

- 1.6.2. One field trip was conducted with representatives of the Reclamation engineering division, Corps of Engineers, and the Service on September 14, 2007 at the Project site to discuss the mitigation plan.

The following are a list of issues that have been identified:

- 1.6.2.1. Enhancement features of the Project for the Rio Grande Silvery Minnow proposed in a mitigation plan required by the Corps of Engineers.
- 1.6.2.2. Removal of Cottonwood and other native tree species.
- 1.6.2.3. Cultural Resource features of the LFCC.
- 1.6.2.4. Dust and noise effects to private land owners from construction activities to adjacent private land owner horse breeding operations.
- 1.6.2.5. Riparian zones within the LFCC that have all three indicators of wetlands, including hydric soils, hydrophytic vegetation, and wetland hydrology.
- 1.6.2.6. The affect on water resources as a result of realigning the LFCC and levee.

Chapter 2 ALTERNATIVES

2.1. Introduction

This chapter will be devoted to describing and comparing the alternatives including a summary of environmental consequences. The chapter has four sections as follows:

- 2.1.1. Description of Alternatives
- 2.1.2. Process Used to Consider, Select, and Eliminate Alternatives
- 2.1.3. Discussion of Proposed Alternative
- 2.1.4. Comparison of Alternatives, their Predicted Effects and Project Objectives (see page 21).

2.2. Description of Alternatives

2.2.1. Description of the No Action Alternative

If this action were selected, the priority site would continue to erode the west bank and eventually damage the Levee and possibly allow an avulsion into the LFCC.

2.2.2. Description of the Proposed Alternative

Realign the LFCC and the Levee to the west. See the discussion of the proposed alternative at section 2.4.

2.3. Process Used to Consider, Select, and Eliminate Alternatives

During the alternative selection process, four basic alternatives were analyzed, Levee and LFCC setback, Riprap Revetment, River Realignment, and no action. However, for the following reasons, the Levee and LFCC setback was selected over the other alternatives which could not provide the same benefits even though the overall cost was much the same:

1. A longer life span of 30 or more years.
2. No use of riprap along the Rio Grande.
3. The Project would not change the behavior of the river.
4. Low maintenance.
5. Allow the river to meander naturally.
6. In the long run, create habitat for the RGSM and for the Southwestern Willow Flycatcher (SWFC).

2.4. Discussion of Proposed Alternative

Proposed sequence of actions at the Project would include the following, with modification of actions depending upon construction operation conditions:

- Access to the project site
- Removal of Vegetation and Topsoil
- LFCC Fish Barrier
- Existing LFCC mowing & Riprap Salvage
- Construction Operations
- Filling the Existing LFCC
- Mitigation Plan Including Vegetation Reseeding
- Post construction activities

Access to the Project Site

Throughout the construction activities, routes of entry to the project site may include the San Lorenzo Arroyo road, the LFCC O&M roads, or the road through San Acacia. Prior to construction, warning signs would be placed along the LFCC operation and maintenance roads instructing the general public not to enter due to heavy equipment and construction activities.

Removal of Vegetation and Topsoil

All vegetation (including cottonwood trees, other native vegetation, and non-native salt cedars) and topsoil would be removed within the proposed new alignment of the LFCC and levee. However, a minimum of topsoil would be removed from the stockpile and staging areas and replaced at the end of the Project. In addition, vegetation would be removed as needed (some may not be removed) from the proposed staging and stockpile sites. Some mulching of non-native vegetation would occur and a majority of the cottonwood trees removed would be utilized as part of the mitigation plan (see mitigation plan on page 10).

LFCC Fish Barrier

The Lemitar radial gate structure located at station 1626+00 in the LFCC would be utilized as a fish barrier. The radial gates would be closed during the entire duration of the construction operations. Reclamation has previously surveyed the reach for the potential presence of RGSM below the proposed construction area to the radial gates.

Existing LFCC Riprap Salvage

Salvaging of riprap would consist of removing existing riprap from the slopes of the existing LFCC during the construction period. The riprap would be stockpiled for later use when the rock would be placed on the slopes of the newly constructed LFCC.

