1.5.6. Cochiti Priority Sites Biological Assessment dated April 2007, prepared by the Albuquerque Area Office Environment Division Staff.

1.6. Issues, Public Scoping

Public scoping, for the purpose of defining the issues regarding the implementation of the proposed action, was limited to the following:

1.6.1. Two technical meetings were held with the Pueblo to discuss various alternatives. One of the meetings was with the Service and the Corps of Engineers to discuss CWA issues and ESA issues.
1.6.2. Three informal field trips with the Pueblo's environmental manager to discuss the scope of work and to understand any issues the pueblo might have regarding the proposed action.
1.6.3. One government to government consultation with the Pueblo's governor to understand any issues the Pueblo may have regarding the proposed action.

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

1.6.3.1. Effects of the project on the Silvery Minnow, Bald Eagle, and the Southwestern Willow Flycatcher.
1.6.3.2. The potential introduction of State-listed noxious weeds.
1.6.3.3. Erosion-related water quality impacts during construction and after construction.
1.6.3.4. Avoidance of cultural and archaeological resources, as well as potential sacred sites in the project area.
1.6.3.5. Avoidance of Indian Trust Assets (ITAs)
1.6.3.6. The potential for any adverse effects to low-income and minority populations.
1.6.3.7. Air quality and noise from construction activities
1.6.3.8. Native vegetation

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. Summary Comparison of the Activities, the Predicted Achievement of the Project Objectives, and the Predicted Environmental Effects of All Alternatives (see page 21).

2.2. Description of Alternatives

2.2.1. Description of the No Action Alternative

If this action were selected, the priority sites would continue to degrade their respective banks. At River Mile 231.3, the river may continue to migrate west and damage the road and agricultural fields. Sinkholes that exist may continue to become more severe and contribute to the erosion of the west side.

At River Mile 228.9, the river could continue to migrate east toward the levee and subsequently damage the levee which may cause it to breach and damage private property.

2.2.2. Description of the Proposed Alternative

At River Mile 231.3, the planned action would be to remove the jetty jacks, install bioengineered bank protection, and move the nearby road farther away from the river. At River Mile 228.9, the planned action would be to block the upstream end of the secondary channel with a berm and excavate a new channel through the island that will connect the main channel to the secondary channel downstream of the Priority site.

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

An alternatives analysis was prepared by the Reclamation engineering department for the purpose of selecting a preferred alternative. At River Mile 231.3, five alternatives were evaluated and eight at River Mile 228.9. Each alternative was evaluated using the following five criteria:

- Design considerations
- Environmental impacts
- Reliability and design life
- Financial costs
- Adaptive management needs such as monitoring and maintenance requirements with costs

The following summarizes the alternatives considered at each priority site:

River Mile 231.3:

1. Install Bioengineering Controls and Move a Road
2. Place Riprap
3. Install Bendway Weirs
4. Realign Channel
5. Realign Channel with Split Flow

River Mile 228.9

1. Install Bioengineering Controls
2. Place Riprap
3. Install Bendway Weirs
4. Realign East Channel A or Realign East Channel B
5. Enhance West Channel using Deflection Vanes
6. Levee Setback

7. Install Vegetated Crib Wall
8. Create Oxbow

The proposed alternative for River Mile 231.3 included the combination of moving a road and Bioengineering Controls (number one). In addition, creation of an oxbow (number eight) was selected for River Mile 228.9.

2.3.1. Discussion of Proposed Alternative

2.3.1.1. Proposed actions at River Mile 231.3 would include seven parts to be successful.

- A temporary dike and pilot channel for dewatering
- Removal of Jetty Jacks and vegetation
- Bio-engineering Bank Stabilizations
- Road Relocation
- Construction of a French Drain
- Vegetation Planting
- Wildlife habitat enhancements

