Draft Environmental Assessment

Improvements to the Arroyo Colorado North Levee Project

April 2009

Lead Agency:

United States Section,
International Boundary and
Water Commission

El Paso, Texas

DRAFT ENVIRONMENTAL ASSESSMENT

IMPROVEMENTS TO THE ARROYO COLORADO FLOODWAY IN HIDALGO AND CAMERON COUNTIES

Lead Agency:

UNITED STATES SECTION,
INTERNATIONAL BOUNDARY AND WATER COMMISSION
UNITED STATES AND MEXICO

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USIBWC Contract IBM04D0002, Task Order IBM09T0016

APRIL 2009

COVER SHEET

DRAFT ENVIRONMENTAL ASSESSMENT
AND
FINDING OF NO SIGNIFICANT IMPACT

FLOOD CONTROL IMPROVEMENTS TO THE ARROYO COLORADO FLOODWAY

Lead Agency: United States Section, International Boundary and Water Commission

Proposed Action: Raising approximately 11 miles of levee along the Divisor Dike and Arroyo Colorado Floodway (ACF) beginning at Divisor Dike near the juncture point of the ACF and the North Floodway to address the 100-year flood protection criteria established by the Federal Emergency Management Administration.

Report Designation: Draft Environmental Assessment (EA)

Abstract: The United States Section, International Boundary and Water Commission (USIBWC) is considering raising levee segments along the Arroyo Colorado starting at the Divisor Dike near the juncture point of the Arroyo Colorado and the North Floodway in Hidalgo County and ending at the town of Rio Hondo in Cameron County, Texas. The Arroyo Colorado was divided into two reaches for planning purposes. Levee rehabilitation would take place on the north side of the Arroyo Colorado levee sections from Divisor Dike to Willacy Canal (6.93 miles) and Willacy Canal to White Ranch Road (4.07 miles). The proposed action would increase the height of the levee up to 2 feet for approximately 8.6 percent of the 11 mile segment. Approximately 4 percent of the levee height would be increased from 2 to 4 feet, and approximately 2.4 percent would be increased from 4 to 6 feet. Moderately higher increases (greater than 6 feet) would be needed in small levee segments accounting for less than 1.2 percent of the total length.

Approximately 84 percent of the two reaches would not require fill material to be placed on top of the levee; therefore, no extension of the levee footprint would be required. Levee raising assumes a centered expansion. In levee sections requiring more than 2 feet of fill material added to the crown of the levee, the footprint would extend a minimum of 6 feet on either side of the levee (12 feet total). In limited portions of the improvement area, the levee would need to be raised 4 feet to meet the design criteria, extending the levee footprint into the floodway up to a maximum of 24 feet.

The EA assesses potential environmental impacts of the proposed action and the no action alternative. Potential impacts on natural, cultural, and other resources were evaluated, and mitigation measures were incorporated into the proposed action. A Finding of No Significant Impact was issued for the proposed action based on a review of the facts and analyses contained in the EA.

DRAFT FINDING OF NO SIGNIFICANT IMPACT
Flood Control Improvements to the Arroyo Colorado

LEAD AGENCY: United States Section, International Boundary and Water Commission, United States and Mexico (USIBWC).

BACKGROUND

The USIBWC is authorized to construct, operate, and maintain any project or works projected by the United States of America on the Lower Rio Grande Flood Control Project (LRGFCP) as authorized by the Act of the 74th Congress, Sec. I Ch. 561 (H.R. 6453), approved August 19, 1935 (49 Stat. 660), and codified at 22 USC Section 277, 277a, 277b, 277c, and Acts amendatory thereof and supplementary thereto. The LRGFCP was constructed to protect urban, suburban, and highly developed irrigated farmland along the Rio Grande delta in the United States and Mexico.

An interior floodway system is a component of the LRGFCP of the Arroyo Colorado Floodway (ACF) that conducts flood water diverted from the Rio Grande to the Laguna Madre in the Gulf of Mexico. Diverted water enters a Main Floodway that branches near Mercedes, Texas into a North Floodway and a south branch, the ACF. The USIBWC prepared this Environmental Assessment (EA) for the proposed action to improve flood control and flood containment capacity along the Divisor Dike and ACF beginning at Divisor Dike near the juncture point of the Arroyo Colorado and the North Floodway in Hidalgo County and ending at the town of Rio Hondo in Cameron County, Texas.

The Arroyo Colorado is an ancient distributary of the Rio Grande, and it serves as drainage for crop irrigation, municipal wastewater returns, and as a floodway during periods of heavy precipitation in the lower Rio Grande Valley. The proposed levee rehabilitation project includes 6.93 miles from the Divisor Dike to Willacy Canal, and 4.07 miles from Willacy Canal to White Ranch Road.

PROPOSED ACTION

The proposed action will improve flood control and increase flood containment capacity along the Divisor Dike and ACF beginning at Divisor Dike near the juncture point of the Arroyo Colorado and the North Floodway in Hidalgo County and ending at the town of Rio Hondo in Cameron County, Texas. The proposed levee rehabilitation improvements consist of: 1) raising the top-of-levee elevation; 2) conducting geotechnical investigations and testing to determine the type and extent of any required remediation improvements due to slope stability, seepage, levee settlement, and any other geotechnical issues that may cause levee failure during a 100-year flood event; and 3) modifying, if necessary, hardware or structures located along the levee reaches. Any structure modifications would be in compliance with the Texas Historical Commission recommendations.

The top elevation of the levee-raising improvements will be to provide containment of flood flows with a minimum freeboard of 3 feet for water surface elevations as calculated in the USIBWC 2003 Hydraulic Model for the LRGFCP. Raising the levee from the centerline of the levee is assumed for analyses, but raising the levee on the riverside of the levee is possible where right-of-way (ROW) is a constraint.

Fill material from commercial sources will be added to the existing levee to bring height to its original design specifications. Height increases of up to 2 feet in improvement areas will not require expansion of the existing levee footprint. The proposed action will increase the height of the levee up to 2 feet for approximately 8.6 percent of the 11-mile segment. Approximately 4 percent of the levee height will be increased from 2 to 4 feet, and approximately 2.4 percent will be increased from 4 to 6 feet. For a typical levee cross-section with more than 2 feet of fill material the levee footprint will be expanded by 12 feet, 6 feet on either side of the levee. For height increases of up to 4 feet, the levee footprint will be expanded by 24 feet, 12 feet on either side of the levee. Moderately higher increases will be needed in a small segment that accounts for less than 1.2 percent of the total length. In areas where existing topography is too steep to allow levee expansion, construction solutions, including armored banks (rip-rap) or retaining walls, will be used.

Footprint expansion, when required, will take place inside the maintained floodway, and entirely within the USIBWC ROW. In some instances, adjustment in levee slope will be made to eliminate the need for levee footprint expansion when required due to construction constraints or for protection of biological or cultural resources. Construction constraints include the presence of irrigation drains or canals as well as structural features abutting or built into the levee, along some reaches of the levee system, or urban development in the immediate vicinity of the levee system. The need for excavation outside the levee structure is not anticipated.

ALTERNATIVES TO THE PROPOSED ACTION

A no action alternative was evaluated for the ACF levee system. This alternative will retain the existing configuration of the system, as designed over 30 years ago, and the current level of protection currently associated with this system. Under severe storm events, current containment capacity may be insufficient to fully control Rio Grande flooding, including risks to personal safety and potential property damage.

SUMMARY OF FINDINGS

Pursuant to the National Environmental Policy Act (NEPA) guidance (40 Code of Federal Regulations 1500-1508), The President's Council on Environmental Quality issued regulations for implementing NEPA, which included provisions for both the content and procedural aspects of the required EA. The USIBWC completed an EA of the potential environmental consequences of raising the ACF levee system to meet current requirements for flood control. The EA, which supports this Finding of No Significant Impact, evaluated the proposed action and no action alternative.

LEVEE SYSTEM EVALUATION

No Action Alternative

The no action alternative was evaluated as the single alternative action to the proposed action. The no action alternative will retain the current configuration of the ACF levee system, with no impacts to biological and cultural resources, water resources, land use, soil, community resources, or environmental health issues. In terms of flood protection, however, current containment capacity under the no action alternative may be insufficient to fully control Rio Grande flooding under severe storm events, including associated risks to personal safety and property.

Proposed Action

Biological Resources

Biological resources in the vicinity of the levee systems are dominated by agricultural fields, rangelands, and non-native grasslands. There are some woody species along the margins of the Arroyo Colorado, drainage ditches from irrigation fields, and adjacent to borrow pits. The 160-foot wide biological survey corridor, centered on the existing levee, includes 228 acres, primarily composed of non-native grasslands dominated by bufflegrass and king ranch bluestem.

The proposed action will raise the levee using a centered expansion. The proposed levee expansion will remove non-native grasslands on the levee slopes and adjacent areas. Native grasses will be planted at the completion of the project. The levee expansion will not occur in wooded areas. There are wetlands in the vicinity of the proposed levee expansion, but the existing wetlands are outside the potential expansion area and will not be affected. No habitats used by federally or state-listed threatened or endangered species will be impacted by the levee expansion.

In areas adjacent to sensitive areas such as water bodies, levee expansion may be altered to an offset expansion toward the riverside of the levee to avoid impacting sensitive resources. In areas where the existing topography is too steep to allow levee expansion, construction solutions, including armored banks (rip-rap), will prevent erosion of the levee slopes. The construction solutions will not affect sensitive habitats, including wooded areas, habitats for threatened and endangered species, or wetlands.

Cultural Resources

Improvements to the ACF levee system may adversely affect unrecorded prehistoric and historic archaeological resources. Areas adjacent to the toe of the levee may contain intact archaeological resources. Adverse effects to archaeological resources may occur from the use of heavy equipment during levee construction that could disturb surface or shallowly buried deposits. Adverse effects may also occur to archaeological deposits that will be buried by the addition of the fill material on the surface above them. Alternatively, levee footprint expansion

may protect archaeological resources by capping with fill material, preserving those resources in place.

Architectural resources may be adversely affected by levee height increases or by expansion of the levee footprint. Potential effects include vibration and ground disturbance from the use of heavy equipment during construction. In addition, several resources associated with flood control or water delivery, including the levee itself, and resources on top of or built into the existing levee, could be buried when fill material to raise the height of the levee is added. The increased height of the levee is not expected to change the flow of water to or from architectural resources in the floodway or farm fields flanking the levee.

Native American resources may be affected by the levee improvements; consultation with the Native American tribes will assist in identifying resources or concerns regarding the project.

Under NEPA, there will be no significant impacts (*i.e.*, "unresolvable" adverse effects under National Historic Preservation Act [NHPA]) to cultural resources because all cultural resources will be identified and evaluated for NHPA eligibility. Any impacts to National Register of Historic Places-eligible resources will be mitigated prior to implementation of levee height increases or footprint expansion, in consultation with the Texas Historical Commission and Native American Tribes.

Water Resources

Flood control improvements to the ACF will increase flood containment capacity to control the design flood event with a negligible increase in water surface elevation. Levee footprint expansion will not affect water bodies.

Land Use

Footprint levee expansion, where required, will take place completely within the existing ROW. No urban or agricultural lands will be affected.

Soil

Improvement activity contributing to soil disturbance will include geotechnical investigations and adding soil to the top and sides of the levee. Levee fill material will come from local commercial sources and not from borrow areas in the floodplain. The disturbance of soil will occur within areas where soil has been disturbed and modified by prior levee construction and maintenance activities. Therefore, alteration of soil previously unassociated with the existing levee will not occur.

Community Resources

In terms of socioeconomic resources, the influx of federal funds into Hidalgo and Cameron Counties from the flood control improvement area will have a positive but minor local economic impact. The impact will be limited to the construction period, and represent less than 1 percent of the annual county employment, income, and sales values. No adverse impacts to disproportionately high minority and low-income populations were identified for construction

activities. Moderate utilization of public roads will be required during construction; a temporary increase in access road use will be required for equipment mobilization to staging areas.

Environmental Health Issues

Estimated air emissions of five criteria pollutants during construction will be discontinuous and represent less than 0.13 percent of the annual emissions inventory within the air quality control region of Hidalgo, Cameron, and Willacy Counties. There will be a moderate increase in ambient noise levels due to construction activities. No long-term and regular exposure is expected above noise threshold values. A database search indicated that no waste storage and disposal sites were within the proposed ACF levee improvement area, and none will affect, or be affected by, the levee improvement project.

Best Management Practices

When warranted due to engineering considerations, or for protection of biological or cultural resources, the need for levee footprint expansion will be eliminated by levee slope adjustment. Best management practices during construction will include development of a storm water pollution prevention plan to avoid impacts to receiving waters, and use of sediment barriers and soil wetting to minimize erosion.

To protect vegetation cover, the embankment improvement areas will be re-vegetated with native herbaceous species. To protect wildlife, construction activities will be scheduled to occur, to the extent possible, outside the March to August bird migratory season.

DECISION

Based on my review of the facts and analyses contained in the Environmental Assessment, I conclude that implementation of the proposed action to improve the ACF levee system will not have a significant impact. Accordingly, requirements of the National Environmental Policy Act and regulations promulgated by the Council on Environmental Quality are fulfilled and an environmental impact statement is not required.

C.W. Ruth, Commissioner
International Boundary and Water Commission,
United States Section

Date

Draft Environmental Assessment

IMPROVEMENTS TO THE ARROYO COLORADO FLOODWAY IN HIDALGO AND CAMERON COUNTIES

LEAD AGENCY:

UNITED STATES SECTION,
INTERNATIONAL BOUNDARY AND WATER COMMISSION
UNITED STATES AND MEXICO

TECHNICAL SUPPORT:

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USIBWC Contract IBM04D0002, Task Order IBM09T0016

APRIL 2009

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ACRONYMS AND ABBREVIATIONS

ACF	Arroyo Colorado Floodway
APE	area of potential effect
AQCR	air quality control region
CFR	Code of Federal Regulations
dbA	A-weighted sound level in decibels
DNL	day-night average sound level
EA	environmental assessment
EO	executive order
GIS	geographic information system
HAER	Historic American Engineering Record
IBWC	International Boundary and Water Commission
LRGFCP	Lower Rio Grande Flood Control Project
LRGV	Lower Rio Grande Valley
MxIBWC	Mexican Section, International Boundary and Water Commission
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NLCD	National Land-Cover Database
NRHP	National Register of Historic Places
NRCS	Natural Resources Conservation Service
O&M	operation and maintenance
PEIS	Programmatic Environmental Impact Statement
ROW	right-of-way
SHPO	state historic preservation office
T&E	threatened and endangered
THC	Texas Historical Commission
TPWD	Texas Parks and Wildlife Department
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USIBWC	United States Section, International Boundary and Water Commission

SECTION 1
PURPOSE OF AND NEED FOR THE PROPOSED ACTION

This section discusses the purpose of and need for the proposed action; the authority of the United States Section, International Boundary and Water Commission (USIBWC) to conduct the project as part of its mission; the scope of the environmental review; a summary of environmental compliance requirements; and the organization of this document.

1.1 PURPOSE OF AND NEED FOR ACTION

The USIBWC prepared this Environmental Assessment (EA) for the proposed action to improve flood containment capacity of segments of the Arroyo Colorado Floodway (ACF). The ACF is a component of the Lower Rio Grande Flood Control Project (LRGFCP) that conducts flood water diverted from the Rio Grande to the Laguna Madre in the Gulf of Mexico.

The proposed action would include levee system improvements to address the 100-year flood protection criteria established by the Federal Emergency Management Administration. The Divisor Dike and the two portions of the north AFC levee system would be raised by adding fill material to the existing levee to bring the height to its original design specifications, or to meet a 3-foot freeboard design criterion. The proposed action is described in detail in Subsection 2.2.

1.2 USIBWC AUTHORITY

The International Boundary and Water Commission (IBWC), which before 1944 was known as the International Boundary Commission, was created by the Convention of 1889, and consists of a (USIBWC and a Mexican Section (MxIBWC). The IBWC was established to apply the rights and obligations the Governments of the United States and Mexico assumed under the numerous boundary and water treaties and related agreements. Application of the rights and obligations are accomplished in a way that benefits the social and economic welfare of the people on both sides of the boundary and improves relations between the two countries. The mission of the USIBWC covers the proposed raising of the ACF levee system.

1.3 SCOPE OF THE ENVIRONMENTAL REVIEW

Federal agencies are required to take into consideration the environmental consequences of proposed and alternative actions in the decision-making process under the National Environmental Policy Act (NEPA) of 1969, as amended. The President's Council on Environmental Quality issued regulations to implement NEPA that include provisions for both the content and procedural aspects of the required environmental analysis. In 1978, the Council on Environmental Quality issued regulations implementing the process (40 Code of Federal Regulations [CFR] 1500-1508).

The USIBWC regulations for implementing NEPA are specified in Operational Procedures for Implementing Section 102 of the National Environmental Policy Act of 1969,

Other Laws Pertaining to Specifics Aspects of the Environment and Applicable Executive Orders (46 FR 44083, September 2, 1981; Appendix 501-A).

This EA identifies and evaluates potential environmental consequences that may result from implementation of the proposed action and No Action alternative. It also characterizes the affected environment and describes, when required, mitigation measures to prevent or minimize impacts to environmental resources.

Analysis of environmental resources for the affected environment and environmental consequences was based on a potential impact corridor around the existing ACF levee system. Analyses of environmental consequences also include potential indirect impacts adjacent to the levee corridor and the region, depending on the resource and its relationship to the proposed action and alternatives. Reference values for air quality, cultural resources, socioeconomics, and environmental justice are evaluated on a regional basis (county level).

Results of field biological surveys of terrestrial and aquatic natural resources and cultural resources, including archaeological sites, architectural resources, and Traditional Cultural Properties, were incorporated into the EA. Findings of these studies were used to document baseline conditions for biological resources, cultural resources, wetlands, and waste storage and disposal. The report also documents potential performance of the levee system based on hydraulic model simulations, and an evaluation of environmental compliance requirements and coordination activities.

Environmental impacts associated with the proposed flood control improvements described in this EA were tiered from the 2008 Final Programmatic Environmental Impact Statement (PEIS) (USIBWC 2008), as per 40 CFR 1502.20. Recent published information is used for impact analyses based for the time period covered during construction and subsequent flood control improvement conditions. Potential environmental consequences of the ACF levee system for each resource area are discussed separately in Section 4 of this EA.

1.4 ENVIRONMENTAL COORDINATION AND COMPLIANCE ANALYSIS

Table 1.1 is a summary of regulatory and/or permitting requirements potentially applicable to improvements under consideration, potential compliance issues, and anticipated level of environmental coordination.

Table 1.1 Summary of Environmental Coordination and Compliance

Agency or Organization	Regulation or Issue	Level of USIBWC Coordination
Biological Resources		
U.S. Fish and Wildlife Service (USFWS)	Endangered Species Act of 1973 (Public Law 93-205) and amendments of 1988 (Public Law 100-478)	Section 7 of the Act requires formal consultation if significant adverse impacts to federally listed threatened and endangered species and migratory birds could occur.
Texas Parks and Wildlife Department (TPWD)	Chapters 67 and 68 of the TPWD Code, and Section 65.171-65.184 of the Texas Administrative Code	Coordination with Wildlife Division concerning potential impacts of the levee-raising project to wildlife. Coordination with State Parks Division concerning potential impacts on park tracts.
Cultural Resources		
State Historic Preservation Office (SHPO) - Texas Historical Commission (THC)	National Historic Preservation Act (NHPA) of 1966, as amended (16 United States Code [USC] 470 *et seq.)* American Indian Religious Freedom Act (AIRFA), 1978 Native American Graves Protection and Repatriation Act (NAGPRA) 1990	Ensure compliance with NHPA, AIRFA and NAGPRA. The THC may suggest conditions and mitigation measures following review of the Draft EA.
Water Resources		
U.S. Army Corps of Engineers (USACE)	Section 10 of the Rivers and Harbors Act of 1899 Section 404 of the Clean Water Act (33 USC 1344)	Permit application if waters of the United States are affected. Mitigation plan and permit application for potential impacts to wetlands.
Texas Commission on Environmental Quality (TCEQ)	Section 401 of the Clean Water Act (33 USC 1344); Section 26.040 of Texas Water Code	Section 401 Certification: conditions and mitigation measures may be stipulated for the 401 permit; coordination is typically a function of the USACE permitting process.
United States Environmental Protection Agency (USEPA)	Section 402 of the Clean Water Act Section 404 of the Clean Water Act	Requirements for National Pollutant Discharge Elimination System construction permit and Storm Water Pollution Prevention Plan preparation. Section 404 Certification; coordination is typically a function of the USACE permitting process.
Other Issues		
Natural Resources Conservation Service (NRCS)	Farmland Protection Policy Act	Determination that no unique or prime farmland would be affected by the federal project.
Irrigation Districts	Modifications to intake channel and construction along irrigation canals	Mercedes Districts in Hidalgo County; La Feria, Adams Garden, and Harlingen Irrigation Districts in Cameron County: levee construction along the Arroyo Floodway.

SECTION 2
DESCRIPTION OF PROPOSED ACTION

This section presents a description of the proposed action for improvements of the ACF levee system. An overview of the ACF levee system is presented in Figures 2.1 to 2.7. Appendix A presents detailed maps of levee alignment, potential levee improvement areas, and land use in the levee system vicinity. .

2.1 LEVEE SYSTEM DESCRIPTION

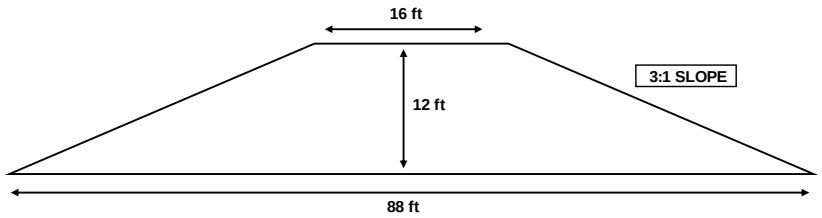
The Arroyo Colorado, that drains to the Laguna Madre, is an ancient distributary of the Rio Grande, and it serves as drainage for crop irrigation, municipal wastewater returns, and as a floodway during periods of heavy precipitation in the lower Rio Grande Valley. The ACF is part of the LRGFCP, which was constructed to protect urban, suburban, and highly developed irrigated farmlands in the Rio Grande delta from floods in both the United States and Mexico. The proposed levee rehabilitation project includes 2.1 miles of the Divisor Dike, and the upper 8.9 miles of the Arroyo Colorado north levee that contain areas of rich farm and citrus land near the municipalities of Mercedes and La Feria, Texas.

Levee floodway system descriptions for the LRGFCP, including the Main and North Floodways and the ACF, are described in detail in the 2008 Final PEIS (USIBWC 2008). Sections of the interior floodway system were identified by hydraulic modeling as priority areas to improve flood containment. The hydraulic evaluation indicated that an increase in levee height, up to 4-feet, would be needed in a number of sections of the ACF to meet design criteria for flood protection (USIBWC 2003a). The section of the ACF evaluated in this EA runs primarily through agricultural areas. Urban development in the section of the ACF evaluated in this EA is primarily limited to portions of Mercedes and La Feria, Texas. No residential developments are allowed within the floodway.

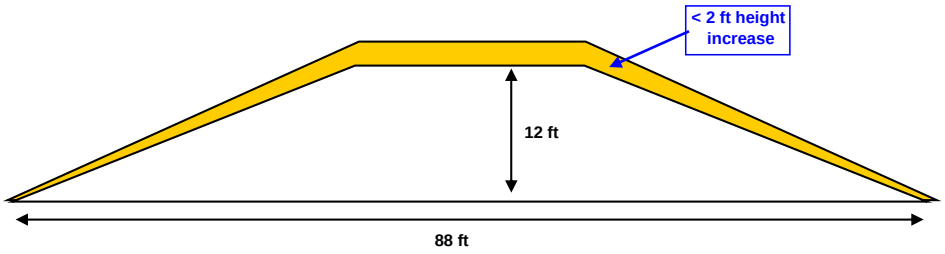
2.2 PROPOSED ACTION

The proposed action would improve flood control and increase flood containment capacity along the Divisor Dike and ACF beginning at Divisor Dike near the juncture point of the Arroyo Colorado and the North Floodway in Hidalgo County and ending at the town of Rio Hondo in Cameron County, Texas. The proposed levee rehabilitation improvements consist of: 1) raising the top-of-levee elevation; 2) conducting geotechnical investigations and testing to determine the type and extent of any required remediation improvements due to slope stability, seepage, levee settlement, and any other geotechnical issues that may cause levee failure during a 100-year flood event; and 3) modifying, if necessary, hardware or structures located along the levee reaches. Any structure modifications would be in compliance with the Texas Historical Commission recommendations. The top elevation of the levee-raising improvements would be to provide containment of flood flows with a minimum freeboard of 3 feet for water surface elevations as calculated in the USIBWC 2003 Hydraulic Model for the LRGFCP (USIBWC 2003a). Raising the levee from the centerline of the levee is assumed for analyses, but raising on the riverside of the levee is possible where right-of-way (ROW) is a constraint.

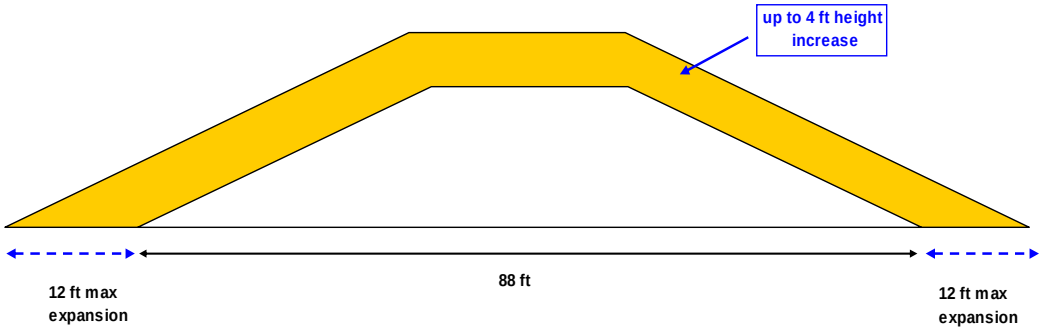
The existing levee is a raised trapezoidal compacted-earth structure with a crown width of 16 feet, a typical height ranging from 10 to 15 feet, and an approximate 3:1 side slope ratio (units of horizontal run in feet per foot of vertical rise). The levee crown is an unpaved service road with restricted public access. The existing levee footprint typically ranges from 70 to 100 feet, depending on location. A typical levee cross-section is shown in the diagram below.



The proposed action would increase flood containment capacity by raising elevation of a number of levee segments for improved flood control. Fill material from commercial sources would be added to the existing levee to bring height to its original design specifications, or to meet a 3-foot freeboard design criterion. Height increases of up to 2 feet in improvement areas would not require expansion of the existing levee footprint.



In some locations, more than 2 feet of fill material would be placed on top of the levee, potentially extending the levee footprint inside the maintained floodway. For a typical levee cross-section with more than 2 feet of fill material the levee footprint would be expanded by 12 feet, 6 feet on either side of the levee. The diagram below shows a centered expansion. For height increases of up to 4 feet, the levee footprint would be expanded by 24 feet, 12 feet on either side of the levee. The need for excavation outside the levee structure is not anticipated.



Figures 2.2 to 2.7 present an overview of the Arroyo Colorado levee systems that would undergo levee rehabilitation. The proposed action would raise the levee in areas where modeling indicates that the existing levee is insufficient to provide 100-year flood protection. The proposed action would increase the height of the levee up to 2 feet for approximately 8.6 percent of the 11-mile segment. Approximately 4 percent of the levee height would be increased from 2 to 4 feet, and approximately 2.4 percent would be increased from 4 to 6 feet. For the remaining 1.2 percent of the segment, a levee would be constructed to a height of 6 to 8 feet in areas where there are currently no levees. Appendix A presents detailed information for the individual segments on levee improvement areas, state and federal natural resources management lands, and locations of wetlands identified during a field survey conducted in support of EA preparation.

Footprint expansion, when required, would take place inside the maintained floodway, and entirely within the flood control project ROW. In some instances, adjustment in levee slope would be made to eliminate the need for levee footprint expansion when required due to construction constraints or for protection of biological or cultural resources. Construction constraints include the presence of irrigation drains or canals as well as structural features abutting or built into the levee, along some reaches of the levee system, or urban development in the immediate vicinity of the levee system. The need for excavation outside the levee structure is not anticipated.

There are two areas where the modeling indicates that more than 6 feet of fill would be required to obtain 100-year flood protection: south of La Feria reservoir and at the easternmost end of the improvement area. Due to the proximity of the existing levee to the boundary of the reservoir in this area, levee improvement may occur by making the slope of the levee on the landside (at the boundary of the reservoir) steeper and armoring the banks of the levee with rip-rap to prevent erosion. Alternatively, levee improvement may be offset toward the riverside of the levee, and up to 36 feet of fill would be added to the riverside toe of the levee.

The eastern end of the improvement area does not include a levee, but rather the “levee road” is on high ground, well above the ACF. Modeling in this location indicates that, because there is no levee in this location, a levee up to 8 feet in height may be required on the crown of the existing road. To the landside of the road, the toe of the road is close to the borrow pit used to construct the road, and close to the USIBWC ROW, and the levee cannot be constructed to the landside of the existing road. However, due to the steep topography in the area, the footprint of the levee cannot extend to the riverside of the existing road. In this case, the slopes of the levee on the riverside would be armored with rip-rap to prevent erosion. Alternatively, a flood retaining wall would be constructed if necessary.

Any staging areas for heavy equipment or soil storage needed for construction activities associated with the proposed action would be located outside the USIBWC ROW and Area of Potential Effect (APE). Vehicles would access the project area by means of existing levee access or farm roads. No new haul roads would be constructed. The majority of work to raise the levee would occur on top of the existing levee. Belly dump trucks would carry commercially obtained fill material to the top of the levee. Areas requiring placement of fill material on the sides of the embankments would be accessed from the top of the levee road and

spread over the embankments until the desired thickness has been reached. After releasing a load of fill, a motorgrader would follow behind to compact fill to the required height. After increasing the height of the levee and extending the footprint, where necessary, the easement area adjacent to the levee, up to 35 feet on either side, would also be subject to compaction.

2.3 ALTERNATIVES CONSIDERED AND ELIMINATED FROM DETAILED STUDY

Levee expansion beyond the current flood control project ROW was ruled out as a viable, or needed, option for levee improvements.

2.4 OTHER ACTIONS WITH POTENTIAL CUMULATIVE IMPACTS

Complete environmental impact analysis of the alternatives must consider cumulative impacts due to other actions. The USIBWC reviewed a number of reasonably foreseeable actions with potential cumulative effects. Two projects were identified along the ACF levee system.

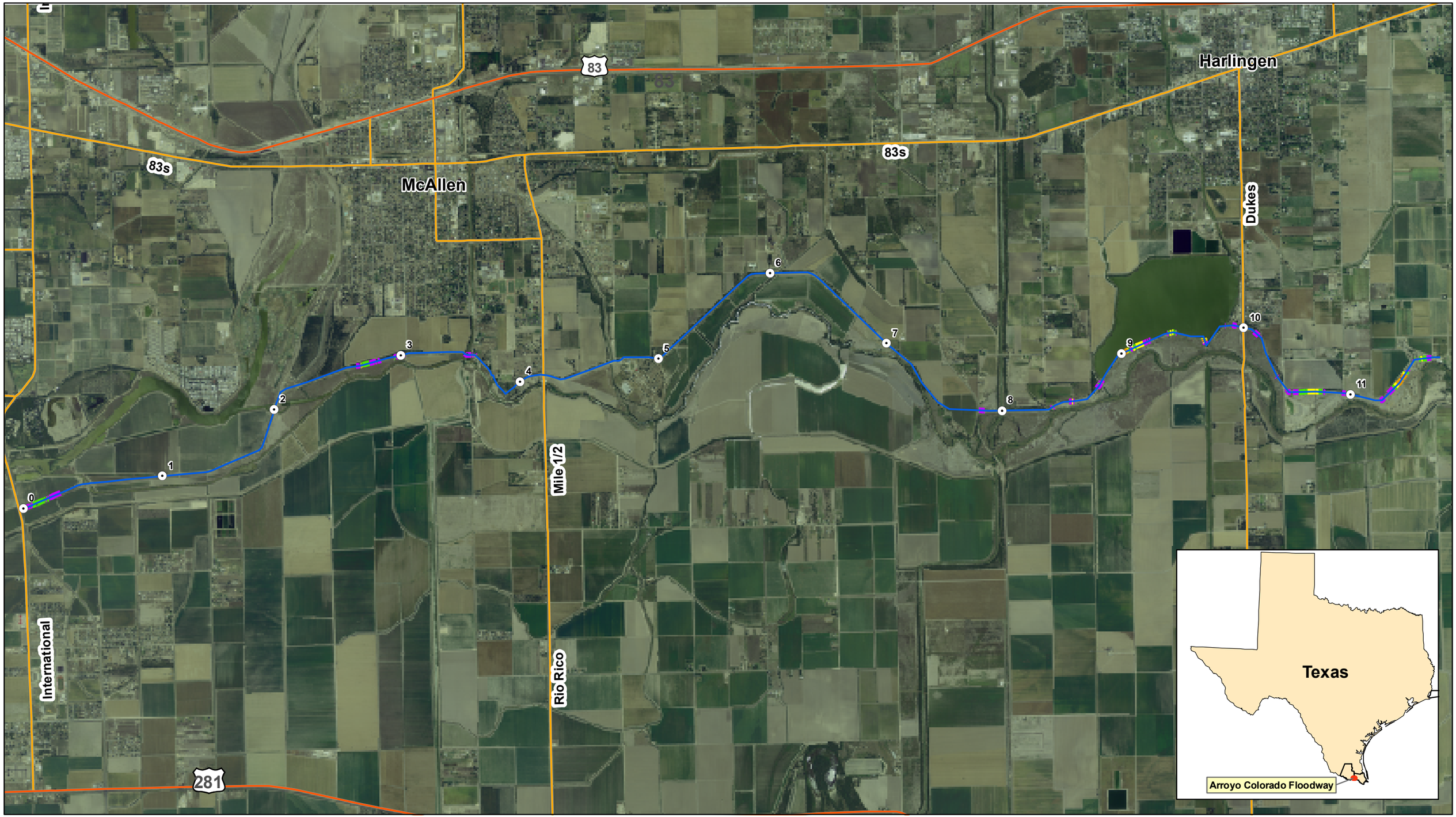
- Construction work for the Main and North Floodway levee improvements project would occur at the same time as the Arroyo Colorado levee improvement project.
- Geotechnical work would be conducted along the 11-mile project area to assess the ability of the levee to safely contain flood flows in the Rio Grande.

Subsection 3.8 provides an assessment of cumulative effects of the Main and North Floodway levee improvements project, in conjunction with the proposed action.

2.5 SUMMARY COMPARISON OF ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES

2.5.1 No Action Alternative

The no action alternative would retain the current configuration of ACF levee system with no impacts to biological and cultural resources, land use, community resources, or environmental health issues. In terms of flood protection, however, current containment capacity under the no action alternative may be insufficient to fully control flooding within the interior floodway system under severe storm events, with associated risks to personal safety and property.



N

0 1 2 Miles

0 1 2 Kilometers

Levee Mile Markers
Levee Centerline
Highway
Major Road

Levee Deficiency
Feet
< 2
2 - 4
4 - 6
6 - 8
8 - 9

Figure 2.1
Site Location

Arroyo Colorado Floodway
Levee Deficiency
International Boundary and Water Commission
United States Section

N

0 1,000 2,000 Feet

0 250 500 Meters

Levee Mile Markers

Levee Centerline

Levee Deficiency
Feet
< 2
2 - 4
4 - 6
6 - 8
8 - 9

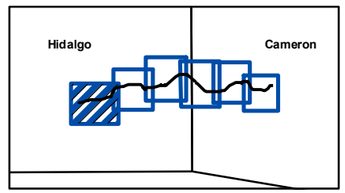


Figure 2.2
Levee Miles 0-2

Arroyo Colorado Floodway
Levee Deficiency
International Boundary and Water Commission
United States Section

0 1,000 2,000 Feet

0 250 500 Meters

Levee Mile Markers

Levee Centerline

Levee Deficiency

Feet

< 2

2 - 4

4 - 6

6 - 8

8 - 9

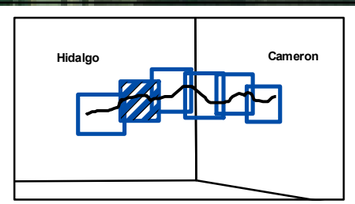


Figure 2.3
Levee Miles 2-4

Arroyo Colorado Floodway
Levee Deficiency
International Boundary and Water Commission
United States Section

N

0 1,000 2,000 Feet

0 250 500 Meters

Levee Mile Markers

Levee Centerline

Levee Deficiency

Feet

< 2

2 - 4

4 - 6

6 - 8

8 - 9

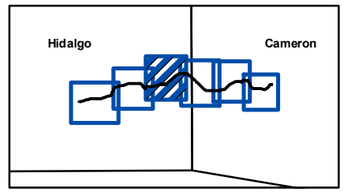


Figure 2.4
Levee Miles 4-6

Arroyo Colorado Floodway
Levee Deficiency
International Boundary and Water Commission
United States Section

N

0 1,000 2,000 Feet

0 250 500 Meters

Levee Mile Markers
Levee Centerline
High Ground, No Levee Present

Levee Deficiency
Feet
< 2
2 - 4
4 - 6
6 - 8
8 - 9

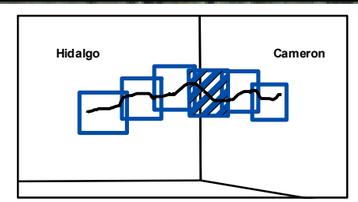
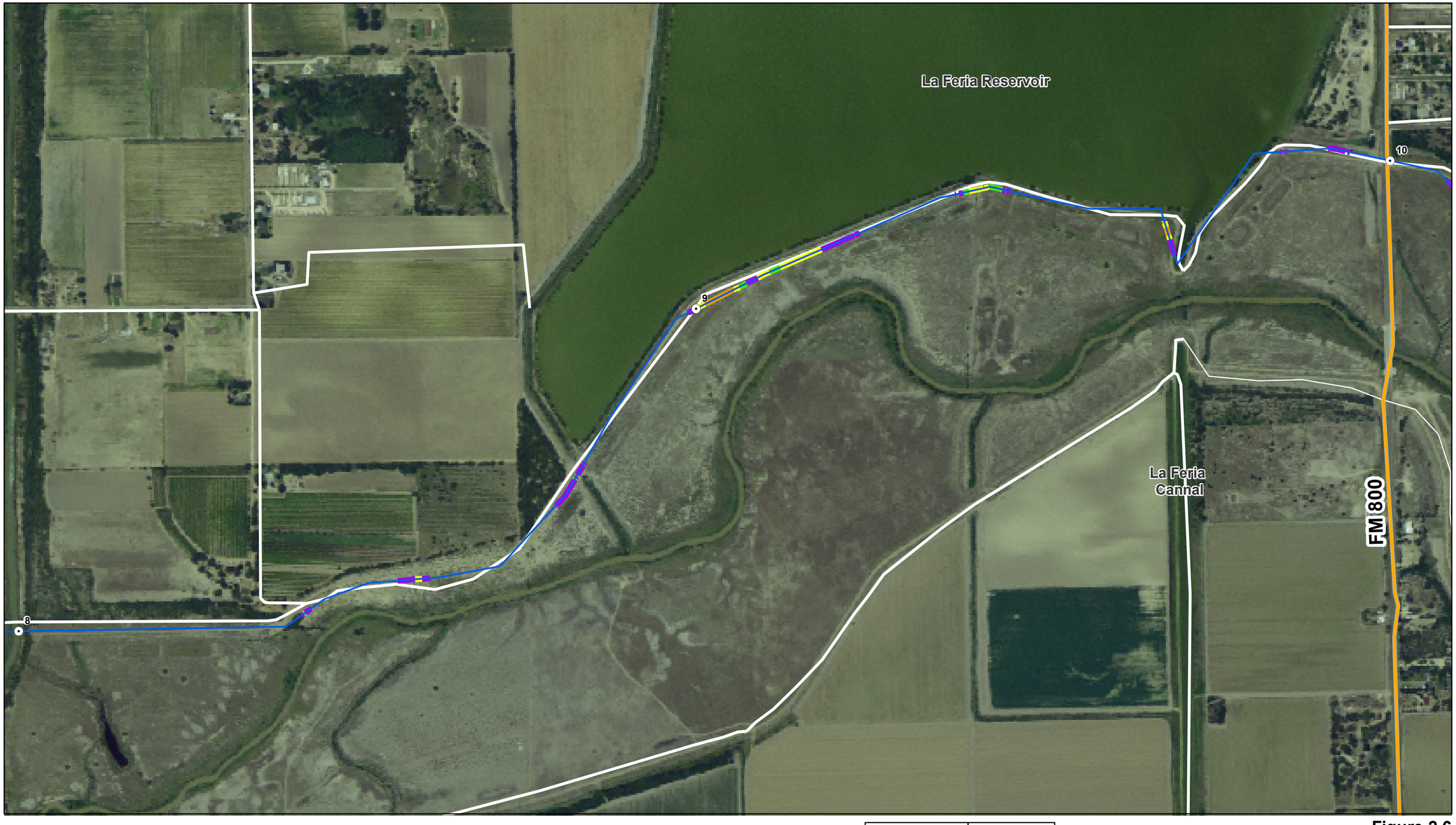


Figure 2.5
Levee Miles 6-8

Arroyo Colorado Floodway
Levee Deficiency
International Boundary and Water Commission
United States Section



N

0 1,000 2,000 Feet

0 250 500 Meters

Levee Mile Markers

Levee Centerline

Levee Deficiency

Feet

< 2

2 - 4

4 - 6

6 - 8

8 - 9

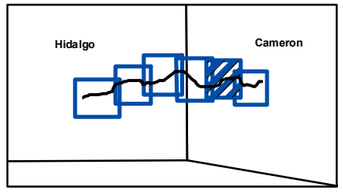


Figure 2.6
Levee Miles 8-10

Arroyo Colorado Floodway
Levee Deficiency
International Boundary and Water Commission
United States Section

N

0 1,000 2,000 Feet

0 250 500 Meters

Levee Mile Markers

Levee Centerline

Levee Deficiency

Feet

< 2

2 - 4

4 - 6

6 - 8

8 - 9

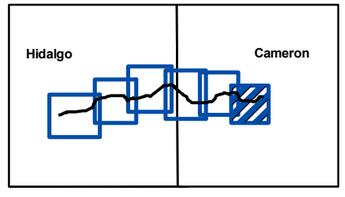


Figure 2.7
Levee Miles 10-12

Arroyo Colorado Floodway
Levee Deficiency
International Boundary and Water Commission
United States Section

2.5.2 Proposed Action

The proposed increase in levee height for improved flood protection in some cases would require extension of the levee footprint into the USIBWC ROW and removal of herbaceous vegetation on the levee slopes. No impacts on biological resources are anticipated since footprint expansion areas would not take place along natural resources conservation areas. Similarly, there would be no significant impacts (*i.e.*, "unresolvable" adverse effects under the National Historic Preservation Act) to cultural resources because all cultural resources would be identified and evaluated for eligibility on the National Register of Historic Places (NRHP). Any impacts to NRHP-eligible resources would be mitigated prior to implementation of levee height increases or footprint expansion, in consultation with the Texas Historical Commission (THC) and Native American Tribes.

All levee expansion, when required, would take place along the current levee alignment and in areas immediately adjacent to the levee where footprint expansion is required, inside the maintained floodway, and entirely within the flood control project ROW. No potential impacts on land use, community resources, or environmental health issues as a result of the levee improvement were identified. Table 2.1 summarizes the potential environmental consequences of the proposed improvements to the ACF levee system.

Table 2.1 Summary of Environmental Impacts of Proposed Improvements to the Arroyo Colorado Floodway

Resource Area	Environmental Impacts
Biological Resources *(Subsection 3.1)*	Flood control improvements to the levee system would include placement of fill material that would affect grassed areas at levee footprint expansion locations. All expansion would take place along the centerline of the current levee, limiting vegetation removal to invasive species grasses and weedy species on the levee slopes. Native herbaceous species would be planted at the completion of the project. There is limited woody vegetation in the project area, typically restricted to the banks of the Arroyo Colorado or toward the north side of the levee, outside the project area. No significant effects on wildlife habitat in the vicinity of the levee system are anticipated, including potential habitat for threatened and endangered species. No natural resources conservation areas are immediately adjacent to the levee expansion corridor. In areas requiring levee footprint expansion, no woodland communities would be impacted, and impacts on vegetation would be limited to non-native grasslands along the levee. The levee slopes provide only limited value as wildlife habitat. Limited wetlands are present near the levee, but no wetlands are close enough to the proposed expansion areas to be affected by levee raising and potential footprint expansion.

Table 2.1 Summary of Environmental Impacts of Proposed Improvements to the Arroyo Colorado Floodway (continued)

Resource Area	Environmental Impacts
Cultural Resources *(Subsection 3.2)*	Levee improvements may adversely affect unrecorded prehistoric and historic archaeological resources. Areas adjacent to the toe of the levee may contain intact archaeological resources. The majority of levee height increases (approximately 83.8% of the project area) would take place on top of the current levee and within the existing levee alignment. In a few segments of the project area, the width of the levee footprint (base) would be expanded to accommodate height increases above 2 feet. Fill material obtained from commercial sources would be used to expand the footprint of the levee from the existing alignment into the service road or floodway up to 12 feet. Adverse effects to archaeological resources may occur from the use of heavy equipment during levee construction that could disturb surface or shallowly buried deposits. Adverse effects may also occur to archaeological deposits that would be buried by the addition of the fill material on the surface above them. Alternatively, levee footprint expansion may protect archaeological resources by capping with fill material, preserving those resources in place. Architectural resources may be adversely affected by levee height increases or by expansion of the levee footprint. Potential effects include vibration and ground disturbance from the use of heavy equipment during construction. In addition, several resources associated with flood control or water delivery, including the levee itself, and resources on top of or built into the existing levee, could be buried when fill material to raise the height of the levee is added. The increased height of the levee is not expected to change the flow of water to or from architectural resources in the floodway or farm fields flanking the levee. Native American resources may be affected by the levee improvements; consultation with the Native American tribes will assist in identifying resources or concerns regarding the project. Under NEPA, there would be no significant impacts (*i.e.*, "unresolvable" adverse effects under NHPA) to cultural resources because all cultural resources would be identified and evaluated for NRHP eligibility. Any impacts to NRHP-eligible resources would be mitigated prior to implementation of levee height increases or footprint expansion, in consultation with the Texas Historical Commission and Native American Tribes.
Water Resources *(Subsection 3.3)*	Flood control Improvements to the ACF would increase flood containment capacity to control the design flood event with a negligible increase in water surface elevation. Levee footprint expansion would not affect water bodies.
Land Use *(Subsection 3.4)*	Footprint levee expansion, where required, would take place completely within the existing floodway. No urban or agricultural lands would be affected.
Soil *(Subsection 3.5)*	Levee fill material would come from local commercial sources and not from borrow areas in the floodplain. The disturbance of soil would occur within areas where soil has been disturbed and modified by prior levee construction and maintenance activities. Therefore, alteration of soil previously unassociated with the existing levee would not occur.

Table 2.1 Summary of Environmental Impacts of Proposed Improvements to the Arroyo Colorado Floodway (continued)

Resource Area	Environmental Impacts
Community Resources *(Subsection 3.6)*	In terms of socioeconomic resources, the influx of federal funds into Hidalgo and Cameron Counties from the flood control improvements project would have a positive but minor local economic impact. The impact would be limited to the construction period, and represent less than 1% of the annual county employment, income, and sales values. No adverse impacts to disproportionately high minority and low-income populations were identified for construction activities. Moderate utilization of public roads would be required during construction; a temporary increase in access road use would be required for equipment mobilization to staging areas.
Environmental Health Issues *(Subsection 3.7)*	Estimated air emissions of five criteria pollutants during construction would be discontinuous and represent less than 0.13% of the annual emissions inventory within the air quality control region of Hidalgo, Cameron, and Willacy Counties. There would be a moderate increase in ambient noise levels due to construction activities. No long-term and regular exposure is expected above noise threshold values. A database search indicated that no waste storage and disposal sites were within the proposed ACF levee project area, and none would affect, or be affected by, the levee improvement project.

SECTION 3
AFFECTED ENVIRONMENT AND POTENTIAL ENVIRONMENTAL CONSEQUENCES

This section describes resources in the potential area of influence of the levee construction project and presents an analysis of potential environmental impacts that could result from implementation of the no action alternative and the proposed action. The sequence of resource areas presented in this section are discussed as follows:

- Biological resources;
- Cultural resources;
- Water resources;
- Land use;
- Soil;
- Community resources; and
- Environmental health.

3.1 BIOLOGICAL RESOURCES

Biological resources analyses considered whether and to what extent the action would:

- Diminish habitat for a plant or animal species;
- Diminish population sizes or distribution of regionally important plant or animal species; and/or;
- Interfere with wildlife movement or reproductive behavior; or
- Adversely affect endangered species.

3.1.1 Biological Resources Affected Environment and Environmental Consequences

3.1.1.1 Vegetation

Based on literature review and field surveys, the following four vegetation community classifications were identified as occurring within the improvement area: a) Woodlands/Thornscrub; b) Herbaceous; c) Wetlands/Riparian communities; and d) Agricultural/Rangeland. In addition to these four plant communities, open waters were mapped, and developed areas were mapped, including roads, urban areas, and other impervious cover.

Regional Vegetation

The Lower Rio Grande Valley (LRGV) covers an approximate 150-mile segment of the Rio Grande that extends from Falcon Reservoir Dam to the river opening into the Gulf of Mexico. The Arroyo Colorado, as a former distributary of the Rio Grande, runs a course approximately parallel to the lowermost portion of the Rio Grande (Texas Parks and Wildlife Department [TPWD] 2006). The Arroyo Colorado is up to 20 miles north of the Rio Grande. The LRGV is part of the Tamaulipan Biotic Province as described by Blair (1950) and summarized by Judd (2002) of southern Texas and northeastern Mexico where multiple vegetation communities and warm average temperatures provide a highly diversified wildlife habitat.

Potential Levee Improvement Areas

Vegetation along the levee corridors of the ACF levee system was evaluated during field surveys conducted during April 6 – 9, 2009 to identify plant communities, threatened and endangered (T&E) species habitat, and potential jurisdictional wetlands, as listed below. Results of the field studies conducted in support of this EA preparation are reported in the document Technical Support Studies for the Environmental Assessment of Flood Control Improvements to the ACF Levee System (see Appendix E).

Vegetation communities were determined within a 160-foot wide buffer centered on the levee centerline (*e.g.*, 80 feet to each side of the levee) along the entire length of the improvement area to ensure coverage by field survey included in the potential levee expansion areas. The 160-foot wide survey corridor includes 228 acres, including the levee slopes, which are included in the levee footprint. The current levee footprint and maximum levee expansion area for levee height increases would account for 127.6 acres of herbaceous vegetation within the survey corridor. Potential levee footprint expansion areas were determined from USIBWC levee evaluation data (USIBWC 2003a), and from modeling performed by the USIBWC using recent Lidar data. Following the field mapping efforts, this expansion area was analyzed using Geographic Information Systems (GIS) to determine the composition of the vegetation community based on vegetation mapping within the survey corridor. The 160-foot survey corridor and maximum potential levee improvement area are shown on the schematic cross sections in Subsection 2.2 where up to 2 feet of fill material would be added, assuming a centerline expansion. For areas where the levee would be raised between 2 and 4 feet (4%, or 2,318 feet), the levee improvement would utilize an additional 1.28 acres outside the current levee footprint (24 feet). In areas where the levee would be raised between 4 and 6 feet (2.4%, or 1,393 feet), the levee improvement would utilize an additional 1.15 acres outside the current levee footprint (36 feet).

South of the La Feria reservoir where modeling indicates that more than 6 feet of fill would be required to obtain 100-year flood protection, an offset levee would be required (see Subsection 2.2), and calculation of the amount of herbaceous vegetation removed for the levee improvement (1.15 acres) includes expansion of the levee at this location using the offset expansion.

The eastern end of the improvement area does not include a levee, but rather the "levee road" is on high ground, well above the ACF. Because this area has steep topography and unique requirements for additional levee construction, the calculation of 2.43 total acres (1.28 + 1.15 = 2.43) of herbaceous vegetation removed does not include segments at the east end of the levee that require 6 feet or more of fill on the existing road.

No Action Alternative Environmental Consequences

No changes would be made to improve the levees. The levee slopes would continue to be mowed on an as-needed basis, which would maintain the vegetation as non-native grasses and stunted honey mesquite. No herbaceous vegetation or plant habitat would be affected.

Proposed Action Environmental Consequences

Improvements to the ACF levee system would add fill to the crown of the levee, the sidewalls of the levee, and areas immediately adjacent to the levee. Improvements to the ACF levees would affect herbaceous plant communities (primarily non-native grassland) through fill activities, but not wooded areas. A total of 228 acres of vegetation is present within the 160-foot wide survey corridor. The area of the 160-foot wide survey corridor, and the levee expansion would remove up to 127.6 acres of herbaceous vegetation on the existing levee slopes, and 2.43 acres of herbaceous vegetation adjacent to the levee for increases in levee footprint. Native grasses would be planted on both the levee slopes and adjacent areas after project completion. Therefore, herbaceous vegetation would be lost temporarily during construction activities, and the loss of an additional 2.43 acres of herbaceous vegetation would not diminish overall population sizes or plant habitats.

One small tract of land is owned and/or managed by the USFWS as part of the LRGV National Wildlife Reserve. This tract of USFWS land intercepts the ACF at approximately levee mile 8. However, the ACF levee in this area would be raised less than 2 feet, and no levee footprint expansion would occur. Therefore, the USFWS tract would not be affected by the potential levee expansion.

3.1.1.2 Wildlife

Regional Wildlife

From a regional perspective, the proposed levee improvement area is located within the LRGV. The USFWS maintains one unit of the LRGV National Wildlife Refuge as a corridor adjacent to the Willacy Canal. The tract intersects the ACF at approximately levee mile 8. The wildlife refuge is a component of a multi-partner effort attempting to connect and protect blocks of habitat, known locally as a Wildlife Corridor (USFWS 2009). The Wildlife Corridor partnership includes USFWS, TPWD, National Audubon Society, The Nature Conservancy, and private owners, and extends over 90,000 acres within the four southernmost counties of Texas (Hidalgo, Cameron, Willacy, and Starr Counties) (USFWS 2009; USIBWC 2003b).

Common LRGV wildlife species include whitetail deer (*Odocoileus virginianus*), turkey (*Meleagris gallopavo*), javelina (*Pecari tajacu*), bobwhite quail (*Colinus virginianus*), scaled quail (*Callipepla squamata*), white-winged dove (*Zenaida asiatica*), mourning dove (*Zenaida macroura*), cottontail rabbit (*Sylvilagus floridanus*), jackrabbit (*Lepus californicus*), waterfowl, and a variety of nongame birds. The region also provides important wintering habitat for migratory birds, including many species of passerines, raptors, sandhill cranes (*Grus canadensis*), ducks, and geese. In addition to the more common wildlife species, a number of unique and rare animals occur in the region (World Wildlife Fund 2001, USIBWC 2003b, USIBWC 2008).

Levee System Corridor

Along the levee corridor, habitat considered high quality wildlife habitat is limited. Plant communities considered high quality habitat include thorn woodlands and wetlands/riparian areas. The riparian areas immediately adjacent to the Arroyo Colorado have woody vegetation that could be utilized by some wildlife species, but the riparian corridor is relatively narrow in most places, limiting extensive wildlife utilization, particularly those species with large home ranges. The remaining habitat in the levee system corridor is dominated by non-native grassland areas and agricultural/rangeland areas, and these habitats are considered low quality habitats for wildlife species, with the exception of raptors, which hunt in the grassland areas. The USFWS maintains one unit of the LRGV National Wildlife Refuge as a corridor adjacent to the Willacy Canal. Within the ACF levee system corridor, there are several areas considered wetlands, or areas where water is ponded (particularly in borrow pits as a result of levee construction), and several waterfowl species utilize these areas.

No Action Alternative Environmental Consequences

No changes would be made to improve the levees. The ongoing mowing operations would maintain the non-native grasses and stunted honey mesquite on the levee slopes, which provides little suitable wildlife habitat, except as transit corridors, with the exception that several species of raptors hunt in the non-native grassland areas. No high quality wildlife habitat would be altered, nor would raptor hunting grounds be altered under the no action alternative.

Proposed Action Environmental Consequences

The value of vegetation to wildlife along the ACF levee system depends on the quantity of habitat and the relative successional stage of the vegetation (quality of habitat). The thorn woodlands and wetlands areas along the ACF levee system may provide the best quality wildlife habitat, but are limited in spatial area. The grassland and agricultural areas are dominated by invasive or cultivated species, and provide little suitable habitat for most wildlife species. Some wildlife species may utilize these areas as transit corridors, but the usage is likely limited. Several raptor species utilize the grassland areas and, to some extent, the agricultural areas for hunting. The proposed action would not affect the USFWS tract that intercepts the ACF.

The ACF levee expansion would not remove any Mesquite-Acacia thorn woodland that occurs within the 160-foot wide survey corridor. If levee expansion is required in these areas, it would not extend into these sensitive areas.

The herbaceous non-native vegetation described in Subsection 3.1.1.1 is considered relatively low-quality wildlife habitat. Native grasses would be planted on both the levee slopes and adjacent areas after completion of the project. The raptors that utilize the grassland areas for hunting would likely utilize other areas during construction, and would utilize the area after the grasses re-establish. The loss of 2.43 acres of low quality non-native grasslands would not diminish population sizes or wildlife habitat under the proposed action.

3.1.1.3 Threatened and Endangered Species

Habitat requirements and life history for each federal and state-listed species potentially occurring along the ACF levee system corridor were identified through literature review. Sources of information included T&E species fact sheets published by natural resource agencies, species recovery plans, and scientific literature (USFWS 2005). The TPWD compiles a list of federal and state-listed species and species of concern. The lists are organized by county (TPWD 2007). Appendix B lists federal and state-listed species potentially occurring within Cameron and Hidalgo Counties where the levee system is located. Twenty-one species are federally listed as threatened or endangered, or as candidate species, and 33 species are on state-threatened and endangered species lists, including two species that are federally delisted, but still state-listed as endangered. A detailed analysis is provided in Section 5 of the *Technical Support Studies Report* prepared in conjunction with this EA.

Preferred habitat types for each T&E species potentially occurring in Hidalgo and Cameron Counties were compared to the habitat types identified during field surveys to evaluate their likelihood of occurrence. The habitat determination was categorized according to USFWS guidelines as follows:

- Not Likely Present: no suitable habitat identified;
- Potentially Present: habitat present but there are no records of species occurrence in the vicinity;
- Likely Present: habitat present and species are known to occur in the vicinity; and
- Present: observed.

For those species considered potentially or likely present in the area, a determination of the effect of each action on those species was made. The determination of effect includes vegetation that may be altered or removed, water resources used by the species (if appropriate), and the effects of construction activities such as noise and disturbance during breeding activities.

No Action Alternative Environmental Consequences

No changes would be made to improve the levees. The ongoing mowing operations would maintain the non-native grasses on the levee slopes, which provides little suitable T&E

habitat, except possibly as transit corridors. If populations or individuals of T&E species occur in the improvement area, the species will not be affected by on-going operations, and no habitat for T&E species will be lost under the no action alternative.

Proposed Action Environmental Consequences

Levee expansion activities of the ACF levee system would occur on the crown of the levee and immediately adjacent to the levee. No levee expansion activities would occur in wooded areas nor would levee expansion encroach on habitat suitable for T&E species. Within Cameron and Hidalgo Counties, 21 species are federally listed as threatened or endangered, and 33 species are listed by the State of Texas as threatened or endangered. Of these 21 federally listed species, eight species have a potential to occur within the counties included in the improvement area. Levee expansion activities would not remove suitable T&E habitat. Therefore, no adverse effects to T&E species would be expected from the levee improvement. No adverse modification of habitat for listed species or effect on listed individuals or populations is expected to occur as a result of levee expansion activities.

Unforeseen adverse effects may be prevented by timing construction activities to avoid breeding and nesting seasons of T&E species. Consultation with TPWD and USFWS would be needed to schedule construction activities to minimize potential impacts on species and species habitat (see the *Technical Studies Report* compiled in conjunction with this EA).

3.1.1.4 Wetlands and Aquatic Habitat

Several individual wetland features were identified during field surveys; however, very few of these features were in the 160-foot wide survey corridor. Potential wetlands areas were initially identified using aerial photography, soil maps, and National Wetlands Inventory data. Specific wetlands delineations and analysis is provided in Section 4 of the *Technical Support Studies Report* prepared in conjunction with this EA. Non-jurisdictional wetlands within the survey corridor are described as "Non-jurisdictional water features" that are typically seasonally or temporarily flooded former borrow pits or artificial settling basins used for irrigation.

No Action Alternative Environmental Consequences

No changes would be made to improve the levees. There are no anticipated impacts to jurisdictional wetlands or aquatic habitat due to ongoing operations. The ongoing operations will not add fill or sediment to existing wetlands, or remove or alter wetland habitats.

Proposed Action Environmental Consequences

There are potential jurisdictional wetlands within the 160-foot wide survey corridor; however, no wetlands (jurisdictional or non-jurisdictional) were observed within the potential levee expansion area during the field survey. Subsequent GIS analysis using the USIBWC levee deficiency study data (USIBWC 2003a) confirmed that none of these wetlands are within the potential improvement area. Therefore, no impacts to jurisdictional wetlands are

anticipated from levee improvement activities associated with the ACF levee system, and existing wetlands would not be removed or altered by the levee expansion.

3.2 CULTURAL RESOURCES

Cultural resources are prehistoric and historic sites, structures, districts, artifacts, or any other physical evidence of human activity considered important to a culture, subculture, or community for traditional, religious, scientific, or any other reason. Cultural resources are discussed in terms of archaeological sites, which include both prehistoric and historical occupations, architectural resources, and locations of concern to Native Americans, including Traditional Cultural Properties. Although cultural resources are addressed in NEPA, procedures for their identification, evaluation, and treatment are contained in a series of other federal and state laws and regulations and agency guidelines. Historic properties, as defined by the NHPA, represent the subset of cultural resources listed on, or are determined eligible for, inclusion on the NRHP.

An undertaking has an effect on a cultural resource when that action "may alter the characteristics of the property that may qualify the property for inclusion in the National Register" (36 CFR 800.5 (a)(1)). An undertaking is considered to have an adverse effect when the effect "may diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association." Adverse effects as defined by Section 106 of the NHPA include, but are not limited to:

1. Physical destruction, damage, or alteration of all or part of the property;
2. Isolation of the property from or alteration of the character of the property's setting when that character contributes to the property's qualification for the NRHP;
3. Introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting;
4. Neglect of a property resulting in its deterioration or destruction; and
5. Transfer, lease, or sale of the property (36 CFR 800.5 (a)(2)).

For purposes of this EA, a significant impact under NEPA is defined as an unresolvable "adverse effect" under Section 106 of the NHPA.

3.2.1 Cultural Resources Affected Environment and Environmental Consequences

The APE for the Divisor Dike and ACF improvement area consists of the USIBWC ROW, including the dike or levee, and an easement of up to 35 feet from both the north and south toes of the dike or levee. In some places, this ROW includes narrow, unpaved levee service roads or farms roads around agricultural fields

3.2.1.1 Previously Identified Cultural Resources within the ACF Improvement Area

Three cultural resources, two archaeological sites, and one cemetery, were previously identified within the ACF APE. An archaeological survey was conducted within a portion of the improvement area in 2004 resulting in the identification of sites 41CF180 and 41CF181 (Bradle and Fuller 2004). An intensive archaeological survey of the entire improvement area will be conducted as part of cultural resources investigations supporting this EA. Information on previous surveys in and in the vicinity of the project area will be included in the cultural resources survey report.

Archaeological Sites

Two previously recorded sites (41CF180 and 41CF181) are located within the ACF APE and were reported on State of Texas Archaeological Site Data Forms by the American Archaeology Group (Bradle and Fuller 2004; Texas Historical Commission 2009a). Site 41CF180 was recorded as two possible hearths evidenced by burned, discolored clay with mussel and marine shell fragments. Site 41CF181 consists of a partially buried prehistoric component and a surface scatter of early 20th century artifacts. Both sites are intact as they were avoided by subsequent sand mining operations and associated construction of access roads related to that project on the Arroyo Colorado (Bradle and Fuller 2004).

Ebony Grove Cemetery

The Ebony Grove Cemetery was designated a Historic Texas Cemetery in 2006. The Cemetery was established in 1922 when the American Rio Grande Land and Irrigation Company developed land around Mercedes, Texas. Nine acres of land were deeded to the Mercedes Cemetery Association, and this organization continues to perform maintenance on the cemetery grounds. Several graves reinterred from another cemetery date from the latter part of the 19th century (Texas Historical Commission 2009b).

Impacts to archaeological sites include physical disturbance through construction of the levee. Heavy equipment, such as dump trucks and motorgraders, may create churning of surface or shallow subsurface deposits, which may be particularly severe during rainy periods. Any ground-disturbing activity in the area of an NRHP-eligible or potentially eligible archaeological site, or modification to such a site, could disturb or destroy the integrity of the archaeological site, resulting in alteration or destruction of those characteristics or qualities that make it potentially eligible for inclusion in the NRHP.

No Action Alternative Environmental Consequences

Under the no action alternative, the current levee configuration would be retained and operation and maintenance (O&M) of the existing structures along the levee and in the floodway would continue. No adverse effects to archaeological resources differing from the baseline condition would be expected. Existing conditions and natural degradation of archaeological resources would continue from increased flooding and erosion potential along the floodway where buried archaeological sites may occur. Cultural resources would continue

to be managed in accordance with Sections 106 and 110 of the NHPA and USIBWC Directives.

Proposed Action Environmental Consequences

Proposed improvements to the Divisor Dike and ACF North levee system may adversely affect unrecorded prehistoric or historic archaeological sites. Two archaeological sites were previously identified within the APE, but only a portion of the APE has been subject to survey; an intensive archaeological resources survey of the entire improvement area has not been completed. Geoarchaeological investigations in other areas of the of the lower Rio Grande floodplain reveal the potential for buried prehistoric deposits associated with older Holocene river meanders, alluvial fans, and relict terraces.

Although no excavation is planned in the floodplain along either side of the levee, the use of heavy equipment, as described in Subsection 2.2, could result in ground disturbance from the creation of track and tire ruts extending several inches below ground surface. Archaeological resources on the surface or shallow subsurface deposits may be adversely affected by the use of heavy mechanical equipment in the APE and along access routes.

If present, archaeological resources in the floodway have already been capped (buried) by the creation of the Divisor Dike and North Levee of the Arroyo Colorado. Fill material was added to the surface of the floodway to create the earthen levee and dike during the original construction of the ACF in the 1940s. Unrecorded archaeological sites may be capped by the addition of soil and gravel used to extend the width (footprint) of the existing levee in deficient locations along the Divisor Dike and ACF.

In some instances, capping may provide a beneficial impact to identified or potential archaeological resources as one method to preserve archaeological resources in place and prevent their inadvertent exposure or destruction. However, to avoid potential adverse effects from capping archaeological sites (*e.g.,* from crushing and compaction), the THC developed recommendations for appropriate techniques to intentionally bury these resources (Texas Historical Commission 1999). These procedures are discussed in Section 4, Best Management Practices. Activities associated with levee expansion may result in adverse effects to archaeological resources.

3.2.1.2 Architectural Resources

Forty-two historic-age or unknown-age architectural resources were identified within the ACF APE during the architectural survey conducted in April 2009. The resources consist of water control structures, including irrigation and drainage features that convey water to and from the Arroyo Colorado from the surrounding farmland. These features include an interconnected system of gatewells, pipes, culverts, and screwgates; separate culverts, headwalls, and wingwalls; the raised earthen North Levee of the Arroyo Colorado and Divisor Dike dividing the Main Floodway of the LRGFCP into the North Floodway and ACF; and a cableway for water flow measurement, drain ditches, and vertical field drains, some of which are associated with the original construction of the ACF Project in the 1940s. Additional resources in the APE include a cemetery and a residential dwelling. Most of these resources

are more than 50 years old and will be evaluated for eligibility to the NRHP as part of a cultural resources survey being conducted to support this EA. All architectural resources in the APE are summarized in Table 3.1.

Table 3.1 Architectural Resources in the Area of Potential Effect

Resource Type	Quantity
Gatewell / Pipe / Culvert / Screwgate System*	22
Culvert / Headwall / Wingwall (no gatewell or screwgate)*	9
Levee / Dike	2
Cableway	1
Drain Ditch	5
Vertical Field Drain / Pipe	1
Other Architectural Resources (Cemetery, Residential Dwelling)	2

Impacts to architectural resources include alteration of architectural traits by modification to existing structures, structural instability to existing structures from erosion, and physical disturbance and vibration effects through use of heavy equipment. Any alteration of architectural traits or loss of structural stability can affect the physical integrity of an NRHP-eligible or potentially eligible architectural resource, resulting in alteration or destruction of those characteristics or qualities that make it potentially eligible for inclusion in the NRHP.

No Action Alternative Environmental Consequences

Under the no action alternative, the current dike and levee configuration would be retained and O&M would continue. No adverse effects to architectural resources differing from the baseline condition would be expected. Existing conditions and natural degradation of architectural resources would continue from increased potential for flooding, which reduces the structural integrity of water control structures (*e.g.*, breaches of screw gates, siltation of drains, and culverts, potential collapse of box culverts supporting the levee over drains and pipes). Cultural resources would continue to be managed in accordance with Sections 106 and 110 of the NHPA and USIBWC Directives.

Proposed Action Environmental Consequences

Proposed improvements to the ACF levee system may adversely affect architectural resources in the APE. Under the proposed action, construction associated with rehabilitation of the levee (toe/footprint expansion) would occur in proximity to architectural resources (*e.g.*, gatewells and screwgates on top of the levee, and culverts and drains under the levee), some of which may be considered eligible for the NRHP. The use of heavy equipment as described in Subsection 2.2, could result in ground disturbance and vibration effects to architectural resources under the levee. Modifications to architectural resources, including height increases and, in some areas, widening of the levee footprints would occur as a result of the proposed action. Resources such as the gatewells and screw gates that occur on top or are built into the

slope of the levee may be affected when the levee is raised or widened. Resources like the culverts, headwalls, and wingwalls could potentially be covered by the addition of soil at the base of the levee to expand the footprint.

3.2.1.3 Native American Resources

Native American resources are sites, areas, and materials important to Native Americans for religious or heritage reasons. Resources may include prehistoric sites and artifacts, contemporary sacred areas, traditional use areas (*e.g.*, native plant or animal habitat), sources used in the production of sacred objects and traditional implements, or traditional cultural properties. Sacred places important to religion may also be present and include mountain peaks, springs, and burial sites. Traditional rituals may prescribe the use of particular native plants, animals, or minerals from specific places. Therefore, activities that may affect sacred areas, their accessibility, or the availability of materials used in traditional practices may be of concern.

Two Native American groups that may have historical ties to the project area are identified in Table 3.2. The USIBWC initiated consultation with these Native American groups, pursuant to 36 CFR 800.2, to ensure that any sites of traditional cultural value are identified and adequately considered under the proposed action.

Table 3.2 Native American Groups Identified for the ACF Improvement Area

State	Tribal Name
Oklahoma	Comanche Nation
	Kiowa Tribe of Oklahoma

Impacts to Native American resources include destruction of traditional resources, burials, and sacred sites, and plant or animal habitat through ground-disturbing activities such as riverbed dredging and levee reconstruction. Audio and visual intrusion may adversely affect the visual and audio landscape or the viewshed of these resources as well as disturb any associated ceremonial activities. These types of physical disturbance may disturb or destroy unidentified Native American resources.

Native American consultation has been initiated with the Comanche Nation and Kiowa Tribe of Oklahoma to identify any Native American resources or concerns.

No Action Alternative Environmental Consequences

Under the no action alternative, the current levee configuration would be retained and O&M would continue.

Proposed Action Environmental Consequences

Although no resources or concerns to Native American Tribes have previously been identified, it is possible that activities related to levee improvements in the ACF APE would result in limited access to segments of the Arroyo Colorado and sites and resources within the

floodway during levee improvement. It is also possible that expanding the footprint could cover unrecorded resources of interest to Tribes and would result in adverse effects to resource accessibility for Native Americans.

3.3 WATER RESOURCES

3.3.1 Water Resources Affected Environment and Environmental Consequences

Impacts to water resources would be considered significant if any of the following were to occur: substantial flooding or erosion; adverse effects on any significant water body (such as stream, lake, or bay); exposure of people to reasonably foreseeable hydrologic hazards such as flooding; or adverse effects to surface or groundwater quality or quantity. Impacts on water quality would be considered significant when concentrations of indicator parameters exceeded regulatory values for protection of human health and aquatic life.

3.3.1.1 Regional Flood Control

Detailed information about regional flood control, design flows, and how flood waters are diverted in the interior floodway along the LRGFCP is provided in the 2008 Final PEIS (USIBWC 2008). The ACF levees begin at Divisor Dike near the Town of Mercedes in Hidalgo County, and end at the Town of Rio Hondo in Cameron County. The levee ROW runs primarily through agricultural areas. Numerous irrigation canals intersect the exterior side of the levee at La Feria, Adams Garden and Harlingen irrigation districts in Cameron County, and the Mercedes Irrigation District located in Hidalgo County.

The interior floodway system was designed with a 3-foot freeboard that is not currently met in one ACF segment and two segments in the North Floodway (USIBWC 2003a). The ACF segment requiring height increase extends 11 miles, from the Divisor Dike to White Ranch Road. Levee elevation data and the need for height increases were determined in a hydraulic modeling study conducted in October 2003 by the USIBWC.

The USIBWC commissioned the U.S. Army Corps of Engineers (USACE) Engineer Research and Development Center to assess structural integrity of the entire LRGFCP levee system. The study indicated that the overall structural condition of the ACF levees fell in the good and adequate categories (USACE 2003); a need for structural improvements is not anticipated.

No Action Alternative Environmental Consequences

The no action alternative would retain the current configuration of the ACF levee system, as designed over 30 years ago, and maintain the current level of protection currently associated with this system. Under severe storm events, current containment capacity may be insufficient to fully control Rio Grande flooding with risks to personal safety and property.

Proposed Action Environmental Consequences

Improvements to the levee system would increase flood containment capacity to control the design flood event as evaluated by hydraulic modeling. A minimum change in water elevation, less than 1 inch, would be anticipated as a result of the levee height increase for the ACF levee system. In areas where there are structural deficiencies in the levee system, the proposed levee expansion would address those deficiencies during construction to improve the overall performance of the ACF levee within the first 11 miles.

3.3.1.2 Water Flow

Flow in the Arroyo Colorado is sustained by wastewater discharges, agricultural return flows, urban runoff, and base flows from shallow groundwater. During non-flood conditions, irrigation/municipal water and local drainage flow into the floodways through irrigation and drainage structures. One third of the stream is also used for shipping from the Gulf Intracoastal Waterway to the Port of Harlingen (Arroyo Colorado 2009).

The ACF empties into the Laguna Madre north of the dredged Arroyo Colorado mouth. The ACF has a high channel bottom and therefore does not receive any flow from Llano Grande except during flood conditions. The flood control features at this site are used to divert a significant portion of flood waters conveyed by the Main Floodway to the ACF during flood events.

Flow into the interior floodways is controlled by the USIBWC with adjustable gates that are closed during high storm events. This could cause flood water to back up into agricultural drainages. A number of pumps are located on top of the levee to remove ponded water. A divider dike splits the base flows between the Main and North Floodways, with a partial routing of North Floodway water into Arroyo Colorado. The TPWD is currently developing strategies to enhance both water quality and habitat in the Arroyo Colorado. According to the TPWD, the agency desires to improve water quality associated with habitat enhancement within the on-channel segment since Llano Grande is located within a TPWD State Park (Alan Plummer Associates, Inc. 2006).

No Action Alternative Environmental Consequences

Under the no action alternative, no impacts are anticipated as the current levee configuration would be retained.

Proposed Action Environmental Consequences

For the proposed action, improvements to the ACF levee system would not affect water flow or downstream water bodies.

3.4 LAND USE

3.4.1 Land Use Affected Environment and Environmental Consequences

Current land use along the ACF levee system was evaluated along a corridor potentially affected by the levee improvement project using three main categories: natural resources management areas, agricultural lands, and urban areas. Conflict with current and future land use of the improvement area is the criterion used to assess impacts on land use.

3.4.1.1 Natural Resources Management Areas

Land set aside specifically for natural resource management activities are important for T&E species recovery, habitat preservation, and the emerging eco-tourism economy in South Texas. Tracts of lands along the ACF levee system are managed by the USFWS. The USFWS maintains one small unit of the LRGV National Wildlife Refuge in the improvement area. The unit is associated with the Willacy canal, which traverses the ACF levee system at mile 8 of the levee improvement project.

3.4.1.2 Agricultural Land

Agricultural and open land flanks approximately 75 percent of the floodway. According to the National Land-Cover Database (NLCD), this land is classified as cultivated crops, pasture, open space, or barren land (NLCD 2001). Crops observed near the improvement area during field reconnaissance were mostly vegetables, grain, and citrus fruit. Pasture land was utilized for cattle, sheep, and goats. Additionally, adjacent land near miles 10 to 12 of the improvement area has been utilized for sand mining.

3.4.1.3 Urban Areas

The NLCD classified approximately 25 percent of the land adjacent to the levee as either low or medium intensity developed. Low intensity implies a 20 to 49 percent impervious surface coverage, whereas medium intensity implies 50 to 79 percent coverage (NLCD 2001). Urban development in the vicinity of the ACF levee system is limited to portions of Mercedes and La Feria, Texas. Although sparsely populated, several residences were found near the improvement area during field reconnaissance. These residences were on the land side, north of the levee system. No residential development is allowed within the levee system ROW.

No Action Alternative Environmental Consequences

No impacts are anticipated, as the current levee configuration would be retained.

Proposed Action Environmental Consequences

Potential impacts were evaluated in terms of natural resources management areas, agricultural lands, and urban areas. Rehabilitation improvements of the ACF levee system would occur entirely within the ROW and into the floodway.

Natural Resources Management Areas. The proposed levee improvement project of the ACF levee system would impact mostly herbaceous vegetation dominated by non-native species. Approximately 125 acres of non-native herbaceous vegetation may be temporarily removed from the existing levee footprint, and 2.6 acres of adjacent non-native herbaceous vegetation may be removed for levee expansion areas.). No thorn woodland, a higher quality habitat, would be removed.

Agricultural Land. No agricultural areas are located within the proposed improvement area. The proposed action would not affect agricultural lands adjacent to the improvement area.

Urban Areas. Urban development in the vicinity of the ACF levee system is limited to portions of Mercedes and La Feria located on the levee boundaries. The proposed action would not affect urban development in these areas.

3.5 SOIL

Project contribution to erosion and alteration of soil previously unassociated with the existing levee are the evaluation criteria used to assess impacts on land use.

3.5.1 Soil Affected Environment and Environmental Consequences

Levees within the ACF levee system are primarily composed of stable fill material transported in from locations outside the area of the floodway. Therefore, soil associated with the actual levee has no unique soil type designation. According to online USDA Natural Resources Conservation Service (NRCS) soil survey maps of the area, soil along the levee centerline is designated as "levee." However, soil immediately adjacent to the levee toe comprises six major soil types: Harlingen clay, Mercedes clay, Hidalgo sandy clay loam, Ramondville clay loam, Runn silty clay, and Hidalgo fine sandy loam (NRCS 2009).

No Action Alternative Environmental Consequences

No impacts are anticipated, as the current levee configuration would be retained.

Proposed Action Environmental Consequences

Improvement activity under the proposed action contributing to soil disturbance would include raising the top of the levee as described in Subsection 2.2. Geotechnical investigations would also be conducted to determine the type and extent of any required remediation improvements due to slope stability, seepage, levee settlement, as well as any other geotechnical issues that may cause levee failure during a 100-year flood event. The disturbance of soil would occur within areas where soil has been disturbed and modified by prior levee construction and maintenance activities. Therefore, alteration of soil previously unassociated with the existing levee would not occur.

The contractor would ensure a storm water pollution prevention plan is completed and approved before initiating activities. The plan would include erosion control best management

practices that would be used during levee rehabilitation improvements to minimize erosion in disturbed areas.

Earthwork would be planned and conducted in such a manner as to minimize the duration of exposure of unprotected soil. Protection would be provided by accelerated growth of permanent vegetation, temporary vegetation, mulching, or netting. Slopes too steep for stabilization by other means would be stabilized by hydroseeding, mulch anchored in place, covering by anchored netting, sodding, or such combination of these and other methods as may be necessary for effective erosion control. Use of best management practices such as rock berms, silt fences, and single point construction entries would minimize erosion during construction. For these reasons, no soil impacts would be expected.

3.6 COMMUNITY RESOURCES

Community resources impacts would be considered significant if the federal action resulted in substantial growth or concentration of population or the need for substantial new housing or public services.

3.6.1 Community Resources Affected Environment and Environmental Consequences

3.6.1.1 Socioeconomics

The ACF levee system is located within Cameron and Hidalgo Counties. Some of the larger cities within these counties that are near the levee system include Weslaco, Mercedes, and Harlingen.

The region of influence of this analysis is based on the location of the levee construction work being conducted in Hidalgo and Cameron Counties. The USIBWC is anticipating spending $14,700,000 for the ACF levee rehabilitation project (including geotechnical analysis, design, and actual levee work) for the first 6.93 miles (up to Hidalgo county line). This amount also includes the geotechnical and design work for the next 4.07-mile segment. The construction work for the smaller segment would be completed only if funding is available. Therefore, assuming 10 per cent of the total project cost ($14.7 million) would be spent on design and geotechnical analysis, the cost to perform the construction work for 6.93 miles of levees is $13.23 million (14.7 – 1.47 = 13.23). This equates to approximately $1.91 million per mile of levee rehabilitation (13.23 / 6.93 = 1.91). Therefore, the amount of construction work that would be conducted in Cameron County is estimated to be $7.77 million (1.91 x 4.07 = 7.77).

Population

Table 3.3 presents population characteristics, including populations in 2000, as well as projected populations for 2005, 2020, and 2030 and the percent change for these statistical areas. As shown in Table 3.4, the total county population for Cameron County is projected to

increase 65 percent from 2000 to 2030 while Hidalgo County is projected to increase 89 percent.

Table 3.3 Population Growth in Cameron and Hidalgo Counties Adjacent to the Arroyo Colorado Floodway

Jurisdiction	2000	2005	2020	2030	Percent Change 2000-2030
Cameron County	335,227[1]	371,081[1]	476,992[2]	554,513[2]	65
Hidalgo County	569,463[2]	671,967[2]	879,381[2]	1,078,637[2]	89

1 U.S. Census Bureau 2007

2 Texas Water Development Board 2006

Executive Order (EO) 12898 defines a minority as an individual belonging to one of the following population groups: Hispanic, Black (not of Hispanic origin), American Indian or Alaskan Native, Asian or Pacific Islander. Under EO 12898, minority populations are to be identified if: (i) the minority population with the affected area exceeds 50 percent; or (ii) if the minority population age is meaningfully greater than the age in the general population. Table 3.4 indicates the percentage of the population represented by minorities and the poverty rate for each of the selected census tracts in the project area. The minority population in Cameron and Hidalgo Counties is 85.5 and 89.6 percent, respectively. Minority populations of Hispanic nationality dominate in the potential region of influence.

Table 3.4 Percentage of Minority Populations and Poverty Rates in the Arroyo Colorado Floodway Levee Area

Ethnic Composition [1]	Hidalgo County	Percent	Cameron County	Percent
White	59,224	10.4	48,608	14.5
Hispanic (of any race)	502,836	88.3	282,596	84.3
Black	1,708	0.3	1,676	0.5
Asian	3,417	0.6	1,006	0.3
American Indian	2,278	0.4	1,341	0.4
Total Population	*569,463*	*100*	*335,227*	*100*
Total Minority	*510,239*	*89.6*	*286,619*	*85.5*
Poverty Levels [2]	*187,353*	*32.9*	*94,534*	*28.2*
Individuals below poverty level	213,549	37.5	110,960	33.1

1 Based on 2006 values presented in U.S. Census Bureau, accessed 2007

2 Based on 2000 values and percentages presented in U.S. Census Bureau, accessed 2007

Employment

The economy of the two county region is based primarily on the service, retail trade, and government sectors. Each of these industries comprise approximately 22 to 23 percent of the total employment in the region of impact. In Cameron County, employment was also high in the manufacturing and transportation industries, approximately 11 percent and 4 percent,

respectively. Manufacturing (7%), construction (5%), and the agricultural (5%) industries have relatively high employment in Hidalgo County (USIBWC 2003b). Table 3.5 indicates the estimated total employment for the two counties. The estimated total employment for the two counties increased 10.8 and 26.6 percent, respectively, from 2000 to 2005.

Table 3.5 Estimated Total Employment for Cameron and Hidalgo Counties

	2000	2005	Percent Change 2000-2030
Cameron County	118,079[1]	130,864[1]	10.8
Hidalgo County	191,542[1]	242,525[1]	26.6

1 Texas Workforce Commission 2007

Income

Median household incomes for Cameron and Hidalgo Counties (reported in 1999 dollars) was $26,155, $24,863, and $22,114, respectively. The median family income was $27,853 and $26,009 counties. Per capita income was $10,980 for Cameron County and $9,899 for Hidalgo County (U.S. Census Bureau 2007).

Agricultural Economics

Approximately 34,277 acres of agricultural land lie in the project area along the Rio Grande in Cameron and Hidalgo Counties. Although land is not cultivated immediately along the riverbanks, agricultural land predominates within the floodplain inside the ACF levee system (USIBWC 2003b).

