

## 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:

- Description of the Alternatives.
- Summary Comparison of the Alternatives, the Predicted Achievement of the Project Objectives, and the Predicted Environmental Effects of Reasonable Alternatives.
- Process Used to Develop the Alternatives Including those Considered but Eliminated.
- Discussion of the Preferred Alternative.

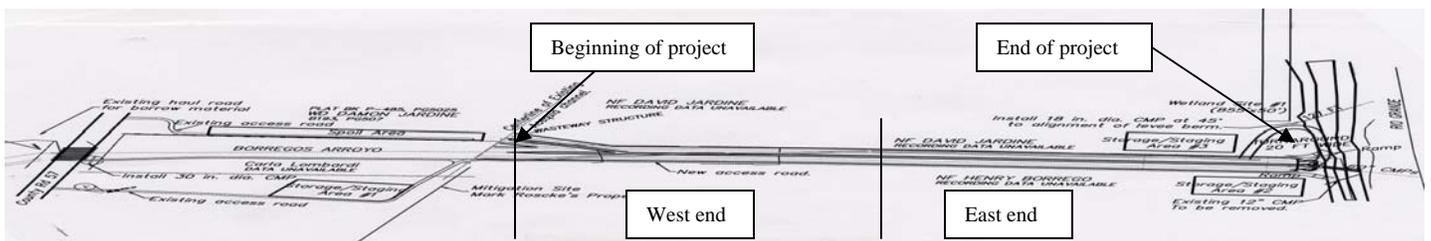
### 2.2 Description of the Alternatives

#### 2.2.1. No Action:

Flooding from the arroyos would continue during stormwater flows, stormwater runoff from adjacent properties, and irrigation overflows. There would be no outlet to the Rio Grande to drain the flooding from private land.

#### 2.2.2. Proposed Action:

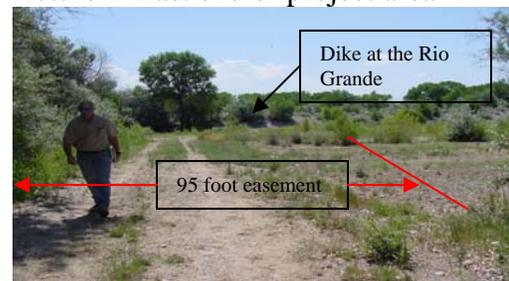
An open channel would be constructed and lined with riprap from El Guique Acequia to the dike at the Rio Grande covering a distance of approximately 1800 feet (see the summary comparison of the Alternatives in the table on page 8). The following drawing and pictures show part of the project area before construction would begin (Notice in the pictures below the vegetation that would have to be cleared before excavation would begin.):



Picture A West end of project area



Picture B East end of project area



<b>Summary Comparison of the Alternatives, the Predicted Achievement of the Project Objectives, and the Predicted Environmental Effects of Reasonable Alternatives.</b>			
<b>Reasonable Alternatives</b>	<b>Affected Resources</b>	<b>Predicted Impacts (Issues section 1.6) of the proposed action on the Resource</b>	<b>Predicted Achievement of objective criteria listed in section 1.4 and section 2.3.1 to fulfill the need.</b>
No Action	Native Vegetation	None	None
	Wetlands	None	None
	Threatened and Endangered Species	No affect on the Bald Eagle and the Southwestern Willow Flycatcher	None
	Water Resources	None	None
	Private Land	Flooding and ponding would occur.	None
	Environmental Justice	None	None
	Indian Trust Assets	No affect	None
	Cultural Resources	No affect	None
Proposed Action	Air Quality and Noise	None	None
	Native Vegetation	12 large cottonwood trees would be removed including their saplings.	Removal of the cottonwood trees would allow the channel to be built to achieve the objective criteria.
	Wetlands	None affected	Wetlands would be preserved
	Threatened and Endangered Species	No affect on Bald Eagle or the SW Willow Flycatcher	Removal of cottonwoods could eliminate perch trees for the Bald Eagles; however other cottonwood forests exist nearby that could be utilized. SW Willow Flycatchers were not found in the project site nor was the habitat suitable for nesting. Therefore, this species would not be affected.
	Water Resources	The wasteway ditch would be eliminated.	A new channel would be built with improved outlet to the Rio Grande.
	Private Land	Flooding and water ponding would not occur.	Eliminate flooding and water ponding would provide opportunities for development.
	Environmental Justice	None	N/A
	Indian Trust Assets	None	N/A
Cultural Resources	Excavation would occur through the dike.	Documentation to the SHPO would enable the proposed project to continue and help achieve the objectives.	
Air Quality and Noise	Excess dust and noise may occur during construction only.	Construction activities would achieve the objective criteria listed in section 1.4.	