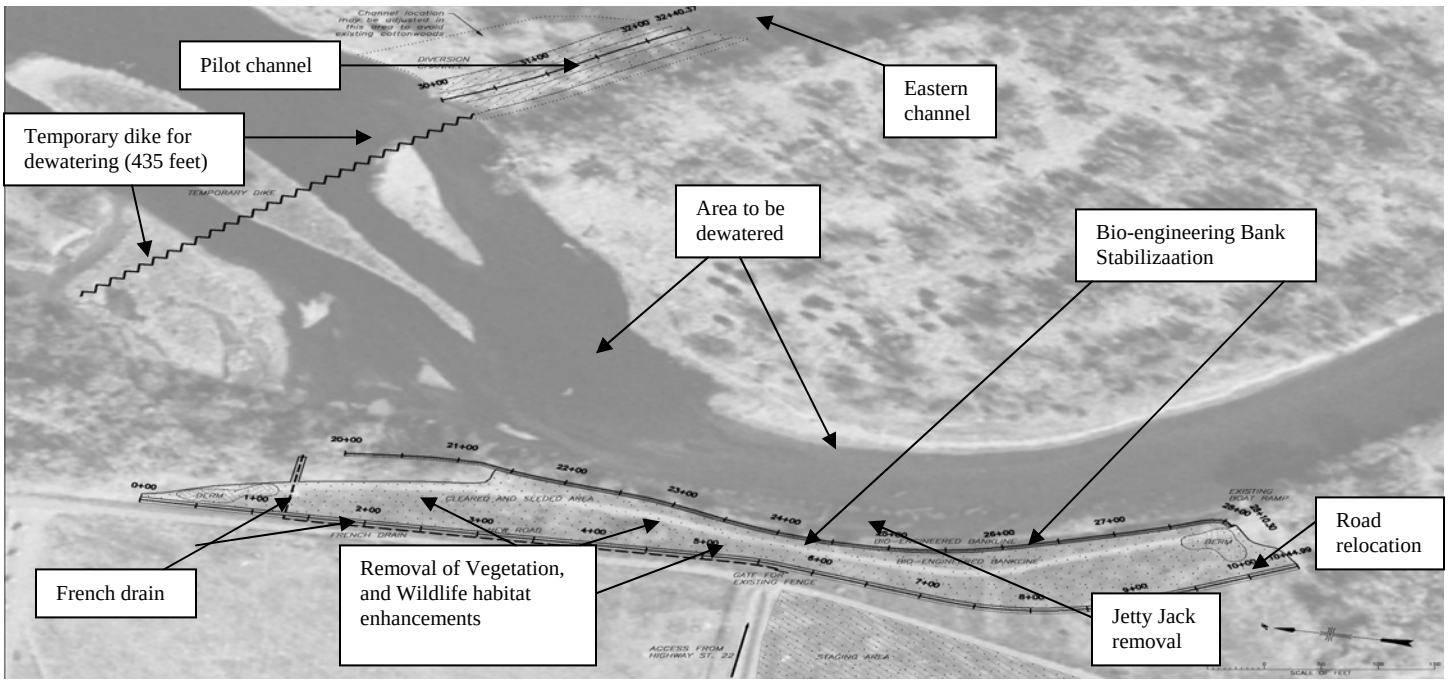


Figure 2, Rivermile 231.3 priority site project area

The following table separates out the areas of surface disturbance for Priority Site 231.3:

Location	Acres of disturbance	Comments
Bio-engineering bank/road relocation	3.0	Some of the bio-engineering may be below the ordinary high water mark of the river.
Diversion Channel/Temporary dike	2.5	This disturbance is below the ordinary high water mark. Composed of excavated earth material deployed as a dike in the river
Staging area	5	Above the ordinary high water mark
Other potential disturbed areas	10.5	Roads and other areas disturbed by heavy equipment during construction

Temporary dike and pilot channel for dewatering

Dewatering would be required to remove river water, local surface and groundwater during construction. A temporary dike would be installed in the main (western) side channel upstream of the priority site as shown in Figure 2. A diversion channel between the western and eastern channels would be built prior to the construction of the temporary berm to allow diverted flows to bypass the construction area. The temporary dike diversion channel would divert most of the flow down the eastern side channel during construction. After the bio-engineering bankline has been completed, the temporary dike would be removed, and the diversion channel would remain.

Removal of Jetty Jacks and Vegetation

All existing jetty jacks, including both tieback and main lines, located within the project area would be removed from the site. The jetty jacks would be removed concurrent with bank stabilization activities and require a construction access of 30 feet left and right of the centerline of each jetty jack line. Removal of jetty jacks would promote safer conditions during construction.

All non-native vegetation would be removed within the disturbed area of the project site. The removal of existing cottonwood trees and other native plants would be avoided or minimized during all project phases. All removed vegetation would be mulched within the project site and spread out evenly on the ground surface, not to exceed a height of 3 inches.

Bio-engineering Bank Stabilizations

The preferred alternative at this site involves using coir fabric to encapsulate the soil, creating a bio-engineered bank protection system. The design would also include the construction of a toe trench and installation of toe stone to prevent toe scour. Figure 3 shows a plan view of the bio-engineered bankline.

The main objective of the bio-engineered bankline would be to provide long term stability through establishment of deep rooted native vegetation on the bankline. Coir fabric would be used to provide temporary stability (approximately 3 years) while the trees and shrubs become established. The design would include the installation of toe stone buried below the bio-engineered bankline to prevent toe scour.

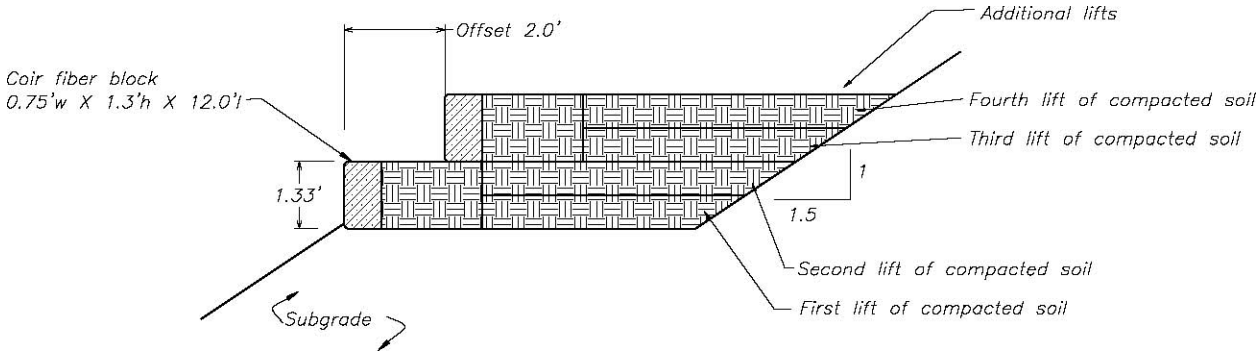


Figure 3. Typical cross-section of coir fabric lift. All dimensions are approximate.

The construction of the bio-engineered bankline would occur above the toe stone. The bio-engineered bankline would be designed such that at flows greater than 1,500 cfs the first lift would be expected to flood, and at flows between 1,500 and 5,000 cfs the second lift would become flooded. It is expected that flows greater than 5,000 cfs would flood the third lift and cause flooding to go over the bank within the general project vicinity.

Approximately three lifts would be placed, with each lift offset to the west by 2 feet. This final sloped area would be seeded (see “Vegetation Planting and Seeding”) and protected against erosion caused by rainfall and runoff.

