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# **Section 203(a), Uinta Basin Replacement Project Habitat Mitigation and Monitoring Plan**

File Number 200250319

Prepared for  
**U.S. Army Corps of Engineers  
Sacramento District**

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November 2002

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# Executive Summary

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This report presents a habitat mitigation plan (HMP) to compensate for wetland losses associated with the Uinta Basin Replacement Project. The project area is located within Duchesne County, Utah. The proposed project components include the Big Sand Wash Feeder Diversion Structure and associated facilities, access road, Big Sand Wash Feeder Pipeline, Big Sand Wash Dam and Reservoir expansion and relocated outlet, and Big Sand Wash Roosevelt Pipeline. Together these components will provide stabilization of and replacement storage for high mountain lakes, water for municipal and industrial use to Roosevelt and the Lake Fork Drainage area, irrigation, improved water resources management and water conservation, and mitigation/enhancement for environmental and recreation resources.

The total permanent and temporary wetland impacts due to construction and project structures were estimated to be 5.69 acres and 4.50 acres, respectively. The proposed HMP is meant to compensate for total permanent impacts that are attributed to the diversion structure and pad, access road, and reservoir expansion.

The nearly 10-acre area within Big Sand Wash Canyon just southeast of the south dam was selected as the proposed mitigation site. The HMP implementation will result in creation of 8.65 acres of Palustrine Emergent Marsh (PEM), Scrub-Shrub (PSS), and Forested (PFO) wetlands within the Big Sand Wash Canyon between the new dam and the existing seep. Mitigation efforts will consist of reestablishment of a water source by piping water from the reservoir and creating a series of berms to retain water within constructed PEM areas, regrading and topsoil placement, woody and herbaceous vegetation establishment, and installation of perimeter fencing to reduce human activities and prevent cattle grazing.

A 5-year monitoring and maintenance plan is presented to follow establishment of the created wetlands. Provisions for reporting and measuring success are also provided and a schedule of activities and contingency measures is discussed.

# Project Description

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## Responsible Parties

The applicant for the proposed project is the Central Utah Water Conservancy District (CUWCD). The contact person is:

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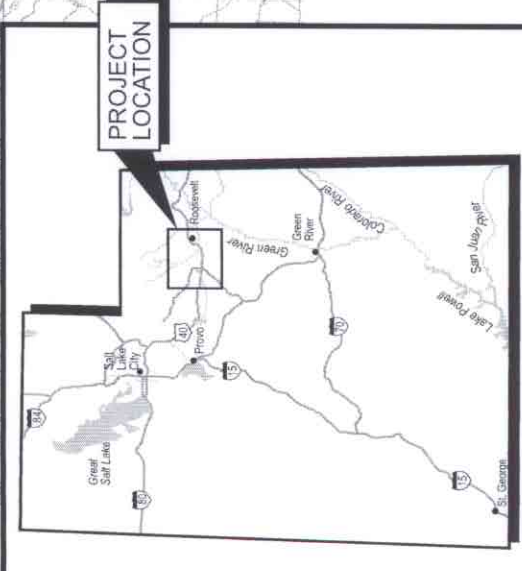
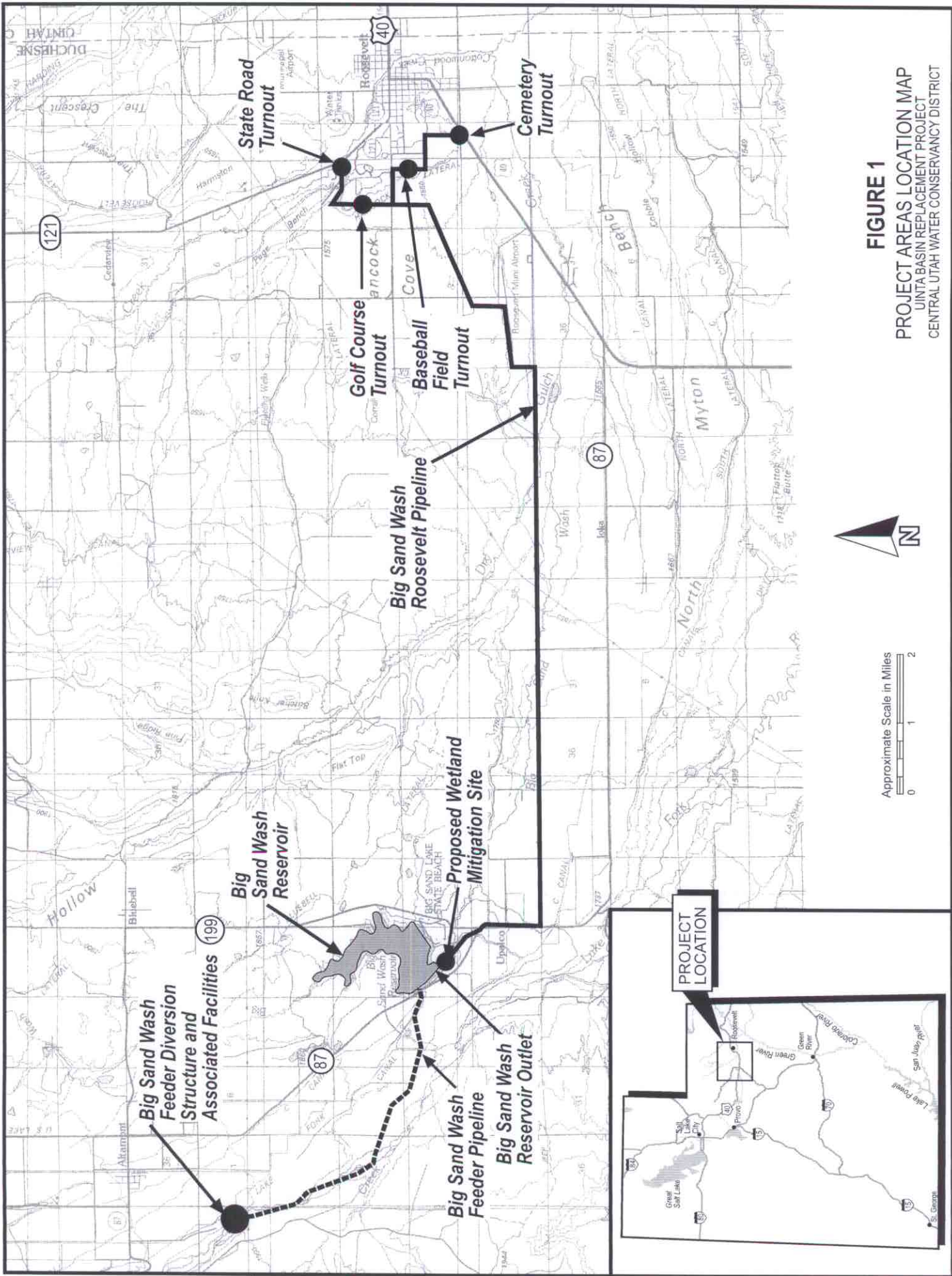
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The proposed mitigation site is currently owned by the Moon Lake Water Users Association (MLWUA), who will retain ownership. Utah Reclamation and Mitigation Conservation Commission (Mitigation Commission) will be responsible for long-term maintenance and monitoring of the proposed mitigation site, as well as meeting the success criteria required by the proposed Mitigation Plan.