No Action Alternative Environmental Consequences

No impacts to community resources are anticipated, as the current levee configuration would be retained.

Proposed Action Environmental Consequences

The analyses of impacts of the footprint expansion on socioeconomic resources and environmental justice were based on changes in employment, income, and business volume as indicator criteria, as well as the disproportionate number of minority or low-income populations potentially affected by the proposed levee improvements.

The direct influx of federal funds would be $13,230,000 on the basis of construction costs, assuming 6.93 miles of the levee system improvement project would be constructed in Hidalgo County. This influx of funds would have a small but positive local economic impact, representing an increase of $44,836,660 in direct and indirect sales. Job creation is estimated at 410 in direct and indirect employment. The positive impact would be limited to the duration of the construction period. Table 3.6 illustrates the magnitude of the economic influx relative to reference values for Hidalgo County.

Table 3.6 Potential Economic Impacts Improvements to the Arroyo Colorado Floodway Levee System for Hidalgo County

Evaluation Criteria	Unit Value for Rio Grande Levees [a]	Raising of Arroyo Colorado Floodway Levee	Annual Value for Hidalgo County	Increase Relative to County
Local Expenditures	$1,000,000	$13,230,000	Not applicable	
Direct Employment	10	251		
Indirect Employment	6	159		
Total Employment	16	410	242,525 [b]	0.17%
Direct Sales Volume	$1,274,065	$16,855,900		
Indirect Sales Volume	$2,114,948	$27,980,760		
Total Sales Volume	$3,389,013	$44,836,660	$ 10,375 million [c]	0.43%
Direct Income	$554,814	$7,340,190		
Indirect Income	$452,466	$5,986,125		
Total Income	$1,007,280	$13,326,315	$6,652 million [d]	0.2%

a Unit data for levee construction from the USIBWC Rio Grande Canalization Project (Parsons 2004).

b Total of the labor force (16 years and older) employed in 2005 (Texas Workforce Commission 2007).

c Estimated Gross sales for Hidalgo County in 2005 (Texas Comptroller 2005).

d Based on a 2000 per capita income of $9,899 and an Hidalgo County population of 671,967.

The direct influx of federal funds for Cameron County would be $7,770,000 on the basis of construction costs, assuming 4.07 miles of the levee improvement project would be constructed in the county. This influx of funds would have a small but positive local economic impact, representing an increase of $26,332,630 in direct and indirect sales. Job creation is estimated at 240 in direct and indirect employment. The positive impact would be limited to the duration of the construction period. Table 3.7 illustrates the magnitude of the economic influx relative to reference values for Cameron County.

3.6.1.2 Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, was issued by the president on February 11, 1994. The EO requires a federal agency to make "…achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." As such, a proposed action must be evaluated in terms of an adverse effect that:

- Is predominantly borne by a minority population and/or low-income population; or
- Would be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that would be suffered by the non-minority population and/or non-low income population.

Table 3.7 Potential Economic Impacts Improvements to the Arroyo Colorado Floodway Levee System for Cameron County

Evaluation Criteria	Unit Value for Rio Grande Levees [a]	Raising of Arroyo Colorado Floodway Levee	Annual Value for Cameron County	Increase Relative to County
Local Expenditures	$1,000,000	$7,770,000	Not applicable	
Direct Employment	10	147		
Indirect Employment	6	93		
Total Employment	16	240	130,864 [b]	0.18%
Direct Sales Volume	$1,274,065	$9,899,490		
Indirect Sales Volume	$2,114,948	$16,433,140		
Total Sales Volume	$3,389,013	$26,332,630	$ 5,064 million [c]	0.52%
Direct Income	$554,814	$4,310,900		
Indirect Income	$452,466	$3,515,660		
Total Income	$1,007,280	$7,826,560	$4,074 million [d]	0.19%

a Unit data for levee construction from the USIBWC Rio Grande Canalization Project (Parsons 2004).

b Total of the labor force (16 years and older) employed in 2005 (Texas Workforce Commission 2007).

c Estimated Gross sales for Cameron County in 2005 (Texas Comptroller 2005).

d Based on a 2000 per capita income of $10,980 and an Cameron County population of 371,081.

Information from Table 3.4 indicates that Cameron and Hidalgo Counties have disproportionately high minority (approximately 86% and 90%, respectively). Approximately 28 percent and 33 percent of all families in Cameron and Hidalgo Counties were reported to be below the poverty level in the 2000 Census (U.S. Census Bureau 2007).

No Action Alternative Environmental Consequences

Under the no action alternative, current condition of minority and low-income populations for all three counties would remain unchanged, as improvements to the levee system would not occur.

Proposed Action Environmental Consequences

Data indicate that Hidalgo and Cameron Counties have disproportionately high minority (approximately 90% and 86%, respectively) and low-income populations (families–33% and 28%, respectively); however, construction activities would not occur in residential or workplace areas associated with these populations. A small but positive economic input to the local community would occur as a result of the levee improvements. As a result, no adverse impacts to disproportionately high minority and low-income populations are expected from construction of the ACF levee improvements.

3.6.1.3 Transportation

Hidalgo, Cameron, and Willacy Counties are an important throughway for agricultural products. One of the major arteries for highway traffic is U.S. Highway 281, which connects Hidalgo County with cities to the north. Also important is U.S. Highway 83, which traverses

Cameron and Hidalgo Counties from east to west, and U.S. Highway 77 in Cameron and Willacy Counties from Brownsville northwest to Harlingen and Raymondville. Hidalgo, Cameron, and Willacy Counties have an extensive network of state and farm-to-market roads. The two spans of the Hidalgo-Reynosa International Bridge over the Rio Grande serve as crossing points between Mexico and the United States. Two major rail systems serve the two counties. The only railroad port of entry in the area is located in Brownsville, Texas.

The crown of the ACF levee system is an unpaved service road with restricted public access throughout most of the system. The road is utilized by the USIBWC as a service road for levee maintenance and vegetation management. The service road is also used by the local farmers for access to farmland.

There are numerous secondary and connecting routes that run perpendicular to the Rio Grande and cross the highways to the north, which allows access to the border areas along the river. However, there are no roads or highways that allow access to the Arroyo Colorado levee system that cross into Mexico. Numerous farm-to-market roads, paved and unpaved county roads, and unpaved farm roads used to access agricultural fields cross the project area.

No Action Alternative Environmental Consequences

No impacts are anticipated, as the current levee system configuration would be retained.

Proposed Action Environmental Consequences

Proposed improvements to the ACF levee would have moderate impacts on local transportation. Heavy construction equipment (dump trucks, front-end loaders, graders) in the reach of the ACF near Mercedes and La Feria would likely be driven to the construction site from local areas using State Highways 83 and 281. The north levee section starting at Divisor Dike near FM 1015 and extending eastward toward La Feria Reservoir can be accessed using FM 491 (Mistletoe Road), Dukes Highway, and White Ranch Road, which generally intersect the floodway.

During levee construction, a temporary increase in use of the access roads would take place during placement of equipment in the staging areas. Subsequent construction activities would also temporarily increase local transportation, as fill material would be imported from commercial sources outside the levee system. Most of these construction activities, however, would not require public road use as, material borrow sites would be located in the vicinity of the construction sites. All construction activities would occur within the existing ROW. Transportation of construction equipment and the use of personnel vehicles would mainly occur within the levee ROW and along the levee road system within the floodway. New easements would have to be obtained by USIBWC if levee footprints are increased from existing conditions. Following completion of the levee improvement project, the levee road would continue providing service for USIBWC and farming activities, and limited public access.

3.7 ENVIRONMENTAL HEALTH

Evaluation criteria considered in air quality analysis include the following.

- Would emissions from the action cause or contribute to a violation of any national, state, or local ambient air quality standard?
- Would emissions from the action represent 10 percent or more of the emissions inventory for the affected AQCR counties, to be considered regionally significant?

The following evaluation criteria were used to determine the impacts of noise:

- The degree to which noise levels generated by demolition and construction activities would be greater than the ambient noise levels;
- The degree to which there would be annoyance, speech interference, and hearing loss; and
- The proximity of noise-sensitive receptors to the noise source.

The evaluation criteria listed below were used to assess the alternatives with regard to hazardous materials and waste.

- Would the action violate federal or state regulations for hazardous waste usage, storage, or disposal?
- Could the action require materials that could not be accommodated by existing guidance?
- Would there be human exposure to hazardous waste or materials due to the action?
- Would the action cause hazardous waste generation that could not be accommodated by current waste management practice?

3.7.1 Environmental Health Affected Environment and Environmental Consequences

3.7.1.1 Air Quality

The Clean Air Act, Title 42, Section 7407 of the U.S. Code, states that Air Quality Control Regions (AQCR) shall be designated in interstate and major intrastate areas as deemed necessary or appropriate by a federal administrator for attainment and maintenance of concentration-based standards called National Ambient Air Quality Standards (NAAQS). The U.S. Environmental Protection Agency (USEPA) classifies air quality within an AQCR according to whether the concentrations of criteria air pollutants in the atmosphere exceed primary or secondary NAAQSs. All areas within each AQCR are assigned a designation of attainment, nonattainment, unclassifiable attainment, or not designated attainment for each criteria air pollutant.

Air quality standards are currently in place for six pollutants or "criteria" pollutants: carbon monoxide, nitrogen dioxide, ozone, sulfur oxides, lead, and particulate matter with aerodynamic diameters less than or equal to 10 micrometers (PM_{10}) and 2.5 micrometers ($PM_{2.5}$). There are many suspended particles in the atmosphere with aerodynamic diameters larger than 10 micrometers. The collective of all particle sizes is commonly referred to as total suspended particulates.

An attainment designation indicates that air quality within an area is as good as or better than the NAAQS. The proposed levee improvement area is located within AQCR 213, or the Brownsville-Laredo AQCR. This AQCR is located completely within the State of Texas, covering Cameron County, Hidalgo County, Jim Hogg County, Starr County, Webb County, Willacy County, and Zapata County (CFR 2001). As of April 2009, the USEPA designated air quality within all counties of AQCR 213 to be under attainment status for all criteria pollutants (USEPA 2009a). Emissions data for Cameron, Hidalgo, and Willacy Counties are used for analysis purposes because the activity associated with the alternatives would be localized in the narrow area along the river, and emissions from the activities would not likely affect the more distant counties within the AQCR.

The Texas Commission on Environmental Quality has identified 16 companies in Hidalgo, Cameron, and Willacy Counties as contributors of point source emissions. Potential stationary point sources of criteria pollutant and hazardous air pollutant emissions within the three counties include the Rio Grande Valley Sugar growers, Wil Ron Manufacturing Corporation, several oil mills and refineries, and utilities and gasoline facilities. The combined area and stationary point source emission inventory for Hidalgo, Cameron, and Willacy Counties for calendar year 2002, based on the latest available data from USEPA National Emission Inventory as of April 2009 (USEPA 2009b), is as follows:

- Carbon monoxide, 208,099 tons per year;
- Volatile organic compounds, 41,427 tons per year;
- Nitrogen dioxide, 41,128 tons per year;
- Sulfur oxides, 5,185 tons per year; and
- PM_{10}, 97,789 tons per year.
- $PM_{2.5}$, 13,869 tons per year

Existing maintenance activities by USIBWC personnel consists of routine inspections of levees and access roads. Periodic maintenance activities at the levees, channels and floodway results in the use of heavy equipment including scrapers, mowers, bulldozers and dump trucks. Use of these heavy equipment and associated vehicles is typically limited to once every 3 months or less and does not represent a significant source of air pollutants.

No Action Alternative Environmental Consequences

Under the no action alternative, the current configuration of the levee system would be retained. Air emissions would not be expected to increase beyond the established emissions inventory in the project area.

Proposed Action Environmental Consequences

Improvements to the levee system would impact air quality through excavation and fill activities. Potential impacts would be a slight increase in criteria air pollutants within Hidalgo, Cameron, and Willacy Counties. Table 3.8 summarizes the additional estimated criteria pollutants associated with the proposed action, as well as the percent increase above the existing Hidalgo, Cameron, and Willacy Counties' emissions inventory. Estimates were calculated for 11 miles of construction for the levee height increase. Unit air emissions estimates for these activities followed common construction practices and methods (Means 2008) and emission factors reported by USEPA (USEPA 1996) as applied to a similar levee expansion project in an upper reach of the Rio Grande (Parsons 2003). Estimated emissions for the criteria pollutants represent less than 0.13 percent of the Hidalgo, Cameron, and Willacy Counties' annual emissions inventory.

Table 3.8 Air Emissions for Improvements to the Arroyo Colorado Floodway Levee System

Parameter	Emissions (tons per year)					
	Sulfur Oxides	Nitrogen Dioxides	Carbon Monoxide	Volatile Organic Compounds	Particulate Matter (PM_{10})	Particulate Matter ($PM_{2.5}$)
Unit emissions per mile of levee height increase*	0.55	5.05	2.11	0.4	5.61	0.95
Floodway Levee Systems (11 miles)	6.05	55.55	23.21	4.40	61.71	10.45
Hidalgo, Cameron, and Willacy Counties emissions inventory**	5,185	41,128	208,099	41,427	97,789	13,869
Floodway Levee Systems Emissions as a Percent of Hidalgo, Cameron, and Willacy Counties' Emissions	0.12%	0.13%	0.01%	0.01%	0.06%	0.07

* *Unit data for levee construction from the USIBWC Rio Grande Canalization Project Environmental Impact Statement (Parsons 2003: Table 4.11-2).*

** *USEPA 2009b, the most recent available data as of April 2009.*

3.7.1.2 Noise

Guidelines

Noise is defined as sound that is undesirable because it interferes with speech and hearing, is intense enough to damage hearing, or is otherwise annoying. Noise levels often change with time. To compare sound levels over different time periods, several descriptors were developed that take into account this time-varying nature. These descriptors are used to assess and correlate the various effects of noise on humans.

The day-night average sound level (DNL) is a measure of the total community noise environment. DNL is the average A-weighted sound level in decibels, or dBA, over a 24-hour

period, with a 10 dBA adjustment added to the nighttime levels (between 10:00 p.m. and 7:00 a.m.). This adjustment is an effort to account for increased human sensitivity to nighttime noise events. DNL was endorsed by the USEPA for use by federal agencies. DNL is an accepted unit for quantifying annoyance to humans by general environmental noise, including aircraft noise. The Federal Interagency Committee on Urban Noise developed land use compatibility guidelines for noise (USDOT 1980). Potential adverse effects of noise include annoyance, speech interference, and hearing loss.

Baseline Noise Levels

Land use and zoning classifications in the area surrounding the proposed levee improvement area provide an indication for potential noise impact. Land surrounding the ACF levee system is predominantly managed as agricultural land. No sensitive noise receptors such as schools, churches, and medical facilities are located in or surrounding the ACF levee system; however, several residences associated with Mercedes and La Feria, Texas were found along the landside of the levee during field reconnaissance conducted for this project.

Typical outdoor noise sources near the levee system include vehicles, pickup trucks, diesel tractor mowers, and other farm machinery. Noise sources such as mowers at 100 feet, a diesel truck, or scrapers used to grade levee roads at 50 feet are approximately 70 dBA, 88 dBA, and 89 dBA, respectively (CERL 1978).

Existing maintenance activities by USIBWC personnel consist of routine inspections of levees and access roads. Periodic maintenance activities at the levees result in the use of heavy equipment, including scrapers, mowers, bulldozers, and dump trucks. Use of heavy equipment and associated vehicles is typically limited to once every three months or less and does not represent a significant source of noise.

Since noise-generating activities are intermittent, it is expected that most areas at the ACF levee system exhibit noise levels less than 55 dBA, which is normally accepted by the public without complaints. Existing noise levels near Mercedes and La Feria should be typical of a light commercial or industrial area, which is about 65 dBA.

No Action Alternative Environmental Consequences

No impacts from noise are anticipated, as the current levee configuration would be retained.

Proposed Action Environmental Consequences

Improvements to the ACF levee system would increase ambient noise levels through the use of trucks to bring additional fill material to the site and fill activities associated with the levee improvement project. For the purposes of this EA, it is estimated that the shortest distance between an equipment noise source and a non-construction receptor would be a person(s) 50 feet off-site, or less. Typical noise levels generated by activities associated with the proposed action range from 75 to 89 dBA at 50 feet from the source (CERL 1978).

Several residences associated with Mercedes and La Feria, Texas were found along the landside of the levee; therefore, potential noise-sensitive receptors would be nearby residents. However, given the primarily rural nature of the area, it is unlikely anyone other than a construction worker would be within 50 feet of the site boundary during activities. If a non-construction receptor were within this distance, the person could be exposed to noise as high as 75 to 89 dBA. This level of noise could annoy nearby residents and cause disruption of speech during the noise event. However, interior noise levels during construction activity would be reduced from the 75 to 89 dBA level by approximately 18 to 27 dB due to the noise level reduction properties of the building's construction materials (USDOT 1992).

The potential for hearing loss involves direct exposure on a regular, continuing, long-term basis to noise levels above 75 dBA. Hearing loss projections are based on an average daily outdoor exposure of 16 hours over a 40-year period. It is anticipated that construction activities would occur between 7:30 a.m. and 5:00 p.m., five days per week for the duration of the project. However, individuals would not be exposed during the entire noise-producing period. Under these conditions, persons would not be exposed to long-term and regular noise above 75 dBA. Therefore, nearby persons should not experience loss of hearing, but may experience frequent speech disruption.

