than 1,300 acres. This property (formerly known as the Travis Ranch) has been made available to the LCR MSCP for habitat restoration activities by the California Department of Fish and Wildlife.

The eastern boundary of the property (more than four miles) is adjacent to the Colorado River, and the western boundary is adjacent to active agricultural fields. The PVER has an extensive infrastructure consisting of miles of lined irrigation ditches, roads, and a pump. Currently, the acreage is leased to a contract farmer and is planted with crops of alfalfa and wheat. Each year a portion of the active crop acreage will be taken out of production to develop the next phase of native habitat. The intent is to create as much riparian habitat as practical. Generally, all phases at PVER are targeted for southwestern willow flycatcher, yellow-billed cuckoo, and other covered species.

The restoration includes a mosaic of habitats that contain areas of riparian species (including mesquite) and ground covers or open areas. Ground cover is an effective method of controlling non-native species and provides another layer of vegetation for habitat. Ground covers are planted with transplants or by seed; costs vary with the methods of planting used. Mesquite trees are generally planted by a tree planter or auger.

MSCP's Cibola Valley Conservation Area

In 2007, the Bureau of Reclamation secured 1,309 acres of land within the Cibola Valley Irrigation and Drainage District in southwestern Arizona and established the Cibola Valley Conservation Area (CVCA). In September 2007, the property was conveyed to the Arizona Game and Fish Department (AGFD) through an

agreement among AGFD, Reclamation, the Mohave County Water Authority, and The Conservation Fund. Under the agreement, AGFD retains title to the property and leases the land and water rights to Reclamation until April 5, 2055 as part of the LCR MSCP. Several farmers also have short-term leases on portions of the land for crop production. Within the CVCA, Reclamation is planting former agricultural fields with native riparian cottonwood-willow, and mesquite habitats for species defined in the LCR MSCP Final Habitat Conservation Plan, including the southwestern willow flycatcher and yellow-billed cuckoo. Cottonwood, willow, and honey mesquite are planted to create an integrated mosaic of habitats resembling riparian communities that were historically present in the Colorado River floodplain. When feasible, areas of standing water or moist soil, and open areas with ground cover and low shrubs are incorporated into the design.

The CVCA will be developed over a number of years through phased restoration activities. A phase-specific restoration plan is prepared each fiscal year, which documents the planning, design, planting, and monitoring requirements of that phase. An annual report is prepared each year summarizing restoration and monitoring activities conducted during the previous year.

To date, six phases of the site have been restored with riparian habitat, honey mesquite, and upland buffer areas in varying densities of trees per acre to help determine the most suitable planting methodology. Phases 1-3 were primarily planted with cotton-wood and willow. Phases 4-6 were planted with primarily honey mesquite. No additional planting is scheduled until at least 2016 or until the long-term water requirements of Phases 1-6 both for maintenance and to meet species-specific performance standards have been quantified.

3.13.1 Impacts by Resource

Land Use

The Proposed Action Alternative would not change any land uses in the area and/or disrupt any established land configurations, wildlife or recreational areas. Implementation of the Proposed Action Alternative, in conjunction with the other actions is not anticipated to have negative cumulative impacts to land use.

Air Quality

Implementation of the Proposed Action and other actions described in section 3.13 may result in increased area emissions associated with construction activities. Due to the mobile nature and short duration of most emission sources, project emissions in combination with future emission sources would not be expected to contribute to an exceedance of an ambient air quality standard. As a result, the Proposed Action, in combination with other foreseeable projects and mitigation requirements, would not produce significant cumulative impacts to air quality and climate conditions.

Biological Resources

The Proposed Action Alternative and the above mentioned projects in section 3.13 have the potential for biological impacts due to short-term habitat loss for sensitive and common wildlife species. However, several of the projects are restoration and enhancement projects that are designed to benefit targeted species and other wildlife that utilize the proposed project site, resulting in a net positive impact over the duration of the proposed project implementation. With incorporation of avoidance, minimization, and mitigation measures the Proposed Action Alternative, in conjunction with the other actions, is not anticipated to have negative cumulative impacts to biological resources.

Cultural Resources

Reclamation has made a finding of no adverse effect to historic properties for the activities associated with the implementation of the Proposed Action. During the implementation phase of projects identified in section 3.13, there is potential for unforeseen cultural resources to be discovered or damaged. Reclamation has established “stop work” procedures that shall be implemented should and unanticipated discovery situation arise. Therefore, the Proposed Action, in conjunction with other projects listed in section 3.13, would not result in significant cumulative impacts on cultural resources.

Indian Trust Assets

There are no ITAs or other resources of tribal concern in the project area, and significant impacts on ITAs or other tribal resources from implementation of the Proposed Action would not occur. Therefore, the Proposed Action, in combination with other proposed or on-going projects, would not cause disproportionate cumulative effects on ITAs.

Environmental Justice and Socioeconomic

The Proposed Action would have negligible effects on population, housing, and other socioeconomic issues. The Proposed Action would not displace persons or housing, nor would it induce substantial population growth in the area, either directly or indirectly. The types of potential effects identified (e.g., increased noise, and fugitive dust) for the Proposed Action and the other projects would be localized and short-term. The Proposed Action, in combination with other foreseeable projects described in section 3.13, is not expected to have a cumulatively significant impact on socioeconomics and minority or low-income populations.

Hazardous Materials

The project site is not located in close proximity to any known or suspected hazardous waste or petroleum waste sites. However, incidental spills of petroleum products could occur during construction activities, and such spills could result in significant impacts to water quality. With the implementation of mitigation measures, the risks of incidental spills would be reduced to less than significant. Other projects described in section 3.13 have hazards/hazardous materials related impacts due to construction activities. However, with

anticipated mitigation measures, these risks would be cumulatively less than significant as these impacts are localized and temporary.

Noise

The Proposed Action Alternative would require some use of heavy equipment to assist in the construction of sediment control structures. Overall, proposed project activities would be phased out over a couple of years to minimize noise impacts. Other projects described in section 3.13 would have similar temporary construction noise. The Proposed Action, in conjunction with the other actions, is not anticipated to have long term negative cumulative impacts in the vicinity of the proposed project area.

Water Resources

The Proposed Action would have beneficial impacts by ensuring water deliveries to area users continue to be met. The Proposed Action, in conjunction with other proposed or on-going projects described in section 3.13, would not result in cumulatively significant impacts to water resources.

4.0 Consultation, Coordination, and List of Preparers

4.1 Agencies Consulted

An electronic copy of this EA has been posted for public viewing on Reclamation's Yuma Area Office web site at <http://www.usbr.gov/lc/yuma/>. Paper copies of the Notice of Availability memorandum and EA were distributed to the following entities:

US Fish and Wildlife Service	Bureau of Land Management
CA Department of Fish and Wildlife	AZ Game and Fish Department
Quechan Indian Tribe	Cocopah Indian Tribe
Yuma Audubon Society	Colorado River Indian Tribes

Consultations with the State Historic Preservation Office are ongoing under Section 106 of the NHPA (36 Part 800) for undertaking involving Federal facilities.

AZ State Parks; State Historic Preservation Office
CA State Parks; State Historic Preservation Office

4.2 List of Preparers

4.2.1 Bureau of Reclamation

Nicholas Heatwole	Environmental Protection Specialist
Julian DeSantiago	Group Manager, Environmental Planning and Compliance
James Kangas	Archaeologist
Alex Belous	Engineer
Jay Nemeth	Engineer

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