Fill material would be provided for the bioengineered bankline from regrading of the existing bankline and construction of the toe stone trench.

Road Relocation

A two-track dirt road that is used periodically by members of the Pueblo of Cochiti lies immediately to the west of the priority site. The road through this area would be relocated to the west as shown in Figure 2. The new dirt road location would establish a path of similar width to the existing location by constructing an area approximately 14 feet wide. The existing road location would be ripped to soften the compacted soil. The soil would then be contoured to fit in with the bank bio-engineering and discourage vehicular traffic from continuing to follow the existing road location. This area would subsequently be planted with native vegetation suitable for an upland habitat (see “Vegetation Planting”).

Construction of a French Drain

A trench would be dug following a path west from one of the sinkholes towards the agricultural fields to investigate the source of the water causing the piping. If it is determined that the source is primarily a broken drainage tile, then this would be repaired. If the source is unchecked, seepage from Cochiti Dam or the nearby agricultural fields may occur. The underground flow would be intercepted by digging a trench perpendicular to this flow and filling it with rock, gravel packed perforated pipe, solid pipe, or some combination of these three to create a French drain (see Figure 4).

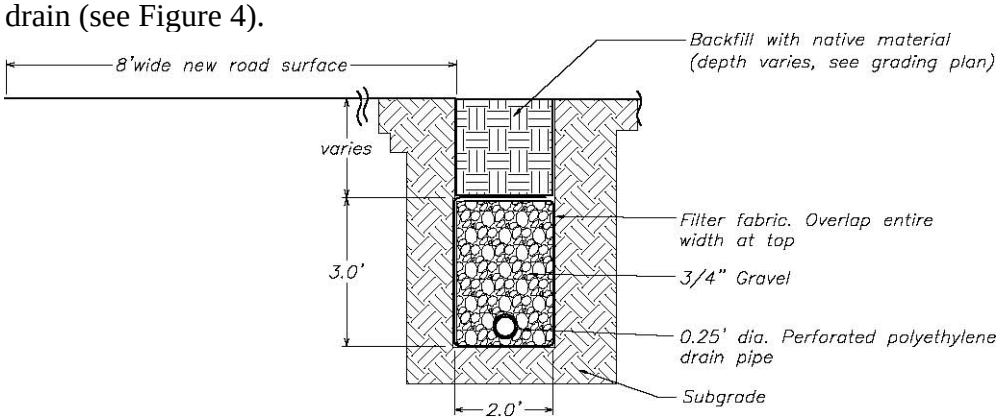


Figure 4, Cross-section of typical French drain. All dimensions are approximate.

A filter fabric would be placed between the French drain and the native material to prevent the clogging of the French drain (Gorven, 2006). The expected location of this drain would be immediately to the west of the two-track dirt road relocation in the vicinity of the project area that is known to have potential seepage problems.

Vegetation Planting and Seeding

The following would be procedures for plant species to be used, for planting, and a seed mix:

- Plant species would be planted in groups, approximately 5 feet on center, as shown in Figure 4.
- Areas denuded of vegetation would be seeded as a result of constructions operations.
- Seeding would take place during suitable conditions such as fall, spring, or rainy season.
- Previously stockpiled topsoil would be placed just before seeding operations to eliminate competition from weeds.
- Seed would be close to 100 per cent pure live seed.
- Seed would be broadcast at the rate of 15 pounds per acre or less depending upon the conditions of site.

The following table shows the proposed plants species to be planted and seeded:

Vegetative species	Containerized, pole, or pounds of pure live seed per acre	Method of planting
Populus deltoides (Rio Grande cottonwood)	pole	pole
Salix exigua (coyote willow)	pole	pole
Amorpha fruticosa (false indigo)	In containers	containerized
Artemisia filifolia (sand sage)	“	“
Atriplex conescens (fourwing saltbrush)	“	“
Chrysothamnus nauseosus (rubber rabbitbrush)	“	“
Forestiera pubescens (New Mexico olive)	“	“
Ribes aureum (golden currant)	“	“
Achnatherum or Oryzopsis hymenoides (Indian ricegrass)	3.4	Broadcast
Agropyron smithii (western wheatgrass)	4.36	“
Bouteloua gracilis (blue grama)	0.79	“
Distichlis stricta (saltgrass)	1.01	“
Eleocharis palustris (common spikerush)	0.84	“
Juncus balticus (Baltic rush)	0.20	“
Scirpus pungens (threesquare bulrush)	2.74	“
Sporobolus airoides (alkali sacaton)	0.99	“
Sporobolus cryptandrus (sand droopseed)	0.33	“

Native vegetation shall be planted throughout disturbed areas of the project. It is expected that cottonwood poles will be planted near the river on surfaces which will be flooded at flows of 5,000 cfs or higher, while coyote willows shall predominant at elevations between the 1,000 cfs and 5,000 cfs water surface elevations. Shrubs and grasses suitable for wetland and upland communities shall also be planted, interspersed with the cottonwood and willow pole plantings. Figure 5, Page 12, illustrates a plan view of the plantings and seedings.

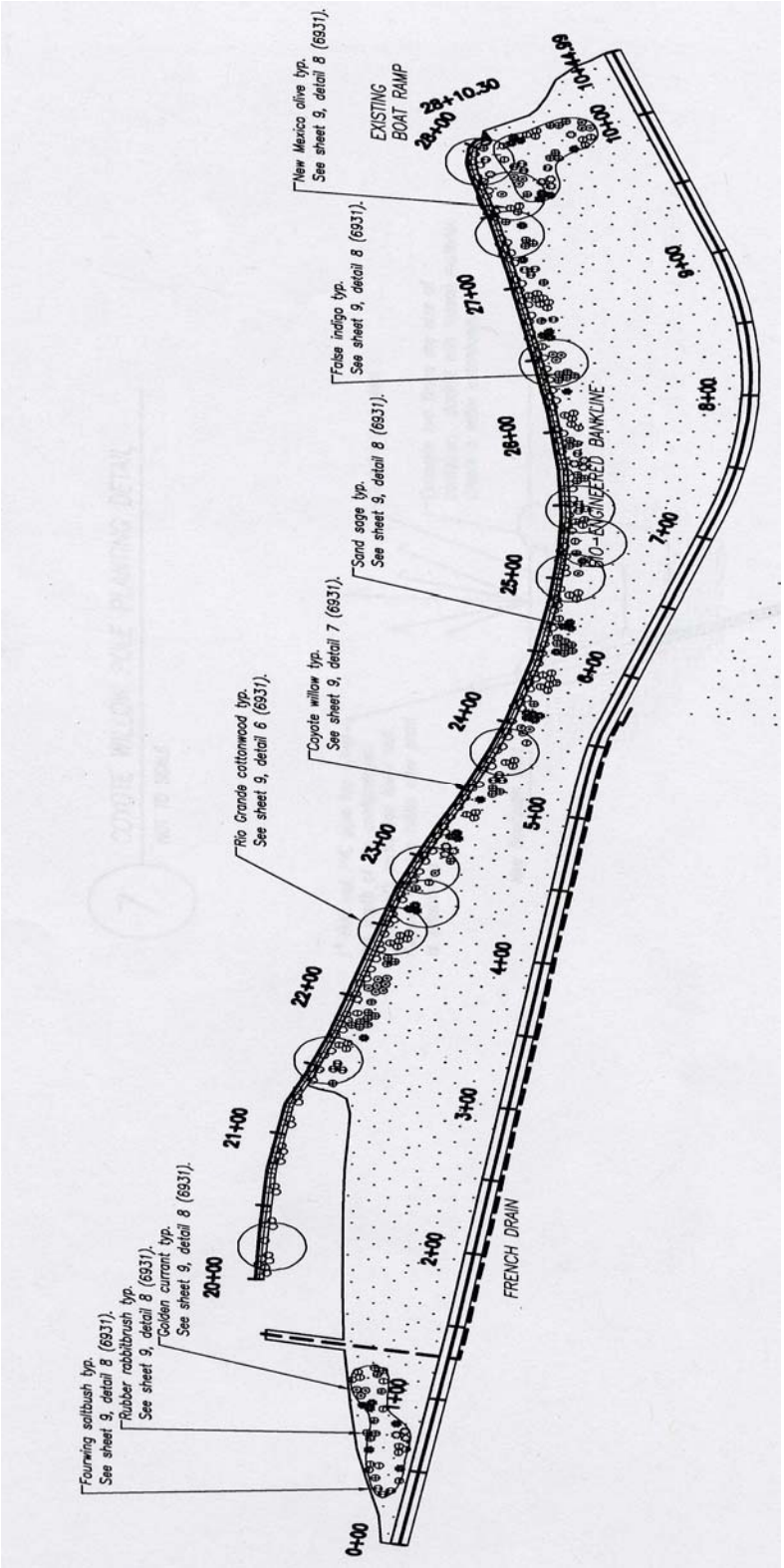
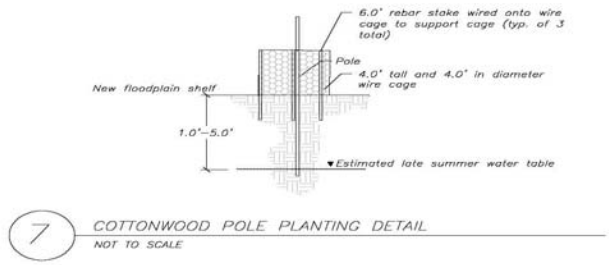
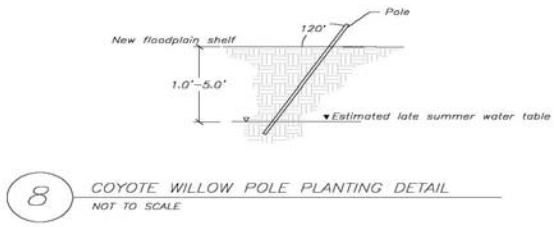
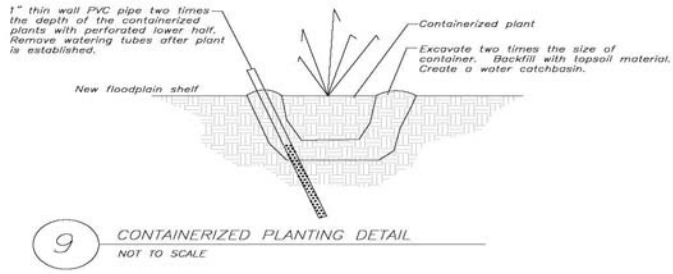


Figure 5, Planting Illustration/drawing

Wildlife habitat enhancements The following shows planting details of pole and containerized planting:







Replacing the existing vertical bank with a bio-engineered bankline would increase the preferred habitat of the silvery minnow. The bio-engineered bankline would create a bank surface with variable heights that would be subject to flooding at different river stages. This alternative may provide habitat improvements for the Rio Grande silvery minnow by improving the overall habitat conditions through this reach.

Native vegetation would be planted throughout the project area. As the size of the planted area is relatively small, it is not expected that the established vegetation would significantly improve the habitat for the Southwestern Willow Flycatcher or the Yellow-Billed Cuckoo (Bio-West, Inc., 2005c). However, as the woody vegetation becomes established at this site, there would be the potential to connect existing tracts of riparian habitat, which may improve the overall habitat conditions in this reach for both of these bird species.

2.3.1.2. Proposed actions at River Mile 228.9 would also include seven parts to be successful. The following is a list of these parts (see Figure 6):

- Removal of Vegetation
- Diversion Berm and Oxbow Creation
- Dewatering and Construction Operations
- Cross-Island Channel Alignment
- Berm and Bank Restructuring
- Vegetation Planting
- Wildlife Habitat Enhancements

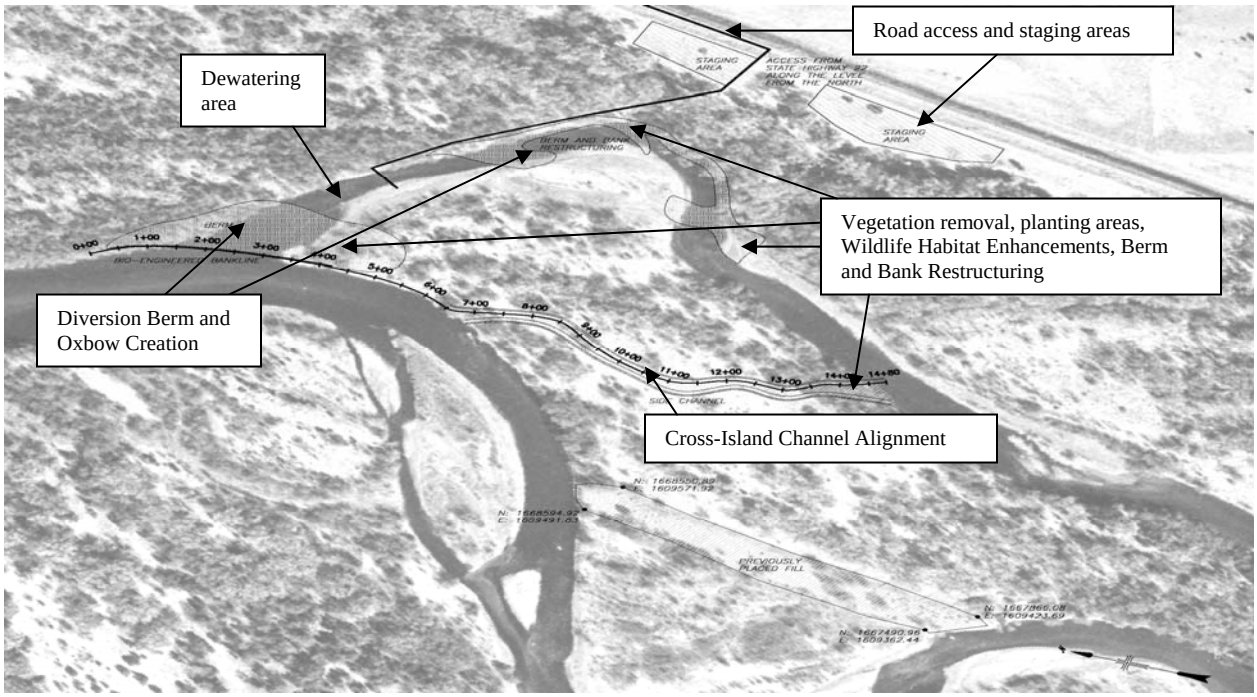


Figure 6, Priority Site 228.9, Project Elements

The following table separates out the areas of surface disturbance for Priority Site 228.9:

Location	Acres of disturbance	Comments
Diversion Berm	2.5	Below ordinary high water mark (OHWM).
Berm & Bank restructuring	4	Part of area above and part below OHWM
Side Channel	1.5	below OHWM
Previously Placed Fill	1.47	Above OHWM
Staging area	3	Above OHWM
Other potential	19.53	Roads and other areas disturbed by heavy equipment during construction

Removal of Vegetation

All vegetation would be removed from the project site. The removal of existing cottonwood trees and other native plants would be minimized to the extent practical during all project phases.

All removed vegetation would be mulched within the project site and spread out evenly on the ground surface, not to exceed a height of 4 inches.

Diversion Berms and Oxbow Creation

The preferred alternative would protect the priority site through installation of a berm at the entrance to the eastern side channel, thereby diverting all of the flow to the western side channel. By cutting off flow from the eastern side channel, the diversion berm would create an oxbow in the location of the priority site. It is estimated that a small amount of flow (3 to 5 cfs) may still enter the eastern side channel due to seepage through the diversion berm (Bio-West, Inc., 2005c). This seepage may provide sufficient oxygenation of the water to improve the fishery habitat value of the created oxbow (see "Other Habitat Enhancements") and create and maintain a wetlands.

To accommodate future changes in the riverbed elevation, a bed of rip rap would be placed in the channel to hardened the bottom of the river prior to the construction of the diversion berm. The rip rap stone would be placed as a mound with a top width of 14 feet along the channel bed immediately upstream of the proposed diversion berm. The diversion berm would be composed of fill material from existing spoil piles on Cochiti Island or excavated from the cross-island channel alignment design feature (see "Cross-Island Channel Alignment"). After the fill is placed, additional stabilization would be provided by installing a bio-engineered bank above the rip rap stone on the west side of the berm. The main objective of the bio-engineered bankline would be to provide long term stability through establishment of deep rooted native vegetation on the bankline. Coir fabric would be used to provide temporary stability while the trees and shrubs become established.

The following figure 5 shows a typical cross-section of the diversion berm with bio-engineered bankline and toe stone (rip rap in the channel).

