Big Bend of the Jordan River Habitat Restoration and Federal Land Transfer

Final Environmental Assessment

September 2018

Utah Reclamation Mitigation and Conservation Commission

CHAPTER 1
PURPOSE AND NEED

INTRODUCTION

The City of West Jordan and the Utah Reclamation Mitigation and Conservation Commission (Mitigation Commission), a Federal Agency, are proposing to create or enhance riparian, wetland and upland habitats along a reach of the Jordan River, referred to as the Big Bend site, which has been impacted by prior human alterations to the stream channel and adjacent lands. Under the proposed action, restoration objectives would be accomplished by re-aligning the Jordan River channel to meander through properties owned by the City of West Jordan and the Mitigation Commission. A portion of the Jordan River flow would continue down the old channel to maintain riparian vegetation and provide flood conveyance during large flood events. Recreational enhancements are also planned as part of the project.

The project area is approximately 68 acres in size, of which 43 acres (68%) is owned by the United States under the administration of the Mitigation Commission, and 25 acres (32%) is owned by the City of West Jordan Figure 1. The 25-acre City of West Jordan parcel is presently encumbered by a conservation easement enforced by the State of Utah Division of Forestry, Fire and State Lands. Under the Proposed Action, the conservation easement would be amended to include the 43-acre federal parcel, and concurrently the Mitigation Commission would transfer the 43-acre federal parcel to the City of West Jordan. The City of West Jordan would subsequently transfer that portion of the 68-acre parcel that would become the new bank and bed of the Jordan River to the State of Utah Forestry, Fire and State Lands. The 68-acre parcel would be managed for ecological restoration and compatible recreational uses consistent with the conservation easement.

PURPOSE AND NEED FOR THE PROJECT

The Jordan River begins as the outlet for Utah Lake and flows northward to the Great Salt Lake. Agricultural development, urban encroachment, and channelization of the river for flood control have resulted in significant degradation of the natural river ecosystem. The Jordan River corridor was significantly modified by channel straightening and was relocated several times from the early 1930s to the mid-1950s. The most drastic changes to the Jordan River in the project area occurred prior to 1952, by which time long segments of the river had been re-aligned and confined between levees to accommodate the Sharon Steel milling and smelting plant. The Sharon Steel site is located immediately north (downstream) of the proposed restoration area, as shown in Figure 1.

Modifications to the Jordan River channel have greatly impacted the natural mechanics of the river and decreased its stability and function. Channel realignment, dredging and channelization activities occurring in the 1950s were particularly damaging to the river's natural riparian processes, and consequently the habitat of the Jordan River. These actions increased the river's channel gradient and flow velocity, which in turn has caused increased head cutting, channel bed degradation, and stream bank erosion. As a result of this channel instability, much of the remaining riparian, wetland, aquatic

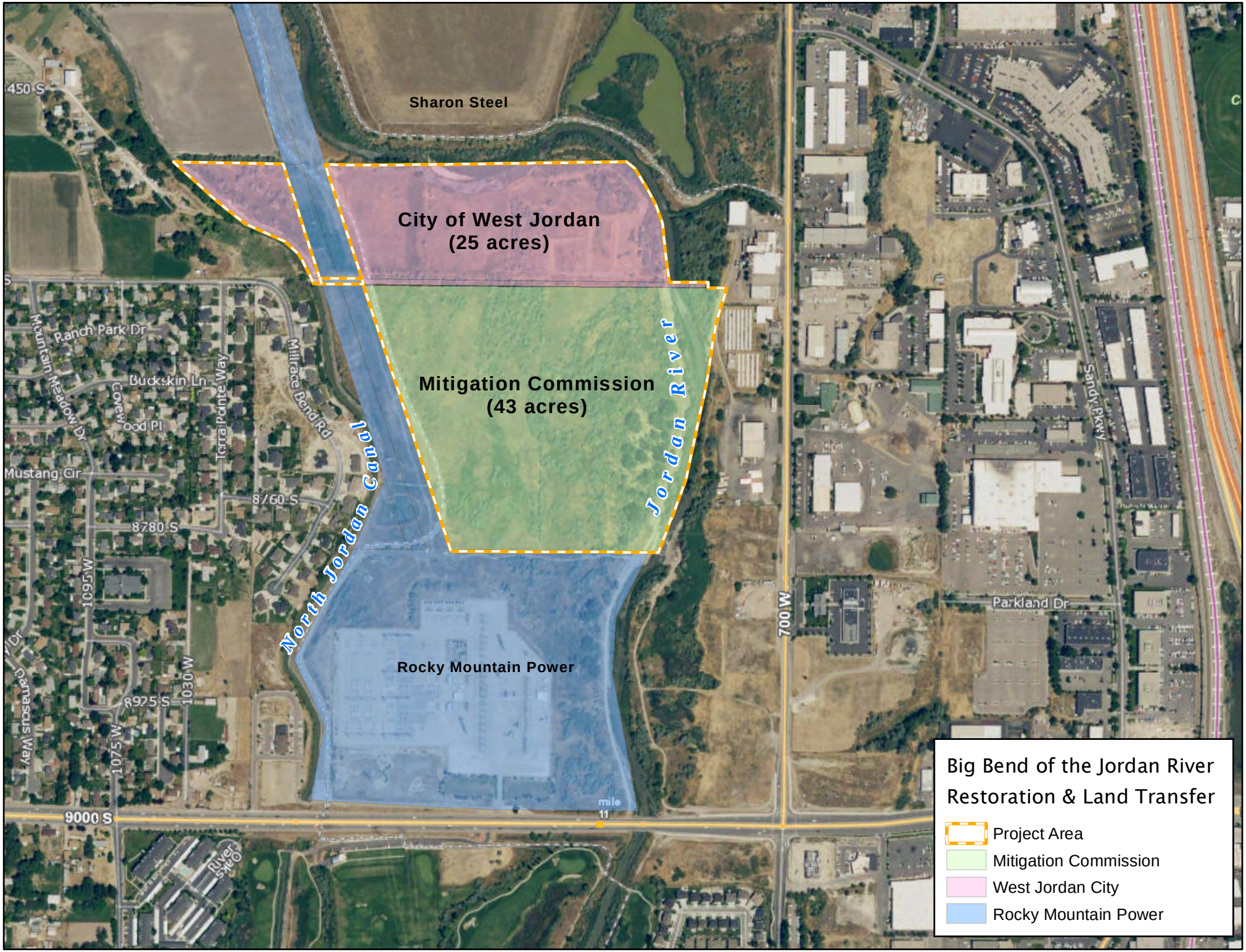


Figure 1 Project Area Map

and upland habitats have been lost or impaired. Continuing bank erosion, particularly during high-water events (such as occurred as recently as 2011) is resulting in the loss of remnant habitats within and adjacent to the channel.

Historically, the project area was dominated by willow stands, cottonwoods, and species native to the area. These native species contributed to a diversity of habitat types and provided important functions in the river's ecosystem. As a result of channelization, wetland and riparian vegetation along the Jordan River has deteriorated. Channel bed degradation caused the river's water table (water surface elevation) to lower with respect to the floodplain, resulting in a loss of connection between the root zone of floodplain vegetation and shallow groundwater associated with the river. Consequently, most of the project site is currently vegetated with non-native species that provide relatively poorer habitat value to native wildlife compared to native species. Russian olive (*Elaeagnus angustifolia*) has replaced Fremont cottonwood (*Populus fremontii*) as the dominant overstory species. The native woody component of the understory, primarily sandbar willow (*Salix exigua*), Wood's rose (*Rosa woodsia*), and golden currant (*Ribes aureum*) has been replaced with introduced grasses, weedy forbs, and salt cedar (or Tamarisk, *Tamarix* ramossissima). This condition and loss of natural riverine ecological processes and associated native vegetation is similar to what has occurred over large portions of the entire Jordan River corridor.

The Jordan River is considered lowland riparian habitat (below 5,500 feet in elevation). This habitat type is considered the single most important in the state for avian species (Parrish et al., 2000). The significance and rarity of riparian habitats for breeding birds make the limited remaining Jordan River bird habitat an important area for restoration. The river's importance is magnified by its location within the Great Salt Lake Flyway, and its function as a connector between the Great Salt Lake and aquatic and riparian habitats to the south (Utah Lake) and to the east (the canyons of the Wasatch Front).

The proposed restoration site (the Big Bend Site, or Site) is one of the last remaining large undeveloped sections of land within the Jordan River corridor, and thus provides a unique opportunity to restore the degraded ecosystem structure, function, and dynamic processes of the river to a more natural condition. Restoring both aquatic and terrestrial ecosystem functions would improve both aquatic and terrestrial habitat over what presently occurs on-site, which is the underlying purpose for the project.

The proposed project, described in greater detail in Chapter 2, would divert a portion of the Jordan River out of its existing channel into a new excavated channel west of its present location. Flows in the new channel and an excavated floodplain would facilitate the restoration of riparian habitat and river mechanics that have been impacted from prior human alterations of the river. The project would provide associated outdoor recreational opportunities that are currently limited in the community with the construction of a 4-acre fishing pond, trails, a viewing platform, educational and interpretive facilities, picnic tables, parking and restrooms. The bank of the Jordan River located at the north end of

the project area would also be stabilized and re-contoured to provide public use spaces adjacent to the river. Historic berms constructed to channelize the Jordan River would be recontoured to approximate the natural landscape and the project area would be revegetated with native plant species. The proposed action would restore, create or enhance the most wetland, riparian and upland habitats of the three action alternative evaluated in this EA. The other two action alternatives would accomplish similar objectives, but to a lesser degree.

"Significant acreages of wetland, native vegetation and wildlife habitat will be professionally managed in an integrated manner in perpetuity. Areas that are primarily for human use such as trails, golf courses and parks will be managed, to the extent possible, to complement the wetlands, native vegetation and wildlife habitat of the natural conservation corridor. A minimum stream flow will be maintained for the benefit of fisheries, wildlife and people."
Desire Future Condition - - *The Jordan River Natural Conservation Corridor Report*

"Meandering through the center of the highly urbanized Salt Lake Valley, the Jordan River corridor will be a continuous system of natural areas, recreation and nature trails, and parks, providing a wealth of opportunities for people to experience and learn about the natural world and enjoy the outdoors. With its rich complex of riparian, wetland, and upland habitats, the greenway will provide an abundance of important and diverse habitats supporting a wide variety of wildlife. Through protection, enhancement, and restoration of its diverse habitats, the greenway will function as an important migration corridor for wildlife and provide unique opportunities for people to view, study, and enjoy wildlife in an urban area."
Vision Statement - - *Blueprint Jordan River*

PURPOSE OF THIS DOCUMENT AND DECISIONS TO BE MADE

The National Environmental Policy Act of 1969 (NEPA) requires all Federal Agencies to take into account the environmental impacts of their proposed actions before they implement them. Under the proposed project, an existing conservation easement held by the Utah Division of Forestry, Fire and State Lands on the 25-acre City of West Jordan Parcel (Appendix 4) would be amended to include the 43-acre federal parcel. The 43-acre federal parcel would concurrently be transferred from the Mitigation Commission to the City of West Jordan.[1] The City of West Jordan would transfer ownership of the bed and bank of the new river channel to Forestry, Fire and State Lands. The decision by the Mitigation Commission to encumber the 43-acre parcel with a conservation easement and concurrently to transfer it out of federal ownership to the City of West Jordan are actions subject to the requirements of NEPA and require the preparation of an environmental review of the proposed project.

The environmental review requires Federal Agencies to consider the environmental effects of their actions including, among others, impacts on social, cultural, and economic resources, as well as natural resources. ***The purpose of this document is to inform and disclose to other agencies and the interested***

[1] Transfer of ownership includes the 43-acre parcel and associated water rights.

public what the environmental impacts of this proposed project would be, and to provide an opportunity to comment on the proposal. This Environmental Assessment (EA) fulfills the requirements of NEPA.[2]

Based on the analyses presented in this EA and comments received from the public, agencies and other interested parties, the Executive Director of the Mitigation Commission will decide whether or not to encumber the 43-acre parcel with a conservation easement by amending the existing conservation easement on West Jordan City's 25-acre parcel to include the 43-acre federal parcel and concurrently to transfer the 43-acre parcel to the City of West Jordan. The City of West Jordan would subsequently transfer that portion of the 68-acre parcel that will become the bed and bank of the Jordan River to Forestry, Fire and State Lands. If it is determined through this EA that the environmental impacts of the project are not significant, then the Mitigation Commission would make a Finding of No Significant Impact (FONSI) and the project would likely proceed. If, however, it is determined that the project would result in a significant impact on the environment, then a more detailed Environmental Impact Statement (EIS) would be required prior to proceeding. In order to take advantage of funding opportunities, the Mitigation Commission may authorize West Jordan City, through a permit or license agreement, to initiate a limited amount of work on the 43-acre parcel while still in ownership of the United States.

[2] A Draft EA for this project was completed in 2003 by the U.S. Army Corps of Engineers and released for public review and comment. As a result of funding limitations and program priorities, the U.S. Army Corps of Engineers did not finalize the EA or make a decision to implement any of the alternatives. Interest in the project continued however, and in 2008 limited funding for the project was revitalized, and the project was reaffirmed by the sponsors. Significant progress was made through 2011 to update the EA, but the document was not issued for public review and no decisions were made to implement any alternative. This document utilizes data and analyses from both earlier NEPA efforts and updates and supplements the analyses where necessary.

CHAPTER 2
DESCRIPTION OF PROJECT ALTERNATIVES

INTRODUCTION

This Chapter describes alternative methods for meeting the proposed project's objectives. Three Alternatives were analyzed, including the No Action Alternative. In the fall of 2014, the City of West Jordan awarded a contract to an interdisciplinary team of engineers, hydrologists and designers to develop a range of alternatives that address the underlying need for the project. The interdisciplinary team, led by River Restoration Inc., submitted a Preliminary Design Alternatives Report in April 2015 [River Restoration 2015]. The alternatives described in this Chapter, and the description of existing conditions and analysis of environmental impacts described in Chapter 3, rely heavily on the April 2015 report.

ACTIONS COMMON TO ALL ALTERNATIVES

There are certain actions common to all three action alternatives, described as follows:

- A 225-foot-long section of the south bank of the Jordan River on the north boundary of the project area that is actively eroding would be stabilized. Stream boulders set at or just below the ordinary high-water elevation will be used to reinforce the toe of the tiered slope. A 25-foot-wide "beach area" would be incorporated into the stabilization project and provide visitors a place to recreate and relax along the river bank. Three "tiers" will extend up from the beach area, each with an 18-inch rise and a 5-foot run. Above the last tier, slopes will be graded at 10: 1 to match existing grade. Each tier will be planted with native grasses and forbs; the beach will likely be composed of sands and small cobbles. Larger flood events will inundate the beach area. See Figure 2 below.

  Bank stabilization work and the "beach area" will occur on the City of West Jordan parcel using funding they have secured from non-federal sources. The City of West Jordan has already approved implementation of this work starting in April 2018. In accordance with CEQ regulations for implementing NEPA 1508.25(a)(3), although already approved by the City of West Jordan, bank stabilization and the "beach area" is a Similar action closely related to other features of the alternatives described in this EA. Therefore, in accordance with the regulations, the impacts of the bank stabilization and "beach area" are described in this environmental analysis even though the action has already been approved by the City of West Jordan. During the period between the Draft EA issued in March 2018 and the release of this Final EA in September 2018, the 225-foot long section of the south bank was stabilized by West Jordan City as described herein.

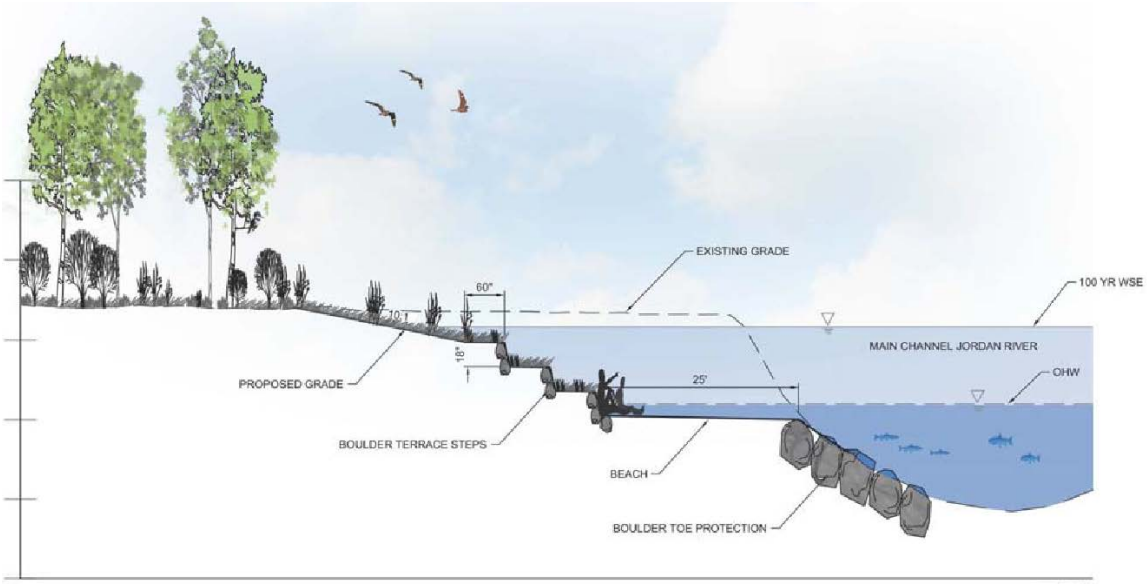


Figure 2 Bank Stabilization - Beach Area

The remaining 250 feet of eroding bank will be stabilized by laying back the bank to a more stable slope of 3:1 or 4:1. The bank toe will be protected with stream boulders and large woody debris. The flatter slopes will be planted with native riparian plants. See Figure 3 below. These project features would stabilize the actively eroding banks present along the north edge of the project site and reduce the amount of fine sediments delivered downstream.

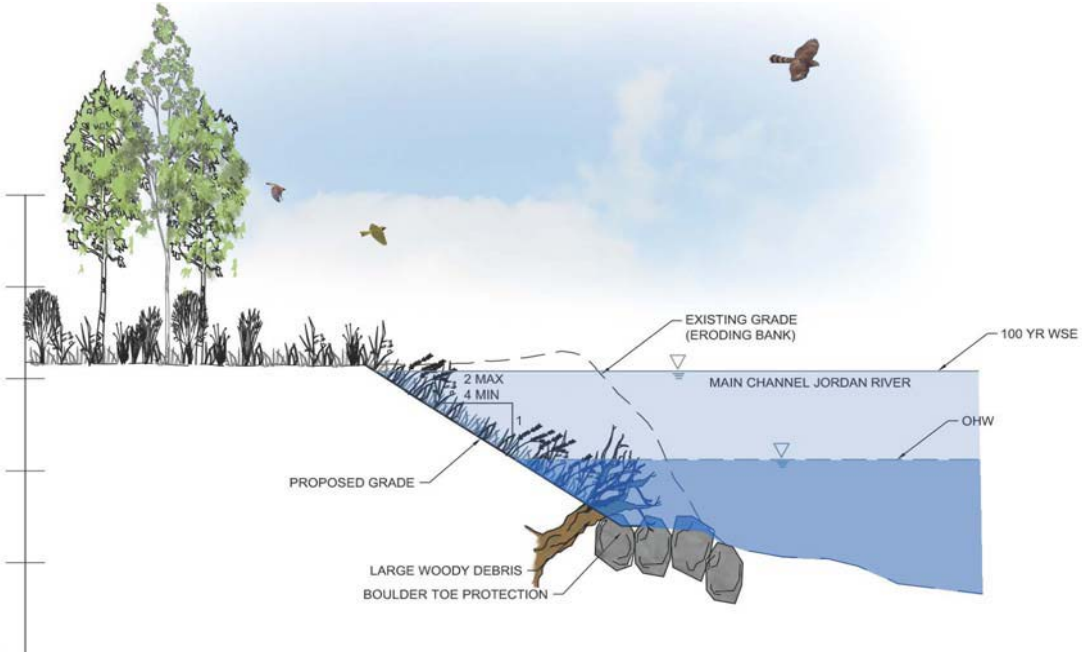


Figure 3 Bank Stabilization

- The west bank of the Jordan River, located east of the Mitigation Commission and City of West Jordan parcels, has relict berms that are the result of many years of dredging and channelizing. This material will be recontoured to approximate the natural landscape or removed from the project site.
- Much of the project area is dominated by non-native plant species, many of which are noxious weeds, which provide more limited value to wildlife when compared to native species. Non-native species and weeds would be managed and the project area revegetated with native species.
- A high efficiency pressurized irrigation system will be installed to provide the means for delivering irrigation water from the fishing pond to habitat restoration planting and seeding areas throughout the entire project site. A pump house would be constructed on the southeast side of the fishing pond, near the parking area, to enclose two electric pumps. The pumps would be approximately 4" centrifugal pumps capable of delivering 300 gallons per minute at 90 psi. The pumps would be powered with 480-volt, 3-phase, 60 hertz electric power. The conceptual design is to bring power in from the existing sewer lift station. Irrigation would be applied during the normal irrigation season, April through October, for approximately the first 5 years, until the vegetation becomes well established, and subsequently during drought periods.
- Outdoor recreational opportunities, which are currently limited in the community, would be constructed and include a fishing pond, trails, and education and interpretive features. Size and design of these features would be similar but would vary by alternative.
- The project area would be managed by the City of West Jordan through their Public Works Department. The fishing pond would be managed cooperatively by the City of West Jordan and the Utah Division of Wildlife Resources. No motorized activities would be allowed within the project area other than maintenance vehicles. Restrooms would be provided and trash would be picked up on a regular basis.

ALTERNATIVE 1 (THE PREFERRED ALTERNATIVE)(LOWERED FLOODPLAIN WITH MEANDERING CHANNEL)

Under **ALTERNATIVE 1** the main channel of the Jordan River would be realigned into a new meandering channel located west of its present location as depicted in Figure 4. A boulder weir structure would be constructed across the main channel of the Jordan River that would push a majority of the Jordan River flow into the new channel. At flows up to approximately 600 cubic feet per second (cfs) in the Jordan River, approximately 90% of the flow would be directed into the new river channel with the remainder continuing down the existing channel. When flows in the Jordan River reach approximately 700 cfs, the boulder weir would overtop allowing a portion of the higher flows to continue down the existing channel.