Additional riprap salvage would occur when all the riprap grade control structures would be removed downstream to the Lemitar radial gate. The riprap would also be stockpiled.

Construction Operations

The proposed alternative at this site involves realigning the existing LFCC from A to B in Figure 3, a total of 5,500 feet. The new LFCC alignment would be constructed to the west of the existing LFCC alignment. The new LFCC alignment would be approximately 6,200 feet in length and would accommodate space for two permanent riprap storage areas (see #6 & 7 of Figure 3). A typical cross section of the Project is shown in Figure 4 on page 8.

The realigned LFCC would be constructed for a 2,000 cfs flow. The bottom width of the LFCC would be $30\pm$ feet and would have 2:1 side slopes. New 6-inch nominal riprap protection would be provided on the LFCC slopes up to a height of 6.5 feet above the bottom of the LFCC channel at a minimum thickness of 11 inches. This riprap height provides a $1\pm$ foot freeboard at a flow of 500 cfs. Salvaged 6-inch riprap from the abandoned section of the LFCC may be used to protect the realigned LFCC slopes above the new riprap to provide erosion control from rainfall events. Salvaged or new 6-inch riprap may also be used to stabilize the toe of the new LFCC location during excavation.

Access roads for O&M would be located on both sides of the LFCC and would be a minimum of 24.0 feet wide at the top. The top surface would be a compacted road base material having a minimum thickness of 6 inches. During construction, if the original ground surface is found to be undesirable for the O&M access roads the soil may be reconditioned or removed and replaced with suitable fill. Where this occurs the material would be placed in lifts and compacted by construction equipment prior to the placement of the road base.

A levee would be constructed to the east of the east O&M access road along the entire length of the new levee setback. The levee would be offset from the O&M access road to allow the placement of a ditch to collect runoff from rainfall events. The levee would be constructed from material excavated from the new alignment of the LFCC. It is estimated that the levee height would range from 10-20 feet high as measured from the original ground surface. The spoil embankment would be constructed with a top width of 24 feet, 2:1 or 3:1 (H:V) side slopes on the west depending upon construction conditions, and 3:1 (H:V) side slopes on the east.

Additional features such as drainage ditches, corrugated metal pipe (CMP) drainage pipes, gabion basket protection at drainage outlets, and spoil embankment access ramps would be placed as needed along the levee setback alignment. All access ramps used temporarily for construction would be removed at the completion of the project.

Drainage ditches would be constructed on both O&M access roads away from the LFCC. The ditches would be sloped to the CMP drainage pipes and would be constructed to fit within the areas designated for disturbance. The average depth of both drainage ditches would range from 2 to 3 feet depending on field conditions. The CMP drainage pipes would extend from the drainage ditch into the LFCC channel. Gabion mattresses would be filled with 6-inch nominal riprap where the CMP pipe daylighted into the LFCC channel for erosion control.

Figure 3, RM 111 priority site area

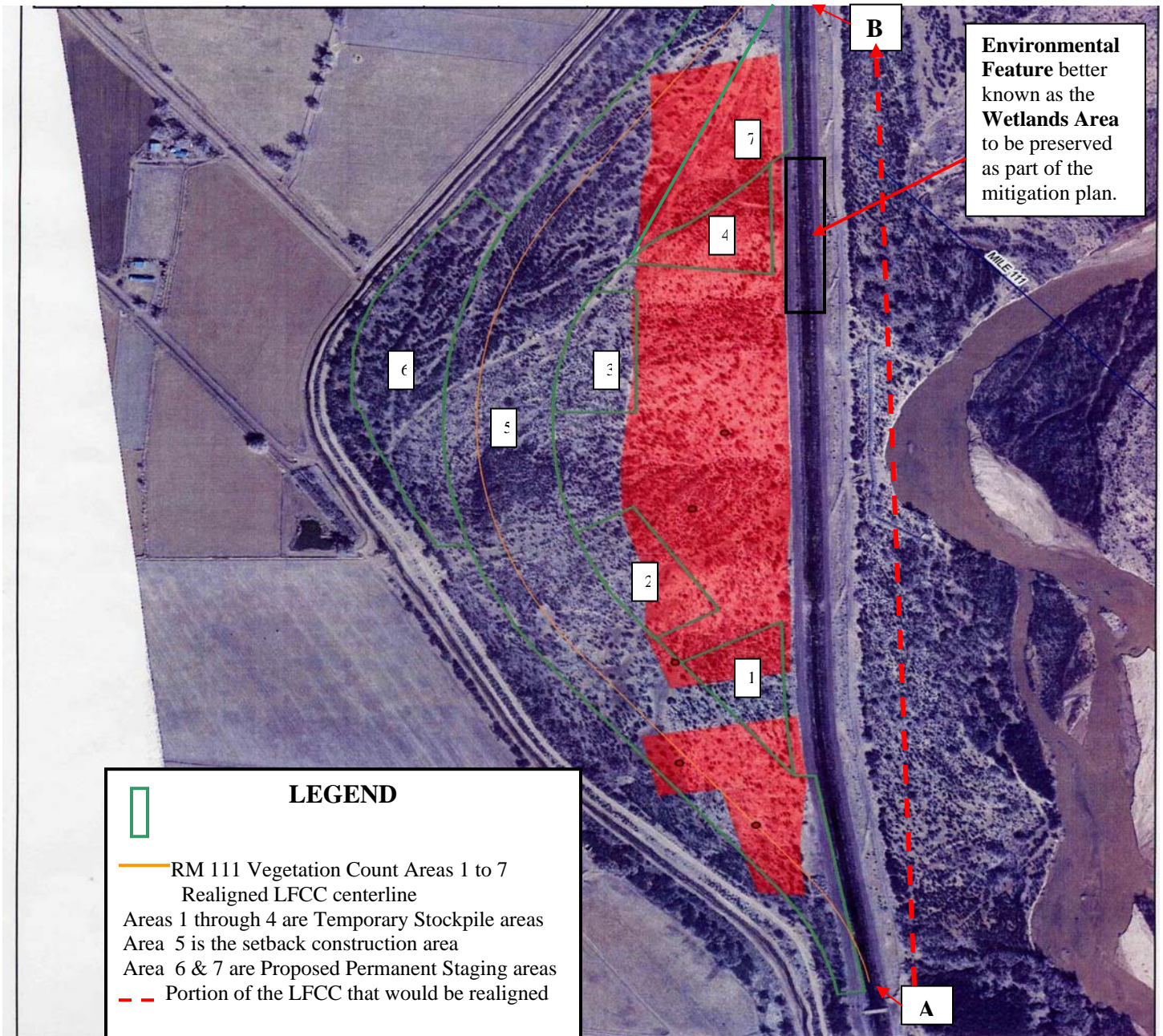
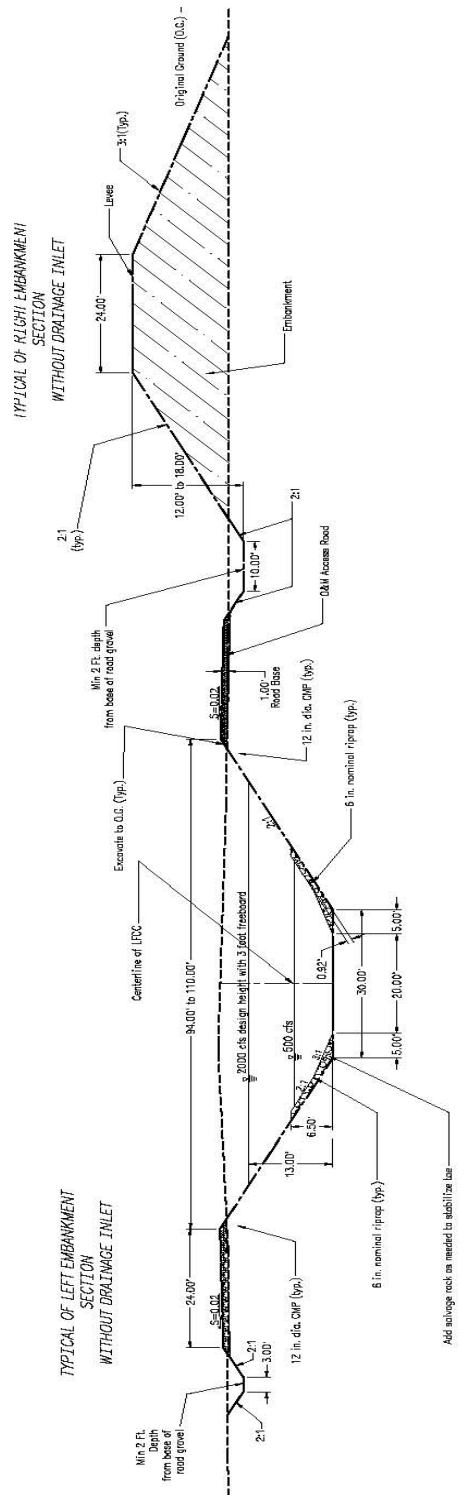


Figure 4. Typical RM 111 levee setback project cross section



To facilitate the crossing of the existing LFCC during construction, a maximum of three temporary LFCC crossings may be installed. Construction conditions would determine the number of these crossings constructed on the realigned LFCC to allow construction equipment access to both sides of the channel.

All crossings would have a CMP (36-inch minimum diameter) to allow water to flow in the existing and realigned LFCC. A rock embankment may be located upstream of the crossings and would pond the water in the channel to a depth required to allow for pumping activities. Riprap may be placed on the upstream and downstream exposed slopes for erosion control during construction activities. At the conclusion of the project the riprap would be removed.

Waste material from the Red Canyon Mine would be imported and spread to provide pads for the temporary stockpile areas, the permanent staging areas, and haul roads. The total area would not exceed the acreage designated in Table 1. At the end of construction the waste material from the temporary stockpile areas and haul roads would be removed to the extent possible and placed on the realigned LFCC side slopes or placed on the east side slopes of the new levee until all waste material is utilized. The disturbed areas will then be rehabilitated by loosening the compacted soil and reseeded.

| Table 1. Construction Areas | |
|---|-----------|
| Temporary Stockpile Areas: | 15 acres |
| Permanent Staging Areas: | 18 acres |
| Temporary Haul Routes: | 0.5 acres |
| Maximum Disturbed Acreage: | 150 acres |
| Maximum Acreage that may be reseeded: | 65 acres |
| Maximum Extent of Potential Impacted Acreage: | 180 acres |

Filling the Existing LFCC

Once the new LFCC alignment on the Project has been completed, a berm separating the new alignment from the old would be removed. A new berm would be placed across the existing LFCC and flows would be directed into the new channel. Filling of the old LFCC would occur starting at the upstream berm and proceed in a downstream direction. Fill material would come from the old levee and moved using construction equipment from the bank outward in a downstream direction. Any construction crossings constructed during the Project operations would be removed with the possibility that one crossing may be temporarily left in place or relocated further downstream to allow for delivery of water for construction activities. Backfill placed in the abandoned LFCC would vary in height and typically have finished grades no greater than 50:1.

During the backfill operations, approximately 1000 feet of the existing LFCC (Environmental feature, Figure 3) would only be filled in according to the mitigation plan.

Mitigation Plan Including Vegetation Re-seeding (see Figures 5 and 6)

A majority of cottonwood trees, other native vegetation, and non-native salt cedars would be removed from the proposed new alignment, stockpile, and staging areas. In addition, approximately 4 to 6 acres below the ordinary high water mark of riparian wetland area in the LFCC would be removed.

The following is a list of opportunities to mitigate the loss of native vegetation and riparian wetlands that would be implemented during and after the conclusion of the project:

1. Some Cottonwood trees removed (including trees with root wads) would be utilized under the direction of the Albuquerque Area Office fishery biologist for Silvery Minnow habitat near the project site.

Approximately five to ten root wads from removed Cottonwood Trees may be utilized along the bank of RM-111 priority site. These trees would be tagged and monitored as they self launch into the river to see where they go. Similar studies have shown that this method may benefit the RGSM (Dudley, 2007).

Stock piling some root wads from Cottonwood Trees could be utilized on other river maintenance and restoration projects in the future.

2. Some of the Cottonwood trees removed may be utilized as snags near the project site for wildlife habitat such as raptor perches etc. The current location of the old LFCC that would be filled in could be used for placement of some removed Cottonwood Trees as snags for wildlife perches.
3. Some trees cut down may be used randomly as brush piles for wildlife habitat on the Project site other than in the Rio Grande.

Woody debris piles would also be placed at point bars and islands of the Rio Grande in the vicinity of the project for the RGSM to be utilized to improve minnow habitat. A fishery biologist would be consulted for appropriate locations for the use of brush piles and Cottonwood snags. However, placement of the woody piles and root wades would only be accomplished in dry conditions.

4. A maximum of up to 65 acres of temporary stockpile areas, temporary haul roads, and permanent staging areas would be reseeded at the end of the project. At that time, a seed mix of native grasses would be formulated prior to application to areas that would require reseeded. Depending upon availability, the species may consist of blue grama (*Bouteloua gracilis*), sideoats grama (*Bouteloua curtipendula*), Indian ricegrass (*Achnatherum hymenoides*), streambank wheatgrass (*Elymus lanceolatus*), galleta grass (*Pleuraphis jamesii*), alkali sacaton (*Sporobolus airoides*), sheep fescue (*Festuca ovina*), and little bluestem (*Schizachyrium scoparium*).

- 6200 feet of new potential riparian wetlands would be created to replace 5500 feet of existing riparian wetlands along the LFCC. However, 1000 feet of the existing LFCC would be preserved with already existing Cottonwood Tree saplings, Coyote Willow, and other native riparian vegetation (see location of the Environmental Feature in Figure 5).

By providing an opportunity for the river to migrate to the west, it is expected that approximately up to 83 acres of potential new riparian habitat may be created as a result of the Project. According to Geomorphic investigations (Massong, Bauer, Nemeth, 2000; Massong, 2005) it may take approximately 20 to 30 years for this to be created naturally.