## Location of Project

The project areas are located in Duchesne County near the towns of Altamont, Upalco, and Roosevelt, Utah (Figure 1). The Big Sand Wash Feeder Pipeline Diversion structure, diversion pad, and diversion access road construction are proposed on the Lake Fork River about 1.5 miles south of Altamont in the NW 1/4 of Section 2, T2S, R4W. There will also be a temporary diversion dike and side channel associated with the diversion structure to route water around the site during construction activities. The feeder pipeline starts at the diversion structure and continues in a southeasterly direction within the Lake Fork River Canyon bottom, roughly parallel with Utah State Route 87, and ultimately crosses Utah State Route 87 to enter the southwestern side of the Big Sand Wash Reservoir. The Duchesne County Assessor parcel numbers impacted by the diversion structure, pad, access road, and feeder pipeline include: #2112, #2110U, #1942, #1942U, #1945, #1949, #1950, and #1951. Names and addresses are shown in Attachment 8 of the Section 404 Permit application.

The Big Sand Wash Reservoir is located between Utah State Route 87 and Local Road 199, approximately 1.5 miles northwest of the town of Upalco. The parcel number for the



**FIGURE 1**

**PROJECT AREAS LOCATION MAP**  
 UINTA BASIN REPLACEMENT PROJECT  
 CENTRAL UTAH WATER CONSERVANCY DISTRICT

impacted wetlands below the reservoir is #1952. The parcel numbers for Drainages 1, 2, and 3 are currently being researched. Big Sand Wash Reservoir and the proposed new outlet are located in T2S R3W Sections 9, 15, 16, 21, and 22. This parcel is owned by the MLWUA. The new outlet works will start at approximately the midpoint of the southwestern side of Big Sand Wash Reservoir just southeast of the small peninsula. It will parallel the eastern side of the irrigation ditch that runs along the eastern side of State Route 87 until it meets the "C" Canal, located south of Big Sand Wash. The new outlet will be approximately 5,400 feet in length.

The Big Sand Wash-Roosevelt Pipeline begins at the southeastern corner of the Big Sand Wash Reservoir and continues eastward for approximately 13.3 miles to the town of Roosevelt. Immediately prior to reaching Roosevelt, this pipeline bifurcates and continues north to the Golf Course Turnout and State Road Turnout as well as southeast to the Baseball Field Turnout and Cemetery Turnout. The parcel numbers with or adjacent to impacted wetlands or water bodies include: #1803, #1826, #1827, #1842, #1842-1, #1804, #1608, #1609, #1813-1, #1813-1-4, #1814, #1815-1, #1820, #1820, #1809, #1824, #1825, #1808, #1836, and #1836-1. Legal descriptions of the route from the Big Sand Wash Reservoir to Roosevelt include: T2S R3W Sections 21, 25, 26, and 27; T2S R2W Sections 25, 26, 27, 28, 29, and 30; and T2S R1W Sections 17, 19, 20, 21, and 30. Names and addresses are shown in Attachment 8 of the Section 404 Permit application.

## Project Description

The Uinta Basin Replacement Project includes the expansion of the Big Sand Wash Dam and Reservoir, construction of a new reservoir outlet and two conveyance systems carrying water to and from the reservoir, as well as a diversion structure to divert water from the Lake Fork River to the reservoir. The Big Sand Wash Feeder Pipeline will carry water from the proposed diversion structure on the Lake Fork River to Big Sand Wash Reservoir. The Big Sand Wash Roosevelt Pipeline will deliver project municipal and industrial (M&I) water from the enlarged Big Sand Wash Reservoir to the existing distribution system in Roosevelt, and will deliver both project and non-project irrigation water to the Lower K2 and State Road area northeast of Roosevelt for irrigation use.

The diversion structure is approximately 75 feet wide and affects 420 feet of the Lake Fork River (Figure 2), construction of which will involve removal of soil and placement of fill from and into Waters of the U.S. (Waters). The channel upstream and downstream of the structure will be reshaped to accommodate the new concrete sill and inlet screening structure. The concrete sill is designed to pass a flow of 2,000 cubic feet per second (cfs) and incorporates a notch for fish passage during low flows. Channel shaping will also result in a pool being formed both upstream and downstream of the sill to accommodate the fish passage rock sills (Figure 2). The Lake Fork River will be diverted around the construction site during construction by installing a temporary diversion dike and side channel (Figure 3). Additional erosion/sediment control facilities will be installed as needed to avoid discharge into the river.

A concrete channel about 4 feet deep and 4 feet wide by 350 feet long will be constructed to pass and measure flows downstream of the diversion dam (Figure 2). There will be a

Figure 2

Figure 3

12-foot-wide earth berm constructed on either side of the diversion structure, which will also result in fill being placed into Waters. Various areas of the diversion structure will require placement of Class IV riprap, some of which will be placed into Waters. The location and quantity of the riprap was designed to prevent the design 50-year flood flow, of about 1,900 cfs, from scouring and eroding the new earth embankment channel banks. Aerial photographs of the Lake Fork River indicate the existing stream is very unstable and that the river has historically flooded outside of the main channel into various braided streams along the river reach where the new Diversion Structure will be located. Flows in the Lake Fork River widely vary on a monthly and yearly basis and daily peak flows are much larger than the average monthly flows. The size of the riprap was selected by using the methodology presented in the U.S. Army Corp of Engineers, *Hydraulic Design of Flow Control Channels*, Engineer Manual EM 1110-2-1601, July 1, 1991, and by considering the operating and environmental conditions, which include impact loads from ice, uprooted trees, and other types of large floating debris. Following construction, willow stakes will be planted within the riprap areas to encourage establishment of riparian vegetation along the diversion structure.