During extreme flood events when the Jordan River is above approximately 2000 cfs, flows would be split approximately 65%:35% between the new channel and existing channel, respectively. The new main channel would have a top width of approximately 70 feet and an average depth of 3.5 feet and would convey flows up to approximately 600 cfs. The channel and diversion would be designed to pass

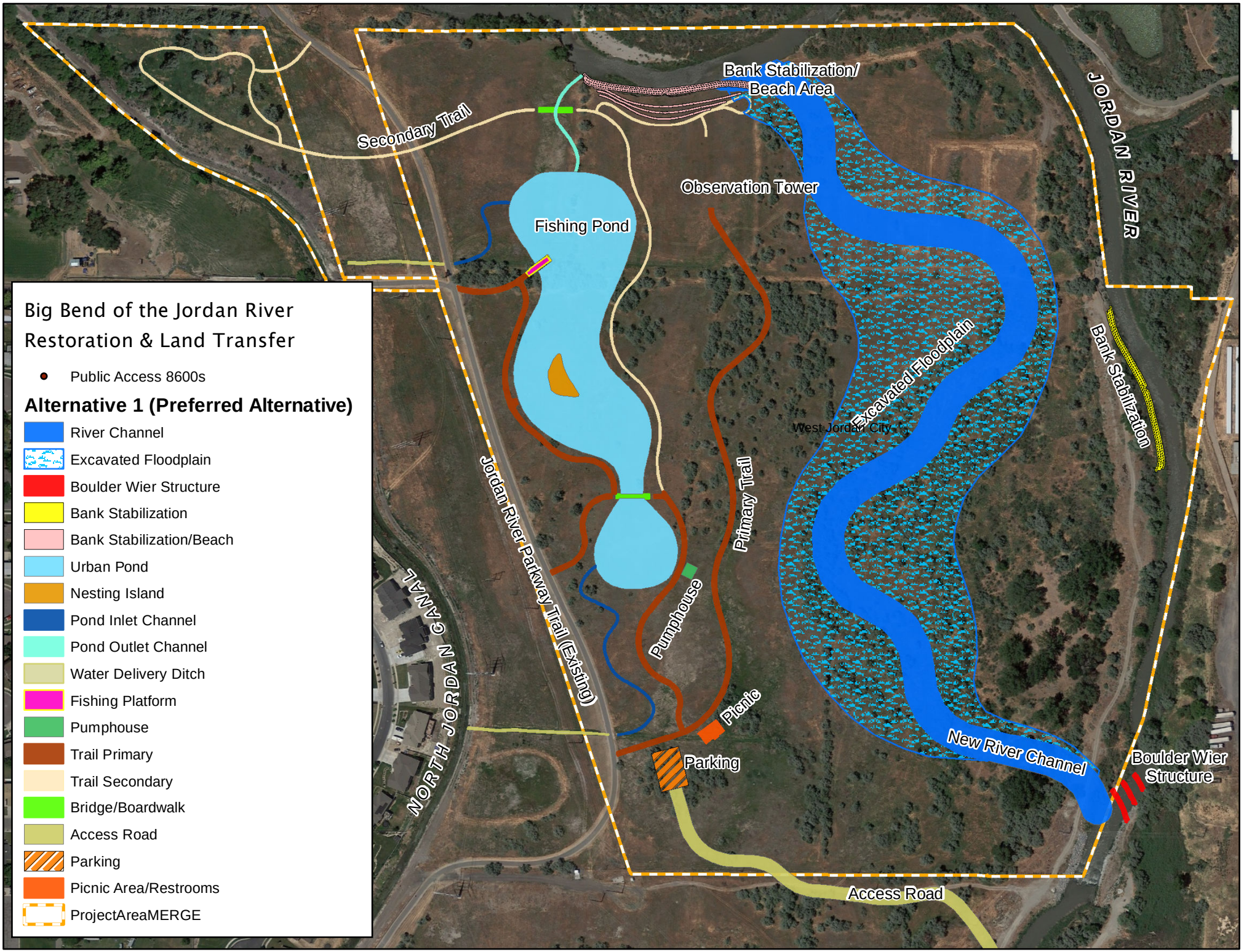


Figure 4 Alternative 1 Project Features

small watercraft (canoes, kayaks, paddle boards, for example). At flows greater than 600 cfs in the new channel, flow would overtop the bank and spread out onto the new channel's floodplain area, which would vary in width from 300 to 500 feet. To allow for this, the existing floodplain would be excavated down approximately 6-8 feet from its present elevation generating approximately 100,000 cubic yards of excess material. Table 1 shows the flow split breakdown between the new and existing channels for different flows in the Jordan River.[3]

Table 1 Proportion of Flow in New and Existing River Channel Alternative 1

Total Jordan River Flow (cfs)	Flow Diverted Into New Channel (cfs)	% of Flow Into New Channel	Flow Continuing Down Existing Channel (cfs)	% of Flow Down Existing Channel
60	52	87%	8	13%
100	88	88%	12	12%
200	180	90%	20	10%
400	367	92%	33	8%
800 (2-year)[4]	708	89%	92	12%
1,200	934	78%	266	22%
1,700	1,186	70%	514	30%
2,200	1,396	63%	804	37%
2800 (100-year)	1,655	59%	1,145	41%

[River Restoration, Inc. 2015]

Although the new channel would be more sinuous compared to the existing channel, it is not anticipated that any additional channel length would be achieved because the river would restore a more direct route across the floodplain than the series of 90-degree bends it is presently routed through. Flow velocities and sediment transport characteristics in the restored channel would also be similar to those in the existing channel. However, the new meandering channel would have a greater diversity of desirable riverine features including varying bank heights and steepness, and varied channel forms (riffles, runs, and pools). Habitat would include large woody debris, stream boulders and plantings along

[3] Figures in Table 1 are calculated, actual amounts may vary.

[4] A flow of 800 cfs would be expected to occur with an average frequency of once every 2 years (50% chance of occurring in a given year).

the bank. The main channel would be constructed to allow the river to move laterally across the floodplain except in areas where large woody debris and boulders would be placed to protect infrastructure and desirable habitat areas. A typical cross section of **ALTERNATIVE 1** is shown in Figure 5 below.

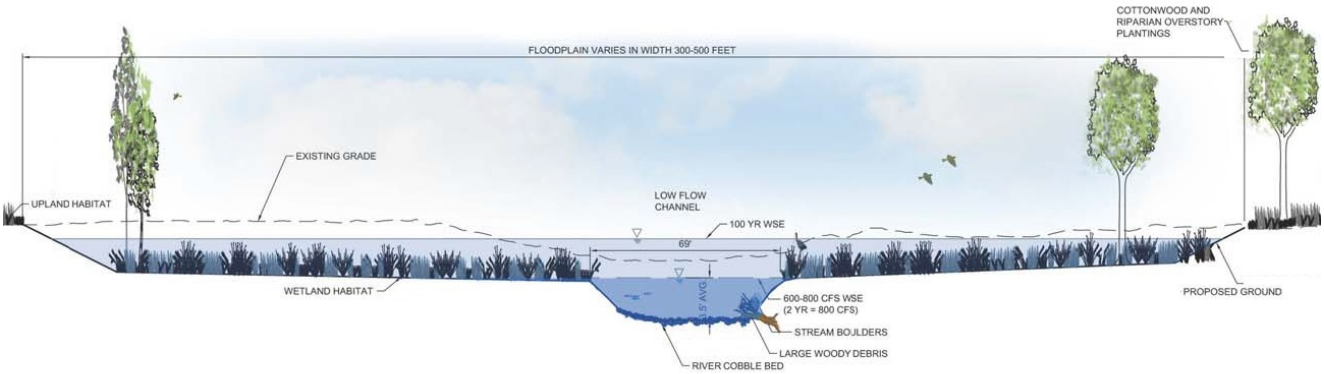


Figure 5 Alternative 1 Cross Section [River Restoration, Inc. 2015]

A fishing pond would be constructed east of the Jordan River Parkway Trail segment and west of the proposed realignment of the Jordan River. The fishing pond would vary in depth with a maximum depth of approximately 15 feet and a surface area of approximately 4 acres. Excavation of the pond would generate approximately 46,000 cubic yards of material. The pond would receive water from two existing diversions out of the North Jordan Canal utilizing water rights currently owned by the City of West Jordan and the Mitigation Commission, with additional water to be purchased if needed. The two inflows to the pond would include small meandering water delivery channels. Having two inflows would promote circulation within the pond and provide redundancy to accommodate maintenance activities when needed. An outflow from the pond would be constructed as a meandering channel that would flow north back to the existing Jordan River channel. The Utah Division of Wildlife Resources would stock the pond with species appropriate to the water quality and habitat conditions of the pond and the pond would be open to fishing in accordance with State of Utah fishing regulations.

The visual focal point of the restoration project would be a viewing platform that would be constructed between the pond and new main channel and floodplain. The viewing platform would be accessed from the south from a gradually rising path allowing visitors to see the structure in the distance. A network of trails would be constructed as part of **ALTERNATIVE 1**. Trails would be confined to the western half of the project site to minimize disturbance to the wildlife habitat restoration area planned for the eastern half of the site. Approximately 3/4 mile of primary trails would be constructed and used to connect high use recreational areas and to provide accessibility in accordance with the Americans with Disabilities Act (ADA). The primary trails would consist of a suitable surface (e.g., compacted crusher fines or other soft surface materials consistent with the conservation easement but also ADA accessible to allow for wheelchair access and would connect the proposed parking area to the Jordan River Parkway Trail, accessible fishing pier, picnic tables, restrooms, fish cleaning station, and the viewing platform. Primary

trails would be 8 to 12 feet wide to accommodate multiple uses safely and would not exceed 5 percent slope.

Approximately 3/4 miles of secondary trails would be constructed consisting of a native surface of soil, compacted crusher fines, or wood chips, as appropriate. The secondary trails would allow users to circumnavigate the pond and connect to other recreational amenities at the project site. Grades on secondary trails may exceed 5 percent slope, but only for short distances, and would never exceed 10 percent slope. Secondary trails would typically be 2 to 4 feet wide. Two short segments of elevated boardwalk would also be constructed to traverse riparian wetland areas near the south and north ends of the pond. These would be constructed at approximately 6 to 8 feet wide and no more than 30 inches above ground to eliminate the need for rails where appropriate.

The 46,000 cubic yards of material excavated for the fishing pond will be used onsite for the construction of elevated terraces and berms. Berms would be strategically placed to screen some views while framing or enhancing others. These subtle earth works would be sculpted to appear natural and to enhance aesthetics of the site. Earthen berms on the west side of the pond are designed to be low (i.e., less than 6 feet) and undulating to create interest for users of the nearby trail systems. The larger east-side earthen berm is more elevated to help screen the irrigation pumphouse and high use activity areas in and around the pond from the wildlife habitat restoration area to the east. The east-side berm would gradually climb in elevation heading north from the parking lot towards a viewing platform to create a dramatic arrival and to promote distant views of the restoration area in the foreground and the distinctive Wasatch mountain range in the background to the east. Soils excavated from the pond would be used to construct all of the west-side earthen berms and approximately 50 percent of the east-side berm. The remainder of the east-side berm would be constructed of fill from the excavation of the new Jordan River channel.

Access and parking for the site would be provided off of 9000 South using the existing Rocky Mountain Power entrance. The 26-foot wide access road runs parallel to the existing Jordan River channel turning north west into the proposed parking area located on the south end of the Mitigation Commission parcel. The parking area would provide approximately 19 total spaces, 2 of which would meet ADA guidelines.

As shown on Figure 4, the western portion of the project area provides more recreational amenities compared to the eastern portion, which focuses primarily on habitat restoration and preservation. A split-rail fence located on the toe of the slope of the viewing platform berm would generally demark the area that would receive more public use compared the habitat preservation area, east of the split-rail fence. Signage would be installed on the split-rail fence to discourage park visitors from entering the habitat preservation area, particularly during certain times of year such as nesting season. The recreation use area (west of the split-rail fence), which includes the fishing pond, viewing platform, trails, picnic tables, parking and restroom, would be approximately 31 acres in size (46% of the project area) (Figure 6). The remaining 37 acres east of the split-rail fence would focus primarily on habitat restoration. In addition to the split-rail fence, the proposed meander channel would also provide a

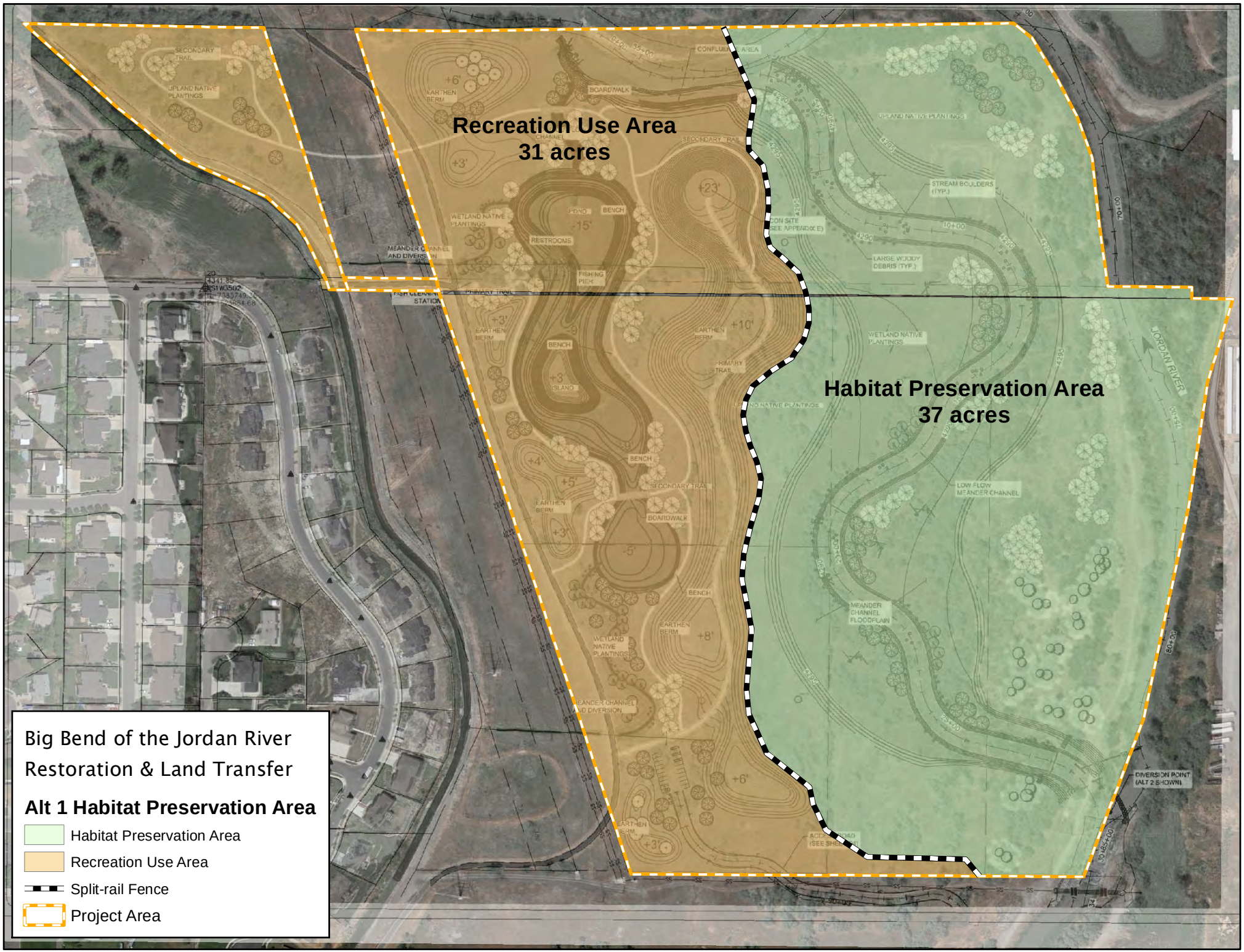


Figure 6 Alternative 1 Habitat Preservation Area

natural barrier to habitat located on the east side of this new river channel (16.6 acres) further insulating this area of the site from frequent public use.

The new meandering river channel would be approximately 2,575 feet in length with a floodplain width as wide as 500 feet in places. The restored floodplain area would create approximately 15.3 acres of wetland and riparian habitat. Upland areas outside the restored floodplain would be reseeded and planted with native plants. During construction of the new channel, the existing mature cottonwood forest would be protected to the maximum extent possible. However, because of the close proximity of the new river diversion to the cottonwood forest, it may be necessary to remove up to three large (> 10 inch diameter at breast height) cottonwood trees.

Restoration efforts would employ an ecosystem approach that considers soils, hydrology, hydraulics, plant species, microclimatic conditions, plant and animal interactions, and other ecosystem variables. Restoration efforts would include excavation and regrading of the floodplain over a width of 300-500 ft to connect the floodplain with the river's water table. In non-excavated areas, non-native species would be selectively removed. The entire restoration area will be revegetated with a mix of native plants including a variety of native trees, shrubs, grasses, forbs, and wetland species as appropriate for various micro-habitat zones created on the site. Existing on-site topsoil removed during excavation, which contain important microorganisms and nutrients essential for supporting native plant species, will be conserved and re-used where appropriate. Soil amendments and mulch will be considered during the design process.

To provide the greatest potential for successful revegetation and habitat restoration, a combination of planting methods would be implemented, including: seeding with a variety of native seed mixes, transplanting stockpiled native plants (e.g., riparian species) collected from within project related disturbance areas and planting nursery stock. Nursery stock would likely include a variety of sizes such as bare root, tubelings, containerized, and balled and burlapped plants depending upon the specific habitat type being planted and budget constraints. Anticipated habitat types for the project site include sagebrush shrublands and grasslands in upland areas, and emergent marshes, wet meadows, and riparian woodlands and shrublands in areas within the influence of the restored river channel.

- A permanent irrigation system would be installed throughout the project site that can be used initially to establish vegetation and then subsequently to provide supplemental water when necessary (e.g., during drought). A high efficiency pressurized irrigation system would provide the means for delivering irrigation water from the fishing pond to habitat restoration areas. A pumphouse would be constructed on the southeast side of the fishing pond, near the parking area, to enclose 2 electric pumps. The pumps would be approximately 4" centrifugal pumps capable of delivering 300 gallons per minute at 90 psi. The pumps would be powered with 480-volt, 3-phase, 60 hertz power which would be brought in from near the existing sewer lift station. The pumphouse would be insulated to diminish any noise coming from the pumps and doorway openings would be constructed to face east. Trees, shrubs and other landscape plantings would be utilized to mask the pumphouse from the from the viewshed of homes

located west of the project area. These measures will mitigate the potential for the noise from the pumps and irrigation system to impact adjacent residents. Irrigation would be applied during the normal irrigation season, April through October, for approximately the first 5 years, until the vegetation becomes well established, and subsequently during drought periods.

The existing conservation easement held by Forestry, Fire and State Lands on the 25-acre City of West Jordan Parcel (Appendix 4) would be amended to include the 43-acre federal parcel to provide assurance of long-term management and protection of the property. The 43-acre federal parcel would concurrently be transferred from the Mitigation Commission to the City of West Jordan. The City of West Jordan would transfer ownership of the bed and bank of the new river channel to Forestry, Fire and State Lands. The conservation easement would then be amended a second time to exclude the transferred river channel as Forestry, Fire and State Lands cannot enforce a conservation easement on lands they own. The 68-acre property would be managed by the City of West Jordan for ecological conservation and restoration purposes and compatible recreational pursuits consistent with the conservation easement. The Mitigation Commission has already issued the City of West Jordan a License Agreement to construct and maintain the Jordan River Parkway Trail across the Mitigation Commission parcel. This action was the subject of a prior Environmental Assessment and Finding of No Significant Impacts dated September 2013.

ALTERNATIVE 2 (SMALL FLOODPLAIN ALTERNATIVE)

ALTERNATIVE 2 is similar to **ALTERNATIVE 1** but smaller in scope and cost (see Figure 7). Under **ALTERNATIVE 2** a split channel of the Jordan River would be excavated through the Mitigation Commission and City of West Jordan parcels. The split channel would be excavated to a slightly shallower depth, would have a narrower floodplain width and would convey a smaller portion of Jordan River flow compared to **ALTERNATIVE 1**. As with **ALTERNATIVE 1**, a boulder weir structure would be constructed across the main channel of the Jordan River with approximately 10 cfs continuing down the existing channel to maintain in-channel habitat during periods of low flow. Compared to **ALTERNATIVE 1**, the new main channel would overtop the boulder weir at a lower flow, sending flows down both the new channel and existing channel. During high flows above 600 cfs, approximately 35 percent of the river's volume would flow into the new channel, with 65 percent of the flow going down the existing channel (see Table 2).