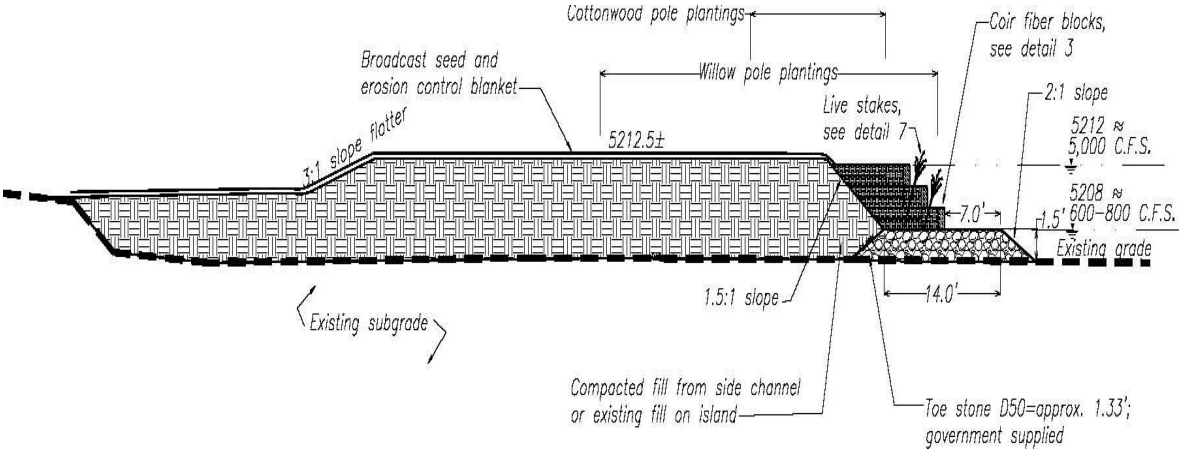


Figure 5 Cross-section of the Diversion Berm

Cross-Island Channel Alignment

The preferred alternative also calls for the excavation of a cross-island channel across Cochiti Island. This channel would run from the existing western side channel through Cochiti Island and connect with the abandoned eastern side channel downstream of the priority site location. The east bank of the east side channel is much lower at the proposed outlet location of the new cross-island channel alignment than the current priority site location. It is expected that this decreased bank height will make the exposed eastern bank less vulnerable to erosion and bend migration than the eastern bankline at the priority site. Figure 5 shows a plan view of the cross-island channel.

Fill excavated from this channel would be used to construct the diversion berm and for providing fill for the berm and bank restructuring around the priority site. The design purpose of this cross-island channel is to allow flows back into the eastern side channel to avoid eliminating potential habitat (see “Other Habitat Enhancements”).

Berm and Bank Restructuring

As the diversion berm reduces the risk of exposure to high river flows at the priority site, no engineered structure would be built along this bankline. To facilitate vegetation regrowth in this area, however, the bank would be graded at a reduced slope. The following Figure 7 shows a plan view of the berm and bank restructuring:

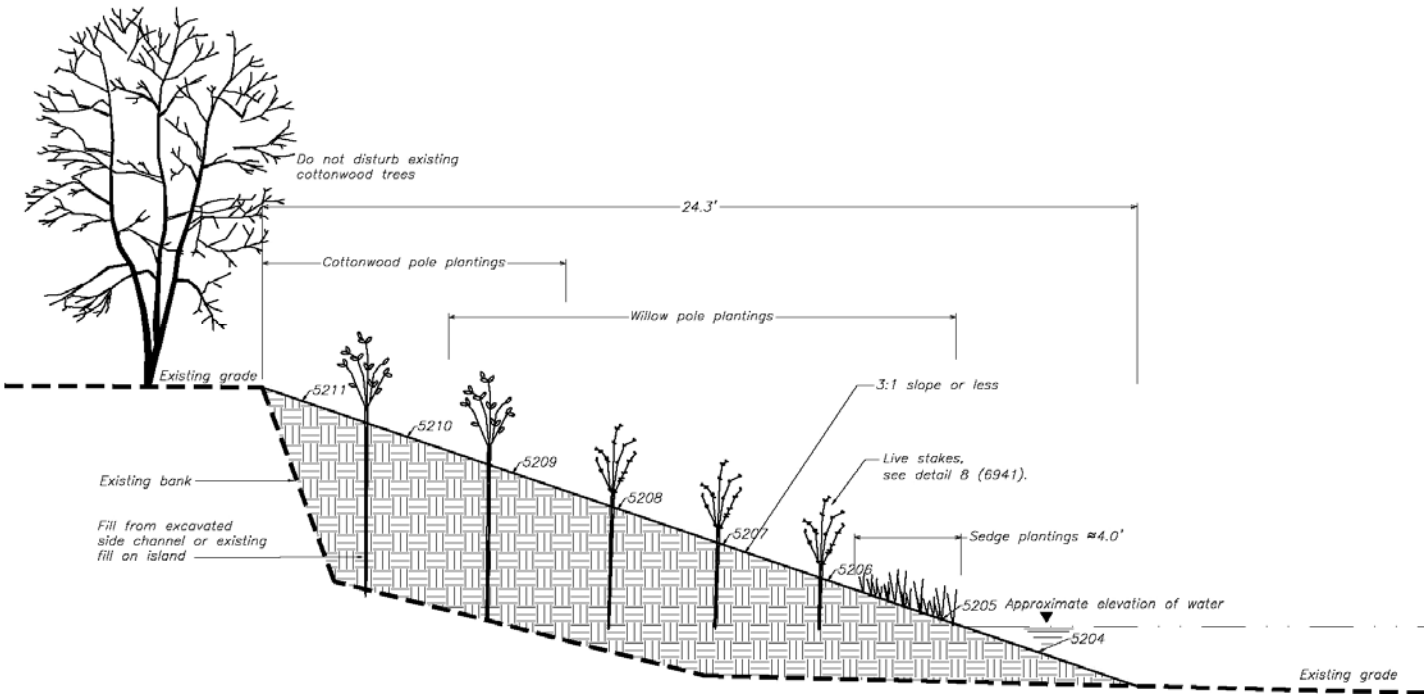


Figure 7 Berm and Bank Restructuring

As the bank is restructured to a reduced grade, habitat variability ("see "Other Habitat Enhancements") would be introduced by adding berm features to the bankline. These berms would be created at varying slopes and would be planted with native riparian vegetation to help ensure berm stability and improve habitat (see "Vegetation Planting").