3.7.1.3 Hazardous Materials and Waste Management

Waste disposal activities at or near the proposed levee improvement area were reviewed to identify areas where industrial processes occurred; solid and hazardous waste were stored, disposed, or released; and hazardous materials or petroleum or its derivatives were stored or used. A data search on waste storage and disposal sites along the ACF levee system was conducted by Banks Information Systems, Inc. (2009). The search extended along major portions of the potential levee expansion area, up to 1/2 mile from the levee corridor centerline.

Results of the data search along the ACF levee system, including the search radius (up to 1/2 mile) by individual database, are shown in Table 3.9. No hazardous materials or waste storage, disposal sites, or spill sites, were identified within the proposed ACF levee improvement area; however, the Hidalgo County Landfill was identified within 1/8 mile from the levee.

No Action Alternative Environmental Consequences

No impacts regarding hazardous materials and waste management are anticipated, as the current levee configuration would be retained.

Proposed Action Environmental Consequences

The proposed action would not result in noncompliance with federal or state regulations regarding hazardous materials and waste management. No hazardous materials or waste storage, disposal, or spill sites were identified within the proposed ACF levee improvement area. The Hidalgo County Landfill was identified within 1/8 mile from the levee; however, due to the distance from the project area, the landfill would not affect, nor be affected by the levee construction project. Improvements to the ACF levee system under the proposed action would

not be affected by waste storage and disposal sites, nor would they affect ongoing management operations of hazardous materials and waste sites. There would be no significant impacts to hazardous materials and waste management.

Table 3.9 Summary Search Report for the Arroyo Colorado Floodway Levee System, McAllen, Texas Vicinity

Database	Database Updated	Search Radius	Levee Corridor	1/8 Mile	1/4 Mile	1/2 Mile	Total
NPL	**01-12-09**	**1.00**	**0**	**0**	**0**	**0**	**0**
CERCLIS	01-09-09	0.50	0	0	0	0	0
NFRAP	01-09-09	0.50	0	0	0	0	0
RCRA TSD	11-13-08	0.50	0	0	0	0	0
RCRA COR	11-13-08	1.00	0	0	0	0	0
RCRA GENS	11-13-08	0.25	0	0	0	-	0
ERNS	03-03-09	0.25	0	0	0	-	0
SWL	12-17-08	0.50	0	1	0	0	0
State Spills	01-15-09	0.25	0	0	0	-	0
VCP/IOP	01-02-09	0.50	0	0	0	0	0
Regular UST/AST	02-26-09	0.25	0	0	0	-	0
Leaking UST	02-29-09	0.50	0	0	0	0	0
Brownfields	11-17-08	0.50	0	0	0	0	0
Other	03-04-09	0.25	0	0	0	-	0
Total Sites			**0**	**1**	**0**	**0**	**1**

NPL *National Priorities List*
CERCLIS *Comprehensive Environmental Response, Compensation, and Liability Information System*
NFRAP *No Further Remedial Action Planned*
RCRA *Resource Conservation and Recovery Act*
TSD *Transport, Storage, and Disposal*
COR *Corrective Action*
GENS *Generator of Hazardous Waste*
ERNS *Emergency Response Notification System*
SWL *Solid Waste Landfill*
VCP *Voluntary Cleanup Program*
IOP *Innocent Owner/Operator Program*
UST *underground storage tank*
AST *aboveground storage tank*

3.8 INDIRECT AND CUMULATIVE IMPACTS

Following completion of the proposed levee improvement project, the levee road would continue providing service for USIBWC, farmers, and adjacent land owners. Subsection 2.4 identifies the USIBWC action of levee improvements for the Main and North Floodways. The construction project along the Main and North Floodways would occur at the same time as construction activities for the ACF improvement area (Parsons 2007). However, the levees are separated far enough apart that cumulative impacts during construction would not likely occur for the concurrent construction projects. Table 3.10 summarizes the expected cumulative impacts for each resource area considered in this EA.

Table 3.10 Cumulative Impacts

Resource Area	Cumulative Effect
Biological Resources	USIBWC's ongoing and planned initiatives are not expected to have an effect on plant communities, wildlife communities, T&E species, or wetlands. On natural resource managed lands adjacent to the floodways, some habitat improvement can be expected. The use of native species in re-vegetation activities of newly constructed levee slopes would support the beneficial effects of these actions.
Cultural	USIBWC's ongoing and planned initiatives would not have any significant cumulative effects in conjunction with the proposed action.
Water	USIBWC's ongoing and planned initiatives would not affect water quality within the floodways. No new wetlands would be constructed and the waterways would not be affected by the ongoing and planned initiatives.
Land Use	USIBWC's ongoing and planned initiatives would not have any significant cumulative effects in conjunction with the proposed action.
Soil	USIBWC's ongoing and planned initiatives would not have any significant cumulative effects in conjunction with the proposed action.
Community Resources	USIBWC's ongoing and planned initiatives would not have any significant cumulative effects in conjunction with the proposed action.
Environmental Health	USIBWC's ongoing and planned initiatives would not have any significant cumulative effects in conjunction with the proposed action.

SECTION 4
BEST MANAGEMENT PRACTICES

Section 4 describes best management practices to be implemented as part of the proposed action for improved flood control of the ACF levee system. Best management practices represent specific actions to minimize the potential for impacts to natural and cultural resources. Best management practices are organized within the engineering, natural resources, and cultural resources categories.

4.1 ENGINEERING MEASURES

Levee expansion alignment would be optimized, to the extent possible, to avoid impacts to wooded vegetation, wetlands, and other natural resources. Levee footprint expansion is not anticipated along natural resources management areas, or areas with a potential to contain cultural resources areas. Best management practices to avoiding construction impacts on resources near levee improvement areas:

- A storm water pollution prevention plan would be developed during project design to minimize impacts to receiving water, as specified by USEPA regulations for construction projects. The storm water pollution prevention plan would include construction areas along the levee system, as well as equipment staging areas. To prevent sedimentation, sediment fences and/or sediment barriers around wetlands would be installed while construction occurs in affected areas.
- During the project construction, methods such as wetting the soil would be employed to prevent erosion from unvegetated slopes and/or corridors.
- During the project construction, existing access points to the levee road would remain in service; because no significant modifications would be made to the levee 3:1 slope ratio, lateral access to the levee road would continue as currently available.

4.2 NATURAL RESOURCES

Fill material placement and levee footprint expansion would not be conducted along USFWS natural resources management areas. For additional protection of vegetation and wildlife habitat along the Divisor Dike and ACF improvement area, the following best management practices would be utilized:

- After construction is complete, the expanded levee, as well as any required construction corridor, would be re-vegetated with native herbaceous vegetation.
- Construction activities near natural resources management areas would be coordinated with the USFWS. Activities would be scheduled to occur outside the March through July migratory bird nesting season.

4.3 CULTURAL RESOURCES

Mitigation measures reduce adverse effects on cultural resources. The assumed (and preferred mitigation) is avoidance. Avoidance preserves the integrity of cultural resources and protects their research potential (*i.e.*, their NRHP eligibility) and also avoids costs and potential construction delays associated with data recovery. The USIBWC is currently developing a Programmatic Agreement with THC to identify appropriate treatments for routine O&M activities as well as specific mitigation measures for NRHP-eligible resources along Rio Grande flood control projects, including the LRGFCP.

Archaeological Sites

Historically, data recovery of archaeological sites through professional techniques such as surface collection, mapping, photography, subsurface excavation, technical report preparation, and dissemination, has been the standard mitigation measure. Under the revised Section 106 regulations (36CFR800.5(a)(2)(i)), data recovery conducted as mitigation is now considered, in and of itself, an adverse effect. Because intact prehistoric archaeological resources that may contain sufficient information to be NRHP eligible may occur in the APE in areas designated as high probability for archaeological resources, a Phase I archaeological survey is being conducted prior to ground disturbing or levee improvement activities.

The Phase I survey will consist of shovel testing for shallowly buried deposits (<3 feet deep), artifact analysis, and report preparation to identify archaeological sites to determine their extent and integrity. If intact archaeological sites are identified during Phase I investigations, two approaches may be employed, depending on the effect.

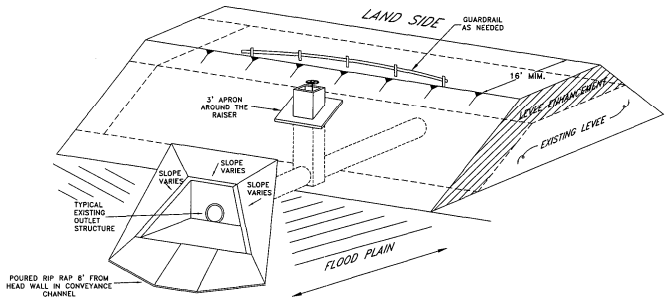
For those sites that could be buried by the addition of fill to expand the footprint of the levee, the USIBWC may implement, as appropriate, recommendations for appropriate techniques to intentionally bury archaeological sites to avoid potential adverse effects (Texas Historical Commission 1999). Commercial material, compatible in physical and chemical characteristics with the existing material comprising the levee (and surrounding floodway), would be used for the expansion. Existing use of the restricted-access road on the crown of the dike and levee would continue with no increase in traffic that could result in additional impacts (*e.g.,* soil compaction). The depth of additional capping material would not exceed 6.6 feet in nearly all areas of the dike and levee. The levee cross section diagrams shown in Subsection 2.2 schematically illustrate how soil would be added to the existing crown and slopes to expand the levee. Combined, these practices would avoid potential adverse impacts to archaeological sites that may be identified as part of the cultural resources survey.

In cases where identified archaeological sites cannot be avoided by project redesign or protected by capping using the recommended techniques, Phase II cultural resources studies would be designed in consultation with the Texas State Historic Preservation Office (SHPO), and implemented to determine the NRHP eligibility of the cultural resources. If NRHP-eligible resources occur and cannot be avoided through project redesign, data recovery investigations would be designed in consultation with the Texas SHPO and implemented prior to construction.

Architectural Resources

Project engineering plans would take into account the locations of architectural resources in the APE. These resources would be avoided through project redesign. Examples of project redesign include altering the slope of the dike or levee, implementing a construction solution such as rip rap for slope siding, or designing adjustments around structures such as gatewells and culverts on and under the levee (Figure 4.1) to minimize adverse effects.

Figure 4.1 Proposed Adjustments Around Structures on and under the Arroyo Colorado North Levee and Divisor Dike



TYPICAL ADJUSTMENTS AROUND STRUCTURES

NOTES:
1. THE SKETCH ABOVE CONVEYS THE BASIC IDEA TO ADJUST THE MODIFIED EMBANKMENT SLOPES TO EXISTING STRUCTURES (THERE ARE A WIDE VARIETY OF GATED STRUCTURES WITHIN THE FLOOD CONTROL PROJECT)

2. AFTER ADJUSTMENT OF THE EMBANKMENT SLOPES, THE DESIGN SHALL INCLUDE PROVISIONS TO INSURE THAT THE CONVEYANCE STRUCTURE AND CONVEYANCE CHANNEL IS FREE OF VEGETATION AND SILT AND IS HYDRAULICALLY EFFICIENT.

3. THE DESIGN SHALL INCLUDE PROVISIONS TO INSURE THAT A MINIMUM OF 16 FOOT LEVEE CROWN TRAVELED WIDTH IS MAINTAINED OVER STRUCTURES.

4. WHEN ADJUSTED EMBANKMENT SLOPES AROUND STRUCTURES RESULT IN A ROADWAY CONSTRICTION OR VARYING CROWN WIDTH FOR A LEVEE, A GUARDRAIL SHALL BE DESIGNED AND INSTALLED AT THE LEVEE SHOULDER AS DETERMINED BY A PROJECT MANAGER.

5. AS NECESSARY PROTECT EXISTING STRUCTURE IN PLACE, INSTALL, REPAIR OR REPLACE GATE(s), INSURE THAT THE GATE MECHANICS OPERATE PROPERLY AND EFFECTIVELY. INSURE THAT FLOW THROUGH THE CONDUIT IS STOPPED WHEN THE GATE(s) IS CLOSED.

6. ADJUST SLOPE AROUND THE STRUCTURE, ADD CONCRETE RIP RAP TO GUARD AGAINST EROSION.

7. REFERENCE FEMA TECHNICAL MANUAL: CONDUIT THROUGH EMBANKMENT DAM AS A GUIDE FOR STRUCTURES.

8. REFERENCE TxDOT DRAWING "CONCRETE RIPRAP AND SHOULDER DRAINS"

Architectural studies to determine the NRHP eligibility of the unevaluated architectural resources in the APE is being conducted in accordance with standards established by the Texas SHPO and implemented prior to project activities. If NRHP-eligible resources occur and cannot be avoided through project redesign, Phase III data recovery investigations would be designed in consultation with the Texas SHPO and implemented prior to construction. Mitigation measures may include, but not be limited to, renovation using architecturally compatible design and materials and documentation through the Historic American Engineering Record (HAER) program administered by the National Park Service. Documentation of structures to HAER standards to preserve the contextual and architectural information of the resource even if the resource is demolished.

Native American Resources

Mitigation measures for Native American resources would be determined in consultation with the Comanche Nation and Kiowa Tribe of Oklahoma, and the Texas SHPO. Established USIBWC consultation procedures would be followed during this consultation process.

SECTION 5
ENVIRONMENTAL COMPLIANCE AND COORDINATION

5.1 PUBLIC REVIEW OF DRAFT EA

Copies of the Draft EA were distributed for a 30-day public review period to agency representatives, general managers of irrigation districts, and other interested parties, as listed below.

Federal Agencies	**State Agencies (...continued)**
Wilson Palmer Jr. Port of Harlingen Authority P O Box 3646 Harlingen, Texas 78551	Kay Jenkins, Natural Resources Coordinator Texas Parks and Wildlife Department State Parks Division, Region 2 715 Highway 35 South Rockport, TX 78382
Bryan Winton , Refuge Manager Lower Rio Grande Valley National Wildlife Refuge U.S. Fish and Wildlife Service Rt. 2, Box 202-A Alamo, TX 78516	Steve Benn, Manager Texas Parks and Wildlife Department Las Palomas WMA, Lower Rio Grande Units 154B Lakeview Drive Weslaco, TX 78596
Ernesto Reyes U.S. Fish and Wildlife Service, Ecological Services Rt. 2, Box 202-A Highway 281, Farm Road 907 Alamo, TX 78516	Jennifer Owen Estero Llano Grande State Park 154A Lakeview Drive Weslaco, Texas 78596
Lloyd Mullins Unit Leader, Corpus Christi Field Office U.S. Army Corps of Engineers 5151 Flynn Parkway, Suite 306 Corpus Christi, Texas 78411-4318	Mark Lingo Texas Parks & Wildlife Lower Laguna Madre Ecosystem Leader 95 Fish Hatchery Road Brownsville, TX 78520
Michael P. Jansky, P.E. Regional Environmental Coordinator Environmental Protection Agency, Region 6 1445 Ross Avenue Suite 1200 Dallas, TX 75202-2733	Willy Cupit Texas Parks & Wildlife Lower Laguna Madre Ecosystem Leader 95 Fish Hatchery Road Brownsville, TX 78520
Cruz J. Rodriguez, Assistant Chief Patrol Agent, McAllen Sector U.S. Customs and Border Protection, 2301 Main Street McAllen, Texas 78503	Lori Hamilton/NEPA Reviewer Texas Commission on Environmental Quality Water Quality Division, MC-150 12100 Park 35 Circle Austin, TX 78753
State Agencies	Roger Miranda, P.G. Texas Commission on Environmental Quality MC203 P.O. BOX 13087 Austin, Texas 78711-3087
Russell Hooten, Habitat Assessment Biologist Texas Parks and Wildlife Department Wildlife Habitat Assessment Program TAMU-CC, Natural Resource Center 6300 Ocean Drive, NRC Suite 2501 Corpus Christi, TX 78412	Kathy Boydston Texas Parks and Wildlife Department Natural Resources Coordinator 4200 Smith School Road Austin, TX 78744
Rachel Leibowitz Division of Architecture Texas Historical Commission 1511 Colorado Austin, TX 78701	Debra Beene Division of Archaeology Texas Historical Commission 1511 Colorado Austin, TX 78701

Native American Parties	**Irrigation Districts (...continued)**
Chairman Wallace Coffey Comanche Nation 584 NW Bingo Road HC 32 Box 1720 Lawton, Oklahoma 73502	Archie Miles Hidalgo County Water and Irrigation District No 5 FM 1015 & Jonny Vela Street Progresso, Texas 78579
Chairman Don Tofpi Kiowa Tribe of Oklahoma Hwy 9 West P.O. Box 369 Carnegie, Oklahoma 73015-0369	Sonia Kaniger, General Manager Cameron County Drainage District # 2 & #3 P.O. Box 687 San Benito, Texas 78586
Regional Agencies/Interested Parties	Alan Moore Cameron County Drainage District #5 301 East Pierce Harlingen, Texas 78550
Kenneth N. Jones, Jr., Executive Director, Lower Rio Grande Valley State Planning Region (21) 311 N. 15th McAllen, Texas 78501-4705	**Other Interested Parties**
Honorable Sylvia Handy, Chairman Lower Rio Grande Valley State Planning Region (21) County Commissioner, Hidalgo County 1902 Joe Stephens Avenue Weslaco, Texas 78596-3702	Jaime J Flores, PG Arroyo Colorado Watershed Coordinator 2401 E Hwy 83 Weslaco, TX 78596
Ludy Saenz Texas Reviewer and Comment System Coordinator Lower Rio Grande Valley Development Council 311 North 15th Street McAllen, Texas 78501-4705	Joel Quintanilla, Mayor P.O. Box 837 Mercedes, Texas 78570
Irrigation Districts	Mary Lou Campbell Frontera Audubon/Sierra Club 7030 Mile 2 3/4 East Mercedes, Texas 78570
Wayne Halbert – Manager Harlingen Irrigation District CC #1 and Adams Garden ID #19 P.O. Box 148 Harlingen, TX 78551	Christine Rakestraw Coalition to Save The Arroyo Colorado Fun N Sun RV Park 1400 Zillock Rd, M169 San Benito, TX 78586
Rick Smith - Manager La Feria Irrigation District, DD #3 and Santa Maria IC CC #4 P.O. Box 158 La Feria, TX 78559	Jim Tabak President Valley Land Fund 2400 N. 10th St., Suite A McAllen, TX 78501
Frank White, General Manager Hidalgo and Cameron Counties Irrigation District No. 9 (Mercedes) P.O. Box 237 Mercedes, TX 78570	Laura De La Garza 2814 Treasure Hills Blvd. "C" Harlingen, Texas 78550

5.2 LIST OF CONTRIBUTORS

Tables 5.1 and 5.2 list contributors to the preparation of this Environmental Assessment for improvements to the ACF Levee System, and development of technical support studies.

Table 5.1 Preparers of the Environmental Assessment and Technical Studies

Name	Organization	Degree	Years Experience	Project Role
Carlos Victoria-Rueda	Parsons	Ph.D., Environmental Engineering	25	Project manager; water resources evaluation
Anthony Davis	Parsons	B.S., Civil Engineering	32	Air quality, environmental health, socioeconomics
James Hinson	Parsons	M.S., Wildlife Science	20	Vegetation, wetlands and wildlife analyses; field studies supervision
Justin Kirk	Parsons	B.S. Environmental Sciences	10	Land use, soil, environmental health
Jill Noel	Parsons	M.S., Botany	8	Vegetation, threatened and endangered species, field survey, biological resources technical sections
Sherrie Keenan	Parsons	B.A., Journalism	35	Technical editor
Rachael Mangum	Parsons	M.A. Anthropology	9	Cultural resources specialist, field survey, cultural resources technical sections
Susan Bupp	Parsons	M.A. Anthropology	33	Cultural resources, document review
Seth Wilcher	Parsons	B.S. History	4	Cultural resources/ Historic structures
Erin Atkinson	Parsons	M.A. Geography	4	Cultural resources

Table 5.2 Technical Review of the Environmental Assessment

Name	Agency	Degree	Years Experience	Project Role
Rita Crites	USIBWC Environmental Protection Division	B.S. Biology M.S. in progress	13	Project manager
Carlos Peña	USIBWC Environmental Protection Division	M.S. Environmental Engineering	17	NEPA compliance; document review
Raymundo Aguirre	USIBWC Engineering Division	Ph.D. Civil Engineering	49	Engineering, hydraulics and hydrology; document review
Enrique Reyes	USIBWC O&M Division	B.S., P.E. Civil Engineering	32	LRGFCP Project Manager; document review

SECTION 6
REFERENCES

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APPENDIX A
DETAILED MAP OF LEVEE ALIGNMENT AND POTENTIAL IMPROVEMENT AREAS

APPENDIX B
HABITAT OF THREATENED AND ENDANGERED SPECIES POTENTIALLY OCCURRING WITHIN COUNTIES INTERSECTING THE LEVEE SYSTEM

Federally and State Listed Species								Habitat Presence Possible or Not Likely
Taxon	Common Name	Scientific Name	Federal Status	State Status	Cameron County	Hidalgo County	Description	
BIRDS								
	American Peregrine Falcon	*Falco peregrinus anatum*	DL	T	X	X	year-round resident and local breeder in west Texas, nests in tall cliff eyries; also, migrant across state from more northern breeding areas in US and Canada, winters along coast and farther south; occupies wide range of habitats during migration, including urban, concentrations along coast and barrier islands; low-altitude migrant, stopovers at leading landscape edges such as lake shores, coastlines, and barrier islands.	possible
	Brown Pelican	*Pelecanus occidentalis*	LE-PDL	E	X		largely coastal and near shore areas, where it roosts and nests on islands and spoil banks	not likely
	Eskimo Curlew	*Numenius borealis*	LE	E	X		historic; nonbreeding: grasslands, pastures, plowed fields, and less frequently, marshes and mudflats	possible
	Interior Least Tern	*Sterna antillarum athalassos*	LE	E	X	X	subspecies is listed only when inland (more than 50 miles from a coastline); nests along sand and gravel bars within braided streams, rivers; also known to nest on man-made structures (inland beaches, wastewater treatment plants, gravel mines, etc); eats small fish and crustaceans, when breeding forages within a few hundred feet of colony	possible
	Northern Aplomado Falcon	*Falco femoralis septentrionalis*	LE	E	X	X	open country, especially savanna and open woodland, and sometimes in very barren areas; grassy plains and valleys with scattered mesquite, yucca, and cactus; nests in old stick nests of other bird species	possible
	Peregrine Falcon	*Falco peregrinus*	DL	T	X	X	both subspecies migrate across the state from more northern breeding areas in US and Canada to winter along coast and farther south; subspecies (F. p. anatum) is also a resident breeder in west Texas; the two subspecies' listing statuses differ, F.p. tund	possible
	Piping Plover	*Charadrius melodus*	LT	T	X		wintering migrant along the Texas Gulf Coast; beaches and bayside mud or salt flats	not likely
FISHES								
	Rio Grande silvery minnow	*Hybognathus amarus*	LE	E	X	X	extirpated; historically Rio Grande and Pecos River systems and canals; pools and backwaters of medium to large streams with low or moderate gradient in mud, sand, or gravel bottom; ingests mud and bottom ooze for algae and other organic matter; probably spawns on silt substrates of quiet coves	not likely
	Smalltooth sawfish	*Pristis pectinata*	LE	E	X		different life history stages have different patterns of habitat use; young found very close to shore in muddy and sandy bottoms, seldom descending to depths reater than 32 ft (10 m); in sheltered bays, on shallow banks, and in estuaries or river mouths	not likely
MAMMALS								
	Jaguar	*Panthera onca*	LE	E	X	X	extirpated; dense chaparral; no reliable TX sightings since 1952	not likely
	Jaguarundi	*Herpailurus yaguarondi*	LE	E	X	X	thick brushlands, near water favored; 60 to 75 day gestation, young born sometimes twice per year in March and August, elsewhere the beginning of the rainy season and end of the dry season	not likely
	Ocelot	*Leopardus pardalis*	LE	E	X	X	dense chaparral thickets; mesquite-thorn scrub and live oak mottes; avoids open areas; breeds and raises young June-November	not likely
	West Indian manatee	*Trichechus manatus*	LE	E	X		Gulf and bay system; opportunistic, aquatic herbivore	no marine habitat
MOLLUSKS								
	Texas hornshell	*Popenaias popeii*	C		X	X	both ends of narrow shallow runs over bedrock, in areas where small-grained materials collect in crevices, along river banks, and at the base of boulders; not known from impoundments; Rio Grande Basin and several rivers in Mexico	not likely
REPTILES								
	Atlantic hawksbill sea turtle	*Eretmochelys imbricata*	LE	E	X		Gulf and bay system, warm shallow waters especially in rocky marine environments, such as coral reefs and jetties, juveniles found in floating mats of sea plants; feed on sponges, jellyfish, sea urchins, molluscs, and crustaceans, nests April through Nov	no marine habitat
	Green sea turtle	*Chelonia mydas*	LT	T	X		Gulf and bay system; shallow water seagrass beds, open water between feeding and nesting areas, barrier island beaches; adults are herbivorous feeding on sea grass and seaweed; juveniles are omnivorous feeding initially on marine invertebrates, then increasingly on sea grasses and seaweeds; nesting behavior extends from March to October, with peak activity in May and June	no marine habitat
	Kemp's Ridley sea turtle	*Lepidochelys kempii*	LE	E	X		Gulf and bay system, adults stay within the shallow waters of the Gulf of Mexico; feed primarily on crabs, but also snails, clams, other crustaceans and plants, juveniles feed on sargassum and its associated fauna; nests April through August	no marine habitat
	Leatherback sea turtle	*Dermochelys coriacea*	LE	E	X		Gulf and bay systems, and wide-ranging open water sea turtle; omnivorous, shows a preference for jellyfish; nests from November to February, but not known to nest in Gulf of Mexico, just forages	no marine habitat
	Loggerhead sea turtle	*Caretta caretta*	LT	T	X		Gulf and bay system primarily for juveniles, adults are most pelagic of the sea turtles; omnivorous, shows a preference for mollusks, crustaceans, and coral; nests from April through November	no marine habitat
PLANTS								
	South Texas ambrosia	*Ambrosia cheiranthifolia*	LE	E	X		grasslands and mesquite-dominated shrublands on various soils ranging from heavy clays to lighter textured sandy loams, mostly over the Beaumont Formation on the Coastal Plain; in modified unplowed sites such as railroad and highyway right-of-ways, cemeteries, mowed fields, erosional areas along small creeks; flowering July-November	possible
	Star cactus	*Astrophytum asterias*	LE	E	X	X	gravelly clays or loams, possibly of the Catarina Series (deep, droughty, saline clays), over the Catahoula and Frio formations, on gentle slopes and flats in sparsely vegetated openings between shrub thickets within mesquite grasslands or mesquite-blackbrush thorn shrublands; plants sink into or below ground during dry periods; flowering from mid March-May, may also flower in warmer months after sufficient rainfall, flowers most reliably in early April; fruiting mid April-June	possible
	Texas ayenia	*Ayenia limitaris*	LE	E	X	X	Subtropical thorn woodland or tall shrubland on loamy soils of the Rio Grande Delta; known site soils include well-drained, calcareous, sandy clay loam (Hidalgo Series) and neutral to moderately alkaline, fine sandy loam (Willacy Series); also under or among taller shrubs in thorn woodland/thorn shrubland; flowering throughout the year with sufficient rainfall	possible
	Walker's manioc	*Manihot walkerae*	LE	E		X	periphery of native brush in sandy loam; also on caliche cuestas?; flowering April-September (following rains?)	
State Listed Species								
	Black-spotted newt	*Notophthalmus meridionalis*		T	X	X	can be found in wet or sometimes wet areas, such as arroyos, canals, ditches, or even shallow depressions; aestivates in the ground during dry periods; Gulf Coastal Plain south of the San Antonio River	
	Mexican treefrog	*Smilisca baudinii*		T	X	X	subtropical region of extreme southern Texas; breeds May-October coinciding with rainfall, eggs laid in temporary rain pools	
	Sheep frog	*Hypopachus variolosus*		T	X	X	predominantly grassland and savanna; moist sites in arid areas	
	South Texas siren (large form)	*Siren sp 1*		T	X	X	wet or sometimes wet areas, such as arroyos, canals, ditches, or even shallow depressions; aestivates in the ground during dry periods, but does require some moisture to remain; southern Texas south of Balcones Escarpment; breeds February-June	
	White-lipped frog	*Leptodactylus fragilis*		T	X	X	grasslands, cultivated fields, roadside ditches, and a wide variety of other habitats; often hides under rocks or in burrows under clumps of grass; species requirements incompatible with widespread habitat alteration and pesticide use in south Texas	
BIRDS								
	Cactus Ferruginous Pygmy-	*Glaucidium brasilianum*		T	X	X	riparian trees, brush, palm, and mesquite thickets; during day also roosts in small caves and recesses on slopes of low hills; breeding April to June	
	Common Black-Hawk	*Buteogallus anthracinus*		T	X	X	cottonwood-lined rivers and streams; willow tree groves on the lower Rio Grande floodplain; formerly bred in south Texas	
	Northern Beardless-	*Camptostoma imberbe*		T	X	X	mesquite woodlands; near Rio Grande frequents cottonwood, willow, elm, and great leadtree; breeding April to July	
	Reddish Egret	*Egretta rufescens*		T	X	X	resident of the Texas Gulf Coast; brackish marshes and shallow salt ponds and tidal flats; nests on ground or in trees or bushes, on dry coastal islands in brushy thickets of yucca and prickly pear	
	Rose-throated Becard	*Pachyramphus aglaiae*		T	X	X	riparian trees, woodlands, open forest, scrub, and mangroves; breeding April to July	
	Sooty Tern	*Sterna fuscata*		T	X		predominately 'on the wing'; does not dive, but snatches small fish and squid with bill as it flies or hovers over water; breeding April-July	

	White-faced Ibis	*Plegadis chihi*		T	X	X	prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats	
	White-tailed Hawk	*Buteo albicaudatus*		T	X	X	near coast on prairies, cordgrass flats, and scrub-live oak; further inland on prairies, mesquite and oak savannas, and mixed savanna-chaparral; breeding March-May	
	Wood Stork	*Mycteria americana*		T	X	X	forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, sometimes in association with other wading birds (i.e. active heronries); breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands, even those associated with forested areas; formerly nested in Texas, but no breeding records since 1960	
	Zone-tailed Hawk	*Buteo albonotatus*		T	X	X	arid open country, including open deciduous or pine-oak woodland, mesa or mountain county, often near watercourses, and wooded canyons and tree-lined rivers along middle-slopes of desert mountains; nests in various habitats and sites, ranging from small trees in lower desert, giant cottonwoods in riparian areas, to mature conifers in high mountain regions	
	Gray Hawk	*Asturina nitida*		T	X	X	locally and irregularly along U.S.-Mexico border; mature riparian woodlands and nearby semiarid mesquite and scrub grasslands; breeding range formerly extended north to southernmost Rio Grande floodplain of Texas	
	Texas Botteri's Sparrow	*Aimophila botterii texana*		T	X	X	grassland and short-grass plains with scattered bushes or shrubs, sagebrush, mesquite, or yucca; nests on ground of low clump of grasses	
	Tropical Parula	*Parula pitiayumi*		T	X	X	dense or open woods, undergrowth, brush, and trees along edges of rivers and resacas; breeding April to July	
FISHES								
	Mexican goby	*Ctenogobius claytonii*		T	X		Southern coastal area; brackish and freshwater coastal streams	
	Opossum pipefish	*Microphis brachyurus*		T	X		brooding adults found in fresh or low salinity waters and young move or are carried into more saline waters after birth; southern coastal areas	
	River goby	*Awaous banana*		T	X	X	Southern coastal waters; clear water with slow to moderate current, sandy or hard bottom, and little or no vegetation; also enters brackish and ocean waters	
MAMMALS								
	Coues' rice rat	*Oryzomys couesi*		T	X	X	cattail-bulrush marsh with shallower zone of aquatic grasses near the shoreline; shade trees around the shoreline are important features; prefers salt and freshwater, as well as grassy areas near water; breeds April-August	
	White-nosed coati	*Nasua narica*		T	X	X	woodlands, riparian corridors and canyons; most individuals in Texas probably transients from Mexico; diurnal and crepuscular; very sociable; forages on ground and in trees; omnivorous; may be susceptible to hunting, trapping, and pet trade	
REPTILES								
	Black-striped snake	*Coniophanes imperialis*		T	X	X	extreme south Texas; semi-arid coastal plain, warm, moist micro-habitats and sandy soils; proficient burrower; eggs laid April-June	
	Indigo snake	*Drymarchon corais*		T	X	X	Texas south of the Guadalupe River and Balcones Escarpment; thornbush-chaparral woodlands of south Texas, in particular dense riparian corridors; can do well in suburban and irrigated croplands if not molested or indirectly poisoned; requires moist microhabitats, such as rodent burrows, for shelter	
	Northern cat-eyed snake	*Leptodeira septentrionalis*		T	X	X	Gulf Coastal Plain south of the Nueces River; thorn brush woodland; dense thickets bordering ponds and streams; semi-arboreal; nocturnal	
	Reticulate collared lizard	*Crotaphytus reticulatus*		T		X	requires open brush-grasslands; thorn-scrub vegetation, usually on well-drained rolling terrain of shallow gravel, caliche, or sandy soils; often on scattered flat rocks below escarpments or isolated rock outcrops among scattered clumps of prickly pear and mesquite	
	Speckled racer	*Drymobius margaritiferus*		T	X	X	extreme south Texas; dense thickets near water, Texas palm groves, riparian woodlands; often in areas with much vegetation litter on ground; breeds April-August	
	Texas horned lizard	*Phrynosoma cornutum*		T	X	X	open, arid and semi-arid regions with sparse vegetation, including grass, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive; breeds March-Sep	
	Texas scarlet snake	*Cemophora coccinea lineri*		T	X		mixed hardwood scrub on sandy soils; feeds on reptile eggs; semi-fossorial; active April-September	
	Texas tortoise	*Gopherus berlandieri*		T	X	X	open brush with a grass understory is preferred; open grass and bare ground are avoided; when inactive occupies shallow depressions at base of bush or cactus, sometimes in underground burrows or under objects; longevity greater than 50 years; active March	

APPENDIX C
WETLAND ISSUES IN THE ARROYO COLORADO

APPENDIX D
COMMENT LETTERS ON THE DRAFT EA

WILL BE PROVIDED IN THE FINAL VERSION

APPENDIX E
TECHNICAL SUPPORT STUDIES REPORT

[Appendix is provided in attached CD-ROM]

WILL BE PROVIDED IN THE FINAL VERSION