A pad will be constructed adjacent to the diversion structure to be used for vehicle turnaround and for placement of materials that will be used in operating or maintaining the diversion structure (Figure 2). The pad will require excavation to sound granular foundation material (6 inches or less). Some of this material will be excavated from wetlands. A 12-inch layer of rock refill or drain rock with an overlay of geotextile will be installed and then covered with earth fill and a 6-inch top layer of untreated base course (UBC) to finished grade. There will be approximately 6.5 feet of fill used to build the pad. Some of this fill will be placed into areas formerly occupied by wetlands and excavated as described above. A 6-inch perforated drain pipe will be installed within the limits of the pad. A 24-inch-wide vertical wall of drain rock will be installed from the perforated drain pipe to the 12-inch rock refill layer.

A 1,700-foot-long access road will be constructed to access the diversion structure (Figure 4). The access road will connect to an existing road on the Cook property and terminate at the pad discussed above. The Cook property road will be improved and ultimately will connect to County Road 134. Construction of the access road will require cut and fill, due to the steep slope through which the road will be built. Wetlands will be impacted by the road construction activity.

The Big Sand Wash Feeder Pipeline extends for approximately 4.3 miles from the diversion structure to the Big Sand Wash Reservoir (Figure 1). The Big Sand Wash-Roosevelt Pipeline extends for 16.1 miles from the Big Sand Wash Reservoir outlet to the four turnouts in Roosevelt (Figure 1). Both pipeline routes will require a 50-foot-wide right-of-way (ROW) comprised of a 25-foot-wide temporary construction easement and 25-foot-wide permanent easement. In some areas the temporary construction easement is wider than 25 feet to accommodate construction activities. Pipeline installation will require trenching and backfilling activities. Wetland impacts from pipeline construction are temporary, as all disturbed areas within the pipeline ROWs will be restored to pre-existing conditions. Disruptions to wetland hydrology will be avoided through utilization of construction techniques such as construction of cutoff walls to avoid draining wetland areas. Topsoil will be reserved during construction and be placed and graded to pre-construction grade. Native

Figure 4

vegetation that is the same as that currently found on the pipeline routes will be seeded over the disturbed areas. The pipeline trench will be approximately 10 feet wide at the top, decreasing to a 6-foot-wide trench at a depth of 4 feet, which is maintained to a depth of 8 feet.

The project will also expand the capacity of Big Sand Wash Reservoir by raising the height of the south and southeast dams, which will increase the full pool elevation by 26 feet. This will inundate approximately 285 acres of land surrounding the reservoir. The area below the dam within the Big Sand Wash Canyon will be used as a staging area, stockpile area, and vehicle turnaround area (Figure 5). A significant amount of the existing dam's fill will be removed and stored in this area below the dam as the dam is rebuilt. This removal of the existing dam is being completed at the request of the Utah Division of Water Rights to eliminate existing seeps through the dam. It is also possible that some borrow material will be removed from this area. Raising the dams will impact wetlands below the existing dams through the activities listed above or by being buried under the rebuilt dam. The increase in flooded areas will cause semi-permanent impacts to three wetlands on the north and northwestern sides of the reservoir.

The outlet of the Big Sand Wash is currently located within the Big Sand Wash Canyon, which will be impacted by the rebuilt dam as well as stockpiled materials during construction activities. As a result, the outlet will be relocated to the southwestern side of Big Sand Wash. The new outlet will consist of an underground 6-foot-wide pipeline. The outlet corridor for installation activities will be approximately 50 feet wide, which includes a 25-foot temporary ROW and a 25-foot permanent ROW. The outlet will be approximately 5,400 feet in length, running from the reservoir to the "C" Canal located south of Big Sand Wash Reservoir and Dam.

## Jurisdictional Wetland Impacts

Surveys for wetlands, riparian areas, and threatened and endangered species were conducted on June 17, 26, 27, and 28, 2002, for the diversion structure, pad, access road, and Big Sand Wash Feeder Pipeline and August 6 through August 9, 2002, for the Big Sand Wash Reservoir expansion and Big Sand Wash-Roosevelt Pipeline. The survey area for the pipelines consisted of a 50-foot-wide ROW. In a few areas, additional space was required for construction activities and the ROW was expanded as necessary. The survey area for the Big Sand Wash Reservoir expansion included the land between the existing high water line (5,892 feet above sea level [asl]) and the proposed high water line (5,918 feet asl), the vicinity of the enlarged dam and new outlet works, and the Big Sand Wash Canyon below the dam.

All jurisdictional wetlands were delineated and a wetland delineation report was submitted to the U.S. Army Corps of Engineers (COE) on September 6, 2002. The COE regulator, Amy Defreeze, performed an onsite review of the project areas and the jurisdictional wetlands identified in the September 2002 wetland delineation report. A revised wetland delineation report was resubmitted in November 2002 based on agency comment and field review. As of the date of preparation of this report, the COE has not issued a concurrence with the accuracy of the wetland mapping.

Figure 5

Although a reasonable attempt was made to minimize impacts to wetlands, unavoidable, permanent wetland impacts will be incurred during construction of the diversion structure, diversion dam pad, access road, and Big Sand Wash Reservoir. A total of 5.69 acres of jurisdictional wetland areas will be permanently impacted by the various components of this project. This includes:

- Riverine Rock Bottom (RRB) 1.38 acres
- Palustrine Emergent (PEM) 1.41 acres
- Palustrine Shrub/Scrub (PSS) 0.22 acre
- PFO/PSS 0.21 acre
- PFO 0.082 acre
- PEM/PSS 0.35 acre
- RUB 2.04 acres

Wetland locations and areas of impact are shown in Figures 6 through 13. Table 1 shows the estimated permanent impacts for each wetland within the various components of the project.