Table 2 Proportion of Flow in New and Existing River Channel Alternative 2

Total Jordan River Flow (cfs)	Flow Diverted Into New Channel (cfs)	% of Flow Into New Channel	Flow Continuing Down Existing Channel (cfs)	% of Flow Down Existing Channel
60	52	87%	8	13%
100	74	74%	12	26%
200	100	50%	100	50%

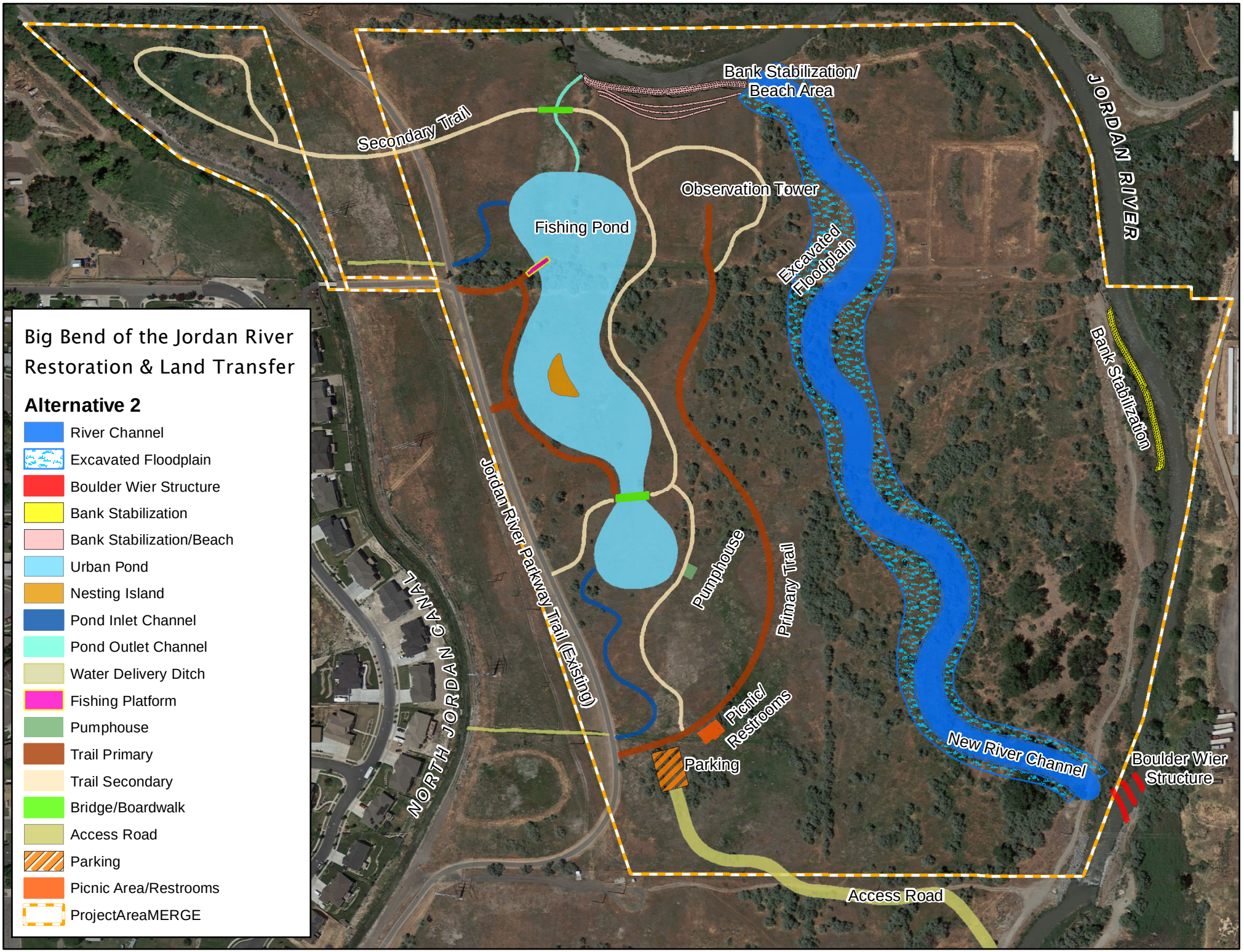
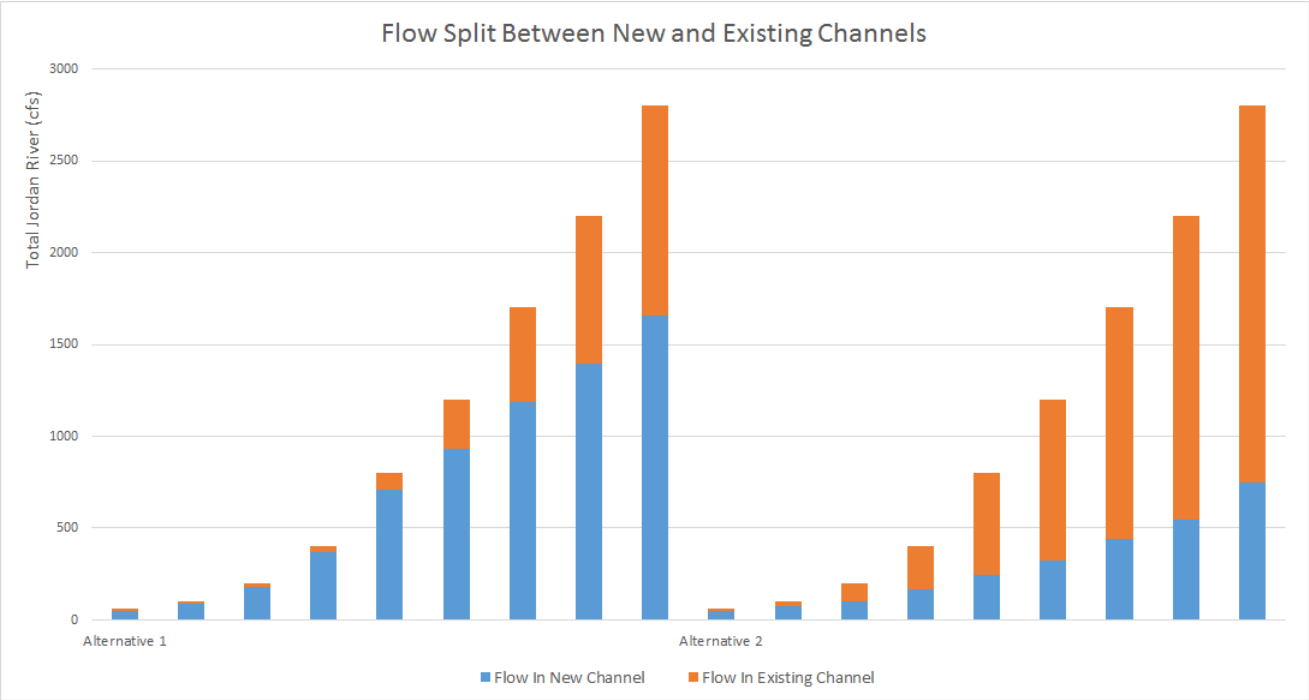


Figure 7 Alternative 2 Project Features

400	169	42%	231	58%
800 (2-year)	248	31%	552	69%
1,200	325	27%	875	73%
1,700	438	26%	1,262	74%
2,200	548	25%	1,652	75%
2800 (100-year)	748	27%	2,052	73%

[River Restoration, Inc. 2015]

The following graph shows how under **ALTERNATIVE 2** a larger portion of the Jordan River flow would continue down the existing channel compared to Alternative 1.



The channel would have a top width of approximately 40 feet and an average depth of 3.5 feet. The channel and diversion would be designed to pass small watercraft (canoes, kayaks, paddle boards, for example). At flows above approximately 200 cfs in the new channel, the flow would spread out onto the constructed interior floodplain area. As with **ALTERNATIVE 1**, **ALTERNATIVE 2** would have a diversity of desirable riverine features including varying bank heights and steepness, and varied channel forms

(riffles, runs, pools). Habitat would include large woody debris, stream boulders and plantings along the bank line. The channel would be constructed to allow the river to move laterally across the floodplain, albeit a narrower floodplain compared to **ALTERNATIVE 1**, except in areas where large woody debris and boulders would be placed to protect infrastructure and desirable habitat areas. A typical cross-section of the **ALTERNATIVE 2** is shown in Figure 8 below.

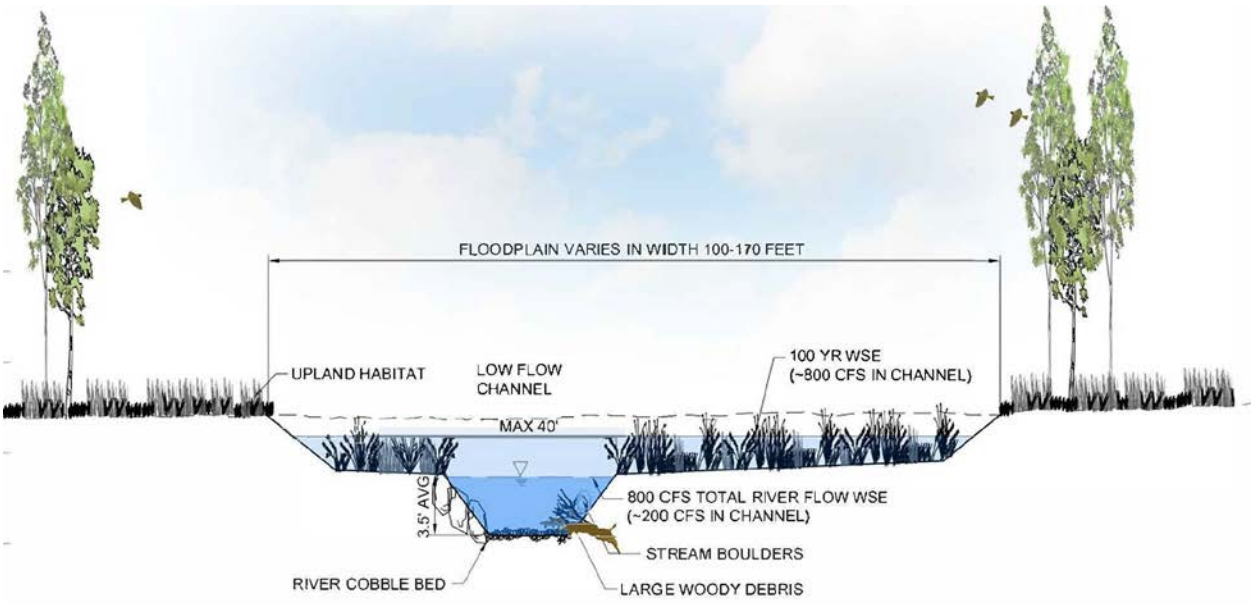


Figure 8 Alternative 2 Cross Section [River Restoration, Inc. 2015]

The fishing pond, trail-system, pumphouse, earthen berms, picnic area, restrooms and parking area would be the same for both **ALTERNATIVE 1** and **ALTERNATIVE 2**. The viewing platform for **ALTERNATIVE 2** would be simpler and smaller in scale compared to **ALTERNATIVE 1,** using similar materials and the same general layout.

A split-rail fence would be constructed on the toe of the slope of the viewing platform berm demarcating the recreation use area to the west of the fence from the habitat preservation area east of the fence, similar to **ALTERNATIVE 1**. Although the split-rail fence alignment would be oriented differently under **ALTERNATIVE 2**, there would still be approximately 31 acres west of the fence (46% of the project area) that would focus primarily on compatible outdoor recreational amenities, including the fishing pond, viewing platform, trails and education and interpretive facilities (see Figure 9). Habitat restoration, planting and irrigation would also be the same as described for **ALTERNATIVE 1**, with the exception that more riparian/upland and less wetland/riverine would be developed because of the narrower floodplain width.

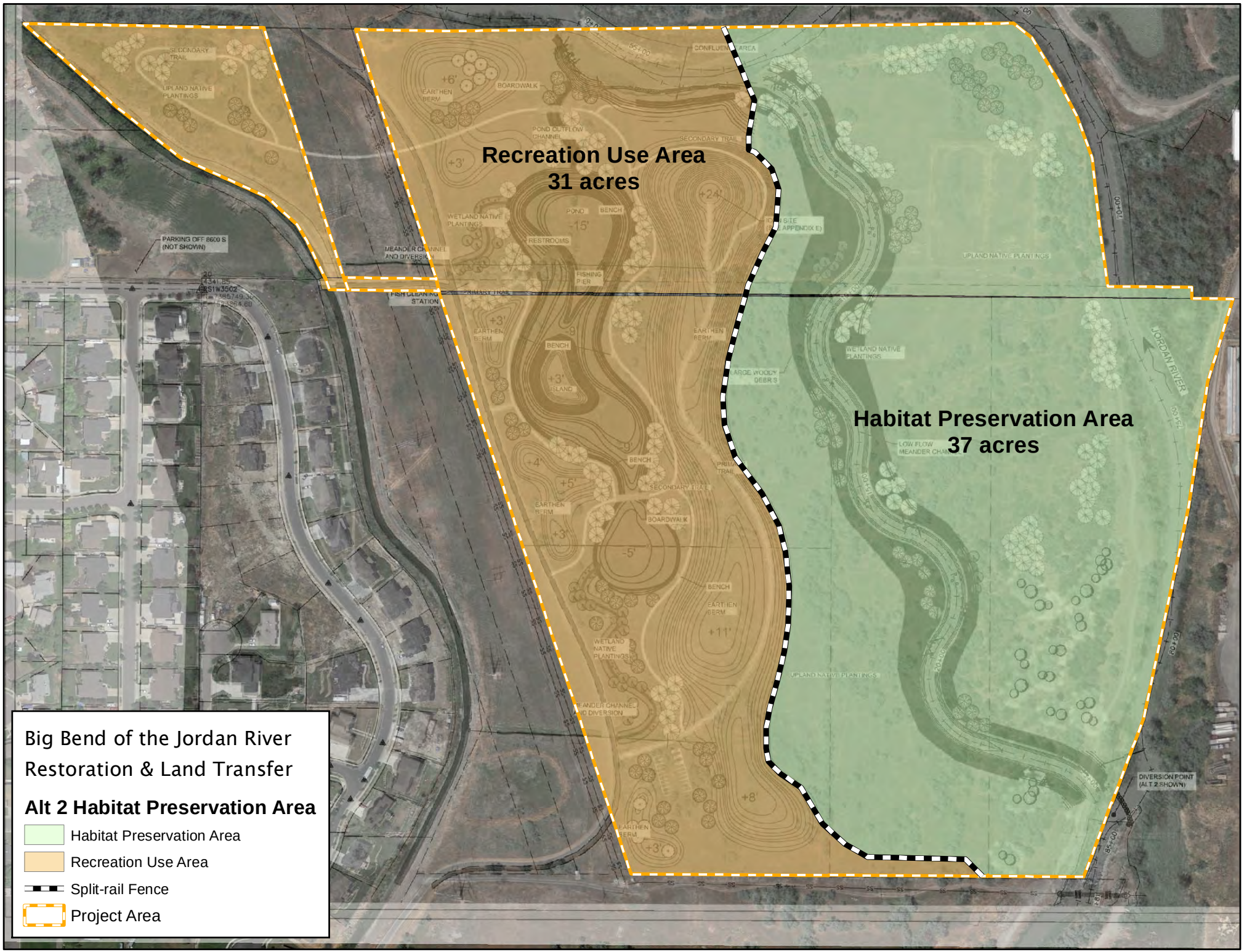


Figure 9 Alternative 2 Habitat Preservation Rec Use Areas

The 25-acre conservation easement would be amended to include the 43-acre federal parcel, transferred to the City of West Jordan and managed for ecological restoration and compatible recreational uses the same as described for **ALTERNATIVE 1**.

ALTERNATIVE 3 (CANAL FED TRIBUTARY STREAM ALTERNATIVE)

ALTERNATIVE 3 is the smallest in scope of the three action alternatives (see Figure 10). Under this alternative, the existing main channel of the Jordan River would remain in its present location. A tributary stream would be constructed, fed from a diversion off the North Jordan Canal, that would meander north across the property and empty back into the Jordan River. The diversion from the North Jordan Canal would be the same as the southernmost diversion of the two that feed the fishing pond. A splitter would be constructed shortly down gradient of the diversion sending a portion of the flow to the pond and approximately 2-3 cfs to the tributary stream. The fishing pond would be smaller than for the other two action alternatives, 3-acres compared to 4-acres, and 9-12 feet maximum depth compared to 15 ft depth. Excavation of the pond would generate approximately 30,000 cubic yards of material, compared to 46,000 yards of material for the other two action alternatives. Berms constructed around the pond would be smaller than for the other two action alternatives and would be constructed exclusively from pond excavation materials. The trail system would be similar to that described for the other action alternatives, except all trails would be secondary trails consisting of a native surface of soil, compacted crusher fines, or wood chips, as appropriate. The pumphouse would be in a similar location as with the other two action alternatives, just a short distance further north so as still be adjacent to a smaller fishing pond which does not extend as far south as the 4-acre pond. Parking would not be provided under **ALTERNATIVE 3** and visitors would access the site via the Jordan River Parkway Trail system or the existing pedestrian bridge over the North Jordan Canal, located at approximately 8600 South and Millrace Road. The picnic area would be located on the west side of the fishing pond, closer in proximity to the 8600 South entrance into the project area. Maintenance vehicles would access the site via the Jordan River Parkway Trail. A viewing platform would not be included as part of **ALTERNATIVE 3**.

Under **ALTERNATIVE 3**, approximately 26 acres (38% of the project area) would focus primarily on compatible outdoor recreational amenities including the fishing pond, trails and education and interpretive facilities, (see Figure 11). Habitat restoration, planting and irrigation would be the same as described for the other action alternatives, but riparian and wetland vegetation would be planted over a smaller area, 1.1 acres compared to 15.3 acres for **ALTERNATIVE 1** and 6.2 acres for **ALTERNATIVE 2**. A higher proportion of the planted areas in **ALTERNATIVE 3** would consist of upland vegetation types rather than wetland or riparian plants compared to the other action alternatives because there would be no active floodplain associated with the tributary stream**.** The existing conservation easement would be amended to include the 43-acre federal parcel, transferred to the City of West Jordan and the entire 68-acre parcel managed for recreation, ecological conservation and restoration purposes, the same as described for the other two action alternatives. The bed of the Jordan River would remain in its present location, therefore no property would be transferred to Forestry, Fire and State Lands.

Table 3 summarizes the primary features of the action alternatives.

Figure 10 Alternative 3 Project Features

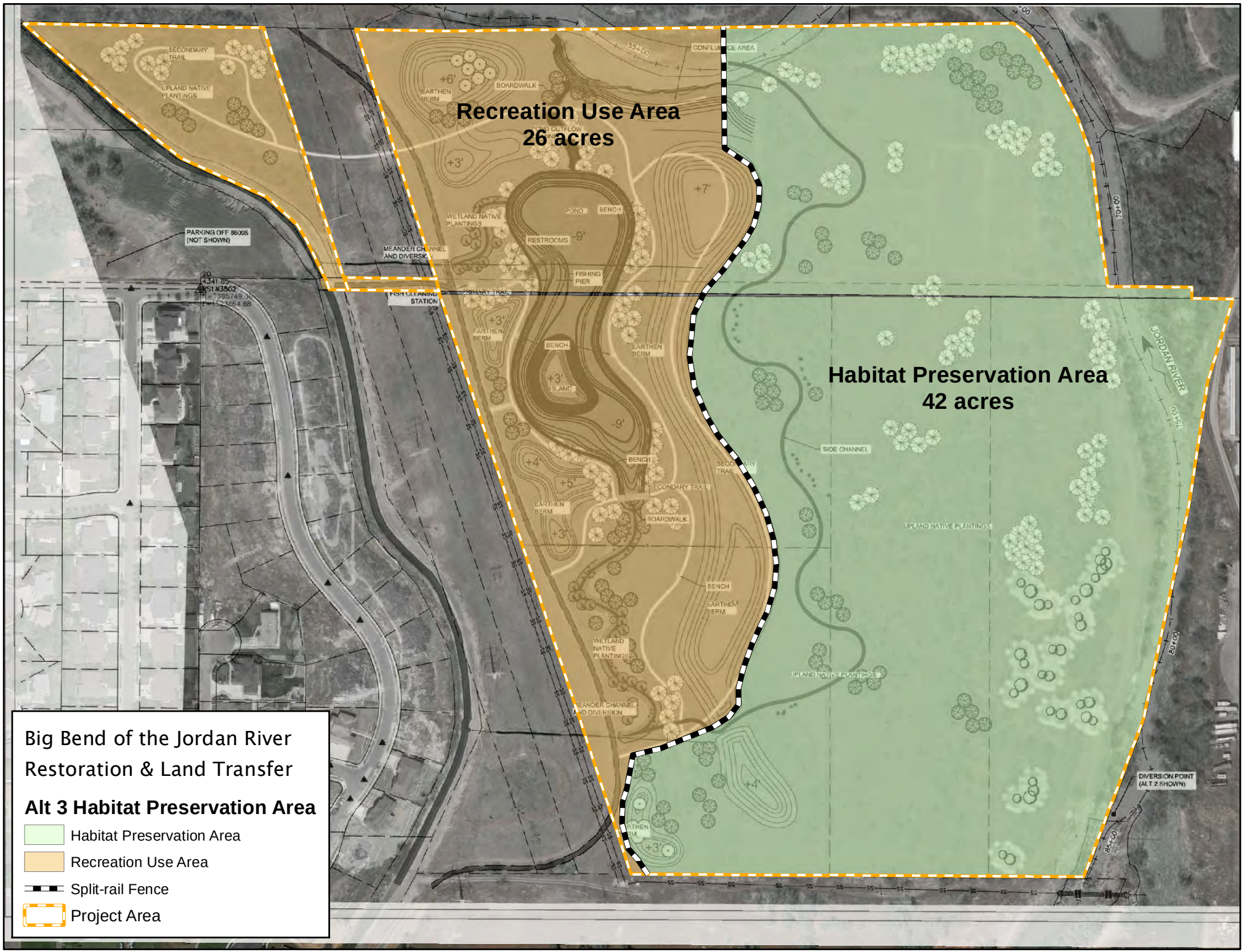


Figure 11 Alternative 3 Habitat Preservation Rec Use Areas

Table 3 Summary of the Primary Features of the Action Alternatives

Project Feature	Alternative 1	Alternative 2	Alternative 3
How will the flow in the Jordan River be split between the new and existing Jordan River channels?	A majority of the flow of the Jordan River would be diverted into the new channel at all flow levels. Above 600 cfs, the proportion of flow continuing down the existing channel would increase as flows increased (See Table 1).	Compared to **Alternative 1**, a smaller portion of the flow of the Jordan River would be delivered into the new channel at all flows above 60 cfs. A majority of the water would continue down the existing channel at all flows above 200 cfs (See Table 2).	The entire Jordan River flow would continue down the existing channel. Approximately 2-3 cfs would be diverted into new tributary stream fed from a diversion off the North Jordan Canal.
What are the physical characteristics of new channel, floodplain width, and riparian/wetland habitat?	2,575 feet length, 70 feet wide and 3.5 feet deep would convey a flow up to 600 cfs. At flows above 600 cfs in the new channel, flows would overtop the bank and spread out onto new floodplain with width of 300-500 feet. There would be **15.3 acres of wetland and riparian habitat.**	2,173 feet length, 40 feet wide and 3.5 feet deep would convey a flow up to 200 cfs. Above 200 cfs in the new channel, flows would overtop the bank and spread out onto new floodplain width of 150-200 feet. There would be **6.2 acres of wetland and riparian habitat**.	Tributary stream 2,422 feet length, approximately 5 feet wide. Would convey flow of approximately 2-3 cfs originating from North Jordan Canal. No floodplain, wetted area of approximately 5 feet from either side of centerline and **1.1 acres of wetland and riparian habitat.**
What are the revegetation features associated with the alternatives?	The restoration area will be revegetated with a mix of native plants including a variety of native trees, shrubs, grasses, forbs, and wetland species as appropriate for various micro-habitat zones created on the site. A permanent irrigation system would be installed to help establish native vegetation and to provide	Similar to **ALTERNATIVE 1**, except proportionally fewer wetland and riparian plants would be planted in favor of upland species with the channels narrower floodplain width compared to **ALTERNATIVE 1**.	Similar to **ALTERNATIVES 1 AND 2** although fewer wetland and riparian plants would be planted because no active floodplain would be constructed.

	supplemental water when necessary (e.g., during drought).		
What recreational opportunities with the alternatives provide?	4-acre fishing pond, 15-foot maximum depth. Viewing platform, 3/4 mile of primary trails and 3/4 mile of secondary trails, beach, picnic tables, restrooms, parking, accessible fishing pier, fish cleaning station.	Same as **ALTERNATIVE 1**, although the viewing platform would be slightly smaller in scope.	Same as **ALTERNATIVE 1**, except 3-acre fishing pond, 9 to 12 foot maximum depth. No viewing platform or parking. Picnic area located on west side of fishing pond. 1.4 miles of secondary trails and no primary trails.
What will be the disposition of federal lands under the alternatives?	The 43-acre federal parcel encumbered by a conservation easement and concurrently transferred to the City of West Jordan. The City of West Jordan would subsequently transfer the bed and bank of the new Jordan River channel, approximately 4.25 acres, to the Utah Division of Forestry, Fire and State Lands.	Similar to **ALTERNATIVE 1** except 2.9 acres would be transferred to Forestry, Fire and State Lands.	Same as Alternatives 1 and 2 but no subsequent transfer of property from the City of West Jordan to Forestry, Fire and State Lands.