FIGURE 5

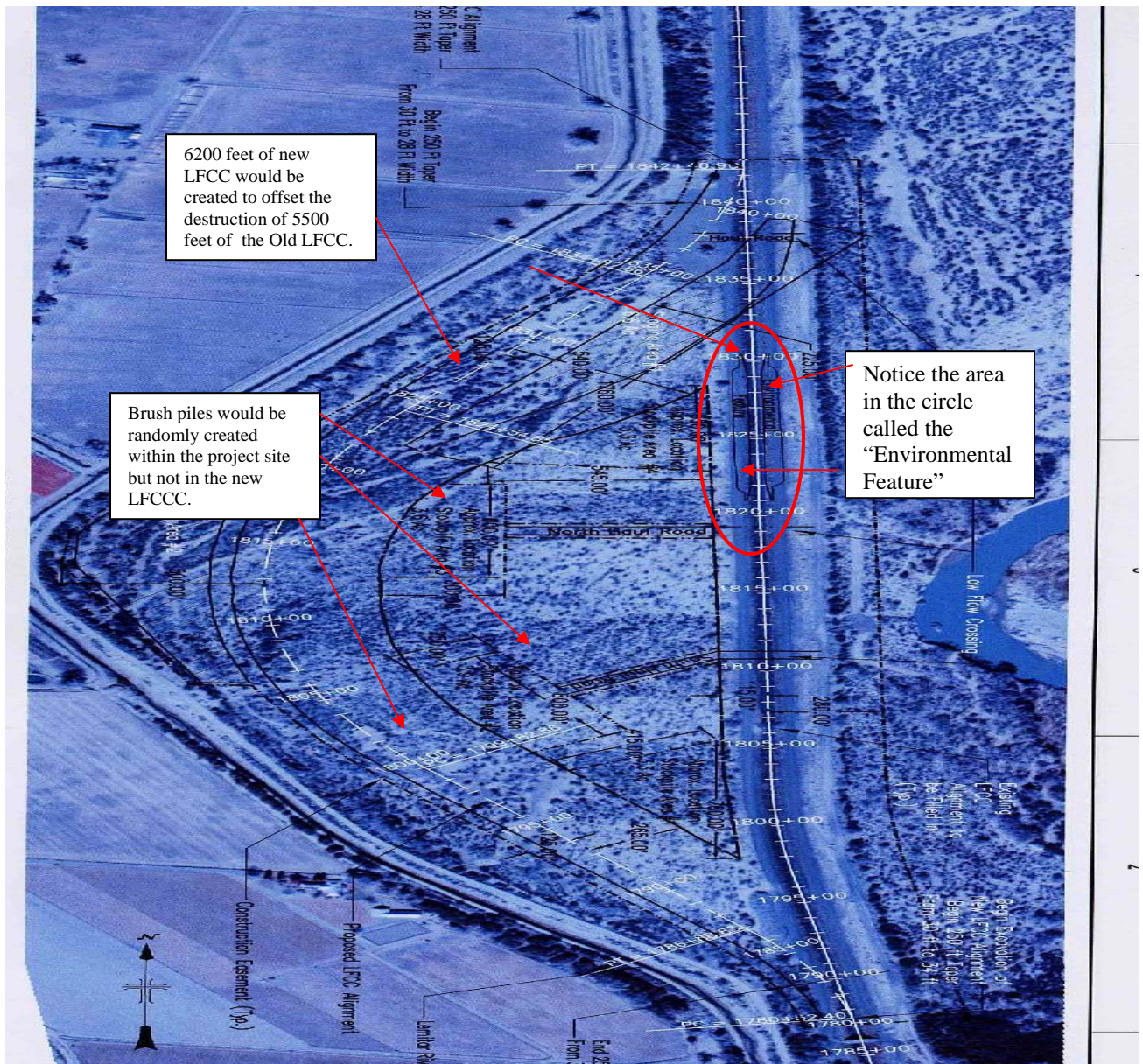
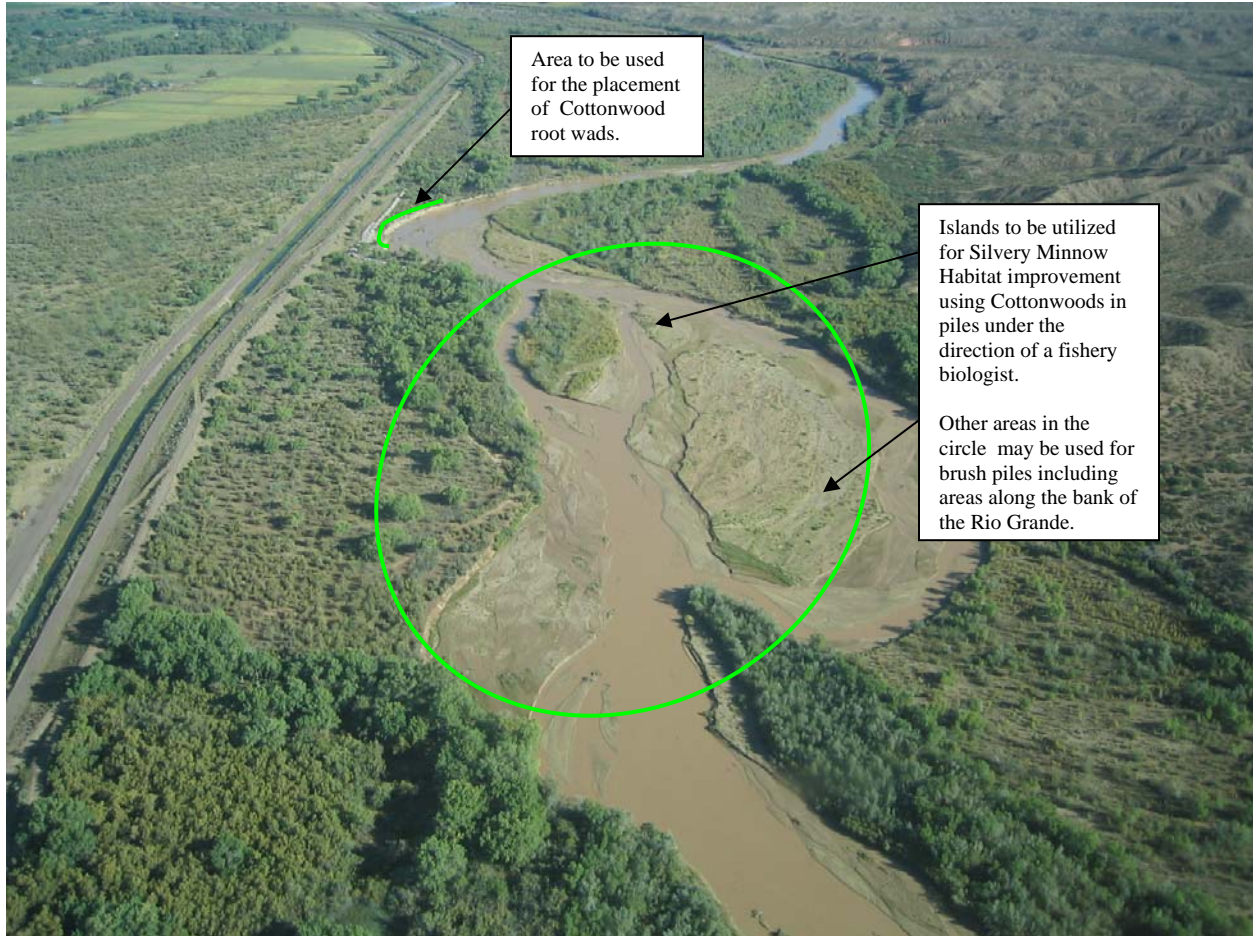


FIGURE 6



Post Construction Activities

- Monitor the mitigation plan for 5 years in accordance with the commitments in the 404 permit.
- Reseed vegetation that may have failed to survive. Establishment of reseeded vegetation should survive so that the success rate would provide for remediation equal to or better than the original and surrounding vegetation composition for native species. Therefore, replanting vegetation would depend upon the survival rate of the vegetation as compared to the areas immediately surrounding the areas replanted.
- On going maintenance activities after construction would be performed on roads, side slopes of the LFCC, levee, and would include such activities as mowing vegetation, and erosion control.

2.5. Comparison of Alternatives their Predict Effects and Project Objectives

| Reasonable Alternatives | Affected Resources | Predicted Achievement of objectives in section 1.4 to fulfill the need. | Predicted Impacts of Alternatives (See Issues section 1.6) |
|---|--|--|--|
| No Action A | Vegetation | None | None |
| | Wetlands | None | None |
| | Water Resources | None | Potential avulsion of the river channel into the LFCC |
| | Wildlife including Threatened and Endangered Species | None | None |
| | Noxious Weeds | None | None |
| | Socioeconomic | None | None |
| | Environmental Justice | None | None |
| | Indian Trust Assets | None | None |
| | Cultural Resources | None | None |
| Air Quality and Noise | None | None | |
| Proposed Alternative For River Mile 111 | Affected Resources | Predicted Achievement of objectives in section 1.4 to fulfill the need. | Predicted Impacts of Alternatives (See Issues section 1.6) |
| | Vegetation | Yes | Removal of native vegetation including Cottonwood trees and willows |
| | Wetlands | Yes | Wetlands in existing LFCC would be destroyed. New wetlands would be created to compensate. |
| | Water Resources | Yes | Potential impact to the LFCC Delivery of water |
| | Wildlife including Threatened and Endangered Species | Yes | Positive impact to create nursery habitat for the silvery minnow and habitat for other wildlife species. |
| | Noxious Weeds | Yes | Need to be controlled |
| | Environmental Justice | N/A | None |
| | Indian Trust Assets | N/A | None |
| | Cultural Resources | N/A | None |
| | Air Quality and Noise | Yes | During construction only |

Chapter 3 AFFECTED ENVIRONMENT

3.1 Introduction

The relevant resources described in this chapter are those that would be affected by the alternatives if they were implemented. Only resources that may be affected or impacted are described and only to the extent necessary to understand anticipated impacts. The effects (impacts or issues) to these resources created by the alternatives if implemented are discussed in Chapter 4.