TABLE 1  
Wetland Areas into Which Material will be Permanently Placed

Wetland Identifier	Wetland Type	Wetland Area
<b>Permanent Fill</b>		
<b>Diversion Structure and Associated Facilities</b>		
Earthen Dikes	RRB	0.64 acre
Bank Protection	RRB	0.38 acre
Rock Sills	RRB	0.20 acre
Diversion Dam	RRB	0.10 acre
Below Gate Concrete Channel	RRB	0.06 acre
Wetland #1	PEM	0.017 acre
Wetland #4AB	PSS	0.0022 acre
	<b>Subtotal</b>	<b>1.399 acres</b>
<b>Dredging of Upstream Channel</b>		
Dredging	RRB	2.3 acres
	<b>Subtotal</b>	<b>2.3 acres<sup>a</sup></b>
<b>Diversion Dam Pad</b>		
Wetland #1	PEM	0.154 acre
Wetland #2	PEM	0.04 acre
Wetland #4AB	PSS	0.125 acre
	<b>Subtotal</b>	<b>0.319 acre</b>

**TABLE 1**  
Wetland Areas into Which Material will be Permanently Placed

<b>Wetland Identifier</b>	<b>Wetland Type</b>	<b>Wetland Area</b>
<b>Access Road</b>		
Wetland #3	PSS	0.037 acre
Wetland #3	PFO/ PSS	0.21 acre
Wetland #4AB	PSS	0.023 acre
Wetland #5AB	PEM	0.015 acre
Wetland #6AB	PFO	0.082 acre
Wetland #7B	PEM	0.03 acre
	<b>Subtotal</b>	<b>0.397 acre</b>
<b>Big Sand Wash Reservoir</b>		
Drainage #1	RUB	1.3 acres <sup>b</sup>
Drainage #2	RUB	0.52 acre <sup>b</sup>
Drainage #3	RUB	0.22 acre <sup>b</sup>
Wetland #11	PEM/PSS	0.11 acre
Wetland #11	PEM	0.05 acre
Wetland #12	PSS	0.03 acre
Wetland #12	PEM	0.75 acre
Wetland #13	PEM	0.20 acre
Wetland #14	PEM/PSS	0.24 acre
Wetland #15	PEM	0.153 acre
	<b>Subtotal</b>	<b>3.753 acres</b>
	<b>Permanent Fill Total</b>	<b>5.69 acres</b>

<sup>a</sup>This represents the area to be dredged. Wetland area filled with this material is included in totals elsewhere.

<sup>b</sup>Although these wetlands will be impacted by flooding; no fill will be placed into these wetlands.

**Note:** Wetland identification numbers correspond with the wetland numbers defined in the September 2000 Wetland Delineation Report.

In addition to the permanent wetland impacts described above, approximately 4.50 acres of jurisdictional wetlands will be temporarily impacted during construction of the temporary diversion dam, Big Sand Wash Feeder Pipeline, and Big Sand Wash Roosevelt Pipeline. Temporary wetland impacts will not be mitigated for and therefore are not discussed in detail within this Mitigation Plan. A detailed description of all temporary impacts and their locations is provided in the Section 404 Permit application.

Figure 6

Figure 7

Figure 8

Figure 9

Figure 10

Figure 11

Figure 12

Figure 13

## Impacted Habitat Types, Functions, and Values

This section provides a general discussion applicable to all wetlands in the project area. Wetlands within the study area primarily consist of RRB (Lake Fork River), RUB, PEM, PSS, and PFO as well as complexes of two of these wetland types.

The wetlands identified within the proposed diversion structure, diversion dam pad, and access road provide medium functions, value, and social significance (Figures 6, 7, and 8). Generally, the more diverse wetlands provide a higher degree of value and function by providing sediment stabilization and retention, groundwater recharge, flood flow alteration, and wildlife habitat. The PSS and PFO wetlands may support large and small game species and recreational opportunities to hunters. Similarly, fishermen also utilize the Lake Fork River. Passive recreation uses may include wildlife watching, but are most likely minimal due to the limited access.

The Lake Fork River (RRB wetland) is classified as a high-quality water by Utah and is protected for uses such as drinking water supply, secondary contact recreation (boating, wading, etc.), and cold water species of game fish (Utah Administrative Code [UAC], 2002). The Utah Department of Environmental Quality (UDEQ) has identified several areas of concern regarding the Lake Fork River including: sediment loading, temperature changes, and habitat alteration in its lower reaches (UDEQ, 2002). The Lake Fork River itself provides moderate value, providing wildlife habitat and recreational uses. Ute ladies'-tresses orchid (*Spiranthes diluvialis*), a federal threatened species, is found along the Lake Fork River, but no individuals have been identified in the project area.

The surrounding PEM, PSS, and PFO wetland systems (Wetlands #1, 2, 3, 4AB, 5AB, 6AB, and 7B) are generally supported by groundwater flow and irrigation system seepage caused by impermeable rock layers and formations throughout the area (Figures 6, 7, and 8). Wetland #3 appears to have formed within an old channel or oxbow of the Lake Fork River, although the upstream dam most likely limits direct river flow to this area. These wetlands and wetland complexes provide wildlife habitat, improved water quality through surface water interception, nutrient retention, and suspended sediment reduction, as well as flood protection and erosion control. Most importantly they act as a "sink" for irrigation water and allow for groundwater recharge. Dominant vegetation within the PEM wetlands included herbaceous species such as Baltic rush (*Juncus balticus*), cattails (*Typha latifolia*), and various *Carex* species. At the time of the delineation in June, standing water was limited, most likely due to the 4-year regional drought. Dominant shrub and tree species identified within wetlands associated with the Lake Fork River system include Russian olive (*Elaeagnus angustifolia*), narrowleaf cottonwood (*Populus angustifolia*), and sandbar willow (*Salix exigua*).

The three drainage systems (RUB) located on the northern and northwestern sides of the reservoir are small stream channels supplied by agricultural flow return (Figures 10 and 11). The vegetation is dominated by one species, reed canary grass (*Phalaris arundinacea*) and the species composition is low in diversity providing low quality wildlife habitat. The density of the vegetation immediately along the stream channel provides low to moderate sediment retention and nutrient removal, improving the water quality as it flows into the reservoir.

The wetlands identified within the Big Sand Wash Canyon are associated with seeps from the reservoir, as well as the former Big Sand Wash channel (Wetland #12) (Figures 12 and 13). Together, the five wetlands make up an intricate network of PEM and PSS wetlands, which provide groundwater recharge and a moderate quality wildlife habitat. No listed rare or endangered species were identified in this area. The recreational value of these wetlands is limited by their remote location and poor access. Dominant shrub species include cottonwoods, willows, Russian olive, and tamarisk (*Tamarix ramosissima*). Herbaceous species predominantly consist of *Juncus* sp., *Equisetum* sp., and few-flower spikerush (*Eleocharis pauciflorus*).

## Impact Minimization Measures

All practical measures of minimizing direct and secondary construction impacts will be utilized within wetlands. The limits of the pipeline ROWs and limits of construction associated with the diversion structure, access road, pad, and dam adjacent to wetland boundaries will be clearly marked and strictly observed. The width of the pipeline ROW within jurisdictional wetlands will be minimized to the extent possible that does not compromise health and safety requirements. Clearing and disturbances within wetland areas will be restricted to the established limits of construction and pipeline ROWs. Activities such as equipment or material storage or stockpiling; construction staging or maintenance; field offices; hazardous material or fuel storage, handling; turnouts; or temporary access roads will be restricted within wetland areas. No soil, rock stockpile, or excess soil materials will be placed near sensitive resource habitats, including water channels, wetlands, and riparian areas, where they may erode into these habitats or where runoff from spoils could run into the sensitive habitats. Because of the limited work space available within the pipeline ROWS, temporary material storage and stockpiling required for pipeline installation may be required. These disturbances will be minimized to the extent possible. Staging areas, access roads, and other site disturbances required for diversion dam construction will be located to reduce damage to natural plant communities. Special construction methods and materials (e.g., cutoff collars) will be used to avoid long-term impacts on site hydrology in wetlands within the pipeline ROWs and the areas adjacent to the diversion structure, pad, access road, and new dam.

In areas of temporary disturbances, specific measures will be utilized to minimize impacts and ensure successful restoration of disturbed areas. During excavations within wetlands, the upper 12 to 18 inches of soil will be removed from the trench area and stockpiled separately from non-wetland topsoil and subsoil materials. Once construction is complete within areas of temporary wetland disturbances; surface elevations will be restored to preconstruction conditions and the segregated wetland topsoil will be replaced. The area will be revegetated and the necessary erosion and sediment control measures will be installed and maintained until the site is permanently stabilized. Soils must be backfilled within wetlands in such a manner that accounts for settling of the soil and prevents a mound or depression from forming within the pipeline ROW. Excess soil material will be appropriately disposed of or stored within upland areas.

# Mitigation Goal

## Mitigation Types

Mitigation for this project will use a combination of onsite and offsite mitigation and will be in-kind to the extent practicable. Palustrine emergent (PEM), scrub-shrub (PSS), and forested (PFO) wetland types will be replaced in-kind. In addition to mitigating for the loss of wetlands, compensation ratios greater than 1:1 also provide compensation for the loss of wetlands during the construction phase as well as for the time required for created wetlands to become established, fully functioning wetlands.

Replacement ratios are proposed to be 2:1 for PEM, PSS, and PFO compensation. It will not be possible to replace RRB and RUB at the mitigation site. Instead, we propose replacing RRB and RUB with PEM and PFO habitats. We propose to compensate RRB impacts at a ratio of 1.5:1, based on the rationale that the replacement wetlands (PEM and PFO) have higher functions, in general, than the RRB habitats. We also propose to compensate RUB impacts at a ratio of 1:1. This is based on the rationale that the impacts to Drainages 1, 2, and 3 are semi-permanent. The majority of these areas will only be inundated during a portion of the year when the water elevation is at its highest. Current features of the drainage above and below the existing high water mark are very similar and do not show adverse impacts to the vegetation present along the drainage for a considerable portion of the areas that are intermittently flooded.

Because the proposed mitigation site is located below the enlarged Big Sand Wash Dam, compensation would be onsite for those impacts arising from enlargement of the Big Sand Wash Dam. Compensation for impacts from construction of the diversion dam, access road, and pad would be offsite. Mitigation will consist of creation of 8.65 acres of PEM, PSS, and PFO habitats. Table 2 shows the different habitat components of the mitigation site. Figure 14 shows the location of these habitat components.

**TABLE 2**  
Habitat Components Impacted, Compensation Ratios, and Habitat to be Created

Habitat Impacted	Impacted Area	Compensation Ratio	Habitat Created	Compensation Area
RRB	1.38 acres	1.5:1	PEM (1.55 acres) and PFO (0.52 acre)	2.07 acres
RUB	2.04 acres	1:1	PEM (1.55 acres) and PFO (0.52 acre)	2.04 acres
PEM	1.41 acres	2:1	PEM	2.82 acres
PSS	0.22 acre	2:1	PSS	0.44 acre
PFO	0.082 acre	2:1	PFO	0.164 acre
PEM/PSS	0.35 acre	2:1	PSS	0.70 acre
PFO/PSS	0.21 acre	2:1	PFO	0.42 acre
<b>Totals</b>	<b>3.65 acres</b>			<b>8.65 acres</b>

Figure 14

Although not discussed in detail, mitigation for temporary impacts associated with construction of the pipelines will consist of protection of wetland hydrology, restoration of original contours, application of reserved topsoil, and re-vegetation of all disturbed areas with native wetland species common to the disturbed sites. There will also be upland plantings in all disturbed upland areas using native species similar to those removed during construction.

## **Mitigation Functions and Values**

The proposed mitigation site currently shows signs of slight impacts due to off-road vehicle use and general unregulated use by the public. The majority of the site is in uplands, but pockets of wetlands exist, as do wetlands along the remnants of the original Big Sand Wash Creek channel and along the spillway channel.

Groundwater recharge, wildlife habitat, and nutrient removal will be the major functions exhibited by the created wetlands. Groundwater recharge will increase over existing conditions because of the greatly expanded area of wetlands. Wildlife diversity will increase as the extent of emergent, shrub/scrub riparian, and forested riparian habitats increase. The quality of the habitat being created will be higher than that of the habitats impacted through increases in vegetation species diversity, richness, density, and canopy coverage. Although contamination or elevated levels of nutrients are not a major problem in this area, increasing vegetation density and cover, as well as increases in biological diversity, will provide a large capacity for nutrient removal. Water entering the Big Sand Wash channel from the wetland will be of higher quality than the water entering the wetland.

Recreation is not likely to become a major use of this site and uniqueness/heritage values will not change. There would be no effect to groundwater discharge or flood flows, as these were not major functions of the site prior to construction.

## **Temporal Losses**

There will be a period of time before habitat and other functions and values reach their full potential. Wildlife diversity/abundance and nutrient removal functions are expected to reach pre-disturbance levels in PEM habitats within 3 years following implementation. Shrub/scrub and forested habitats will take longer; 5 years for shrubs and 10 to 15 years for forested habitats. Groundwater recharge will be functioning following construction and should reach pre-disturbance levels within 2 years.

## **Estimated Cost**

An estimated cost for this restoration is \$530,700. This is based on approximations as shown in Table 3 and does not represent exact costs to be incurred. Approximate annual monitoring and maintenance costs over a 5-year period are \$87,000 (\$17,400/year).