Vegetation Planting

Native vegetation would be planted throughout disturbed areas of the project. The following table shows the proposed plants species to be planted and seeded:

Vegetative species	Containerized, pole, or pounds of pure live seed per acre	Method of planting
Populus deltoides (Rio Grande cottonwood)	pole	pole
Salix exigua (coyote willow)	pole	pole
Amorpha fruticosa (false indigo)	In containers	containerized
Artemisia filifolia (sand sage)	"	"
Atriplex conescens (fourwing saltbrush)	"	"
Forestiera pubescens (New Mexico olive)	"	"
Ribes aureum (golden currant)	"	"
Achnatherum or Oryzopsis hymenoides (Indian ricegrass)	3.4	Broadcast
Agropyron smithii (western wheatgrass)	4.36	"
Bouteloua gracilis (blue grama)	0.79	"
Distichlis stricta (saltgrass)	1.01	"
Eleocharis palustris (common spikerush)	0.84	"
Juncus balticus (Baltic rush)	0.20	"
Scirpus pungens (threesquare bulrush)	2.74	"
Sporobolus airoides (alkali sacaton)	0.99	"
Sporobolus cryptandrus (sand droopseed)	0.33	"

It is expected that cottonwood poles would be planted near the river on surfaces which will be fl oded at flows of 5,000 cfs or higher, while coyote willows will predominant at elevations between the 1,000 cfs and 5,000 cfs water surface elevations. Shrubs and grasses suitable for wetland and upland communities will also be planted, interspersed with the cottonwood and willow pole plantings. The total area of created vegetative communities for this site is approximately 3.05 acres. Pole and shrub species to be planted include the following: Rio Grande cottonwood, black willow, coyote willow, false indigo, sand sage, fourwing saltbush, rubber rabbitbrush, New Mexico olive, and golden currant.

The following Figure 8 illustrates a plan view of the plantings and seedings:

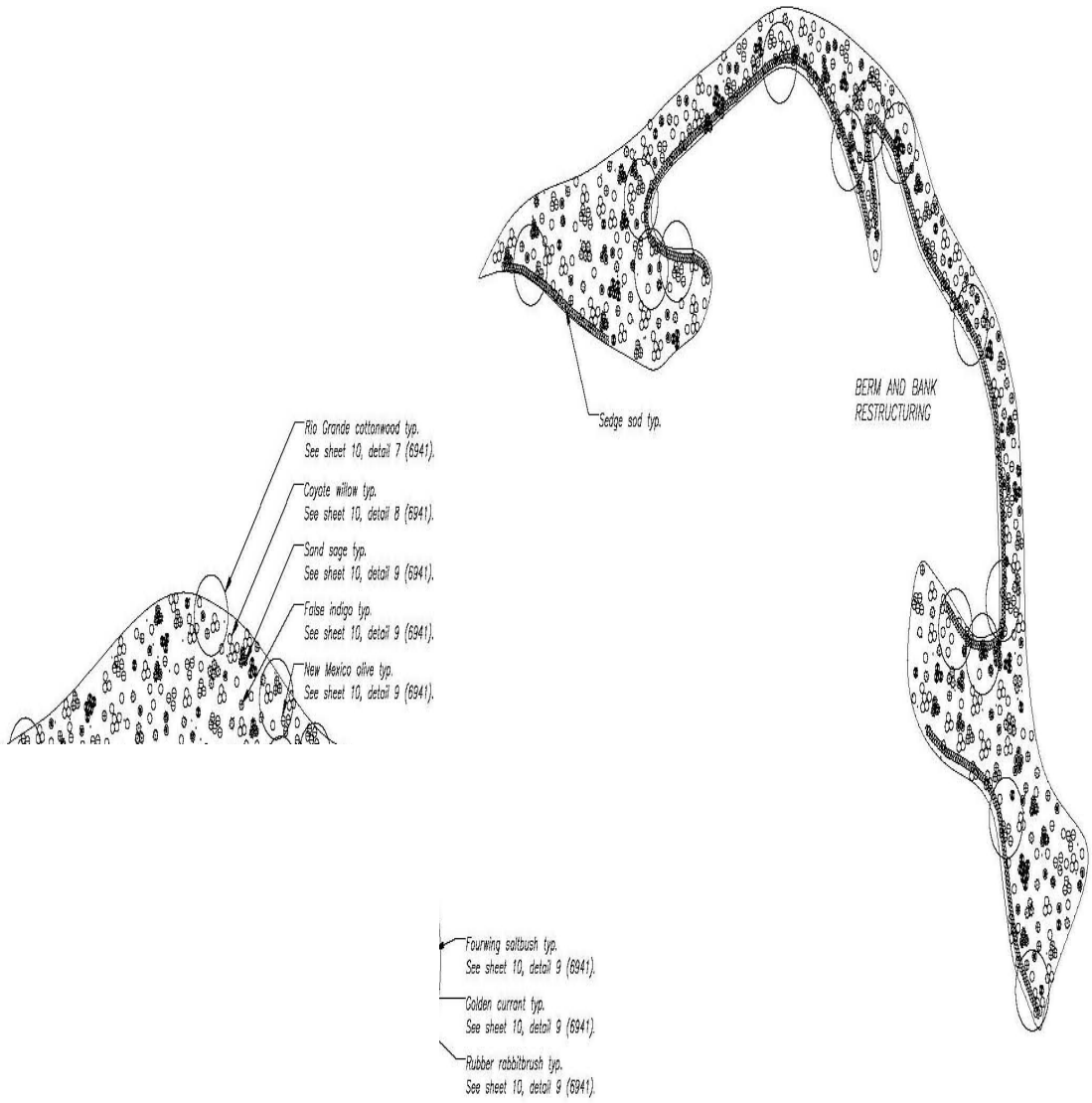
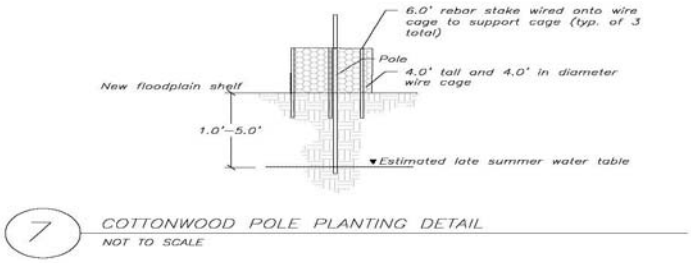
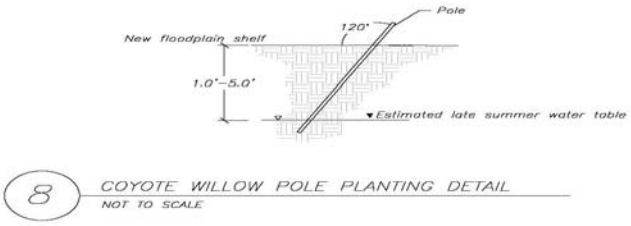
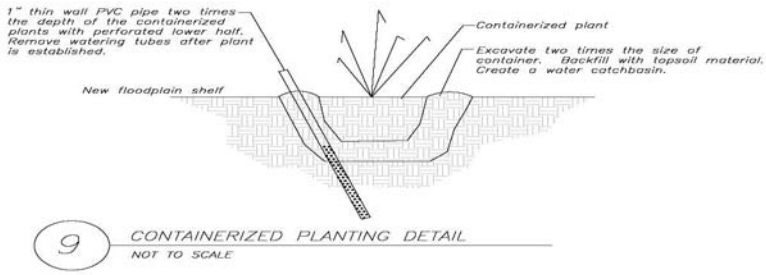