NO ACTION ALTERNATIVE

NEPA requires the **NO ACTION ALTERNATIVE** be considered in the Environmental Analysis process. The **NO ACTION ALTERNATIVE** serves as a baseline against which to compare other alternatives. Under the **NO ACTION ALTERNATIVE,** the Mitigation Commission would not transfer the 43-acre parcel to the City of West Jordan. The 43-acre federal parcel would remain in federal ownership in the near term and the river restoration project would most likely not be constructed because of the limited land area available

for the project. The existing conservation easement would not be amended to include the 43-acre federal parcel while it remains in federal ownership.

Outdoor recreational features such as the fishing pond, trails, viewing platform, beach, picnic area and educational/interpretive signing would most likely not be constructed. Noxious weeds would continue to be managed on the federal parcel, but native vegetation would not likely be re-established. The opportunity to restore the degraded ecosystem structure, function, and dynamic processes of this reach of the Jordan River to a more natural condition would most likely be lost. Aquatic and terrestrial ecosystem functions would continue to be limited and both aquatic and terrestrial habitat would not improve.

The environmental effects of the proposed project alternatives are described in detail in Chapter 3, but are summarized below in Table 4.

Table 4 Summary of Environmental Effects

Resource	Alternative 1 *(Preferred Alternative)*	Alternative 2	Alternative 3	No Action Alternative
Physical & Biological Resources				
Wildlife habitat, vegetation and wetlands	Creates approximately 15.3 acres of wetland and riparian vegetation. Has the largest construction area footprint and therefore the greatest short and mid-term impacts. Approximately 48-acres (71% of project area) would be disturbed during construction.	Creates approximately 6.25 acres of wetland and riparian vegetation. Approximately 37-acres (54% of project area) disturbed during construction.	Creates approximately 1.1 acres of wetland and riparian vegetation. Approximately 31-acres (45% of project area) disturbed during construction.	No new riparian/ wetland habitats created and existing habitat continues to provide ecological services at reduced level. Non-native vegetation still selectively removed resulting in some short and mid-term impacts.

Resource	Alternative 1 *(Preferred Alternative)*	Alternative 2	Alternative 3	No Action Alternative
Fish and Aquatic Resources	Fish numbers may increase in newly restored section of the river as holding habitat area improves. Utah Division of Wildlife Resources would stock the fishing pond with species suitable to the prevailing water quality and temperature.	Same as **ALTERNATIVE 1**	No Change in numbers of fish in existing channel. Utah Division of Wildlife Resources would stock the fishing pond with species suitable to the prevailing water quality and temperature.	No Change
Special Status Plants, Fish and Wildlife	No anticipated impacts on threatened, endangered or special status species.	Same as **ALTERNATIVE 1**	Same as **ALTERNATIVE 1**	No Change
Water quality	Measures would be implemented to stabilize eroding bank on the north end of the project area at the "Big Bend", which contributes tons of fine sediments to the Jordan River.	Same as **ALTERNATIVE 1** Similar short term impacts to	Same as **ALTERNATIVE 1** Smaller short-term impacts compared	Water quality in the Jordan River would continue to degrade as eroding banks in the project area would continue to contribute tons of fine sediments to the system.

Resource	Alternative 1 *(Preferred Alternative)*	Alternative 2	Alternative 3	No Action Alternative
	Erosion rates reduced and water quality improved. Short-term impact, lasting 24 to 36 hours, would occur when the existing channel is breached and water is initially diverted into the newly constructed river channel.	**ALTERNATIVE 1**. Shorter length would expose less disturbed soils to new flows, thus decreasing short-term impacts relative to **ALTERNATIVE 1**.	to **ALTERNATIVE 1**, with much smaller channel length and flow.	
Socioeconomic Resources				
Recreation	Substantial increase in recreational opportunities with construction of 4-acre fishing pond, unpaved trails, viewing platform, interpretive facilities, beach, picnic tables, restrooms and parking.	Same as **ALTERNATIVE 1**	Similar to **ALTERNATIVE 1** except 3-acre pond instead of 4-acre pond, no viewing platform or parking. Trail system not as extensive as Alternatives 1 and 2.	Recreational opportunities limited to current uses, e.g., use of Jordan River Parkway Trail that runs along the western boundary of the property.
Water Rights	Requires approximately 90 acre-feet of water annually for the project with an additional 16 acre-feet required for the initial filling of the pond. Requires a non-consumptive	Same as **ALTERNATIVE 1**	Approximately 85 acre-feet of water required annually for the project with an additional 10.5 acre-feet required for the initial filling of the pond. Would require 1.22 cfs	No additional water use required beyond existing irrigation needs.

Resource	Alternative 1 *(Preferred Alternative)*	Alternative 2	Alternative 3	No Action Alternative
	water right of 1.9 cfs inflow to maintain water quality in the pond. Requires the acquisition or conversion of water rights to carry water in the North Jordan Canal outside the irrigation season.		inflow to maintain water quality.	
Land Ownership/Land Use	The project area managed for habitat restoration, protection and compatible recreational uses. Land uses on adjacent properties would remain unaffected by the project. The 43-acre federal parcel would be encumbered by a conservation easement and concurrently transferred to the City of West Jordan. The City of West Jordan would subsequently transfer the bed and bank of the new river channel (about 4.25 acres) to	Same as **ALTERNATIVE 1** except with a slightly smaller and less sinuous river channel, only 2.9 acres would be transferred to State of Utah from the City of West Jordan	Same as Alternative 1 except no transfer to Forestry, Fire and State Lands.	The 43-acre federal parcel federal parcel would not be transferred to the City of West Jordan and the Mitigation Commission would not authorize the City of West Jordan for the construction of the project on federal lands. The project would most likely not be constructed because of limited land area available for the project (the 25-acre West Jordan parcel). The existing conservation easement would not be amended to include the 43-acre parcel while it remained in federal ownership.

Resource	Alternative 1 *(Preferred Alternative)*	Alternative 2	Alternative 3	No Action Alternative
	Forestry, Fire and State Lands.			
Socioeconomics	No anticipated impacts on adjacent property owners anticipated. The project would protect open space from development, provide wildlife viewing and outdoor recreational opportunities to the community, all of which enhance quality of life for many residents.	Same as **ALTERNATIVE 1**	Similar to **ALTERNATIVE 1**, although scope of recreational development not as great and anticipated wildlife habitat and viewing opportunities not as great. Access to the site would be from existing disbursed locations; no new parking area would be provided.	No anticipated impacts
Conceptual Cost	$8.5 million	$5 million	$3.1 million	No new incremental costs above existing management costs.
Transportation	Less than 1% increase in westbound traffic on 9000 South. No reduction in level of service.	Same as **ALTERNATIVE 1**	No centralized parking would be provided and users would access the site from disbursed locations. Therefore, no reduction in level of service.	No additional impacts to traffic or level of service
Visual	Project Area remains essentially non-visible from	Same as **ALTERNATIVE 1**	Same as **ALTERNATIVE 1**	Project Area will retain the look of undeveloped

Resource	Alternative 1 *(Preferred Alternative)*	Alternative 2	Alternative 3	No Action Alternative
	outside the project area. Views within the project area are enhanced through architectural design and siting of trails, berms and structures such as the viewing platform.			pastureland while Action Alternatives would have more riparian and native vegetation. Future disposition of the project area unknown.
Cultural & Paleontological	No anticipated Impacts	Same as **ALTERNATIVE 1**	Same as **ALTERNATIVE 1**	No Change
Air Quality and Climate	No long-term impacts to air quality. Temporary emissions during construction are significantly below the federal de minimis threshold levels established by the EPA for air quality. Fugitive dust generated by construction activities mitigated through best management practices. Revegetation and restoration would increase vegetative biomass, a carbon sink. Scale of the project would not have a significant	Same as **ALTERNATIVE 1**	Similar to **ALTERNATIVE 1**. Scale of temporary impacts from construction smaller than **ALTERNATIVE 1** with reduced level of construction.	No Change

Resource	Alternative 1 *(Preferred Alternative)*	Alternative 2	Alternative 3	No Action Alternative
	effect on climate change.			

CHAPTER 3
AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

The purpose of this Chapter is to describe the existing environment that could be affected by the proposed project and to describe the environmental effects that would likely result for each alternative. For each resource, a list of issues considered in the analysis is identified. The impacts are summarized in Table 4, located at the end of Chapter 2.

VEGETATION AND WETLANDS

Issues considered	● How would the project change the vegetation communities in the project area, particularly vegetation important for migratory birds? ● How would mature riparian vegetation along the existing river channel and elsewhere in the project area be impacted? ● Would the project change the amount and distribution of noxious weeds in the project area and on adjacent properties? ● Would jurisdictional wetlands be impacted by the project?

Affected Environment

Examination of historic aerial imagery of the project area from 1937 reveals a highly sinuous river channel (Figure 12). Historic meander scars are evident across a floodplain having a width of over 3,000 feet. As the Jordan River moved laterally across its floodplain, new channels were created and old channels were abandoned. High flows periodically overtopped the river bank and spread out across the floodplain. These riverine processes created a diversity of wildlife habitat. By the mid-1950s and early 1960s the Jordan River was altered to accommodate agricultural development, industrialization and urbanization (Figure 13). Due to human-induced impacts, the Jordan River in the project area retains little of its original geomorphic function and character (Figure 14). A 2013 wetland delineation of the project did not identify any remaining wetlands within the project area, with just a narrow band of riparian vegetation remaining along the existing river corridor. A small patch of cottonwoods on the southeast end of the Mitigation Commission parcel provides the only tall structured habitat within the project area.

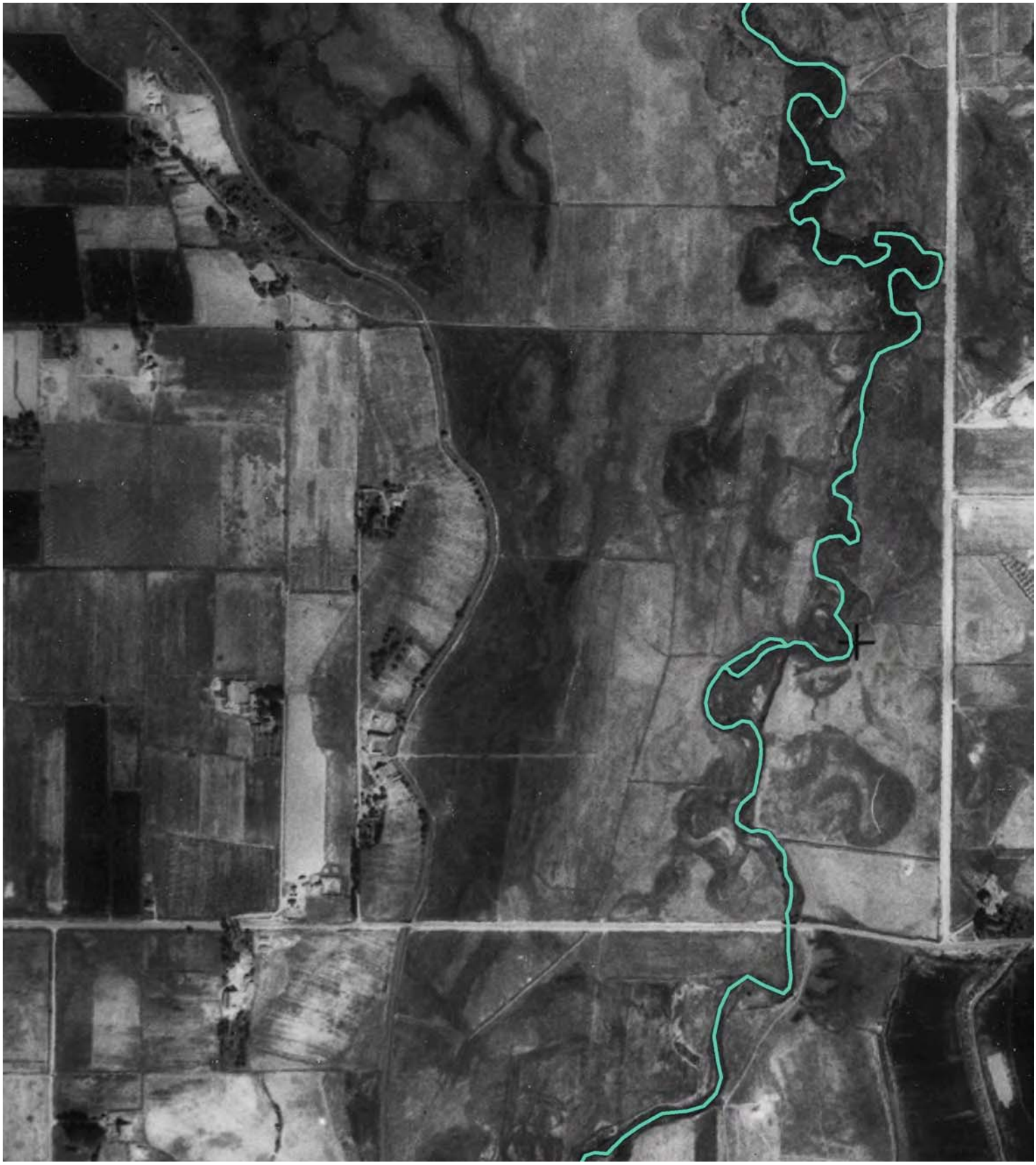


Figure 12 Aerial image of the project area in 1937, with the channel alignment drawn in blue. Note that some attempt at channel straightening had already occurred, but was limited to a short section of channel near the middle right of the image.

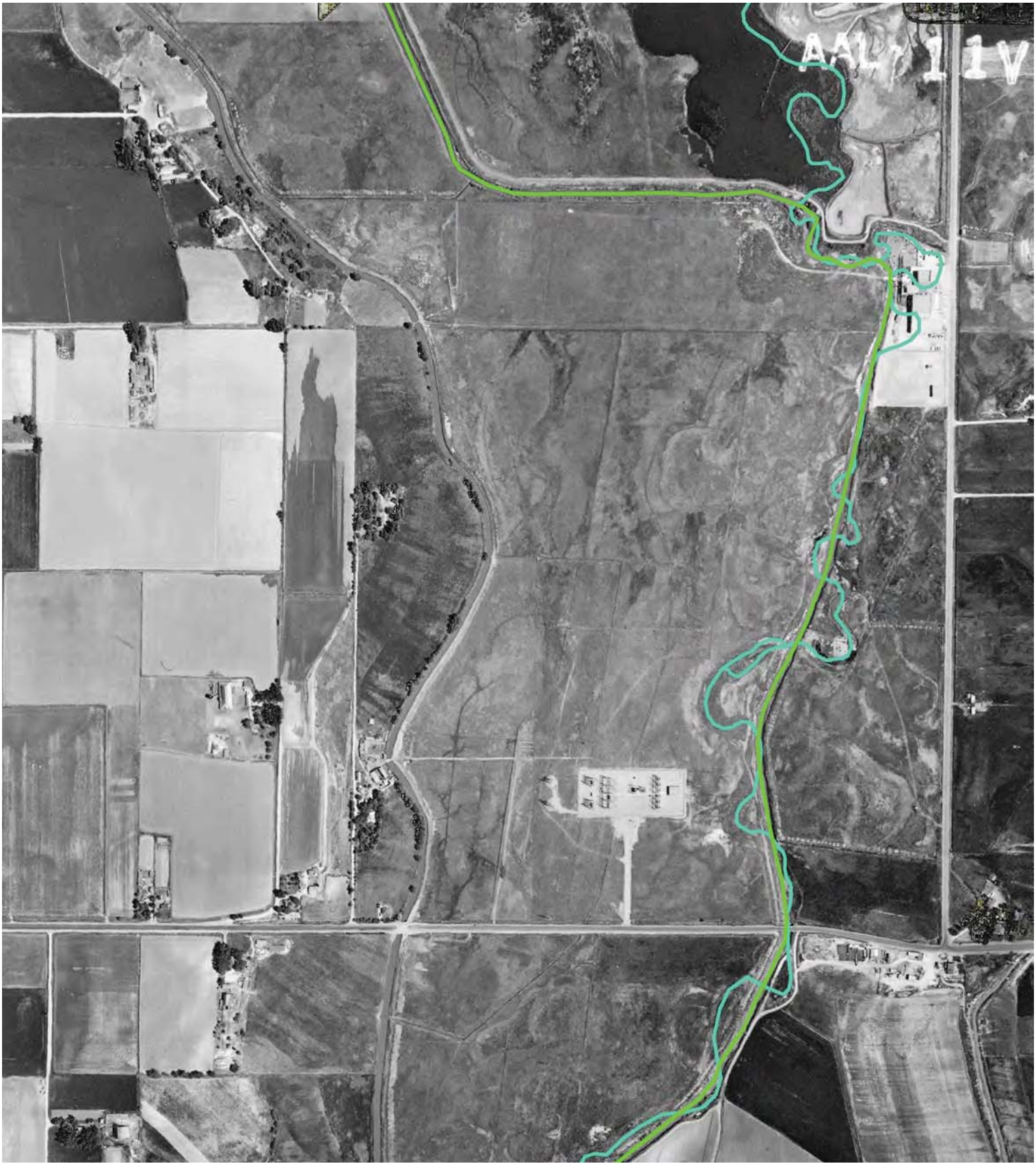


Figure 13. Aerial image of the project area in 1958, with the 1937 and 1958 channel alignments drawn in blue and green respectively. Note that by 1958 the natural meanders had all been removed and the channel almost completely straightened.

Figure 14. Aerial image of the project area in 2014, with the 1937, 1958 and 2014 channel alignments drawn in blue, green and yellow, respectively.

Vegetation inventories of the project area were completed in 2014 and are depicted in Figure 15. Table 5, below, lists the vegetation community types identified in the project area, most of which are also commonly found in other Jordan River locations.

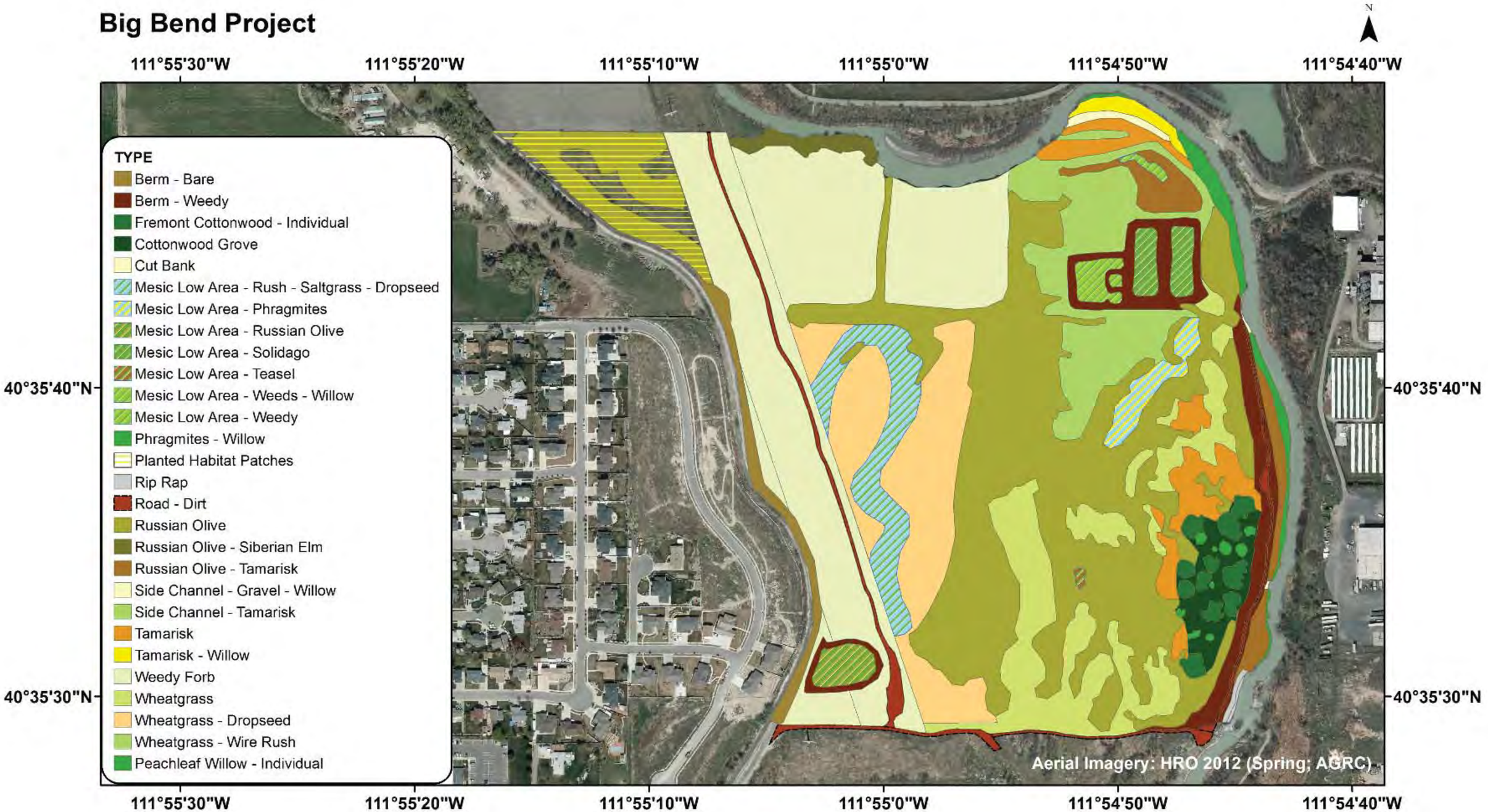
Table 5 Vegetation Community Types

Vegetation Type	Dominant Species
Uplands/Arid uplands (Weedy Forb)	Whitetop *(Cardaria draba),* Redstem stork's bill *(Erodium cicutarium)* Scotch Thistle (*Onopordum acanthium*) Cheatgrass (*Bromus tectorum)*
Wet Meadow	Inland saltgrass *(Distichlis spicata*) Arctic rush (*Juncus arcticus*) Western goldentop *(Euthamia occidentalis)* Fourwing saltbush *(Atriplex canescens)* Common reed *(Phragmites australis)* Reed canarygrass *(Phalaris arundinacea)* Canada thistle *(Cirsium arvense)*
Riparian Forest (Upper canopy)	Russian olive *(Elaeagnus angustifolia)* Fremont cottonwood *(Populus fremontii)* Peachleaf willow *(Salix amygdaloides)*
Willow (Mid-level canopy)	Sandbar (coyote) willow *(Salix exigua)* Cuman ragweed *(Ambrosia psilostachya)* Salt cedar *(Tamarix ramosissima)*

Environmental Effects

ALTERNATIVE 1 provides the greatest long-term opportunity to restore ecological function and associated wetland and riparian habitats in the project area. Approximately 37 acres of the project area (54%) would be dedicated to habitat preservation, while the remaining area would be used primarily for compatible recreational uses (Figure 6). The habitat area would be demarcated from the rest of the site with a split-rail fence and signage to discourage park visitors from entering the habitat area. In addition to the split-rail fence, the proposed meander channel will also provide a natural barrier to habitat located on the east side of this new channel (16.6 acres), further insulating this area from frequent public use. The new meandering river channel through the project area would be approximately 2,575 feet in length with a floodplain width as wide as 500 feet in places. The restored floodplain area would create approximately 15.3 acres of wetland and riparian habitat. Upland areas outside the restored floodplain would be reseeded and planted with native plants. During construction of the new channel, the existing mature cottonwood forest would be protected to the maximum extent possible. However,

Big Bend Project



B2–ExistingVegetationCover

INTERMOUNTAIN AQUATICS INC.
ENVIRONMENTAL CONSULTING & HABITAT RESTORATION

Figure 15 Existing Vegetation Inventory

because of the close proximity of the river diversion to the cottonwood forest, it may be necessary to remove up to three large (> 10-inch diameter at breast height) cottonwoods under this alternative.

While **ALTERNATIVE 1** provides the greatest opportunity to restore ecological function and associated wetland and riparian habitat, it consequently has the greatest short and mid-term impacts resulting from a larger area being initially cleared of existing (primarily exotic/non-native) vegetation to construct the new meander channel. Approximately 48 acres of the project area (71%) would be disturbed during construction (Figure 16). While this area currently does not provide the ecological function and habitat it potentially could, it does provide some habitat value as documented in the Wildlife section of this report. Avian species utilizing these habitats would be displaced until new native vegetation is established and matures to a sufficient size to provide those ecological functions (food, cover, breeding and nesting habitat). In order to minimize impacts to avian species utilizing these habitats, removal of non-native vegetation would be implemented in phases until new native vegetation becomes established.

Having the largest total disturbance area of any of the action alternatives, **ALTERNATIVE 1** also presents the greatest potential for noxious weed establishment. However, all action alternatives will include a revegetation plan that includes the selective removal of non-native vegetation and noxious weeds followed by seeding and planting with native plants throughout the site. A noxious weed treatment program would be implemented under each of the action alternatives. Therefore **ALTERNATIVE 1**, and the other action alternatives, would result in a substantial decrease in noxious weeds.

Since there are no existing jurisdictional wetlands within the project area, there will be no wetland impacts under any of the alternatives.

Under **ALTERNATIVE 2**, approximately 37 acres of the project area (54%) would be dedicated to habitat preservation, while the remaining area would be used for compatible recreational uses (Figure 9), the same as **ALTERNATIVE 1**. The new river channel would be less sinuous and would have a narrower floodplain width of 200 feet at its widest point. The narrower floodplain width would restore approximately 6.25 acres of wetland and riparian habitats. As with **ALTERNATIVE 1,** which has the same diversion point, **ALTERNATIVE 2** may also result in the loss of up to three large (> 10-inch diameter at breast height) cottonwoods.

The smaller floodplain width under **ALTERNATIVE 2** would require less disturbances during construction than **ALTERNATIVE 1**. Approximately 31 acres would only be minimally or not disturbed during construction (Figure 17). Therefore, while **ALTERNATIVE 2** provides fewer opportunities to restore ecological function and associated habitats when compared to **ALTERNATIVE 1**, it also results in fewer short to mid-term impacts. Upland areas outside the restored floodplain but within the habitat preservation area (approximately 31 acres) would be reseeded and planted with native plants suitable for drier upland conditions. Existing vegetation in these areas would be phased out over a period of 5 to 20 years as new native vegetation plantings become established. Newly created habitat within disturbed areas would require a similar time-frame for establishment.

Figure 16 Alternative 1 Limited Construction Disturbance Area

Figure 17 Alternative 2 Limited Construction Disturbance Area

Figure 18 Alternative 3 Limited Construction Disturbance Area

ALTERNATIVE 3 provides the largest area dedicated primarily to preservation, 42 acres, and the smallest area dedicated to recreational uses, 26 acres (Figure 11). However, the alternative also provides the smallest area of wetland and riparian habitat restoration, which would be limited to a small riparian corridor that would extend approximately 10 feet on either side of the tributary channel, amounting to approximately 1.1 acres. The tributary channel would receive flows diverted from the North Jordan Canal, and no direct impacts would occur to the mature riparian forest. As with the other action alternatives, upland sites within the preservation area would be reseeded and planted with native vegetation.

The smaller area required for construction of the tributary channel and recreational features would result in fewer short and midterm impacts compared to the other two action alternatives. Approximately 31 acres of the project area (45%) would be disturbed during construction (Figure 18). The remaining 37 acres would require minimal disturbance and clearing during project construction. Existing vegetation in these areas would be phased out over a period of 5 to 20 years as new native vegetation plantings become established. Table 6 summarizes the impacts of the action alternatives on vegetation and wetlands.

Under the **NO ACTION ALTERNATIVE**, riparian and wetland habitats would not be created and the existing habitat would provide ecological services at reduced level. Non-native vegetation would still be selectively removed resulting in some short and mid-term impacts.

Table 6 Summary of Impacts on Vegetation and Wetlands

	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3
Long-Term Habitat Changes			
Area managed primarily as preservation	37 acres (54% of project area)	37 acres (54% of project area)	42 acres (62% of project area)
Area managed primarily for compatible recreation.	31 acres (46% of project area)	31 acres (46% of project area)	26 acres (38% of project area)
Floodplain area and potential wetland and riparian habitat creation	15.3 acres	6.25 acres	1.1 acres (no floodplain but 20' wide wetted corridor 10' on either side of tributary channel)

River/tributary channel length	2,575 feet	2,173 feet	2,425 feet
Cottonwood Forest Impacts	Loss of up to three greater than 10" DBH cottonwood trees	same as **ALTERNATIVE 1**	none
Short-Mid Term Temporary Habitat Impacts			
Area cleared/disturbed during construction	48 acres (71% of project area)	37 acres (54% of project area)	31 acres (46% of project area)

WILDLIFE

Issue Considered	• How would wildlife and the habitat they rely upon be impacted by the project, particularly neo-tropical migratory birds?

Affected Environment

Avian Species

In anticipation of this planning effort and environmental analysis, Tracy Aviary in Salt Lake City was solicited by the City of West Jordan to design and implement a long-term monitoring plan, identify the baseline avian community composition of the project area, and to provide management recommendations with regard to practices favoring avian communities. Data has been collected at eight point count locations as shown in Figure 19 from 2013 through 2017 and compiled in a report *Bird Monitoring at Big Bend Restoration Area, 2016*. The report is briefly summarized in this Section and is included as Appendix 1.

Since the first year of bird surveys initiated at Big Bend in 2013, 110 bird species have been documented using the site. Of these, approximately 40 species use the site year-round. There are migratory species that breed in the area, such as blue gray gnatcatcher and Bullock's orioles, as well as other transient species that use the Jordan River as stop-over or migratory path during the spring and fall migration. Resident species that also breed in the area include mourning dove, black-billed magpie, American robin, red-tailed hawk, and American kestrel. There are species that are restricted to particular habitats. For example, bank swallows, belted kingfishers, spotted sandpipers and American avocets, use the river

Figure 19 Bird Monitoring Point Count Locations

corridor, beaches and banks. Other species use wooded areas that provide shelter, and food in the form of insects and fruit, especially in the Russian olive. These species include blue-gray gnatcatcher, cedar waxwing, evening grosbeak, northern flicker, and yellow-rumped warbler among others. In the spring of 2015, migrating MacGillivrays warblers, gray catbird and yellow-breasted chat were documented at Big Bend, as well as willow flycatcher in 2016.

The *Bird Monitoring at Big Bend Restoration Area* report found that in absence of other riparian and forest structure, Russian olive patches at Big Bend provide key resources for multiple species and life stages throughout all seasons of the year. Tracy Aviary has recommended that management and removal of Russian olive patches should be done gradually, with consideration for the importance of mature Russian Olives for bird habitat requirements. They have recommended that Russian olive seedlings and young trees (between 1-3 inch Diameter at Breast Height (DBH)) should be targeted for removal first. Mature trees should be thinned out slowly while they are replaced with native trees and shrubs so vertical structure and fruiting resources are maintained. These recommendations are being integrated into the project plans that include a phased approach for the removal of the site's Russian olives and replacement with appropriate native species. Areas that will not be disturbed during the main construction will be managed first, so the native species can establish prior to the Russian olive removal.

Upland Species

A few resident mule deer, red fox, raccoon and other urban tolerant wildlife species are found on the property. It is not the intent of this project to improve habitat for these upland species. Mule deer are not well suited to live in urban environments and it is not the purpose of this project to promote herd development on this relatively small and isolated parcel. Red fox and raccoon are predators of avian species and it is not the intent of this project to enhance their habitats.

Environmental Effects

Both **ALTERNATIVE 1** and **ALTERNATIVE 2** would enhance and create riparian and wetland habitat by diverting the main flow of the Jordan River into a newly constructed channel. The lowered floodplain created with these two alternatives (which will allow tree roots to reach the river's water table) and periodic overbank flooding during high run-off years would allow riparian habitats to develop. Over the long-term, **ALTERNATIVE 1** has the greatest potential to restore ecological function and associated habitat with the creation of approximately 15.3 acres of wetland and riparian habitat. **ALTERNATIVE 1** would, however, have the greatest short and mid-term impacts on avian species by having the largest area cleared of existing vegetation as part of the restoration effort, 48-acres. Avian species utilizing these habitats would be impacted until new native vegetation is established and matures to a sufficient size to provide those ecological functions currently being provided (food, cover, breeding and nesting habitat). **ALTERNATIVE 2** does not have as great a potential to restore wetland and riparian habitats, 6.25 acres, but also results in fewer short and mid-term impacts resulting from a smaller disturbance area, 37 acres, when compared with **ALTERNATIVE 1**. **ALTERNATIVE 3** provides the smallest opportunity for wetland and riparian restoration, 1.1 acres, but also has the fewest short-term impacts.

All vegetation removal, trimming, and grading of vegetated areas shall be scheduled outside of the peak bird breeding season to the maximum extent practicable. The Mitigation Commission and the City of

West Jordan will consult with Utah Division of Wildlife Resources and U.S. Fish and Wildlife Service to identify peak breeding months for local bird species.

Under the **NO ACTION ALTERNATIVE,** existing habitat would not change significantly from existing conditions. The existing habitat provides some ecological value to avian species but at reduced levels compared to its potential. Non-native vegetation would still be selectively removed resulting in some short and mid-term impacts.

THREATENED, ENDANGERED AND SENSITIVE SPECIES

Affected Environment and Environmental Effects

A list of Threatened (T), Endangered (E) and Candidate (C) species and State-sensitive species (SS) that may occur in the project area are identified Table 7, below. None of the alternatives will affect any federally listed or candidate species or their habitat or State sensitive species.

Table 7 Threatened, Endangered and Sensitive Species in the Project Area

Species	Status	Occurrence Potential	Environmental Effects for all Alternatives
June sucker *Chasmistes liorus*	E	Unlikely	June sucker is endemic to Utah Lake and is not known to occur in this reach of the Jordan River. It is possible that a few individuals have "spilled" out of Utah Lake and may be found in the section just downstream of Utah Lake. Other than these accidental occurrences, June sucker are not known to utilize the Jordan River.
Least chub *Iotichthys phlegethontis*	CA	Unlikely	No suitable habitat in the project area.
Greater sage grouse *Centrocercus urophasianus*	SS	Unlikely	No suitable habitat in the project area.
Yellow-billed cuckoo *Coccyzus americanus*	T	Unlikely	Suitable nesting habitat does not exist on the project site for western yellow-billed cuckoo, which is thought to need large (100-acre minimum) tracts of contiguous riparian forest. The project site is not likely to provide foraging habitat for this species either, as no suitable breeding habitat is found near the project site.

Species	Status	Occurrence Potential	Environmental Effects for all Alternatives
Canada lynx *Lynx Canadensis*	T	Unlikely	No suitable habitat in the project area.
American White Pelican *Pelecanus erythrorhynchos*	SS	Likely	Small numbers of American White Pelican were observed each year during the Tracy Aviary bird monitoring efforts 2013-2016. The nearby open water pond adjacent to the Sharon Steel Property and slack water areas in the Jordan River are utilized by American White Pelican on occasion. While some habitat may be lost within the existing river channel with reduced flows, new habitat will be created with the construction of the fishing pond and river channel. There is no net loss of American White Pelican habitat expected under any of the action alternatives.
Long-billed curlew *Numenius americanus*	SS	Unlikely	No suitable habitat in the project area.
Western pearl shell *Margarita falcate*	SS	Unlikely	No suitable habitat in the project area.
Burrowing owl *Athene cunicularia*	SS	Unlikely	No suitable habitat in the project area.
Short eared owl *Asio flammeus*	SS	Unlikely	No suitable habitat in the project area.

AQUATIC SPECIES

Issues Considered	• How would fish and aquatic species and the habitat in which they rely upon be impacted by the project?

Affected Environment

The Jordan River currently supports fisheries consisting of species adapted for warm water, including many species that tolerate poor water quality. There are 23 species of fish inhabiting the Jordan River, only seven of which are native (Appendix 2, Fish Species of the Jordan River, Dan Potts, 2011). As the river is a contiguous system, it can be assumed that any of these species may be found in the project reach.

Environmental Effects

With the increased diversity of desirable riverine features including varying bank heights and steepness and varied channel forms (riffles, runs, pools), the new channel under **ALTERNATIVE 1** is expected to provide improved fish habitat. The existing assemblage of fish species is not expected to change as they will continue to move in and out of this reach of the Jordan River. Fish numbers may increase in this section of river as holding habitat area improves. **ALTERNATIVE 2** will also have a diversity of desirable riverine and in-channel forms. The response of the fish community would be expected to be similar to **ALTERNATIVE 1**. Under **ALTERNATIVE 3** and the **NO ACTION ALTERNATIVE,** the flow in the Jordan River would remain unchanged from existing conditions for the reach adjacent to the project site. Two to three cfs would be diverted into the tributary channel from the North Jordan Canal. The tributary channel size would provide limited habitat for aquatic species.

HYDROLOGY AND GROUND WATER

Issues Considered	• How would moving the main river channel affect ground water hydrology on adjacent properties? • To what degree would the natural ecological processes be restored by the alternative? • How would the project change local site hydrology, geomorphic function and character, important for channel stability and to support riparian vegetation?

Affected Environment

Surface Water Hydrology

The Jordan River is a relatively short river, approximately 51 miles long, originating at Utah Lake and flowing north to terminate in wetlands that eventually discharge to the Great Salt Lake. The hydrology of the Jordan River is highly altered. Jordan River flows are influenced by a complex mix of irrigation demand, flood control concerns, Utah Lake levels, and natural rainfall and snowmelt conditions.

Releases into the Jordan River from Utah Lake are controlled by the pumping plant and outlet works operated by the Utah Lake Water Users Association (Association) for irrigation purposes [Hooton 2012]. Releases are also subject to flood control restrictions as outlined in the Utah Lake and Jordan River Operating Procedures and Flood Management Plan. This plan, which was developed as part of a 1985 legal settlement, established the current "Compromise Elevation" of Utah Lake at 4489.045 feet above sea level. When the lake exceeds compromise elevation, the Association must fully open the outlet gate except when doing so causes the Jordan River to exceed 3,400 cfs as measured at the 2100 South diversion [Salt Lake County 2016].

Although Utah Lake is the single largest source of flows to the Jordan River, during the irrigation season much of this water is diverted within a few miles of the lake's outlet for agricultural and municipal use. Five major canals divert water from the river before it reaches the Big Bend site [Salt Lake County 2016]. Between Utah Lake and the Big Bend site, other tributaries flow into the Jordan River from both east and west. These include Willow Creek from the east and Rose Creek from the west. These tributaries are also subject to a complex network of diversions, return flows from canals, storm water discharge, and exchange agreements between culinary and agricultural users. The North Jordan Canal, primarily containing water from Utah Lake, is located immediately to the west of the Big Bend site.

Jordan River hydrologic patterns in the vicinity of the Big Bend site vary seasonally and year-to-year. Higher flows most commonly occur during spring and early summer, with lower flows common during the fall and early winter. This pattern is evident in average monthly flow data collected at the 90th South streamflow gage just upstream of the Big Bend site (Figure 20, below). However, Jordan River hydrology is subject to multi-year wet and dry periods that affect Utah Lake levels and corresponding releases to Jordan River [UDWR 2010]. During the extremely wet period in the 1980s, flows remained high for an extended period. During drought periods such as the 2001-2005 time frame, flows at the 90th South gage remained consistently low, rarely exceeding 150 cfs. Flow duration analysis for the 1980-2013 time period at the 90th South gage shows that flows are 90 cfs or lower about 50% of the time, and exceed 900 cfs about 20% of the time [River Restoration, Inc. 2015 Appendix C].

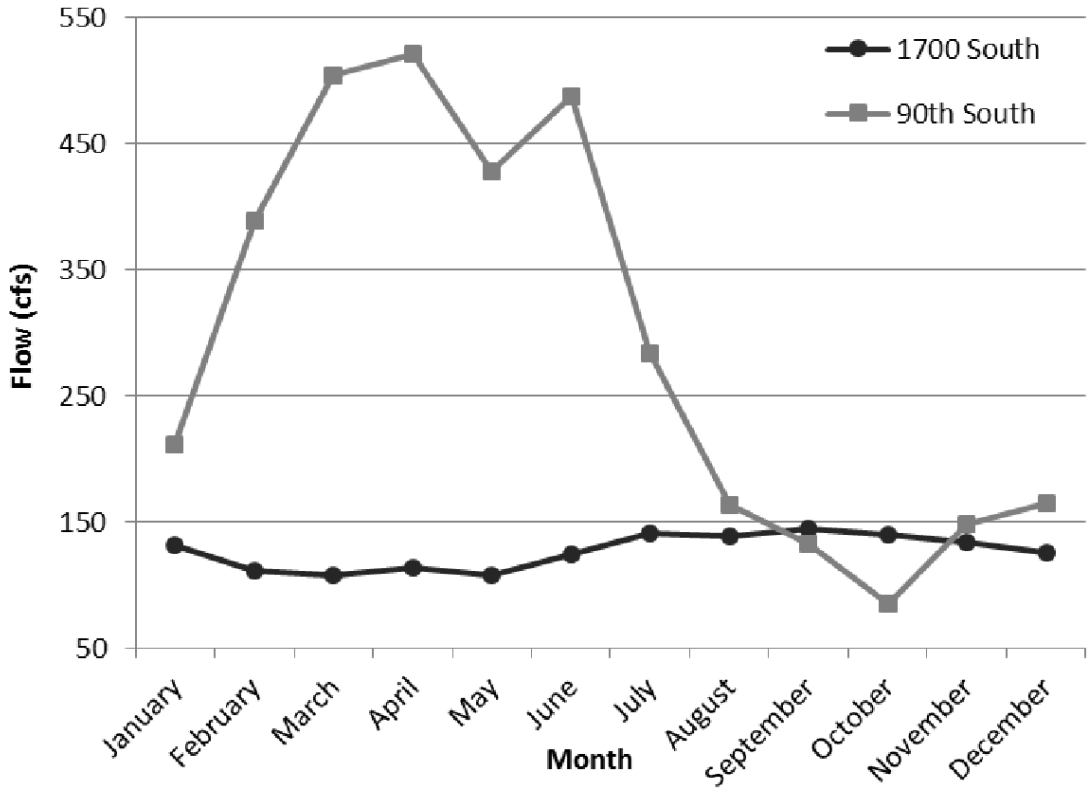


Figure 20 Monthly mean hydrograph for 90th South and 1700 South flow gages (1700 South gage [1995-2014]; 9000 South gage [1995-2011]). Source: Jordan River Comprehensive Management Plan, SWCA 2016.

Floods in this portion of the Jordan River are generally associated with high Utah Lake levels and associated high flow releases via the outlet gate. Flood frequency analyses completed in 2000 found the 2-year flood flow to be about 750 cfs and the 100-year flood flow to be 2,800 cfs [USACOE 2003].

Ground Water

Available mapping shows that the Big Bend project lies entirely within an area identified as a ground water discharge zone [Anderson et al. 1994]. Jordan River is considered a gaining stream reach along its full length [SLCO 2009].

Soil borings from March 2001 found that groundwater was between about 4 feet and 7.5 feet below ground surface at the Big Bend site, with an average depth of about 6 feet [USACOE 2003]. More recent groundwater monitoring wells provide updated groundwater information for the Big Bend site. Specifically, five wells were installed in December 2014, and depth-to-groundwater information was collected periodically through June 2016 (Figure 21). Monitoring results indicate that groundwater elevations vary from about 5 to 9 feet below the ground surface. At each well, seasonal variability is on the order of 1 to 2 feet and no clear correlations with water level in either Jordan River or the North Jordan Canal are apparent (Figure 22).

Figure 21 Locations of groundwater monitoring wells installed in 2014.

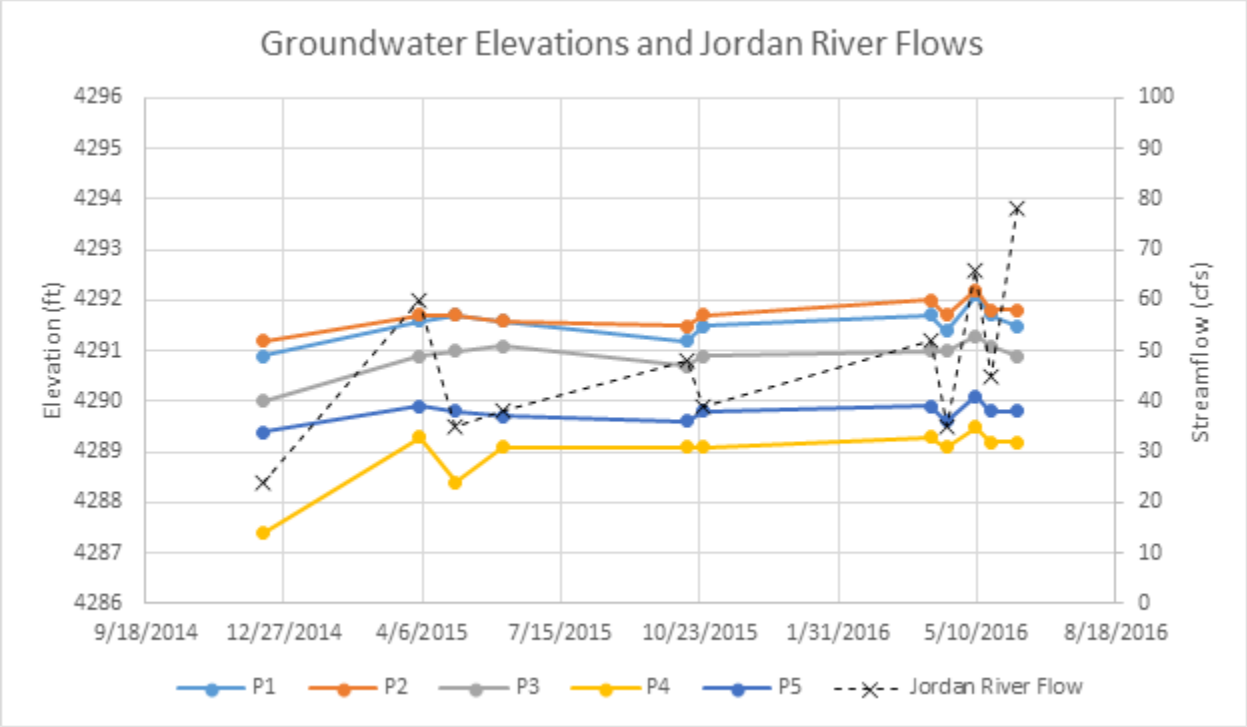


Figure 22 Groundwater elevations measured at monitoring wells between 2014-2016 and Jordan River flow (90th South gage operated by Salt Lake County) at time of measurement.

Environmental Effects

Surface Water Hydrology

None of the proposed alternatives would alter the overall hydrology of the Jordan River. However, under **ALTERNATIVE 1** and **ALTERNATIVE 2**, the location and distribution of Jordan River flows would change within the project area. Under **ALTERNATIVE 1**, most of the flow would be directed into the new river channel. Flows in the existing Jordan River channel would be reduced to approximately 10 cfs during low flow periods. At high flows above about 600-800 cfs, additional water, up to about 12% of the overall river flow, would be conveyed down the existing channel section. The total volume of water in the river would not change under either alternative, but having a split channel slightly increases the total water surface area resulting in greater evaporative losses, estimated to be less than 2-acre-feet per year. Increased consumptive uses and evaporation of water caused by implementation of any action would be covered by water rights owned by or to be acquired by the City of West Jordan. Chapter 2 includes a more detailed description of the proposed flow distribution.

ALTERNATIVE 2 most of the flow would be diverted into the new small floodplain with approximately 10 cfs continuing down the existing channel during low flow conditions. At flows above approximately 200 cfs, a larger percentage of the overall flow would be directed into the existing channel than the new channel. At high flows above about 600 cfs, about 70% would be conveyed down the existing channel

section. This would result in evaporative losses similar to **ALTERNATIVE 1,** but at a lesser level. Chapter 2 includes a more detailed description of the proposed flow distribution.

No changes to the existing Jordan River hydrology, its location, or distribution among channels would occur under **ALTERNATIVE 3** or the **NO ACTION ALTERNATIVE**.

None of the proposed alternatives would increase flooding risks. **ALTERNATIVES 1** and **2** would be designed to allow flows equal to or greater than the 2-yr recurrence flood interval to spread out onto constructed floodplain areas. These overbank flows would be wholly contained within the Big Bend site without adversely affecting neighboring property owners. Flooding risk associated with the existing channel alignment would be expected to decrease in the project area as flows would be split into the new and existing channel, thereby increasing the capability to deliver flood flows within the river channels. Flooding risk downstream of the project area would decrease slightly from existing conditions due to flood storage capacity within the excavated floodplains. Under **ALTERNATIVE 3** and the **NO ACTION ALTERNATIVE,** the Jordan River flows would remain in the existing channel and floodplain connectivity and flooding risk would not change.

Ground Water

Because Jordan River is a gaining stream reach that receives inputs from groundwater rather than recharging groundwater, the shifts in location and distribution of Jordan River flows proposed under **ALTERNATIVE 1** and **ALTERNATIVE 2** would not be expected to change ground water conditions on adjacent properties. This conclusion is further supported by groundwater monitoring results from 2014-2016 that found no consistent correlation between river flows and groundwater elevations. **ALTERNATIVE 3** and the **NO ACTION ALTERNATIVE**, which would leave Jordan River flows in its present location, would also not alter ground water conditions on adjacent properties.

WATER QUALITY

Issues Considered	• How would the project affect erosion and water quality in the Jordan River, particularly with respect to constituents for which the river is "impaired" under Section 303(d) of the Clean Water Act (total dissolved solids (TDS) and dissolved oxygen)

Affected Environment

Beneficial uses designated under the Standards of Quality for Waters of the State of Utah (Administrative Rule R317-2) for the Big Bend segment of the Jordan River include, 2B: secondary contact recreation (boating, wading, fishing, etc.); 3A: cold water fishery; and 4: agricultural irrigation. These uses are protected by a variety of water quality standards, but every segment of the Jordan River has been found to be non-supporting of one or more beneficial uses (i.e., impaired) due to exceeding one or more of these water quality standards.

The segment of the Jordan River that contains the Big Bend site is currently listed as impaired for dissolved oxygen, selenium, temperature, Observed:Expected bio assessment ratio, and total dissolved solids (TDS) [UDWQ 2016]. Exceedances in temperature and TDS are associated with shallow water conditions, hot summer air temperatures, and ground water high in natural thermal discharges.

One major area of concern for the Jordan River is the episodic rising and lowering of flow levels within the river due to operations at the outlet of Utah Lake. Release gates are often adjusted rapidly, causing rapid fluctuations in Jordan River flow levels. These rapid changes are problematic from a restoration standpoint, because they often initiate rapid erosion. Of particular concern are rapid decreases in flow levels, which leave saturated banks that fail under gravity due to the weight of saturated soils. These types of failures are common along the Jordan River. Along the north edge of the project site, the existing left bank of the Jordan River is near vertical and there is evidence of active erosion and undercutting. Historical aerial photographs show that the bank line has migrated south almost 90 feet in this location since 2005, as shown in Figure 23.

In addition to the saturated banks, erosion at this location is also likely a result of armoring the opposite bank with riprap. Migrating banks in a river or stream are a natural occurrence and can be a sign of stream health as material from the banks can provide substrate for downstream bars and riffles. For this project however much of the material in this particular eroding bank is finer silts and clays that cause turbidity issues in the Jordan River and exacerbate water quality problems downstream.

Environmental Effects

All of the action alternatives would include measures to stabilize the eroding bank on the north end of the project area at the "Big Bend" site, which contributes tons of fine sediments to the Jordan River annually. A 225-foot-long section of the south bank of the Jordan River on the north boundary of the project area that is actively eroding would be stabilized.[5] Stream boulders set at or just below the ordinary high water elevation will be used to reinforce the toe of the tiered slope. A 25-foot-wide “beach area” would be incorporated into the stabilization project and provide visitors a place to recreate and relax along the river bank. Three “tiers” will extend up from the beach area, each with an 18-inch rise and a 5-foot run. Above the last tier, slopes will be graded at 10: 1 to match existing grade. Each tier will be planted with native grasses and forbs; the beach will likely be composed of sands and small cobbles. Larger flood events will inundate the beach area.

Under the **NO ACTION ALTERNATIVE,** water quality in the Jordan River would continue to degrade as eroding banks in the project area would not be stabilized and would continue to contribute tons of fine sediments to the system.

[5] As described in greater detail in Chapter 1, much of this work on the 225 ft. beach area was completed by West Jordan City in the Spring of 2018.

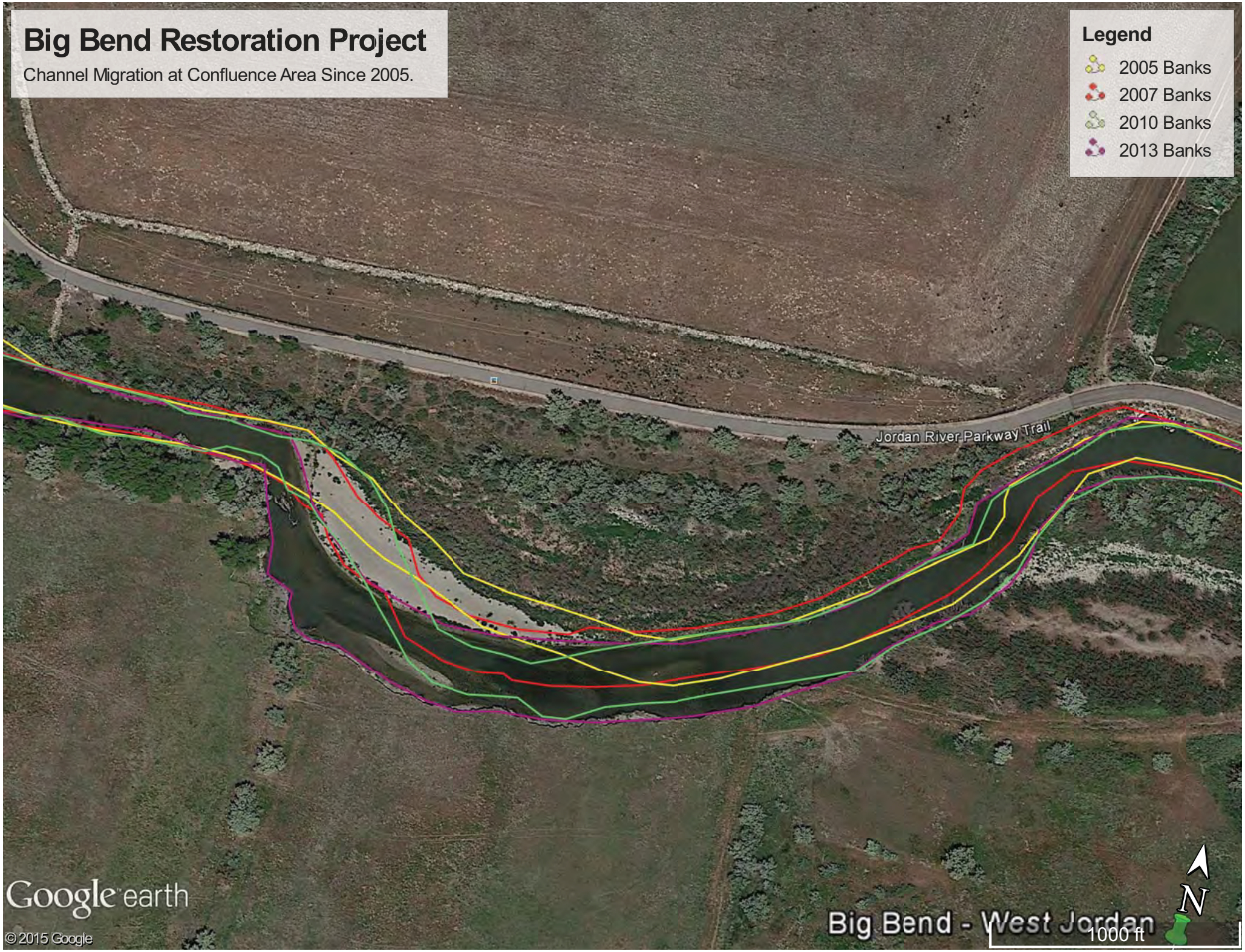


Figure 23 Big Bend Area Erosion

RECREATION

Issues considered	• How would recreational opportunities and experiences change as a result of the project?

Affected Environment

Up until construction of the Jordan River Parkway Trail in 2014, which passes through the project area, limited or no recreational opportunities were afforded on the City of West Jordan and Mitigation Commission properties. The Jordan River Parkway Trail is fenced on both sides as it passes through the project area, restricting public access to the remainder of the parcel. The Mitigation Commission parcel has been managed primarily for its potential wildlife habitat values.

Environmental Effects

One of the main purposes of the project is to provide recreational opportunities to the public, compatible with the primary objectives of restoring and protecting the ecological function of the Jordan River and its associated habitats. Each of the action alternatives will substantially increase the recreational opportunities available to the public. Under **ALTERNATIVE 1** and **ALTERNATIVE 2** the fishing pond would have a surface area of approximately 4 acres in size with a nesting island in the middle. The pond would be stocked with fish by the Utah Division of Wildlife Resources with species suitable to the prevailing water quality and temperature. It is anticipated that the pond would be deep enough to over-winter fish. Additional recreation amenities include accessible trails, secondary trails, boardwalks, interpretive and directional signing, and a viewing platform. Parking, picnic tables, restrooms with flush toilets and trash containers would be provided. The parking area would be of sufficient size to accommodate school buses. **ALTERNATIVE 3** would be very similar to what is described above but slightly smaller in scope. The fishing pond would be approximately 3 acres in size. The trail system would be less developed, non-flush vault toilet restrooms would be provided along with trash containers, interpretive and directional signing. The viewing platform and parking area would not be constructed under **ALTERNATIVE 3**. Visitors would access the site via the Jordan River Parkway Trail system or the existing pedestrian bridge over the North Jordan Canal located at approximately 8600 South. Maintenance vehicles would access the site via the Jordan River Parkway Trail.

Under the **NO ACTION ALTERNATIVE**, none of the recreational features would be constructed and recreational opportunities would be substantially limited to the Jordan River Parkway Trail.

WATER RIGHTS

Issues considered	• Are there sufficient water rights to provide flows to the fishing pond and irrigation system (all alternatives), and tributary channel (**ALTERNATIVE 3**)? • Would existing water rights owners be impacted?

Affected Environment

Both the Mitigation Commission and the City of West Jordan parcels include associated water rights which were acquired with the properties. The Mitigation Commission's 43-acre parcel includes 24.4 acres that are considered irrigable, and the City of West Jordan's 25-acre parcel includes 17.21 acres that are irrigable. The water application duty at this location as determined by the State Engineer is 5-acre feet (af) of water per acre of irrigable property during the irrigation season, which runs from April 1 to October 31. The amount of water owned by the Mitigation Commission and the City of West Jordan available for use on the project is 208.5 acre-feet, with a flow rate of 6.05 cfs during the irrigation season, as summarized in Table 8 below:

Table 8 Water Rights That Include Water Available for Project Use

Water Right 59-3509	**Acre-ft**	**%**	**cfs**	**Irrigable Acreage**
Fur Breeders	13.45	13.5%	0.72	2.69
City of West Jordan	**86.05**	**86.5%**	**4.58**	**17.21**
total 3509	99.5	100.0%	5.30	19.9
Water Right 59-3510	**Acre-ft**	**%**	**cfs**	**Irrigable Acreage**
Mitigation Commission	**122**	**27.7%**	**1.47**	**24.4**
Richardson	152	34.5%	1.83	30.4
Sandy City	166	37.7%	2.00	33.2
total 3510	440	100.0%	5.30	88
Total Water Rights Available (City of West Jordan + Mitigation Commission)	**Acre ft**		**cfs**	**Irrigable Acreage**
	208.05		6.05	41.61

Source: Utah Water Rights https://www.waterrights.utah.gov/cgi-bin/wrprint.exe?Startup

Environmental Effects

Under all action alternatives, the City of West Jordan would ensure that the ability to deliver all valid existing water rights will not be altered by the project. Under **ALTERNATIVE 1** and **ALTERNATIVE 2** sufficient water rights will be required to support the fishing pond and to supply irrigation water to revegetation areas for approximately the first 5 years until the vegetation becomes well established. The amount of water required to maintain adequate water quality in the fishing pond is approximately 1.9 cfs. At this rate of flow, the volume of water in the fishing pond would be replaced approximately every 7 days and is referred to as residence time. This flow rate would pass through the pond and return to the Jordan River. The City of West Jordan would apply to the State Engineer for a non-consumptive use for the amount of water returned to the Jordan River.

Residence time is important for ponds because it affects many aspects of water quality, including dissolved oxygen concentrations and water temperature. The amount of dissolved oxygen in the pond reflects the dissolved oxygen concentrations of the flow entering the pond. Fish and other organisms in the pond will use the dissolved oxygen present in the water column. Aeration through wind and wave action would replace some of the dissolved oxygen at the surface of the pond, but not at a rate sufficient to maintain concentrations that would allow fish to survive. Therefore, long residence times may result in dissolved oxygen concentrations that cannot support certain fish species or other organisms. Additionally, a longer residence time allows the water to absorb more solar radiation, causing an increase in water temperature during the summer. Warmer water holds less dissolved oxygen, further reducing the limited amount available in the water column. Higher water temperatures are also known to be a stressor for certain fish species. A 7-day residence time ensures that water in the pond is being replaced at a rate that minimizes these issues.

The evapotranspiration losses for the fishing pond system were calculated on a monthly basis [BIO-WEST, 2015]. Annual evapotranspiration losses for the fishing pond are approximately 14.63 acre-feet per year based on a pond surface area of 4 acres and adjacent riparian vegetation. The split channels under **ALTERNATIVE 1** and **2** and the tributary channel under **ALTERNATIVE 3** will result in less than 2 acre-feet per year of incremental evaporative losses.

The amount of irrigation water needed to support the 60+ acres of native upland, riparian, and wetland habitat restoration plantings is approximately 73 acre-feet per year. This amount would be used and applied during the normal irrigation season, April through October, for approximately the first 5 years until the vegetation becomes well established. A high efficiency pressurized irrigation system will provide the means for delivering irrigation water from the canal to habitat restoration planting areas throughout the entire project site.

Under **ALTERNATIVES 1 AND 2**, approximately 90 acre-feet of water would be needed annually for the project plus an additional 16 acre-feet for the initial filling of the pond. An additional 1.9 cfs inflow would be required to maintain water quality in the pond. The City of West Jordan would apply to the State Engineer for a non-consumptive water right for the 1.9 cfs inflow into the pond. Except for a brief

shut-down period for maintenance, the North Jordan Canal operates on a year-round basis. However, the water rights held by the City of West Jordan and the Mitigation Commission are valid only through the irrigation season April 1 through October 31.[6] Existing water rights would need to be converted or new rights acquired in order to carry the 1.9 cfs during the non-irrigation season. Table 9 summarizes the water requirements needed for **ALTERNATIVES 1 AND 2**.

Table 9 Summary of Water Requirements Alternatives 1 & 2

	Acre ft	cfs	Notes
Initial Pond Filling	16		1/
Pond Inflow to Maintain Water Quality		1.9	2/
Pond Evaporation	14.6		
New Channel Evaporative Losses	2		
Irrigation of Restoration Areas	73		
Total	89.6		

1/ Initial filling requirement of 16 acre-feet would only be needed for the initial pond filling. This amount is not included in the 89.6 acre-feet total.
2/ The City of West Jordan would apply to the State Engineer for a non-consumptive use water right on the 1.9 cfs inflow into the pond.

Adapted from Table 3, *Water Rights and Water Needs Investigation for the Big Bend Habitat Restoration Project in the City of West Jordan*, Memorandum from Bio West, August 21, 2015

ALTERNATIVE 3 would require approximately 85 acre-feet of water annually plus an additional 10.5 acre-feet for the initial filling of the pond. An additional 1.9 cfs inflow would be required to maintain water quality in the pond. The City of West Jordan would apply to the State Engineer for a non-consumptive water right for the 1.2 cfs inflow into the pond. Table 10 summarizes the water requirements needed for **ALTERNATIVE 3.**

[6] The City of West Jordan and Mitigation Commission water rights are valid through October 31 of each year, but the North Jordan Canal Company stops delivering irrigation water October 1.

Table 10 Summary of Water Requirements Alternative 3

	Acre ft	cfs	Notes
Initial Pond Filling	10.50		1/
Pond Inflow to Maintain Water Quality		1.22	2/
Pond Evaporation	10.25		
New Channel Evaporative Losses	1.50		
Irrigation of Restoration Areas	73.00		
Total	84.75		

1/ Initial filling requirement of 10.5 acre-feet would only be needed for the initial pond filling. This amount is not included in the 89.6 acre-feet total.
2/ The City of West Jordan would apply to the State Engineer for a non-consumptive use water right on the 1.22 cfs inflow into the pond.

Adapted from Table 3, *Water Rights and Water Needs Investigation for the Big Bend Habitat Restoration Project in the City of West Jordan*, Memorandum from Bio West, August 21, 2015

Under the **NO ACTION ALTERNATIVE**, there would be no additional water use required beyond existing irrigation needs.

LAND USE AND OWNERSHIP

Issues Considered	• What are the regulatory constraints in creating a new river channel that will take a significant portion of the flow of the Jordan River? • How would land uses within the project area change? • How would land uses on adjacent properties change? • How would land ownership change?

Affected Environment

The project area is approximately 68 acres in size, which includes 43 acres in federal ownership under the administration of the Mitigation Commission, and 25 acres owned by the City of West Jordan (Figure 1). The 43-acre parcel administered by the Mitigation Commission was purchased in 1998 to support habitat restoration and protection of riverine ecosystems. The Mitigation Commission recognized the need and dwindling opportunities to conserve natural areas along the Jordan River. The Project Area is one of the few remaining undeveloped natural areas along the Jordan River. The property has been managed as a natural area since its acquisition. The property has been irrigated within the limitations of the existing irrigation system and according to the water rights acquired with the land, and noxious weeds are treated annually. Nevertheless, noxious weeds are common on the property, as described in the Vegetation section of this document.

The City of West Jordan purchased their 25-acre parcel with the intent to restore and protect the remaining ecological values of the Jordan River and to provide compatible outdoor recreational opportunities consistent with the habitat restoration objectives. The City of West Jordan placed a conservation easement on the 25-acre parcel in 2001 which is held in Trust by the Utah Division of Forestry, Fire and State Lands (Appendix 4). The purpose of the conservation easement is, "*to protect and enhance forever the important wetland resources, natural wildlife habitat, recreational, open space and scenic qualities of the real property described below in an effort to restore the natural values of the Jordan River."* Under the terms of the conservation easement the City of West Jordan and Forestry, Fire and State Lands are to *"regulate public access so that it is not detrimental to the Conservation Values."* The Conservation Easement allows for the construction of restrooms, soft surface trails, boardwalks, signage and recognizes fishing as a compatible use. The conservation easement allows West Jordan City to, "*carry out activities to restore and enhance aquatic, terrestrial, and wetland habitat for fish and wildlife habitat. Such activities may include rechanneling, stream bank stabilization, improvement to the quality and quantity of water available, and development of watering facilities and ponds; provided such activities are conducted in a manner consistent with accepted waterway stabilization, rehabilitation, and enhancement methods, state and federal laws and regulations, and the terms and intent of this Easement."* Current vegetative and habitat conditions on the City of West Jordan parcel are similar to those described for the Mitigation Commission parcel.

The adjacent Rocky Mountain Power parcel, located to the west of the Jordan River Trail, is maintained in an open condition as an easement/right-of-way for a high-power transmission line leading from the Rocky Mountain Power sub-station south of the project. The City of West Jordan parcel and portions of the Rocky Mountain Power parcel had been leased for grazing for a small number of livestock. These grazing leases were discontinued in 2014. Treatment of noxious weeds on the West Jordan and Rocky Mountain Power parcel has been infrequent. The parcel owned by the Mitigation Commission has not been used for grazing or other uses since 1998.

Environmental Effects

Under all three alternatives, non-native plants and noxious weeds would be selectively removed and controlled. Native riparian and upland vegetation would be planted and irrigated sufficiently to ensure

establishment of desirable vegetation, as described more thoroughly in the Vegetation section. Compatible recreational facilities including fishing, trails, and educational and interpretive opportunities would be provided under all action alternatives.

Land uses on adjacent properties would remain unaffected by the project. Additional fencing would be installed between the new access road leading to the parking area and the Rocky Mountain Power Substation to protect the substation from trespass and vandalism. Barriers would also be placed at selected locations between the access road and the Jordan River for public safety.

The beds of navigable waters within the State of Utah, including the Jordan River, are owned by the State and held in trust for the public. The Utah Division of Forestry, Fire and State Lands is required to ensure that all uses on, beneath or above the bed of the Jordan River are regulated to ensure protection of navigation, fish and wildlife habitat, aquatic beauty, public recreation and water quality. Under both **ALTERNATIVE 1** and **ALTERNATIVE 2**, portions of the flow of the Jordan River would be directed into a newly constructed river channel. The new river channel would become part of the bed of the Jordan River. Consistent with State Law requiring the bed of navigable rivers to be held in trust for the public by the State, the Mitigation Commission and the City of West Jordan would transfer ownership of that portion of the newly constructed river bed to the State of Utah under these two alternatives. Ownership of the bed of the new river channel would remain with the State even as the river channel moves laterally across the constructed floodplain. The State would also continue its ownership of the existing Jordan River channel. The existing conservation easement held by the Utah Division of Forestry, Fire and State Lands on the 25-acre City of West Jordan Parcel (Appendix 4) would be amended to include the 43-acre federal parcel. The 43-acre federal parcel would concurrently be transferred from the Mitigation Commission to the City of West Jordan. The conservation easement on the lands transferred to Forestry, Fire and State Lands would be removed as required by State law. Under **ALTERNATIVE 3**, the bed of the Jordan River would remain entirely in its present location and therefore no property transfer to the State of Utah would be required. Ownership of the entire 43-acre federal parcel would be transferred to the City of West Jordan for the purposes previously described. Table 11 summarizes the transfer of property out of federal ownership.

Under the **NO ACTION ALTERNATIVE**, the Mitigation Commission would not issue a License Agreement to the City of West Jordan. The 43-acre federal parcel would remain in federal ownership in the near term. The project would most likely not be constructed because of limited land area available for the project.

Table 11 Transfer of Ownership of Federal Lands (acres)

	Alternative 1	Alternative 2	Alternative 3
Transfer to City of West Jordan	38.75	40.1	43
Transfer to State of Utah, Division of Forestry, Fire and State Lands	4.25	2.9	0
Total	43	43	43

SOCIOECONOMICS

Issues considered	• Would adjacent property owners be impacted by the project as a result of increased public access to the area (trash, vandalism, noise)? • How much would the project cost, who would manage the project and how would it be paid for? • Would the project increase the financial burden on local governments?

Affected Environment

The project area is relatively isolated from adjacent properties, particularly residential neighborhoods where increased public use may be disruptive. The closest residential properties are to the west of the project area, but they sit on an elevated bluff and are separated from the project site by the North Jordan Canal and the Rocky Mountain Power transmission line corridor.

Environmental Effects

The project area would be managed by the City of West Jordan through their Public Works Department. The fishing pond would be managed cooperatively by the City of West Jordan and the Utah Division of Wildlife Resources. No motorized activities would be allowed within the project area other than maintenance vehicles. Picnic tables and restrooms would be provided and trash would be picked up on a regular basis. The proposed parking area under **Alternatives 1 and 2** would be located on the south boundary of the 43-acre federal parcel, which is separated from the residential neighborhoods to the west by a distance of approximately 1,250 feet (0.25 mi.) and 50-foot drop in elevation. Additionally, the North Jordan Canal presents a physical barrier between the project area and the residential area. Because of this physical barrier, distance and separation, along with public use regulations and regular

maintenance, it is not anticipated there will be any impacts on adjacent property owners under **ALTERNATIVES 1 AND 2**. The pumps used to pressurize the irrigation system would be approximately 4" centrifugal pumps capable of delivering 300 gallons per minute at 90 psi. The pumps would be powered with 480-volt, 3 phase, 60 hertz power which would be brought in from near the existing sewer lift station. The pumphouse would be insulated to diminish any noise coming from the pumps and doorway openings would be constructed to face east. Trees, shrubs and other landscape plantings would be utilized to mask the pumphouse from the from the viewshed of homes located west of the project area. These measures will mitigate the potential for the noise from the pumps and irrigation system to impact adjacent residents.

Under **ALTERNATIVE 3** no additional parking would be provided and the public would access the site via the Jordan River Parkway Trail system or the existing pedestrian bridge over the North Jordan Canal located at approximately 8600 South. There would likely be an increase in the number of people parking along 8600 South and Millrace Bend Road near the existing public access point to the project area.

Cost estimates for each of the action alternatives are preliminary and are dependent on a number of factors that cannot be precisely determined at this time. For instance, a significant cost for **ALTERNATIVES 1** and **2** depends on the disposal of excavated materials generated from excavating the new river channel and floodplain. The degree to which materials can be utilized on-site with the construction of berms and related features or sold as a product for off-site use (e.g., sand and gravel), or the degree to which materials will need to be hauled off-site with an associated cost for disposal, will weigh heavily on the ultimate cost of each alternative. Using similar assumptions, a conceptual cost estimate for each alternative is summarized in Table 12.

Table 12 Conceptual Cost Estimate of Alternatives

Alternative	Conceptual Cost
ALTERNATIVE 1	$8.5 million
ALTERNATIVE 2	$5.0 million
ALTERNATIVE 3	$3.1 million

The City of West Jordan has been able to obtain partial funding for planning, design and construction of the proposed project, through various grants and federal funding programs. A more detailed discussion of anticipated funding sources can be found in the Response to Comments found in Appendix 5. It is anticipated the construction of the project would be completed in phases as construction funding becomes available. The Mitigation Commission would enter into a Memorandum of Understanding with

the U.S. Fish and Wildlife Service and the City of West Jordan that identifies how a phased approach would work to ensure that habitat improvement features of the project are implemented along with recreational features of the project.

Once constructed, the project would be managed by the City of West Jordan. The City of West Jordan would finance long-term management costs through its annual budget process. It is not anticipated that any of the action alternatives would result in increased property tax assessments as property tax increases are limited to new growth.

As described in greater detail in the Recreation section, all of the action alternatives would provide additional outdoor recreational opportunities and protected open-space. These amenities would enhance the quality of life for many local residents and are considered a beneficial impact of the project.

Under the **NO ACTION ALTERNATIVE** there would be no socioeconomic impacts, including the beneficial impact of additional outdoor recreational opportunities and protected open space.

MOSQUITOES

Issues considered	● Would the project result in any increase in abundance mosquitoes?

Affected Environment

Currently, on lands owned and managed by the Mitigation Commission, watering is done via flood irrigation on an unscheduled, irregular basis. The Mitigation Commission's 43-acre parcel includes 24.4 irrigable acres and water rights amounting to 5-acre feet per irrigable acre during the irrigation season. Based on site observations made in 2015, approximately 1.3 acres are flooded when the area is irrigated for a 36-hour period. These flooded areas contain adequate water depths for the eggs of floodwater mosquitoes, such as *Aedes vexans,* a widespread pest mosquito, to hatch quickly. As the flooding is done on an irregular basis, effective control of these species is difficult.

Environmental Effects

Under all action alternatives, irrigation of the project area would be done through sprinkler irrigation rather than flood irrigation. Sprinkler irrigation does not create the same breeding habitat for mosquitoes as does flood irrigation. The fishing pond would include small areas of standing water that support vector mosquitoes such as *Culex spp.*, however these areas are expected to be smaller than the current flood irrigated areas and will be predictable and thus more effectively treated. While vector mosquitos are more of a human disease concern, the overall result of the action alternatives should be a decrease in mosquito habitat and mosquitos produced in the project area.

Under the **NO ACTION ALTERNATIVE**, the property would continue to be flood irrigated on an irregular basis providing standing water that supports the development of vector mosquitoes.

TRANSPORTATION

Issues considered	• Would the project result in any impacts on the existing transportation infrastructure with regard to access, congestion and delays?

Affected Environment

Parking for **ALTERNATIVES 1 AND 2** would be located along the south boundary of the Mitigation Commission parcel, as shown in Figure 4 and Figure 7. The parking areas would be accessed from 9000 South at approximately 890 West. At this location, 9000 South is four lanes wide, with a middle turning lane. The average annual daily traffic volume on this segment of 9000 South is 41,470 vehicles per day (2013). The project area could also be accessed on foot or bicycle from the Jordan River Parkway Trail or from the pedestrian access trail located off Millrace Bend Road, located at approximately 8600 South and 940 West in the residential area west of the project. In addition, a connector trail linking the project area to a light-rail (Trax) station at Gardner Village, about one mile north of the northern boundary of the project area, has been funded and is planned for construction.

Environmental Effects

Under **ALTERNATIVES 1 AND 2**, even during peak use of the project area, it is not anticipated that the volume of traffic generated by users of the project area would degrade the level of service of this section of 9000 South. At 200 vehicles per day, representing full utilization of available parking throughout an entire day, this would result in an increase of less than 1% in westbound traffic on 9000 South. It is anticipated that all traffic exiting the project area onto 9000 South would be required to make a right hand turn and that a center turn lane would be provided for eastbound traffic entering the project. Details would be completed during final design.

The number of vehicles parking in the Millrace Bend residential neighborhood area and entering the project area on foot via the pedestrian bridge over the North Jordan Canal is more speculative. The pedestrian bridge over the North Jordan Canal was constructed as part of the Jordan River Parkway Trail construction completed in 2014.

ALTERNATIVE 3 does not include a designated parking area for the project. Park visitors would access the project area from the Jordan River Parkway Trail or the existing pedestrian access point off Millrace Bend Road and 8600 South. As with **ALTERNATIVES 1 AND 2**, it is anticipated that there will be an increase in the amount of visitors parking near the existing public access corridor, but the amount of increased use is speculative. This public access point was opened in 2014 with the opening of the Jordan River Parkway Trail through the project area. To date, there have been no known complaints from nearby residents, and it is anticipated that the impact from increased amount of use will be insignificant.

Under the **NO ACTION ALTERNATIVE** there would be no changes from existing conditions.

VISUAL

Issues considered	• What are the visual impacts of the project from both within the project area and to adjacent property owners?

Affected Environment

When viewed outside of the project area, the site is relatively isolated from the viewshed of the surrounding landscape. Views from 9000 South are blocked by the Rocky Mountain Power substation and from the east by industrial developments. From the west a very few number of the residences can see the project area; most of the viewshed is blocked by the topographic relief. The newly constructed segment of the Jordan River Parkway trail provides the best views of the project area as the trail passes through the western boundary of the site.

Environmental Effects

The project area would remain relatively isolated from the surrounding properties and the viewshed from outside the project area looking in would not be substantially altered. Under **ALTERNATIVE 1** and **ALTERNATIVE 2,** a viewing platform would be constructed on top of a berm approximately 23 feet above existing grade. This would be the tallest structure in the project area and presumably the most visible. Figure 24 shows in yellow the locations from which the top of the 23-foot berm would be visible. As can be seen in Figure 24, the 23-foot berm is substantially only visible within the project area.[7]

Perhaps the biggest change to the viewshed would be the concerted effort to take advantage of the views from within the project area looking outward, as enhanced through design considerations. The viewing platform would be placed at the north end of the project area where visitors would be furthest away from the Rocky Mountain Power substation. From that location visitors would be afforded outstanding views of the central Wasatch Mountains to the east as they rise above the river and riparian area in the foreground. These views would be in stark contrast to the nearby urban and industrial areas. Earthen berms would be strategically located to screen some views while framing or enhancing others. These subtle earth works would be sculpted to appear natural and to enhance the aesthetics of the site. Earthen berms on the west side of the fishing pond would be designed to be low (i.e., less than 6 feet) and undulating to create interest for users of the nearby trail systems. A larger berm on the east side of the fishing pond would be more elevated to help screen high use activity areas in and around the pond from the wildlife habitat restoration area to the east.

Under the **NO ACTION ALTERNATIVE** there would be no change from existing conditions.

[7] The viewshed analysis is described in greater detail at http://desktop.arcgis.com/en/arcmap/10.3/tools/spatial-analyst-toolbox/using-viewshed-and-observer-points-for-visibility.htm.

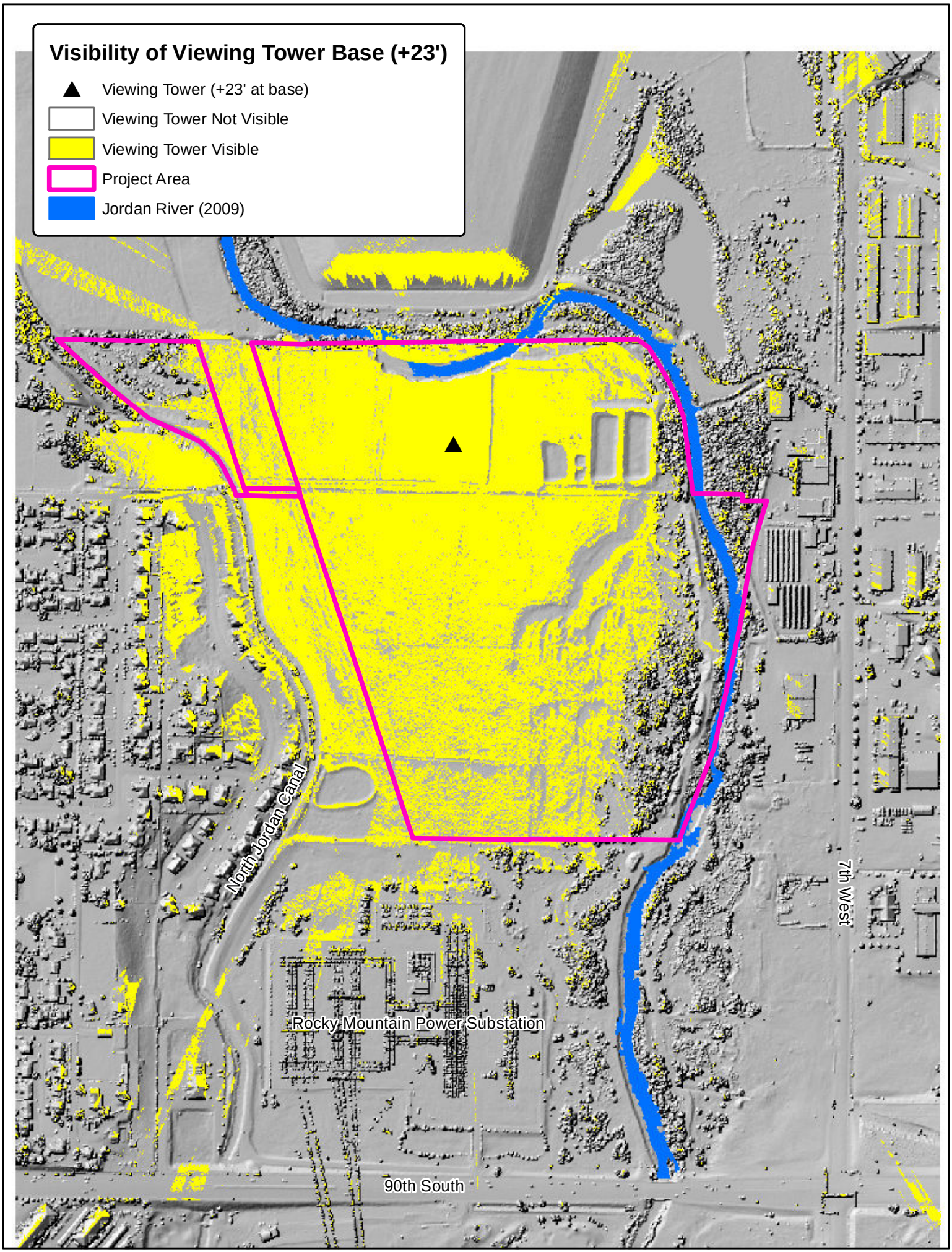


Figure 24 Visual Impact Analysis

CULTURAL

Issues considered	• Would the project impact any resources eligible for listing to the National Register of Historic Places? • Would the transfer of property out of federal ownership jeopardize any listed or eligible resources to the National Register? • Would the project impact any resources culturally or religiously significant to Indian Tribes?

Affected Environment

Section 106 of the National Historic Preservation Act requires all Federal Agencies to identify the impacts their actions would have on cultural and historical resources. In accordance with these responsibilities, an intensive cultural resource survey was completed in 2011 and updated in 2013 for the project area (Polson, N. 2011).

Prior to completing the on-site survey, the Utah State Division of History was consulted to determine if any prior recordings within, or in the vicinity of, the project area had been completed. A segment of the North Jordan Canal just west of the project area had been previously recorded and determined to be eligible for listing to the National Register of Historic Places (NHRP) because of its association with early development of West Jordan (Section 106 Criterion A). This segment of canal was eligible for listing because of its early history as the Gardner Mill Race, built by Archibald Gardner, one of the most prominent early settlers of the West Jordan area, in direct relation to one of his primary contributions to early Utah communities (Section 106 Criterion B). The canal has integrity of location, setting, feeling, and association, and therefore it was determined the North Jordan Canal is eligible for listing in the NRHP.

The on-site survey consisted of a team of archaeologists walking parallel transects across the project area spaced no more than 15 meters apart. The only potentially eligible site identified within the project area was a complex of earthen settling ponds located on the easterly portion of the City of West Jordan parcel, as shown in Figure 25. According to Chris Falco, General Manager of Fur Breeders Agricultural Cooperative (FBAC), the settling ponds were constructed by the FBAC in the company's early years following incorporation [personal communication, June 7, 2011], most likely the early 1940s. Use of these ponds was discontinued about 30 years ago, at which point they were abandoned. It is not clear whether they were used in the production of feed for distribution or in pelt production, but most likely the former. Although fur breeding and the FBAC played an important role in Utah's history, it has been

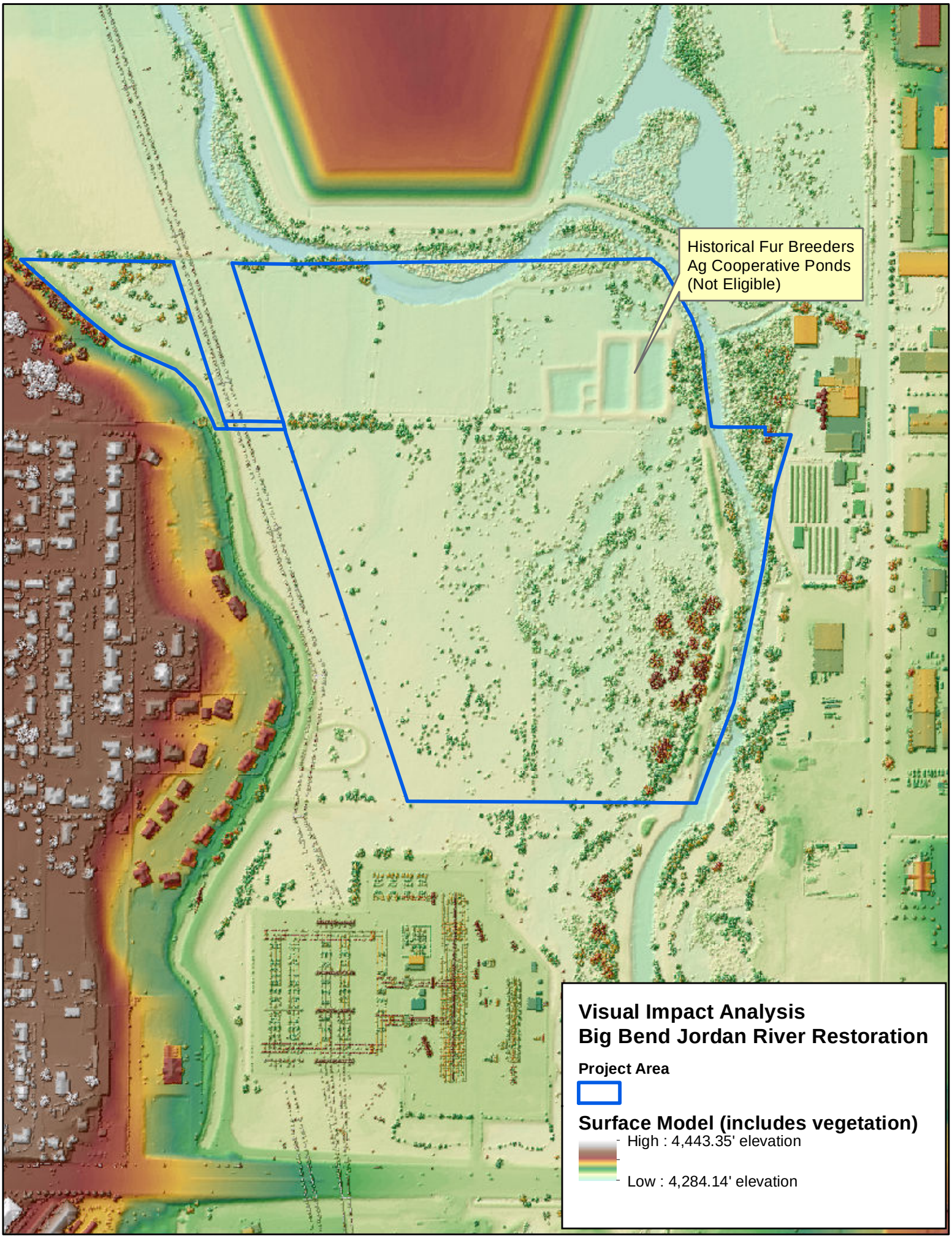


Figure 25 Historic Fur Breeder Ponds

determined that the settling ponds played a peripheral role to this event and they are not eligible for listing in the National Register of Historic Places.

Environmental Effects

Under each of the action alternatives, water would be delivered to the fishing pond from the North Jordan Canal from two diversion points. The first diversion point along the canal is the existing diversion that has been in use since at least 1958. A second existing diversion off of the North Jordan Irrigation Canal is located immediately north of the 8600 South pedestrian bridge. This diversion will also be improved and utilized to feed the fishing pond and the irrigation system. The Mitigation Commission and the City of West Jordan would work closely with the Utah State Historic Preservation Office (SHPO), to identify any potential impacts to the canal resulting from diversion improvements. The Mitigation Commission and the City of West Jordan would enter into a Memorandum of Understanding with SHPO that identifies a plan for mitigation of impacts prior to any ground disturbing activities.

Regulations implementing the National Historic Preservation Action define the transfer of property out of federal ownership as an "adverse effect" unless adequate and legally enforceable restrictions or conditions are included in the documents that legally transfer ownership to ensure long-term preservation of the property's historic significance (36 CFR 800.5(a)(2)(vii)). Under **ALTERNATIVE 1** and **ALTERNATIVE 2** those portions of the 43-acre Mitigation Commission parcel that would become the bank and bed of the Jordan River would be transferred to the State of Utah with the remainder of the parcel transferred to the City of West Jordan. Under **ALTERNATIVE 3** the entire federal parcel would be transferred to the City of West Jordan. The State of Utah has parallel laws to the National Historic Preservation Act providing similar protections to cultural resources located on Utah State owned properties. Therefore, transfer of federal property to the State of Utah would provide legally enforceable restrictions on the property. The transfer of property out of federal ownership to the City of West Jordan would include legally enforceable restrictions in the transfer of ownership documents to ensure long-term preservation of the property's historic significance. However, since no cultural resources have been identified on the Mitigation Commission-owned property, no impacts are anticipated. If cultural resources were discovered during construction, SHPO would be consulted and appropriate measures would be taken to mitigate any impacts.

Under the **NO ACTION ALTERNATIVE** there would be no construction and therefore no potential impacts to any buried archaeological resources not discovered during the archaeological survey. The federal properties would remain in federal ownership and protected under the National Historic Preservation Act.

PALEONTOLOGICAL

Issues considered	• Would the project impact any paleontological resources?

Affected Environment

Paleontological resources, often referred to as fossils, are the remains, traces, or imprints of ancient organisms preserved in or on the Earth's crust that provide information about the history of life on Earth. The Paleontological Resources Preservation Act of March 30, 2009 provides for the management and protection of paleontological resources on federal land. State of Utah Code Title 79 Chapter 3 Section 508 requires state agencies to take into account the effect of their actions on paleontological resources prior to approving or expending State funds on such undertaking.

Environmental Effects

The proposed project would occur in part on federal lands and use funds from different sources, including the Utah Division of Wildlife Resources. Therefore, in compliance with the aforementioned requirements, the Utah Geological Survey was consulted with regard to the presence of known or likely occurring paleontological resources within the project area. Consultation with the Utah Geological Survey determined that the study area does not have any paleontological localities recorded and has low potential for yielding significant fossil localities. Therefore, it is anticipated that none of the alternatives would have any direct or indirect impacts on paleontological resources. A discovery clause will be incorporated into project mitigation to assure that construction crews would alert appropriate officials should any fossils be discovered as a result of construction activities.

Under the **NO ACTION ALTERNATIVE** there would be no impacts.

CLIMATE AND AIR QUALITY

Issues considered	• Would the proposed project have an impact on air quality or contribute to global climate change?

Climate Change

Affected Environment

For more than a century, humans have been adding to the amount of greenhouse gases in the atmosphere, primarily by burning fossil fuels such as coal, natural gas, oil, and gasoline. Added gases are enhancing the natural greenhouse effect of the atmosphere and likely contributing to an increase in global average temperature and related climate changes [EPA 2012a]. In a 2007 report to Utah's Governor [BRAC 2007], a panel of elected officials, agency representatives, scientists, and other key stakeholders advised that it is likely increases in greenhouse gas concentrations are contributing to several climate trends that have been observed in Utah and most of the western United States during the past 50 years. These trends include the following:

- A several-day increase in the frost-free growing season,
- An earlier and warmer spring,

• Earlier flower blooms and tree leaf out for many plant species,
• An earlier spring snowmelt and runoff,
• A greater fraction of spring precipitation falling as rain instead of snow; and,
• Increased average summer temperatures.

Environmental Effects

Over the long term the study area is unlikely to experience any major changes to land use or human activity that would significantly alter regional greenhouse gas emissions. In particular, the study area would be managed for ecological purposes and would be unlikely to experience intense development that would contribute to increased electricity consumption that would most likely be generated from coal fired power plants. Under any of the action alternatives, the project area would restore natural ecological processes, including increased amounts of large woody vegetation and increased soil microbial communities and function, both of which would tend to function as a carbon sink and to increase shading of both water and ground (e.g., by the presence of an upper riparian canopy), reducing surface and water temperatures in the vicinity of the canopy. **ALTERNATIVE 1** would provide the highest level of restoration, but, at this scale, effects on climate change would be similar for each of the action alternatives. Under the **NO ACTION ALTERNATIVE** there would be no changes from existing conditions.

Air Quality

Affected Environment

Utah's air quality standards are based on Federal National Ambient Air Quality Standards (NAAQS) established through the Federal Clean Air Act of 1969, and are monitored and enforced by the Utah Division of Air Quality. In 1990, the Clean Air Act was amended to require that any federally funded project must not cause or contribute to any violation of a NAAQS. A conformity determination is required for each pollutant, where the total of direct and indirect emissions caused by a federal action in a nonattainment area exceeds United States Environmental Protection Agency (EPA) *de minimis* threshold levels (tons/year).[8]

Areas that are not in compliance with NAAQS are referred to as nonattainment areas. Areas that were once designated as nonattainment and subsequently demonstrated to the EPA that they will attain and maintain a particular standard for a period of 10 years are referred to as maintenance areas. EPA must approve the demonstration. (https://www3.epa.gov/airquality/greenbook/ancl.html)

Salt Lake County is currently designated as follows:

Nonattainment for:

- Sulfur dioxide (SO2) since 1992 (Re-designation to Maintenance is pending)
- Particulate matter of 10 micrometers or less (PM10) since 1992 (Re-designation to Maintenance is pending)

[8] The conformity determination ensures that the actions taken by federal agencies do not interfere with a state's plans to attain and maintain national standards for air quality.

- Fine particulate matter of 2.5 micrometers or less (PM2.5) since 2009

Maintenance for:
- Carbon monoxide (CO) since 1999
- Ozone (O3) since 1999

Attainment/Unclassified for:
- Nitrogen dioxide (NO2)
- Lead (Pb)

Environmental Effects
Since use of the project area would be limited to non-motorized uses, no long-term impacts on air quality are anticipated. Potential impacts to air quality are limited to construction-related activities and are short-term.

Temporary impacts include emissions exhaust from construction equipment, fugitive dust generated by a variety of construction activities, and exhaust from worker trips to and from the construction site. Estimated emissions of each pollutant were calculated using the following formula:

> emissions = (daily hours of operation) x (emission factor for equipment type[9]) x (total project days of operation per type of equipment).

Table 13 provides a Summary of estimated emissions resulting from the project. Estimated emissions are significantly below the Federal *de minimis* threshold levels established by the EPA for conformity analyses shown in Table 13. Therefore, a conformity determination is not required for all emission types and no short- or long-term impacts on air quality are anticipated.

Table 13 Summary of Estimate Emissions From Construction

			Emissions				
Equipment	**Usage**		**Pollutant**	**EF (lb/hr)**	**lb/yr**	**tons/yr**	
Excavators	No. of Units	2	Nox	0.830	747	0.37	
	days (ea)	50	CO	0.529	476	0.24	
	hr/ day (ea)	10	ROG	0.114	103	0.05	
	utilization rate	90 %	Sox	0.001	1	0.00	

[9] http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/off-road-mobile-source-emission-factors

			Emissions				
	hr/year (total)	900	PM	0.043	39	0.02	
Dumpers	No. of Units	4	Nox	0.058	105	0.05	
	days (ea)	50	CO	0.031	57	0.03	
	hr/ day (ea)	10	ROG	0.009	17	0.01	
	utilization rate	90 %	Sox	0.000	0	0.00	
	hr/year (total)	1800	PM	0.002	4	0.00	
Off-Highway Trucks	No. of Units	6	Nox	1.668	3002	1.50	
	days (ea)	50	CO	0.615	1107	0.55	
	hr/ day (ea)	10	ROG	0.203	366	0.18	
	utilization rate	25 %	Sox	0.0 03	5	0.00	
	hr/year (total)	750	PM	0.058	104	0.05	
Other Construction Equipment	No. of Units	1	Nox	0.717	1290	0.65	
	days (ea)	50	CO	0.370	666	0.33	
	hr/ day (ea)	10	ROG	0.082	148	0.07	
	utilization rate	50 %	Sox	0.0 01	2	0.00	
	hr/year (total)	250	PM	0.0 30	53	0.03	

			Emissions				
Loader	No. of Units	2	Nox	0.862	1552	0.78	
	days (ea)	50	CO	0.468	843	0.42	
	hr/ day (ea)	10	ROG	0.112	202	0.10	
	utilization rate	50 %	Sox	0.0 01	2	0.00	
	hr/year (total)	50 0	PM	0.046	83	0.04	
Dozer	No. of Units	2	Nox	2.38 7	1909	0.95	
	days (ea)	50	CO	1.106	885	0.44	
	hr/ day (ea)	10	ROG	0.285	228	0.11	
	utilization rate	80 %	Sox	0.002	2	0.00	
	hr/year (total)	800	PM	0.099	79	0.04	
							De Minimis Threshold
Total Emissions			Nox		8605	**4.30**	**100**
			CO		4032	**2.02**	**100**
			ROG		1063	**0.53**	**100**
			Sox		13	**0.01**	**100**
			PM		362	**0.18**	**100**

Generation of fugitive dust could be expected in the vicinity of project construction areas as a result of earth excavation, vegetation removal, equipment operation, and traffic activity. Fugitive dust emissions will vary depending on the level of activity, specific construction techniques, soil characteristics, and weather conditions. Fugitive dust is composed of relatively large particles that settle out quickly, thus localizing the effect to air quality. Proper construction techniques, such as utilizing water, mulching, or applying surfactants on areas with high fugitive dust potential, will minimize dust emissions. The constructor will be required to contact the Utah Division of Air Quality and obtain any needed emissions

permitting for construction and will implement best management practices to minimize emissions as practicable. Under the **NO ACTION ALTERNATIVE** there would be no changes from existing conditions.

CHAPTER 4
CONSULTATION AND COORDINATION

One of the primary purposes of NEPA is for Federal Agencies to inform and involve the public and other Federal, State, and local entities of the likely environmental impacts of their proposed actions. A Draft Environmental Assessment was sent out to approximately 105 adjacent property owners, businesses and governmental agencies in March 2018 requesting review and comment on the EA. Notice of the availability of the EA was posted on the property and made available at the Salt Lake County Public Library in West Jordan City. A summary of the EA distribution list is provided in Table 14.

Table 14 Draft EA Distribution List

Local	**Federal**
West Jordan City	U.S. Fish and Wildlife Service
Sandy City Corporation	U.S. Department of the Interior
Salt Lake County	U.S. National Park Service
Riverton City Corporation	U.S. Army Corps of Engineers
State	**Business**
Utah Division of Wildlife Resource	North Jordan Irrigation
Utah Forestry, Fire and State Lands	Draper Irrigation Company
Utah Division of Water Rights	Rocky Mountain Power
Utah Department of Environmental Quality, Division of Water Quality	Fur Breeders Agricultural Cooperative
Utah State Historical Preservation Office	Gardner Heritage Farm, LLC
Utah Geological Survey	Ridgeline Capital, L.C.
Utah State Historical Preservation Office	Westlake Angus Ranch, LLC
Utah Public Lands Coordination Office	River Restoration Inc.
Other Agency	**Conservation**
Jordan Valley Water Conservancy District	Tracy Aviary
Jordan River Commission	Salt Lake Fish and Game
	Audubon in Utah
Adjacent Water Right Owners	Friends of Great Salt Lake
20 adjacent water right owners	Great Salt Lake Audubon
Adjacent Property Owners	
75 adjacent property owners	

Eighteen (18) comment letters were received in response to the Draft EA. Appendix 5 provides a summary of the comments received on the Draft EA along with a response to those comments. Appendix 6 includes copies of the individual comment letters. On May 24, 2018, the Mitigation Commission, the City of West Jordan and the U.S. Fish and Wildlife Service met at West Jordan City Hall with individuals who commented on the Draft EA and requested a meeting in which they could ask questions and provide comments. The Agenda for the May 24 meeting is included as Appendix 7.

Prior to issuing the Draft EA, a Scoping Notice describing the proposed project was sent to approximately 225 individuals and agencies in November 2013. The purpose of the Scoping Notice was to solicit input from interested parties regarding issues that should be addressed in the EA and to provide an opportunity to suggest alternatives that would address the underlying need for the project. The Scoping Notice is included as Appendix 3.

CHAPTER 5
MITIGATION MEASURES AND BEST MANAGEMENT PRACTICES

The following mitigation measures and best management practices will be implemented as part of the project.

- The pumphouse would be insulated to diminish any noise coming from the pumps and doorway openings would be constructed to face east. Trees, shrubs and other landscape plantings would be utilized to mask the pumphouse from the from the viewshed of homes located west of the project area. These measures will mitigate the potential for the noise from the pumps and irrigation system to impact adjacent residents.
- Equipment shall be cleaned to remove noxious weeds/seeds and petroleum products prior to moving on site.
- Fueling machinery shall occur off site or in a confined, designated area to prevent spillage into waterways and wetlands.
- Proper construction techniques, such as utilizing water, mulching, or applying surfactants on areas with high fugitive dust potential, will minimize dust emissions. The constructor will be required to contact the Utah Division of Air Quality and obtain any needed emissions permitting for construction and will implement best management practices to minimize emissions as practicable.
- Excavated soils shall be sorted into mineral soils and top soils. When backfilling a disturbed site, top soils shall be placed on top to provide a seed bed for native plants.
- Excavated material and construction debris may not be wasted in any stream channel or placed in flowing waters or adjacent wetlands; this will include material such as grease, oil, joint coating, or any other possible pollutants. Excess soil material not intentionally placed into a channel must be wasted at an upland site away from any channel or removed from the site.
- Use boulders, root-wads, and other natural materials from local sources to stabilize streambanks and in the active stream channel rather than using concrete, asphalt, steel, or other human-made materials.
- Use erosion-control environmental commitments where project construction will disturb soil. These areas are expected to be along channel-construction and -modification areas, construction access roads, floodplain grading areas, setback berms, and stockpile areas. The procedures will be designed to stabilize soils, restore vegetation to a desired plant community, and to prevent infestation by noxious plants and to avoid erosion.
- Care shall be taken to minimize sedimentation resulting from bank or stream bed disturbance.
- Remove and stockpile topsoil to a depth of 1 foot (or less if topsoil layer is less than 1 foot deep) for site restoration.
- Secure additional topsoil of suitable quality for revegetating disturbed sites from areas that will have minimal impacts on important fish and wildlife habitats.

- Implement the weed-control program in the vegetation management plan to control noxious weeds resulting from project implementation.
- Reclaim disturbed areas to desired riparian, wetland or upland plant communities as soon as possible after construction. Require the contractors to use specified plant materials and reclamation techniques.
- Select plant species for rehabilitating disturbed areas and erosion control based on soil type, root stabilizing characteristics, consistency with composition of contiguous native plant communities, ability to compete with undesirable vegetation, and compatibility with restoration goals.
- Schedule all vegetation removal, trimming, and grading of vegetated areas outside of the peak bird breeding season to the maximum extent practicable. Consult with Utah Division of Wildlife Resources and U.S. Fish and Wildlife Service to identify peak breeding months for local bird species.

CHAPTER 6

REFERENCES

Anderson et al. (1994). *Hydrogeology of Recharge Areas And Water Quality Of The Principal Aquifers Along The Wasatch Front And* Adjacent *Areas, Utah.* (Water-Resources Investigations Report 93-4221 1994.). U.S. Geological Survey. doi:https://pubs.usgs.gov/wri/1993/4221/report.pdf

[River Restoration, Inc. 2015] *Big Bend Habitat Restoration Project, Preliminary Design Alternatives Report*. (2015). Carbondale, CO: River Restoration Inc.

Climate Change Science: Future of Climate Change. (2017). U.S. Environmental Protection Agency. doi:https://19january2017snapshot.epa.gov/climate-change-science/future-climate-change_.html

Draft Integrated Report, Chapter 3: Rivers and Stream Assessments (60 p.). (2016). Salt Lake City, Utah: Utah Division of Water Quality.

Farr, C. (2016). *Bird Monitoring At Big Bend Restoration Area*. Salt Lake City, Utah: Tracy Aviary.

Hooton, L. W., Jr. (2012). *New Utah Lake Pumping Plant Is Under Construction*. doi:http://www.slcdocs.com/utilities/NewsEvents/news2012/news3262012.htm

Jordan River Basin Planning For the Future. (2010). Utah Division of Water Resources. doi:https://water.utah.gov/Planning/SWP/Jord_riv/Jordan%20River%20Basin%20Final0610t.pdf

Jordan River Comprehensive Management Plan, 2016. . (2016). Utah Division of Forestry, Fire and State Lands. doi:https://ffsl.utah.gov/images/statelands/jordanriver/JRCMP_FINAL_Combined_20170106_Compressed.pdf

Parish, J. R., Howe, F. P., & Norvell, R. E. (2002). *Utah Partners in Flight avian conservation strategy Version 2.0* (UDWR Publication Number 02-27). Salt Lake City, Utah: Utah Partners in Flight Program, Utah Division of Wildlife Resources.

Phase I Environmental Site Assessment West Jordan River Trail Project. (2013). Prepared For: Environmental Planning Group, LLC by URS.

Polson, N. (2011). *The West Jordan 206 Aquatic Ecosystem Restoration Project, Continuing Authorities Program (Cultural Resource Survey Report)*. U.S. Army Corps of Engineers.

Salt Lake County Water Quality Annual Report. (2016). Salt Lake County Watershed Planning and Restoration Program.

doi:https://slco.org/uploadedFiles/depot/publicWorks/fwatershed/2016%20SLCo%20Water%20Quality%20Report.pdf

Salt Lake Countywide Water Quality Stewardship Plan. (2009). Salt Lake County

Section 206 Aquatic Ecosystem Restoration Draft Engineering Appendix (101 p). (2003). West Jordan, Utah: US Army Corps of Engineers.

[BIO-WEST, 2015] Water Rights and Water Needs Investigation for the Big Bend Habitat Restoration Project in the City of West Jordan. (2015). Logan, Utah: BIO-WEST, Inc.

(Memo to City of West Jordan, Big Bend Restoration Project Stakeholders)

APPENDIX, FIGURES, TABLES

APPENDIX

FIGURES

TABLES