**TABLE 3**  
Estimated Costs for Restoration and Annual Monitoring and Maintenance

Activity	Cost
Design Costs	\$47,500
Implementation	
Site Excavation	\$400,000
Site Preparation	\$7,500
Plants Installed	\$59,000
Seed Installed	\$700
Fence Installed	\$11,000
Culverts Installed (1-inch diameter)	\$5,000
<b>Estimated Restoration</b>	<b>\$530,700</b>
Maintenance	\$15,000
Monitoring (5-yr total)	
Labor	\$55,000
Expenses	\$8,000
Reporting	\$9,000
<b>Estimated Total Annual Monitoring and Maintenance</b>	<b>\$87,000</b>

## Proposed Mitigation Site

### Site Description

The mitigation site is a 8.65-acre parcel in the Big Sand Wash Creek Canyon below the enlarged dam. The realigned roadway will pass through the upper end of the restoration site. It is located in Section 21 of Township 2S and Range 3W. It was chosen because it will have a reliable water supply, is adjacent to the project and impacted wetlands, will be substantially impacted through project implementation, and is located on land owned by the project proponent.

Figure 14 shows a plan view of the mitigation site, including mitigation features and presents a cross-section view through the mitigation site.

In addition to wetland creation within the proposed mitigation site, willow stake plantings will be placed within the riprap areas associated with the diversion structure to encourage establishment of riparian vegetation.

## **Ownership Status**

The mitigation site is currently owned by the MLWUA. The Mitigation Commission will acquire a permanent easement.

The Mitigation Commission will be responsible for actual maintenance of the site and will also be responsible for funding maintenance activities throughout the maintenance period. A written agreement will be executed between the Mitigation Commission and the MLWUA to describe the responsibilities of each party and ensure that the goals of the Mitigation Plan are implemented.

Water flows through the mitigation are controlled by the MLWUA. Flows sufficient to maintain hydrologic conditions at the site to satisfy Mitigation Plan goals will be provided.

Easement restrictions will be implemented to maintain this area as a perpetual wetland mitigation/wildlife habitat preserve. The proposed easement restriction language will be submitted to the COE at least 30 days prior to recordation. The easement will be recorded at least 15 days prior to the start of project construction.

## **Existing Function and Values**

Groundwater recharge is fair to moderate at this time. Groundwater discharge is very good, because this forms the basis of hydrology for the impacted, existing wetlands at the mitigation site. Wildlife diversity is moderate, as there are upland and wetland habitats present. Existing vegetation ranges from low-quality, weedy, ruderal vegetation on disturbed sites to high-quality riparian shrub vegetation in scattered, wetland patches. Sediment stabilization is high, as there are very infrequent flows with velocities that could move sediment. Eroded sediments would tend to stay in the mitigation area. Biological diversity is moderate at this time. The nutrient removal function of this area is very low, as high concentrations of nutrients are not present. No organized recreation occurs on this private property and there are currently no uniqueness/heritage values. Unauthorized use of the site by the public does occur, as evidenced by fire rings, broken bottles, and off-road vehicle tracks causing erosion.

## **Present and Proposed Uses**

There are no structures on the site. The "C" Canal exits Big Sand Wash Reservoir and flows through the site. The spillway is also located at the lower end of the mitigation site. Proposed future uses would be as a mitigation site. No special uses will be made of the site, but it will be open to the public. The mitigation site will be fenced to prevent cattle grazing.

## **Jurisdictional Wetlands**

As discussed in the Section 404 Permit Application, wetlands are located on the site. Five PSS and PEM wetlands totaling 1.53 acres would be lost with the project. This entire area will be used as a staging area, stockpiling area, and vehicle turnaround area. There are no alternatives to these uses, as the existing dam fill must be removed, stored, and then replaced following repair of the dam structure. The overwhelming volume of material to be handled precludes transportation of this material for any appreciable distance.

## **Present and Proposed Use of Adjacent Areas**

Adjacent areas are also used for grazing and stock watering. Several houses are located downstream along the canal.

## **Zoning**

This area is rural agricultural. Nothing in this plan would impact current zoning.

## **Implementation Plan**

### **Implementation Success Rationale**

Creation of wetlands functions is well documented in the literature. CH2M HILL has completed many wetland creation projects from creation of new wetlands to restoration of existing systems. Successfully creating wetlands at the proposed mitigation site will depend in large part on establishment of suitable hydrology, establishment of correct soil surface elevations, and design and planting of adapted vegetation. The key to maintaining wetland functions will depend on controlling degrading factors including livestock and destructive human use of the site (off-road vehicles).

### **Responsible Parties**

The CUWCD will be responsible for implementing this plan. The contacts for this project are:

Mr. Lee Wimmer  
CUWCD Assistant General Manager, CUP Completion  
355 West 1300 South  
Orem, UT 84065  
801/226-7139

or

Mike Weland  
Executive Director  
Utah Reclamation and Mitigation Conservation Commission  
102 West 500 South, Suite 315  
Salt Lake City, UT 84101  
801/524-3146

### **Schedule**

Table 4 shows the tasks and schedule that will be followed to implement this plan.

**TABLE 4**  
Schedule for Implementation

<b>Task</b>	<b>Date</b>
Construct wetland water supply	Spring/Summer 2005
Establish wetland contours	Fall 2005
Place outlet culverts	Fall 2005
Collect cottonwood/willow cuttings	Winter 2005/2006
Seed herbaceous stock	Spring 2006
Plant container stock	Spring 2006
Plant cuttings	Spring 2006
Collect willow/cottonwood cuttings	February 2004

## Site Preparation

Active mitigation elements are described below.

### Establishment of Water Source

As shown in Figure 14, water will be introduced into the wetland near the toe of the new dam. Water will be withdrawn from Big Sand Wash Reservoir and piped to the western side of the wetland. A gated header pipe will be constructed across the width of the wetland to supply water across the entire wetland. A series of very shallow berms will be constructed perpendicular to the water flow throughout the length of the wetland. The berms will pond water and then the water will overtop the berm and pond behind the next berm. The flow rate will be calculated based on the need to maintain saturated conditions across the entire mitigation site. A series of 4-inch berms will be built within the PEM wetlands to help slow water movement through the mitigation site and promote saturated conditions (Figure 14).

### Site Grading/Topsoil Placement

Three distinct soil elevations will be established on which to plant wetland plant communities (Figure 14). The lowest elevation will support PEM, the intermediate elevation will support PSS, and the highest elevation will support PFO. The site will slope slightly from west to east to facilitate water movement across the site. The berm upon which the PFO is established on the eastern side of the site will be used in combination with the culverts to maintain a slightly flooded condition in the PEM habitats (2- to 6-inch water depth). The PSS habitats will be saturated and the PFO habitats will be saturated within 12 to 18 inches of the soil surface.

The initial grading will establish a soil surface that is 24 inches below final grade. The lower 18 inches will be filled with a high clay content soil. Topsoil will then be spread over the site to a depth of 6 inches to achieve final grade. Topsoil reserved from impacted wetlands (and upland areas as needed) will be spread over the site to achieve final grade.

## Vegetation Establishment

Woody vegetation will be established in the PSS and PFO habitats. Narrowleaf cottonwood (*Populus angustifolia*) and river birch (*Betula occidentalis*) will be established in the overstory of the PFO wetland, with golden current (*Ribes aureum*) and Woods rose (*Rosa woodsii*) in the understory. A herbaceous understory will be seeded in the PFO habitat. Coyote willow (*Salix exigua*) and red-ozier dogwood (*Cornus stolonifera*) will be planted in the PSS habitat, with an understory of Baltic rush (*Juncus balticus*) and Nebraska sedge (*Carex nebraskensis*). Dominant species to be established in the PEM habitat include Baltic rush, Nebraska sedge, few-flower spikerush (*Eleocharis pauciflora*), and awned sedge (*Carex atherodes*), with lesser densities of scouring rush (*Equisetum sp.*) and common monkeyflower (*Mimulus guttatus*).

Cottonwood, red-ozier dogwood, and willow will be established using cuttings. River birch and remaining shrubs will be planted using 1-gallon container stock. All herbaceous plants will be planted from 10-cubic-inch containers. The seed mix in the PFO will be sown mechanically after the woody plants are planted and then lightly raked into the soil. Water-holding saucers will be formed around all woody plants.

## Site Fencing

The entire 8.65-acre site will be fenced to exclude livestock. The fence will be designed to allow free passage of wildlife over or under the fence. Gates will be installed at locations necessary to provide maintenance and public access to the site.

## Planting Plan

Wetland vegetation will be established as described above. All plants will be collected from local sources if available, or locally adapted seeds will be used as an alternative if collections cannot be made.

## Woody Vegetation

Woody vegetation will consist of coyote willow, narrowleaf cottonwood, river birch, red-ozier dogwood, golden current, and Woods rose. Willow, cottonwood, and dogwood will be established as cuttings collected from local sources. Cuttings will be collected in mid-winter and stored in coolers until ready for outplanting. Holes for cuttings will be augured into the groundwater. Cuttings will be placed in each hole (base in water) and the hole backfilled and tamped to remove air space. All remaining woody plants will be planted as container stock grown in 1-gallon containers.

Trees will be planted on 10-foot centers and shrubs will be planted on 5-foot centers. Each planting hole will be two times the root ball diameter and 4 inches deeper than the root ball. The root collar will be located at grade. A shallow basin will be constructed around each plant to collect rain or irrigation water.

## Herbaceous Vegetation

Herbaceous vegetation will be established in PEM, PSS, and PFO habitats. Herbaceous vegetation will be established from seed in the PFO habitats. Herbaceous plants in the PSS and PEM habitats will be established from 10-cubic-inch containers. Container-grown herbaceous plants will be established on 3-foot centers. They will be planted in rows, with each plant 3 feet from the previous plant. Adjacent rows will be 3 feet apart and the plants

in one row offset from the plants in the adjacent row by one-half the planting distance. This systematic planting pattern will facilitate first-year evaluation for survival of planted stock. The PFO-seeded species mix will contain grass and forb species adapted for the establishment location.

## Irrigation Plan

A temporary irrigation system will be constructed to keep the site saturated until planted and seeded vegetation is well established. It is anticipated that irrigation will be needed for the first growing season only. Water will be turned into the site from the permanent water supply system after woody plants have extended roots into the soil and the herbaceous seeding has germinated. Irrigation can be terminated following turn-in of the permanent water supply system.

## As-Built Conditions

An as-built report will be submitted to the COE within 60 days of substantial completion of the mitigation site. Separate as-built reports will be submitted for the elements not completed within 6 weeks of each other. As-built reports will include a discussion of changes from the original plan (marked in red on the plans) and drawings showing locations of features constructed as part of the plan. If major changes are planned, these will be coordinated with the COE prior to initiation of the change work.

## Maintenance During Monitoring Period

### Maintenance Activities

Regular maintenance is important to ensure the success of mitigation measures. Maintenance will be conducted by the Mitigation Commission for the entire monitoring period (5 years). Maintenance activities (Table 5) will include fence inspection and repair early in the spring before livestock are placed on the adjoining pastures every year, and inspections will continue monthly for the duration of the grazing season.

TABLE 5  
Schedule for Maintenance Activities

Activity	March	April	May	June	July	August	September
Fence inspection and repair <sup>a</sup>	X	x	x	x	x	x	x
Planting survival surveys						x	
Replacement plantings <sup>b</sup>							x
Weed control	X	x	x	x	x	x	
Inspect plants for girdling and damage (install controls)			x	x			

<sup>a</sup>Fence inspection and maintenance should begin early in the spring prior to placing livestock into adjacent pastures each year and continue monthly until livestock are rounded up and moved elsewhere. The actual schedule will depend on the grazing rotation system used.

<sup>b</sup>Replacement plantings may also be allowed in October or November.

The first year after plantings are in place, they will be checked for survival. Survival must equal 100 percent for each species at the end of Year 1. If survival falls below this level for any species, replacement plantings will be made in the fall of the first year and a 1-year warranty for replaced plants will be required.

To enhance survival, new plantings will be inspected in late spring for signs of herbivory from mice, beaver, or other wildlife. If necessary, planting nets or planting cylinders will be placed around critical plants/plantings to protect against girdling by rodents.

Weeds will be pulled and/or sprayed with herbicides approved for use in streamside habitats early in the growing season or at the appropriate time for the target species by the maintenance contractor. Woody weed species will be cut and stump-treated. Of particular concern are Russian olive and tamarisk (*Tamarix ramosissima*). Any access control signs necessary will be maintained and/or replaced at least once a year.

## Responsible Parties

The Mitigation Commission will be financially responsible for maintenance of the mitigation site and mitigation actions. The vegetation contractor will be responsible for the initial plantings, irrigation, and replacing new plantings for the first 2 years, or until all plants have survived for 1 year.

## Monitoring Plan

### Success Criteria

Mitigation success will be based on meeting criteria for vegetation stature. The mitigation will be considered successful when performance criteria for all created wetlands are met. Monitoring will continue for 5 years.

### Performance Criteria

The following criteria are proposed to determine mitigation success. Data to evaluate performance criteria will be collected annually.

Mitigation will be considered successful if the following has occurred within 5 years:

- **Percent canopy cover** of planted herbaceous vegetation shall equal 80 percent or greater, with no bare patches greater than 4 cubic feet.
- Planted **woody vegetation survival** shall exceed 70 percent.
- No **invasive weed species** are present, including Russian olive and tamarisk.

### Monitoring Methods

Monitoring will include yearly measurements to determine success.

### Yearly Monitoring

The first monitoring event will be conducted at the end of the first growing season following planting and extend for 5 years.

## Woody Vegetation

Success criteria for woody vegetation is based on survival. The monitoring for the first year shall consist of a 100 percent evaluation of all plantings. Approximately 20 percent of the area planted will be sampled to determine survival during monitoring Years 2 through 5. Survival shall equal 100 percent at the end of the first growing season, no less than 90 percent at the end of the second growing season, and no less than 70 percent for the remaining three growing seasons. Permanent 1/10-acre plots will be randomly located within PFO and PSS habitats to measure survival. Plot shape can be adjusted to accommodate the randomly selected location. A total of eight plots will be established within the PSS and PFO habitats; four plots within the PFO habitats and four plots within the PSS habitats. Each island will have one PSS monitoring plot and one PFO monitoring plot. Two additional PFO monitoring plots and PSS monitoring plots will be located throughout the mitigation site. A measurement plot drawing showing tree/shrub, by species, locations shall be created following plot establishment to be used in future measurements.

## Herbaceous Vegetation

Forty-seven 0.01-acre plots will be randomly located throughout the PEM habitat to measure canopy cover of planted herbaceous vegetation.

- A total of forty-seven 435-square-foot (0.01-acre) plots will be randomly located within the established PEM wetlands to determine herbaceous canopy cover of seeded areas. This generally provides eight plots per acre of PEM wetlands.
- A photograph of each plot will be taken from the southeast plot corner each year.
- A total count of all planted herbaceous seedlings will be done the first year to determine survival percentage. Missing plants shall be re-planted. Monitoring in Years 2 through 5 will be conducted within the monitoring plots.

## Additional Monitoring Elements

- The mitigation area will be searched for weeds, and those found will be sprayed or cut and sprayed.
- Site observations shall record at least the additional following factors: evidence of ponding/flooding (approximate, depth, location, etc.); human disturbance (trash dumping, off-road vehicles, etc.); erosion (into or within created wetlands); and evidence of wildlife usage (droppings, holes, deer beds, etc.).
- Several permanent photo points will be established and permanently marked with a metal fence post. A photo will be collected from each point each year.

## Final Measurements

If all performance criteria have been met at Year 5, no further monitoring will be conducted. If any resource area does not meet performance criteria at Year 5, the COE will be consulted to determine future action needed to satisfy mitigation commitments.

## Long-Term Maintenance

Once the 5-year monitoring program is completed and/or the mitigation commitments are satisfied, the mitigation site will require long-term maintenance to ensure that the newly created wetlands continue to thrive and remain undisturbed. The Mitigation Commission and the Utah Division of Wildlife Resources will be responsible for the long-term maintenance and perpetuity of the mitigation site. Long-term maintenance responsibilities will include, but are not limited to, conducting periodic site visits, mending fences, maintaining wetland hydrology, and invasive weed control.

## Annual Reports

An annual report will be prepared each year for submission to the COE. The reports will be delivered prior to December 30 of each monitoring year. The reports will contain the following:

- Name, title, and address of all persons preparing the report
- Copy of the COE permit, including special provisions
- Analysis of monitoring data
- Discussion of achievement of performance criteria and movement toward achieving success criteria
- Photos of monitoring sites at permanent locations as discussed above
- Map of measurement locations
- Maintenance performed
- Problems encountered and remedial actions conducted
- Additional observations noted during the monitoring event, as necessary

A final annual report will be prepared upon completion of monitoring and achievement of success criteria.

## Schedule

All vegetation data collection for vegetation performance criteria will be done in August of every year. Weed inventories will be done as early in the spring/summer as possible to identify plants.

## Completion of Mitigation

### Notification

The COE will be notified when the initial monitoring period is complete and the Mitigation Commission believes that final success criteria have been satisfied. This notification will be part of the annual report.

## **COE Confirmation**

The COE may request a visit to the site with the Mitigation Commission to confirm and verify completion of mitigation. The COE will prepare a letter notifying the Mitigation Commission that their mitigation responsibility is satisfied and that the Mitigation Commission is released from further obligations, other than those agreed upon between the Mitigation Commission and the mitigation site owner.

## **Contingency Measures**

### **Initiating Procedures**

Annual monitoring will be used to determine if the site is on a trajectory leading to successful mitigation. Remedial actions will be taken to correct problems.

### **Annual Measurements**

Annual vegetation measurements will be used to determine if vegetation is developing in a manner that will lead to satisfying the success criteria.

**Herbaceous Vegetation.** Canopy cover of seeded herbaceous vegetation shall exceed 50 percent following one growing season and 70 percent following two growing seasons. Only those parts of the seeded area not meeting the criteria will be reseeded. Planted herbaceous vegetation will be 100 percent surveyed the first year and missing plants replaced.

**Woody Vegetation.** As discussed previously, all plants must survive for 1 year. The final success criteria is 70 percent survival. If survival falls below 70 percent at the end of any growing season, woody plants shall be planted to bring the total number of plants to 70 percent of what was planted.

### **Alternative Locations**

In addition to the Big Sand Wash Canyon site, there are two alternative locations being proposed for this mitigation project. The alternative sites include: the Mallard Springs Wildlife Management Area located in Duchesne County approximately 1.5 miles southeast of Myton, Utah, and areas further downstream of the proposed mitigation site along the Big Sand Wash.

### **Funding Mechanism**

CUWCD has committed to providing the funding necessary to establish, monitor, and conduct remedial actions as needed. Monitoring and remedial action funding will be the responsibility of the Mitigation Commission.

## References

Utah Administrative Code (UAC) Website,

<http://www.rules.state.ut.us/publicat/code/r317/r317-002.htm>, 2002

Utah Department of Environmental Quality (UDEQ) Website,

[http://waterquality.utah.gov/watersheds/uinta/water\\_quality.htm](http://waterquality.utah.gov/watersheds/uinta/water_quality.htm), 2002