2.3 Alternatives Considered but Eliminated from Further Study:

2.3.1. The following are criteria used for the process to select a preferred alternative:

- An engineering design that fulfills the objectives listed in section 1.4.
- An alternative that would cost the least amount.
- A channel design that would carry flows up to a maximum of 60 cfs.
- A design that would control backwater effects from high water of flows up to 5000 cfs in the Rio Grande.

2.3.2. The following table compares alternatives considered including the preferred alternative:

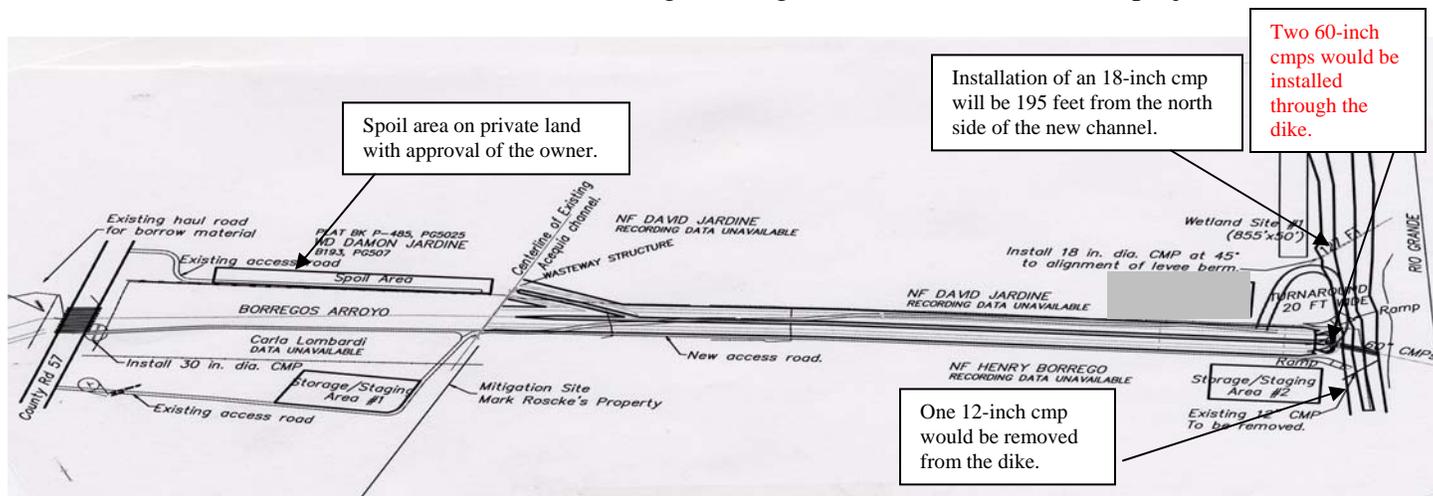
Alternatives Considered	Criteria for Selecting the Preferred Alternative			
	Meets Objective criteria in sections 1.4 and 2.3.1	Cost Effective	Design Channel Flows would be 60 cfs	Design to meet backwater effects up to 5000 cfs
Concrete Pipe	Yes	No	Yes	Yes
Concrete Flume	Yes	No	Yes	Yes
Open Channel with Trashrack, CMPs with Flapgates	Yes	No	Yes	Yes
Open Channel with drop structures	Yes	No	Yes	Yes
Open Channel with riprap, CMPs with one Flapgate on 18-inch cmp and *no Flapgate on two 60-inch cmps	Yes	Yes	Yes	Yes

