Draft Environmental Impact Statement

Flood Control Improvements and Partial Levee Relocation USIBWC Presidio Flood Control Project

Presidio, Texas

November 2009

United States Section
International Boundary and Water Commission
El Paso, Texas

DRAFT ENVIRONMENTAL IMPACT STATEMENT
FLOOD CONTROL IMPROVEMENTS AND PARTIAL LEVEE RELOCATION
USIBWC PRESIDIO FLOOD CONTROL PROJECT
PRESIDIO, TEXAS

Lead Agency

UNITED STATES SECTION
INTERNATIONAL BOUNDARY AND WATER COMMISSION
UNITED STATES AND MEXICO
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November 2009

Cover Sheet

FLOOD CONTROL IMPROVEMENTS AND PARTIAL LEVEE RELOCATION

USIBWC PRESIDIO FLOOD CONTROL PROJECT
PRESIDIO, TEXAS

(X) Draft **( ) Final**

Lead Agency

United States Section, International Boundary and Water Commission (USIBWC)
El Paso, Texas

Abstract

The USIBWC anticipates the need for flood control improvements and partial levee relocation to improve flood control capabilities of the Presidio Flood Control Project (FCP). In response to September 2008 flooding damage, the USIBWC developed engineering alternatives for long-term improvement of the Presidio FCP. The USIBWC compared six action alternatives to the No Action Alternative (Alternative 1). The action alternatives include:

- Rehabilitate the levee system along the current alignment to repair structural damages, and to ensure the original 25-year design criteria is met along the entire levee system (Alternative 2);
- Raise the levee system along the entire Presidio FCP to provide protection from a 100-year flood event (Alternative 3) or a partial downstream levee realignment (Alternative 4); and,
- Raise the upstream section of the levee system to provide a 100-year flood protection to the City of Presidio, while retaining the 25-year flood protection of agricultural lands in downstream section. To connect the raised, upstream section of the levee to elevated terrain south of the City of Presidio, a spur levee would be constructed. Three spur levee alignments are under consideration (Alternatives 5, 6, and 7).

This Draft EIS evaluated potential environmental consequences of alternatives under consideration for the improvement of the Presidio FCP. The USIBWC will apply the evaluation as guidance of the anticipated implementation of one of the action alternatives.

Other Requirements Served

This Draft EIS is intended to serve other environmental review and consultation requirements pursuant to 40 CFR 1502.25(a).

Date of Draft EIS availability to USEPA and the Public:

November 20, 2009

Comments should be directed to:
Mr. Daniel Borunda
Environmental Management Division
USIBWC
4171 North Mesa St., C-100
El Paso, Texas 79902

Comments should be postmarked no later than January 12, 2010.

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ACRONYMS AND ABBREVIATIONS

ACHP	Advisory Council on Historic Preservation
APE	Area of Potential Effect
AQCR	Air Quality Control Region
AST	above-ground storage tanks
BMP	Best Management Practices
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFR	Code of Federal Regulations
cfs	cubic square feet
CPB	Customs and Border Protection
CWA	Clean Water Act
EIS	Environmental Impact Statement
EO	Executive Order
EPCM	El Paso Centennial Museum
ERNS	Emergency Response Notification System of Spills
ESA	Endangered Species Act
FCP	Flood Control Project
FEMA	Federal Emergency Management Agency
GENS	RCRS-registered small quantity generator of hazardous waste
GPS	Global Positioning System
HAER	Historic American Engineering Record
IBWC	International Boundary and Water Commission
IH	Interstate Highway
INS	Immigration and Naturalization Service
IOP	Innocent Owner/Operator Program
LUST	leaking underground storage tank
MBTA	Migratory Bird Treaty Act
mg/L	milligram per liter
mg N/L	milligrams nitrogen per liter
MxIBWC	Mexican Section, International Boundary and Water Commission
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NFRAP	No Further Remedial Action Plan
NHPA	National Historic Preservation Act
NLCD	National Land-Cover Database
NPL	National Priority List
NRCS	National Resources Conservation Service
NRHP	National Register of Historic Places
O&M	operations and maintenance
P.L.	public law

RCRA	Resource Conservation and Recovery Act
ROW	Right-of-way
SDWA	Safe Drinking Water Act
SHPO	State Historic Preservation Officer
SWL	solid waste landfills
T&E	threatened and endangered
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TGPC	Texas Groundwater Protection Committee
THC	Texas Historical Commission
TMDL	Total Maximum Daily Loads
TPWD	Texas Parks and Wildlife Department
TSD	Transport, Storage, and Disposal
TWC	Texas Water Code
TWDB	Texas Water Development Board
USACE	U.S. Army Corps of Engineers
USBP	U.S. Border Patrol
USC	U.S. Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USIBWC	United States Section, International Boundary and Water Commission
UST	underground storage tanks
UTEP	University of Texas at El Paso
VCP	Voluntary Cleanup Program

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SECTION 1
BACKGROUND, PURPOSE OF, AND NEED FOR ACTION

This Environmental Impact Statement (EIS) evaluates potential environmental effects of proposed alternatives for improvement of the Presidio Flood Control Project (Presidio FCP) operated by the United States Section, International Boundary and Water Commission (USIBWC) along the Rio Grande in Presidio, Texas. Improvements under consideration include structural rehabilitation in downstream segments of the levee system while retaining the current 25-year flood protection; raising the levee system to provide a 100-year flood protection; and partial levee relocation. This section of the EIS gives a summary description of the project; describes the purpose of and need for the action, and scope of the environmental evaluation; identifies regulatory compliance requirements; and presents the EIS organization.

1.1 BACKGROUND

The Presidio FCP lies within the Presidio-Ojinaga Valley, in southern Presidio County, Texas. It extends approximately 13.1 miles along the Rio Grande in the Texas-Mexico border. The length of the levee system in the United States (north levee of the Presidio FCP) is approximately 15.3 miles, and includes the downstream section of Cibolo Creek, a tributary of the Rio Grande north of the City of Presidio. Figure 1-1 shows the location of the Presidio FCP.

Figure 1-1 Presidio Flood Control Project, Presidio, Texas

The Presidio FCP was constructed in 1975 to protect productive agricultural lands in the Presidio-Ojinaga valley from frequent flooding, and to establish the international boundary as per the Boundary Treaty of 1970. For many years, insufficient levees resulted in repeated flood damage in the area during the early and mid-1900s. The situation was addressed by ratification of the Boundary Treaty of 1970, which provided for excavation of channels to relocate the Rio Grande in the Presidio Valley. Subsequent to the Boundary Treaty of 1970, an IBWC report on flood control (dated June 1971) paved the way for an international agreement of collaborative flood control efforts in the Presidio-Ojinaga Valley. Based primarily on this report, Title II of Public Law 92-549 (signed October 25, 1972) authorized construction, operation, and maintenance efforts with Mexico for providing flood control to the Presidio Valley. The timing of the signing of the international flood control agreement allowed for 15.2 miles of levee to be built concurrently with the channel relocation (as provided by the Boundary Treaty of 1970).

The Presidio FCP provided flood protection by augmenting the capacity of the river channel through construction of cleared berms and levees on both sides of the river. Rectification also took place at the time of project construction, reducing the channel length by 6.3 miles. In the United States, the levee system extends for 15.3 miles thorough Presidio, Texas. The system includes parallel spur levees along the lower reach of Cibolo Creek. The levees were designed to contain a 25-year flood with 4 feet of freeboard. Downstream of the confluence of the Rio Conchos with the Rio Grande, the design flow is 42,000 cubic feet per second (cfs). In 1979, levees downstream of the end of the river relocation were raised 4 feet following a September 1978 flood. After Hurricane Katrina struck New Orleans in 2005, the Federal Emergency Management Agency (FEMA) instituted a policy that levees provide protection from a 100-year flood event. If the levees meet this requirement, as certified by independent surveyors or federal agencies, homeowners will not be required to purchase additional flood insurance.

1.2 PURPOSE OF AND NEED FOR ACTION

During September 2008, the Presidio FCP experienced severe flooding conditions due to water releases from the Rio Conchos watershed in Mexico. The flooding caused substantial damage to the Presidio FCP, including levee breaches, overtopping, piping/sand boils, under-seepage, and severe surface and slope erosion. The flooding also compounded levee foundation integrity issues at several levee segments, primarily at locations of old resacas (river meanders). Emergency responses during the flooding event included filling over 25,000 sand bags and placing the bags on the existing levee to add support, and using Department of Defense helicopters to fill bridge openings with larger sand bags in existing railroad right-of-ways to create secondary levees. The sandbags and secondary levees prevented the City of Presidio from more extensive flooding.

Emergency rehabilitation was required at two locations north of Cibolo Creek due to the substantial damage to Presidio FCP levees following the September 2008 flooding. Emergency levee repairs were conducted in two reaches of approximately 1,000 feet and 2,000 feet, located at levee miles 3.8 and 4.4, respectively. The existing levee was repaired, to the extent possible, to protect the City of Presidio from subsequent damage during the 2009 flood season. Repairs consisted of embankment material placement along the levee slopes where erosion occurred to re-establish pre-flood levee conditions and minimize the potential for underseepage. Emergency rehabilitation was completed before June 1, the traditional start of the flood season.

Potential environmental effects of the emergency repairs were evaluated by the USIBWC in the April 2009 document, *Final Environmental Assessment: Emergency Levee Repairs to the Presidio Flood Control Project, Station 7+000* (USIBWC 2009a).

In response to the September 2008 flooding damage, the USIBWC developed engineering alternatives for long-term improvement of the Presidio FCP flood containment capacity. These alternatives were formulated to achieve the following goals relative to the No Action Alternative (Alternative 1):

- Rehabilitate the levee system along the current alignment as needed to repair structural damages and to ensure the original 25-year design criteria is met along the entire levee system (Alternative 2).
- Raise the levee system along the entire Presidio FCP to provide protection from a 100-year flood event. Increasing levee height along the existing alignment and a partial downstream realignment are under consideration (Alternatives 3 and 4, respectively).
- Raise the upstream section of the levee system to provide a 100-year flood protection to the City of Presidio, while retaining the 25-year flood protection of agricultural lands in the downstream section. To connect the raised, upstream section of the levee to elevated terrain south of the City of Presidio, a spur levee would be constructed. Three spur levee alignments are under consideration (Alternatives 5, 6, and 7).

1.3 SCOPE OF ENVIRONMENTAL REVIEW

This EIS was prepared by the USIBWC as the lead agency to evaluate potential environmental effects of a range of proposed alternatives for levee height increase and partial relocation along the Presidio FCP. Federal agencies are required to take into consideration environmental consequences of proposed 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 Federal Register 44083, September 2, 1981). These federal regulations establish both the administrative process and substantive scope of the environmental impact evaluation designed to ensure that deciding authorities have a proper understanding of the potential environmental consequences of a contemplated course of action.

The EIS evaluates a No Action Alternative and six Action Alternatives for levee rehabilitation and relocation that would allow USIBWC to minimize potential environmental impacts and fulfill the project goal of flood protection. In compliance with NEPA, the USIBWC integrated the environmental evaluation process with other planning at the earliest possible time to ensure that planning and decisions reflect environmental values, to avoid delays later in the process, and to avert potential conflicts.

The environmental documentation and analyses provided in this EIS are based on site-specific and project specific alternatives. Potential impacts are evaluated for the following environmental resources: biological resources, cultural resources, water resources, land use, socioeconomic resources and transportation, environmental health issues (air quality, noise, public health, and environmental hazards), and cumulative impacts.

No changes in levee, floodway, and river channel maintenance are anticipated as a result of improvement alternatives under consideration for the Presidio FCP. Current maintenance practices to be retained, regardless of which alternative is adopted, include mowing vegetation from the levee slopes, selectively removing woody vegetation, and dredging the river and mouths of Cibolo and Alamito Creeks. The impacts evaluation of individual alternatives in Section 4 addresses levee rehabilitation, expansion, or levee relocation, but not maintenance practices. These maintenance practices have been previously evaluated in the 2008 *Final Programmatic Environmental Impact Statement, Improvements to the USIBWC Rio Grande Flood Control Projects along the Texas-Mexico Border* (USIBWC 2008).

1.4 USIBWC AUTHORITY

The IBWC, which before 1944 was known as the International Boundary Commission, was created by the Convention of 1889, and consists of a United States Section (the 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 has five components, as follows:

- Regulation and conservation of waters of the Rio Grande for use by the United States and Mexico through joint construction, operation, and maintenance of international storage dams and reservoirs and plants for generating hydroelectric energy at the dams, and regulation of the Colorado River waters allocated to Mexico;
- Distribution of waters of the Rio Grande and the Colorado River between the two countries;
- Protection of lands along the Rio Grande from floods through levee and floodway projects and solution of border sanitation and other border water quality problems;
- Preservation of the Rio Grande and Colorado River as the international boundary; and,
- Demarcation of the land boundary.

1.5 COMPLIANCE WITH APPLICABLE LAWS AND REGULATIONS

This EIS is subject to and consistent with applicable federal, state, and tribal laws, regulation, policies, and interstate and international compacts and treaties. Applicable regulations are summarized below.

1.5.1 Federal Environmental and Cultural Resources Laws

National Environmental Policy Act

This document is prepared in accordance with NEPA 1969, as amended (Public Law [P.L.] 91-910, 42 United States Code [USC] 4321-4347). Written responses to comments will be published in the Final EIS. A Notice of Availability will be published in the Federal Register announcing the availability of the Final EIS. A Record of Decision will be issued following a 30-day review period of the Final EIS.

Endangered Species Act

Passed in 1973 and reauthorized in 1988, the Endangered Species Act (ESA) regulates a wide range of activities affecting plants and animals designated as endangered or threatened. By definition, an endangered species is an animal or plant listed by regulation as being in danger of extinction. A threatened species is any animal or plant likely to become endangered within the near future. A species must be listed in the Federal Register as endangered or threatened for the provisions of the ESA to apply.

The ESA prohibits the following activities involving endangered species:

- Importing into or exporting from the United States.
- Taking (includes harassing, harming, pursuing, hunting, shooting, wounding, trapping, killing, capturing, or collecting) within the United States and its territorial seas.
- Taking on the high seas.
- Possessing, selling, delivering, carrying, transporting, or shipping any such species unlawfully taken within the United States or on the high seas.
- Delivering, receiving, carrying, transporting, or shipping in interstate or foreign commerce in the course of a commercial activity.
- Selling or offering for sale in interstate or foreign commerce.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) of 1918 implemented the 1916 convention between the United States and Great Britain for the protection of birds migrating between the United States and Canada. Similar conventions between the United States and Mexico (1936), Japan (1972) and the former U.S.S.R (1976) further expanded the scope of international protection of migratory birds. Each new treaty has been incorporated into the MBTA as an amendment, and the provisions of the new treaty are implemented domestically. These four treaties and their enabling legislation, the MBTA, established federal responsibilities for the protection of nearly all species of migratory birds, their eggs, and nests.

National Historic Preservation Act

Archaeological, architectural, and Native American resources are protected by a variety of laws and their implementing regulations: the Archeological and Historic Preservation Act of 1974; the Archaeological Resources Protection Act of 1979; the American Indian Religious Freedom Act of 1978; the Native American Graves Protection and Repatriation Act of 1990; and the National Historic Preservation Act (NHPA) of 1966, as amended 2006. The Advisory Council on Historic Preservation (ACHP) further guides treatment of archaeological and architectural resources through the implementing regulations for the NHPA, 36 CFR 800, Protection of Historic Properties. Section 106 of the NHPA, as amended (16 USC 470) requires federal agencies to take into account the effects of their undertakings, including licensing and approvals, on historic properties and to afford the ACHP and other interested parties a reasonable opportunity to comment. As defined broadly by the regulations implementing Section 106 (36 CFR 800), a historic property is defined as "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP) maintained by the Secretary of the Interior."

Resources that qualify for inclusion in the NRHP must meet at least one of the following four criteria:

- Criterion A: be associated with events that have made a significant contribution to the broad patterns of our history;
- Criterion B: be associated with the lives of persons significant in our past;
- Criterion C: embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction; or
- Criterion D: have yielded, or may be likely to yield, information important in prehistory or history (36 CFR 60.4).

Properties that qualify for the NRHP must also possess integrity, defined by the following seven aspects: location, design, setting, materials, workmanship, feeling, and association.

Clean Water Act

Federal laws regulating water quality include the Clean Water Act (CWA) (33 USC 1251 *et seq.*) and the Safe Drinking Water Act (SDWA) (42 USC 300f *et seq.*). The CWA was enacted by Congress to restore and maintain the chemical, physical, and biological integrity of waters of the United States. The primary provisions are designed to restore the chemical, physical and biological integrity of the nation's waters and to make the waters both "fishable and swimmable" by eliminating pollutant discharges.

Runoff is addressed in Section 319 of the CWA, which establishes a national program to control nonpoint sources of pollution. Funding is available under Section 319(h) of this section for protection or restoration of wetland and riparian areas to reduce non-point source pollution.

Section 401 of the Clean Water Act gives a State the option of reviewing, approving, conditioning, or denying all federal permits or licenses that might result in a discharge to State waters, including wetlands. In Texas, the Texas Commission on Environmental Quality (TCEQ) provides review and certification under Section 401 of the CWA. For impaired water bodies, the CWA directs each state to develop Total Maximum Daily Loads (TMDL), the amounts of pollutants that can be assimilated by a body of water without exceeding water quality standards. Based on the developed TMDLs, TCEQ or the U.S. Environmental Protection Agency (USEPA) can limit any discharge of pollutants to a level sufficient to ensure compliance with state water quality standards.

Section 404 (Dredge and Fill) of the CWA regulates the discharge of dredge and fill material into waters of the United States, including some wetlands deemed jurisdictional under the CWA. Activities regulated under this program include water resource projects (such as dams, levees, etc.), infrastructure development, fills for development, and conversion of wetlands to uplands for farming and forestry. The program is administered by the U.S. Army Corps of Engineers (USACE), 33 USC 330 and 403, and 33 USC subpart U, and it administers the day-to-day program, including individual permit decisions and jurisdictional determinations. In addition, resource agencies such as USFWS and the Texas Parks and Wildlife Department (TPWD) act in advisory capacities.

Natural Resources Conservation Service Prime Farmland

The Natural Resources Conservation Service (NRCS), formerly the Soil Conservation Service, was established in 1935 to provide leadership in a partnership effort to help America's private landowners and managers conserve their soil, water, and other natural resources. The NRCS developed a web soil survey that provides mapped soil data and natural resources information for specific map units and areas. In addition to other soil properties, the web soil survey identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland.

Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and that is available for these uses. It has the combination of soil properties, growing season, and moisture supply needed to produce sustained high yields of crops in an economic manner if it is treated and managed according to acceptable farming methods. In general, prime farmland has an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, an acceptable level of acidity or alkalinity, an acceptable content of salt or sodium, and few or no rocks. Its soil is permeable to water and air. Prime farmland is not excessively eroded or saturated with water for long periods of time, and it either does not flood frequently during the growing season or is protected from flooding, and is not in areas of water or urban or built-up land.

Executive Order to Address Environmental Justice

Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, encourages federal facilities to achieve "environmental justice" by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations. Accompanying EO 12898 was a Presidential transmittal memorandum that referenced existing federal statutes and regulations to be used in conjunction

with EO 12898. One of the items in that memorandum was the use of the policies and procedures of NEPA, specifically that, "Each Federal agency shall analyze the environmental effects, including human health, economic, and social effects, of Federal actions, including effects on minority communities and low-income communities, when such analysis is required by the NEPA 42 USC Section 4321, *et seq*."

Clean Air Act

The Clean Air Act (42 USC 7407) 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 USEPA classifies the air quality within an AQCR according to whether the concentration of criteria air pollutants in the atmosphere exceeds primary or secondary NAAQS. All areas within each AQCR are assigned a designation of attainment, nonattainment, unclassifiable attainment, or not designated attainment for each criteria air pollutant. An attainment designation indicates that air quality within an area is as good as or better than the NAAQS. Nonattainment indicates that air quality within a specific geographical area exceeds applicable NAAQS. Unclassifiable and not designated indicates that air quality cannot be or has not been classified based on available information as meeting or not meeting the NAAQS and is, therefore, treated as attainment. Before a nonattainment area is eligible for reclassification to attainment status, the state must demonstrate compliance with NAAQS in the nonattainment area for three consecutive years and demonstrate, through extensive dispersion modeling, that attainment status can be maintained in the future even with community growth.

Comprehensive Environmental Response, Compensation, and Liability Act

Hazardous materials are those substances defined by the Comprehensive Environmental Response, Compensation, and Liability Act (42 USC 9601 *et seq*.), as amended by the Superfund Amendments and Reauthorization Act, and the Toxic Substances and Control Act. Hazardous waste is defined under the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act (RCRA). In general, both hazardous substances and waste include substances that, because of their quantity, concentration, and physical, chemical, or infectious characteristics, may present a danger to public health and/or welfare and to the environment when released or improperly managed.

1.5.2 State Laws and Regulations

Texas Parks and Wildlife Department Threatened and Endangered Species Listing

In 1973, the Texas legislature authorized the TPWD to establish a list of threatened and endangered (T&E) animals in the state. Endangered species are those species that the Executive Director of the Texas Parks and Wildlife Department has named as being "threatened with statewide extinction." Threatened species are those species that the TPWD has determined are likely to become endangered in the future. Laws and regulations pertaining to endangered or threatened animal species are contained in Chapters 67 and 68 of the Texas Parks and Wildlife Code and Sections 65.171 – 65.176 of Title 31 of the Texas Administrative Code (TAC).

In 1988, the Texas legislature authorized TPWD to establish a list of T&E plant species for the state. An endangered plant is one "in danger of extinction throughout all or a significant portion of its range." A threatened plant is one that is likely to become endangered within the near future. Laws and regulations pertaining to endangered or threatened plant species are contained in Chapter 88 of the Texas Parks and Wildlife Code and Sections 69.01 – 69.9 of the TAC.

Antiquities Code of Texas

Originally passed in the 1969, the Antiquities Code of Texas, established by Senate Bill No. 58, Chapter 442, Government Code of Texas, was initially written to prevent looting of historic shipwrecks in state waters. However, it applies to all sites on land or under waters controlled by the state or political subdivisions of the state (*e.g.*, cities, counties, river authorities). It was later redefined as the Texas Natural Resource Code of 1977, a formal revision of the statutes relating to the public domain. Title 9, Chapter 191 of the Resource Code pertains to the Antiquities Code of Texas. Further revisions were added culminating in the latest amendment, dated September 1, 1997.

Under the Antiquities Code, a political subdivision is required to notify the Texas Historical Commission (THC) if its project meets at least one of the following conditions: (1) is 5 or more acres in extent; (2) will involve excavation of at least 5,000 cubic yards of material; (3) is in a known historic district; or (4) contains a recorded archeological site. The THC issues Antiquities Permits for archeological studies to professional archeologists who meet the definition of principal investigator found in the Rules of Practice and Procedure (Title 14, Chapter 26, of the TAC). Any person who plans to carry out work involving ground disturbance on state-owned land in Texas must first obtain an Antiquities Permit from the State Historic Preservation Officer (SHPO). These permits are issued either for archaeological or historic buildings and structures investigations. In general, the state review process parallels the federal process under Section 106 of the NHPA.

Texas Groundwater Protection Committee

State guidance regulating the use and protection of groundwater resources in Texas are provided in the Texas Groundwater Protection Strategy. The State Legislature recognized the importance of groundwater use in the State and, in 1989, created the Texas Groundwater Protection Committee (TGPC), composed of nine State agencies and the Texas Alliance of Groundwater Districts (TGPC 2003). Three overarching principles guide state groundwater management: (1) the policy of non-degradation of groundwater quality established in the State's Groundwater Goal and Policy (Texas Water Code [TWC] Section 26.401); (2) stakeholder and regionally based planning for ground and surface water that is the cornerstone of the State's water planning effort; and (3) local control of groundwater quantity management through groundwater conservation districts (TWC, Section 36.0015).

These regulations provide a means to protect groundwater resources in the State. Groundwater conservation districts are the State's preferred method of groundwater management. As of February 2003, 80 groundwater conservation districts had been established in Texas covering all or parts of 119 counties. Another nine districts created by the Legislature await voter confirmation elections. There are currently no groundwater protection districts in the Presidio area.

1.6 EIS ORGANIZATION

Section 1 provides information on the EIS objectives and a description of the flood control project.

Section 2 presents an overview of alternatives and actions for evaluation in the EIS, as well as the process followed for initial formulation of alternatives.

Section 3 provides a description of existing conditions, or affected environment.

Section 4 evaluates environmental consequences of the No-Action alternative and the proposed action alternatives for levee improvement.

Section 5 discusses Best Management Practices and Mitigation.

Section 6 discusses environmental coordination, including information on EIS preparation and review.

Section 7 presents a glossary of terms used in the document and a list of cited references.

SECTION 2
DESCRIPTION OF ALTERNATIVES

This section describes the Presidio Flood Control Project, the formulation process followed to arrive at the alternatives evaluated in the EIS, and describes the flood control improvements under consideration.

2.1 FLOOD CONTROL PROJECT DESCRIPTION

The Presidio FCP lies within the Presidio-Ojinaga Valley in southern Presidio County, Texas. It is formed by the Rio Grande, from Haciendita to the confluence with Brito Creek, approximately 13 miles downstream. The Rio Conchos, the largest tributary to the international section of the Rio Grande from Mexico, enters the Rio Grande approximately 2 miles upstream of the City of Presidio. Cibolo Creek joins the Rio Grande just north of the City of Presidio. Downstream of the Presidio FCP, Alamito Creek joins the Rio Grande from Presidio County.

In the United States, the levee system extends for approximately 15 miles thorough Presidio. The system includes parallel spur levees along the lower reach of Cibolo Creek. The levees were designed to contain a 25-year flood with 4 feet of freeboard. Downstream of the confluence of the Rio Conchos with the Rio Grande, the design flow is 42,000 cubic feet per second (cfs). In 1979, the levees downstream of the end of the river relocation were raised 4 feet following a September 1978 flood.

Figure 2-1 shows main geographic features and the current alignment of the Presidio FCP levee system. The levee mile notation throughout this document refers to the distance along the north levee, from the upstream point near Haciendita (levee mile 0). For the evaluation of alternatives, the Presidio FCP levee system was divided into three sections, as follows:

- The *upper reach* of the levee extends approximately 4.5 miles downstream, to the end of the Cibolo Creek north levee;
- The *middle reach* of the Presidio FCP begins with the south levee of Cibolo Creek, and continues to levee mile 9; and
- The *lower reach* of the levee extends from levee mile 9 to the downstream end of the system, at levee mile 15.3.

The levee height varies from 12 to more than 20 feet, with the higher levees at the southern end of the Presidio FCP. The existing levee is a raised trapezoidal compacted-earth structure with an average crown width of 12 feet in the upper reach, and 8 to 10 feet average width in the lower reach. The side slope ratio of the levees is approximately 2.5:1 or 3:1 (units of horizontal run in feet per foot of vertical rise). The average levee height is 12 to 15 feet in the upper reach and a height of 20 plus feet in the lower reach. The levee crown is an unpaved service road with limited public access. The existing levee footprint (from the landside toe to the riverside toe of the levee) typically ranges from 70 to 150 feet, depending on location. Levees along the north and south sides of Cibolo Creek are each 145 feet wide.

2.2 ALTERNATIVES AND BASIS FOR FORMULATION

Potential actions and alternatives to improve flood containment capacity of the Presidio FCP were initially identified by the Engineering, Operations, and Environmental Divisions of the USIBWC. A summary description of those actions and alternatives was provided for comment to agencies, State and local governments, organizations, and other potential stakeholders as part of a public scoping process. A public scoping meeting was held in the City of Presidio on March 10, 2009.

Findings and conclusions of the scoping process, described in Section 6, were compiled in the document, *Scoping Meeting Summary, Presidio Environmental Impact Statement, Presidio Flood Control Project* (USIBWC 2009b). Comments and recommendations submitted during the scoping process were then incorporated into a No Action Alternative and three Action Alternatives (USIBWC 2009c).

After the initial scoping meeting and presentation of alternatives developed by the USIBWC, representatives of the local landowners, the Environmental Defense Fund, and the Trans-Pecos Water Trust, met with the USIBWC Commissioner and personnel from the Engineering and Environmental Divisions to discuss impacts of the proposed alternatives on agricultural lands. Two additional alignments of a new spur levee were proposed, and subsequently developed in detail by the USIBWC for evaluation as additional alternatives in the EIS (USIBWC 2009e).

Action alternatives under consideration would improve the flood containment capacity of the Presidio FCP relative to the No Action Alternative (Alternative 1) to achieve the following goals:

- Rehabilitate the levee system along the current alignment as needed to repair structural damages and ensure the 25-year design criteria is met along the entire levee system (Alternative 2).
- Increase levee height along the entire Presidio FCP levee system to increase flood protection from a 100-year flood event. Two options under consideration are increasing levee height along the existing alignment (Alternative 3), and partial downstream realignment (Alternative 4).
- Raise the upstream section of the levee system to provide a 100-year flood protection to the City of Presidio, while retaining the 25-year flood protection of agricultural lands in downstream section. To connect the raised, upstream section of the levee to elevated terrain south of the City of Presidio, a spur levee would be constructed. Three spur levee alignments are under consideration (Alternatives 5, 6, and 7).

Table 2-1 summarizes primary features of seven alternatives under consideration. These alternatives are discussed individually below. Detailed descriptions are provided in the *Formulation of Alternatives Report* (USIBWC 2009e), available for review at the USIBWC website [www.ibwc.state.gov/Organization/Environmental/reports_studies.html]. Figures 2-1 to 2-4 illustrate current and modified levee alignments under consideration.

Table 2-1 Summary of Flood Control Improvement Alternatives under Consideration

Alternative	Main Features
ALTERNATIVE 1 (No Action)	• Retains current levee alignment and footprint. • No further structural levee repairs beyond emergency repairs already completed.
Levee improvements to ensure 25-year flood protection design criteria are met along entire Presidio FCP	
ALTERNATIVE 2 Rehabilitation to 25-year design criteria	• Retains current alignment, footprint, and original design specifications to provide protection from a 25-year flood along the entire Presidio FCP. • Levee height raised to 4 feet along a1-mile segment (levee miles 13.1 to 14.1) • Structural repairs (levee reconstruction and/or placement of slurry walls) along the levee section between miles 9.2 and 15.3. • Potential placement of overflow weir and an outlet structure in the levee system lower reach.
Raising levee system for a 100-year flood protection along entire Presidio FCP	
ALTERNATIVE 3 100-year flood protection along current alignment	• Levee height increase along the entire Presidio FCP to provide 100-year flood protection, retaining current alignment; height increase results in a lateral expansion of the levee. • Damaged levee foundations repaired in the Presidio FCP lower reach.
ALTERNATIVE 4 100-year flood protection with downstream offset alignment	• Height increase along the along the upper and middle reaches of the levee system to provide 100-year flood protection, retaining current alignment. • Relocation of lower reach of the levee system approximately 500 feet from existing levee to provide protection from a 100-year flood. • The offset levee would be approximately 3.4 miles long (from levee mile 9.2 to mile 13.2). • Structural repairs of the existing levee from levee mile 13.2 to 15.3.
Improvement for 100-year flood protection limited to the upstream reach of the Presidio FCP	
ALTERNATIVE 5 Upstream 100-year flood protection with Mile 9.2 spur levee	• Height increase along the along the upper and middle reaches of the levee system to provide 100-year flood protection, retaining current alignment (from levee miles 0 to 9.2). Increased flood protection provided to the City of Presidio and adjacent agricultural lands. • The lower reach of the existing levee would be rehabilitated in place to retain the 25-year design flood protection for the downstream agricultural lands. • Potential placement of overflow weir and an outlet structure in the levee system lower reach. • A new spur levee, approximately 1.3 miles long, would be constructed at levee mile 9.2 to connect raised levee segment to elevated terrain south of the City of Presidio. • The spur levee would be constructed nearly perpendicular to the existing levee, running in a northeast direction to reach Ranch Road 170.
ALTERNATIVE 6 Upstream 100-year flood protection with Mile 8.5 spur levee	• Height increase along the upper and middle reaches of the levee system to provide 100-year flood protection, retaining current alignment (from levee miles 0 to 8.5). Increased flood protection provided to the City of Presidio and adjacent agricultural lands. • The lower reach of the existing levee would be rehabilitated in place to retain the 25-year design flood protection for the downstream agricultural lands. • Potential placement of overflow weir and an outlet structure in the levee system lower reach. • A new spur levee, approximately 1.4 miles long, would be constructed to connect the raised levee segment to elevated terrain south of the City of Presidio. • The spur levee would extend north from the levee, around a resaca, continuing in a northeast direction to reach Ranch Road 170.
ALTERNATIVE 7 Upstream 100-year flood protection with railroad spur levee	• Height increase along the along the levee system upper reach, retaining current alignment (from levee miles 0 to 7.3), to provide 100-year flood protection to the City of Presidio. • The middle and lower reach of the existing levee would be rehabilitated in place to retain the 25-year design flood protection to all agricultural lands along the Presidio FCP. • Potential placement of overflow weir and an outlet structure in the levee system lower reach. • A new spur levee, approximately 2.9 miles long, would be constructed to connect the raised levee segment to elevated terrain south of the City of Presidio. • The spur levee would extend west along a curved railroad embankment, and then turn southeast to reach Ranch Road 170.

2.3 ALTERNATIVE 1 - NO ACTION

Under Alternative 1 (No Action), no further structural levee repairs or levee improvements would be made to the existing levee beyond the emergency repairs north of Cibolo creek already completed to protect the City of Presidio following the September 2008 flood. No repairs to the existing levee would be made to pre-flood conditions in areas where the levee breached or was severely eroded.

Operation and maintenance of the Presidio FCP includes the levee system, the floodway, and the river channel. These maintenance practices, described below, would continue as currently conducted.

Levee System Maintenance. The USIBWC annually grades and resurfaces the maintenance road on the levee, mows the grass, and removes woody vegetation from the levee slopes. In areas where erosion has occurred, levees are reinforced with riprap. Levee side slopes are frequently mowed, and mesquite and salt cedar trees are removed from the levees. The levee crest and approach ramps are graded as needed. A flex base material is applied to the levee crest and ramps as needed to eliminate rutting. Mowers are used for mowing, a backhoe and dozer are used for grubbing, and a water truck compactor and grader are used for crest grading and dust control.

Floodway Maintenance. The area between the boundary line and the levees is maintained clear and free of vegetation to allow floodwaters to pass unobstructed. For this purpose, USIBWC controls vegetation in the levees and floodways, mows 400 acres semi-annually, and removes mesquite and salt cedar. Grubbing is done year round, while mowing is done three times a year. A 25-foot wide, 1-mile long strip of land between the confluence of the Rio Conchos and Cibolo Creek is not mowed or cleared. The U.S. Border Patrol (USBP) drags tires both in the floodplain and on the landside of the U.S. levee to track illegal entry. Dragging is done at the toe of the levee and in some instances adjacent to the riverbank. This dragging sometimes appears to cause erosion in the floodplain during river overbank flooding.

River Channel Maintenance. The USIBWC maintains the Presidio FCP river channel, either routinely or on an as-needed basis. River channel maintenance includes removing sediment from the main channel and drains to maintain conveyance capacity and diversion requirements, and stabilizes riverbanks with rocks where erosion has occurred. When required, Cibolo Creek and Alamito Creek are excavated to maintain channel grade and conveyance and to remove sediment plugs. Scrapers and bulldozers are used, as needed, to remove debris and move silt from the river channel to eroded banks. Sediment is disposed on floodways, uplands, and on federal lands. Silt is also removed from the mouth of Cibolo Creek to the extent allowed by the USIBWC jurisdiction only.

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Figure 2-1
Current Levee Alignment
(Alternatives 1, 2, and 3)
Presidio Flood Control Project
International Boundary and Water Commission
United States Section

Levee raised for 100yr flood protection.

1

2

3

4

5

Upper Reach

RANCH RD 170

Rio Conchos

Cibolo Creek

0 1,250 2,500 5,000 Feet

0 250 500 1,000 Meters

Mile Markers

Levee Centerline

Rio Grande

Highways

Major Roads

Existing Levee Footprint

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Figure 2-2
Levee Improvements in Upper Reach (Alternatives 3-7)
Presidio Flood Control Project
International Boundary and Water Commission
United States Section

Cibolo Creek

5

Presidio

US HWY 67

6

Ojinaga

Middle Reach

7

8

RANCH RD 170

Alternative 4
New Alignment

Alternative 3
Existing Alignment

Lower Reach

9

12

13

14

Levee raised for
100yr flood protection.

10

11

Resaca

Hudspeth
Culberson
Reeves
Ward
Jeff Davis
Pecos
Presidio
Brewster
Mexico
Site Location
Big Bend NP

0 1,250 2,500 5,000 Feet

0 250 500 1,000 Meters

Mile Markers
Levee Centerline
Roads
Rio Grande
Alternative 4 - Levee Realignment
Existing Levee Footprint
Alternative 4 Levee Footprint

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Figure 2-3
Levee Improvements in Middle and Lower Reaches (Alternatives 3 and 4)
Presidio Flood Control Project
International Boundary and Water Commission
United States Section

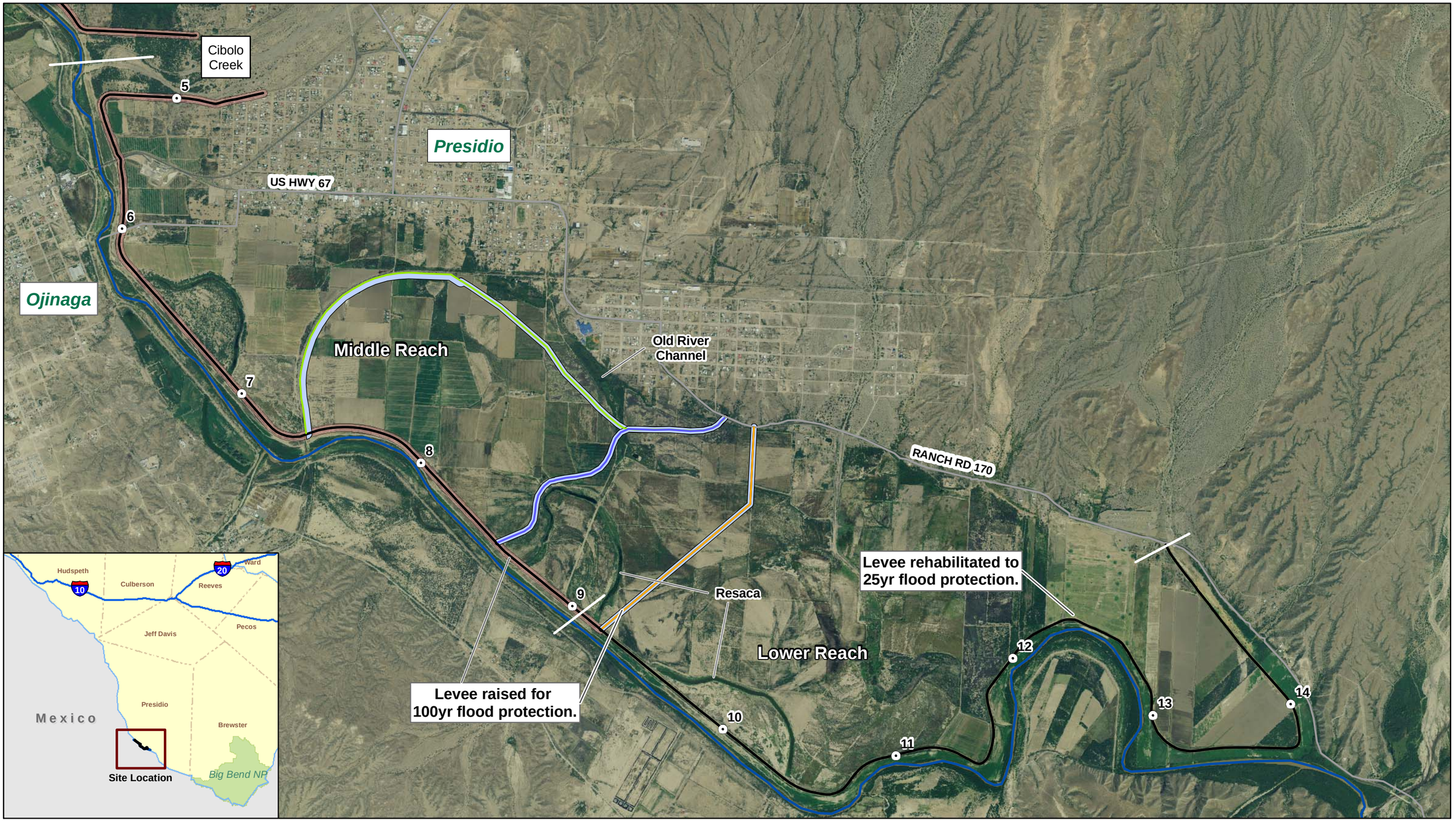


Figure 2-4
Spur Levee Alignments in Middle and Lower Reaches (Alternatives 5, 6, and 7)
Presidio Flood Control Project
International Boundary and Water Commission
United States Section

2.4 ALTERNATIVE 2 - 25-YEAR FLOOD PROTECTION ALONG ENTIRE LEVEE SYSTEM

Current alignment of the Presidio FCP would be retained along the entire length of the levee system for Alternative 2 (Figure 2-1), as in the No Action Alternative. Under this alternative, three improvement measures are under consideration:

- Structural rehabilitation of an approximately 1-mile segment in the downstream of the Presidio FCP where substantial damages occurred during the September 2008 flooding;

- Raising the levee along an approximately 1-mile segment of the levee system, where the original design criteria for 25-year protection are not currently met due to long-term erosion; and

- Potential placement of an overflow weir in the middle reach of the Presidio FCP to facilitate levee overtopping when flood conditions exceed the 25-year design criteria; the overflow weir would be coupled with a downstream outfall gate to more rapidly drain flooded areas.

Structural repairs to the existing levee would be made to pre-flood conditions along levee miles 9.2 to approximately mile 15.3, where the levee breached or was severely eroded. Those sections may be shored with riprap, embankment material, or with sheet metal piles where the erosion was too severe to place riprap. Subsequent repairs to other sections of the levee may be required, as determined by results of geotechnical studies.

In areas of the lower reach where the levee foundation is compromised due to under-seepage, a slurry trench or sheet piles in certain levee reaches with extensive underseepage may be required at the toe of the levee. The slurry trench, or trenches, would be similar to the slurry trenches constructed under the emergency repairs (USIBWC 2009a). The slurry trench consists of constructing a slurry trench cut-off wall with a backhoe, trencher, or excavator, and filling the trench during excavation with a slurry mixture. The slurry mixture consists of approximately 94 percent water and six percent bentonite. This technique requires a high water table to be effective. Hydrostatic pressure of the slurry forces the bentonite particles into the trench walls forming a cake layer and preventing additional groundwater intrusion. As trench excavation proceeds, the backfilling operation follows. The slurry trench would be approximately 3 feet wide and 20 feet deep and of a length sufficient to cover areas where previous underseepage occurred. Installation of metal sheet piles requires a similar sized trench where metal panels are inserted to create a barrier for water. After the metal panels are placed, the trench is backfilled.

The levee system would be raised from 2 to 4 feet in an approximately 1-mile segment in the lower reach of the Presidio FCP (levee miles 13.1 to 14.1). Along this segment, the original design criteria for 25-year protection are not currently met due to long-term erosion. An approximate 0.7 mile of levee in the lower reach would have to be raised 2 feet, resulting in a lateral expansion of the footprint of 0.5 acre; the remaining 0.3 mile would be raised between 2 and 4 feet, with a 0.7 acre of footprint increase.

For additional protection of the levee system, rehabilitation of the lower reach would potentially include placement of an upstream overflow weir that would facilitate levee overtopping when flood conditions exceed the 25-year design criteria. The upstream overflow weir would be coupled with a downstream outfall gate to more rapidly drain flooded areas. These functionality improvements in levee overtopping and draining of flooded areas would be done along the current levee alignment, and would not expand the current levee footprint.

The estimated requirement for levee material under Alternative 2 would be approximately 6,650 cubic yards (USIBWC 2009f). Levee material for levee rehabilitation under Alternative 2 would be obtained from an approximately 13-acre borrow site operated by the USIBWC north of the City of Presidio. Use of commercially sourced, borrow sites for material, unlike other action alternatives under consideration, would not be required.

Two common elements among all action alternatives under consideration, including Alternative 2, are the use of staging areas outside the floodplain for storage of equipment, vehicles, and materials; and utilization of existing farm roads as haul roads, some of which may require leveling, grading, or filling to improve their current condition.

2.5 ALTERNATIVES 3 AND 4: 100 YEAR FLOOD PROTECTION ALONG ENTIRE LEVEE SYSTEM

Two alternatives are under consideration to increase protection from a 100-year flood along the entire Presidio FCP levee system. Under Alternative 3, the levee system would be raised in-place, keeping the current levee alignment (Figures 2-2 and 2-3). Under Alternative 4, current alignment would be retained in the upper and middle reaches of the levee system (Figure 2-2), but in the lower reach the levee would be partially relocated along a new offset alignment (Figure 2-3). These two alternatives are discussed below. Table 2-2 presents the calculated increase in levee height under Alternatives 3 and 4, as well as the expected footprint expansion associated with levee raising under both alternatives.

2.5.1 Alternative 3 – Raising Entire Levee along the Current Alignment

Current alignment of the Presidio FCP would be retained along the entire length of the levee system for Alternative 3 (Figure 2-1), as in the No Action Alternative. To improve flood control of the Presidio FCP under this alternative, the levee would be raised in place to obtain a 100-year flood design. Hydraulic modeling results indicate that the levee would require a height increase between 4 and 7 feet in the upper and middle reaches of the Presidio FCP (USIBWC 2009f). In the lower reach, the levee would be raised up to 10.5 feet, and repairs would be made for structural damages. The estimated requirement for levee material under Alternative 3 is approximately 0.36 million cubic yards (USIBWC 2009f).

Table 2-2 presents a comparison of requirements to provide 100-year flood protection along the entire levee system under Alternatives 3 and 4. Required levee height increases are summarized in 2-foot intervals. Data are presented for each interval on the length of levee to be raised and the levee lateral footprint expansion as a result of the height increase.

Footprint expansion of the levee would occur on both sides of the levee where there is sufficient ROW (“centered expansion”). In some sections of the levee, if there were

insufficient ROW to use a centered expansion, the expansion would be primarily toward the riverside of the levee. Where the levee is raised 6 feet, the footprint would be expanded to retain the levee slope ratio of 3:1. Using a centered expansion would increase the footprint by approximately 18 feet on either side of the existing levee. Using a riverside expansion, the levee footprint would expand 36 feet on the riverside of the existing levee. Table 2-2 shows the expected footprint expansion associated with levee raising under Alternative 3.

Table 2-2 Length and Footprint Increase Associated with Levee Raising for 100-year Flood Protection under Alternatives 3 and 4

Height (feet)	Modified Length (miles)		Expansion Area (acres)	
	Alternative 3	Alternative 4	Alternative 3	Alternative 4
Existing levee height increase				
0 - 2	1.4	4.4	1.0	3.2
2 - 4	5.0	6.7	10.8	14.5
4 - 6	7.4	2.0	26.8	7.2
6 - 8	1.1	0.2	5.6	1.0
8 – 10+	0.3		1.7	
Subtotal	***15.2***	***13.3***	***45.9***	***26.0***
New offset levee				
18 – 20		0.4		6.2
20 – 22		2.6		44.2
22 – 24		0.6		10.6
Subtotal		***3.6***		***61.0***
Total by Alternative	***15.2***	***16.9***	***45.9***	***87.0***

2.5.2 Alternative 4 – Raising the Levee with Partial Downstream Relocation

Under Alternative 4, the upper and middle reaches of the Presidio FCP (levee mile 0 to approximately levee mile 9) would be raised in place to provide 100-year design flood protection, as described for Alternative 3 (Figure 2-2). The levee would also be raised in the middle reach of the levee system retaining the current alignment. In the lower reach, however, the levee alignment would be offset relative to the current alignment, away from the Rio Grande (Figure 2-3).

The lower reach of the Presidio FCP sustained the most damage, including several levee breaches and severe erosion on both sides of the levee. Preliminary surveys and analyses indicate that the levee foundation may be compromised (ERDC 2008) and, therefore, the levee in the lower reach may need to be relocated. Alternative 4 would relocate the levee approximately 500 feet to the landside of the centerline of the existing levee, and the levee would be constructed to provide 100-year flood protection (Figure 2-3). The location of the proposed offset levee under Alternative 4 was designed to avoid sensitive biological and cultural resources. The offset levee would start at approximately levee mile 9.2 and connect

back to the existing levee at approximately levee mile 13.2, and would be approximately 3.6 miles long.

Table 2-2 shows the levee height increases required for the upper and middle reaches to provide 100-year flood protection, and the required height of the offset levee to provide 100-year flood protection (USIBWC 2009f). Expansion areas required for the upper and middle reaches, and the area required to construct the offset levee are presented in Table 2-2. It is assumed that for a newly constructed levee segment, the top of the levee would include a 15-foot wide access road, and adjacent to the riverside toe of the levee, a maintenance road would be present. It is assumed that the maintenance road would be approximately 20 feet wide, and the maintenance road would be used for maintenance of the levee (e.g., erosion repair) and floodway maintenance (e.g., mowing operations). Areas calculated for construction of a new levee segment include the 20-foot wide maintenance road.

Construction of the offset levee under Alternative 4 may utilize materials from the existing levee; essentially removing the existing levee in most of the lower reach of the Presidio FCP. The estimated requirement for levee material under Alternative 4 is approximately 1.32 million cubic yards (USIBWC 2009f). If the levee foundation is damaged below levee mile 13.2, slurry trenches or sheet piles may be required to stabilize the levee foundation, as described for Alternative 2.

2.6 ALTERNATIVES 5, 6 AND 7 – 100 YEAR FLOOD PROTECTION LIMITED TO THE UPSTREAM SECTIONS OF THE LEVEE SYSTEM

Three alternatives are under consideration to raise the levee system along the upstream sections of the levee for protection from a 100-year flood (Figure 2-2), while retaining the current 25-year design for flood protection in the lower reach of the Presidio FCP. The three alternatives require construction of a spur levee connecting the raised levee section to elevated terrain south of the City of Presidio. Figure 2-4 illustrates spur levee alignment under Alternatives 5, 6 and 7. These three alternatives are discussed below. Table 2-3 presents the calculated increase in levee height under Alternatives 5, 6 and 7, and Table 2-4 the expected footprint expansion associated with levee raising under those alternatives. The potential use of commercial materials borrow sites is discussed in Section 5.2

2.6.1 Alternative 5 – Upstream Reach Raised and Spur Levee at Mile 9.2

Under Alternative 5, the upper reach of the levee would be raised in place to provide 100-year flood protection, as previously described for Alternative 3 (See Figure 2-2). The levee would also be raised in the middle reach of the levee system retaining the current alignment (Figure 2-4). In the lower reach, increased flood protection in the lower reach would be provided by constructing a new spur levee at approximately levee mile 9.2 to provide 100-year flood protection. Figure 2-4 shows location of the Alternative 5 spur levee, along with other spur levee alignments discussed in Alternatives 6 and 7.

Approximately two-thirds of the new Alternative 5 spur levee would cross fallow agricultural fields in a northeast direction, and then continue north along an existing farm road until it reaches a high ground location at its intersection with Highway 170 (Figure 2-4).

Table 2-3 Levee Height Increase Required for 100-year Flood Protection, Alternatives 5, 6, and 7

	Length (miles)		
Increase (feet)	**Alternative 5**	**Alternative 6**	**Alternative 7**
Existing Levee			
0 – 2	3.8	3.7	5.3
2 - 4	6.4	6.3	4.2
4 - 6	1.9	2	1.9
6 - 8	0.1	0.1	0.1
Total existing levee (miles)	***12.2***	***12.1***	***11.5***
New Levee			
10 - 12			0.2
12 – 14			0.3
14 – 16		0.2	0.4
16 – 18		0.6	0.2
18 – 20	0.6	0.4	0.3
20 – 22	0.5	0.1	1.0
22 – 24	0.2		0.5
Total for spur levees (miles)	***1.3***	***1.3***	***2.9***
Total modified length (miles)	***13.5***	***13.4***	***14.4***

Table 2-4 Footprint Increase Associated with Levee Raising for 100-year Flood Protection, Alternatives 5, 6, and 7

	Expansion (Acres)		
Increase (feet)	**Alternative 5**	**Alternative 6**	**Alternative 7**
Existing Levee			
0 – 2	2.7	2.7	3.8
2 - 4	13.9	13.7	9.1
4 - 6	6.9	7.2	6.9
6 - 8	0.5	0.5	0.5
Total existing levee (acres)	***24.0***	***24.1***	***20.3***
New Levee			
10 - 12			1.9
12 – 14			3.4
14 – 16		2.5	5.1
16 – 18		8.5	2.8
18 – 20	9.3	6.2	4.7
20 – 22	8.5	1.7	17.0
22 – 24	3.5		8.9
Total for spur levees (acres)	***21.4***	***18.9***	***43.6***
Total area increase (acres)	***45.4***	***43.0***	***64.0***

Hydraulic modeling indicates that existing levee in the upper and middle reaches would be raised up to 8 feet to provide 100-year flood protection (USIBWC 2009f). The spur levee 9.5 would be up to 22 feet tall for most of the length, and up to 24 feet tall in one 0.2-mile section to provide 100-year flood protection (Table 2-3). The area required for the spur levee 9.2 is shown in Table 2-4. Areas calculated for construction of a new levee segment include the 20-foot wide maintenance road. Table 2-4 also provides a comparison of levee height increases and expansion area for the Alternative 5 spur levee relative to spur levees under consideration for Alternatives 6 and 7. The estimated requirement for levee material under Alternative 5 is approximately 0.55 million cubic yards (USIBWC 2009f).

The levee system in the lower reach of the Presidio FCP would be rehabilitated to provide 25-year flood protection as described in Alternative 2. Improvements may also include installation of an overflow weir and outfall gate to protect the levee from flood stage erosion, and installation of slurry trenches or sheet pile as needed to stabilize the levee foundation.

2.6.2 Alternative 6 - Upstream Reach Raised and Spur Levee at Mile 8.5

Under Alternative 6, the upper reach of the levee would be raised in place to provide 100-year flood protection, as previously described for Alternative 3 (Figure 2-2). The levee would also be raised in the middle reach of the levee system retaining the current alignment (Figure 2-4).

Increased flood protection in the lower reach would be provided by a new spur levee located at approximately levee mile 8.5. The spur levee would be constructed to a height that would provide 100-year design flood protection to the City of Presidio. The spur levee would start at approximately levee mile 8.5, circle around the central resaca, turn east, and then northeast to a high ground location on Highway 170 (Figure 2-4).

Hydraulic modeling indicates that the upper and middle reaches would be raised up to 8 feet, and the spur levee 8.5 would be up to 22 feet tall (USIBWC 2009f). Table 2-3 presents the extent of required height increases. The areas required to raise the levee in the upper and middle reaches and the area required to construct the spur levee 8.5 are shown in Table 2-4. Areas calculated for the construction of a new levee segment include the 20-foot wide maintenance road. Table 2-4 also provides a comparison of levee height increases and expansion area for the Alternative 6 spur levee relative to spur levees under consideration for Alternatives 5 and 7. The estimated requirement for levee material under Alternative 6 is approximately 0.47 million cubic yards (USIBWC 2009f).

The levee system in the remainder of the middle reach and the lower reach of the Presidio FCP would be rehabilitated to provide 25-year flood protection as described in Alternative 2. Improvements may also include installation of an overflow weir and outfall gate to protect the levee from flood stage erosion, and installation of slurry trenches or sheet pile as needed to stabilize the levee foundation.

2.6.3 Alternative 7 - Upstream Reach Raised and Spur Levee at Mile 7.4

Under Alternative 7, the upper reach of the levee would be raised to provide 100-year flood protection, as previously described for Alternative 3 (Figure 2-3). A portion of the

middle reach, to the railroad bridge at approximately levee mile 7.4, would also be raised to provide 100-year flood protection, as described for Alternative 2 (Figure 2-4).

Increased flood protection in the middle reach would be provided by a new spur levee constructed adjacent to the embankment of the railroad bridge at approximately levee mile 7.4. The spur levee would follow the curve of the railroad bridge until reaching the City of Presidio, then the levee would curve south of Presidio High School to a point that would intersect the proposed levee for Alternative 6, run in an easterly direction, and then northeast to a high ground location on Highway 170 (Figure 2-4).

Hydraulic modeling indicates that the upper and middle reaches would be raised up to 8 feet, and the railroad spur levee would be up to 29 feet tall (USIBWC 2009f). Table 2-3 presents the extent of required height increases. The areas required to raise the levee in the upper and middle reaches and the area required to construct the railroad spur levee are shown in Table 2-4. Areas calculated for construction of a new levee segment include the 20-foot wide maintenance road. Table 2 also provides a comparison of levee height increases and expansion area for the Alternative 7 railroad spur levee relative to spur levees under consideration for Alternatives 5 and 6. The estimated requirement for levee material under Alternative 7 is approximately 0.88 million cubic yards (USIBWC 2009f).

The levee system in the lower reach of the Presidio FCP would be rehabilitated to provide 25-year flood protection as described in Alternative 2. Improvements may also include installation of an overflow weir and outfall gate to protect the levee from flood stage erosion, and installation of slurry trenches or sheet pile as needed to stabilize the levee foundation.

2.7 OTHER ACTIONS WITH POTENTIAL CUMULATIVE IMPACTS

2.7.1 U.S. Border Patrol Activities

Regional Plans

Cumulative impacts considered for the Presidio FCP include greater restrictions to public use/access of the floodway due to increased USBP operations and designation of restricted use zones. Anticipated changes in future USBP operations were evaluated in terms of potential environmental consequences in an updated Programmatic EIS prepared by USACE for the Immigration and Naturalization Service (INS) and Joint Task Force-North (formerly known as Joint Task Force-Six) in 1994 and updated in 2001 (USACE 1994 and 2001).

Actions for Joint Task Force-North support the INS strategy for enforcement activities cover a 50-mile corridor along the United States-Mexico border. Enforcement activities would allow INS to gain and maintain control of the border by enhancing prevention, deterrence, and detection of illegal activities. The support of Joint Task Force-North would include two major categories with potential cumulative effects on the Presidio FCP: operational measures such as increased ground patrols and access restrictions, and engineering measures such as placement of fences or flood control walls, additional lighting, and installation of remote sensing systems such as ground sensors (Integrated Surveillance and Intelligence System).

Local Plans

Customs and Border Protection (CBP) proposes to construct, operate, and maintain tactical infrastructure consisting of primary pedestrian fence, patrol roads, access roads, and lights along the U.S./Mexico international border in the Marfa Sector, Texas. Congress has appropriated funds for the construction of the proposed tactical infrastructure. Construction of additional tactical infrastructure might be required in the future as mission and operational requirements are continually reassessed.

There would be no change in overall USBP Marfa Sector operations. The Marfa Sector operations would effectively provide a law enforcement resolution to illegal cross-border activity. Fence maintenance would initially be performed by USBP Sector personnel, but would eventually become a contractor-performed activity.

CBP is also proposing to construct and operate permanent lighting within the Presidio operational area. Light poles would be constructed approximately every 50 yards. CBP is working closely with local landowners and others potentially affected by the proposed tactical infrastructure. Gates and ramps would be constructed to allow USBP, USIBWC, and other landowners access to land, the Rio Grande, water resources, and infrastructure. In agricultural areas, gates would be wide enough to allow access for necessary farming equipment. In other cases, gates would be situated to provide access to existing recreational amenities; water resources, including pump houses and related infrastructure; grazing areas; existing parks; and other areas. On a case-by-case basis, USACE might purchase the land between the fence and the Rio Grande on behalf of USBP, if operationally necessary.

2.7.2 Removal of Salt Cedar Plug in Rio Grande Below Presidio FCP

There is a dense growth of salt cedar located outside the USIBWC's flood control project jurisdiction and upstream of Alamito Creek extending from the United States side of the Rio Grande into approximately the center of the main river channel. This salt cedar plug in the river changes the river flow, and during high flow events, water is redirected around the plug and erodes the Mexico riverbank, or slows water flow enough that upstream flooding occurs (e.g., the process of backing up water). The dense salt cedar is also on the Mexican bank of the river.

Based on comments received during the scoping process, and comments received during the continuation of the scoping process with USIBWC, the primary concern of landowners was the removal of a dense growth of salt cedar and sediment below the Presidio FCP that formed a bottleneck during the September flooding, causing the damage to be more severe. This is outside the USIBWC flood control project jurisdiction; however, the USIBWC and the MxIBWC, along with other interested parties, may enter into a joint agreement to remove this vegetation. Removal of this vegetation is not evaluated in this EIS

2.8 SUMMARY COMPARISON OF ALTERNATIVES BY RESOURCE AREA

Table 2-5 presents a summary of potential environmental consequences of each of the Action Alternatives for the Presidio FCP, relative to Alternative 1 (No Action).

Table 2-5 Summary of Engineering Features and Potential Environmental Consequences of the Presidio FCP Improvement Alternatives

ENGINEERING FEATURES

	ALTERNATIVE 2 In-Place Rehabilitation of Existing Levee	ALTERNATIVE 3 Levee Raised in Place Over Entire Length of the Presidio FCP	ALTERNATIVE 4 Entire Levee System Raised with Downstream Offset Alignment	ALTERNATIVE 5 Levee Raised Upstream Adding Spur Levee at Mile 9.2	ALTERNATIVE 6 Levee Raised Upstream Adding Spur Levee at Mile 8.5	ALTERNATIVE 7 Levee Raised Upstream Adding Spur Levee Along Railroad Track
Objective	*Rehabilitation to Original 25-year Flood Protection Design*	*100-Year Flood Protection by Raising Levee Along the Entire Presidio FCP for Protection of the City of Presidio and Downstream Agricultural Lands*		*100-Year Protection in Upper and Middle Reaches by Raising Levee in Combination with New Spur Levee Reaching the City of Presidio, 25-Year Flood Protection Retained in Lower Reach*		
Elements	• Levee alignment retained along entire length of the Presidio FCP • No modifications to the upper and middle reaches; 1 mile in the lowe reacht raised from 1 to 4 feet, with a 1.2-acre footprint expansion • 1 mile of downstream structural levee rehabilitation (reconstruction or slurry wall placement) • Potential addition of downstream overflow weir and outfall gate • Levee material volume of approximately 7,000 cubic yards, to be obtained entirely from the USIBWC borrow site currently in operation	• Levee alignment retained along entire length of the Presidio FCP • The upper and middle reaches of levee system raised up to 8 feet • The lower reach of the levee system raised up to 10.5 feet • Up to 48 acres footprint expansion resulting from levee height increase • 1 mile of downstream structural levee rehabilitation, as in Alternative 2 • Levee material volume of 0.36 million cubic yards, requiring development of new commercial borrow sites	• Levee alignment retained in upper and middle reaches of the Presidio FCP • 11.2 miles along current alignment raised up to 8 feet, resulting in a 20-acre footprint expansion • 3.6 miles of downstream re-alignment ranging in height from 18 to 22 feet • Up to 60 acres of additional footprint along new offset alignment • Potential removal of existing levee along the 3.6-mile realigned segment • Levee material volume of 1.3 million cubic yards, requiring development of new commercial borrow sites	• Levee alignment retained along entire length of the Presidio FCP • 11.3 miles raised up to 6 ft along current alignment, resulting in a 22-acre footprint expansion • 1.3 miles of new spur levee, ranging in height from 18 to 22 feet, and 21 acres of additional levee footprint • 1 mile structural rehabilitation and potential addition of downstream overflow weir and outfall gate, as in Alternative 2 • Levee material volume of 0.55 million cubic yards, requiring development of new commercial borrow sites	• Levee alignment retained along entire length of the Presidio FCP • 11.2 miles raised up to 6 ft along current alignment, resulting in a 22-acre footprint expansion • 1.3 miles of new spur levee, ranging in height from 14 to 18 feet, and 19 acres of additional levee footprint • 1 mile structural rehabilitation and potential addition of downstream overflow weir and outfall gate, as in Alternative 2 • Levee material volume of 0.47 million cubic yards, requiring development of new commercial borrow sites	• Levee alignment retained along entire length of the Presidio FCP • 10.6 miles raised up to 6 ft along current alignment, resulting in a 19-acre footprint expansion • 2.9 miles of new spur levee, ranging in height from 10 to 22 feet, and 44 additional acres of levee footprint • 1 mile structural rehabilitation and potential addition of downstream overflow weir and outfall gate, as in Alternative 2 • Levee material volume of 0.88 million cubic yards, requiring development of new commercial borrow sites

SUMMARY OF IMPACTS RELATIVE TO ALTERNATIVE 1 (NO ACTION)

RESOURCE AREA	ALTERNATIVE 2 In-Place Rehabilitation of Existing Levee	ALTERNATIVE 3 Levee Raised in Place Over Entire Length of the Presidio FCP	ALTERNATIVE 4 Entire Levee Raised with Downstream Offset Alignment	ALTERNATIVE 5 Levee Raised Upstream Adding Spur Levee at Mile 9.2	ALTERNATIVE 6 Levee Raised Upstream Adding Spur Levee at Mile 8.5	ALTERNATIVE 7 Levee Raised Upstream Adding Spur Levee Along Railroad Track
BIOLOGICAL RESOURCES						
Vegetation	• Potential impacts moderate and/or temporary • Repairs to the existing levee, installation of overflow weir and outfall gate would not increase the existing levee footprint	• Potential impacts moderate and/or temporary • In upper and middle reaches, removal by footprint expansion of 17.4 acres of grassland, 9.9 acres of agricultural lands and 8.6 acres of desert scrub/woodlands. Re-seeding used to rapidly recolonize grassland areas • In the lower reach, removal of 17.4 acres of grasslands, 13.3 acres of agricultural lands, and 10.1 acres of desert scrub/woodlands. • In middle reach, impacts to 3.7 acres of desert scrub/woodland to be avoided by shifting footprint expansion alignment	• Minimum impacts in upper and middle reaches, as in Alternative 3 • In the lower reach, removal of 56.2 acres of agricultural lands and 1.5 acres of desert scrub/woodland along new 3.6 mile long offset levee • Impacts to desert scrub/woodland in middle reach to be avoided by shifting footprint expansion alignment	• No impacts along the lower reach of the levee system • Minimum impacts in upper and middle reaches, as in Alternative 3 • New 1.3 mile long spur levee to remove 23.1 acres of agricultural lands • No impacts to desert scrub/woodland in middle reach, as in Alternative 4	• No impacts along the lower reach of the levee system • Minimum impacts in upper and middle reaches, as in Alternative 3 • New 1.3 mile long spur levee to remove 7.2 acres of agricultural lands and 16.7 acres of desert scrub/woodlands • New levee crosses historic river channel and removes 1.1 acres of wetland/riparian areas	• No impacts along the lower reach of the levee system • Minimum impacts in upper and middle reaches, as in Alternative 3 • New 2.9 mile long levee to remove 32.4 acres of agricultural areas and 14.7 acres of desert scrub/woodlands, • New levee crosses historic river channel and removes 1.4 acres of wetland/riparian vegetation
Terrestrial Wildlife	• Minimum impacts anticipated, and only during construction	• Minimum impacts anticipated. Removed grassland and agricultural land are low-quality habitat	• Minimum impacts as only low-quality habitat would be removed	• Minimum impacts as only low-quality habitat would be removed	• Minimum impacts as only low-quality habitat would be removed	• Minimum impacts as only low-quality habitat would be removed

	ALTERNATIVE 2 In-Place Rehabilitation of Existing Levee	ALTERNATIVE 3 Levee Raised in Place Over Entire Length of the Presidio FCP	ALTERNATIVE 4 Entire Levee Raised with Downstream Offset Alignment	ALTERNATIVE 5 Levee Raised Upstream Adding Spur Levee at Mile 9.2	ALTERNATIVE 6 Levee Raised Upstream Adding Spur Levee at Mile 8.5	ALTERNATIVE 7 Levee Raised Upstream Adding Spur Levee Along Railroad Track
BIOLOGICAL RESOURCES (cont.)						
Aquatic Wildlife	• Minimum impacts anticipated. • Best management practices (BMP) used to control release of construction-generated sediment	• Moderate and temporary and minor impacts anticipated. • BMPs used to control release of construction-generated sediment. • Wetlands disturbance in middle reach to be minimized with adjustment of levee expansion alignment, as needed	• Potential impacts to be avoided by BMPs use levee alignment adjustment as needed, as in Alternative 3 • Wetlands avoided in lower reach during design of new levee	• Potential impacts to be avoided by BMPs use and adjusted levee alignment, as in Alternative 3 • Wetlands avoided in lower reach during design of new levee	• Potential impacts to be avoided by BMPs use and adjusted levee alignment, as in Alternative 3 • Spur levee would remove 1.1 acres of wetlands in historic river channel	• Potential impacts to be avoided by BMPs use and adjusted levee alignment, as in Alternative 3 • Spur levee would remove 1.4 acres of wetlands in historic river channel
Threatened, Endangered, and Special Status Species (T&E Species)	• No significant impacts anticipated. • Sediment control during construction minimizes impacts to Rio Grande silvery minnow and 3 other T&E fish species	• No significant impacts anticipated. • Sediment control during construction minimizes impacts to Rio Grande silvery minnow and 3 other T&E fish species • Southwestern willow flycatcher and Western yellow-billed cuckoo suitable habitat is not present in the project area • State-listed reptile and additional bird species potentially present near the project are mobile and would avoid construction areas	• No significant impacts anticipated due to BMPs use, lack of habitat, and mobile-species avoidance of construction areas	• No significant impacts, as in Alternative 2	• No significant impacts, as in Alternative 3	• No significant impacts, as in Alternative 3
CULTURAL RESOURCES						
Archaeological Resources	• Alternative may adversely affect archaeological resources; construction would incorporate best management practices and mitigation measures • Three archaeological sites and five sensitive areas have been previously identified in the existing levee alignment ROW but additional sites are anticipated • Use of heavy equipment may affect surface and shallow subsurface resources in areas along the levee alignment and in staging areas; however, these resources likely lack stratigraphic integrity • Excavation for slurry trenches and sheet piles may adversely affect deeply buried archaeological resources • Excavation for overflow weir and outfall gate may adversely affect archaeological resources	• Alternative may adversely affect archaeological resources; construction would incorporate best management practices and mitigation measures • Three archaeological sites and five sensitive areas have been previously identified in the existing levee alignment ROW but additional sites are anticipated • Use of heavy equipment may affect surface and shallow subsurface resources in new levee alignment and staging areas; these resources likely lack stratigraphic integrity • Potential burial of archaeological resources by fill material placement up to 12 feet from current levee toe • Capping may be beneficial by preserving archaeological resources in place if conducted in accordance with best management practices and mitigation measures to avoid adverse effects from soil compaction • Excavation in previously unused/ undisturbed borrow areas may adversely affect archaeological resources	• Entire current alignment, potential adverse effects for footprint expansion as in Alternative 3 • New offset levee may adversely affect resources by burial Removal of existing levee in the lower reach may expose previously unidentified archaeological resources • No archaeological sites identified but areas of archaeological sensitivity may occur along the new levee alignment ROW	• In-place raising along upper and middle reaches may have adverse effects, as in Alternative 3 • New 1.3 mile long spur levee may adversely affect resources, by burial • No archaeological sites identified but areas of archaeological sensitivity may occur along the new levee alignment ROW, pending additional analysis • Excavation for overflow weir and outfall gate may adversely affect archaeological resources	• In-place raising along upper and middle reaches may have adverse effects, as in Alternative 3 • New 1.3 mile long spur levee may adversely affect additional resources, either by burial or heavy equipment soil disturbance • One archaeological site occurs along new levee alignment's ROW and areas of archaeological sensitivity may occur, pending additional analysis • Excavation for overflow weir and outfall gate may adversely affect archaeological resources	• In-place raising along upper and middle reaches may have adverse effects, as in Alternative 3 • New 2.9 mile spur levee, may adversely affect additional resources, either by burial or heavy equipment soil disturbance • One archaeological site occurs along new levee alignment's ROW and areas of archaeological sensitivity may occur, pending additional analysis

	ALTERNATIVE 2 In-Place Rehabilitation of Existing Levee	ALTERNATIVE 3 Levee Raised in Place Over Entire Length of the Presidio FCP	ALTERNATIVE 4 Entire Levee System Raised with Downstream Offset Alignment	ALTERNATIVE 5 Levee Raised Upstream Adding Spur Levee at Mile 9.2	ALTERNATIVE 6 Levee Raised Upstream Adding Spur Levee at Mile 8.5	ALTERNATIVE 7 Levee Raised Upstream Adding Spur Levee Along Railroad Track
CULTURAL RESOURCES (cont.)						
Architectural Resources	• Heavy equipment operation may affect architectural resources by vibration and ground disturbance • Excavation for slurry trenches and sheet piles may adversely affect architectural resources in or immediately adjacent to the levee • Excavation for overflow weir and outfall gate may adversely affect architectural resources in or immediately adjacent to the levee	• Footprint expansion may affect the levee and built-in structures (e.g., gatewells and culverts); however, those structures are less than 50 years old and are not likely to be eligible for the National Register of Historic Places (NRHP) or contribute to an NRHP-eligible historic district. • Footprint expansion may affect farming irrigation structures (e.g., ditches) that intersect the levee; these structures predate the construction of the levee and may be NRHP eligible or contribute to an NRHP-eligible historic district. • Heavy equipment operation may affect architectural resources by vibration and ground disturbance • Excavation for slurry trenches and sheet piles may adversely affect architectural resources in or immediately adjacent to the levee	• Potential adverse effects for footprint expansion along current levee location, as in Alternative 3 • Additional farming irrigation resources that may be NRHP eligible or contribute to an NRHP-eligible historic district may be affected along the new offset alignment • Removal of existing levee and associated structures (e.g., gatewells) in the lower reach may result in alterations or the need for alterations to farming irrigation resources that may be NRHP eligible or contribute to an NRHP-eligible historic district	• Levee raising along the upper and middle reaches may have adverse effects as in Alternative 3 • Additional resources may be affected along new 1.3 mile long spur levee • Excavation for overflow weir and outfall gate may adversely affect architectural resources in or immediately adjacent to the levee	• Levee raising along the upper and middle reaches may have adverse effects as in Alternative 3 • Additional resources may be affected along new 1.4 mile long spur levee • Excavation for overflow weir and outfall gate may adversely affect architectural resources in or immediately adjacent to the levee	• Levee raising along the upper and middle reaches may have adverse effects as in Alternative 3 • Additional resources may be affected along new 2.9 mile long spur levee • Excavation for overflow weir and outfall gate may adversely affect architectural resources in or immediately adjacent to the levee
Native American Resources	• Temporary adverse effects by limiting river/resource access during construction • Potential for disturbance of buried Native American resources	• Temporary adverse effects by limiting river/resource access during construction • Potential for disturbance of buried Native American resources	• Potential adverse effects, as in Alternative 3	• Potential adverse effects, as in Alternative 3	• Potential adverse effects, as in Alternative 3	• Potential adverse effects, as in Alternative 3
WATER RESOURCES						
Flood control, surface water quality and groundwater	• Repairs to levee and improvements to meet 25-year flood design will protect adjacent properties from moderate flood event • Water Quality in area not altered • No impacts to groundwater resources	• Increased flood protection for the City of Presidio and all downstream agricultural areas (from 25-year storm to 100-year storm event) • Minimum impacts on surface water quality by BMPs use to control release of construction-generated sediment • Water quality in area not altered • No impacts to groundwater resources	• Increased flood protection along entire Presidio FCP, as in Alternative 3 • No impacts to water quality or groundwater resources	• Increased flood protection limited to the City of Presidio and agricultural lands along the middle reach of levee • Downstream agricultural areas will not have increased flood protection • No impacts to water quality or groundwater resources	• Increased flood protection limited to the City of Presidio and agricultural lands along the middle reach of levee • Downstream agricultural areas will not have increased flood protection • No impacts to water quality or groundwater resources	• Increased flood protection limited to City of Presidio • Adjacent and downstream agricultural areas will not have increased flood protection • No impacts to water quality or groundwater resources
LAND USE						
Residential, agricultural, and other land uses	• No land uses will be altered by action • No impacts on agricultural land use; development on new levee materials borrow sites is not required	• 74 acres of agricultural land, and 6 acres of developed area would be affected by levee footprint expansion • Encroached areas would represent 3% of 3,262 acres within land use corridor • Likely need to use over 10 acres of agricultural land for development of new levee materials borrow sites	• 3% encroachment of 3,028 acres within land use corridor (89 acres of agricultural and 11 acres of developed areas) • Likely need to use over 40 acres of agricultural land for development of new levee materials borrow sites	• 3% encroachment of 2,376 acres within the land use corridor (49 acres of agricultural and 11 acres of developed areas) • Likely need to use over 15 acres of agricultural land for development of new levee materials borrow sites	• 2.5% encroachment of2,445 acres land use corridor (52 acres of agricultural and 10 acres of developed areas) • Likely need to use over 15 acres of agricultural land for development of new levee materials borrow sites	• 3% encroachment of 89 acres within the land use corridor (72 acres of agricultural and 17acres of developed areas) • Likely need to use over 25 acres of agricultural land for development of new levee materials borrow sites

	ALTERNATIVE 2 In-Place Rehabilitation of Existing Levee	ALTERNATIVE 3 Levee Raised in Place Over Entire Length of the Presidio FCP	ALTERNATIVE 4 Entire Levee System Raised with Downstream Offset Alignment	ALTERNATIVE 5 Levee Raised Upstream Adding Spur Levee at Mile 9.2	ALTERNATIVE 6 Levee Raised Upstream Adding Spur Levee at Mile 8.5	ALTERNATIVE 7 Levee Raised Upstream Adding Spur Levee Along Railroad Track
SOCIOECONOMIC RESOURCES						
Regional economics, environmental justice, and transportation	• Moderate but temporary, limited to construction period, beneficial impact on minority and low income populations • Moderate increase in road utilization during construction period	• 57% and 14% estimated increases in sales volume and income relative to County annual values, respectively • Moderate but temporary, limited to construction period, beneficial impact on minority and low income populations • Moderate increase in road utilization during construction period	• Relative to County, temporary sales and income increases (54% percent and 14%, respectively) • Moderate impacts on minority populations and road utilization	• Relative to County, temporary sales and income increases (48% percent and 12%, respectively) • Moderate impacts on minority populations and road utilization	• Relative to County, temporary sales and income increases (46.5% percent and 11.8%, respectively) • Moderate impacts on minority populations and road utilization	• Relative to County, temporary sales and income increases (51.8% percent and 13.2%, respectively) • Moderate impacts on minority populations and road utilization
ENVIRONMENTAL HEALTH						
Air quality, noise, and public health and environmental hazards	• No impacts to regional air quality, noise levels, or hazardous materials or waste storage sites	• Moderate impacts on air quality limited to the construction period • Air emissions below 10% of annual county inventory for carbon monoxide, volatile organic compounds, and particulate matter. • Sulfur oxide and nitrogen dioxide emissions moderately above that threshold (18.7% and 10.3%, respectively) • Limited noise impacts limited to the construction period • No hazardous materials or waste storage sites reported within the proposed project area or its vicinity	• As in Alternative 3, moderate temporary impacts • Sulfur oxides and nitrogen dioxides air emissions moderately above 10% of the Presidio County inventory	• As in Alternative 3, moderate temporary impacts • Sulfur oxide air emissions moderately above 10% of the Presidio County inventory	• As in Alternative 3, moderate temporary impacts • Sulfur oxide air emissions moderately above 10% of the Presidio County inventory	• As in Alternative 3, moderate temporary impacts • Sulfur oxide air emissions moderately above 10% of the Presidio County inventory

SECTION 3
AFFECTED ENVIRONMENT

This chapter describes the resources in the existing environment that would be impacted by the No Action Alternative and the Action Alternatives. The resources presented include the following:

1. Biological resources - *vegetation, terrestrial wildlife, aquatic wildlife, threatened, endangered, and special status species*;

2. Cultural resources - *archaeological resources, architectural resources, and traditional cultural properties*;

3. Water resources - *flood control and floodplain management, surface water quality, and groundwater resources*;

4. Land use - *developed lands and agricultural lands*;

5. Socioeconomic resources and transportation - *population, employment and income, agricultural economics, environmental justice, and transportation*; and,

6. Environmental health - *air, noise, public health and environmental hazards*.

3.1 BIOLOGICAL RESOURCES

3.1.1 Definition of Resource

The EIS evaluates potential impacts to the following biological resource areas (1) vegetation communities (discussed in subsection 3.1.2), terrestrial wildlife (discussed in subsection 3.1.3), aquatic wildlife (discussed in subsection 3.1.4), and threatened, endangered, and special status species (discussed in subsection 3.1.5). Wetlands and other aquatic habitats are important to many species within the Presidio FCP. These habitats are discussed within an ecological context within subsection 3.1.4, while wetlands and other regulated waters are discussed in a regulatory context within subsection 3.3 (Water Quality).

3.1.2 Vegetation Communities

Regional Vegetation Classification

The Trans-Pecos region of the Chihuahuan Desert is historically a mosaic of grasslands and desert shrublands (MacMahon 1988; McClaran 1995). The grassland areas are dominated by tobosa, black grama, and other grass species. The dominant desert shrub species are creosote bush, tarbush, or a mixture of the two. Other shrub species and succulents are also present in this area. In areas where washes or rivers are present, willows, cottonwood, and mesquite dominate riparian vegetation. In the recent past, riparian areas have been degraded, and the invasive salt cedar has attained dominance in many locations.

Based on literature review and field surveys, the following four vegetation communities were identified as occurring within the vegetation survey corridor: Desert scrub/woodland community; herbaceous community; wetland/riparian community; and agricultural/rangeland areas, as described below.

Desert Scrub Community

Mixed desert scrub - The upland areas from the Rio Grande are characterized by vegetation dominated by creosote bush and in some places tarbush. Other species may occur in the vegetation type, including mesquite, yucca, lotebush, ocotillo, javelina bush, catclaw, white-thorn acacia, whitebrush, ceniza, althorn, guayacan, pricklypear, pitaya, and tasajillo (McMahan, et al. 1984). In areas where grazing or other disturbance has occurred, snakeweed and Russian thistle (tumbleweed) are present. All scientific names are in the *Biological Resources Evaluation*, prepared in support of this EIS (USIBWC 2009d).

Woodland – Woodlands in the area are characterized by larger woody species, generally dominated by mesquite, salt cedar, and retama (palo verde). Historically, there may have been other species in the woodland areas but changes in water (e.g., lowered water tables) and agriculture (e.g., clearing wooded areas for agriculture) has reduced the extent of this vegetation in the area and altered the species composition.

Herbaceous Community

Non-native grassland – Historically, the landscape was characterized by large areas of grasslands, and included such species as chino grama, black grama, fluffgrass, range ratany, skeletonleaf goldeneye, and mariola (McMahan, et al. 1984). At present, the levee slopes are frequently mowed to prevent encroachment of woody species, and the only woody species generally found on the levee slopes are stunted Russian thistle, occasionally stunted salt cedar. The levee slopes and floodway are currently dominated by herbaceous species. In the project area, the dominant non-native grass is Bermuda grass.

Wetland/Riparian Community

Wetlands – Wetlands in the area are generally characterized by herbaceous species, with some woody species present on the fringes of the wetlands. The wetland areas are characterized by common reed, cattail, some sedges, and occasionally, Johnsongrass. The fringes of the wetlands in the region generally include mesquite and salt cedar (McMahan, et al. 1984).

Riparian communities – Riparian areas in the region historically included cottonwood, willow, desert willow, fourwing saltbush, and acacia (MacMahon 1988). Two species of the invasive salt cedar have gained dominance in many riparian areas, and one species (*Tamarix ramosissima*) generally is of smaller stature and very close to water sources, and the second species, Athel tamarisk (*Tamarix aphylla*) are often the largest trees in the landscape and tend to me in more upland areas.

Agricultural / Rangeland

Active Agricultural Fields – Areas currently subject to cultivation of crops. Common crops in the area include alfalfa and small grains.

Fallow Agricultural Fields – Areas that have been cultivated in the past, but are not currently being used for agricultural purposes. Due in part to the recent flooding, many fallow fields have been invaded by exotic plant species, in particular, Russian thistle (tumbleweed).

Vegetation Survey and Preliminary Analyses

Vegetation communities along the Presidio FCP were delineated from color infrared orthoimagery, and field verified. Positional data were captured using a global positioning system (GPS) to associate imagery signatures with field observations. The vegetation classification used for the evaluation was adapted from Diamond (1993), and the 1996 National Vegetation Classification System, in use by the U.S. Fish and Wildlife Service (USFWS) and TPWD. Information on baseline vegetation typical in the area was obtained from several sources (MacMahon 1988; McClaran 1995; McMahan, et al. 1984; USIBWC 2008).

Field surveys of the Presidio FCP vegetation were conducted on March 10 through March 12, July 6 through July 9, August 10 through August 12, and September 29 through October 2, 2009. Vegetation surveys were conducted within a 300-foot wide vegetation survey corridor centered on the existing levee. Vegetation communities were determined within the 300-foot survey corridor along the entire length of the existing levee. Further, vegetation communities in the approximate locations of the proposed alternative levee locations were determined by a combination of aerial photography and visual field inspection. The 300-foot wide vegetation survey corridor includes the levee slopes.

Based on the field survey information, vegetation communities were photo-interpreted and data entered into a GIS. In addition to the four plant communities described above, open water and developed areas were mapped. Developed areas include roads, ranch houses or barns, and other impervious cover, and the golf course southeast of Presidio. The existing levee footprint is separated from the vegetation classes, and the vegetation on the levees is considered non-native grassland. Analyses of the resulting vegetation maps for the Presidio FCP and proposed alternatives indicated that the non-native grassland was the dominant vegetation type on the levee slopes and immediately adjacent to the existing levee and in the floodway between the levee and the Rio Grande. Agricultural fields were the dominant vegetation type in the locations of the proposed offset levee and the proposed spur levees.

Table 3-1 presents the distribution of vegetation communities along the upper and middle reaches of current levee alignment. The upper and middle reaches of the survey corridor includes approximately 331.8 acres, distributed as follows:

- In the upper reach, 180.2 acres are present, including non-native grasslands (40.7 acres) and agricultural areas (44.7 acres). Because the floodway is relatively narrow in the upper reach, and the vegetation survey corridor may extend to the Rio Grande, the open water category includes portions of the river.

- In the middle reach, 158.9 acres are present, including non-native grasslands (48.6 acres) and desert scrub/woodlands (30.1 acres). In this reach, the desert scrub/woodland vegetation type occurs within the c-shaped segment between the ends of the resacas.

Table 3-1 Vegetation Communities in the Survey Corridor along the Current Presidio FCP Levee System

Vegetation Community	Acres Within the Vegetation Survey Corridor	
	Upper Reach (levee miles 0 to 4.5)	Middle Reach (levee miles 4.5 to 9)
Desert scrub/ woodlands	29.2	30.2
Non-native grasslands	40.7	48.6
Wetlands / Riparian	0.0	1.6
Agricultural	44.7	21.7
Open Water	5.2	2.8
Developed lands	0.1	2.9
Existing levee footprint [(a)]	60.3	51.1
Total	***180.2***	***158.9***

Table 3-2 presents the vegetation communities in survey corridors along the lower reach of the Presidio FCP where raising the levee in-place (for 25-year flood protection or for 100-year flood protection; Alternatives 2 and 3) or placement of an offset levee (Alternative 4) is under consideration. The vegetation community distribution for those two potential levee alignments is as follows:

- In the lower reach, along the existing levee, 208.0 acres are present, including non-native grasslands (50.7acres), agricultural areas (47.4 acres), and desert scrub/woodlands (32.3acres). The desert scrub/woodlands vegetation occurs within the c-shaped segments between the ends of the resacas.

- Within the survey corridor along the proposed offset levee (Alternative 4), 132.7 acres are present, including agricultural areas (111.7 acres), developed land (16.2 acres), and desert scrub/woodland (3.0 acres). Developed land includes a golf course adjacent to the proposed offset levee.

Table 3-2 Vegetation Communities within Survey Corridors along Existing or Relocated Levee Alignments in the Lower Reach of the Presidio FCP

Vegetation Community	Acres Within the Lower Reach Survey Corridors	
	Lower Reach (levee miles 9 to 15.3) (Alternative2 and 3)	Offset Levee Relocation (Alternative 4)
Desert scrub/ woodlands	32.3	3.0
Non-native grasslands	50.7	0.5
Wetlands / Riparian	0.7	0.1
Agricultural	47.4	111.7
Open Water	1.1	0.0
Developed lands	6.3	16.2
Existing levee footprint	69.5	1.3 [(a)]
Total	***208.0***	***132.7***

(a) The existing levee footprint is the portion of the newly constructed levee that intersects the existing levee at an approximately perpendicular angle.

Table 3-3 presents the vegetation community composition in the survey corridors along three additional spur levee locations in the middle reach of the Presidio FCP. The vegetation community distribution is as follows:

- In the lower reach, along the corridor for the spur levee at levee mile 9.2 (Alternative 5), 46.5acres are present, almost entirely agricultural (45.8 acres).

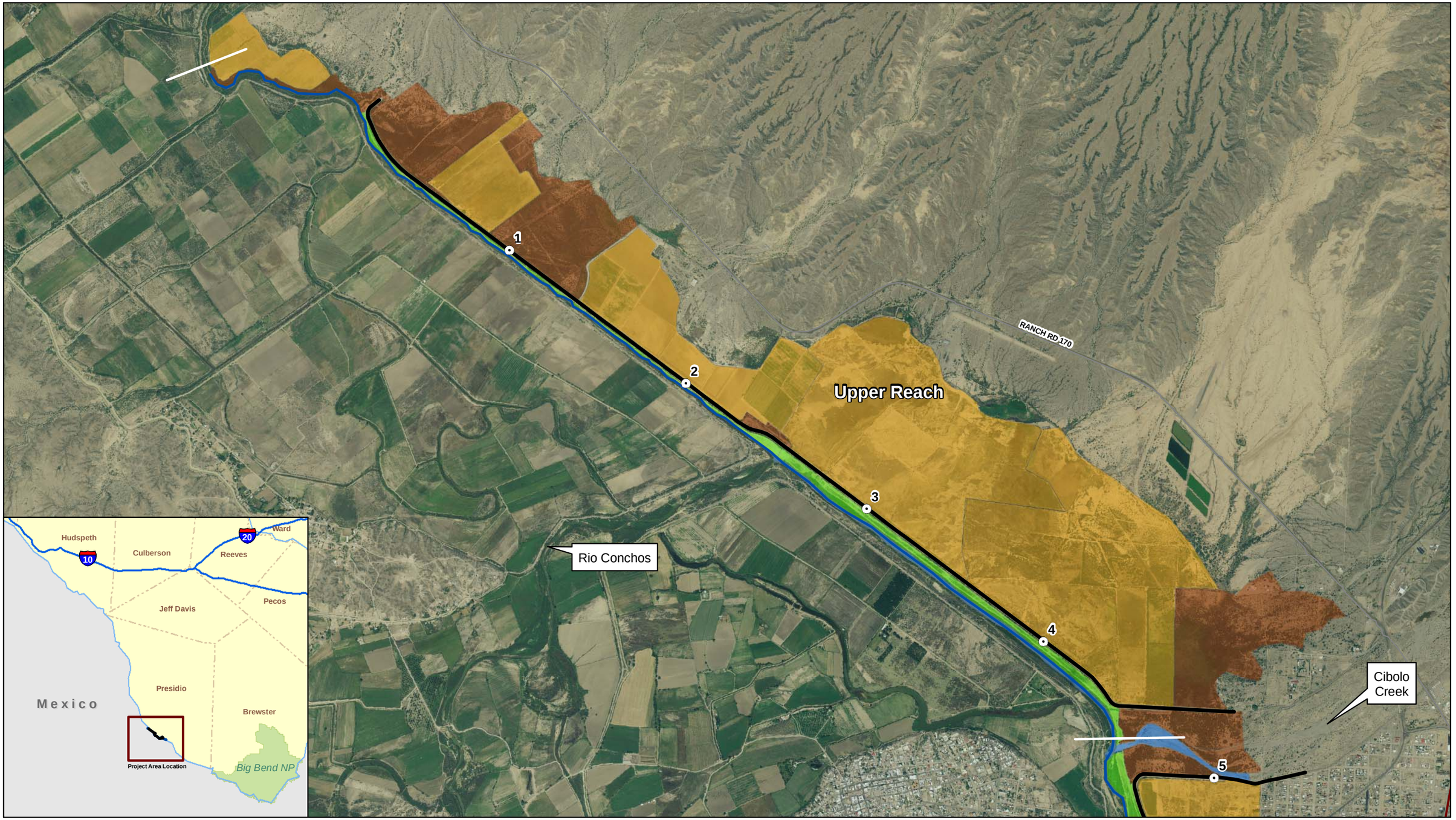
- In the middle reach, along the corridor for the proposed spur levee at mile 8.5 (Alternative 6), 49.9 acres are present, including desert scrub/woodlands (32.7 acres) and agricultural areas (14.6 acres). The woody vegetation occurs adjacent to a central resaca, and within the historic river channel.

- In the middle reach, along the corridor for the proposed the railroad spur levee (Alternative 7), 103.4 acres are present, including agricultural land (67.1 acres) and desert scrub/woodlands (29.1 acres). The woody vegetation for the proposed railroad spur levee is adjacent to the railroad and within the historic river channel.

Table 3-3 Vegetation Communities within Survey Corridors along Three Spur Levee Alignments in the Middle and Lower Reaches of the Presidio FCP

Vegetation Community	Acres Within the Lower Reach Survey Corridors		
	Alternative 5 Spur Levee at Mile 9.2	**Alternative 6 Spur Levee at Mile 8.5**	**Alternative 7 Railroad Spur Levee**
Desert scrub/ woodlands	0.7	32.7	29.1
Non-native grasslands	<0.01	0.3	0.4
Wetlands / Riparian	0.1	2.6	2.9
Agricultural	45.8	14.6	67.1
Open Water	0.0	0.0	<0.01
Developed lands	0.0	0.0	3.6
Existing levee footprint [(a)]	0.04	0.04	0.3
Total	***46.5***	***49.9***	***103.4***

(a) The existing levee footprint is the portion of the newly constructed levee that intersects the existing levee at an approximately perpendicular angle.



0 1,250 2,500 5,000 Feet

0 250 500 1,000 Meters

Vegetation

- Agricultural
- Desert scrub/woodlands
- Non-native grasslands
- Open Water

- Mile Markers
- Levee Centerline
- Rio Grande

- Highways
- Major Roads

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Figure 3-1
Vegetation Communities- Upper Reach
Presidio Flood Control Project
International Boundary and Water Commission
United States Section

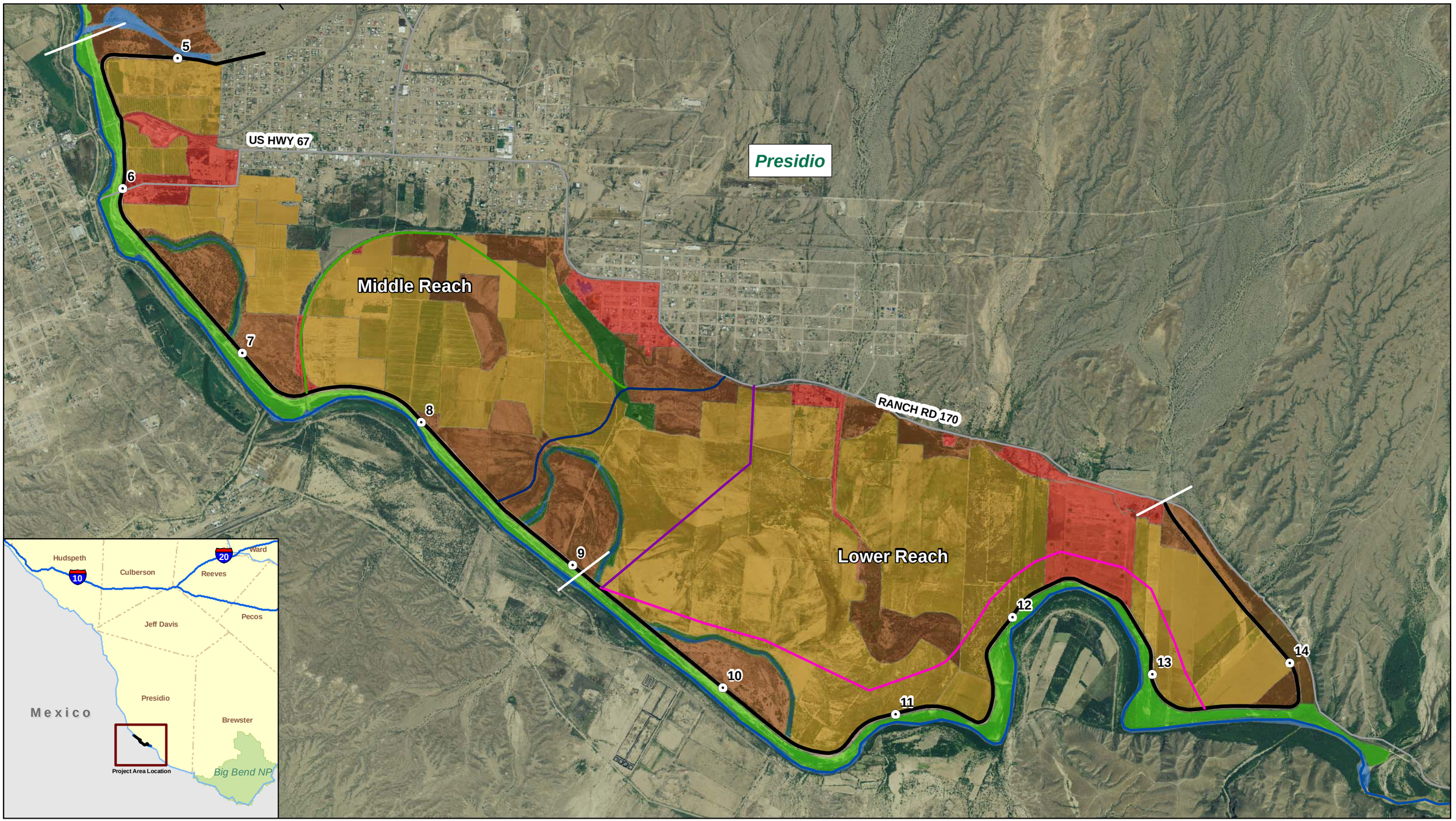

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Figure 3-2
Vegetation Communities - Middle and Lower Reaches
Presidio Flood Control Project
International Boundary and Water Commission
United States Section

3.1.3 Terrestrial Wildlife Communities

Regional Wildlife Classification

A number of wildlife species are present in the region. The Rio Grande is a major migratory flyway for numerous bird species, particularly waterfowl, shore birds, and those associated with riparian habitats. The cleared floodplain also provides suitable hunting areas for raptors.

Of the variety of birds found in the area, some common species include the Gambel's quail, red-winged blackbird, western kingbird, gadwall, mourning dove, scaled quail, and turkey vulture. Scientific names of species are included in the *Biological Resources Evaluation* (USIBWC 2009d), prepared in support of this EIS.

The mule deer and pronghorn antelope are large game animals known to occur in the region. Other non-game mammals include the coyote, western spotted skunk, striped skunk, desert cottontail, black-tailed jackrabbit, porcupine, raccoon, ringtail, badger, and several species of bats. Furbearing mammals include the bobcat, mountain lion, kit fox, gray fox, long-tailed weasel, beaver, nutria, and muskrat.

Small rodents may include desert pocket gopher, yellow-faced pocket gopher, kangaroo rats, woodrats, pocket mice, and Texas antelope squirrel.

Reptiles and amphibian species have not been well studied in the area. Reptile species that may occur in the area include Texas banded gecko, reticulated gecko, greater earless lizard, spiny lizards, whiptail lizards, Trans-Pecos ratsnake, western hooknose snake, whipsnakes, and western diamondback rattlesnake. Amphibian species that may occur in the area include tiger salamander, several toad species, Couch's spadefoot, western spadefoot, plains spadefoot, and Great Plains narrowmouth toad.

Wildlife Survey

Field surveys of the Presidio FCP vegetation were conducted on March 10 through March 12, July 6 through July 9, August 10 through August12, and September 29 through October 1, 2009. The field surveys of vegetation largely determined wildlife habitats for common species that may occur in the area. During these surveys, some bird species were observed, and focused bird surveys were conducted on July 7 and 8, and September 29 through October 1, 2009. The species observed during the bird survey are included in the *Biological Resources Evaluation* (USIBWC 2009d).

3.1.4 Aquatic Wildlife Communities

Regional Aquatic Communities

The aquatic ecosystems are restricted to the Rio Grande and the tributaries that flow into the Rio Grande (including the Rio Conchos from Mexico). Above the confluence with the Rio Conchos, the Rio Grande is seasonally dry due to extensive irrigation practices upstream. Downstream of the confluence with the Rio Conchos, the Rio Grande becomes a permanent water body. In this region of the Rio Grande and its tributaries, the fish fauna include common species such as include common carp, river carpsuckers, characins, bullhead and channel catfishes, gizzard shad, red shiner, and green sunfish (CDM 2005; USACE 1999). Aquatic

macro-invertebrates in the Rio Grande and tributaries near the Presidio FCP include mayfly and dragonfly larvae, beetles, insects from the order diptera, and caddisflies (CDM 2005).

Wetlands in the Presidio FCP were found in resacas and the more deeply carved historic river channels. The Rio Grande was historically a braided river, and the main river channel moved across the floodplain over time. At the time of the levee construction, recent river channels, defined as resacas, were likely active river channels, and the connection between the Rio Grande and the resaca was severed during levee construction. The resaca wetlands within the Presidio FCP are considered primarily palustrine wetland systems. Palustrine wetlands systems are non-tidal fresh-water wetlands dominated by trees, shrubs, and other vegetation. The resacas in the Presidio FCP measure from 1 to 6 feet deep and 30 to 150 feet wide. Flood water contributions to resacas from the Rio Grande within the Presidio FCP are generally restricted by levees (designed to hold 25-year flood events); although some resacas retain waters received either through groundwater or from agricultural tail waters (surplus surface flows from irrigated fields). Sedimentation and siltation in resacas may pose a threat to long-term viability of the wetland resources in resacas (Ramirez 1986). The vegetation surrounding the resacas within the Presidio FCP is composed primarily of mesquite, salt cedar, common reed, and retama.

Historic river channels in the Presidio FCP are those river channels that have not been active for much of the last 75 or more years and typically are not farmed due to topographic relief and poor drainage. The historic river channel in the Presidio FCP is south of the Presidio High School, running southeast through the floodplain. The historic river channel measures between 150 feet and 600 feet wide, based on aerial imagery and field observations, and is dry most of the year. The isolation of the historic river channel has created a palustrine system within the former banks. Within the channel, aquatic beds supporting common reed transitions up-gradient through non-persistent herbaceous vegetation and shrub vegetation. The historic river channel in the Presidio FCP generally receives waters from rainwater, and possibly from storm water runoff from the city of Presidio, and waters will remain in the channel until waters seep to groundwater or evaporate. There is no connection between the historic river channel and the resacas or the Rio Grande.

Wetland Surveys

Field surveys of the Presidio FCP wetlands were conducted on August 10 through August 12, 2009 and on September 29 through October 1, 2009.

Three resacas were identified within the survey corridor from aerial imagery, and field verified. Based on preliminary evaluations, the resacas were the wetlands most likely to be affected if the levees were raised in place to provide improved flood protection. Therefore, to verify the wetlands boundaries, a more detailed boundary delineation was performed, in accordance with the USACE Wetlands Delineation Manual (USACE 1987) and the *Final Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)* (USACE 2008).

Each resaca intercepted the current levee survey corridor at two ends; therefore, six wetland areas were assessed (two for each resaca). Each resaca was designated with a letter (Resacas A, B, and C) (Figure 3-3), and each wetland area was designated with a number indexed to the resaca. Therefore, the six wetland areas assessed in the field were designated Wetland A-1, A-2, B-1, B-2, C-1, and C-2.

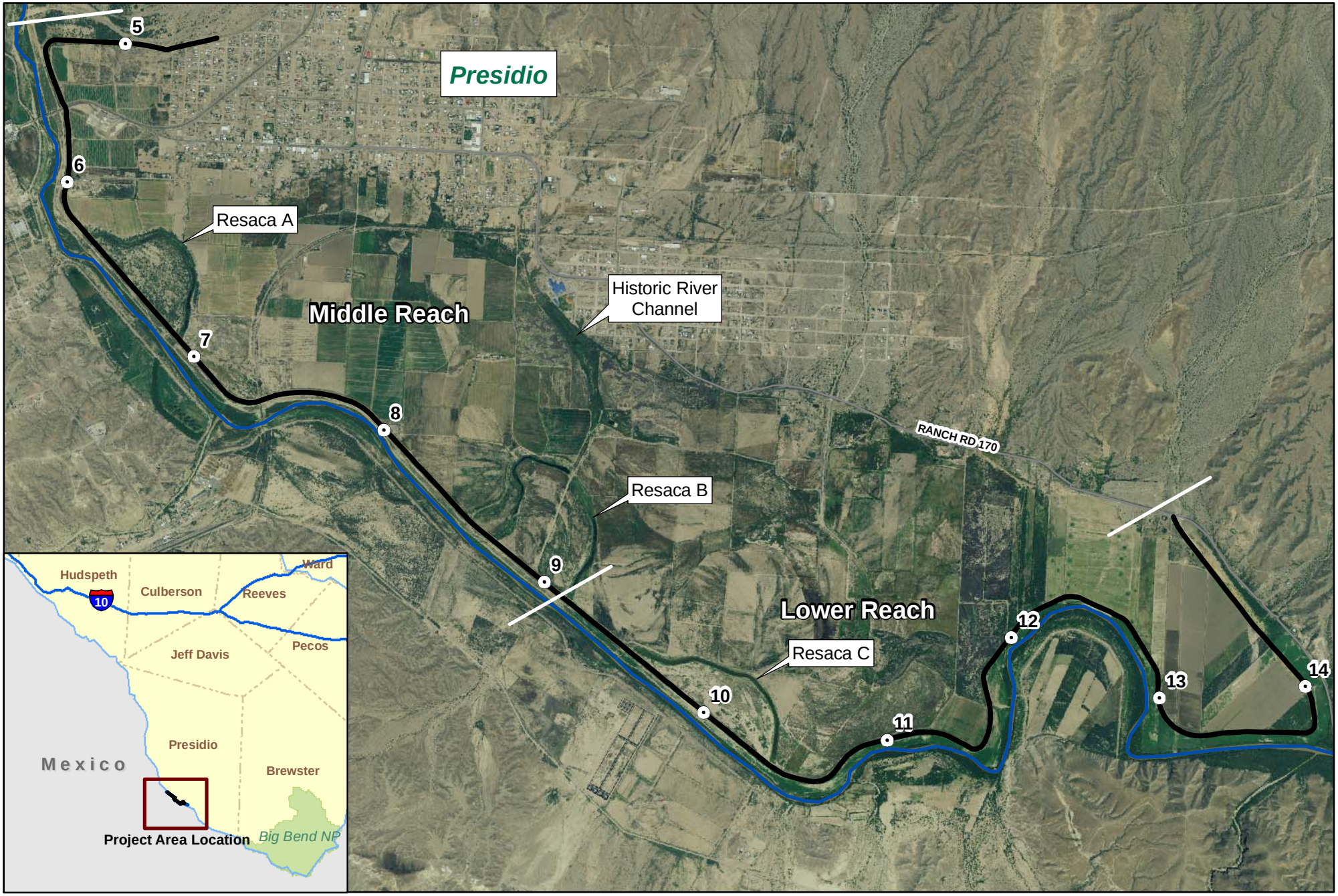

Figure 3-3
Wetland Areas Identified in the Presidio FCP
Presidio Flood Control Project

International Boundary and Water Commission
United States Section

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The historic river channel boundaries were identified from aerial imagery, and field verified. Based on preliminary analyses, two of the alternatives presented in this EIS would cross the boundaries of the historic river channel. Therefore, field surveys located the extent of the historic river channel.

3.1.5 Threatened, Endangered and Special Status Species

The potential presence of special status species habitat was analyzed based on vegetation survey data and habitat requirements species potentially occurring in the project area that are protected under federal and state regulatory frameworks or otherwise considered of conservation concern. This information was used to assess the likelihood of special status species occurrence based on the following assumptions:

1. The likelihood of a species occurring within the project area can be substantially determined from agency contacts, species life history descriptions, and literature reviews.

2. Analyses of plant community types are sufficient for determining whether suitable special status species habitat occurs in the project area.

3. Although there is a very small likelihood of actually observing a rare species in the course of a survey, suitable habitat can be identified in the field.

Habitat requirements and life history for each special status species potentially occurring along the Presidio FCP levee corridor were identified through literature review. Sources of information included species fact sheets published by natural resource agencies, species recovery plans, and scientific literature.

Preferred habitat types for each special status species potentially occurring in Presidio County was compared to the habitat types identified during field surveys to evaluate their likelihood of occurrence.

Based on literature review and field surveys, the list of Special Status Species, including federal and state listed T&E species, within Presidio county was consolidated to include a list of species with potential habitat in the area, species that are extant, or species that have been observed in the area. The *Biological Resources Evaluation* (USIBWC 2009d) provides additional information on species habitats and presence in the Presidio FCP area. The list of federal and state listed T&E species that may occur in the area of the Presidio FCP are shown in Table 3-4. Also presented is the likelihood of occurrence based on available descriptions of likely habitat utilized and field observations of habitat present. The likelihood of occurrence is defined as:

- Present in project area (species was observed during field surveys);

- Potentially present in area (suitable habitat is present in the area); and

- Not known if habitat present (the habitat requirements are not well understood, and therefore, the species may be present).

Table 3-4 Special Status Species That May Occur Within the Presidio FCP

Common Name (*Scientific Name*)	Federal Regulatory Status [(a)]	State Regulatory Status [(a)]	Likelihood of Occurrence
FISH			
Chihuahua shiner (*Notropis Chihuahua*)		T	Potentially present in area
Conchos pupfish (*Cyprinodon eximius*)		T	Not known if habitat present
Mexican stoneroller (*Campostoma ornatum*)		T	Not known if habitat present in Rio Grande, possibly present in Rio Conchos
Rio Grande silvery minnow (*Hybognathus amarus*)	LE	E	No suitable habitat in area; Experimental Population established downstream in State Park and Big Bend areas
REPTILES			
Chihuahuan Desert lyre snake (*Trimorphodon vilkinsonii*)	.	T	Not known if habitat present
Chihuahuan mud turtle (*Kinosternon hirtipes murrayi*)	.	T	Not known if habitat present
Reticulated gecko (*Coleonyx reticulates*)	.	T	Not known if habitat present
Texas horned lizard (*Phrynosoma cornutum*)	.	T	Not known if habitat present
Trans-Pecos black-headed snake (*Tantilla cucullata*)	.	T	Not known if habitat present
BIRDS			
American Peregrine Falcon (*Falco peregrinus anatum*)	DL	E	Potential migrant, no suitable breeding habitat
Arctic Peregrine Falcon (*Falco peregrinus tundrius*)	DL	T	Potential migrant, no suitable breeding habitat
Common Black-Hawk (*Buteogallus anthracinus*)	.	T	Potentially present in area
Gray Hawk (*Asturina nitida*)	.	T	Potentially present in area
Northern Aplomado Falcon (*Falco femoralis septentrionalis*)	LE	E	Potential foraging habitat, no suitable breeding habitat
Southwestern Willow Flycatcher (*Empidonax traillii extimus*)	LE	E	Historical occurrence in area, no recent surveys of habitat in area
Western Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*)	Candidate Species		Present in project area
Zone-tailed Hawk (*Buteo albonotatus*)		T	Present in project area
Brown Pelican (*Pelecanus occidentalis*)	LE	E	Observed in project area

(a) Only special status species with regulatory status are included in the table. Regulatory status is defined as:

- *LE/LT (federal listed as endangered or threatened)*
- *DL (federal de-listed as an endangered species)*
- *Candidate species are under consideration for possible addition to the List of Endangered and Threatened Species)*
- *E/T (state-listed as endangered or threatened)*

Descriptions of Federal Listed Species

Rio Grande silvery minnow. The Rio Grande Silvery minnow is a federal and state listed endangered species that historically inhabited the Rio Grande and Pecos River systems. The Rio Grande silvery minnow occurs in waters with slow to moderate flow in perennial sections of the Rio Grande, and may occur in associated irrigation canals. Threats to the Rio Grande silvery minnow include habitat degradation and flow modifications, including dewatering, channelization, water regulation, diversion of river flow for irrigation, and reduce water quality due to urbanization. Other threats can include interactions with non-native fish, and lack of adequate refugia during periods of low or no flow. The Rio Grande silvery minnow is considered extirpated in the Presidio FCP area. However, the USFWS has recently introduced a non-essential experimental population of Rio Grande silvery minnows near Big Bend National Park, downstream of the project area.

Northern aplomado falcon. The northern aplomado falcon is a federal and state listed endangered species that nests in trees or shrubs, laying eggs between March and June. The general habitat requirements include open desert terrain with scattered trees, relatively low ground cover, an abundance of small to medium-sized birds as a food source (supplemented with insects, small snakes, lizards, and rodents), and a supply of previously constructed nests, and above ground nesting substrate such as yucca and mesquite. The reasons for declining populations of northern aplomado falcons are not well-known. Within the project area, there is some suitable foraging habitat, and the presence of nesting habitat is unknown.

Southwestern willow flycatcher. The southwestern willow flycatcher is a federal and state listed endangered bird species that typically breeds in dense riparian habitats along rivers, streams, or other wetlands. Suitable foraging and nesting vegetation can be dominated by dense growth of willows, seepwillow, or other shrubs and medium sized trees, including salt cedar, box elder, and Russian olive. All nesting habitat trees and shrubs have to have a specific plant and twig structure, regardless of species. The major threats to the southwestern willow flycatcher include habitat loss and degradation, and cowbird parasitism is a problem in some areas. Although salt cedar does exist along the river banks in the Presidio FCP, these plant communities do not meet the minimum patch size and density requirements for the southwestern willow flycatcher. In addition, the status of the population in Texas has not been recently quantified (USFWS 2002). There are historical records of the species occurring in the Big Bend National Park, but there are no accurate surveys of the population in the area of the Presidio FCP (USFWS 2002).

Brown pelican. The brown pelican is a federal and state listed endangered bird species that typically nest on small, isolated coastal islands where they are safe from predators such as raccoons and coyotes. Foraging habitat for brown pelicans is deep, clear water for diving. Threats to brown pelicans historically were DDT poisoning, but populations have recovered to the extent that the brown pelican is proposed for federal de-listing. The brown pelican is not expected to occur in the Presidio FCP area, however, a transient juvenile brown pelican was observed after the September 2008 flooding, before the flood waters had receded. The waters of the Rio Grande are not clear enough or deep enough to support brown pelicans.

Western yellow-billed cuckoo. The Western Yellow-billed Cuckoo is federal listed as a candidate species when west of the Pecos River drainage. The western yellow-billed cuckoo

nests and forages in riparian habitat with dense understory foliage and associated drainages. Threats to the western yellow-billed cuckoo include habitat loss, habitat degradation and replacement of native riparian vegetation with salt cedar. Flood control practices include channelization and bank stabilization may contribute to decline of the species. There are few areas within the Presidio FCP area that have suitable habitat, but the area is within the former known range of the western subspecies. During the July 2009 bird survey a species of yellow-billed cuckoo was detected at least twice, but the subspecies could not be determined.

Descriptions of State Listed Species

Chihuahua shiner. The Chihuahua shiner is considered by the USFWS as a species of concern and state listed as endangered. The Chihuahua shiner inhabits channels of large creeks and small to medium rivers; typically in clear, cool water that is often associated with nearby springs. The Chihuahua shiner often occurs in pools with slight current or riffles over a gravel or sand bottom where vegetation may be present. Threats to the species include damming and irrigation practices, and intermittent dewatering of streams. The species is known from the Rio Grande drainage from near the mouth of the Rio Conchos, and from several small tributaries to the Rio Conchos (Edwards et al. 2002). There is possible suitable habitat for the species in the Presidio FCP area.

Conchos pupfish. The Conchos pupfish is considered by the USFWS as a species of concern and state listed as threatened. The species is widely distributed in the upper Rio Conchos and the upper portions of Alamito creek (Edwards et al. 2002). The Conchos pupfish inhabits sloughs, backwaters, marshes, and margins of larger streams, and mouths of creek tributaries to larger rivers. Threats to the species include destruction, modification, or reduction of habitat or range (Edwards et al. 2002). It is not known if suitable habitat is present in the Presidio FCP area.

Mexican stoneroller. The Mexican Stoneroller is considered by the USFWS as a species of concern and state listed as threatened. The Mexican Stoneroller inhabits small to medium sized streams with shallow riffles, runs, and pools of clear to slightly turbid waters. Larger adults may be found in pools over sand or gravelly bottoms, or in flowing segments of pools or along undercut banks or other cover. Threats to the species include displacement by the introduced Plains killifish, habitat loss and degradation due to historic overgrazing, erosion, water diversion, and aquifer pumping (Edwards et al. 2002). The species is known from the Rio Conchos above the confluence with the Rio Grande, and from the Big Bend area (Edwards et al. 2002), but it is not known if suitable habitat exists in the Presidio FCP area.

Chihuahuan desert lyre snake. The Chihuahuan Desert lyre snake is state listed as threatened. The snake occurs most commonly in dry, rocky terrain of mountains, canyons, hills and arroyos in areas with desert plants such as ocotillo, white thorn, yucca, lechuguilla, prickly pear, and grasses, or occasionally occurs on desert flats dominated by creosote bush. This is a secretive snake, and the life-history and current threats to the species are not well known. It is not known if suitable habitat exists within the Presidio FCP area or nearby areas.

Chihuahuan mud turtle. The Chihuahuan mud turtle is state listed as threatened. This small turtle occurs primarily in lakes, rivers, streams, and ponds in areas of mesquite and grassland. Specific threats to the subspecies have not been well studied, but related species in the genera are subject to the effects of drought, pollution from sewage and industrial waste, and

they are considered a pest by some landowners and killed. The species has been documented from the Alamito watershed, but current presence in Presidio County is unknown, and it is not known if suitable habitat exists within the project area.

Reticulated gecko. The Reticulated gecko is a state listed threatened species. Little is known about the life-history of the species; however, the nocturnal reticulated gecko inhabits limestone canyons and other rocky areas in desert regions. Because little is known about the species, specific threats to the species have not been identified. They are known to occur in the Big Bend region of Texas and adjacent Mexico, but it is unknown if there are populations or suitable habitat within the Presidio FCP area.

Texas horned lizard. The Texas horned lizard is a state listed threatened species. Horned lizards generally have a small home range, and the primary prey is Harvester ants (of the genera *Pogonomyrmex*). The species generally inhabits open, arid, and semi-arid regions with sparse vegetation. Threats to the horned lizard are loss of habitat and suitable prey (prey includes several species of harvester ants, which are displaced by red imported fire ants); use of insecticides to kill harvester ants, and in the past, the species was over-collected for the pet trade. Suitable habitat for Texas horned lizards may be present in the fallow agricultural fields, but no reptile surveys have been conducted in the Presidio FCP area.

Trans-Pecos black-headed snake. The Trans-Pecos black-headed snake is a state listed threatened species. The Trans-Pecos black-headed snake is a small, fossorial species, inhabits steep-sided rocky canyons, hilly grasslands with juniper and cholla, and streamside woodlands with creosote bush, acacia, yucca, and grasses. Because this snake is nocturnal, fossorial, and secretive, little is known about the threats to the species. The species is known from the Big Bend area, but no reptile surveys have been conducted in the Presidio FCP area.

American and Arctic peregrine falcon. The American Peregrine Falcon is state listed as endangered. The Arctic Peregrine Falcon is state listed as threatened. Both subspecies were federal listed, but have recovered to the extent that they have been delisted. Both subspecies may be present in west Texas as migrants across the state from northern breeding areas, and both subspecies winter along coastlines farther south. Additionally, some individuals of American peregrine falcon may establish year-round breeding colonies in west Texas. The Peregrine Falcon occupies a wide range of habitat during migration, including urban areas, landscape edges such as lake shores and barrier islands. Both subspecies are considered low-altitude migrants. Nesting often occurs on cliff ledges, large tree hollow, or other areas with undisturbed wide views close to plentiful prey. Prey for the peregrine falcon are generally other birds. Threats to peregrine falcons historically due to pesticide poisoning, but populations have been recovering throughout most of the range. The Peregrine Falcon may occur as a migrant in the Presidio FCP area, but there are limited areas for nesting near the project area.

Common black hawk, gray hawk, zone-tailed hawk. The Common Black Hawk, the Gray Hawk, and the Zone-tailed Hawk are state listed as threatened. The three hawks occur irregularly along the U.S.-Mexico border in the area of the Presidio FCP. The Zone-tailed hawk was recorded during the July bird survey (USIBWC 2009d). These hawk species tend to nest in mature riparian woodlands, and tend to forage in open, arid country. There are limited

areas within the Presidio FCP area that would be considered mature riparian woodlands. The mature riparian woodlands that may be present are generally in Mexico.

Species Status Species Protected under the Migratory Bird Treaty Act

All birds present within the Presidio FCP are protected under the MBTA. Focused bird surveys were conducted in the Presidio FCP on July 7 through July 8 and September 29 through October 1, 2009. The focused bird survey identified 84 bird species, as described in the *Biological Resources Evaluation* (USIBWC 2009d), which are all protected under the MBTA. The MBTA allows for legal hunting of certain species protected under the MBTA, thirteen of which were identified within the Presidio FCP (mallard, gadwall, green-winged teal, common moorhen, American coot, Gambel's quail, scaled quail, rock dove, white-winged dove, mourning dove, Eurasian collared-dove, Inca dove, and common ground-dove).

3.2 CULTURAL RESOURCES

3.2.1 Definition of Resource

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 this EIS in terms of (1) the affected environment (discussed in subsection 3.2.2), (2) the previous cultural resources studies (discussed in subsection 3.2.3), (3) archaeological sites (discussed in subsection 3.2.4), which include both prehistoric and historic occupations, (4) architectural resources (discussed in subsection 3.2.5), and (3) locations and resources of concern to Native Americans, including Traditional Cultural Properties (discussed in subsection 3.2.6).

Archaeological resources include prehistoric and historic locations or sites where human actions have resulted in detectable changes. Archaeological resources can have a surface component, a subsurface component, or both. Prehistoric resources are physical properties resulting from human activities predating written records. These archaeological sites are the loci of human behavior as indicated by concentrations of artifacts, features, or floral and faunal remains. Prehistoric land use patterns were more closely related to local environmental conditions than are most modern settlements. Historic resources are physical properties that postdate the existence of written records and include features such as trails, roadbeds, foundations, and refuse concentrations. They may include subsurface features such as wells, cisterns, or privies. Submerged cultural resources include prehistoric cultural remains and submerged historic materials.

Architectural resources are elements of the built environment. These resources include existing buildings; dams; bridges; and other structures of historic, engineering, or artistic importance. These resources consist of residential buildings (*e.g.*, farmhouses, plantation manors and associated outbuildings including sheds and barns), industrial structures such as dams and levees, commercial buildings (*e.g.*, stores, banks, and other business related office buildings), and transportation structures such as bridges.

Native American resources can include, but are not limited to, archaeological sites, cultural items, burial sites, ceremonial areas, caves, mountains, water sources, trails, plant

habitat or gathering areas, or any other natural area important to a culture for religious or heritage reasons. Traditional cultural resources are resources associated with beliefs and cultural practices of a living culture, subculture, or community. These beliefs and practices must be rooted in the group's history and must be important in maintaining the cultural identity of the group.

3.2.2 Affected Environment

An integral part of the Section 106 process is the delineation of the area within which archaeological and architectural resources would be affected or are likely to be affected. The Area of Potential Effect (APE) as defined by 36 CFR 800.16(d) represents:

> *the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties [i.e., NRHP-eligible resources], if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking.*

For the purposes of assessing effects through the Section 106 review process, direct effects include, but are not limited to, areas of construction resulting in the partial or complete demolition of NRHP-eligible buildings or structures or the physical disturbance of NRHP-eligible archaeological resources. Indirect effects include, but are not limited to, visual, audible, or atmospheric effects that alter the character or use of any of the physical aspects of integrity that contribute to the resource's ability to meet the criteria for listing in the NRHP.

The APE for the Presidio FCP consists of the existing USIBWC ROW, including the current levee alignment, and an easement of approximately 35 feet from both the north (landside) and south (riverside) toes of the existing levee, and 200 ft-wide, linear reaches covering the four alignment alternatives (Figure 3-4). Any staging areas (including equipment yards and soil storage areas) needed for construction activities will be located outside of the floodplain in areas owned or leased by the USIBWC. Heavy vehicles will access the project area using existing paved or gravel farm or levee access roads, some of which may require leveling, grading or filling to improve their current condition. Because all of the potential sources for borrow material have not yet been identified, a set of criteria for their selection was developed (Section 5.2).

3.2.3 Previous Cultural Resources Studies

Three previous cultural resources investigations were conducted to identify resources specifically in the Presidio FCP area and have primarily focused on the identification of archaeological resources (Holliday and Ivey 1974; Parsons *et al.* 2004; Gibbs *et al*. 2005). The earliest of these, conducted in 1973 and 1974 was a cultural resources evaluation to determine potential impacts of relocating the channel as part of the flood control project design (Holliday and Ivey 1974). The survey identified or revisited several previously documented sites in the area and test excavations were conducted at three of the sites (41PS15, 41PS16, and 51PS86) but no sites were identified within the channel relocation area (Holliday and Ivey 1974:19).

More recent investigations included a cultural resource reconnaissance of the existing levee alignment that included literature review and archival research of previously recorded archaeological resources in the Presidio vicinity, and an initial study of the geoarchaeological

potential of selected portions of the existing alignment (Parsons *et al.* 2004). Eleven areas of higher probability for cultural resources were identified (designated F-1, F-2, F-3, F-4, F-4a, F-4b, and F-5 through F-9) along and near the existing levee alignment (Parsons, *et al*. 2004), as well as the location of a previously recorded archaeological site (41PS86) that has suffered increased damage from erosion because of USIBWC channelization of the mouth of Cibolo Creek (Parsons, *et al.* 2004:7-37). No further archaeological fieldwork was required for most of these locations; however, additional investigations for four of these areas (F-1, F-4b, F-7, and 41PS86) along with additional geoarchaeological investigations was recommended. Although the focus of that survey was largely on archaeological resources, additional investigations were recommended for three areas containing architectural resources. These resources included irrigation canals and a former international bridge at the former Presidio Port of Entry.

The final cultural resources study of the current project area was conducted in support of a Programmatic EIS for several USIBWC flood control projects. The study was an overview including literature review and site files search only (Gibbs, *et al*. 2005). No systematic archaeological survey of the entire current project area has been conducted. An intensive survey for cultural resources is currently underway in support of this EIS.

3.2.4 Archaeological Resources

The Texas Archeological Sites Atlas (2009), the Texas Historic Sites Atlas (2009), and previous investigations of the project area were consulted for information about known archaeological sites that occur in the project area. To determine site potential within the project area and to provide data on the prehistoric and historic settlement pattern as documented in the Presidio vicinity, a broad area extending from the present levee to the valley wall was also reviewed in the sites atlases.

Three previously recorded archeological sites, 41PS86 and 41PS87, both in the La Junta de los Rios Archeological District, and 41PS363, have been recorded in or immediately adjacent to the existing project Right-of-Way (ROW) (Table 3-5). Three additional loci in the current ROW have been recommended for further investigation as a result of reconnaissance survey (Parsons, *et al.* 2004). These include the Haciendita Canal (Parsons, *et al.* 2004: Area F-1), possibly associated with Site 41PS363, and areas that may contain buried cultural material (Parsons, *et al.* 2004; Areas F-4b and F-7) for which pedestrian survey, shovel testing, and geoarchaeological testing, if subsurface impacts are expected, are recommended. Geoarchaeological testing of two additional areas in the current ROW (Parsons, *et al.* 2004: Areas F-4a and F-9) documented the potential for deeply buried surfaces that may require additional investigation if subsurface disturbance is required, but where shovel testing is not viable for site identification.

The four proposed new alignment alternatives were selected, in part, to avoid any previously recorded archaeological sites; however, intensive archaeological survey of these linear corridors is currently being conducted to identify archaeological sites.

Table 3-5 Previously Recorded Archaeological Sites or Areas of Archaeological Potential in the Vicinity of the Project Area

Site/Area Number (Site Name)	Site Type	Temporal Association [(a)]				Site Designations	Recorded By/ Institution [(b)]	Date
		Prehistoric period (if any)	HIS	MC	UN			
41PS86	surface scatter	Late Prehistoric				La Junta de los Rios NRHP Archeological District	E. Jelks; Holliday and Ivey; Parsons	1969; 1974: 2004
41PS87	surface scatter	Late Prehistoric				La Junta de los Rios NRHP Archeological District	E. Jelks; Holliday and Ivey; Parsons	1969; 1974: 2004
41PS363 (Blas Sosa House)	dwelling		X			Potential for SAL	EPCM/UTEP; Parsons	1977; 2004
Area F-1 (Haciendita Canal)	irrigation structure		X			Possibly associated with 41PS363and Haciendita Ranch	Parsons	2004
Area F-4a					X	La Junta de los Rios Archaeological District	Parsons	2004
Area F-4b					X	La Junta de los Rios Archaeological District	Parsons	2004
Area F-7					X	unknown	Parsons	2004
Area F-9					X	unknown	Parsons	2004

(a) Temporal association: Prehistoric, Historic (HIS), Multiple Component (MC), Unknown (UN)

(b) TPWD: Texas Parks and Wildlife Department; THC: Texas Historical Commission; TARL: Texas Archaeological Research Laboratory; THSC: Texas Historic Sites Committee; EPCM: El Paso Centennial Museum; UTEP: University of Texas at El Paso

La Junta De Los Rios Archeological District. The La Junta de los Rios district encompasses a roughly triangular area surrounding the confluence of the Rio Grande and Rio Conchos from Ruidoso to Redford, Texas and to Cuchillo Parado, Chihuahua. The confluence of these two rivers served as a reliable water source for Native Americans throughout history in the otherwise arid Chihuahuan Desert; this geography provided adequate resources for the establishment of mixed agricultural lifeways and the settlement of villages. Spanish explorers entered the area in 1535 to find active farming communities residing in multiple roomed adobe structures. These communities where then used as sites for Spanish missions and forts along the western frontier.

The La Junta de los Rios Archeological District was first discussed by Kelley, et al. (1940) as a region encompassing several large village complexes near the confluence of the two rivers. Kelley conducted extensive excavations at several sites in the area recovering multiple roomed pithouses, complex human internments, evidence of widely practiced agriculture, and remnants of Spanish Colonial missions. Further research was carried out by Edward Jelks (1969) and Holliday and Ivey (1974). The La Junta de los Rios Archeological District was listed on the NRHP in 1978. The majority of the current project area roughly parallels the district in the area surrounding Presidio, Texas. The current project area overlaps only a small portion of the district, including two sites, 41PS86 and 41PS87, discussed below.

41PS86 and 41PS87. 41PS86 and 41PS87 are described as Late Prehistoric surface scatters of burned rocks, with several concentrations of ashy soil; cultural materials include lithic debris, biface fragments, and a mix of Majolica and Conchos ceramics. Both sites were first recorded by Edward Jelks in 1969 when he conducted survey and surface collection of much of the La Junta de los Rios Archaeological District. Holliday and Ivey revisited the sites in 1973 and carried out surface collection in support of the Presidio-Ojinaga Survey for USIBWC. Holliday and Ivey (1974) note the possibility of buried pithouses existing at 41PS86, and that 41PS86 and 41PS87 may be part of one larger site. Therefore, while the center point of 41PS87 does not fall within the footprint of the current project area, the site boundaries, along with 41PS86, may extend into the current project area. Lopez Garcia Group, under contract to Parsons, revisited the sites in 2003 and reported that channelization and levee construction along Cibolo Creek had resulted in severe erosion of the intact portion of 41PS86 (Parsons, *et al.* 2004). The report recommended archeological testing to ascertain the sites' NRHP eligibility status.

41PS363 and Haciendita Canal (Parsons F-1). 41PS363 is the adobe ruin of the Blas Sosa house, a late 19th- early 20th-century farmstead including two collapsed adobe structures and a scatter of historic artifacts associated with the Haciendita Ranch. The site was first recorded in 1977 by the El Paso Centennial Museum (EPCM) and the University of Texas at El Paso (UTEP) and was revisited by the Lopez Garcia Group in 2003 support of the Presidio-Ojinaga Flood Control Project reconnaissance survey (Parsons, *et al.* 2004). Lopez Garcia also recorded a portion of the Haciendita Canal as being visible in the eastern bank of Arroyo Chillon and designated it as an area requiring additional investigation (Parsons, *et al.* 2004: Area F-1). This irrigation canal may be associated with 41PS363 and other previously recorded sites (41PS359-364) in conjunction with the historic Haciendita Ranch (Parsons, *et al.* 2004). Site 41PS363 is unevaluated for NRHP eligibility but may potentially be a State Archaeological Landmark.

Sites in the Vicinity of the Project Area. In addition to the three sites and five archaeologically sensitive areas located in or immediately adjacent to the project area, 35 archaeological sites are located in the vicinity of the project area. Four sites are prehistoric in age, 17 sites are historic, 13 contain multiple components and one is of an unknown age. Prehistoric site types include house mounds, hearths, rock circles, stone alignments, and artifact scatters. Historic sites represented include ruins of adobe buildings, smelters, a school house, a private family cemetery, a threshing circle, other rock features, and artifact scatters. Multiple component sites consist of a prehistoric occupation found in conjunction with a later historic component such as an adobe building built on top of the site of a prehistoric pithouse.

Of the 38 total sites, all are located on the alluvial slope or at higher elevations and none are located within the floodplain. While this distribution may indicate the relative permanence of the landforms themselves rather than a preference by prehistoric populations, the historic settlement pattern in the Presidio favors the stable lower alluvial slopes near the floodplain edge.

An intensive archaeological survey of the current project area and limited testing of previously identified sites, including backhoe trenching, are currently being conducted to systematically identify archaeological sites in the project area and provide preliminary determinations of their NRHP eligibility. Findings of the survey and testing of all alignments will be included in a separate cultural resources technical report. Additional archaeological sites are likely to be identified during this survey and some may be considered NRHP-eligible.

3.2.5 Architectural Resources

Fifty-nine historic-age or unknown age architectural resources were identified within the APE during architectural survey conducted July 6-8 and September 29 - October 1, 2009 in support of this EIS (Table 3-6). One previous survey identified three architectural resources, irrigation canals and a former international bridge and port of entry that would likely require further investigation (Parsons, *et al.* 2004). The majority of resources identified in the current 2009 survey include 54 irrigation/drainage systems including elements such as ditches and channels, culverts, and gatewells, some of which intersect the Presidio FCP levee, constructed in the 1970s. Additional resources include a well, a small berm, a railroad bridge and a portion of the railbed and tracks, a gaging station, and a grade control or check structure (Table 3-6).

The USIBWC began administering the Presidio FCP after a treaty between the United States and Mexico, signed on November 23, 1970, agreed upon a relocation of the Rio Grande's channel to provide flood control and restore the international boundary. By 1977, the river relocation and resultant property exchanges had been fully executed (IBWC Minute 257 1977). Engineering drawings and maps as well as interviews with USIBWC representatives indicate that levees and associated water control structures were built soon thereafter, with construction activities on these improvements complete in 1978. The levee and associated structures were compromised in major flooding from August to October 1978, and initial repairs and improvements to the system were planned later that year and into the next. Portions of the system were again severely damaged during a flood in 2008 that resulted from heavy rains and subsequent releases of water into the Rio Conchos, a tributary to the Rio Grande that flows from Mexico.

As the existing levee was originally constructed as part of the USIBWC's administration of the Presidio FCP beginning in the 1970s, the structure itself does not meet the age requirement to be considered potentially eligible for the NRHP. However, gated control structures integrated in the design of the levee (e.g., gatewells) were required to convey and regulate the flow of water from irrigation systems (ditches and channels) that existed prior to the development of the flood control system through the levee and to or from the Rio Grande. Although the structures built and managed by the USIBWC are not themselves of historic age, they are integrated with elements of irrigation systems that existed prior to the development of the flood control project and may be of historic age.

There is not an organized irrigation district in the Presidio area proper, although in areas downstream around Redford and to some extent upstream near Ruidosa as well, irrigation districts are in place. Also, until fairly recently, around the mid-20th century, irrigation for farming diverted seasonal runoff from the arroyos rather than relying only on river water. Wells and pumps were also used on the floodplain, but seasonal flooding was important, to the extent that some of the older farmers viewed the construction of the levees as harmful to their farming practice. Therefore, architectural features associated with irrigation and drainage are largely informal constructions and may or may not be formally documented except where they intersect the USIBWC levee. In addition, because of the frequent changes in the river course large investments in irrigation were likely not made and structures may not have been designed for permanence.

Table 3-6 Previously Recorded and Currently Identified Architectural Resources in the Project Area

Resource Name [(a)]	Resource Type(s)	Function	Ownership	NRHP Eligibility	Station No.	Northing	Easting	Association per 1980 Strip Map	Association per 1977 Structure List
Structure 1	gatewell, screw gate, culverts	drain	USIBWC	NE	0+478	3275170.95	552917.393	M. Spencer Haciendita Farm	M. Spencer
Structure 2	gatewell, screw gate, culverts	drain	USIBWC	NE	0+837	3274938.39	553195.173	line between F. Sosa Estates and M. Sosa	M. Sosa
Structure 3	gatewell, screw gate, culvert	irrigation			0+921	3274892.84	553261.672	line between M. Sosa and T. Madrid	M. Sosa
Structure 4	gatewell, screw gate	drain	USIBWC	NE	1+674	3274476.69	553888.343	M. Spencer La Tuna Farm	M. Spencer
Structure 5	gatewell, screw gate, culverts	irrigation		NE	1+721	3274449.47	553924.788	M. Spencer La Tuna Farm	M. Spencer
Structure 6	gatewell, screw gate	drain	USIBWC	NE	2+224	3274171.71	554346.563	C.W. Adams	Frank Armendariz
Structure 7	gatewell, screw gate, ditch	irrigation		TBD	2+408.4	3274072.71	554495.268	C.W. Adams	Frank Armendariz
Structure 8	gatewell, screw gate, culvert, ditch	drain	USIBWC	TBD	3+329	3273552.4	555260.381	A. Armendariz	A. Armendariz
Structure 9	gatewell, screw gates	drain	USIBWC	NE	4+403.3	3273011.11	556180.233	Valley Farms (La Junta Farms)	C. Spencer
Structure 10	gatewell, screw gate, ditch	irrigation		TBD	Cibolo Creek North Spur Levee 0+094	3271428.28	558448.056	E. Hernandez	J. Rodriguez
Structure 11	gatewell, screw gate, ditch	drain	USIBWC	TDB	Cibolo Creek North Spur Levee 0+119.5	3271426.74	558447.793	J. Rodriguez	J. Rodriguez
Structure 12	gatewell, screw gate, culvert, ditch	drain	USIBWC	TBD	Cibolo Creek North Spur Levee 0+472	3271428.89	558802.414	L.V. Rodriguez	L. Rodriguez
Structure 13	gatewell, screw gate, culvert, ditch	irrigation		TBD	Cibolo Creek South Spur Levee 0+320	3270941.11	558840.98	J. Crosson	Paulita Crosson
Structure 14	gatewell, screw gate, culvert	irrigation		NE	8+179	3270501.69	558720.89	C [Clay]. Slack	R.C. Slack
Structure 15	gatewell, screw gate	drain	USIBWC	NE	10+157	3270021.63	558779.197	O. Spencer	O. Spencer
Structure 16	gatewell, screw gate, disperser	irrigation		TBD	11+188	3268706.79	559791.981	Clay Slack	R.C. Slack
Structure 17	gatewell, screw gate, pump, disperser	irrigation		TBD	11+586	3268452.11	560893.606	Clay Slack	R.C. Slack
Structure 18	gatewell, screw gate	drain	USIBWC	NE	13+814	3267771	561693.173	Valley Farms	Valley Farms
Structure 19	gatewell, screw gate	drain	USIBWC	NE	15+671	3265952	564105	U.S. Property (Tract 7 Resaca)	O. Spencer

Resource Name [(a)]	Resource Type(s)	Function	Ownership	NRHP Eligibility	Station No.	Northing	Easting	Association per 1980 Strip Map	Association per 1977 Structure List
Structure 20	gatewell, screw gate, pump, ditch	irrigation		TBD	17+043.5	3266247.79	565326.584	J. Rubio	J. Rubio
Structure 21	gatewell, screw gates, ditch	drain	USIBWC	TBD	17+675	3266466.61	565678.896	J. Rubio	Nieto Estates
Structure 22	gatewell, screw gate, pump, ditch	irrigation		TBD	18+207.5	3266942.83	565776.773	line between D.R. Molinar and B. Alvararo	Nieto Estates
Structure 23	gatewell, screw gate	irrigation		NE	18+305.3	3267022.92	565830.571	line between B. Alvararo and D.R. Molinar	D. Molinar
Structure 24	gatewell, screw gate, ditch	drain	USIBWC	TBD	18+544.3	3267187.9	565998.087	Nieto Estate	Nieto Estates
Structure 25	standpipe, probable location of gatewell lost in flood	irrigation		NE	18+748.7	3267286.39	566190.063	Ch. Spencer	C. Spencer
Structure 26	gatewell, screw gate, ditch	irrigation		TBD	19+372	3267012.92	566709.314	L.M. Brito	L.H. Brito
Structure 27	pump, pipe, probable location of gatewell lost in flood	irrigation		NE	19+562	3266867.4	566816.806	R. Hernandez	R. Hernandez
Structure 28	gatewell, screw gate, standpipe, pipe	irrigation		NE		3266363.67	567036.331	Listed as 28-A; T. Juarez	Albina V. Juarez and Hilando V. Juarez
Structure 29	gatewell, screw gate, standpipe, pipe	irrigation		NE		3266365.15	567034.455	Listed as 29-A; Clay Slack	R.C. Slack
Structure 30	pipe, probable location of gatewell lost in flood	irrigation		NE		3266328.74	567215.334	C.B.E. Hernandez	A.T. McCall
Structure 31	gatewell, screw gate, pump, pipe, ditch	irrigation		TBD	20+560	3266346.62	567320.305	A.T. McCall	A.T. McCall
Structure 32	gatewell, screw gate, pump, pipe, ditch	irrigation		TBD	20+565.4	3266354.52	567318.874	A.T. McCall	E.H. Huffington
Structure 33	gatewell, screw gate	drain	USIBWC		Brito Creek Spur Levee 0+377	3266720.41	567966.365	Ruben Madrid	E.H. Huffington
Structure 34	gatewell, screw gate, ditch	irrigation		TBD	Brito Creek Spur Levee 0+588	3266882.77	567821.569	A.T. McCall	A.T. McCall

Resource Name [(a)]	Resource Type(s)	Function	Ownership	NRHP Eligibility	Station No.	Northing	Easting	Association per 1980 Strip Map	Association per 1977 Structure List
New Presidio Gaging Station above Rio Conchos	gaging station	gaging station	USIBWC	TBD	0+697.8	3275015.37	553074.376		USIBWC
Grade Control Structure No. 1	check structure	check structure	USIBWC	TBD	0+716	3274980	553073.6	only 1 identified in the field; others identified on maps	
Railroad Bridge	bridge	bridge	TXDOT	TBD	10+955.8	3268232.67	560273.032	Atchison Topeka & Santa Fe Railroad (AT&SF RR) Trestle Bridge	
3-A	ditches	Irrigation / drainage		TBD		3266903.85	567026.906	associated with Structures 28 and 29	
3-B	pump, pipe	Irrigation / drainage		TBD		3266516.51	567210.861	associated with Structure 30	
3-C	ditch	Irrigation / drainage		TBD		3266378.7	567359.603	associated with Structures 31 and 32	
3-D	ditch	Irrigation / drainage		TBD		3267272.37	566813.202	associated with Structure 27	
3-E	ditch	Irrigation / drainage		TBD		3267348.26	566700.887	associated with Structure 26	
Structure 32	gatewell, screw gate, pump, pipe, ditch	irrigation		TBD	20+565.4	3266354.52	567318.874	A.T. McCall	E.H. Huffington
Structure 33	gatewell, screw gate	drain	USIBWC		Brito Creek Spur Levee 0+377	3266720.41	567966.365	Ruben Madrid	E.H. Huffington
Structure 34	gatewell, screw gate, ditch	irrigation		TBD	Brito Creek Spur Levee 0+588	3266882.77	567821.569	A.T. McCall	A.T. McCall
New Presidio Gaging Station above Rio Conchos	gaging station	gaging station	USIBWC	TBD	0+697.8	3275015.37	553074.376		USIBWC
Grade Control Structure No. 1	check structure	check structure	USIBWC	TBD	0+716	3274980	553073.6	only 1 identified in the field; others identified on maps	
Railroad Bridge	bridge	bridge	TXDOT	TBD	10+955.8	3268232.67	560273.032	Atchison Topeka & Santa Fe Railroad (AT&SF RR) Trestle Bridge	
3-A	ditches	Irrigation / drainage		TBD		3266903.85	567026.906	associated with Structures 28 and 29	
3-B	pump, pipe	Irrigation / drainage		TBD		3266516.51	567210.861	associated with Structure 30	

Resource Name [(a)]	Resource Type(s)	Function	Ownership	NRHP Eligibility	Station No.	Northing	Easting	Association per 1980 Strip Map	Association per 1977 Structure List
3-C	ditch	Irrigation / drainage		TBD		3266378.7	567359.603	associated with Structures 31 and 32	
3-D	ditch	Irrigation / drainage		TBD		3267272.37	566813.202	associated with Structure 27	
3-E	ditch	Irrigation / drainage		TBD		3267348.26	566700.887	associated with Structure 26	
3-F	ditch, culvert	Irrigation / drainage		TBD		3267242.04	565757.549	associated with Structure 22	
3-G	ditch	Irrigation / drainage		TBD		3266835.88	563332.527		
3-H	ditch	Irrigation / drainage		TBD		3266676.61	563705.754		
3-I	ditch	Irrigation / drainage		TBD		3266524.63	564319.709		
4-A	ditches, culvert	Irrigation / drainage		TBD		3268201.09	563740.63		
4-B	ditch	Irrigation / drainage		TBD		3267876.45	563537.756		
4-C	ditch	Irrigation / drainage		TBD		3267683.14	563329.96		
5-6-A	ditch, screw gate	Irrigation / drainage		TBD		3268263.02	562982.237	Terry Bishop(current)	
5-6-B	ditch, pump house	Irrigation / drainage		TBD		Ditch: 3268312.41922Pumphouse: 3268277.93929	Ditch: 562979.857926 Pumphouse: 562980.310389	Terry Bishop(current)	
5-6-C	stone well	Irrigation / drainage		E		3268256.79	563184.792	Terry Bishop(current)	
5-6-D	ditch	Irrigation / drainage		TBD		3268228	563335.936		
5-A	pumps, pipes	Irrigation / drainage		TBD		3267655.23	561834.275	linked to 5B	
5-B	ditch	Irrigation / drainage		TBD		3267671.98	561848.021	linked to 5A	
5-C	ditch	Irrigation / drainage		TBD		3268159.06	562222.164		
6-A	ditch	Irrigation / drainage		TBD		3269365.81	561860.088		
Bishop-A	ditch	Irrigation / drainage		TBD		3268585.85	562966.152	Terry Bishop(current)	
Bishop-B	berm	Irrigation / drainage		TBD		3268578.35	562743.388		

(a) Number preceding letter refers to the location of the resource along one of the Alternatives, e.g., Resource 3-A, is the first resource along Alternative 4

None of the architectural resources in the project area have been previously evaluated for NRHP eligibility. These resources will be evaluated for individual NRHP eligibility and as contributing resources to a potential NRHP-eligible historic district as part of the cultural resources technical report being prepared in support of this EIS.

3.2.6 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.

Six Native American groups that may have historical ties to the project area have been identified (Table 3-7). The USIBWC has notified these Native American groups of the proposed project and will initiate formal consultation with them, pursuant to 36 CFR 800.2, once the draft cultural resources technical report is complete. Consultation ensures that any sites of traditional cultural value are identified and adequately considered.

Table 3-7 Native American Groups Identified for Presidio FCP

State	Tribal Name
Texas	Ysleta del Sur Pueblo
Texas	Kickapoo Traditional Tribe of Texas
Oklahoma	Comanche Nation
	Kiowa Indian Tribe of Oklahoma
Arizona	White Mountain Apache Tribe
New Mexico	Mescalero Apache Tribe

The White Mountain Apache Tribe has indicated that they do not anticipate adverse effects from the proposed project to the Tribe's Cultural Heritage Resources and/or historic properties; however, they recommend monitoring of ground disturbance activities in areas where artifacts are believed to occur (Altaha 2009).

3.3 WATER RESOURCES

3.3.1 Definition of Resource

The EIS evaluates potential impacts to the following water resources (1) the flood control mission of the Presidio FCP and floodplain management (discussed in subsection 3.3.2), surface water quality (discussed in subsection 3.3.3), and groundwater resources (discussed in subsection 3.3.4).

3.3.2 Flood Control and Floodplain Management

The existing Presidio FCP levees were designed to contain a 25-year flood event with four feet of freeboard. The Presidio FCP has low upstream flow contributions, but baseline flow becomes more stable downstream of the Rio Conchos. The 25-year design flow is 42,000 cfs. During September 2008 the Presidio FCP experienced flood flows to 52,972 cfs. As a result, the Presidio FCP sustained substantial damage that included levee breaches, overtopping, piping/sand boils, under-seepage, and severe surface and slope erosion. After the floodwaters subsided and the geotechnical work on the upper reach was completed, emergency repairs to 3,000 feet of the levee near Cibolo Creek were completed. The emergency repairs included installing a slurry trench cut-off wall (constructing a slurry trench with a backhoe or excavator and filling the trench with a slurry mixture of water and bentonite to prevent further groundwater intrusion). The emergency repairs to this reach of the levee were evaluated in the *Final Environmental Assessment, Emergency Levee Repairs to the Presidio Flood Control Project, Station 7+000* (USIBWC 2009a).

3.3.3 Surface Water Quality

The Presidio FCP is located within water quality management Segments 2306 and 2307 of the Rio Grande, as defined by TCEQ. Segment 2307 extends from the Riverside Diversion Dam in El Paso County to the confluence of the Rio Conchos in Presidio County, and Segment 2306 extends from the confluence of the Rio Conchos to the International Amistad Reservoir in Val Verde County. The designated uses of the two segments are high aquatic life, contact recreation, and public water supply. The most recent surface water quality data from TCEQ are for 2008, the 303(d) list. For each segment, surface water quality is monitored and evaluated. Above the confluence of the Rio Grande and Rio Conchos (upstream of Presidio and Ojinaga) (Segment ID 2307, Area 05) water quality information indicates that chloride and total dissolved solids exceed surface water quality and drinking water supply standards. Below the confluence of the Rio Grande and Rio Conchos, through Presidio and Ojinaga, to Alamito Creek (Segment ID 2306, Area 01), water quality information indicates that bacteria (fecal coliform) concentrations exceed surface water quality and drinking water standards (TCEQ 2008).

Wetlands have been identified as being of particular concern because they perform valuable functions in restoring and maintaining the quality of the nation's waters. These functions include flood water storage, sediment trapping, nutrient removal, chemical detoxification, shoreline stabilization, aquatic food chain support, fish and wildlife habitat, and groundwater recharge.

Within the Presidio FCP, the wetlands are generally associated with resacas. Resacas within the Presidio FCP store waters and cycle nutrients that contribute to the overall water quality of the floodplain that contains the Presidio FCP and downstream portions of the Rio Grande. Periodic flooding from the Rio Grande, subsurface groundwater contributions, agricultural tail water flows, and surface runoff pooling in the resaca scars are the primary water contribution pathways for the resacas within the Presidio FCP. Resacas can contribute to the overall water quality of the Rio Grande in two ways (Mitsch and Gosselink 2007; Brinson, et al. 1981):

- Resaca flooding provides an adequate water supply for woody upland and woody and herbaceous wetland vegetation. Increased vegetation in these resacas can cycle pollutants from upstream portions of the Rio Grande as well as upland portions of the floodplain.
- Resacas can cycle nutrients contributed by periodic flooding and favorably alter soil chemistry. These soil alterations include nitrification, sulfate reduction, and nutrient mineralization.

Wetlands within the Presidio FCP are also associated with the historic river channels in the area. While the historic river channel is not directly connected to the Rio Grande, it may serve some of the same water quality functions as the resacas, in particular providing water for upland woody species and nutrient cycling.

3.3.4 Groundwater Resources

Groundwater has been developed along the floodplain of the Rio Grande, where it is used mostly for irrigation; in other parts of the basin, groundwater is pumped only for livestock watering and domestic use. Large-diameter irrigation wells in the floodplain of the Rio Grande at the southern end of the basin yield from 300 to 800 gallons per minute. Specific-capacity data indicate a transmissivity of about 5,000 to 21,000 feet squared per day for the alluvial aquifer in the Rio Grande Valley. Recharge to the basin fill is mainly along the bordering mountains where small streams enter the basin. Groundwater flows from the basin margins to the Rio Grande, where it is discharged either by evapotranspiration or by seepage to the river (USGS 1996).

The groundwater source in the project area is the West Texas Bolsons Aquifer, a minor aquifer located several basins in far west Texas. It is an important source for irrigation and public water supply, including the city of Presidio (Texas Water Development Board [TWDB] 2007). This unconfined system consists of sand, gravel, silt, and clay and ranges in depth from 100 to 1,000 feet but may extend to depths of more than 3,000 feet. The most common sources for potential groundwater contamination include: 1) increased chloride/sulfate concentrations along the Rio Grande that exceed Secondary Drinking Water Standards; 2) higher levels of total dissolved solids with levels exceeding 3,000–10,000 milligrams per liter (mg/L); 3) natural or human-caused levels of nitrate and fluoride that continually exceed federal drinking water standards. For Presidio County, 41-60 percent exceedances of the nitrate standard (0.002 milligrams nitrogen per liter [mg N/L]) have been reported, and up to three percent exceedances of the 4 mg/L fluoride standard (USACE 2001).

The groundwater supply for the West Texas Bolsons aquifer for 2010 was estimated at 62,000 acre-feet per year (TWDB 2007). The reported groundwater use is 29,000 acre-feet per year. The overall water needs for Presidio County for 2010 was estimated at 3,546 acre-feet per year, largely for agricultural use (TWDB 2007).

Water levels of the West Texas Bolsons aquifer tend to be very shallow. Based on shallow groundwater wells near the Rio Grande, groundwater irrigation wells used by farmers and the golf course typically between 10 and 20 feet below ground surface (TWDB 1980; TPWD Groundwater Database, 2009). Further away from the river, groundwater wells are much deeper, and water levels may be more than 100 feet below ground surface (TWDB 1980).

3.4 LAND USE

3.4.1 Definition of Resource

This section characterizes land uses in the immediate and general vicinity where the project will occur. The EIS evaluates the land use corridor (defined in subsection 3.4.2), and potential impacts to the following land use areas (1) previous development (discussed in subsection 3.4.3), and, (2) agricultural use (discussed in subsection 3.4.4).

3.4.2 Land Use Corridor

This section includes a description of the existing public and private land uses in this portion of the Rio Grande valley of the United States. General land use categories were identified through National Land-Cover Database (NLCD) categories, or based on aerial photograph interpretation.

Land use within the Presidio FCP land use corridor was defined by the area that extends 0.25 mile beyond each side of the ROW, or proposed ROW, limited to the land within the United States. This land use corridor was analyzed by geographically quantifying acreage by general land use within the corridor. An estimated 5,368 acres make up the 0.25-mile Land Use Corridor along each side of the ROW (limited to land within the United States), including the proposed new levees associated with Alternatives 4, 5, 6 and 7. According to the NLCD, land uses include agricultural areas, developed areas of commerce and residences, particularly in the city of Presidio (NLCD 2001).

Table 3-8 below summarizes the land use types and acreage within the Presidio FCP land use corridor, as it relates to each proposed alternative. Land use types are divided between two primary land use categories, as identified by the NLCD, including agricultural land and previously developed land. Additionally, miscellaneous land is quantified within Table 3-8. Land use corridors are illustrated by category (agricultural, developed and miscellaneous use) in Figure 3-4 for the upper reach of the Presidio FCP, and Figure 3-5 for the middle and lower reaches.

Agricultural land use is the dominant land use, comprising 82 percent of the land use corridor. Specific land uses within this classification include agricultural farming, such as crops, and range land for livestock. Developed areas comprise approximately 13 percent of the land use corridor, with the greatest proportion in the city of Presidio. Land uses within this classification include a mixture of residential units, vacant land, commercial office parks, shopping centers, wholesale and retail trade, central business districts, areas of planned commercial use, as well as churches and cemeteries. The remaining five percent of the land use corridor is classified as miscellaneous. These are minor quantities of undeveloped areas identified by the NLCD as wetlands, deciduous forest, open water, or areas unidentifiable.

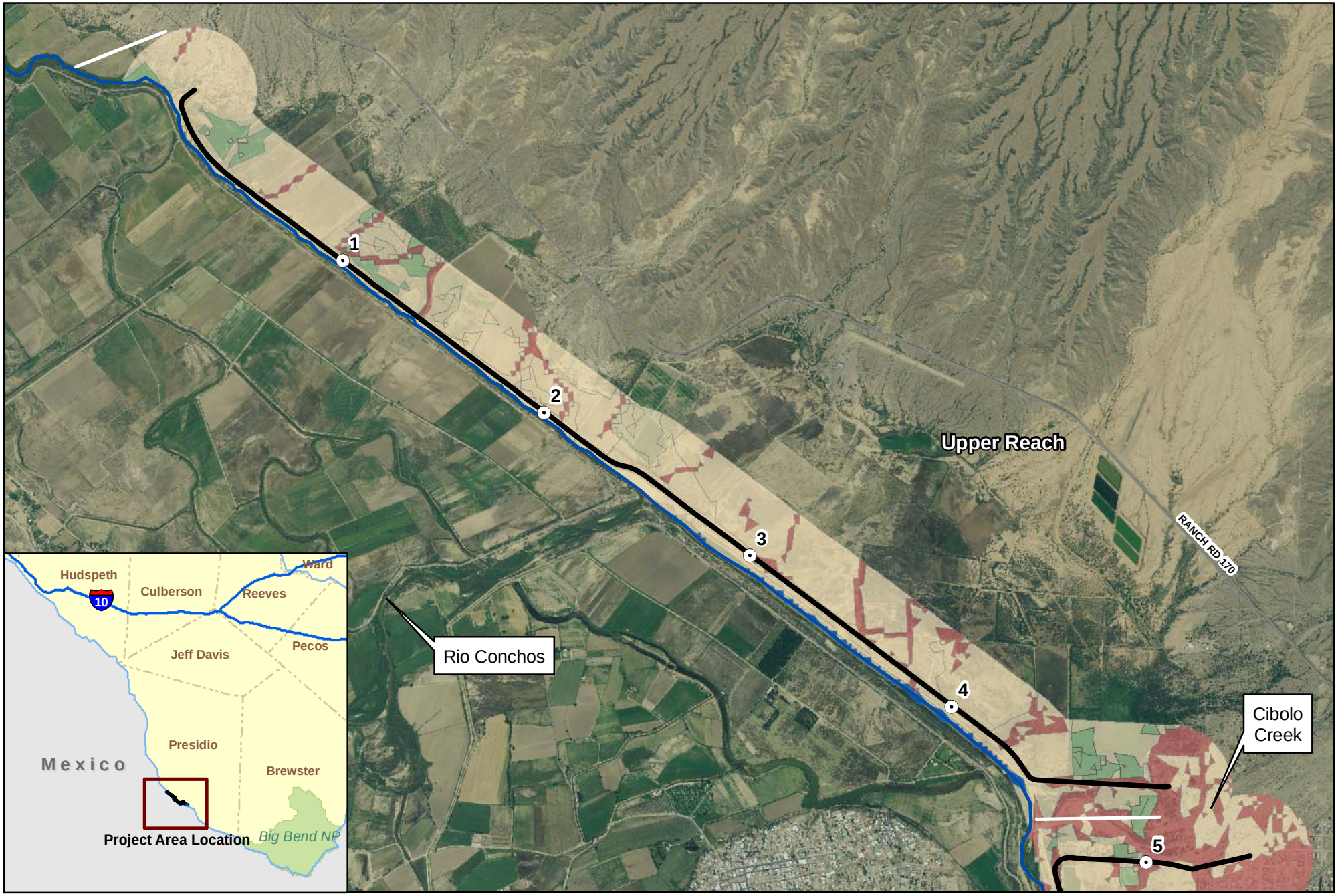

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Figure 3-4
Land Use Corridor - Upper Reach
Presidio Flood Control Project
International Boundary and Water Commission
United States Section

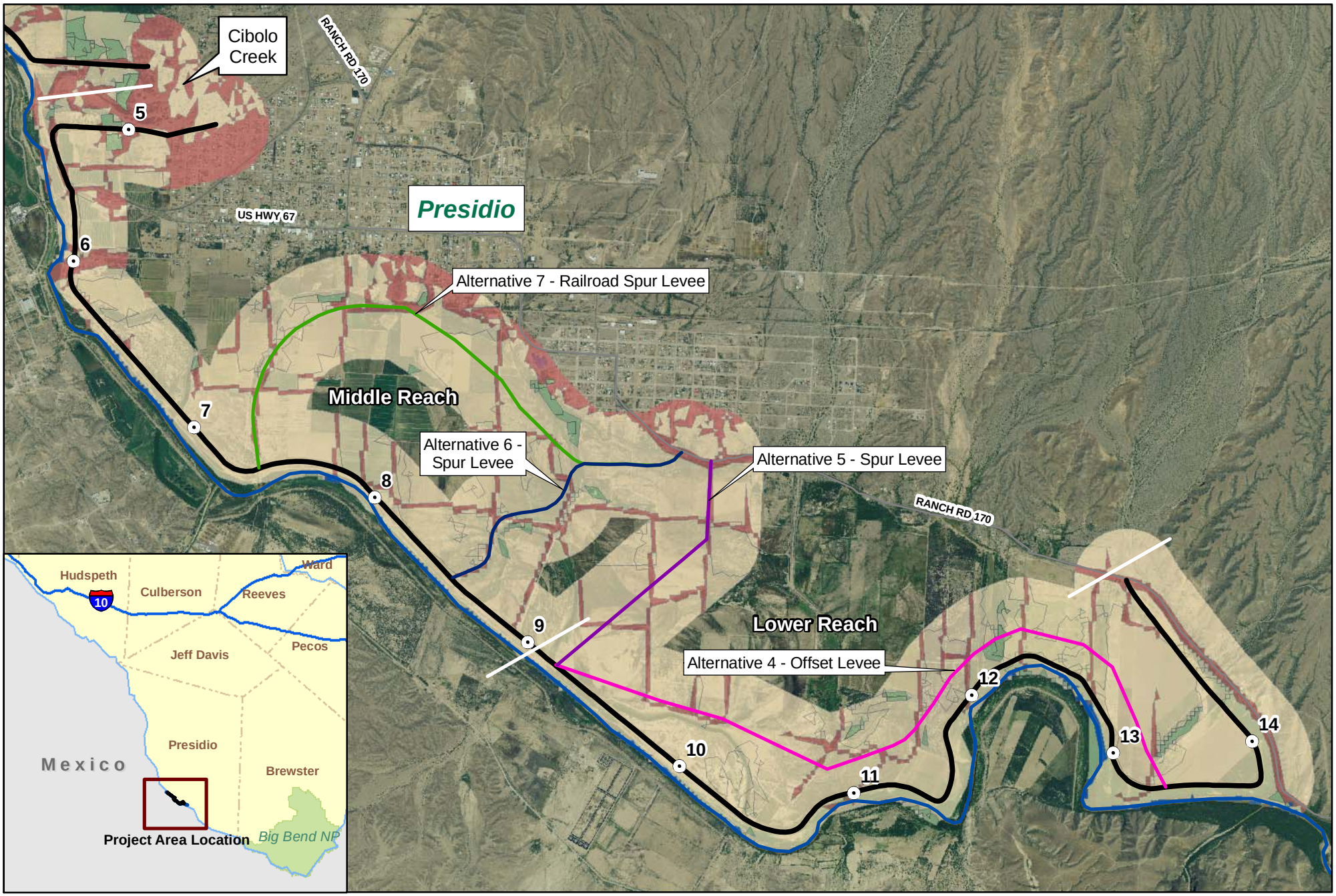

Figure 3-5
Land Use Corridor - Middle and Lower Reaches
Presidio Flood Control Project
International Boundary and Water Commission
United States Section

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Table 3-8 Land Use Types within the Presidio FCP Land Use Corridor

Land Use Type [(a)]	Land Use Corridor (acres) [(b)]	Alternative 3 (acres)	Alternative 4 (acres)	Alternative 5 (acres)	Alternative 6 (acres)	Alternative 7 (acres)
Agriculture	4,403	2,740	2,531	1,934	1,942	2,308
Previously Developed	678	358	335	329	338	444
Miscellaneous	287	164	162	113	165	174
Total	***5,368***	***3,262***	***3,028***	***2,376***	***2,445***	***2,926***

(a) Land use types are identified by the NLCD (NLCD 2001).
(b) The land use corridor is the total area within a 0.25 mile from the existing and the proposed new levees.

3.4.3 Previous Development

Much of the immediate project vicinity is undeveloped rural farmland and rangeland for cattle (FWT-WPG 2006). Scattered industrial, commercial, vacant, and residential uses begin on the western edge of Presidio, as well as irrigation facilities. These are located approximately 3 miles west of Presidio, adjacent to the Rodriguez Arroyo (GoogleEarth 2006-2007). This small city had a population of 4,167 at the 2000 U.S. census (FWT-WPG 2006). Several different types of land uses are located within the immediate project vicinity, including residential, commercial, industrial, and vacant. The City of Presidio had a population of 4,167 at the 2000 U.S. census. Based on aerial photography, it appears that the majority of these residents are located within the immediate project vicinity (GoogleEarth 2006-2007). The majority of residential lands are low intensity areas where single-family and multi-family homes, mobile homes, and housing developments are dispersed along the project area.

There are no significant areas of residential population in the United States beyond the Presidio urban area. The next populated area along the project corridor is the town of Redford (population 132, per the 2000 U.S. census), more than 8 miles east of the project limits on the United States - Mexico border. The Chihuahuan Desert to the north has prevented much settlement; the small town of Shafter is located about 20 miles north of Presidio on U.S. 67, but is little more than a tourist stop at a ghost town destination (Presidio Chamber of Commerce 2007).

3.4.4 Agricultural Use

The general project vicinity corridor, except for the developed area of the city of Presidio, contains primarily agricultural land, including range and farmland (NLCD 2001, GoogleEarth 2006-2007). Agricultural land use in Presidio County consists primarily of rangeland that varies in quality from good to poor, depending on rainfall, soil conditions, and past history of overgrazing. Along the river, irrigation allows farming of vegetables, grains, and cotton. Dominant farm crops are cantaloupe and onions, and crops grown in the past include wheat, oats, barley, and sorghum. Irrigated farmland in Presidio County is generally found in the Rio Grande Valley between Candelaria and Redford, but occasionally cropland is removed from

production due to drought conditions (FWT-WPG 2006). Recent conditions on the Rio Grande above the city of Presidio have triggered such measures. There is no prime farmland, as protected under the Farmland Protection Policy Act, within the project vicinity corridor (NRCS 2009). Most of the income in the county comes from cattle, sheep, wool, angora goats and mohair, and alfalfa (Handbook of Texas 2008, Presidio Chamber of Commerce 2007).

3.5 SOCIOECONOMIC RESOURCES AND TRANSPORTATION

3.5.1 Definition of Resource

Socioeconomics is defined as the basic attributes and resources associated with the human environment. Depending on local economic and demographic characteristics, the proposed action at the Presidio FCP would potentially influence socioeconomic activity within the surrounding region of influence. Impacts on these fundamental socioeconomic components can also influence other issues such as housing availability.

The socioeconomic region of influence for the proposed project includes Presidio County, with particular emphasis on the City of Presidio. Socioeconomic characteristics described for the region of influence would not vary between site alternatives for the Presidio FCP; therefore, the following discussion is applicable to all the alternatives.

The EIS evaluates potential impacts to the following socioeconomic resource areas (1) regional economics (population, employment and income, housing, agricultural economics) (discussed in subsection 3.5.2), (2) environmental justice (discussed in subsection 3.5.3), and (3) transportation (discussed in subsection 3.5.4).

3.5.2 Regional Economics

Population

Table 3-9 presents population characteristics, including populations in 2000, as well as projected populations for 2008, 2020, and 2030. As shown in Table 3-9, the total county population for Presidio County is projected to increase 150 percent.

Table 3-9 Population Growth in Presidio County Adjacent to the Presidio FCP

Jurisdiction	Estimated 2000 [(a)]	Estimated 2008 [(a)]	Estimated 2020 [(b)]	Estimated 2030 [(b)]	Estimated Percent Change 2000-2030
Presidio County	7,304	7,467	15,008	18,268	150%

(a) U.S. Census Bureau 2009. Census data are only collected every ten years; therefore, the 2008 data are estimated.
(b) TWDB 2002

Employment and Income

The economy of Presidio County is based on agriculture, public administration, social services, and retail sales sectors of the economy. The 2008 reported gross sales for Presidio County are $63,168,642 (Texas Comptroller 2008). The estimated total of employed workforce for Presidio County in 2008 was 3,026 (Texas Workforce Commission 2009). The median household income for Presidio County in 2007 was $27,251, and the per capita income was $9,950 (based on 1999 estimates). Approximately 24.4 percent of all families in Presidio County were reported to be below the poverty level for 2007 (U.S. Census Bureau 2009). Economics Associated With Flood Control

The Presidio FCP was implemented in 1975 to protect productive agricultural lands in the Presidio-Ojinaga Valley and the city of Presidio from frequent flooding, as well as to establish the international boundary in accordance with the Boundary Treaty of 1970. Much of the land in the Presidio Valley is undeveloped rural land, farmland, and rangeland for cattle (FWT-WPG 2006), but also includes developed areas associated with the southern portions of the City of Presidio (GoogleEarth 2006-2007). A 2004 study for IBWC titled *Estimated Benefits of IBWC Rio Grande Flood-Control Projects in the United States* estimates the costs of flood damage to the Presidio Valley from potential flood-control failure at approximately $12,569,000. This damage estimate includes baseline property and crop damage, vehicle damage, damage to roads and utilities, and emergency costs (USIBWC 2004).

3.5.3 Environmental Justice

In developing statistics for the 2000 Census of Population and Housing, the U.S. Department of Commerce, Bureau of the Census, identified small subdivisions used to group statistical census data. In metropolitan areas, these subdivisions are known as census tracts. Relevant data regarding environmental justice were obtained from the analysis of census tracts that would be affected by flood control management alternatives being considered for the Presidio FCP. Analysis of the demographic data was conducted to derive information on the approximate locations of low-income and minority populations in the community of concern.

Since the analysis considers disproportionate impacts, two areas must be defined to facilitate comparison between the area actually affected and a larger regional area that serves as a basis for comparison and includes the area actually affected. The larger regional area is defined as the smallest political unit that includes the affected area and is called the community of comparison.

The percentages of the population represented by minorities and the poverty rate for each of the selected census tracts in the project area are shown on Table 3-10. The minority population in Presidio County is approximately 85 percent. Minority populations of Hispanic origin dominate in the potential region of influence.

Table 3-10 Minority Populations and Poverty Rates in Presidio County

Ethnic Composition [(a)]	Presidio County	Percent
White	1,120	15
Hispanic or Latino (of any race)	6,198	83
Black	97	1.3
Asian	15	0.2
American Indian	22	0.3
Total Population	***7,467***	***100***
Total Minority	***6,347***	***85***
Poverty Levels [(b)]		
Individuals below poverty level	1,549	24.4

(a) Based on 2008 values presented in U.S. Census Bureau, does not include persons reporting two races, accessed 2009.
(b) Based on 2000 values and percentages presented in U.S. Census Bureau, accessed 2009.

3.5.4 Transportation

The levee system for the Presidio FCP extends approximately 15 miles along the southern portions of Presidio County where numerous agricultural areas adjacent to the Rio Grande are accessed by unimproved county and local roadways.

The major artery for highway traffic is IH 67, which connects Presidio to Marfa. Also important is Ranch Road 170, which traverses the county along the Rio Grande from southeast to northwest connecting Presidio to La Junta and Ochoa. Ranch Road 170 also traverses the southwest portion of Big Bend State Park, which is approximately 50 miles southeast of Presidio.

The project area is located in a remote area of southwest Texas near the Rio Grande where traffic is not a major issue. The city has an international bridge (IH 67), the Presidio Bridge, spanning the Rio Grande to Mexico that allows traffic to flow between the United States and Mexico. The Presidio-Ojinaga railroad bridge also crosses the Rio Grande, but the bridge is not operational and the span over the river has been removed.

3.6 ENVIRONMENTAL HEALTH

3.6.1 Definition of Resource

The EIS evaluates potential impacts to the following environmental health resource areas (1) air quality (discussed in subsection 3.6.2), noise (discussed in subsection 3.6.3), and (3) public health and environmental hazards (discussed in subsection 3.6.4).

3.6.2 Air Quality

The levee system for the Presidio FCP area traverses the southern portions of Presidio County, and is located within AQCR 153, or the El Paso-Las Cruces-Alamogordo Interstate AQCR. This AQCR includes Doña Ana, Lincoln, Sierra, and Otero Counties in New Mexico, and Brewster, Culbertson, El Paso, Hudspeth, Jeff Davis, and Presidio Counties in Texas. As of April 2005, the USEPA designated air quality within all counties of AQCR 153 to be in attainment status for all criteria pollutants, with the exception of El Paso County (USEPA 2009a).

The TCEQ identified no contributors of point source emissions in Presidio County. The area source emission inventory for Presidio County for calendar year 2002, based on the latest available data from USEPA National Emission Inventory as of September 2009 (USEPA 2009b), is as follows:

- Carbon monoxide, 2,086 tons per year;
- Volatile organic compounds, 379 tons per year;
- Nitrogen dioxide, 749 tons per year;
- Sulfur oxides, 45 tons per year;
- PM_{10}, 2,206 tons per year; and
- $PM_{2.5}$, 284 tons per year.

Existing maintenance activities by USIBWC personnel includes 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.

3.6.3 Noise

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 have been 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 DNL is a measure of the total community noise environment. 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 (U.S. Department of Transportation 1980). Potential adverse effects of noise include annoyance, speech interference and hearing loss.

Noise Components

Annoyance. Noise annoyance is defined by the USEPA as any negative subjective reaction to noise by an individual or group. Typically 15 to 25 percent of persons exposed on a

long-term basis to DNL of 65 to 70 dBA would be expected to be highly annoyed by noise events, and over 50 percent at DNL greater than 80 (National Academy of Sciences 1977).

Speech Interference. In a noisy environment, understanding speech is diminished when speech signals are masked by intruding noises. Based on a variety of studies, DNL 75 dBA indicates there is good probability for frequent speech disruption. This level produces ratings of "barely acceptable" for intelligibility of spoken material. Increasing the level of noise to 80 dB reduces the intelligibility to zero, even if the people speak in loud voices.

Hearing loss. Hearing loss is measured in decibels and refers to a permanent auditory threshold shift of an individual's hearing. The USEPA (USEPA 1974) has recommended a limiting daily equivalent energy value of equivalent sound level of 70 dBA to protect against hearing impairment over a period of 40 years. Hearing loss projections must be considered conservative as the calculations are based on an average daily outdoor exposure of 16 hours.

Existing Regional Noise Levels

Land-use and zoning classifications surrounding the project areas provide an indication of potential noise impact. Land use in the Presidio FCP area is predominantly agricultural with a small percentage of residential and commercial land use areas. No sensitive noise receptors are located immediately adjacent to the levees (*i.e.*, within 100 feet). Typical existing 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, and diesel truck or scrapers used to grade levee roads at 50 feet are approximately 70 dBA and 89 dBA, respectively (CERL 1978).

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 noise.

3.6.4 Public Health and Environmental Hazards

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. Banks Information Systems, Inc. (2009) conducted a data search on waste storage and disposal sites along the Presidio FCP Levee System. The search extended along major portions of the potential levee expansion area, up to 1 mile from the levee corridor centerline. The identification of hazardous and toxic waste disposal and the storage sites near the project area included the following databases:

- The National Priority List (NPL);
- State equivalent Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) list;
- CERCLIS No Further Remedial Action Plan (NFRAP) List;
- RCRA Corrective Actions and associated Transport, Storage, and Disposal (TSD) list;

- RCRA-registered small quantity generator of hazardous waste (GENS);
- Emergency Response Notification System of Spills (ERNS) list;
- Sites permitted as solid waste landfills (SWL), incinerators, or transfer stations;
- Emergency response actions listed within the TCEQ database;
- Listing of all sites with the Voluntary Cleanup Program (VCP) and the Innocent Owner/Operator Program (IOP);
- Registered above-ground storage tanks (AST), underground storage tanks (UST), and leaking USTs (LUST); and
- Sites currently or formerly under review by the USEPA.

Results of the data search along the Presidio FCP by individual database (up to 1 mile), are shown in Table 3-11. No hazardous materials or waste storage, disposal sites, or spill sites, were identified within the immediate Presidio FCP area (1/8 mile from existing or proposed levees). However, one UST associated with the U.S. Customs Service was reported within one-quarter mile from the project area. Five other USTs were reported within 1 mile of the Presidio FCP area, including two associated with a USBP Station and the other three associated with convenience store fuel stations. One leaking LUST, associated with the Covos Exxon Station, was reported within 1 mile of the Presidio FCP area. Two solid waste landfills, both of which can be identified as the city of Presidio Landfill, are reported within 1 mile of the Presidio FCP area. The West Texas Utilities Company was identified within 1 mile both as a small quantity generator of hazardous materials (RCRA GENS) and "Other," but is only labeled as a small quantity generator within the detailed summary of the site. Locations of all these sites are shown in Figure 3-6.

Table 3-11 Summary Search Report for the Presidio FCP Vicinity

Database	Database Updated	Search Radius	Levee Corridor	1/8 Mile	1/4 Mile	1/2 Mile	>1/2 Mile	Total
NPL	06-12-09	1.00	0	0	0	0	0	0
CERCLIS	05-27-09	1.00	0	0	0	0	0	0
NFRAP	05-27-09	1.00	0	0	0	0	0	0
RCRA TSD	05-13-08	1.00	0	0	0	0	0	0
RCRA COR	05-13-08	1.00	0	0	0	0	0	0
RCRA GENS	05-13-08	1.00	0	0	0	1	0	1
ERNS	06-16-09	1.00	0	0	0	0	0	0
SWL	12-17-08	1.00	0	0	0	0	2	2
State Spills	05-01-09	1.00	0	0	0	0	0	0
VCP/IOP	01-02-09	1.00	0	0	0	0	0	0
Regular UST/AST	05-01-09	1.00	0	0	1	2	3	6
Leaking UST	02-29-09	1.00	0	0	0	0	1	1
Brownfields	11-17-08	1.00	0	0	0	0	0	0
Other	03-04-09	1.00	0	0	0	1	0	1
Total Sites			**0**	**0**	**1**	**4**	**6**	**11**

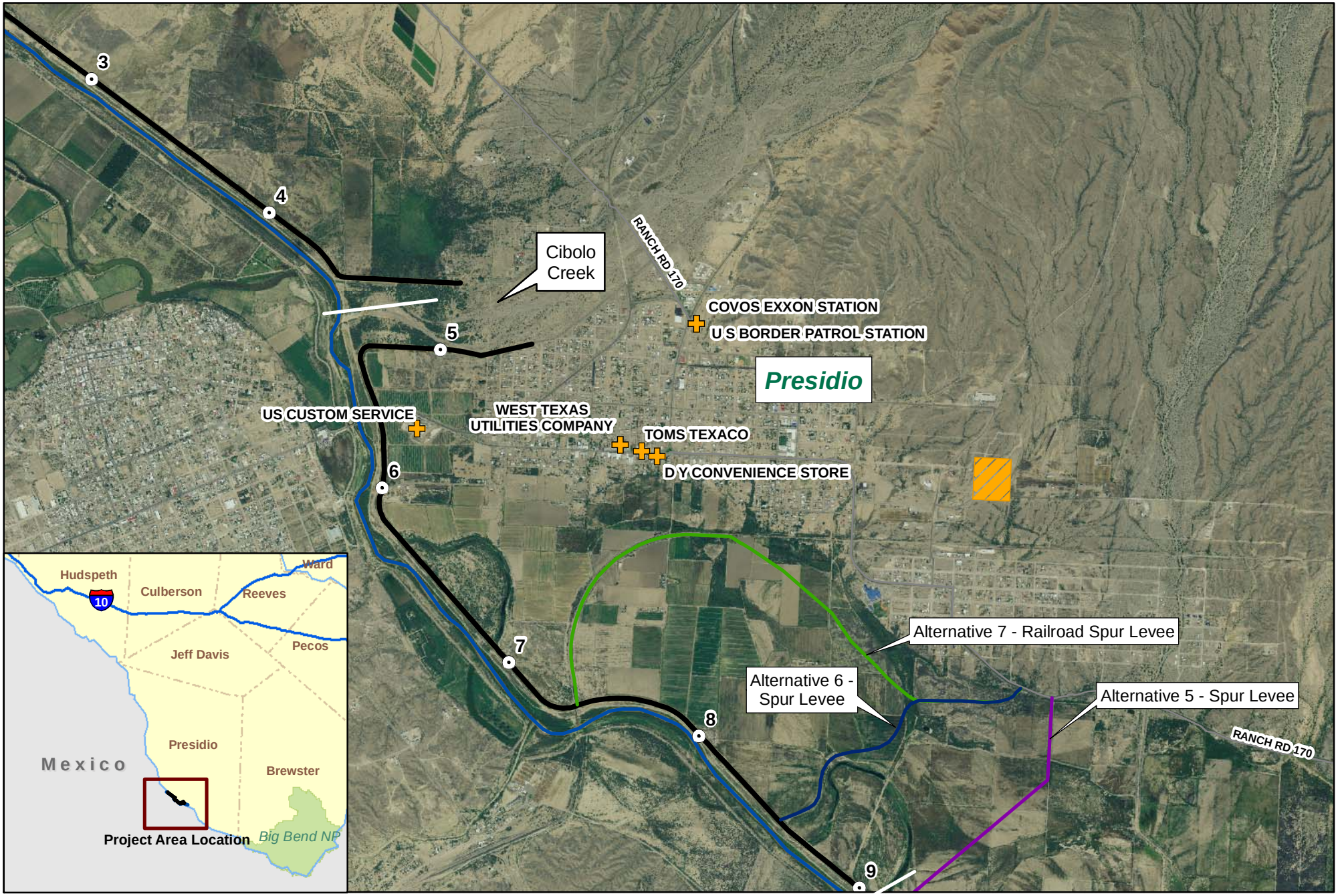

Figure 3-6
Hazardous and Toxic Waste Disposal and Storage Sites
Presidio Flood Control Project
International Boundary and Water Commission
United States Section

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SECTION 4
ENVIRONMENTAL CONSEQUENCES

This section provides analyses of the environmental consequences of the No Action Alternative and five action alternatives considered in the EIS for the Presidio FCP.

4.1 EFFECTS DETERMINATION

4.1.1 Biological Resources

Biological resources analyses used the following evaluation criteria to assess impacts of the alternatives.

- *No significant impacts* - No changes made to existing vegetation communities, and no vegetation, terrestrial wildlife habitat, aquatic wildlife habitat or habitat for threatened, endangered, or special status species removed.
- *Minor impacts* - Some vegetation or terrestrial wildlife habitat removed during construction activities, but that the effects would be for short duration and the overall habitats would recover after the construction was complete.
- *Significant impact* - A large portion, relative to the amount available in the project area, of vegetation or terrestrial wildlife habitat was permanently removed; or transit corridors were interrupted; or construction activities degraded existing vegetation to a lower-quality habitat for a long period of time (e.g., an entire breeding season).

To determine the project area, the extent of agricultural fields approximately coincides with the 100-year floodplain, except in the City of Presidio, where the 100-year floodplain extends to at least the center of the city. The total project area is approximately 6,452 acres, divided into the vegetation types shown in Table 4-1, and the percent of vegetation removed is compared to the vegetation present in the project area for the effects determination.

Table 4-1 Acreage of Project Area, Presidio Flood Control Project

Vegetation Type	Area within Project Area (acres)
Agricultural	3,924
Desert scrub/woodlands	1,329
Developed Lands	354
Existing Levee Footprint	181
Non-native grasslands	394.
Open Water	178.0
Wetlands/Riparian	91.7
Total	***6,452***

4.1.2 Cultural Resources

Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties (*i.e.,* NRHP-eligible resources). 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 EIS, a significant impact under NEPA is defined as an "unresolvable" adverse effect under Section 106 of the NHPA.

Impacts to archaeological sites include physical disturbance through surface grading, building excavation and construction, road construction, trenching for drainage or utility lines, use of staging areas for heavy equipment and supplies, borrow pit excavations, and vandalism of archaeological materials. Any ground-disturbing action in the area of an NRHP-eligible or potentially eligible archaeological site, or modification to such a site, can affect the physical integrity of that cultural resource, resulting in alteration or destruction of those characteristics or qualities that make it potentially eligible for inclusion in the NRHP and thus, would be an adverse effect under Section 106 of the NHPA.

Impacts to architectural resources include demolition, alteration of architectural traits, structural instability through vibration, short-term audio intrusions during construction, and visual intrusions to historic settings and cultural landscapes. Any visual or audio intrusions to the setting or demolition or alteration of architectural traits can affect the 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 and thus, would be an adverse effect under Section 106 of the NHPA.

Impacts to Native American resources include destruction of traditional resources, burials and sacred sites, and plant or animal habitat through ground-disturbing activities and construction of buildings and roads. Audio and visual intrusion may adversely affect the visual and audio landscape or the viewshed of these resources. These types of physical disturbances may disturb or destroy unidentified Native American resources and thus, would be an adverse effect under Section 106 of the NHPA. Native American consultation has been initiated with the Comanche Nation, the Kiowa Indian Tribe of Oklahoma, the Mescalero Apache Tribe, the White Mountain Apache Tribe, the Kickapoo Tribe of Texas, and the Ysleta del Sur Pueblo Tribe to identify any Native American resources or concerns.

4.1.3 Water Resources

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, including federal freshwater quality criteria for the Rio Grande. Impacts to wetlands would be considered significant if water quality in wetlands regulated under the CWA were altered or degraded.

4.1.4 Land Use

Impacts to land use would be considered significant if implementation of the alternative would result in substantial changes in agricultural or previously developed land within the land use corridor. Land use analysis is limited to lands outside USIBWC jurisdiction. Potential changes in land use would be associated with levee footprint expansion or new levee construction. A significant impact would a loss of 10 percent or more of agricultural lands or developed lands for levee expansion or new levee construction within the designated land use corridor.

4.1.5 Socioeconomic Resources and Transportation

A socioeconomic impact would be considered significant if the local expenditures resulting from the federal action resulted in substantial change in the local economy and labor force. Local expenditures were compared with the applicable 2008 values for Presidio County, and a significant impact defined as a change greater than 10 percent relative to county values. In addition, if levees are not certified to provide 100-year flood protection, then homeowners will be required to purchase flood insurance coverage. An impact to transportation resources would be considered significant if increases in traffic exceeded capacity of the existing roadways.

4.1.6 Environmental Health

Potential impacts on environmental health issues would be considered significant if implementation of an alternative would result in the following:

- Generate air emissions that cause or contribute to a violation of any national, state, or local ambient air quality standard; represent 10 percent or more of the emissions inventory for the affected AQCR counties to be considered regionally significant; or cause non-conformance with the USEPA General Conformity requirements.
- Noise generation by construction activities above ambient noise levels; cause annoyance, speech interference, or hearing loss; or noise-sensitive and non-construction receptors are located near the noise source.
- Regarding public health and environmental hazards, violation of federal or state regulations for hazardous waste usage, storage, or disposal; use of materials that would not be accommodated by existing guidance; human exposure to hazardous waste or materials; or hazardous waste generation that would not be accommodated by current waste management practices.

4.2 ALTERNATIVE 1 (NO ACTION)

Under Alternative 1 (No Action), the levees would not be repaired and no levee improvements beyond the emergency repairs already completed would be made. There will be no changes to the levee alignment or footprint. This alternative would continue current maintenance practices.

4.2.1 Biological Resources

Vegetation

The levee slopes would continue to be maintained as described in Section 2 on an as-needed basis. The levee slopes would remain primarily invasive grasses that rapidly re-grow after disturbances such as mowing, and establishment of native plant species on the levee slopes is not expected.

Terrestrial Wildlife

No additional changes to the vegetation would occur. The on-going maintenance of levee slopes and river channel as described in Section 2 would continue. The levee maintenance actions would maintain the vegetation on levee slopes as primarily invasive grasses, and therefore, this habitat would be relatively low-quality for wildlife use except as transit corridors.

Aquatic Wildlife

Sediment removal would continue on an as-needed basis, which may temporarily improve aquatic habitats by improving flow regimes. The resacas adjacent to the levees will not be affected by expansion of the levee footprint, or other operations that would inhibit wetland function. Mowing operations do not affect wetlands.

Threatened, Endangered and Special Status Species

The on-going maintenance of levee slopes and river channel will not be changed, and no impacts on federal or state listed T&E species or special status species are expected.

4.2.2 Cultural Resources

Under Alternative 1 (No Action), the levees will not be modified or relocated to improve flood protection and Operations and Maintenance (O&M) would continue. Cultural resources would continue to be managed in accordance with Sections 106 and 110 of the NHPA and USIBWC Directives.

Archaeological Resources

In general, no 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 Rio Grande floodplain where archaeological sites occur. Archaeological investigations revealed that prior channelization and levee construction along Cibolo Creek resulted in severe erosion of the intact portion of Site 41PS86, a contributing site in an NRHP-listed archaeological district.

Maintaining the current levee configuration may result in continued destruction of this and other NRHP-eligible sites through natural degradation.

Architectural Resources

In general, no impacts to cultural resources differing from the baseline condition would be expected. Existing conditions and natural degradation of architectural resources would continue from increased flooding and sedimentation, which reduces the structural integrity of water control structures that intersect the levee (*e.g.*, gatewells, siltation of ditches and channels, and collapse of the levee over channels). Historic-age and potentially NRHP-eligible architectural resources, primarily related to irrigation, would be damaged or destroyed through natural degradation.

Native American Resources

If Native American resources are present in the Presidio FCP, as identified through consultation with Tribes as part of this NEPA process, access to segments of the river and collection of sensitive Native American plant resources would continue. Existing conditions and natural degradation of Native American resources in the floodplain would continue from increased flooding and erosion potential along the Rio Grande floodplain.

4.2.3 Water Resources

Flood Control and Floodplain management

Under Alternative 1 (No Action), additional levee repairs would not be made, and levee improvements would not be made. Due to breaches along the lower reach of the levee, agricultural fields adjacent to the existing levee are not protected from flooding when water stages cause the river to overtop the riverbanks. Under severe storm events, current containment capacity is insufficient to fully control Rio Grande flooding, with risks to personal safety and property.

Surface Water Quality

No changes in water quality management of Segments 2306 and 2307 are expected. There would be no changes to the designated used of the two segments, and any exceedances of water quality standards would continue as under present conditions.

Wetlands protected under the CWA would not be affected by Alternative 1 (No Action). Current levee maintenance practices do not affect wetlands.

Groundwater Resources

Under Alternative 1 (No Action), no changes to the current groundwater irrigation would occur.

4.2.4 Land Use

Under Alternative 1 (No Action), agricultural and previously developed land use within the Presidio FCP land use corridor would not change from the current management practices of USIBWC. Due to the levee breaches in the lower reach of the levee system, agricultural lands and previously developed lands adjacent to the lower reach would be subject to flooding at

nearly all flood stages. There would potentially be adverse effects on agricultural or previously developed areas.

4.2.5 Socioeconomic Resources and Transportation

Regional Economy

No additional equipment or personnel would be required if current O&M practices were continued. Thus, Alternative 1 (No Action) would not result in any additional construction or operation costs. There would be no impact on cropland and production or on labor due to additional construction or operation costs. Since there would not be a need for additional workers, there would be no effects on population or employment rates. Alternative 1 (No Action) would not result in relocations to or from the area and, consequently, housing and community services would not be impacted.

Due to levee breaches in the lower reach of the Presidio levee system, there is potential for flooding of agricultural and previously developed lands in these areas if no repairs are made. As summarized in subchapter 3.5.2, the total potential damage to the Presidio Valley from flood control failure is estimated at approximately $12,569,000. Flooding in the lower reach of the levee system would likely cause damage to agricultural and developed lands, vehicles, roads and utilities, as well as create emergency services costs (USIBWC 2004).

Because the levees would be not be repaired or improved to provide 25-year flood protection, FEMA would not accredit the levees and therefore, homeowners within the 100-year floodplain would be required to purchase flood insurance. Flood insurance rates of homeowners in Presidio County range from $200 per year to more than $400 per year depending on coverage (Texas Flood Insurance 2009). For the estimated 7,467 persons living in Presidio, assuming that flood insurance could be obtained at a cost of $200 per year, the cost of flood insurance may be prohibitive for some individuals who earn less than the average per capita income of $9,950 per year.

Environmental Justice

Under Alternative 1 (No Action), current condition of minority and low-income populations for Presidio County would remain unchanged, as improvements to the levee system would not occur.

Transportation

Under Alternative 1 (No Action), current maintenance of the levee using local farm roads would not change. Alternative 1 would not alter local traffic patterns or volumes on local roads. No changes to maintenance roads adjacent to the existing levee would occur, nor would changes to the traffic flow across the international bridge. Alternative 1 (No Action) would not result in any impacts to transportation.

4.2.6 Environmental Health

Air Quality

Under Alternative 1 (No Action), the current configuration of the levee system would be retained. Existing air emissions from current practices are established in the emissions inventory for Presidio County. The existing levee would not be repaired or improved under

Alternative 1, and the current configuration of the levee system would be retained. Alternative 1 would not contribute to a violation of any national, State, or local ambient air quality standard, and would not raise the emissions within Presidio County beyond 10 percent of the county's current estimated emissions inventory. Air emissions would not be expected to increase beyond the established emissions inventory in the project area.

Noise

Under Alternative 1 (No Action) no repairs or improvements to the existing levee would occur, and the current configuration of the levee system would be retained. For the purposes of this assessment, it is estimated the shortest distance between an equipment noise source and a receptor in a rural area would be a person(s) 100 feet offsite. Given the rural nature and low population density of the area, it is unlikely a person other than a construction worker would be within 100 feet of the site boundary during project activities. As stated under the affected environment, no sensitive noise receptors (*i.e.*, schools, churches, and medical facilities) are located immediately adjacent to the levees (*i.e.*, within 100 feet). Therefore, there would be no significant impacts due to noise from current levee maintenance activities.

Public Health and Environmental Hazards

Hazardous material practices of the USIBWC are in compliance with applicable standards under the current O&M practices. Storage of diesel fuel and refueling of vehicles and equipment is performed in compliance with applicable State and federal standards. No hazardous materials sites are currently affected by O&M activities. Therefore, current USIBWC practices would not affect hazardous materials handling, nor any facilities or sites in the project area.

The Presidio FCP would continue to implement current maintenance practices such as resurfacing roadways of the levee system and floodway maintenance activities. Alternative 1 would not result in exposure to any contamination on the site, and there are no remediation activities ongoing at the Presidio FCP. For these reasons, impacts to public health and environmental hazards would not occur.

4.3 ALTERNATIVE 2 (25-YEAR FLOOD PROTECTION, IN-PLACE CONSTRUCTION)

Under Alternative 2, repairs would be made to the levee breaches to pre-flood conditions, and rehabilitation of some sections to meet 25-year flood control design specifications would occur. Under Alternative 2, no expansion of the existing footprint would occur. If an overflow weir and outfall gate are added to the existing levee during repairs and rehabilitation of the existing levee, there would be no changes to the levee alignment or footprint. In the lower reach, slurry trenches or sheet pile may be installed to stabilize the levee foundation and prevent levee deterioration, and this would occur within the existing levee footprint. Excavation for the installation of slurry trenches or sheet piles would require a trench approximately 20 feet deep and 3 feet wide (as described in Section 2). Installation of slurry trenches or sheet piles would occur within the footprint of the existing levee.

4.3.1 Biological Resources

Vegetation

Levee slopes would continue to be maintained as described in Section 2 on an as-needed basis. In areas where levee breaches were repaired, and in areas where the levee was raised to provide 25-year flood protection, after completion of construction, native grass species would be seeded along the levee slopes. Native grass species may include sideoats grama, Arizona cottontop, plains bristlegrass, sand dropseed, black grama, blue grama, green sprangletop, alkali sacaton, and cane bluestem. In areas where no levee improvements are required to provide 25-year flood protection, the levee slopes would remain primarily invasive grasses that rapidly re-grow after disturbances such as mowing, and establishment of native plant species in these areas is not expected.

Terrestrial Wildlife

No additional changes to the vegetation would occur. The on-going maintenance of levee slopes and river channel as described in Section 2 would continue. Levee maintenance actions would maintain the vegetation on levee slopes as primarily invasive grasses, with some areas seeded in native species, and therefore, this habitat would remain as relatively low-quality habitat for wildlife use, except as transit corridors.

Aquatic Wildlife

Sediment removal would continue on an as-needed basis, which may temporarily improve aquatic habitats by improving flow regimes. In areas where levee breaches would be repaired or areas where the levee would be raised to provide 25-year flood protection, the levee is not expected to be expanded into resacas adjacent to the existing levee.

During construction activities associated with Alternative 2, Best Management Practices (BMP) would be used to prevent sediment, silt, or debris from being transported to resacas or the Rio Grande. Prevention of sediment transport to resacas or the river will prevent aquatic habitats from being altered. Therefore, under Alternative 2, no aquatic wildlife habitats would be affected.

Threatened, Endangered, and Special Status Species

The ongoing maintenance of levee slopes and river channel would not be changed, and no impacts on federal or State-listed T&E species or special status species are expected.

4.3.2 Cultural Resources

Under Alternative 2, the levees be repaired and raised to provide 25-year flood protection. O&M would continue. Cultural resources would continue to be managed in accordance with Sections 106 and 110 of the NHPA and USIBWC Directives.

Under Alternative 2, the effects of the proposed construction activities are described below for each resource type.

Archaeological Resources

Proposed rehabilitation of the existing Presidio FCP levee system under Alternative 2 may adversely affect NRHP-eligible prehistoric or historic archaeological sites. Three archaeological sites and five archaeologically sensitive areas have been previously identified within the APE. Results of the geomorphological analysis and radiocarbon dating suggest that the channel of the Rio Grande has changed over time, and that much of the floodplain may be much younger than previously supposed. Nevertheless, there is a potential for buried archaeological sites within the floodplain along the Presidio FCP, particularly historic sites less than 200 years old. The potential for buried prehistoric sites is limited to isolated remnants of older terraces in locations where no historic or modern Rio Grande channels or floodplains have been mapped. An intensive archaeological survey and limited testing of previously recorded sites is currently underway. Additional archaeological sites are expected to be identified and some may be considered NRHP-eligible.

The use of heavy equipment, including backhoes, bulldozers, excavators, and scrapers to aid in the addition and movement of soil for the levee rehabilitation, 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; however, surface and shallow subsurface archaeological resources likely lack stratigraphic integrity due to previous disturbance and would not likely be considered eligible for the NRHP. In addition, USIBWC previously added material dredged from the river along the landside of the levee to the edge of the USIBWC ROW. Archaeological deposits may be more deeply buried by the addition of recent fill and may not be affected by the use of heavy equipment along the levee.

Archaeological resources may also be adversely affected by burial under the restored levee footprint. If present, archaeological resources under the levee were capped when fill material was added to the surface of the floodway and used to create the earthen levee during the original construction of the Presidio FCP in the 1970s. Archaeological sites may be re-buried by the addition of soil and gravel used to rehabilitate the existing levee in breached or compromised locations.

In some instances, capping may provide a beneficial impact to known or potential archaeological resources. Capping archaeological sites using soil and gravel, although not permanent, may be viewed as one method to preserve archaeological resources in place and prevent their inadvertent exposure or destruction. If intentional burial is used, the THC has developed recommendations for appropriate techniques to avoid potential adverse effects to these resources (THC 1999). In accordance with Best Management Practices in Section 5, these procedures can be applied to the capping of archaeological resources that could occur because of levee expansion. 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 levee road would continue with no increase in traffic that could result in additional impacts (*e.g.*, soil compaction). Lastly, the depth of additional capping material would not exceed 6.6 feet.

Improvements to the lower reach of the existing levee would also include installation of slurry trenches or sheet piles to stabilize the levee foundation and prevent deterioration of the

levee. Excavation for installation of slurry trenches or sheet piles may be required in segments parallel to the existing levee along the riverside toe of the levee. The excavation of deep (20 feet) trenches or excavation for burial of sheet piles may result in adverse effects to NRHP-eligible archaeological resources.

Under Alternative 2, water control features, including an overflow weir and an outfall gate may be installed. Additional impacts in the lower reaches may occur where construction would require excavation below the modern ground surface. Excavation for these features may result in adverse effects to NRHP-eligible archaeological resources.

Architectural Resources

Proposed improvements to the Presidio FCP levee system under Alternative 2 may have the potential to adversely affect architectural resources that are eligible for the NRHP or are contributing to an NRHP eligible historic district. Under Alternative 2, construction associated with rehabilitation of the levee would occur in proximity to architectural resources (*e.g.*, gatewells, culverts, and ditches intersecting the levee). Although the Presidio FCP levee and levee structures are less than 50 years old and do not merit consideration under standard NRHP criteria, the project integrates elements of irrigation systems (*e.g.*, ditches and irrigation canals) that pre-date the project and may be eligible or contributing resources to a district eligible for listing in the NRHP. The use of heavy equipment, including backhoes, bulldozers, excavators, scrapers, and dump trucks to aid in the addition and movement of soil for the levee rehabilitation, could result in ground disturbance and vibration effects to architectural resources. In addition, the addition of soil to repair the levee could bury resources that intersect or abut the toe.

The Presidio FCP levee is not likely to be NRHP eligible or contributing to an NRHP-eligible district; therefore, Alternative 2 is not likely to adversely affect aspects that would make it eligible for the NRHP. The action does not include any alterations to the levee inconsistent with previous maintenance and repair practices. Soil was previously along the levee slopes to improve stability and along the crown surface to level the access road. No major modifications to the levee's slope ratio or shape would occur. Improvements to the levee would increase, not diminish, its functional integrity and are not likely to be detrimental to the aspects that could make it eligible for the NRHP when it reaches 50 years of age.

Increasing the height and width of the levee is not expected to alter the flow of water to or from architectural resources in the APE. Based on existing conditions in the project area, water flow and runoff toward architectural features is minimal. Water flow and runoff would not be re-routed as a result of levee improvements.

Levee improvements may have potentially adverse effects to architectural resources caused by ground disturbance and vibration effects from heavy machinery used during construction as well as potential burial of resources abutting or intersecting the levee.

Improvements to the lower reach of the existing levee would also include installation of slurry trenches or sheet piles to stabilize he levee foundation and prevent deterioration of the levee. Excavation for the installation of slurry trenches or sheet piles may be required in segments parallel to the existing levee along the riverside toe of the levee.. The excavation of deep (20-foot) trenches or excavation for burial of sheet piles may result in adverse effects to NRHP-eligible architectural resources in the proposed path of the trenches or sheet piles.

Under Alternative 2, water control features, including an overflow weir and an outfall gate, may be installed. Additional impacts in the lower reaches may occur where construction would require excavation below the modern ground surface. Excavation for these features may result in adverse effects to NRHP-eligible architectural resources in the proposed path of the weir or outfall gate.

Native American Resources

Consultation with Native American tribes is part of this NEPA process. If Native American resources are present in the project area, activities related to levee improvements under Alternative 2 would result in limited access to segments of the river during levee reconstruction and would result in temporary adverse effects to river and resource accessibility for Native Americans. Excavation for trenches, sheet piles, or water control features would adversely affect any buried Native American resources.

4.3.3 Water Resources

Flood Control and Floodplain management

Under Alternative 2, the levee would be repaired and raised to meet the 25-year design flood specifications, but the levee would not be raised to provide 100-year flood protection. Under severe storm events, current containment capacity is insufficient to fully control Rio Grande flooding, with risks to personal safety and property.

Surface Water Quality

No changes in water quality management of Segments 2306 and 2307 are expected. There would be no changes to the designated used of the two segments, and any exceedances of water quality standards would continue as under present conditions.

Wetlands protected under the CWA would not be affected by Alternative 2. Construction activities associated with levee repair and levee raising to meet 25-year design flood protection specifications would not occur adjacent to wetlands. Current levee maintenance practices do not affect wetlands.

Groundwater Resources

Under Alternative 2, no changes to the current groundwater irrigation would occur.

4.3.4 Land Use

Under Alternative 2, agricultural and previously developed land use within the Presidio FCP land use corridor would not change from the current management practices of USIBWC. Under Alternative 2, levee repairs would be made to pre-flood conditions, and rehabilitation of other sections would be made to meet 25-year flood-control design specifications. Following levee repairs and rehabilitation, agricultural lands and previously developed lands subject to flooding under current conditions, would be protected from a 25-year flood event. There would be no adverse effects on agricultural or previously developed areas.

4.3.5 Socioeconomic Resources and Transportation

Regional Economy

The analysis of impacts of Alternatives 2 on the regional economy was based on estimated changes in baseline levels of income and business volume, which could potentially be affected by the proposed levee improvements. Construction cost would be $2 million on the basis of the most conservative estimated costs, assuming 1 mile of raised levee at a cost of approximately $2 million per mile.

Because levee construction would require most of the labor and materials to be brought from outside Presidio County, only a fraction of the construction cost would actually represent local expenditures in the Presidio area. Local employment would not be expected to significantly increase from baseline levels because a workforce from outside Presidio County would be utilized for construction activities.

In terms of economic influx, only a fraction of construction costs would actually represent local expenditures. For the impacts evaluation, it was assumed that 10 percent of the total construction cost, or $200,000, would be associated with local expenditures, and have a potential for increased sales volume and income. Table 4-2 illustrates the magnitude of the economic influx relative to reference values for Presidio County. Table 4-2 presents a comparison of potential economic impacts under Alternative 2. The anticipated increase in sales and income was calculated based on a unit ratio of sales and income increases as a function of local expenditures from levee construction of the USIBWC Rio Grande Canalization Project (Parsons 2004). Annual sales volume were estimated from the gross sales for Presidio County in 2008 (Texas Comptroller 2008); income values were based on a 2007 per capita income of $9,950 and an estimated 2008 Presidio County population of 7,467.

Table 4-2 Potential Economic Impacts from Alternative 2 for Presidio County

	Sales / Income Increase Ratio (Parsons 2004)	Estimated Value
		Alternative 2
Project Expenditures		
Construction	n/a	$2,000,000
Local expenditures [(a)]	1.00	$200,000
Sales Volume Increase		
Direct plus indirect increases	3.38	*$676,000*
Presidio County annual value	-	*$63,168,642*
Increase relative to county sales	-	1.07%
Increase in Income		
Direct plus indirect increases	1.01	*$202,000*
Presidio County annual value [(c)]	-	*$74,296,650*
Increase relative to county income	-	0.27%

(a) Local expenditures were estimated at 10% of construction costs

On the basis on a local expenditure value of $200,000, the potential for increase in sales volume would not be significant, equivalent to 1.07 percent of the annual value for Presidio County. The potential increase in local income would also not be significant; an estimated 0.27 percent of the annual county value. These increases would be associated with local services and supplies, but limited to the construction period.

Because the levees would be repaired and improved to provide 25-year flood protection, FEMA would not accredit the levees and, therefore, homeowners within the 100-year floodplain would be required to purchase flood insurance. Flood insurance rates for homeowners in Presidio County range from $200 per year to more than $400 per year depending on coverage (Texas Flood Insurance 2009). For the estimated 7,467 persons living in Presidio, assuming that flood insurance could be obtained at a cost of $200 per year, the cost of flood insurance may be prohibitive for some individuals who earn less than the average per capita income of $9,950 per year.

Environmental Justice

Data indicate that Presidio County has a disproportionately high minority (approximately 85%) and low-income populations (approximately 24%). However, construction activities associated with Alternative 2 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. Therefore, under Alternative 2, no impacts to the disproportionately high minority and low-income populations are expected.

Transportation

Construction activities associated with Alternative 2 would include the transport of heavy equipment to the levee, and the transport of fill materials from borrow pits outside the City of Presidio to the levee. Construction equipment and fill materials would be transported to the levee using existing paved and unpaved roads that intersect the levee. Under Alternative 2, no impacts on traffic patterns in the City of Presidio and surrounding areas are expected. Alternative 2 would not affect traffic patterns across the international bridge.

4.3.6 Environmental Health

Air Quality

Improvements to the levee system under Alternative 2 would impact air quality through excavation and levee raising activities. Potential impacts would be a slight increase in criteria air pollutants within Presidio County. Table 4-3 summarizes the additional estimated criteria pollutants associated with Alternative 2, as well as the percent increase above the existing Presidio County emissions inventory. Estimates were calculated for 1 mile of construction activities associated with Alternative 2. 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).

Based on the estimated emissions for Alternative 2, none of the criteria pollutant emissions are above the threshold of 10 percent of the county emissions inventory. Therefore, there are no impacts to air quality associated with Alternative 2.

Table 4-3 Air Emissions for Alternative 2 Levee Improvements

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 [(a)]	0.55	5.05	2.11	0.4	5.61	0.95
Alternative 2, levee height increase (1 mile)	0.55	5.05	2.11	0.4	5.61	0.95
Presidio emissions inventory[(b)]	45	749	2,086	379	2,206	284
Emissions as a Percent of Presidio County Emissions	1.22%	0.67%	0.10%	0.11%	0.25%	0.33%

(a) Unit data for levee construction from the USIBWC Rio Grande Canalization Project EIS (Parsons 2003: Table 4.11-2).
(b) USEPA 2009b, the most recent available data as of September 2009.

Noise

Improvements to the levee system under Alternative 2 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. 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. Under Alternative 2, typical noise levels generated by construction activities range from 75 to 89 dBA at 50 feet from the source (CERL 1978). 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. Although unlikely, 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 cause disruption of speech during the noise event (U.S. Department of Transportation 1992). Construction workers would be required to utilize appropriate hearing protection during construction activities.

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 during Alternative 2 would occur between 7:30 a.m. and 5:00 p.m., five days per week for the duration of the project. However, potential non-construction receptors would not be exposed during the entire noise-producing period. Under these conditions, potential receptors would not be exposed to long-term and regular noise above 75 dBA. Therefore, under Alternative 2, potential nearby non-construction receptors would not experience loss of hearing, only temporary speech disruption.

Public Health and Environmental Hazards

Under Alternative 2, hazardous and/or toxic products (*e.g.*, fuel, oil, grease, and hydraulic fluid) would be used from operating construction equipment. Implementing established industry practices for controlling releases of these substances would reduce the possibility of accidental releases of these products. Preventive maintenance and daily inspections of the equipment would ensure that any releases of these hazardous materials are minimized. All visible dirt, grime, grease, oil, loose paint, *etc*., would be removed from the equipment prior to use at the construction sites. Activities proposed under Alternative 2 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 immediate Presidio FCP area (1/8 mile from the project area). Improvements to the levee system under Alternative 2 would not be affected by waste storage and disposal sites, nor would they affect ongoing management operations of hazardous materials and waste sites.

4.4 ALTERNATIVES 3 AND 4 (100-YEAR FLOOD PROTECTION ALONG ENTIRE LEVEE SYSTEM)

Alternatives 3 and 4 would improve flood containment capacity by increasing levee height to provide 100-year flood protection along the entire levee system. Raising the levee would result in a lateral expansion of the levee footprint. In the upper and middle reach of the levee system, the levee would be raised in place, up to 8 feet, for both Alternatives 3 and 4.

While the same improvements are under consideration for the upper and middle reaches of the levee system, Alternatives 3 and 4 differ in levee alignment along the lower reach of the Presidio FCP, as follows:

- Under Alternative 3, current levee alignment of the lower reach would be retained, and height increased up to 10.5 feet to provide protection from a 100-year flood event. In addition, an approximate 1-mile segment (levee miles 9.9 to 10.9) would be rehabilitated by repairing damaged levee foundations and levee breaches using slurry trenches or sheet piles on the riverside toe of the levee.
- Under Alternative 4, a 3.6-mile levee segment of the lower reach would be relocated approximately 500 feet toward the landside of the existing levee. Height of the new, realigned levee would be constructed up to 22 feet, as required to provide protection from a 100-year flood event. Construction of the offset levee would start at approximately levee mile 9.2 and connect back to the existing levee at approximately levee mile 13.2.

Potential impacts of the two alternatives to increase levee height to a 100-year flood protection are discussed jointly by resource area. Impacts applicable to only Alternative 3 or Alternative 4 are discussed separately, as applicable.

4.4.1 Biological Resources

Vegetation

Raising the levee under Alternatives 3 and 4 would remove vegetation on the levee slopes where the levee footprint is expanded to provide 100-year flood protection. After completion of construction, native grass species would be seeded along the levee slopes. Native grass species may include sideoats grama, Arizona cottontop, plains bristlegrass, sand dropseed, black grama, blue grama, green sprangletop, alkali sacaton and cane bluestem.

Table 4-4 presents a comparison of potential vegetation removal under Alternatives 3 and 4 resulting from a levee height increase to provide 100-year flood protection. Raising the levee would expand the footprint, removing vegetation from the footprint expansion area. The expansion corridor is that section of land adjacent to the toe of either side of the existing levee.

The existing levee footprint is not included in the levee expansion area. The levee expansion area is compared to the total area of each vegetation type within the project area.

Table 4-4 Acreage of Vegetation Communities along Survey Corridor and Levee Expansion Area, Alternatives 3 and 4

Vegetation Community	Levee Footprint Expansion Corridor (acres)				Vegetation Removal from Project Area	
	Along Current Alignment		Lower Reach	Total Expansion Corridor	Total in Project Area (acres)	Relative Vegetation Removal
	Upper Reach	Middle Reach				
ALTERNATIVE 3 *(Alignment Retained Along Entire Levee System)*						
Desert scrub/ woodlands	3.4	4.8	6.9	15.1	1,329	1.1%
Non-native grasslands	6.6	18.4	18.6	43.6	394	11.1%
Wetlands / Riparian	0.0	0.09	0.1	0.2	91.7	0.2%
Agricultural	6.2	3.4	11.8	21.4	3,924	0.5%
Open Water	0.0	0.8	0.2	1.0	178	0.6%
Developed lands	0.02	0.3	1.4	1.72	354	0.5%
Total	***16.2***	***27.9***	***39.0***	***83.0***	***6,271***	
ALTERNATIVE 4 *(Offset Alignment in the Lower Reach)*						
Desert scrub/ woodlands	3.4	4.8	1.7	9.8	1,329	0.7%
Non-native grasslands	6.6	18.4	0.1	24.3	394	6.3%
Wetlands / Riparian	0.0	0.09	0.0	0.7	91.7	0.1%
Agricultural	6.2	3.4	60.2	69.8	3,924	1.8%
Open Water	0.0	0.8	0.0	0.8	178	0.4%
Developed lands	0.02	0.3	8.4	8.72	354	2.5%
Total	***16.2***	***27.9***	***70.4***	***114.1***	***6,271***	

Alternatives 3 and 4 would increase the height of the upper and middle reaches of the levee to provide 100-year flood protection. Vegetation removed for levee expansion in the upper reach includes 6.6 acres of non-native grasslands, 6.2 acres of agricultural lands, and 3.4 acres of desert scrub/woodlands (Table 4-4). In the upper reach, the desert scrub/woodlands areas are near levee mile 0.

In the middle reach, vegetation removed includes 18.4 acres of non-native grasslands, 4.8 acres of desert scrub/woodlands, and 3.4 acres of agricultural land (Table 4-4). The area in the middle reach considered desert scrub/woodlands is the woody vegetation associated with the northernmost resaca and the central resaca. Impacts to the wooded areas could be avoided by altering the slope of the levee at these locations or by shifting the levee expansion from a centered expansion to a riverside expansion. After completion of construction, native grass species would be seeded along the levee slopes. Native grass species may include sideoats

grama, Arizona cottontop, plains bristlegrass, sand dropseed, black grama, blue grama, green sprangletop, alkali sacaton and cane bluestem.

Alternative 3

In the lower reach, the existing footprint is approximately 50 feet wide; however, severe erosion along both sides of the levee has made the levee slopes steeper than the design of a 3:1 side slope ratio. If the levee were repaired and raised in place, it is assumed that the existing levee footprint would be expanded to the design conditions; that is, approximately 100 feet wide (landside toe of levee to riverside toe of levee). Hydraulic modeling indicates that the lower reach would be raised up to 10.5 feet to provide 100-year flood protection. In the lower reach, vegetation removed includes 18.6 acres of non-native herbaceous grassland, 11.8 acres of agricultural areas, and 6.9 acres of desert scrub/woodlands (Table 4-4). In the lower reach, the wooded areas are generally associated with the southernmost resaca and the wetland areas associated with this resaca. Impacts to the wetlands areas, wooded areas, and open water areas could be avoided by shifting the centered expansion to a riverside expansion.

Under Alternative 3, a total of 43.6 acres of non-native grasslands, 21.4 acres of agricultural lands, and 15.1 acres of desert scrub/woodlands would be removed in the upper, middle, and lower reaches to raise the levee in-place to provide 100-year flood protection. This represents 11.1 percent of non-native grasslands in the entire project area, 0.5 percent of agricultural lands in the project area, and 1.1 percent of the desert scrub/woodlands in the project area. These effects are considered minor and are expected to be temporary during construction.

Alternative 4

Construction activities in the lower reach of the Presidio FCP would include construction of a new offset levee to provide 100-year flood protection. In the lower reach, the offset levee would be constructed between 19 and 24 feet tall. In the lower reach, vegetation removed includes 60.2 acres of agricultural land, 8.4 acres of developed land (*e.g.*, golf course), and 1.7 acres of desert scrub/woodlands (Table 4-4).

Under Alternative 4, a total of 69.8 acres of agricultural areas, 24.3 acres of non-native grasslands, and 9.8 acres of desert scrub/woodlands would be removed to raise the upper and middle reaches of the existing levee and construction of an offset levee to provide 100-year flood protection. This represents 1.8 percent of agricultural areas in the project area, 6.3 percent of non-native grasslands in the project area, and 0.7 percent of the desert scrub/woodlands present in the project area. To prevent erosion, the slopes of the offset levee would be planted with native grass species as described for Alternative 2. If the materials from the lower reach of the existing levee were used to construct the offset levee, after construction completion, the areas exposed from removal of the existing levee would be planted with native grass species as described for Alternative 2. Therefore, under Alternative 4, these effects are considered minor and are expected to be temporary during construction.

Terrestrial Wildlife

Alternative 3

Invasive grasses on the levee slopes and immediately adjacent to the levee are considered low-quality wildlife habitat, and vegetation would be removed from the levee slopes and areas of levee footprint expansion as described above. After construction is complete, the levee slopes and adjacent area would be seeded with native grass species. The native grass species along the levee slopes may provide limited areas of suitable habitat for wildlife species, but the effect is expected to be relatively small. Therefore, under Alternative 3, these effects are considered minor and are expected to be temporary during construction.

Alternative 4

Due to previous and ongoing agricultural practices in the Presidio FCP, few wildlife species utilize the agricultural fields where the new offset levee would be located. It is expected that the primary wildlife species utilizing the agricultural fields would be small rodents, possibly some snakes, and raptors that may hunt rodents. During construction, the mobile species are expected to move away from the construction areas, and re-colonize after construction is completed. After construction completion, levees of the new offset levee would be planted with native grass species as described in Alternative 2. If the materials from the existing levee were used to construct the offset levee, after construction completion, the area would be reseeded with native grass species. Native grass species may provide limited additional habitat for some wildlife species, but the effect is expected to be relatively small. Therefore, under Alternative 4, these effects are considered minor and are expected to be temporary during construction.

Aquatic Wildlife

Construction activities associated with Alternatives 3 and 4 may increase erosion and sediment loads to the Rio Grande. Use of BMPs would reduce or eliminate sediment transport to the Rio Grande. Without an increase in sediment loads in the river, no impacts to aquatic wildlife habitats are expected, either in the immediate area or in downstream sections of the Rio Grande.

Construction activities associated with Alternatives 3 and 4 may also affect the three resacas identified within the survey corridor, but would not affect the historic river channel. Each resaca is intercepted by the current levee survey corridor at two ends; therefore, six wetland areas were assessed (two for each resaca). To avoid impacts to wetland resources, the levee alignment would be adjusted, as needed, from a centered expansion to a riverside expansion. During construction of Alternatives 3 and 4, BMPs would be utilized to prevent sediment, silt, or debris from reaching the resacas.

Alternative 3

Under Alternative 3, no impacts to aquatic wildlife habitats in resacas are expected.

Alternative 4

Construction of an offset levee under Alternative 4 would increase the amount of bare earth during construction and staging of construction material and equipment. During construction activities, it is expected that additional sediment may be transported to the Rio Grande or to adjacent resacas. If material from the existing levee is used to construct the offset levee, the possibility of sediment transport to the resacas and river is increased. The use of BMPs during construction activities would reduce or eliminate sediment to the Rio Grande or to adjacent resacas.

Construction of the offset levee under Alternative 4 would occur outside of the monsoon season (June through September), which would reduce sediment transport during rain events. Therefore, under Alternative 4, no impacts on aquatic wildlife habitats are expected.

Alignment of the offset levee under consideration for Alternative 4 was selected to avoid ecologically sensitive areas (such as resacas). However, wetlands associated with resacas along the existing levee could be affected as described for Alternative 3. To avoid impacts to wetland resources, the levee alignment would be adjusted, as needed, from a centered expansion to a riverside expansion. During construction in areas adjacent to resacas, BMPs would prevent or reduce sediment transport to the resacas. Therefore, under Alternative 4, no impacts to aquatic wildlife habitats in resacas are expected.

Threatened, Endangered and Special Status Species

Vegetation in the areas associated with the existing levee or adjacent agricultural fields provide limited habitat for special status species present in the area, except as foraging habitat for raptors (in particular, the zone-tailed hawk). It is not known if grasslands or adjacent agricultural areas provide suitable habitat for reptile species.

In the lower reach, expansion of the existing levee (Alternative 3) or construction of an offset levee (Alternative 4) would remove some woody species. The special status species that utilize the woody vegetation in the area include the southwestern willow flycatcher and the western yellow-billed cuckoo. Effects on these species are described below.

Southwestern willow flycatcher. The federal listed endangered southwestern willow flycatcher once occurred in riparian zones of the Rio Grande. Extensive clearing of riparian trees and subsequent invasion by salt cedar reduced both the extent and suitability of riparian habitat for the southwestern willow flycatcher. In the lower reach, where removal of woody vegetation would occur (Table 4-4), the woody vegetation present does not have suitable density or architecture for the southwestern willow flycatcher. Therefore, no suitable habitat for the southwestern willow flycatcher would be removed or altered by construction activities. Therefore, no impacts on the southwestern willow flycatcher are expected.

Western yellow-billed cuckoo. The federal listed candidate western yellow-billed cuckoo has limited habitat within the Presidio FCP, but the area is within the former known range of the western subspecies. The yellow-billed cuckoo typically nests and forages in riparian habitat with dense understory. In the lower reach, there is limited woody vegetation (Table 4-4) present, and the woody vegetation present does not have suitable understory for the western yellow-billed cuckoo. Therefore, no suitable habitat would be removed or altered by

construction activities. Therefore, no impacts to the western yellow-billed cuckoo are expected.

Other special status terrestrial species that are potentially present in the area and that may be affected by construction activities in the lower reach include the federal listed brown pelican, and several State-listed species, as described below.

Brown Pelican. A juvenile brown pelican was observed in the project area shortly after the September 2008 flooding, but there is no suitable foraging habitat for pelicans, and no suitable breeding habitat protected from predators for pelicans.

The State-listed reptile species (Chihuahuan desert lyre snake, Chihuahuan mud turtle, reticulated gecko, Texas horned lizard, and Trans-Pecos black-headed snake) and bird species (American peregrine falcon, arctic peregrine falcon, common black-hawk, gray hawk, northern aplomado falcon, and zone-tailed hawk) that may occur in the Presidio FCP are expected to be mobile and move away from the area during construction activities. These species are also expected to re-colonize after construction is completed. Therefore, no impacts to the State-listed species in the area are expected.

Under Alternatives 3 and 4, staging of construction materials and equipment would likely occur on the landside of the existing levee, which would reduce the potential for sediment transport to the Rio Grande. In addition, during levee expansion actions associated with Alternatives 3 or 4, BMPs would be utilized to prevent sediment, silt, or debris from reaching the Rio Grande. Prevention of sedimentation in the river would prevent any aquatic habitats from being altered, both in the immediate area and in downstream sections of the Rio Grande.

Special status aquatic species that are potentially present in the area that may be affected by construction activities in the lower reach include the federal listed Rio Grande silvery minnow and three fish species of concern, as described below.

Rio Grande silvery minnow. The federal listed endangered Rio Grande silvery minnow was re-introduced downstream of the Presidio FCP as part of the USFWS-sponsored recovery efforts. If some sediment is transported to the Rio Grande during construction activities under Alternatives 3 or 4, the re-introduced population of Rio Grande silvery minnow is substantially downstream (more than 30 miles), and any sediment is expected to settle prior to reaching the area where the Rio Grande silvery minnow populations are present. Under Alternatives 3 or 4, flood capacity of the Presidio FCP would be increased, which may alter downstream flows. These changes are expected to occur only during pulse flood events and not in normal flow conditions. Therefore, under Alternatives 3 or 4, because these changes are relatively small and would attenuate farther from the Presidio FCP, no impacts to the recovery efforts for the Rio Grande silvery minnow are expected.

Chihuahua shiner, Conchos pupfish, Mexican stoneroller. The USFWS identified three fish species (Chihuahua shiner, Conchos pupfish, Mexican Stoneroller) as species of concern, and these species have potential habitat within the Rio Grande adjacent to the Presidio FCP. If sediment were transported to the Rio Grande, and one or more of the special status species were present in the area, they may be affected by increased sediment. -The use of BMPs during construction activities will reduce or eliminate sediment to the Rio Grande. Therefore, under Alternatives 3 or 4, no impacts to the special status fish species are expected.

4.4.2 Cultural Resources

Archaeological Resources

Under Alternatives 3 and 4, effects of the proposed construction activities are expected to have common elements in the upper and middle reaches of the Presidio FCP. The effects of proposed construction are expected to be different for Alternatives 3 and 4 in the lower reach.

Proposed levee improvements to the existing Presidio FCP levee system may adversely affect NRHP-eligible prehistoric or historic archaeological sites. Three archaeological sites and five archaeologically sensitive areas have been previously identified within the existing levee alignment ROW. An intensive archaeological survey and limited testing of previously recorded sites is currently underway. No additional archaeological sites have been identified along the existing levee alignments (Alternative 3) or along the proposed location along the offset levee (Alternative 4); however, there is a potential for archaeologically sensitive areas, pending the results of radiocarbon dating analysis.

The use of heavy equipment, including backhoes, bulldozers, excavators, scrapers, to aid in the addition and movement of soil for the levee footprint and height increases, 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; however, surface and shallow subsurface archaeological resources likely lack stratigraphic integrity due to previous disturbance and would not likely be considered eligible for the NRHP. In addition, USIBWC has previously added material dredged from the river along the landside of the levee to the edge of the USIBWC ROW in the upper and middle reaches of the levee. Archaeological deposits may be more deeply buried by the addition of recent fill and may not be affected by the use of heavy equipment along the levee.

Archaeological resources may also be adversely affected by burial under the expanded levee footprint. If present, archaeological resources in the floodway have already been capped (buried) by the addition of spoil dredged from the river channel. This fill material was added to the surface of the floodway and used to create the earthen levee during the original construction of the Presidio FCP in the 1970s. Archaeological sites may be capped by the addition of soil and gravel used to expand the footprint of the existing levee in deficient locations. In areas of levee deficiencies, the footprint may be expanded from 6 to 12 feet from the existing toe to accommodate height increases from 2 to 4 feet. In areas where the levee deficiencies are greater, the expanded footprint would be wider.

In some instances, capping may provide a beneficial impact to known or potential archaeological resources. Capping archaeological sites using soil and gravel, although not permanent, may be viewed as one method to preserve archaeological resources in place and prevent their inadvertent exposure or destruction. If intentional burial is used, the THC has developed recommendations for appropriate techniques to avoid potential adverse effects to these resources (THC 1999). In accordance with Best Management Practices in Section 5, these procedures can be applied to the capping of archaeological resources that could occur because of levee expansion. Commercial material, compatible in physical and chemical characteristics with the existing material comprising the levee (and surrounding floodway), would be used for the levee footprint expansion. Existing use of the restricted-access levee

road would continue with no increase in traffic that could result in additional impacts (*e.g.,* soil compaction). Lastly, the depth of additional capping material would not exceed 6.6 feet.

Alternative 3

Improvements to the lower reach of the existing levee would also include installation of slurry trenches or sheet piles to stabilize the levee foundation and prevent deterioration of the levee. Excavation for the installation of slurry trenches or sheet piles may be required in segments parallel to the existing levee along the riverside toe of the levee. The excavation of deep (20-foot) trenches or excavation for burial of sheet piles may result in adverse effects to NRHP-eligible archaeological resources.

Alternative 4

Construction of the offset levee in the lower reach under Alternative 4 may also result in adverse effects to archaeological resources through their unintentional exposure by removal of the existing levee alignment in the lower reach. Materials from the existing levee may be used in construction of the offset levee, using heavy equipment for removal of the existing levee and transport to the offset levee location. The existing levee could be capping previously unidentified archaeological sites, and these unidentified sites could be exposed if the soil covering them is removed. Exposed sites could be subject to damage through looting if artifacts are exposed, or erosion from wind and water. Survey of areas adjacent to the levee did not identify archaeological sites along this alignment; however, there is a potential for archaeologically sensitive areas, pending results of radiocarbon dating analysis. If archaeologically sensitive areas occur near the toes of the existing levee, it is likely that they may extend under the levee and would thus be identified through survey; however, it is possible that resources under the existing levee were not identified by the current survey due to the presence of the levee. Results of the current survey may indicate whether there is a potential for archaeological resources, if the area has been too heavily disturbed, or if resources are too deeply buried to identify through intensive survey techniques.

Improvements to the lower reach of the existing levee would also include installation of slurry trenches or sheet piles to stabilize the levee foundation and prevent deterioration of the levee from approximately levee mile 13.8 to levee mile 15.3. Excavation for the installation of slurry trenches or sheet piles may be required in segments parallel to the existing levee along the riverside toe of the levee. The excavation of deep (20-foot) trenches or excavation for burial of sheet piles may result in adverse effects to NRHP-eligible archaeological resources.

Architectural Resources

Under Alternatives 3 and 4, the effects to architectural resources are expected to have common elements in the upper and middle reaches. The effects of construction activities are expected to be different for the lower reach under Alternatives 3 and 4.

In the upper and middle reaches of the levee, proposed improvements may adversely affect architectural resources that are eligible for the NRHP or are contributing to an NRHP eligible historic district. In the upper and middle reaches, construction associated with expansion of the levee footprint would occur near architectural resources (*e.g.*, gatewells, culverts, and ditches intersecting the levee). Although the Presidio FCP levee and levee structures are less than 50 years old and do not merit consideration under standard NRHP

Criteria, the project integrates elements of irrigation systems (*e.g.*, ditches and irrigation canals) that pre-date the project and may be eligible or contributing resources to a district eligible for listing in the NRHP. The use of heavy equipment, including backhoes, bulldozers, excavators, scrapers, and dump trucks, to aid in the addition and movement of soil for the levee footprint and height increases, could result in ground disturbance and vibration effects to architectural resources. In addition, the addition of soil to expand the levee could bury resources that intersect or abut the toe.

The Presidio FCP levee is not likely to be NRHP eligible or contributing to an NRHP-eligible district. Therefore, adverse effects to aspects that would make the levee eligible for the NRHP are not likely. The action does not include any alterations to the levee inconsistent with previous maintenance and repair practices. Soil was previously added along the levee slopes to improve stability and along the crown surface to level the access road. No major modifications to the levee's slope ratio or shape would occur. Improvements to the levee would increase, not diminish, its functional integrity and would not likely to be detrimental to the aspects that could make it eligible for the NRHP when it reaches 50 years of age.

Increasing the height and width of the levee is not expected to alter the flow of water to or from architectural resources in the APE. Based on existing conditions in the project area, water flow and runoff toward architectural features is minimal. Water flow and runoff would not be re-routed because of levee improvements.

Levee improvements may have potentially adverse effects to architectural resources caused by ground disturbance and vibration effects from heavy machinery used during construction as well as potential burial of resources abutting or intersecting the levee.

Alternative 3

Improvements to the lower reach of the existing levee would also include installation of slurry trenches or sheet piles to stabilize the levee foundation and prevent deterioration of the existing levee. Excavation for the installation of slurry trenches or sheet piles may be required in segments parallel to the existing levee along the riverside toe of the levee. The excavation of deep (20-foot) trenches or excavation for burial of sheet piles may result in adverse effects to NRHP-eligible architectural resources in the proposed path of the trenches or sheet piles.

Alternative 4

Architectural resources eligible for the NRHP or are contributing to an NRHP-eligible historic district may be adversely affected by proposed construction activities under Alternative 4. Under Alternative 4, construction for a new levee may occur near architectural resources associated with farming irrigation (*e.g.*, ditches, pumps, pipes, and culverts). Many of these elements of irrigation systems are of historic age and may be eligible or contributing resources to a district eligible for listing in the NRHP. The use of heavy equipment, including backhoes, bulldozers, excavators, scrapers, compactor rollers, and dump trucks to aid in the addition and movement of soil for the levee construction, could result in ground disturbance and vibration effects to architectural resources. In addition, the new levee would intersect resources for which engineering control measures (*e.g.*, gatewells, culverts, and screwgates) may need to be designed to facilitate their continued function or those resources may have to be removed or otherwise altered to accommodate levee construction.

Alternative 4 may also result in adverse effects to architectural resources by removal of the existing levee alignment and irrigation-related structures that intersect the levee in the lower reach. Material from the existing levee may be used for construction of the offset levee. Several structures designed to convey water in irrigation or drainage ditches through the levee (*e.g.*, gatewells) occur in this segment. Although the Presidio FCP levee and levee structures are less than 50 years old and do not merit consideration under standard NRHP criteria, the project integrates elements of irrigation systems (*e.g.*, ditches and channels) that pre-date the project and may be eligible or contributing resources to a district eligible for listing in the NRHP. Removal of the levee and gatewells could result in inadvertent alternations to (*e.g.*, in-filling) or the need for modifications to the remaining ditches and channels to retain their functionality.

Levee construction may have potentially adverse effects to architectural resources caused by ground disturbance and vibration effects from heavy machinery used during construction as well as to resources that would be removed or altered if they intersect the new levee.

Improvements to the lower reach of the existing levee would also include installation of slurry trenches or sheet piles to stabilize the levee foundation and prevent deterioration of the existing levee, from levee mile 13.8 to levee mile 15.3. Excavation for the installation of slurry trenches or sheet piles may be required in segments parallel to the existing levee along the riverside toe of the levee. The excavation of deep (20-foot) trenches or excavation for burial of sheet piles may result in adverse effects to NRHP-eligible architectural resources in the proposed path of the trenches or sheet piles.

Native American Resources

Consultation with Native American tribes is part of this NEPA process. If Native American resources are present in the project area, activities related to levee improvements under Alternative 3 and 4 would result in limited access to segments of the river during levee construction activities and would result in temporary adverse effects to river and resource accessibility for Native Americans. Excavation for trenches or sheet piles would adversely affect any buried Native American resources.

4.4.3 Water Resources

Flood Control and Floodplain Management

Under Alternatives 3 and 4, the existing levee would be repaired and raised to provide 100-year flood protection. Under severe storm events, the higher levee would protect the City of Presidio and adjacent farmlands from flooding and reduce flood risks to personal safety and property in the City of Presidio.

Surface Water Quality

Surface water quality may be affected by changes in water chemistry and changes in suspended sediment transported to the Rio Grande. Under Alternatives 3 and 4, the water quality parameters affecting water quality (*e.g.*, chloride, bacteria counts) would not be altered by construction activities. Under Alternatives 3 and 4, the water quality parameter likely to be affected by construction activities is total dissolved solids because of increased sediment loads to the Rio Grande. Under Alternatives 3 and 4, construction activities would require the use of heavy equipment to remove vegetation and raise the levees in the upper and middle reaches.

Construction equipment could lead to additional sediment transport from the project area to the Rio Grande. Use of BMPs would reduce or prevent additional sediment from reaching the Rio Grande.

In Segment 2307 (above the confluence of the Rio Grande and Rio Conchos), current water quality information indicates that chloride and total dissolved solids exceed water quality standards. However, construction activities and use of BMPs would not increase the total dissolved solids within the Rio Grande or its tributaries. Construction activities would not worsen or improve the existing water quality exceedances for chloride (Segment 2307) or bacteria (Segment 2306).

Wetlands within the floodplain are subject to the provisions of the CWA. Based on findings of the wetlands field surveys, wetlands associated with resacas may be affected by levee expansion under Alternatives 3 and 4, but the historic river channel would not be affected by construction activities under Alternative 3 or 4. There are no wetlands in the upper reach of the Presidio FCP.

Alternative 3

Wetlands protected under the CWA that may be affected by construction under Alternative 3 include the wetlands in the middle and lower reaches of the Presidio FCP. There are approximately 0.2 acres of wetlands and approximately 1.0 acres of open water (which includes the water in the Rio Grande and the resacas) within the levee expansion area under Alternative 3. The USIBWC would design levee expansion areas to move toward the riverside at the location of wetlands to avoid impacts to wetlands due to construction. Construction equipment would not be staged in or adjacent to wetlands, and BMPs would be utilized to prevent or reduce sediment transport to wetlands. Therefore, under Alternative 3, no impacts on wetlands protected under the CWA are expected.

Alternative 4

Wetlands protected under the CWA that may be affected by construction of an offset levee under Alternative 4 include wetlands in the middle and lower reaches of the levee. For construction of the offset levee, approximately 0.7 acres of wetlands/riparian areas, and approximately 0.8 acres of open water (in the Rio Grande and in the resacas) would be affected by construction activities (Table 4-4). The proposed offset levee was designed to avoid sensitive environmental resources such as resacas, and the USIBWC would design levee expansion to be away from (*e.g.,* to the landside of the resacas) sensitive environmental resources. Construction equipment would not be staged in or adjacent to wetlands, and BMPs would be utilized to prevent or reduce sediment transport to wetlands and resacas. Therefore, under Alternative 4, no impacts to wetlands protected under the CWA are expected.

Groundwater Resources

Under Alternatives 3 and 4, groundwater currently used for irrigation would continue to be pumped for irrigation. Improving the flood containment capacity of the levee is not expected to alter the groundwater resources in the area.

4.4.4 Land Use

Construction activities associated with Alternatives 3 and 4 would encroach on agricultural or developed land immediately adjacent to the levee ROW. Table 4-5 summarizes the land uses within the land use corridor, and the amount of land affected by construction activities under Alternatives 3 or 4. The potential need to develop commencial materials borrow sites, discussed in Section 5.2, would require conversion of over 10 acres of agricultural land for Alternative 3, and over 40 acres for Alternative 4.

Table 4-5 Potentially Affected Acreage along the Land Use Corridor from Alternatives 3 and 4 Levee Footprint Expansion

Land Use Type [(a)]	Total Land Use Corridor (acres) [(b)]	Affected Acreage (acres) [(c)]	Percentage of Affected Land Use Corridor
ALTERNATIVE 3			
Agriculture	2,740	74	3%
Previously Developed	358	6	1%
Miscellaneous	164	< 1	< 1%
Total	***3,262***	***80***	***3%***
ALTERNATIVE 4			
Agriculture	2,531	89	4%
Previously Developed	335	11	3%
Miscellaneous	162	2	1%
Total	***3,028***	***102***	***3%***

(a) Land use types are identified by the NLCD (NLCD 2001).

(b) The land use corridor is the total area within a 0.25 mile from the existing levee ROW associated with Alternatives 3 and 4.

(c) The affected acreage of the land use corridor represents the area affected by the levee footprint expansion.

Alternative 3

Approximately 74 acres of agricultural land, or three percent of the agriculture areas within the land use corridor, would likely be affected by levee expansion due to the increased width of the levee footprint. Approximately 6 acres of previously developed land or one percent of the previously developed land in the land use corridor would likely be affected. Less than one percent of the miscellaneous land in the land use corridor would likely be affected. Therefore, under Alternative 3, no impacts to land use are expected above the 10 percent criterion.

Alternative 4

Construction of an offset levee in the lower reach of the Presidio FCP would primarily occur in agricultural areas. Approximately 89 acres of agricultural land, or four percent of the agriculture land in the land use corridor, would likely be affected by levee expansion due to the increased width of the levee footprint in the upper and middle reaches, and construction of an

offset levee footprint in the lower reach. Approximately 11 acres of previously developed land, or three percent of the previously developed land in the land use corridor would likely be affected. Approximately 2 acres of miscellaneous land, or one percent of the miscellaneous land in the land use corridor, would likely be affected. Therefore, under Alternative 4, no impacts to land use are expected above the 10 percent criterion.

4.4.5 Socioeconomic Resources and Transportation

Regional Economy

The analyses of impacts of Alternatives 3 and 4 on the regional economy were based on estimated changes in baseline levels of income and business volume, which could potentially be affected by the proposed levee improvements. Table 4-6 presents a comparison of potential economic impacts under both alternatives. The anticipated increase in sales and income was calculated based on a unit ratio of sales and income increases as a function of local expenditures from levee construction of the USIBWC Rio Grande Canalization Project (Parsons 2003). Annual sales volume were estimated from the gross sales for Presidio County in 2008 (Texas Comptroller 2008), income values were based on a 2007 per capita income of $9,950, and an estimated 2008 Presidio County population of 7,467.

Table 4-6 Potential Economic Impacts from Alternatives 3 and 4 for Presidio County

	Sales / Income Increase Ratio [(a)]	Estimated Value (millions)	
		Alternative 3	Alternative 4
Project Expenditures			
Construction	n/a	$107.1	$100.9
Local expenditures [(b)]	1.00	$10.7	$10.1
Sales Volume Increase			
Direct plus indirect increases	3.38	$36.2	$34.1
Presidio County annual value	-	$63.2	$63.2
Increase relative to county sales	-	*57.3%*	*54.0%*
Increase in Income			
Direct plus indirect increases	1.01	$10.8	$10.2
Presidio County annual value	-	*$74.3*	*$74.3*
Increase relative to county income	-	*14.5%*	*13.7%*

(a) Ratio between sales increase and local expenditures, and income increase and local expenditures from levee construction of the USIBWC Rio Grande Canalization Project (Parsons 2003)
(b) Local expenditures were estimated at 10% of construction costs

Because levee construction would require most of the labor and materials to be brought from outside Presidio County, only a fraction of the construction cost would actually represent local expenditures in the Presidio area. This fraction was estimated as 10 percent of the construction value for the potential impacts evaluation. A workforce from outside Presidio County would be utilized for construction activities, and therefore, local employment would not significantly increase from baseline levels. Table 4-6 illustrates the magnitude of the economic influx relative to reference values for Presidio County.

Under Alternatives 3 or 4, if the levee can be certified by the USIBWC and accredited by FEMA to provide 100-year flood protection, flood insurance rates for local homeowners and landowners would not be increased.

Alternative 3

Under Alternative 3, construction cost would be $107 million based on the most conservative estimated costs, assuming a 15.3 miles of raised levee in the upper, middle, and lower reaches at a cost of approximately $7 million per mile. Nearly $11 million would be associated with local expenditures, and have a potential for increased sales volume and income (Table 4-6). On the basis on a local expenditure value of nearly $11 million, the potential for increase in sales volume would be significant, equivalent to 57 percent of the annual value for Presidio County. The potential increase in local income would also be significant, an estimated 14 percent of the annual county value. These increases would be associated with local services and supplies, but limited to the construction period.

Alternative 4

Under Alternative 4, construction costs would be $100 million based on the most conservative estimated costs, assuming 9.2 miles of raised levee in the upper and middle reaches at a cost of approximately $7 million per mile and approximately 3.6 miles of new levee construction at a cost of $10 million per mile. Assuming that 10 percent of the total construction cost, approximately $10 million would be associated with local expenditures, and have a potential for increased sales volume and income (Table 4-6). On the basis on a local expenditure value of $10 million, the potential for increase in sales volume would be significant, equivalent to 54 percent of the annual value for Presidio County. The potential increase in local income would also be significant, an estimated 13.7 percent of the annual county value. These increases would be associated with local services and supplies, but limited to the construction period.

Environmental Justice

Data indicate that Presidio County has a disproportionately high minority (approximately 85%) and low-income populations (approximately 24%). However, construction activities associated with Alternatives 3 or 4 would not occur in residential or workplace areas associated with these populations. A small but positive economic input to the local community would occur because of the levee improvements. Therefore, under Alternatives 3 or 4, no impacts to the disproportionately high minority and low-income populations are expected.

Transportation

Construction activities associated with Alternatives 3 and 4 would include the transport of heavy equipment to the levee, and the transport of fill materials from borrow pits outside the City of Presidio to the levee. Construction equipment and fill materials would be transported to the levee using existing paved and unpaved roads that intersect the levee. During construction, traffic flow and volumes on local paved and unpaved roads would increase, but these patterns are expected to be temporary only during levee construction. Therefore, under Alternatives 3 and 4, no long-term impacts to local traffic patterns or traffic patterns across the international bridge are expected.

Construction equipment would also be used if the materials from the existing levee in the lower reach were used to construct the offset levee (Alternative 4). Moving material from the existing levee to the location of the new offset levee would utilize existing unpaved farm roads. Construction materials and equipment would be stored outside the floodplain.

4.4.6 Environmental Health

Air Quality

Improvements to the levee system under Alternatives 3 and 4 would affect air quality through excavation and levee raising activities. Table 4-7 presents a comparison of potential air emissions associated with levee system improvements under Alternatives 3 and 4, as well as the percent increase above the existing Presidio County emissions inventory. 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).

Table 4-7 Air Emissions for Alternatives 3 and 4 Levee System Improvements

Parameter	Emissions (tons per year)					
	Sulfur Oxides	Nitrogen Dioxides	Carbon Monoxide	Volatile Organic Compounds	Particulate Matter (PM_{10})	Particulate Matter ($PM_{2.5}$)
Emission Reference Values						
Unit emissions per mile of levee height increase [(a)]	0.55	5.05	2.11	0.4	5.61	0.95
Unit emissions per mile of new levee construction[(a)]	0.91	8.44	3.52	0.67	11.09	1.87
Presidio emissions inventory[(b)]	45	749	2,086	379	2,206	284
ALTERNATIVE 3						
Levee height increase (15.3 miles)	8.41	77.3	32.3	6.12	85.8	14.5
Emissions as a percent of Presidio County inventory	18.7%	10.3%	1.55%	1.61%	3.89%	5.12%
ALTERNATIVE 4						
Levee height increase (9.2 miles) [(a)]	5.06	47.5	19.83	3.76	52.7	8.93
New levee construction (3.6 miles of new offset levee)	3.37	31.2	13.0	2.48	41.0	6.92
Levee removal along 3.6 miles of realigned segment in lower reach [(c)]	3.64	33.8	14.1	2.68	44.4	7.48
Emissions as a percent of Presidio County Emissions	19.0%	10.5%	1.57%	1.65%	4.25%	5.58%
Percent emissions including removal of 3.6 miles of realigned levee	26.8%	15.0%	2.25%	2.35%	6.26%	8.21%

(a) Unit data for levee construction from the USIBWC Rio Grande Canalization Project EIS (Parsons 2003: Table 4.11-2);
(b) USEPA 2009b, the most recent available data as of September 2009.
(c) The unit emissions per mile for new levee construction were used for the levee removal emissions calculations, assuming the two activities generate similar emission levels.

Alternative 3

Potential impacts would be a slight increase in criteria air pollutants within Presidio County (Table 4-7). Estimates were calculated for 15.3 miles of construction activities associated with Alternative 3. Based on the estimated emissions for Alternative 3, both sulfur oxides and nitrogen dioxides are above the threshold of 10 percent of the county emissions inventory, at 18.7 percent and 10.3 percent, respectively. Therefore, there are potential impacts associated with Alternative 3 from the criteria pollutants sulfur oxides and nitrogen dioxides.

Alternative 4

Potential impacts would be a slight increase in criteria air pollutants within Presidio County (Table 4-7). Estimates were calculated for 9.2 miles of levee height increase and rehabilitation, and 3.6 miles of new levee construction. Additional estimates were calculated for the potential removal of the 3.6 miles of levee replaced by new levee. Based on the estimated emissions for Alternative 4, without levee removal, both sulfur oxides and nitrogen dioxides are above the threshold of 10 percent of the county emissions inventory, at 19.0 percent and 10.5 percent, respectively. The estimated emissions for Alternative 4, with levee removal, show both sulfur oxides and nitrogen dioxides even further above the threshold of 10 percent of the county emissions inventory, at 26.8 percent and 15.0 percent, respectively. Therefore, under Alternative 4, there are potential impacts from the criteria pollutants sulfur oxides and nitrogen dioxides.

Noise

Improvements to the levee system under Alternatives 3 or 4 would increase ambient noise levels using trucks to bring additional fill material to the site and fill activities associated with the levee improvement project. 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. Under Alternative 3, typical noise levels generated by construction activities range from 75 to 89 dBA at 50 feet from the source (CERL 1978). 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. Although unlikely, 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 cause disruption of speech during the noise event (U.S. Department of Transportation 1992). Construction workers would be required to utilize appropriate hearing protection during construction activities.

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 during Alternatives 3 or 4 would occur between 7:30 a.m. and 5:00 p.m., five days per week for the duration of the project. However, potential non-construction receptors would not be exposed during the entire noise-producing period. Under these conditions, potential receptors would not be exposed to long-term and regular noise above 75 dBA. Therefore, under Alternatives 3 or 4, potential nearby non-construction receptors would not experience loss of hearing, only temporary speech disruption.

Public Health and Environmental Hazards

Under Alternatives 3 and 4, hazardous and/or toxic products (*e.g.*, fuel, oil, grease, and hydraulic fluid) would be used for operating construction equipment. Implementing established industry practices for controlling releases of these substances would reduce the possibility of accidental releases of these products. Preventive maintenance and daily inspections of the equipment would ensure that any releases of these hazardous materials are minimized. All visible dirt, grime, grease, oil, loose paint, or other debris, would be removed from the equipment prior to use at the construction sites. The activities proposed under Alternatives 3 or 4 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 immediate Presidio FCP area (1/8 mile from the project area). Improvements to the levee system under Alternatives 3 or 4 would not be affected by waste storage and disposal sites, nor would they affect ongoing management operations of hazardous materials and waste sites.

4.5 ALTERNATIVES 5, 6, AND 7 (100-YEAR FLOOD PROTECTION ALONG UPPER PORTION OF LEVEE AND CONTRUCTION OF SPUR LEVEE)

Alternatives 5, 6, and 7 would increase flood containment capacity by increasing levee height to provide 100-year flood protection in the upper and middle reaches of the Presidio FCP. Raising the levee, up to 8 feet, would result in a lateral expansion of the current levee footprint. In the lower reach, an approximate 1-mile segment would be raised up to 4 feet (levee miles 13.1 to 14.1), and a second segment would be rehabilitated by repairing damaged levee foundations and levee breaches using slurry trenches along the toe of the levee (levee miles 9.9 to 10.9).

To provide a 100-year flood protection to the City of Presidio under Alternatives 5, 6, and 7, a new spur levee would be required to connect the raised levee section of the existing levee with elevated terrain south of the City of Presidio. The spur levee would originate at different locations along the existing levee (levee miles 9.2, 8.5 and 7.4 for Alternatives 5, 6 and 7, respectively).

- Under Alternative 5, a spur levee starting at levee mile 9.2 would be constructed approximately perpendicular to the existing levee. The spur levee would be 1.3 miles long, and up to 22 feet tall for most of the length, and up to 24 feet tall in one 0.2-mile section.
- Under Alternative 6, a spur levee starting at levee mile 8.5 would be constructed, approximately perpendicular to the existing levee. The spur levee would be approximately 1.4 miles long, and up to 22 feet tall.
- Under Alternative 7, a spur levee starting at approximately the railroad bridge (levee mile 7.4) would be constructed following the curve of the railroad bridge for most of the length. The railroad spur levee would be approximately 2.9 miles long, and up to 29 feet tall.

In the lower reach of the Presidio FCP for Alternatives 5, 6, and 7, the existing levee would be repaired (using slurry trenches or sheet piles) and rehabilitated to provide 25-year

flood protection for the agricultural areas adjacent to the lower reach. Repairs to the lower reach may also include installation of an overflow weir and outfall gate to regulate waters during flooding conditions. The overflow weir and outfall gate would be installed within the existing levee footprint.

Potential impacts of the three spur levee alternatives to provide 100-year flood protection to the City of Presidio are discussed jointly by resource area. Impacts applicable to only Alternative 5, 6, or 7 are discussed separately, as applicable.

4.5.1 Biological Resources

Under Alternatives 5, 6, and 7 the upper reach of the existing levee would be raised to provide 100-year flood protection to the City of Presidio, and a new spur levee constructed. In addition, the levee would be raised from the start of the middle reach to the start of the spur levee under consideration. For all biological resources, raising the upper reach of the levee would have the same effects as described under Alternative 3.

Vegetation

The spur levees considered under Alternatives 5, 6, and 7 would have different heights, but the same general structure. The levee would have an access road on the top of the levee 15 feet wide, and the levee would have a maintenance road at the toe of the levee. The maintenance road would be 20 feet wide, and would be used to perform levee maintenance (*e.g.*, erosion repair) or floodway mowing operations. The area of vegetation removed for each of the spur levees considered under Alternatives 5, 6, or 7 includes the 20-foot wide maintenance road as well as the actual levee. Table 4-8 presents a comparison of potential vegetation removal under Alternatives 5, 6, and 7.

Under Alternatives 5, 6 and 7, after construction was completed, the exposed areas would be seeded with native grass species as described in Alternatives 2 and 3.

Alternative 5

Under Alternative 5, the spur levee 9.2 would be constructed primarily through agricultural lands. The spur levee 9.2 would be 1.3 miles long, and the levee would be up to 22 feet tall for most of the length, and up to 24 feet tall in one 0.2-mile section. Vegetation removed for construction of the spur levee 9.2 includes 24.3 acres of agricultural lands (Table 4-8). The lower reach would be repaired using slurry trenches or sheet piles as necessary, and the levee raised to provide 25-year flood protection. The exposed areas would be seeded with native grass species as described under Alternative 2, but no levee expansion would occur in the lower reach.

Under Alternative 5, a total of 33.3 acres of agricultural lands, 22.8 acres of non-native grasslands, and 7.4 acres of desert scrub/woodlands would be removed to raise the levee and construct a spur levee 9.2 to provide 100-year flood protection (Table 4-8). This represents 0.8 percent of agricultural lands in the project area, 5.8 percent of non-native grasslands in project area, and 0.6 percent of desert scrub/woodlands in the project area. These effects are considered minor and are expected to be temporary during construction.

Table 4-8 Acreage of Plant Communities Removed along the Levee Expansion Areas and New Spur Levees under Alternatives 5, 6 and 7

Vegetation Community	Levee Footprint Expansion Corridor (acres)				Vegetation Removal from Project Area	
	Along Current Alignment		New Spur Levee	Total Expansion Corridor	Total in Project Area (acres)	Relative Vegetation Removal
	Upper Reach	Middle Reach				
ALTERNATIVE 5 *(Spur Levee at Mile 9.2)*						
Desert scrub/ woodlands	3.3	3.7	0.4	7.4	1329	0.6%
Non-native grasslands	6.4	16.4	0.0	22.8	394	5.8%
Wetlands / Riparian	0.0	0.03	0.0	0.03	91.7	0.3%
Agricultural	6.0	3.0	24.3	33.3	3924	0.8%
Open Water	0.0	0.7	0.0	0.7	178	0.4%
Developed lands	0.02	0.2	0.0	0.2	354	0.06%
Total	***15.7***	***24.1***	***24.7***	***64.4***	***6,271***	
ALTERNATIVE 6 *(Spur Levee at Mile 8.5)*						
Desert scrub/ woodlands	3.3	3.6	15.9	22.8	1329	1.7%
Non-native grasslands	6.4	13.6	0.0	20.0	394	5.1%
Wetlands / Riparian	0.0	0.02	1.0	1.0	91.7	1.1%
Agricultural	6.0	3.0	6.9	15.9	3924	0.4%
Open Water	0.0	0.7	0.0	0.7	178	0.4%
Developed lands	0.02	0.2	0.0	0.2	354	0.06%
Total	***15.7***	***21.1***	***23.8***	***60.6***	***6,271***	
ALTERNATIVE 7 *(Railroad Spur Levee at Mile 7.4)*						
Desert scrub/ woodlands	3.3	3.1	15.1	21.5	1329	1.6%
Non-native grasslands	6.4	8.5	0.1	15.0	394	3.8%
Wetlands / Riparian	0.0	<0.01	1.7	1.7	91.7	1.8%
Agricultural	6.0	2.0	32.3	40.3	3924	1.0%
Open Water	0.0	0.7	0.0	0.7	178	0.4%
Developed lands	0.02	0.06	3.2	3.2	354	0.9%
Total	***15.7***	***14.4***	***52.5***	***82.5***	***6,271***	

Alternative 6

The spur levee 8.5 constructed under Alternative 6 would be constructed primarily through agricultural lands. Vegetation removed for construction of the spur levee 8.5 includes 6.9 acres of agricultural lands and 15.9 acres of desert scrub/woodlands (Table 4-8). In addition, Alternative 6 would cross the historic river channel, and remove approximately 1.0 acre of wetland/riparian area. The wooded areas associated with Alternative 6 spur levee 8.5 are adjacent to the central resaca. The lower reach would be repaired using slurry trenches or sheet piles as necessary, and raised to provide 25-year flood protection. The exposed areas

would be seeded with native grass species as described under Alternative 2, but no levee expansion would occur from levee mile 8.5 to the end of the project area.

Under Alternative 6, a total of 15.9 acres of agricultural lands, 20.0 acres of non-native grasslands, and 22.8 acres of desert scrub/woodlands would be removed to raise the levee and construct a spur levee 8.5 to provide 100-year flood protection. This represents 0.4 percent of agricultural lands in the project area, 5.0 percent of non-native grasslands in the project area, and 1.7 percent of desert scrub/woodlands in the project area. These effects are considered minor and are expected to be temporary during construction. Under Alternative 6, 1.0 acre of wetlands would be removed, and wetlands removal would require a USACE individual permit.

Alternative 7

The railroad spur levee would be constructed primarily through agricultural lands. The railroad spur levee would be 2.9 miles long, and would be up to 29 feet tall. Vegetation removed for construction of the railroad spur levee includes 32.3 acres of agricultural lands and 15.1 acres of desert scrub/woodlands (Table 4-8). Alternative 7 would cross the historic river channel, and remove approximately 1.7 acres of wetland/riparian area. The lower reach would be repaired using slurry trenches or sheet piles as necessary, and raised to provide 25-year flood protection. The exposed areas would be seeded with native grass species as described under Alternative 2, but no levee expansion would occur from levee mile 7.4 to the end of the project area.

Under Alternative 7, a total of 40.3 acres of agricultural lands, 15.0 acres of non-native grasslands, and 21.5 acres of desert scrub/woodlands would be removed to raise the levee and construct a railroad spur levee to provide 100-year flood protection. This represents 1.0 percent of agricultural lands in the project area, 3.8 percent of non-native grasslands in the project area, and 1.6 percent of desert scrub/woodlands in the project area. These effects are considered minor and are expected to be temporary during construction. Under Alternative 7, 1.7 acres of wetlands would be removed, and wetlands removal would require a USACE individual permit.

Terrestrial Wildlife

Due to previous and ongoing agricultural practices in the Presidio FCP, few wildlife species utilize the agricultural fields. It is expected that the primary wildlife species utilizing the agricultural fields would be small rodents, possibly some snakes, and raptors that may hunt rodents. During construction, the mobile species are expected to move away from the construction areas, and re-colonize after construction is completed. Therefore, under Alternatives 5, 6, and 7, these effects are considered minor and are expected to be temporary during construction.

Aquatic Wildlife

Construction activities associated with the upper and middle reaches under Alternatives 5, 6, and 7 may increase erosion and sediment loads to the Rio Grande, and therefore affect aquatic wildlife in the river. Similarly, repair of the lower reach of the levees may increase sediment loads to the river. Use of BMPs would reduce or eliminate sediment transport to the Rio Grande. Without an increase in sediment loads in the river, no impacts to aquatic habitats are expected. Seeding with native grasses over all exposed areas after construction is completed would also reduce erosion and sediment transport.

Activities associated with construction of the spur levees under Alternatives 5, 6, or 7 would occur on the landside of the existing levee, and therefore, additional sediment from spur levee construction would not be transported to the Rio Grande. Therefore, the Rio Grande would not be affected by increased sediment, either in the immediate area or in downstream sections of the river.

Activities associated construction of the spur levees under Alternatives 5, 6 or 7, may also affect the three resacas identified within the survey corridor. Each resaca intercepted the current levee survey corridor at two ends; therefore, six wetland areas were assessed (two for each resaca). To avoid impacts to wetland resources, the levee alignments can be moved from a centered expansion to a riverside expansion. During construction of Alternatives 5, 6, or 7, BMPs would be utilized to prevent sediment, silt, or debris from reaching the adjacent resacas.

Alternative 5

The USIBWC designed the proposed Alternative 5 levee alignment to avoid ecologically sensitive areas (such as resacas). To avoid impacts to wetland resources, the levee alignments can be moved away from the resacas. Therefore, under Alternative 5, no impacts to aquatic wildlife habitats in resacas are expected.

Alternative 6

The USIBWC designed the proposed Alternative 6 levee alignment to avoid ecologically sensitive areas (such as resacas). Spur levee 8.5 would cross the historic river channel, and therefore, would cross wetlands associated with the historic river channel. Under Alternative 6, approximately 1.0 acres of wetlands would be affected by construction activities.

Alternative 7

The USIBWC designed the proposed Alternative 7 levee alignment to avoid ecologically sensitive areas (such as resacas) to the extent possible. Construction of the railroad spur levee would cross the historic river channel, and in the process, the railroad spur levee would remove 1.7 acres of wetland/riparian vegetation. Therefore, under Alternative 7, approximately 1.7 acres of wetlands would be affected by construction activities.

Threatened, Endangered, and Special Status Species

Vegetation in the areas associated with the existing levee or adjacent agricultural fields provides limited habitat for special status species present in the area, except as foraging habitat for raptors (in particular, the zone-tailed hawk). It is not known if the grasslands or adjacent agricultural areas provide suitable habitat for reptile species.

Construction of spur levees under Alternatives 5, 6, or 7 would remove some woody vegetation. The special status species that utilize the woody vegetation in the area include the southwestern willow flycatcher and the western yellow-billed cuckoo. Effects on these species are described below.

Southwestern willow flycatcher. The federal listed endangered southwestern willow flycatcher once occurred in riparian zones of the Rio Grande. Extensive clearing of riparian trees and subsequent invasion by salt cedar has reduced both the extent and suitability of

riparian habitat for the southwestern willow flycatcher. Along the new spur levee alignments, there is limited woody vegetation present (Table 4-8), and the woody vegetation present does not have suitable density or architecture for Southwestern willow flycatcher. Therefore, no suitable habitat for the southwestern willow flycatcher would be removed or altered by construction activities. Therefore, no impacts on the southwestern willow flycatcher are expected for Alternatives 5, 6, or 7.

Western yellow-billed cuckoo. The federal listed candidate western yellow-billed cuckoo has limited habitat within the Presidio FCP, but the area is within the former known range of the western subspecies. The yellow-billed cuckoo typically nests and forages in riparian habitat with dense understory. In the lower reach, there is limited woody vegetation (Table 4-8) present, and the woody vegetation present does not have suitable understory for western yellow-billed cuckoo. Therefore, no suitable habitat would be removed or altered by construction activities. Therefore, no impacts to the western yellow-billed cuckoo are expected under Alternatives 5, 6, or 7.

Other special status terrestrial species that are potentially present in the area and that may be affected by construction under Alternatives 5, 6 or 7 include the federal listed brown pelican, and several State-listed species, as described below.

Brown Pelican. A juvenile brown pelican was observed in the project area shortly after the September 2008 flooding, but there is no suitable foraging habitat for pelicans, and no suitable breeding habitat protected from predators for pelicans.

The State-listed reptile species (Chihuahuan desert lyre snake, Chihuahuan mud turtle, reticulated gecko, Texas horned lizard, and Trans-Pecos black-headed snake) and bird species (American peregrine falcon, arctic peregrine falcon, common black-hawk, gray hawk, northern aplomado falcon, and zone-tailed hawk) that may occur in the Presidio FCP are expected to be mobile and move away from the area during construction activities. These species are also expected to re-colonize after construction is completed. Therefore, no impacts to the State listed species in the area are expected.

Under Alternative 5, 6, and 7, staging of construction materials and equipment would likely occur on the landside of the existing levee, which would reduce the potential for sediment transport to the Rio Grande. In addition, during levee expansion actions associated with the spur levee alternatives, BMPs would be utilized to prevent sediment, silt, or debris from reaching the Rio Grande. Prevention of sedimentation in the river would prevent any aquatic habitats from being altered, both in the immediate area and in downstream sections of the Rio Grande.

Special status aquatic species potentially present in the area that may be affected by construction activities in the lower reach include the federal listed Rio Grande silvery minnow and three fish species of concern, as described below.

Rio Grande silvery minnow. The federal listed endangered Rio Grande silvery minnow was re-introduced downstream of the Presidio FCP, as part of the USFWS-sponsored recovery efforts. If some sediment is transported to the Rio Grande during construction activities under Alternatives 5, 6, or 7, the re-introduced population of Rio Grande silvery minnows is substantially downstream (more than 30 miles), and any sediment is expected to settle prior to

reaching the area where the Rio Grande silvery minnow populations are present. Under Alternatives 5, 6, or 7, flood capacity of the Presidio FCP would be increased, which may alter downstream flows. These changes are expected to occur only during pulse flood events and not in normal flow conditions. Therefore, under Alternatives 5, 6, or 7, because these changes are relatively small and would attenuate farther from the Presidio FCP, no impacts to the recovery efforts for the Rio Grande silvery minnow are expected.

Chihuahua shiner, Conchos pupfish, Mexican stoneroller. The USFWS identified three fish species (Chihuahua shiner, Conchos pupfish, Mexican Stoneroller) as species of concern, and these species have potential habitat within the Rio Grande adjacent to the Presidio FCP. If sediment were transported to the Rio Grande, and if one or more of the special status species were present in the area, they may be affected by increased sediment. The use of BMPs during construction activities would reduce or eliminate sediment to the Rio Grande. Therefore, under Alternatives 5, 6, or 7, no impacts to the special status fish species are expected.

4.5.2 Cultural Resources

Archaeological Resources

Under Alternatives 5, 6, and 7, the effects of the proposed construction activities on archaeological resources have common elements as described below.

Proposed levee improvements in the upper reach of existing Presidio FCP alignment may adversely affect NRHP-eligible prehistoric or historic archaeological sites. Three archaeological sites and five archaeologically sensitive areas have been previously identified within the existing levee alignment ROW. An intensive archaeological survey and limited testing of previously recorded sites is currently underway. No additional archaeological sites have been identified along the existing levee alignments or along the proposed location along the spur levee under Alternative 5; however, one archaeological site occurs within the proposed alignment for Alternatives 6 and 7. In addition, there remains the potential for archaeologically sensitive areas, pending the results of radiocarbon dating analysis.

Construction of spur levees under Alternatives 5, 6, or 7 may adversely affect prehistoric or historic archaeological sites. One prehistoric archaeological site has been identified along the proposed levee alignments under Alternatives 6 and 7. Additional areas of archaeological sensitivity may still be identified.

The use of heavy equipment, including backhoes, bulldozers, excavators, scrapers, compactor rollers, and dump trucks, to aid in the addition and movement of soil for the levee footprint and height increases and construction 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.

Archaeological resources may also be adversely affected by burial under a new levee footprint. If present, archaeological resources along these alignments would be capped (buried) by the addition of fill to construct an earthen levee.

In some instances, capping may provide a beneficial impact to archaeological resources. Capping archaeological sites using soil and gravel, although not permanent, may be viewed as

one method to preserve archaeological resources in place and prevent their inadvertent exposure or destruction. If intentional burial is used, the THC has developed recommendations for appropriate techniques to avoid potential adverse effects to these resources (THC 1999). In accordance with Best Management Practices in Section 5, these procedures can be applied to the capping of archaeological resources that could occur because of levee construction. Commercial material, compatible in physical and chemical characteristics with the surrounding floodway would be required for construction. Activity on the levee would be restricted to avoid additional impacts (*e.g.,* soil compaction) that could result in disturbance to sites below.

In the lower reach, where the levee would be repaired to provide 25-year flood protection, slurry trenches or sheet piles may be required to stabilize the levee foundation and prevent deterioration of the levee. Slurry trenches or sheet piles would be installed parallel to the existing levee along the riverside toe of the levee. The excavation of deep (20-foot) trenches or excavation for burial of sheet piles may result in adverse effects to NRHP-eligible archaeological resources.

In the lower reach, where the levee would be repaired to provide 25-year flood protection, an overflow weir and outfall gate may be installed to allow controlled flooding of the adjacent agricultural fields during flood events, and then rapidly drain the waters from the agricultural areas. Construction of the water control features in the lower reach of the existing levee would require excavation below the modern ground surface. Excavation for these features may result in adverse effects to NRHP-eligible archaeological resources.

Architectural Resources

Under Alternatives 5, 6, and 7, effects of the proposed construction activities on architectural resources have common elements as described below.

Architectural resources that are eligible for the NRHP or are contributing to an NRHP eligible historic district may be adversely affected by proposed levee improvements in the upper and middle reaches. Construction associated with expansion of the levee footprint in the upper and middle reaches would occur near architectural resources (*e.g.*, gatewells, culverts, and ditches intersecting the levee). Although the Presidio FCP levee and levee structures are less than 50 years old and do not merit consideration under standard NRHP criteria, the project integrates elements of irrigation systems (*e.g.*, ditches and irrigation canals) that pre-date the project and may be eligible or contributing resources to a district eligible for listing in the NRHP.

Proposed construction of new spur levee alignments under Alternatives 5, 6 or 7 in the middle and lower reaches of the Presidio FCP may adversely affect architectural resources that are eligible for the NRHP or are contributing to an NRHP-eligible historic district. Under Alternatives 5, 6, or 7 construction of a new levee may occur near architectural resources associated with farming irrigation (*e.g.*, ditches, pumps, pipes, and wells). Many of these elements of irrigation systems are of historic age and may be eligible or contributing resources to a district eligible for listing in the NRHP.

The use of heavy equipment, including backhoes, bulldozers, excavators, scrapers, compactor rollers, and dump trucks, to aid in the addition and movement of soil for the levee construction, could result in ground disturbance and vibration effects to architectural resources. In addition, the new levee would intersect resources for which engineering control measures

(*e.g.*, gatewells, culverts, and screwgates) may need to be designed to facilitate their continued function or those resources may have to be removed or otherwise altered to accommodate levee construction.

Constructing a levee may alter the flow of water to or from architectural resources in the APE. Based on existing conditions in the project area, water flow and runoff toward architectural features is minimal. Water flow and runoff may be re-routed because of levee construction.

In the lower reach, where the levee would be repaired to provide 25-year flood protection, slurry trenches or sheet piles may be required to stabilize the levee foundation and prevent deterioration of the levee. Slurry trenches or sheet piles would be installed parallel to the existing levee along the riverside toe of the levee. Excavation of deep (20-foot) trenches or excavation for burial of sheet piles may result in adverse effects to NRHP-eligible architectural resources in the proposed path of the trenches or sheet piles.

In the lower reach, where the levee would be repaired to provide 25-year flood protection, an overflow weir and outfall gate may be installed to allow controlled flooding of the adjacent agricultural fields during flood events, and then rapidly drain the waters from the agricultural areas. Construction of the water control features in the lower reach of the existing levee water control features in the lower reaches of the levee that would intersect the reconstructed existing alignment and would require excavation below the modern ground surface. Excavation for these features may result in adverse effects to NRHP-eligible architectural resources in the proposed path of the overflow weir or outfall gate.

Native American Resources

Consultation with Native American Tribes is part of the NEPA process. If Native American resources are present in the project area, proposed levee improvements in the upper, middle, and lower reaches of existing Presidio FCP, and installation of a spur levee under Alternatives 5, 6, or 7 would result in adverse effects to Native American resources. Levee improvements or construction of a spur levee would result in limited access to segments of the river during levee construction activities and would result in temporary adverse effects to river and resource accessibility for Native Americans. Excavation for trenches, sheet piles or water control features would adversely affect any buried Native American resources.

4.5.3 Water Resources

Flood Control and Floodplain Management

Construction activities associated with construction of a spur levee under Alternatives 5, 6, or 7 would provide 100-year flood protection to the City of Presidio and the agricultural areas upstream of the spur levee. Improved flood control would reduce flood risks to personal safety and property in the City of Presidio. In the lower reach, the levee would be repaired to provide 25-year flood protection to adjacent agricultural areas. Farmlands adjacent to the existing levee in the areas downstream of the spur levee would be subject to flooding during severe storm events.

Surface Water Quality

Surface water quality may be affected by changes in water chemistry and by changes in suspended sediment transported to the Rio Grande. Under Alternatives 5, 6, and 7, the water quality parameters affecting water quality (*e.g.*, chloride, bacteria counts) would not be altered by construction activities. Improving the levee in the upper and middle reaches would increase the possibility that sediment would be transported to the Rio Grande, and increase the total dissolved solids in the river. Similarly, in the lower reach, where the levee was repaired to provide 25-year flood protection to the adjacent agricultural fields, there could be sediment transported to the river. Use of BMPs would reduce or prevent additional sediment from reaching the Rio Grande.

Construction of the spur levees under Alternatives 5, 6, or 7 would occur on the landside of the existing levee, and therefore additional sediment is not expected to be transported to the river during new levee construction.

In Segment 2307 (above the confluence of the Rio Grande and Rio Conchos), current water quality information indicates that chloride and total dissolved solids exceed water quality standards. However, construction activities and use of BMPs would not increase the total dissolved solids within the Rio Grande or its tributaries. Construction activities would not worsen or improve the existing water quality exceedances for chloride (Segment 2307) or bacteria (Segment 2306).

Wetlands within the floodplain are subject to the provisions of the CWA. Based on findings of the wetlands field surveys, wetlands associated with resacas and the historic river channel may be affected by levee expansion and construction of spur levees under Alternatives 5, 6, or 7, described separately below.

Alternative 5

Improvements to the existing levee in the upper and middle reaches of the Presidio FCP may affect wetlands associated with resacas subject to CWA provisions. Water quality in wetlands may be affected by increasing sediment transport to resacas during construction. During construction, BMPs would be used to prevent or reduce sediment transport to resacas, and therefore, no impacts water quality within the resacas is expected.

Alternative 6

Improvements to the existing levee in the upper and middle reaches of the Presidio FCP would affect wetlands as described in Alternative 5. Under Alternative 6, approximately 1.0 acre of wetlands associated with the historic river channel would be filled. Filling of 1.0 acre of wetlands under Alternative 6 would require USACE formal wetlands delineation and an individual permit.

Alternative 7

Improvements to the existing levee in the upper and middle reaches of the Presidio FCP would affect wetlands as described in Alternative 5. Under Alternative 7, approximately 1.7 acres of wetlands associated with the historic river channel would be filled. Filling of 1.7 acres of wetlands under Alternative 7 would require USACE formal wetlands delineation and an individual permit.

Groundwater Resources

Under Alternatives 5, 6 or 7, groundwater currently used for irrigation would continue to be pumped for irrigation. Improving the flood containment capacity of the levee is not expected to alter the groundwater resources in the area.

4.5.4 Land Use

Construction activities associated with Alternatives 5, 6, or 7 would encroach on agricultural or developed land immediately adjacent to the levee ROW. Table 4-9 summarizes the land uses within the land use corridor, and the amount of land affected by construction activities under those alternatives. The potential need to develop commencial materials borrow sites, discussed in Section 5.2, would require conversion of over 15 acres of agricultural land for Alternatives 5 and 6, and over 25 acres for Alternative 7.

Alternative 5

Under Alternative 5, construction activities associated with raising the levee in the upper and middle reaches and with construction of the spur levee 9.2 would remove approximately 49 acres of agricultural land, or three percent of the agriculture land within the land use corridor. Approximately 11 acres of previously developed land, or three percent of the previously developed land in the land use corridor would likely be affected. Less than 1 acre of miscellaneous land, or less than one percent of the miscellaneous land in the land use corridor, would likely be affected. Therefore, under Alternative 5, no impacts greater than 10 percent to land use are expected.

Table 4-9 Potentially Affected Land Use Corridors under Alternatives 5, 6, and 7

Land Use Type [(a)]	Total Land Use Corridor (acres) [(b)]	Affected Acreage (acres) [(c)]	Percentage of Affected Land Use Corridor
ALTERNATIVE 5			
Agriculture	1,934	49	3%
Previously Developed	329	11	3%
Miscellaneous	113	< 1	< 1%
Total	**2,376**	**61**	**3%**
ALTERNATIVE 6			
Agriculture	1,942	52	3%
Previously Developed	338	10	3%
Miscellaneous	165	<1	<1%
Total	**2,445**	**62**	2.5%
ALTERNATIVE 7			
Agriculture	2,308	72	3%
Previously Developed	444	17	4%
Miscellaneous	174	<1	<1%
Total	**2,926**	**89**	3%

(a) Land use types are identified by the NLCD (NLCD 2001).
(b) The land use corridor is the total area within a 0.25 mile from the proposed and existing levee ROW associated with Alternative 5.
(c) The affected acreage of the land use corridor represents the area affected by the levee footprint expansion in the upper and middle reaches, and the new levee spur construction.

Alternative 6

Under Alternative 6, construction activities associated with raising the upper and middle reaches of the levee, and construction of the spur levee 8.5 would remove approximately 52 acres of agricultural land, or three percent of the agriculture land within the land use corridor. Approximately 10 acres of previously developed land, or three percent of the previously developed land in the land use corridor would likely be affected. None of the miscellaneous land in the land use corridor would likely be affected. Therefore, under Alternative 6, no impacts to land use greater than 10 percent are expected.

Alternative 7

Under Alternative 7, construction activities associated with raising the upper and middle reaches of the levee, and construction of the railroad spur levee would remove approximately 72 acres of agricultural land, or three percent of the agriculture land within the land use corridor. Approximately 17 acres of previously developed land, or four percent of the previously developed land in the land use corridor would likely be affected. None of the miscellaneous land in the land use corridor would likely be affected. Therefore, under Alternative 7, no impacts to land use greater than 10 percent are expected.

4.5.5 Socioeconomic Resources and Transportation

Regional Economy

Under Alternatives 5, 6, or 7, the analyses of impacts on the regional economy were based on estimated changes in baseline levels of income and business volume, which could potentially be affected by the proposed levee improvements. Table 4-10 presents a comparison of potential economic impacts under Alternatives 5, 6 and 7. The anticipated increase in sales and income was calculated based on a unit ratio of sales and income increases as a function of local expenditures from levee construction of the USIBWC Rio Grande Canalization Project (Parsons 2003). Annual sales volume were estimated from the gross sales for Presidio County in 2008 (Texas Comptroller 2008), income values were based on a 2007 per capita income of $9,950, and an estimated 2008 Presidio County population of 7,467.

Because levee construction would require most of the labor and materials to be brought from outside Presidio County, only a fraction of the construction cost would actually represent local expenditures in the Presidio area. This fraction was estimated as 10 percent of the construction value for the potential impacts evaluation. A workforce from outside Presidio County would be utilized for construction activities, and therefore, local employment would not significantly increase from baseline levels. Table 4-10 illustrates the magnitude of the economic influx relative to reference values for Presidio County.

Under Alternatives 5, 6, or 7, if the levee can be certified by the USIBWC and accredited by FEMA to provide 100-year flood protection, flood insurance rates for local homeowners and landowners would not be increased.

Table 4-10 Potential Economic Impacts on Presidio County from Implementation of Alternatives 5, 6 and 7

	Sales / Income Increase Ratio [a]	Estimated Value (millions)		
		Alternative 5	Alternative 6	Alternative 7
Project Expenditures				
Construction	n/a	$89.5	$87.0	$96.9
Local expenditures [b]	1.00	$9.0	$8.7	$9.7
Sales Volume Increase				
Direct plus indirect increases	3.38	*$30.3*	*$29.4*	*$32.7*
Presidio County annual value	-	*$63.2*	*$63.2*	$63.2
Increase relative to county sales	-	*48.0*	*46.5%*	*51.8%*
Increase in Income				
Direct plus indirect increases	1.01	*$9.0*	*$8.7*	*$9.8*
Presidio County annual value	-	*$74.3*	*$74.3*	*$74.3*
Increase relative to county income	-	*12.1%*	*11.8%*	*13.2%*

(a) Ratio between sales increase and local expenditures, and income increase and local expenditures from levee construction of the USIBWC Rio Grande Canalization Project (Parsons 2003)
(b) Local expenditures were estimated at 10% of construction costs

Alternative 5

Construction activities associated with Alternative 5 include raising the upper and middle reaches of the existing levee, and construction of the spur levee at mile 9.2 at an estimated cost of $89.5 million. These construction costs assume that 9.2 miles of levee would be raised at a cost of approximately $7 million per mile, and construction of the 1.3-mile spur levee 9.2 would be $10 million per mile. In the lower reach, the costs for repair and rehabilitation of 6.1 miles of the existing levee to 25-year flood protection would be approximately $2 million per mile (Table 4-10). Nearly $9 million would be associated with local expenditures, and have a potential for increased sales volume and income (Table 4-10). On the basis on a local expenditures, the potential increase in sales volume would significant, equivalent to 48 percent of the annual value for Presidio County. The potential increase in local income would also be significant, an estimated 12.1 percent of the annual county value. These increases would be associated with local services and supplies, but limited to the construction period.

Alternative 6

Construction activities associated with Alternative 6 include raising the upper and middle reaches of the existing levee, and construction of the spur levee at mile 8.5 at an estimated cost of $87 million. These construction costs are based on approximately 8.5 miles of levee raised in the upper and middle reaches, 1.4 miles of the new spur levee 8.5, and repair and rehabilitation of 6.8 miles of existing levee in the lower reach (Table 4-10). Nearly $9 million would be associated with local expenditures, and have a potential for increased sales volume and income. On the basis of local expenditures, the potential increase in sales volume would be significant, equivalent to 46.5 percent of the annual value for Presidio County. The increase in local income would also be significant, estimated 11.8 percent of the annual county value. These increases would be associated with local services and supplies, but limited to the construction period.

Alternative 7

Construction activities associated with Alternative 7 include raising the upper and middle reaches of the existing levee, and construction of the railroad spur levee. Construction costs are based on the conservative assumptions described in Alternative 5, for 7.5 miles of levee raised in the upper and middle reaches; approximately 2.9 miles of the new railroad spur levee, and repair and rehabilitation of approximately 7.8 miles of existing levee in the lower reach (Table 4-10). The total construction costs under Alternative 7 would be $96.9 million. Nearly $10 million would be associated with local expenditures, and have a potential for increased sales volume and income. On the basis on a local expenditure value of nearly $10 million, the potential for increase in sales volume would be significant, equivalent to 51.8 percent of the annual value for Presidio County. The potential increase in local income would also be significant, an estimated 13.2 percent of the annual county value. These increases would be associated with local services and supplies, but limited to the construction period.

Environmental Justice

Data indicate that Presidio County has a disproportionately high minority (approximately 85%) and low-income populations (approximately 24%). However, construction activities associated with Alternatives 5, 6, or 7 would not occur in residential or workplace areas associated with these populations. A small but positive economic input to the local community would occur because of the levee improvements. Therefore, under Alternatives 5, 6, or 7, no impacts to disproportionately high minority and low-income populations are expected.

Transportation

Under Alternatives 5, 6, or 7, the upper and middle reaches of the Presidio FCP would be raised in place to provide 100-year flood protection. In the middle or lower reach, a spur levee would be constructed. In the lower reach, the existing levee would be repaired and rehabilitated to provide 25-year flood protection. Construction activities would include the transport of heavy equipment to the levee, and the transport of fill materials from borrow pits outside the City of Presidio to the levee. Construction equipment and fill materials would be transported to the levee using existing paved and unpaved roads that intersect the levee. During construction, traffic flow and volumes on local paved and unpaved roads would increase, but these patterns are expected to be temporary only during levee construction. Therefore, under Alternatives 5, 6, or 7, no impacts to local traffic patterns or traffic patterns across the international bridge are expected.

4.5.6 Environmental Health

Air Quality

Improvements to the levee system under Alternatives 5, 6, or 7 would affect air quality through excavation and levee raising activities, and construction of new spur levees. Table 4-11 presents a comparison of potential air emissions associated with levee system improvements under Alternatives 5, 6 and 7. 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).

Table 4-11 Air Emissions Associated with Implementation of Alternatives 5, 6 and 7

Parameter	Emissions (tons per year)					
	Sulfur Oxides	Nitrogen Dioxides	Carbon Monoxide	Volatile Organic Compounds	Particulate Matter (PM_{10})	Particulate Matter ($PM_{2.5}$)
Reference Emission Values						
Unit emissions per mile of levee height increase [(a)]	0.55	5.05	2.11	0.4	5.61	0.95
Unit emissions per mile of new levee construction [(a)]	0.91	8.44	3.52	0.67	11.09	1.87
Presidio County annual emissions inventory[(b)]	45	749	2,086	379	2,206	284
ALTERNATIVE 5						
Levee height increase and rehabilitation (9.2 miles)	5.06	46.45	19.45	3.68	51.63	8.74
New spur levee construction (1.3 miles)	1.18	10.97	4.58	0.87	14.42	2.43
Emissions as a percent of Presidio County inventory	13.8%	7.67%	1.15%	1.20%	2.99%	3.93%
ALTERNATIVE 6						
Levee height increase and rehabilitation (8.5 miles)	4.68	42.93	17.9	3.40	47.7	8.08
New spur levee construction (1.4 miles)	1.27	11.8	4.93	0.94	15.53	2.62
Emissions as a percent of Presidio County inventory	13.2%	7.31%	1.10%	1.15%	2.87%	3.77%
ALTERNATIVE 7						
Levee height increase and rehabilitation (7.4 miles)	4.07	37.37	15.61	2.96	41.51	7.03
New spur levee construction (2.9 miles)	2.64	24.48	10.21	1.94	32.2	5.42
Emissions as a percent of Presidio County inventory	14.9%	8.25%	1.24%	1.29%	3.34%	4.38%

(a) Unit data for levee construction from the USIBWC Rio Grande Canalization Project EIS (Parsons 2003: Table 4.11-2).
(b) USEPA 2009b, the most recent available data as of September 2009.

Alternative 5

Improvements to the levee system under Alternative 5 would affect air quality through excavation, fill activities, and new levee construction. Potential impacts would be a slight increase in criteria air pollutants within Presidio County. Table 4-11 summarizes the additional estimated criteria pollutants associated with Alternative 5, as well as the percent increase above the existing Presidio County emissions inventory. Estimates were calculated for 15.3 miles of levee height increase and rehabilitation, and 1.3 miles of new levee construction. Based on the estimated emissions for Alternative 5, the criteria pollutant sulfur oxide is above the threshold of 10 percent of the county emissions inventory, at 13.83 percent. Therefore, there are potential impacts associated with Alternative 5 from the criteria pollutant sulfur oxide.

Alternative 6

Improvements to the levee system under Alternative 6 would affect air quality through excavation, fill activities, and new levee construction. Potential impacts would be a slight increase in criteria air pollutants within Presidio County Table 4-11 summarizes the additional estimated criteria pollutants associated with the Alternative 6, as well as the percent increase above the existing Presidio County emissions inventory. Estimates were calculated for 8.5 miles of levee height increase and rehabilitation, and 1.4 miles of new levee construction. Based on the estimated emissions for Alternative 6, sulfur oxides are above the threshold of 10 percent of the county emissions inventory, at 13.22 percent. Therefore, there are potential impacts associated with Alternative 6 from the criteria pollutant sulfur oxide.

Alternative 7

Improvements to the levee system under Alternative 7 would affect air quality through excavation, fill activities, and new levee construction. Potential impacts would be a slight increase in criteria air pollutants within Presidio County. Table 4-11 summarizes the additional estimated criteria pollutants associated with the Alternative 7, as well as the percent increase above the existing Presidio County emissions inventory. Estimates were calculated for 7.4 miles of levee height increase and rehabilitation, and 2.9 miles of new levee construction. Based on the estimated emissions for Alternative 7, sulfur oxides are above the threshold of 10 percent of the county emissions inventory, at 14.91 percent. Therefore, there are potential impacts associated with Alternative 7 from the criteria pollutant sulfur oxide

Noise

Improvements to the levee system under Alternatives 5, 6, or 7 would increase ambient noise levels using trucks to bring additional fill material to the site and fill activities associated with the levee improvement project. 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. Under Alternative 3, typical noise levels generated by construction activities range from 75 to 89 dBA at 50 feet from the source (CERL 1978). 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. Although unlikely, 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 cause disruption of speech during the noise event (U.S. Department of Transportation 1992). Construction workers would be required to utilize appropriate hearing protection during construction activities.

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 during Alternatives 5, 6, or 7 would occur between 7:30 a.m. and 5:00 p.m., five days per week for the duration of the project. However, potential non-construction receptors would not be exposed during the entire noise-producing period. Under these conditions, potential receptors would not be exposed to long-term and regular noise above 75 dBA. Therefore, under Alternatives 5, 6, or 7 potential nearby non-construction receptors would not experience loss of hearing, only temporary speech disruption.

Public Health and Environmental Hazards

Under Alternatives 5, 6, or 7, hazardous and/or toxic products (*e.g.*, fuel, oil, grease, and hydraulic fluid) would be used from operating construction equipment. Implementing established industry practices for controlling releases of these substances would reduce the possibility of accidental releases of these products. Preventive maintenance and daily inspections of the equipment would ensure that any releases of these hazardous materials are minimized. All visible dirt, grime, grease, oil, loose paint, *etc*., would be removed from the equipment prior to use at the construction sites. The activities proposed under Alternatives 5, 6 or 7 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 immediate Presidio FCP area (1/8 mile from the project area). Improvements to the levee system under Alternatives 5, 6, or 7 would not be affected by waste storage and disposal sites, nor would they affect ongoing management operations of hazardous materials and waste sites.

4.6 INDIRECT AND CUMULATIVE IMPACTS

Indirect and cumulative impacts would be considered significant if the alternative would cause considerable incremental effects when evaluated in combination with relevant current and probable activities in the project area.

4.6.1 USBP Actions

Cumulative impacts considered for the Presidio FCP include greater restrictions to public use/access of the floodway due to increased USBP operations and designation of restricted use zones. The USBP has proposed tactical infrastructure in two fence sections upstream and downstream of the Presidio Port of Entry. The fence sections could encroach on privately owned land parcels. The proposed tactical infrastructure would affect an approximate 60-foot-wide corridor for fences and patrol roads. Vegetation within the corridor would be cleared and grading would occur where needed. The area that would be permanently impacted by the construction of tactical infrastructure would total approximately 78.1 acres. Unavoidable impacts on jurisdictional waters of the United States, including wetlands, would be mitigated. Wherever possible, existing roads and previously disturbed areas would be used for construction access and staging areas.

4.6.2 Removal of Salt Cedar Plug in Rio Grande Downstream of Project Area

If the salt cedar plug downstream of the project area were removed through a joint agreement between the USIBWC and the MxIBWC, the impacts would affect both Presidio and the Town of Redford. Redford is approximately 15 to 20 miles southwest of Presidio. Removal of the salt cedar plug would improve flood flows through the Rio Grande, and prevent water backing into Presidio during flood stages. However, improved water flows through the Presidio area during flood events would transport more flood stage waters to the Town of Redford, and may erode or damage the levees protecting the Town of Redford.

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SECTION 5
BEST MANAGEMENT PRACTICES AND MITIGATION

Section 5 describes best management practices to be implemented for each of the Action Alternatives for improved flood control in the Presidio FCP. 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.

5.1 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 in areas with a potential to contain cultural resources areas.

Best management practices to avoid construction impacts on resources at or near levee improvement areas, include:

- Soil for levee construction would be obtained, to the extent possible, from a borrow site owned by the USIBWC near the City of Presidio. Additional construction material would be obtained from existing commercial borrow sites or new developed sites. Requirements for borrow site development are discussed in Subsection 5.2.

- Equipment staging areas would be placed at the USIBWC borrow site. If needed, secondary or temporary staging areas would be placed at locations with already disturbed terrain.

- 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 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 project construction, methods such as wetting the soil would be employed to prevent erosion from unvegetated slopes and/or corridors.

- During construction, in areas where construction would occur near water bodies (*e.g.*, wetlands, Rio Grande), silt curtains or other erosion control devices, such as temporary erosion blankets, would be used to prevent sediment from reaching water bodies.

- During 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.

5.2 UTILIZATION OF COMMERCIAL BORROW SITES

The USIBWC owns a borrow site outside Presidio that is used for levee repairs as needed. The USIBWC borrow site is approximately 13 acres in size. For construction activities associated with Alternative 2, the USIBWC borrow site would have adequate material to raise the levee in limited sections to meet the 25-year design flood criteria. In addition, there is enough material available in the USIBWC borrow site for levee repairs, including repairs of levee breaches.

Under Alternatives 3 through 7, the quantity of borrow materials would be far greater. Based on levee material volume estimates discussed in Section 2.5, and an assumed depth of 20 feet, the borrow site area needed to raise the entire levee system would be more than 10 acres for Alternative 3, and over 40 acres for Alternative 4. Levee material requirements to raise the upstream section of the levee and construct a spur levee would require development of over 15 acres for Alternatives 5 and 6, and over 25 acres for Alternative 7 based on material volumes discussed in Section 2.6, and the assumption of a borrow site depth of 20 feet.

Near the USIBWC borrow site, the City of Presidio owns a size approximately 10 acres in size that might be used for borrow materials to raise the levees. The City of Presidio borrow site is undisturbed and has not been used as a borrow site in the past, so would need to be evaluated as described below. The use of the City of Presidio borrow site would be arranged by a joint agreement between the city and USIBWC. However, the City of Presidio borrow site may not have enough material to raise the entire length of the Presidio FCP levees to provide 100-year flood protection, and the City of Presidio borrow site is not likely to have enough material for construction of a spur levee.

Therefore, it is possible that for some of the proposed construction activities (*e.g.*, construction of a new spur levee), there would not be enough material available in the USIBWC borrow site or the City of Presidio borrow site. In that case, construction contractors would need to locate and evaluate additional potential borrow sites near the construction area. New borrow sites would be developed in full compliance with NEPA requirements. New borrow sites would likely be developed in agricultural lands.

Borrow sites used for potential construction activities described in this EIS are likely to be considered Categorical Exclusions. The exclusions are categories of actions determined not to have a significant effect on the human environment, either individually or cumulatively. Under NEPA regulations, federal agencies are directed to adopt procedures that include identifying actions that are categorically excluded (*i.e.*, normally do not require preparation of an Environmental Assessment or Environmental Impact Statement).

During construction planning, a checklist would be sent to the relevant agencies for concurrence with the Categorical Exclusion determination. The following decision tree checklist, based on applicable regulations discussed in Section 1, would be utilized:

- *Endangered Species Act*: Are T&E species or special status species present at the site? Is habitat for T&E or special status species present at the site?

- *Migratory Bird Treaty Act*: Is habitat present at the site that could be utilized by bird species protected under the Act? Will construction activities occur outside the breeding season of bird species protected under the Act?

- *National Historic Preservation Act*: Are archaeological, architectural, or Native American resources present that would be protected by Section 106 and related cultural resources laws and regulations? Has there been a previous investigation conducted to determine the presence/ or absence of these resources? Has consultation with the SHPO been initiated, to determine if additional cultural resources investigations are required?

- *Clean Water Act*: Are jurisdictional wetlands present at the site? Will BMPs be used to prevent impacts to waters protected under the Act?

- *Prime Farmland*: Is prime farmland, as defined by NRCS, present at the site?

- *Environmental Justice*: Will economically disadvantaged or minority populations be affected by actions at the site?

- *Clean Air Act*: Will the actions at the site contribute to degradation of air quality in the region?

- *Hazardous Waste*: Will the actions occur on known hazardous waste sites? Will the actions increase hazardous waste at the site?

Further, additional resources to be considered in determination of potential borrow sites would include the following:

- *Would land uses at the site be adversely affected?*

- *Are land ownership, deeds, and boundaries documented?*

- *Are there previous environmental liens against the proposed site?*

- *Will groundwater resources be affected by activities taking place at the proposed site?*

5.3 NATURAL RESOURCES

For protection of vegetation and wildlife habitat along the Action Alternatives for the Presidio FCP improvement area, the following BMPs 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 as soon as possible. Rapid re-establishment of vegetation will allow native species to become established and will provide additional erosion control. The USIBWC developed lists of native plants in coordination with the USFWS for different regions of the Rio Grande. In Hudspeth County, the nearest county with the same general vegetation communities, the USFWS recommends the following native grass species for re-vegetation: sideoats grama, Arizona cottontop, Plains bristlegrass, sand dropseed, black grama, blue grama, green sprangletop, alkali sacaton, and cane bluestem. This

list may be revised slightly for Presidio County, but all these species have historically been present in Presidio County.

Bird species in the area protected under the Migratory Bird Treaty Act may nest in areas containing trees or other suitable habitat. Activities would be scheduled to occur outside the March through July migratory bird nesting season, when possible, or will not occur in vegetation utilized by Special Status species (including T&E species). If construction activities would occur during the nesting season of birds protected under the MBTA, then the areas proposed for disturbance should be surveyed for nesting birds prior to construction to avoid inadvertent destruction of nests and eggs.

Where possible, cattle grazing should be limited within the floodway and on the levee to prevent compaction, tearing of soil, and increased erosion. In particular, cattle and other livestock should be removed from the levee during re-vegetation efforts to allow plant establishment.

Prior to and during construction activities, the contractor performing the levee work will provide an environmental monitor to survey for birds protected under the MBTA to prevent destruction of nests or eggs during construction activities. In addition, the contractor would use BMPs, including a storm water pollution prevention plan.

5.4 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.

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 and historic archaeological resources that may contain sufficient information to be NRHP eligible as well as areas of archaeological sensitivity occur in the existing Presidio FCP ROW, intensive survey and limited testing of those sites and areas is being conducted to determine their extent and eligibility for the NRHP. An intensive (Phase I) archaeological survey of the four proposed alternative alignments is being conducted to identify archaeological sites.

A Work Plan for intensive survey, limited testing, and geoarchaeological trenching was submitted to and approved by the Texas SHPO (THC) for archaeological investigation of Alternatives 3, 4, and-5. An addendum to the Work Plan for intensive survey of Alternatives 6 and 7 will be submitted, but follows identical methods established for Alternatives 3, 4, and 5. The Phase I survey will include a pedestrian survey, shovel testing for shallow buried deposits, artifact analysis, and report preparation to identify archaeological sites and determine their extent and integrity. If additional intact archaeological sites are identified during Phase I investigations, Phase II cultural resources studies should be designed in consultation with the

Texas 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 should be designed in consultation with the Texas SHPO and implemented prior to construction.

Additional treatment/management plans have been recommended for two previously identified areas of potential archaeological sensitivity (Parsons *et al.* 2004: 8-1 to 8-2). Excavation of areas for levee reconstruction near these sensitive areas, designated Parsons F-4a and F-9, will require a plan or agreement developed in coordination with the Texas SHPO prior to any ground-disturbing activities.

Application of appropriate techniques for intentional site burial will minimize potential adverse effects to archaeological resources from their capping as a result of expanding the levee footprint or the deposition of material for a new levee alignment in the floodway. Material used to expand the levee should be consistent in physical and chemical make-up with existing soil comprising the levee and/or floodway, as appropriate, and should not exceed a depth of 6.6 feet above existing conditions to avoid potential adverse effects to archaeological resources. No increased traffic is anticipated after levee improvements along the existing alignment so any change in use that could result in additional impacts (*e.g.*, soil compaction) is not anticipated; however, compaction associated with the use of a new levee alignment may result in potential adverse effects to sites beneath. Capping of sites along a new levee alignment would need to be designed in consultation with the THC and may require additional mitigation measures.

Archaeological resources may be exposed by removal of the existing levee alignment in the lower reaches under Alternative 4. Once results of the archaeological survey identify resources or the potential for resources in this reach, additional survey or monitoring may be necessary to identify resources that had been buried under the existing levee.

Architectural Resources

Project engineering plans would take into account the locations of architectural resources eligible for or contributing to districts eligible for listing in the NRHP that occur in the existing or proposed alignments. These resources would be avoided through project redesign (*e.g.*, narrowing the levee expansion in those areas of the existing alignment, or incorporating alternative levee design or structural improvements) to minimize adverse effects.

Architectural studies to determine the NRHP eligibility of the unevaluated architectural resources are being conducted in consultation with the Texas SHPO. 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 preserves 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 appropriate Tribe and the Texas SHPO. Tribal consultation was initiated at the beginning of the project to identify resources or areas of concern to Native Americans. Additional consultation with Native American Tribes will occur once the draft cultural resources report is completed to notify them of the study results and if resources of potential concern to them have been identified and may require mitigation. Established USIBWC consultation procedures would be followed during this consultation process. Based on previous coordination with Native Americans for projects in other flood control project areas, examples of appropriate mitigation measures for adverse effects to Native American resources may include:

- Scheduling levee improvement activities in coordination with Native American groups to ensure their access to the river and sensitive plant resources during levee (re)construction;
- Identifying sensitive Native American plant resources to ensure their availability/accessibility along portions of the river that would not be affected by levee construction (or that would recover if construction were conducted in stages);
- Ensuring that sensitive Native American plant resources would recover/re-emerge in natural habitats in de-vegetated areas; or
- Preparing/developing habitat for sensitive Native American plant resources to ensure their continued availability during and after levee (re)construction.

SECTION 6
PUBLIC INVOLVEMENT, CONSULTATION, AND COORDINATION

This section describes the public involvement program that included public scooping meetings, and coordination with various agencies throughout the NEPA process. The environmental review was conducted in accordance with the requirements of Section 102(2)(c) of the National Environmental Policy Act of 1969, as amended, Council on Environmental Quality Regulations (40 CFR Parts 1500-1508), other appropriate regulations, and the USIBWC procedures for compliance with these regulations. 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).

Copies of the EIS for the Presidio FCP will be transmitted to federal and state agencies and other interested parties for their review and comment and will be filed with the Environmental Protection Agency in accordance with 40 CFR Parts 1500-1508 and USIBWC procedures.

6.1 PUBLIC SCOPING

6.1.1 Scoping Meeting

A public scoping meeting for the Presidio FCP was held at the Presidio Activity Center on March 10, 2009. The scoping period was from March 10, 2009 through April 10, 2009. Findings and conclusions of the scoping meeting, and comments received during the scoping period were incorporated into the June 2009 document *Scoping Meeting Summary, Environmental Impact Statement, Flood Control Improvements and partial Levee Relocation to the USIBWC Presidio Flood Control Project* (USIBWC 2009b). This document, provided in Appendix D, is an administrative record of public comments received during the March 10, 2009 through April 10, 2009 scoping period.

Full public participation by interested federal, state, and local agencies and organizations as well as the general public was encouraged during the scoping process. Notification of the public meetings was made through letters to agencies, organizations, and individuals; newspaper announcements in English and Spanish; and publication of the Notice of Intent in the Federal Register. Each mailing contained a response form on which comments could be written and submitted. An address to mail comment letters was provided in all communication to potential stakeholders. Discussion was encouraged during the scoping meetings and verbal comments were noted. Comment forms were distributed during the meeting, and turned in during the meeting to mailed the USIBWC after the meeting (USIBWC 2009b).

The Notice of Intent to prepare an EIS was published in the Federal Register by the USIBWC on February 26, 2009. A copy of the Notice of Intent is included in the Scoping Meeting Summary report (Appendix A, Item 1 of the USIBWC 2009b).

6.1.2 Notifications to Agencies, Elected Officials, Organizations, and Individuals

The USIBWC mailed a notification letter for the public scoping meetings to 99 elected officials, federal/state/local agencies, organizations, and individuals. The letter, mailed March 3, 2009, contained a description of the USIBWC flood control projects, example lists of potential alternatives, and example lists of potential criteria to be used for evaluating alternatives. Dates and times of scoping meetings, and instructions for submitting written comments were included. A copy of the letter and the mailing list for notification are included in Appendix A – Item 3 of the Scoping Meeting Summary report (USIBWC 2009b).

A Public Notice announcing the purpose, dates and locations of the scoping meetings was published in the legal section of the *Big Bend Sentinel* and *The International* on March 5, 2009. Copies of the publisher's affidavits are provided in Appendix A - Item 2 of the Scoping Meeting Summary report (USIBWC 2009b).

6.2 PUBLIC INPUT FOR ALTERNATIVES DEVELOPMENT

After the initial scoping meeting and presentation of alternatives developed by the USIBWC, representatives of the local landowners, representatives of Environmental Defense Fund, and representatives of the Trans-Pecos water trust met with the commissioner of the USIBWC and personnel from the USIBWC engineering, and environmental divisions to discuss the impacts of the proposed alternatives on their lands. One meeting was held in Presidio on August 17, 2009, and one meeting was held in El Paso at USIBWC headquarters on August 25, 2009.

These meetings were summarized and based on the meetings, two additional alternatives for the EIS were presented by the landowners and accepted by the USIBWC. The alternatives proposed by the landowners are summarized in an addenda to the Alternatives Report (USIBWC 2009e), and will be evaluated in the EIS for the Presidio FCP.

6.3 EIS FOR THE PRESIDIO FCP PREPARATION AND REVIEW

Technical personnel responsible for preparation and review of the EIS for the Presidio FCP are listed in Table 6.1.

Table 6-1 EIS Preparation Technical Personnel

Name	Organization	Role / or Resource Area	Discipline / Expertise	Experience
Daniel Borunda	USIBWC	Project Lead; EIS oversight and coordination, impacts evaluation	M.S. Fisheries and Wildlife Science	11 years Project Manager NEPA Compliance
Lisa Santana	USIBWC	Biological resources, Document Review	Ph.D. Biology	7 years Project Manager, NEPA Compliance
Carlos Victoria-Rueda.	Parsons	Project management, scoping, impacts evaluation	Ph.D., Environmental Engineering	22 years NEPA and related environmental studies experience
James Hinson	Parsons	Biological resources, impacts evaluation; biology technical oversight	M.S. Wildlife Science	21 years of vegetation and wildlife analyses experience
Jill Noel	Parsons	Biological resources, vegetation analyses; NEPA document preparation	M.S. Plant Biology	8 years of vegetation and community field studies experience
Taylor Houston	Parsons	Wetlands, aquatic ecosystems	M.S, Geography-Environmental Resources	7 years wetlands and land use evaluation
James Patek, P.E.	Parsons	Hydraulic Model technical oversight	M.S. Civil Engineering	33 years environmental engineering and studies, and water hydrology
Monica Suarez, P.E.	Parsons	Hydraulic Modeling	M.S. Environmental Engineering	9 years water quality assessments, and water quality models
Sherrie Keenan	Parsons	Technical editor	B.A., Journalism	34 years technical editor
Justin Kirk	Parsons	Environmental health issues, Socioeconomics, Land Use	B.S., Environmental science	8 years environmental health experience
Paul Fuschille	Parsons	Bird Surveys, Field Biologist	B.S. Wildlife and Fisheries Science	16 years avian field experience
Susan Bupp	Parsons	Cultural Resources; cultural resources technical oversight	M.A., Anthropology	33 years experience in cultural resources management and NEPA
Rachael Mangum	Parsons	Cultural Resources – Archaeology and Historic Structures	M.A. Anthropology	9 years experience in cultural resources management and NEPA
Seth Wilcher	Parsons	Cultural Resources – Historic Structures	B.S. History	5 years experience in Section 106 compliance
Erin Atkinson	Parsons	Cultural Resources – Historic Structures	M.A., Geography	3 years experience in cultural resources management

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SECTION 7
GLOSSARY AND REFERENCES

7.1 GLOSSARY

Area of Potential Effect, area around the levee system, as defined in coordination with THC.

Construction Corridor, the area of the levee identified as having deficiencies, where fill would be added to the top and sidewalls of the levee to provide adequate flood protection, or the area where new alternate levees may be constructed using fill from commercial sources. Staging of equipment or materials is assumed to be outside the construction corridor. The construction corridor is assumed to be up to a 172-foot buffer from the centerline of the existing levee, or from the centerline of proposed alternate levees. Also referred to as an expansion corridor, the area beyond the existing levee footprint.

Existing levee footprint, this is the area currently occupied by the levee, or in the case where levee breaches are present, the area of the levee present before the September 2008 flood event.

Land use corridor, the land on both sides of the levee, or on both sides of proposed alternate levees, defined by the area that extends 0.25 of a mile beyond each side of the ROW, or proposed ROW (for new levee construction), limited to the land within the U.S.

Levee breach, an area where water from the landside, riverside, or both, completely removed portions of the existing levee.

Levee expansion area, the area adjacent to the toe of the existing levee that will be covered when fill is added to the top of the existing levee. The levee expansion is based on models using recent Lidar data that indicate where the existing levee height is insufficient to contain a 100-year flood event.

Levee underseepage, an area where water was piped under the levee through existing animal burrows or levee foundation weak spots, and then the water bubbled to the landside of the toe of the levee causing a sand boil.

Riverside/Landside; riverside refers to the side of the levee closest to the Rio Grande, and landside refers to the side of the levee away from the Rio Grande.

Vegetation Survey Corridor, the land on both sides of the levee, or on both sides of proposed alternate levees, included in visual surveys and verified with aerial imagery. The vegetation survey corridor is approximately 150 feet to each side of the levee (300-foot corridor, centered on the levee).

7.2 REFERENCES

Altaha, Mark T. 2009. Memorandum from Mark T. Altaha, Historic Preservation Officer, White Mountain Apache Tribe Heritage Program/Tribal Historic Preservation Office to Daniel Borunda, USIBWC Environmental Protection Specialist, regarding Proposed Project, EIS for the Levee Realignment of the Presidio Flood Control Project, TX (March 10, 2009).

Banks Information Systems, Inc. 2009. Environmental FirstSearch Report for USIBWC Presidio, TX, October 13, 2009.

Brinson, M.M., B.L. Swift, R.C. Plantico, and J.S. Barclay. 1981. *Riparian Ecosystems: Their Ecology and Status.* FWS/OBS-81/17, U.S. Fish and Wildlife Service, Washington, DC. 151 pp.

CDM 2005. *Biological Resources Survey: Rio Grande and Tijuana River Flood Control Projects, New Mexico, Texas and California*. United States Section International Boundary and Water Commission

CERL. 1978. *Construction Site Noise Control Cost-Benefit Estimating Procedures.* Construction Engineering Research Laboratory, Engineer Research and Development Center of the U.S. Army Corps of Engineers. Interim Report N-36, January 1978.

Diamond. 1993. Classification of the plant communities of Texas (series level). Unpublished document, Diamond, D.D. Texas Natural Heritage Program, Austin. 25 pp.

Edwards, R.J., G.P. Garrett, and E. Marsh-Matthews. 2002. *Conservation and status of the fish communities inhabiting the Rio Conchos basin and middle Rio Grande, Mexico and U.S.A.* Reviews in Fish Biology and Fisheries 12: 110-132.

ERDC 2008, Letter Report: Geotechnical Inspection of US IBWC Levees at Presidio, TX, 29 – 30 September 2008. Prepared for: US Army Engineer Research & Development Center. Prepared by: Joseph Dunbar, Geotechnical and Structures Laboratory, ERDC, and George Sills, George Sills Geotechnical Engineering Consultant, 6 October 2008

FWT-WPG. 2006:. *Far West Texas Water Plan: January 2006*. Prepared by: Far West Texas Water Planning Group; Prepared for the Texas Water Development Board, El Paso, Texas.

Gibbs, V., D.D. Kuehn, C.G. Ward, and D.E. Peter. 2005. A Cultural Resources Overview for the Rio Grande and Tijuana River Flood Control Projects. Prepared by Geo-Marine, Inc., El Paso, Texas in collaboration with Camp Dresser and McKee, Carlsbad, California. Submitted to United States Section, International Boundary and Water Commission, El Paso, Texas.

Google Earth 2006-2007. *Google Earth Aerial Mapping*. Accessed December 2006 – January 2007. Available at: http://earth.google.com

Handbook of Texas. 2008. Presidio, Texas. Accessed October 2009 at: http://www.tshaonline.org/handbook/online/articles/PP/hjp13.html,

Holliday, V.T., and J.E. Ivey. 1974. Presidio-Ojinaga International Flood Control and Channel Relocations Project, Presidio County, Texas: An Evaluative Survey of the

Archaeological and Historical Resources. Texas Archaeological Survey, Research Report 48, University of Texas at Austin, Austin.

IBWC. 1975 International Plan for the Protection of the Presidio-Ojinaga Valley against Floods of the Rio Grande. International Boundary and Water Commission, United States and Mexico. Minute No. 247. February, 1975.

IBWC. 1977. Minute 257: Completion of the Relocations of the Rio Grande, Stipulated in Article 1 of the Treat of November 23, 1970. El Paso, Texas, May 18, 1977.

Jelks, Edward, 1969. Field notes and sketches from a visit by the University of Texas at Austin to the Presidio area, later recorded on official site forms by Alan Rogers of the (then) Texas Historical Survey Commission.

MacMahon. 1988. J.A. MacMahon, 1988. Warm Deserts. IN: M.G. Barbour and W.D. Billings (eds.). North American Terrestrial Vegetation. Cambridge University Press, Cambridge.

McClaran 1995 McClaran, M.P. and T. R. Van Devender, eds. 1995. The Desert Grassland. University of Arizona Press.

McMahan, C.A., R.G., Frye, and K.L. Brown. 1984. The Vegetation Types of Texas including Cropland. Texas Parks and Wildlife Department, Austin, Texas. 40 p.

Means. 2008. *Building Construction Cost Data*. 66th Annual Edition, R.S. Means Company, Incorporated, Kingston, Massachusetts.

Mitsch, W.J and J. G. Gosselink. 2007. *Wetlands, Third Edition.* John Wiley and Sons, Inc. New York, New York, 919 pp.

National Academy of Sciences. 1977. Guidelines for Preparing Environmental Impacts Statements on Noise. Report of Working Group on the Committee on Hearing, Bioacoustics, and Biomechanics, National Research Council. Washington, D.C.

NLCD. 2001. National Land Cover Database. Available at: http://www.mrlc.gov/nlcd.php

NRCS. 2009, Presidio, Texas. Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at http://websoilsurvey.nrcs.usda.gov/ accessed [September 2009].

Parsons (preparer). 2003. Draft Environmental Impact Statement – River Management Alternatives for the Rio Grande Canalization Project. Document prepared by Parsons for the USIBWC, December 2003.

Parsons (preparer). 2004. Final Cultural Resource Reconnaissance Survey for The Presidio-Ojinaga Flood Control Project Presidio County, Texas. Prepared by Parsons, Austin, Texas, LopezGarcia Group, Dallas, Texas, and Prewitt and Associates, Austin, Texas. Prepared for the United States Section, International Boundary and Water Commission.

Parsons, LopezGarcia Group, and Prewitt and Associates, Inc. 2004. *Final Cultural Resource Reconnaissance Survey for the Presidio-Ojinaga Flood Control Project, Presidio County, Texas*. Parsons, Austin, Texas. Prepared for United States Section, International Boundary and Water Commission, El Paso, Texas.

Presidio Chamber of Commerce 2007. *Presidio County Community Internet Portal*. Accessed February 2007 at: http://www.presidiotx.org/index.html.

Ramirez. 1986. Ramirez 1986. *Water development and projects in the Rio Grande and their relationships to the Santa Ana and Rio Grande Valley National Wildlife Refuges*. United States Fish and Wildlife Service. 33 pp.

TCEQ. 2008. Texas Water Quality Inventory and 303(d) List. Texas Commission on Environmental Quality, Surface Water Quality Data and Reports. Compiled in March 2008. Accessed July 2009 at http://www.tceq.state.tx.us/compliance/monitoring/water/quality/data/08twqi/twqi08.html

Texas Archaeological Sites Atlas. 2009. Electronic document, http://nueces.thc.state.tx.us/, accessed October 15, 2009.

Texas Comptroller of Public Accounts. 2008. Gross Sales and Use Tax Analysis for All Industries by County, http://ecpa.cpa.state.tx.us/allocation/HistSalesResults.jsp;jsessionid=0000noAzmfVS8VaTTsz06Bh_TI-:-1.

Texas Flood Insurance. 2009. Flood insurance rates for Presidio County, Texas. Accessed October 2009 at: http://www.texas-flood-insurance.com/.

Texas Historic Sites Atlas. 2009. Electronic document, http://atlas.thc.state.tx.us/, accessed October 15, 2009.

Texas Workforce Commission. 2009. Statistical information on total employment for Texas, http://www.tracer2.com/cgi/dataanalysis/AreaSelection.asp?tableName=Labforce

TGPC. 2003. Texas Groundwater Protection Strategy, Prepared by the Texas Groundwater Protection Committee, February.

THC. 1999. *Intentional Site Burial.* Cultural Resources Management News & Views, Texas Historical Commission 11 (1): 16-18.

TWDB. 1980. *Availability of Fresh and Slightly Saline Ground Water in the Basins of Westernmost Texas.* Texas Water Development Board.

TWDB. 2007. *Water for Texas, 2007.* Texas Water Development Board.

TWDB. 2002. *2002 State Water Plan Population Projections for 1990-2050 by County.* Texas Water Development Board.

TWDB Groundwater Database. 2009. Texas Water Development Board Groundwater Database Report. Accessed: November, 2009.

USACE. 1987 U.S. Army Corps of Engineers wetlands delineation manual. Technical Report Y-87-1. Vicksburg, MS: U.S. Army Engineer Waterways Experiment Station. U.S. Army Corps of Engineers. Available at: http://el.erdc.usace.army.mil/wetlands/pdfs/wlman87.pdf.

USACE. 1994. *Final Programmatic Environmental Impact Statement for JTF-6 Activities Along the U.S./Mexico Border.* U.S. Army Corps of Engineers, 1994.

USACE. 1999. *Final Environmental Baseline Document in support of the Supplemental Programmatic Environmental Impact Statement for INS and JTF-6 Activities.*)

USACE. 2001. *Final Report. Supplemental Programmatic Environmental Impact Statement for INS and JTF-6 Activities.* Prepared by the U.S. Army Corps of Engineers, Fort Worth District. June 2001.

USACE. 2008. U. S. Army Corps of Engineers. 2008. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0),* Final Report. U.S. Army Engineer Research and Development Center Environmental Laboratory. Vicksburg, Mississippi. September 2008.

U.S. Census Bureau. 2000. 2000 census.

U.S. Census Bureau. 2009. Annual Population Estimates by City and County, http://quickfacts.census.gov/qfd/states/48000.html, accessed September 2009.

U.S. Department of Transportation. 1980. Guidelines for Considering Noise in Land Use. Planning and Control. United States Department of Transportation, Federal Interagency Committee on Urban Noise.

U.S. Department of Transportation. 1992. Guidelines for the Sound Insulation of Residences Exposed to Aircraft Operations. United States Department of Transportation, Federal Aviation Administration.

USEPA. 1974. Information on Levels of Environmental Noise Requisite to Protect the Public Health and Welfare with an Adequate Margin of Safety. U.S. Environmental Protection Agency, Report 550/9-74-004, March 1974.

USEPA. 1996. *Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources (AP-42).* 5th edition with Supplements, United States Environmental Protection Agency, Research Triangle Park, February 1996.

USEPA. 2009a. Currently Designated Nonattainment Areas for All Criteria Pollutants, United States Environmental Protection Agency, [*http://www.epa.gov/air/oaqps/greenbk/ancl.html#TEXAS*], accessed September 2009].

USEPA. 2009b. Emissions by Category Report - Criteria Air Pollutants – 2001. http://www.epa.gov/air/data/emcatrep.html?co~48377~Presidio%20Co%2C%20Texas, accessed September 2009

USFWS. 2002. Final Recovery Plan: Southwestern Willow flycatcher (*Empidonax traillii extinuus*). Prepared by Southwestern Willow Flycatcher Recovery Team Technical Subgroup for U.S. Fish and Wildlife Service, August, 2002.

USGS. 1996. U.S. Geological Survey 1996. *Groundwater Atlas of the United States, Chapter E: Oklahoma-Texas*. P.D. Ryder, U.S. Geological Survey Hydrologic Atlas 730-E. [http://capp.water.usgs.gov/gwa/ch_e/index.html].

USIBWC. 2004. Estimated Benefits of IBWC Rio Grande Flood-Control Projects in the United States, prepared by Texas Agriculture Experiment Station, and Texas Water Resources Institute of the Texas A&M University System, September 2004.

USIBWC. 2008. *Final Programmatic Environmental Impact Statement, Improvements to the USIBWC Rio Grande Flood Control Projects along the Texas-Mexico Border.* Prepared for the United States Section, International Boundary and Water Commission, El Paso, Texas.

USIBWC. 2009a. Final Environmental Assessment, Emergency Levee Repairs to the Presidio Flood Control Project, Station 7+000. Prepared by: United States Section, International Boundary and Water Commission, El Paso, Texas. May, 2009.

USIBWC. 2009b. Scoping Meeting Summary, Environmental Impact Statement, Flood Control Improvements and Partial Levee Relocation to the USIBWC Presidio Flood Control Project. Prepared for: United States Section, International Boundary and Water Commission, El Paso, Texas. Prepared by: Parsons, Austin, Texas, June 2009.

USIBWC. 2009c. Alternatives Report for Environmental Impact Statement; Flood Control Improvements and partial Levee Relocation to the USIBWC Presidio Flood Control Project, Presidio, Texas. August 2009.

USIBWC. 2009d. Biological Resources Evaluation, Presidio Flood Control Project. Prepared in support of Environmental Impact Statement, Flood Control Improvements and partial Levee Relocation to the Presidio Flood Control Project, Presidio, Texas. September 2009.

USIBWC. 2009e. Revised Alternatives Report for Environmental Impact Statement, Flood Control Improvements and Partial Levee Relocation to the USIBWC Presidio Flood Control Project, Presidio, Texas. October 2009.

USIBWC. 2009f. Hydraulic Modeling Report, Flood Control Improvements and Partial Levee Relocation to the USIBWC Presidio Flood Control Project, Presidio, Texas. October 2009.