Figure 8 Plan view of Plantings and Seedings

The following shows sheet 10 planting details for Figure 8 of pole and containerized planting:







Wildlife Habitat Enhancements

This project is expected to provide valuable habitat improvements for the Rio Grande silvery minnow. With even a small amount of flow from seepage through the diversion berm, there may be sufficient connectivity with the river to maintain adequate water quality conditions and prevent isolation of populations (Bio-West, Inc., 2005c). Permitting flow into and out of these habitat features would prevent water temperatures from increasing too much and allow dissolved oxygen and other water quality parameters to remain sufficient to support the species (Bio-West, Inc., 2005c).The cross-island channel would provide additional flows downstream of the oxbow area, providing a continuous flow through the majority of the abandoned eastern side channel, which may provide additional preferred habitat (less than 40 cm deep and less than 10 cm/s water velocity).

The habitat around the created oxbow and the bio-engineered bankline would be designed and planted with both emergent and woody riparian vegetation to ensure successful establishment of vegetation. The combination of these efforts would result in the eventual creation of habitat suitable for the Southwestern Willow Flycatcher. Because the Southwestern Willow Flycatcher generally occupies habitat consisting of high foliage density, benefits resulting from the implementation of this alternative would not be immediately realized. (Bio-West, Inc.)

2.4. Summary Comparison of the Activities, the Predicted Achievement of the Project Objectives, and the Predicted Environmental Effects of Alternatives.

Reasonable Alternatives	**Predicted Achievement of objectives in section 1.4 to fulfill the need.**	**Affected Resources**	**Predicted Impacts of Alternatives (See Issues section 1.6)**
No Action A	**None**	Vegetation	None
		Threatened and Endangered Wildlife Species	None
		Noxious Weeds	None
		Water Resources	Erosion would continue to develop and contribute to increased turbidity
		Environmental Justice	None
		Indian Trust Assets	None
		Cultural Resources	None
		Air Quality and Noise	None
Proposed Alternative For:	**Predicted Achievement of objectives in section 1.4 to fulfill the need.**	**Affected Resources**	**Predicted Impacts of Alternatives (See Issues section 1.6)**
River Mile 231.3 (Install Bioengineering Controls and move a road.	Yes	Vegetation	Destruction of some during construction
		Threatened and Endangered Wildlife Species	Positive impact to create nursery habitat for the silvery minnow
		Noxious Weeds	Need to be controlled
		Water Resources	Increased turbidity during construction
		Environmental Justice	None
		Indian Trust Assets	None
		Cultural Resources	None
		Air Quality and Noise	During construction only
River Mile 228.9 (Create Oxbow	Yes	Vegetation	Initial destruction of bankline vegetation
		Threatened and Endangered Wildlife Species	Positive impact to create nursery habitat for the silvery minnow
		Noxious Weeds	Need to be controlled
		Water Resources	Increased turbidity during construction
		Environmental Justice	None
		Indian Trust Assets	None
		Cultural Resources	None
		Air Quality and Noise	During construction only