\* Flapgates would be purchased by Reclamation for the two 60-inch cmps. However, the El Guique irrigation district would be responsible to install and maintain the flap gates.



## 2.4 Discussion of Preferred Alternative:

An open channel with riprap, two 60-inch cmps with no flapgate, and one 18-inch cmp with a flapgate is considered the preferred alternative. This alternative would best comply with the criteria listed in section 2.3.1. The following drawing shows an overview of the project area:



The preferred alternative's new channel, would have a 10-foot bottom width and berms approximately 6 feet high. The easement for the new channel is currently 97 feet wide. In addition, the berms would have an inside slope of 3:1 and an outside slope of 2:1. Riprap would be placed along the entire length of the inside portion of the channel. The new channel berms are designed to contain backwater effects due to high flows in the river greater than 5000 cfs.

Preparation for the construction of the channel would include clearing (removing all vegetation including 12 large cottonwood trees that dominate the site) and mulching the removed vegetation. The mulch would be placed on the outside slopes of the new channel for erosion control. Left over mulch would be placed in the proposed spoil area located in the northwest corner of the project (see drawing below). Any additional material (mulch or soil) will be placed on the top or on the west side of the dike.

Excavation of the dike would be required in 3 locations along the Rio Grande as follows: 195 feet north of Borregos Arroyo for installation of an 18-inch cmp with a flapgate; at the east end of the Borregos Arroyo for installation of two 60-inch cmps without flapgates; and removing an existing 12-inch cmp just south of the Borregos Arroyo (see overview drawing above). The 18-inch cmp with the flapgate would be installed to drain water ponding on the north side of the Borregos Arroyo. Gabion baskets would be installed at the outlet of the 18-inch cmp with riprap at the inlet (without concrete). In addition, two 60-inch cmps would also be provided with gabion baskets at the outlet; but with riprap encased in concrete at the inlet.

The dike would be graded and fences removed temporarily for an access road to install the 18-inch cmp. Two permanent ramps would be installed on the west side of the dike over the inlet of the 60-inch cmps and one temporary ramp would be installed and removed after construction where the 18-inch cmp is located. Since water would be required for the project to control dust, Reclamation has been given permission to pump water just south of the arroyo where there is an

existing road and ramp. The water would be pumped into a water truck that would spray the water onto the roads.

The project would replace (mitigate) 12 cottonwood trees with planting 122 cottonwood poles on private land adjacent to the project area. The location of the new trees (see the mitigation site on the drawing below and on the drawing at page 15.) would be south of the Borregos Arroyo between the following UTM coordinates: Northing 3,995,640 and Easting 403,935; Northing 3,995,804 and Easting 404,020, which is approximately 665 feet in length. Poles would be planted in the winter or early spring of 2006, when they are still dormant. Continued access to the private land would be by an agreement with the landowner to monitor the condition and establishment of the cottonwood poles.

A backhoe with an auger would be used to dig the hole for each cottonwood pole (10-12 feet long). A 4-foot wire fence (or equivalent) would be staked around each pole for protection. The landowner currently has a drip system along the acequia where the cottonwood poles would be planted. As the cottonwood poles mature, they would become self-sustaining. Monitoring the mitigation site would continue for five years to insure the trees become established (see map in section 4.2.1 for the location of the mitigation site).

The following drawing shows an overview of the proposed project with access roads and staging areas for heavy equipment, excavated soil, materials, and mulch:

