ENVIRONMENTAL ASSESSMENT

PROPOSED SECTION 408 APPLICATION FOR CITY OF DALLAS' MODIFICATIONS TO THE DALLAS FLOODWAY SYSTEM

DALLAS COUNTY, TEXAS

U.S. ARMY CORPS OF ENGINEERS
Fort Worth District
819 Taylor Street, Room 3A14
Fort Worth, Texas 76102-0300

DECEMBER 2011

DRAFT
FINDING OF NO SIGNIFICANT IMPACT

ENVIRONMENTAL ASSESSMENT
PROPOSED SECTION 408 APPLICATION FOR
CITY OF DALLAS' MODIFICATIONS TO
THE DALLAS FLOODWAY SYSTEM

Description of Action. An Environmental Assessment (EA) has been prepared for the potential environmental consequences resulting from approving, pursuant to 33 U.S.C. 408 (Section 408), proposed modifications to the Dallas Floodway System in the City of Dallas, Dallas County, Texas. The City of Dallas is the proponent of the EA.

The purpose of the proposed modifications is to reduce the potential for underseepage. The modification measures of the Proposed Action Plan were designed by the City and its contractor, HNTB Corporation (HNTB), to correct specific deficiencies pertaining to the one percent annual chance exceedance (100-year base flood) identified in the draft *Problem Identification Report (PID Report)* prepared for the Dallas Floodway System following the release of the *Periodic Inspection Report, Dallas Floodway, Trinity River, Dallas, Dallas County, Report No. 9 (PI Report)*, and include construction of approximately 18,300 linear feet of riverside cutoff walls along selected portions of the East and West Levees of the Dallas Floodway System, along with concrete and riprap scour protection at the Hampton Pump Station outfall channels.

The Fort Worth Engineering Division has performed a technical review of the geotechnical data and analyses report and 35% construction plans and specifications, and determined that the proposed modification meets USACE's engineering and safety standards for construction and meets minimum factors of safety for slope stability in the short term (construction) and long term (post construction). The USACE has determined that the proposed action does not increase the risk to public safety. Final plans and specifications will be reviewed prior to issuance of Section 408 construction approval. In addition to a technical review of the geotechnical analyses, a technical review of the hydraulic analysis was performed. The findings of this review indicate that the proposed project will produce no significant adverse hydraulic impacts.

Alternatives Considered. The City prepared a draft *Levee Remediation Plan* (draft *LRP*) that combined findings from the *PI Report* and draft *PID Report* with geotechnical data to analyze the existing levees and develop preliminary alternatives to address levee deficiencies. The preliminary alternatives included: 1) riverside cutoff walls; 2) landside relief wells; 3) flood side shift with landside relief wells; 4) landside berms; 5) landside levee drains; and 6) riverside fattening. To arrive at a recommended plan, each alternative was analyzed and evaluated based on engineering principles and factors such as: short-term capital and long-term operation and maintenance costs, constructability, compatibility with future proposed projects in the vicinity of the Dallas Floodway System, and relationship to sump conditions. Only the No-Action Alternative and the Proposed Action Alternative were carried forward and analyzed in the EA, since all the other alternatives were eliminated from further consideration in the draft LRP.

Anticipated Environmental Effects. This EA was prepared in compliance with institutional and regulatory criteria including: the National Environmental Policy Act, Executive Order (EO) 13166 - Improving Access to Services for Persons with Limited English Proficiency, EO 12898 – Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations, EO 11988 - Floodplain Management, Endangered Species Act, Migratory Bird Treaty Act, EO 11990 - Protection of Wetlands, Clean Water Act, and Clean Air Act, among others. These criteria were taken into consideration when assessing the potential environmental consequences of Proposed Action Alternative.

Under the No-Action Alternative, the proposed modifications would not be implemented and the City of Dallas would not be able to regain 100-year FEMA accreditation. Under these circumstances, FEMA would issue revised 100-year floodplain maps, and many existing structures within the remapped areas would likely require flood insurance. Additionally, the remapped areas would be subject to new constraints and more stringent requirements for development. As a result, under the No-Action Alternative, substantial impacts to land use and socioeconomic resources would likely occur.

Implementation of the Proposed Action Alternative would result in minor permanent direct impacts to water resources (waters of the U.S., including wetlands) and biological resources (wildlife habitat and aquatic resources), which would be mitigated by creation of a 0.5 acre wetland within the project area. Potential temporary impacts that may result from construction activities associated with the Proposed Action Alternative include minor impacts to geology, soils, water resources (lakes, rivers and streams), water quality, the noise environment, utilities; hazardous, toxic, and radioactive wastes (HTRW); air quality, aesthetics and visual resources. These minor impacts would be reduced to the extent possible by the application of best management practices before, during and after construction, such as erosion control measures, hazardous spill prevention plans, vegetation re-establishment in disturbed areas, etc. Analyses indicate there would be no anticipated adverse impacts to climate, groundwater resources, floodplains, or federal- and/or state-listed threatened or endangered species or their habitats. In addition, no significant transportation, land use, or environmental justice concerns were identified within the project area. Long-term effects of the Proposed Action Alternative would be beneficial as it would help regain 100-year FEMA accreditation. The Proposed Action Alternative has the potential to impact NEPA defined important historic and cultural resources, the Dallas Floodway and various features that support it. However, after construction the cutoff walls would not be visible so implementation of the Propose Action Alternative would ultimately enhance the ability of the Dallas Floodway to convey its significance as defined by NEPA by protecting the integrity of the levees and allowing the Dallas Floodway System to function as it was designed.

The construction contractor would be required to prepare and submit a flood emergency action plan to the USACE and City of Dallas Flood Control District for their approval prior to construction.

Proposed construction and operation/maintenance actions for the project will meet the criteria for Regional General Permit 12 (RGP-12). RGP-12 authorizes the discharge of dredged or fill material into waters of the U.S., including wetlands, and work in, or affecting navigable waters of the U.S., associated with modification and alterations of Corps of Engineers projects that receive USACE approval under Section 408 and meet the conditions of RGP-12. State of Texas water quality certification, issued on January 21, 2010, is provided through the conditions of RGP-12. It was determined that appropriate mitigation for permanent impacts to waters of the U.S., including wetlands, would be to construct a 0.5 acre wetland within the project area. The proposed mitigation site is located west of the Old Hampton Pump Station outfall channel and would be contoured using multiple elevation gradients to a maximum depth of 3 feet to allow for vegetation with appropriate wetland herbaceous species such as sedges, spike-rush, curly dock, and water primrose.

Based on a review of the information contained in this EA, it is concluded that implementation of the proposed modifications to the Dallas Floodway System in Dallas, Texas, are not a major federal action that would significantly affect the quality of the human environment within the meaning of Section 102(2)(c) of the National Environmental Policy Act of 1969, as amended. Therefore, the preparation of an Environmental Impact Statement is not required.

_____ _____

Richard J. Muraski, Jr. Date
Colonel, US Army
District Engineer

PUBLIC DRAFT
ENVIRONMENTAL ASSESSMENT

Proponent: City of Dallas, Texas

Title of Proposed Action: Proposed Section 408 Application for City of Dallas' Modifications to the Dallas Floodway System,

Designation: Environmental Assessment

ABSTRACT

An Environmental Assessment (EA) has been prepared in accordance with the National Environmental Policy Act of 1969 and USACE Engineering Regulation 200-2-2. This EA describes the potential environmental consequences resulting from approving, pursuant to 33 U.S.C. 408, (referred to as Section 408) modifications to the Dallas Floodway System in the City of Dallas, Dallas County, Texas.

The purpose of the proposed modifications is to reduce the potential for underseepage. The modifications, which were designed by the City and its contractor, HNTB Corporation, to correct specific deficiencies pertaining to the one percent annual chance exceedance (100-year base flood) identified in the draft *Problem Identification Report* (*PID Report*) prepared for the Dallas Floodway System following the release of the *Periodic Inspection Report, Dallas Floodway, Trinity River, Dallas, Dallas County, Report No. 9* (*PI Report),* include construction of approximately 18,300 linear feet of riverside cutoff walls along selected portions of the East and West Levees of the Dallas Floodway System, along with concrete and riprap scour protection at the Hampton Pump Station outfall channels. By implementing the Proposed Action Alternative, the City intends to correct system-wide deficiencies of the Dallas Floodway System and regain its 100-year FEMA accreditation.

Under the terms of Section 408, any proposed modification to an existing USACE project, whether federally or locally maintained, that goes beyond those modifications required for normal O&M requires a determination by the USACE that the proposed alteration, permanent occupation, or use of a federal project would not be injurious to the public interest and would not impair the usefulness of the existing project. This EA evaluates the potential environmental consequences of the proposed Section 408 modifications associated with the Dallas Floodway System.

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DECEMBER 2011

EXECUTIVE SUMMARY

An environmental assessment (EA) has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and Unites States Army Corps of Engineers (USACE) Engineering Regulation 200-2-2, *Procedures for Implementing NEPA.* This EA describes the potential environmental consequences resulting from the proposed Section 408 modifications to two federally-authorized levees associated with the Dallas Floodway System in the City of Dallas, Dallas County, Texas.

Under the regulatory control of the USACE, the City of Dallas plans, operates, and maintains the Dallas Floodway System. The East and West Levees protect approximately 8,098 acres of essential infrastructure, commercial, industrial, and residential interests including a portion of downtown Dallas and West Dallas.

Since the mid 1840's, flood events of the Trinity River have warranted increasing and improving measures of flood risk management. The most profound flood event justifying increased risk management for the City of Dallas occurred in 1908. Construction of the East and West Levees was completed in 1932 and formed the original components of the Dallas Floodway System. In response to severe flooding in the mid-1940s, U.S. Congress authorized the flood control project termed the "Dallas Floodway Project" in 1945 and again in 1950. USACE completed the authorized Dallas Floodway Project in 1958, which included major improvements to the East and West Levees for the purpose of containing the Standard Project Flood (800-year event) that was determined at that time by the USACE to be 226,000 cubic feet per second (cfs). Levee modifications included fattening the landside slopes, shifting the levee footprints toward the riverside, and increasing the levee crest width to approximately 16 feet. Improvements also included an additional 4 feet of freeboard (levee height) to provide the East and West Levees additional capacity to contain floodwaters and upgrades to interior drainage structures.

The Trinity River rises above its flood stage of 30 feet several times a year. Typically, the peaks of these events are above flood stage for a relatively short duration, ranging from hours to days. However, river stages, ranging from gage heights of 15 to 30 feet, have been observed over a period of weeks to a couple of months during flood events. During a flood in May of 1990, the river remained above flood stage for approximately two months but only remained above a gage height of 36 feet for approximately three weeks.

The USACE Rehabilitation and Inspection Program (RIP) provides for rehabilitation/repair of Public Law 84-99 eligible (active status) levees that are damaged during flood events. This authority covers post flood repair of both Federally authorized/constructed and non- Federally constructed flood control works. Inspections of Federal levees are funded and conducted under the Inspection of Completed Works (ICW) program. Inspection of non-Federal levees are funded and conducted under the PL 84-99 RIP. As the levees in the Dallas Floodway as described in this report are classified as Federal levees, inspections were funded and conducted under the ICW program.

After Hurricane Katrina struck New Orleans, the USACE began assessing the Levee Safety Program (LSP) and reviewing criteria for evaluating levee systems. The USACE implemented a

new LSP with a more comprehensive and rigorous levee inspection process to aid in communicating to local sponsors and the public the overall condition of levee systems and recommending actions to reduce flood risk.

During December 3-5, 2007, the USACE performed a periodic inspection of the Dallas Floodway System resulting in the *Periodic Inspection Report, Dallas Floodway, Trinity River, Dallas, Dallas County, Report No. 9* (*PI Report*) received by the City of Dallas in March 2009. The USACE documented numerous potential deficiencies based on its visual inspection for each of the four levees within the Dallas Floodway System, resulting in an overall system rating of "Unacceptable." It marked the first time in history for the Dallas Floodway System to not receive an "Acceptable" rating.

As a result of the overall "Unacceptable" rating received in March 2009, the USACE withdrew its letter of support for continued certification of the Dallas Floodway System for the 100-year event Federal Emergency Management Agency (FEMA) accreditation. Shortly after this withdrawal of support, FEMA began the de-accreditation process of the Dallas Floodway System. FEMA is currently remapping the 100-year event Flood Insurance Rate Map (FIRM) for the Dallas Floodway System.

The purpose of the Proposed Action Alternative is to reduce the potential for underseepage and help regain 100-year FEMA accreditation. The modifications, which were designed by the City and its contractor, HNTB Corporation (HNTB), to correct specific deficiencies pertaining to the one percent annual chance exceedance (100-year base flood) identified in the draft *Problem Identification Report (PID Report)* prepared for the Dallas Floodway System following the release of the *Periodic Inspection Report, Dallas Floodway, Trinity River, Dallas, Dallas County, Report No. 9 (PI Report)*, include construction of approximately 18,300 linear feet of riverside cutoff walls along selected portions of the East and West Levees of the Dallas Floodway System, along with concrete and riprap scour protection at the Hampton Pump Station outfall channels.

By implementing the Proposed Action Alternative, the City intends to correct system-wide deficiencies of the Dallas Floodway System and regain its 100-year FEMA accreditation. However, if the Proposed Action Alternative is not implemented, FEMA would finalize and reissue the final effective 100-year event FIRM. Under the latter case, the existing structures within the remapped areas that have federally-backed mortgages and loans would be required to carry flood insurance. In addition, many privately-issued mortgages would also require flood insurance security. The remapped areas would also be subject to new constraints and more stringent requirements for development.

Under the terms of 33 U.S.C. 408 (referred to throughout the document as Section 408), any proposed modification to an existing USACE project, whether federally or locally maintained, that goes beyond those modifications required for normal O&M requires a determination by Secretary of the Army that the proposed alteration, permanent occupation, or use of a federal project would not be injurious to the public interest and would not impair the usefulness of such work. This EA was prepared to evaluate the potential environmental consequences of the proposed Section 408 modifications associated with the Dallas Floodway System.

Two alternatives were analyzed in this EA, the No-Action Alternative and the Proposed Action Alternative. The No-Action Alternative represents the case in which the proposed modifications to the Dallas Floodway System are not implemented and the levees associated with the Dallas Floodway System are not accredited by FEMA. Under the Proposed Action Alternative, the City of Dallas would implement cutoff walls along the East and West Levees and concrete and riprap scour protection at the Hampton Pump Station outfall channels. The Proposed Action Alternative would help regain 100-year FEMA accreditation.

This EA assesses and identifies the potential for direct or indirect impacts of both the No-Action Alternative and the Proposed Action Alternative to various resources and discloses whether potential impacts are beneficial, minor, temporary, substantial, or not anticipated. Analyses performed for the No-Action Alternative indicate that the implementation of future land use plans, future real estate values, the social and economic environment, floodplains, and transportation would likely be adversely impacted as the No-Action Alternative would result in the remapping of many areas currently and historically considered risk-averse from the one percent annual chance exceedance on FIRMs as being at risk for inclusion within such designation. Analyses indicate that there would be no anticipated adverse impacts to climate; geology; soils; groundwater resources; lakes, rivers, and streams; waters of the U.S., including wetlands; water quality; threatened and endangered species; wildlife habitat; aquatic resources; the noise environment; utilities; hazardous, toxic, and radioactive wastes (HTRW); air quality; aesthetics and visual resources.

Analyses performed for the Proposed Action Alternative indicate that it is likely the implementation of future land use plans, future real estate values, the general social and economic environment, and transportation would benefit from the implementation of the Proposed Action Alternative as it would help regain 100-year FEMA accreditation. Implementation of the Proposed Action Alternative has the potential to impact NEPA defined important historic and cultural resources, the Dallas Floodway and various features that support it. The Proposed Action Alternative would result in minor permanent direct impacts to water resources (waters of the U.S., including wetlands) and biological resources (wildlife habitat and aquatic resources). Potential temporary impacts that may result from construction activities associated with the Proposed Action Alternative include impacts to geology; soils (soil disturbance); water resources (lakes, rivers, and streams and water quality); the noise environment; utilities; HTRW; air quality; aesthetics and visual resources. Analyses indicate there would be no anticipated adverse impacts to climate, groundwater resources, floodplains, or federal- or state-listed threatened or endangered species or their habitats. Mitigation for permanent impacts to waters of the U.S., including wetlands, would consist of the construction of a 0.5 acre wetland within the project area.

The Fort Worth Engineering Division has performed a technical review of the geotechnical data and analyses report and 35% construction plans and specifications, and determined that the proposed modification meets USACE's engineering and safety standards for construction and meets minimum factors of safety for slope stability in the short term (construction) and long term (post construction). The USACE has determined that the proposed action does not increase the risk to public safety. Final plans and specifications will be reviewed prior to issuance of Section 408 construction approval. In addition to a technical review of the geotechnical analyses, a

technical review of the hydraulic analysis was performed. The findings of this review indicate that the proposed project will produce no significant adverse hydraulic impacts.

The implementation of the Proposed Action Alternative in conjunction with other past, present, and reasonably foreseeable future actions in the cumulative impacts study area is anticipated to result in either less than significant impacts or beneficial impacts to examined resources. The proposed Section 408 modifications associated with the Proposed Action Alternative are anticipated to be a complimentary and compatible component of the other present and reasonably foreseeable actions identified in the EA. USACE provides no opinion as to the efficacy of the modification for providing flood risk management benefits. Therefore, no conclusions can be reached as to the likelihood of the proposed modifications to be included in future designs. Contrarily, the No-Action Alternative in conjunction with other past, present, and reasonably foreseeable future actions in the cumulative impacts study area is anticipated to result in significant adverse impacts to land use, socioeconomic conditions, and floodplains and would not be a complimentary and compatible component of the other present and reasonably foreseeable future actions identified in the EA.

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ACRONYMS AND ABBREVIATIONS

ALERT	Automated Local Evaluation in Real Time
AQCR	Air Quality Control Region
ASTM	American Society for Testing and Materials
AT&SF	Atchison, Topeka and Santa Fe
ATR	Agency Technical Review
bgs	below ground surface
BMPs	best management practices
BVP	Balanced Vision Plan
CAA	Clean Air Act
CBD	Central Business District
CDC	Corridor Development Certificate
CEQ	Council on Environmental Quality
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFR	Code of Federal Regulations
cfs	cubic feet per second
CGP	Construction General Permit
CNEL	Community Noise Equivalent Level
CO	carbon monoxide
COCs	Containments of Concern
CPTs	Cone Penetrometer Tests
CT	Census Tract
CWA	Clean Water Act
DART	Dallas Area Rapid Transit
dB	Decibel
dBA	A-weighted Decibel
DCAD	Dallas Central Appraisal District
DFW	Dallas-Fort Worth
DHHS	Department of Health and Human Services
DISD	Dallas Independent School District
DPU	Dallas Public Utilities
DPW	Dallas Public Works
DWU	Dallas Water Utilities
EA	Environmental Assessment
EDR	Environmental Data Resources
EIS	Environmental Impact Statement
EJ	Environmental Justice
EM	Engineering Manual
EO	Executive Order
EPA	Environmental Protection Agency
ER	East Reach
ERNS	Emergency Response Notification System
ESA	Environmental Site Assessment

FAA	Federal Aviation Administration
FoS	Factor of Safety
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FINDS	Facility Index System
FIRM	Flood Insurance Rate Map
FONSI	Finding of No Significant Impact
FPPA	Farmland Protection Policy Act
FRWS	Flooded Roadway Warning System
FTA	Federal Transit Administration
FY	Fiscal Year
GDP	Gross Domestic Product
GHGs	Greenhouse Gases
GIS	Geographic Information Systems
HNTB	HNTB Corporation
HTRW	Hazardous, Toxic, and Radioactive Wastes
ICW	Inspection of Completed Works
IEPR	Independent External Peer Review
IH	Interstate Highway
IHW	Industrial and Hazardous Waste
IOP	Innocent Owner/Operator
J.D.	Jurisdictional Determination
Ldn	Day-Night Average Level
LEP	Limited English Proficiency
Leq	Equivalent Sound Levels
LPST	Leaking Petroleum Storage Tank
LRP	Levee Remediation Plan
LSP	Levee Safety Program
LWCF	Land and Water Conservation Fund
MBTA	Migratory Bird Treaty Act
MDCP	Maintenance Deficiency Correction Period Plan
MPA	Metropolitan Planning Area
MPO	Metropolitan Planning Organization
MS4	Municipal Separate Storm Sewer System
NAAQS	National Ambient Air Quality Standards
NAS	National Academy of Sciences
NCA	Noise Control Act
NCTCOG	North Central Texas Council of Governments
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NFRAP	No Further Remedial Action Planned
NHPA	National Historic Preservation Act
NOx	nitrogen oxides
NOA	Notice of Availability
NOI	Notice of Intent

NOT	Notice of Termination
NPL	National Priority List
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NTTA	North Texas Tollway Authority
NWI	National Wetlands Inventory
O&M	Operations and Maintenance
PCBs	Polychlorinated Biphenyls
PCLs	Protective Concentration Levels
PI	Periodic Inspection
PID	Problem Identification
PL	Public Law
PM	particulate matter
ppm	parts per million
ppb	parts per billion
PST	Petroleum Storage Tank
R	Representative noise receiver
RGP	Regional General Permit
RIP	Rehabilitation and Inspection Program
ROD	Record of Decision
ROI	Region on Influence
RONA	Record of Non-Applicability
SALs	State Archeological Landmarks
SFHA	Standard Flood Hazard Area
SH	State Highway
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SOx	sulfur oxides
SPF	Standard Project Flood (800-year event)
SPILLS	Spills Database
SVOCs	Semi-volatile Organic Compounds
SW3P	Storm Water Pollution Prevention Plan
TCEQ	Texas Commission on Environmental Quality
THC	Texas Historical Commission
TIER 2	Tier 2 Chemical Reporting Program Facilities
TIP	Transportation Improvement Program
TIF	Tax Increment Financing
TPWD	Texas Parks and Wildlife Department
TRCCLUP	Trinity River Corridor Comprehensive Land Use Plan
TRE	Trinity Railway Express
TREIS	Trinity River Environmental Impact Statement
TRFCD	Trinity River Flood Control District
TRRP	Texas Risk Reduction Program
TSSBC	Texas-Specific Soil Background Concentration
TxDOT	Texas Department of Transportation

UDAG	Urban Development Action Grant
UPRR	Union Pacific Railroad
U.S.	United States or United States Highway
U.S.C.	United States Code
U.S. DOT	United States Department of Transportation
USTs	underground storage tanks
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VCP	Volunteer Cleanup Program
VMT	vehicle miles traveled
VOCs	Volatile Organic Compounds
WR	West Reach
YBP	Years before present

1.0 INTRODUCTION

This environmental assessment (EA) has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and United States Army Corps of Engineers (USACE) Engineering Regulation 200-2-2, *Procedures for Implementing NEPA.* The EA describes the potential environmental consequences resulting from the proposed Section 408 modifications to two federally-authorized levees associated with the Dallas Floodway System in the City of Dallas, Texas.

For the purposes of this EA, the Dallas Floodway System is defined as a system of two separate federally-authorized levees along the Trinity River. Under the regulatory control of the USACE, the City of Dallas plans, operates, and maintains the two federally-authorized levees to the minimum requirements that the USACE has established for its programs. The two federally-authorized levees associated with the Dallas Floodway System are the East and West Levees, which collectively protect approximately 8,098 acres of essential infrastructure, commercial, industrial, and residential interests including a portion of downtown Dallas and West Dallas.

The purpose of this EA is to determine whether or not the proposed modifications would result in significant environmental impacts. If the EA results in significant environmental impacts, an environmental impact statement (EIS) would be prepared. If the environmental impacts are determined to be less than significant after adoption of mitigation measures, the USACE would prepare a Finding of No Significant Impact (FONSI).

Under the terms of 33 United States Code (U.S.C.) 408 (referred to throughout the document as Section 408), any proposed modification to an existing U.S. Army Corps of Engineers (USACE) project, whether federally or locally maintained, that goes beyond those modifications required for normal operations and maintenance (O&M) requires a determination by the Secretary of the Army that the proposed alteration, permanent occupation, or use of a federal project would not be injurious to the public interest and would not impair the usefulness of such work. Therefore, the USACE is responsible to determine if the proposed modifications would be injurious to the public interest and would impair the usefulness of the Dallas Floodway System.

The Fort Worth Engineering Division has performed a technical review of the geotechnical data and analyses report and 35% construction plans and specifications, and determined that the proposed modification meets USACE's engineering and safety standards for construction and meets minimum factors of safety for slope stability in the short term (construction) and long term (post construction). The USACE has determined that the proposed action does not increase the risk to public safety. Final plans and specifications will be reviewed prior to issuance of Section 408 construction approval. The Engineer of Record (EOR) is defined as the entity whom is ultimately responsible and liable for the adequacy and safety of a design. HNTB Corporation (HNTB) is the EOR for the proposed Section 408 modifications.

The City of Dallas proposes Section 408 modifications to the Dallas Floodway System. The Proposed Action Alternative includes the installation of approximately 18,300 linear feet of riverside cutoff walls along sections of the East and West Levees and concrete and riprap scour

protection at the Hampton Pump Station outfall channels. As discussed in **Section 3.3 Proposed Action Alternative**, each of these modification measures would be individually and/or collectively applied to various portions of the Dallas Floodway System based on potential location-specific levee issues warranting such modifications as discussed in **Section 3.0 Description of Alternatives**.

Explanation of Technical Terms

Throughout this EA, a number of technical terms are used to discuss levee operations, deficiencies, and modification measures. Below is a listing of an explanation of or definition for these terms:

Berm - Horizontal strips or shelves of material built contiguous to the base of either side of levee embankments for the purpose of providing protection from underseepage and erosion, thereby increasing the stability of the embankment or reducing seepage.

Cofferdam - A cofferdam is a type of watertight construction designed to facilitate construction projects in areas which are normally submerged. A cofferdam is installed in the work area and water is pumped out to expose the bed of the body of water so that workers can perform construction in a dry environment.

Cutoff walls - A cutoff beneath a levee to block seepage through pervious foundation strata is the most positive means of eliminating seepage problems. Positive cutoffs may consist of excavated trenches backfilled with compacted earth, slurry trenches, or sheet pile or cement grout cutoff walls.

Riverside - The riverside of a levee is the side of the levee closest to the river channel of a floodway.

Landside - The landside of a levee is the side of the levee opposite the riverside.

Landside drain - A vertical well or borehole designed to collect and direct seepage through or under a levee to reduce uplift pressure under or within a levee, in this case it is located on the landside of the levee.

Levee - An earth embankment whose primary purpose is to furnish flood risk management from seasonal high water and which is therefore subject to water loading for periods of only a few days or weeks a year.

Levee crest - Highest point on the levee.

Levee fattening - Increasing the horizontal to vertical slope of the side of a levee.

Levee modification measure - Particular actions designed to correct levee deficiencies such as seepage/underseepage.

Levee system - A flood risk management system that consists of a levee, or levees, and associated structures, such as closure and drainage devices.

Long-term landside stability - The long-term stability of the landside of a levee.

Normal riverside stability - The stability of the riverside of a levee under normal conditions.

Rapid drawdown - Raid drawdown arises when submerged slopes experience a rapid reduction of the external water level potentially affecting the integrity of levee side slopes.

Relief wells - Pressure relief wells may be installed along the landside toe of levees to reduce uplift pressure which may otherwise cause sand boils and piping of foundation materials. Wells accomplish this by intercepting and providing controlled outlets for seepage that would otherwise emerge uncontrolled landward of the levee. Pressure relief well systems are used where pervious strata underlying a levee are too deep or too thick to be penetrated by cutoffs or toe drains.

Seepage/Underseepage - The passage of water or other fluid through a porous medium, such as the passage of water through an earth embankment, underground sand layers, or a masonry wall. Underseepage and seepage pertain to the same process, except underseepage involves the passage of water through porous underlying earthen layers.

System-wide - Affecting and/or relating to the entire levee system. System-wide deficiencies pertain to the overall flood risk reduction integrity of the entire levee system as opposed to maintenance O&M deficiencies, which pertain to general reach-specific repairs to the levee system.

Toe of levee - The base or bottom of a slope at the point where the ground surface abruptly changes to a significantly flatter grade.

1.1 Study Area

The Proposed Action Alternative is located in the City of Dallas in north central Texas, which is bisected by the Trinity River. The Trinity River traverses the City of Dallas from northwest to southeast. The Dallas Floodway System along the existing Dallas Floodway specifically includes the East and West Levees. Because this EA investigates and documents potential impacts to a number of identified resources that may be affected by the proposed modifications, study areas are assigned to each examined resource independently based on the resources' geographic locations and corresponding scale of potential impacts. Therefore, there is more than one study area for the Proposed Action Alternative, and each resource's study area is defined in **Section 4.0 Existing Environment**. Study areas developed for each resource are referred to as each resource's region of influence (ROI).

For example, the ROI for impacts related to natural resources such as water resources and biological resources is defined by the areas that may be potentially impacted or the areas of disturbance associated with project construction. The ROI for impacts related to land use and

socioeconomic resources is defined as the region protected by the East and West Levees that could be affected by the Federal Emergency Management Agency (FEMA) remapping of the 100-year floodplain as discussed in **Chapter 2: Purpose and Need**. Therefore, ROIs will encompass areas of various sizes and extents including and/or surrounding the Dallas Floodway System.

1.2 Background/Project History

The Trinity River

The Trinity River is a 710-mile watercourse flowing entirely within the state of Texas from its upstream headwaters located just south of the Red River to its downstream outfall at Trinity Bay, located just east of Houston in the Gulf of Mexico. Along its course through the City of Dallas, the Trinity River channel's depth averages 25 feet, and its bottom width averages 50 feet. The Trinity River channel provides a maximum design conveyance capacity of 13,000 cubic feet per second (cfs). Flows exceeding 13,000 cfs spill and expand out of the defined channel and into the Trinity River's associated floodplain. At the confluence of the West and Elm Forks of the Trinity River, the Trinity River Watershed totals approximately 6,100 square miles. Upstream of the City of Dallas, 15 reservoirs and lakes regulate the flow of the Trinity River (City of Dallas, 2009b). Within the City of Dallas, which totals 385 square miles, the Trinity River, its existing associated floodplain, and its feeder creeks and streams account for approximately 47.9 square miles of land area.

Dallas Floodway System History

Since the continued and expanded urbanization of the original settlement of the City of Dallas upon its founding in 1841 and incorporation as a city in 1856, flood events of the Trinity River have warranted increasing and improved measures of protection. The most profound flood event justifying increased protection for the City of Dallas from the swelling banks of the Trinity River occurred in 1908. In May 1908, the Trinity River crested at 52.6 feet, which was the highest recorded flood elevation prior to construction of the East and West Levees. Construction of the East and West Levees was completed in 1932 and formed the original components of the Dallas Floodway System. The original floodway created by the construction of the East and West Levees ranged from approximately 2,000 feet to 3,000 feet wide. Each levee was approximately six feet wide at the crest, approximately 156 feet wide at the base, and approximately 30 feet high with 2.5:1 (horizontal to vertical) side slopes. With the creation of the new Dallas Floodway System, the Trinity River was diverted southwest into the floodway, and the natural channel was kept for the purpose of interior drainage for the City of Dallas. The channelization of the Trinity River and creation of the original Dallas Floodway System was designed to accommodate a peak discharge of 500,000 cfs.

In response to severe flooding in the mid-1940s caused by severe storms and intensified by steady and continued urbanization in the Trinity River watershed, the United States (U.S.) Congress authorized the flood control project termed the "Dallas Floodway Project" in 1945 and again in 1950. The USACE completed the authorized Dallas Floodway Project in 1958, which included major improvements to the East and West Levees for the purpose of containing the Standard Project Flood (800-year) that was determined at that time by the USACE to be 226,000

cfs. Levee modifications included fattening the landside slopes, shifting the levee footprints toward the riverside, and increasing the levee crest width to approximately 16 feet. Improvements also provided an additional 4 feet of freeboard to provide the East and West Levees additional capacity to contain floodwaters, and interior drainage structures sustained upgrades. Freeboard refers to the addition of levee height further contributing to a levee's flood protection capacity beyond what is calculated for a selected size flood and floodway conditions (FEMA, 2010). Freeboard compensates for unknowns involving effects such as wave action and the hydrological effects of urbanization (FEMA, 2010).

In the mid-1990s, the City of Dallas widened portions of the Trinity River downstream of the Houston Street Viaduct and fattened the riverside levee slopes to 4:1 downstream of the Continental Avenue Bridge. Aside from subsequent relatively minor repairs and improvements performed by the USACE and City of Dallas throughout the following decades, including those in the mid-1990s, the 1958 measures constitute the Dallas Floodway Project as it exists today in relation to the East and West Levees and associated interior drainage system. Currently, the Dallas Floodway Project includes the East and West Levees, the Trinity River channel, six pumping plants, seven pressure sewers, and numerous gravity sluices. The East and West Levees were originally designed to confine a flood of about two and one-half times the size of the flood that occurred in 1908, but major urban development and land use changes in the area since project completion in 1958 have reduced that level of flood risk management.

Levee Performance

The Trinity River rises above its flood stage of 30 feet several times a year. Typically, the peaks of these events are above flood stage for a relatively short duration, ranging from hours to days. However, river stages, ranging from gage heights of 15 to 30 feet, have been observed over a period of weeks to a couple of months during flood events. During a flood in May of 1990, the river remained above flood stage for approximately two months but only remained above a gage height of 36 feet for approximately three weeks (estimated 2 days to peak and 15 days to fall back).

Based on flood events encountered since the completion of the Dallas Floodway System in the 1950s, the levees have performed well. Over the history of the Dallas Floodway System, no seepage/underseepage or substantial slope stability issues were previously documented. A series of shallow sloughing slides were documented since the late 1950s along the East and West Levees. The USACE investigated slides along the East and West Levees and documented them in the *Review of Levee Design, Dallas Floodway, Trinity River, Texas, June 1968* and *Periodic Inspection and Continuing Evaluation of Completed Civil Works Structures, Dallas Floodway, Trinity River, Texas, February 1969*. The USACE determined the slides to be a "nuisance," and they were not of substantial size to cause a catastrophic failure.

The long-term stability of a levee system depends on proper O&M of the levees and the other components of a floodway system. The levees require routine maintenance to control vegetation growth and are subject to periodic slides that require attention and repair. Over time, levees can settle and reduce their original height. Consequently, they must be raised to their original design levels to offer the designed level of flood risk management. While in most areas, levee crest

heights have degraded over time, the USACE and the City of Dallas have raised the levees in some areas to compensate for settling and erosion.

Periodic Inspection Report – USACE Review of Dallas Floodway System

The USACE Rehabilitation and Inspection Program (RIP) provides for rehabilitation/repair of Public Law (PL) 84-99 eligible (active status) levees that are damaged during flood events. This authority covers post flood repair of both Federally authorized/constructed and non- Federally constructed flood control works. Inspections of Federal levees are funded and conducted under the Inspection of Completed Works (ICW) program. Inspection of non-Federal levees are funded and conducted under the PL 84-99 RIP. As the levees in the Dallas Floodway as described in this report are classified as Federal levees, inspections were funded and conducted under the ICW program.

After Hurricane Katrina struck New Orleans, the USACE began assessing the Levee Safety Program (LSP) and reviewing criteria for evaluating levee systems. The USACE implemented a new LSP with a more comprehensive and rigorous levee inspection process to aid in communicating to local sponsors and the public the overall condition of levee systems and recommending actions to reduce flood risk.

During December 3-5, 2007, the USACE performed a periodic inspection of the Dallas Floodway System resulting in the *Periodic Inspection Report, Dallas Floodway, Trinity River, Dallas, Dallas County, Report No. 9* (*PI Report*) received by the City of Dallas in March 2009. The USACE documented numerous potential deficiencies based on its visual inspection for each of the four levees within the Dallas Floodway System, resulting in an overall system rating of "Unacceptable."

Preliminary Analysis and Design Check of the Levee Systems for the 100-Year Flood Event and Current Standard Project Flood Level Report

The City of Dallas performed an independent assessment of the condition of the Dallas Floodway System to evaluate options to address potential system-wide deficiencies identified in the *PI Report*. For this purpose, the City of Dallas developed the draft *Preliminary Analysis and Design Check of the Levee Systems for the 100-Year Flood Event and Current Standard Project Flood Level Report*, commonly referred to as the "Problem Identification Report (*PID Report*)." The report was prepared to present and summarize the results of currently available subsurface exploration and laboratory testing information. The report also provides preliminary geotechnical engineering findings for the levee system. The report was based on readily available existing information, which includes historical data, geotechnical data for other projects within the Dallas Floodway System, and recent core penetration test data. The conclusions and recommendations in the *PID Report* were preliminary and subject to change as more detailed information became available.

100-year FEMA Accreditation

As a result of the overall "Unacceptable" rating received in March 2009, the USACE withdrew its letter of support for continued certification of the Dallas Floodway System for the 100-year FEMA accreditation. Shortly after this withdrawal of support, FEMA began the de-accreditation

process of the Dallas Floodway System. FEMA is currently remapping the 100-year Flood Insurance Rate Map (FIRM) for the Dallas Floodway System. The City of Dallas is currently performing additional investigations, including the design of the proposed modifications, and working with FEMA in an effort to regain accreditation of the Dallas Floodway System.

Levees and Project Limits

The project limits for the proposed modifications consist of a total of 22.7 miles on both the flood and landsides of the East and West Levees as depicted in **Appendix A**, **Exhibit 1: Project Location Map** and **Exhibit 2: FEMA Floodplain and United States Geological Survey (USGS) Quadrangle Map**. Photographs of the levees and the area surrounding the project are provided in **Appendix B: Project Photographs**.

The East Levee extends 11.8 miles along the Trinity River including 3.8 miles along the Elm Fork. The downstream end of the East Levee includes a portion referred to as the East Tie-back Levee, which runs in a northeast-southwest direction and incorporates two gate closures and a concrete floodwall. The crest width of the East Levee is approximately 16 feet. The levee side slopes for the East Levee are approximately 3:1 on the riverside upstream of Continental Avenue, 4:1 downstream of Continental Avenue, and 3:1 to 4:1 on the landside. As depicted in **Appendix A**, **Exhibit 1: Project Location Map** the East Levee begins downstream near Cedar Crest Boulevard and a Dallas Area Rapid Transit (DART) line and ends upstream between Interstate Highway (IH) 35E and State Highway (SH) 354 (Harry Hines Boulevard) just north of Regal Row.

The West Levee extends 10.9 miles along the Trinity River including 3.6 miles along the West Fork and Mountain Creek. The crest width of the West Levee is approximately 16 feet. The levee side slopes for the West Levee are approximately 3:1 on the riverside upstream of Continental Avenue, 4:1 downstream of Continental Avenue, and 3:1 to 4:1 on the landside. As shown in **Appendix A**, **Exhibit 1: Project Location Map**, the West Levee begins near a DART rail line and ends upstream just south of IH 30 at Loop 12.

The East and West Levees are subdivided into reaches. The levee reaches were selected based on levee geometry, historical performance, on-going projects, bridges or landmarks, position relative to the river, and landside proximity to ditches or sumps. The East Levee is divided into 11 reaches, while the West Levee is divided into 12 reaches as depicted in **Exhibit 3: Proposed Section 408 Modification Measures Map** in **Appendix A**.

1.3 Impact Analysis Criteria

The USACE identifies a broad spectrum of general and project-specific criteria with which to analyze the potential effects of the proposed Section 408 modifications. These "impact analysis criteria" were used to assess the potential impacts stemming from implementation of the Proposed Action Alternative. These sets of criteria and guidance for determining the significance of impacts in relation to them are derived from the *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies* prepared and published by the U.S. Water Resources Council (1983) and 40 Code of Federal

Regulations (C.F.R.) 1508.27. The following criteria serve as the basis for the impact analysis presented in **Chapter 5**:

- Institutional/Regulatory Criteria;
- Public Criteria; and
- Technical Criteria.

1.3.1 Institutional/Regulatory Criteria

Institutional/regulatory criteria include those criteria required by NEPA for federal agencies to take into consideration when assessing the potential environmental consequences of proposed actions in their decision-making process. The intent of NEPA is to protect, restore, or enhance the environment through well-informed federal decisions. This EA has been prepared in accordance with the requirements as outlined in the following sections:

- NEPA;
- Council on Environmental Quality (CEQ) Regulations [40 C.F.R. 1500-1508];
- USACE Engineering Regulation 200-2-2;
- Farmland Protection Policy Act (FPPA);
- Civil Rights Restoration Act of 1987;
- Executive Order (EO) 13166 - Improving Access to Services for Persons with Limited English Proficiency (LEP);
- EO 12898 – Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations;
- EO 11990 – Protection of Wetlands;
- Clean Water Act (CWA);
- Rivers and Harbors Act of 1899;
- General Bridge Act of 1946;
- EO 11988 – Floodplain Management;
- Endangered Species Act;
- Migratory Bird Treaty Act (MBTA);
- Bald and Golden Eagle Protection Act;
- National Historic Preservation Act;
- Noise Control Act (NCA); and
- Clean Air Act (CAA).

1.3.2 Public Criteria

As part of the public review process, the public and applicable resource agencies will have an opportunity to review the EA and provide comments as per NEPA regulations. The comments received during this review period will be taken into consideration during the final determination of the significance of the effects of implementing the Proposed Action Alternative.

1.3.3 Technical Criteria

HNTB, as the EOR is responsible and liable for the adequacy and safety of a design. The technical component of the Section 408 Report includes the EOR's technical analysis and adequacy of design including hydraulic and hydrology component (i.e., changes in inflow,

changes in water surface profiles and flow distribution, assessment of local and system-wide resultant impacts, upstream and downstream impacts, etc.), geotechnical analysis (i.e., stability, seepage/underseepage, material usage/borrow/waste/transport/hauling, etc.), and O&M requirements (applicant facilities and water control management plan). The USACE provides no opinion as to the efficacy of the modifications to provide flood risk management benefits.

2.0 PURPOSE AND NEED

The purpose of the proposed Section 408 modifications is to reduce the potential for underseepage and help regain the 100-year FEMA accreditation.

After the "Unacceptable" rating the Dallas Floodway System received in March 2009, FEMA began the de-accreditation process of the system. FEMA de-accreditation implies that the Dallas Levees Floodway would not provide protection from the one percent annual chance exceedance (100-year base flood). The proposed Section 408 modifications are needed because FEMA is currently remapping the 100-year FIRMs for the Dallas Floodway System to reflect this condition.

The Proposed Action Alternative consists of the implementation of Section 408 modifications designed to satisfy 100-year FEMA accreditation requirements.

In 2007, a periodic inspection of the Dallas Floodway System (*PI Report*) was performed based on the new, more stringent post-Hurricane Katrina levee rating methods. When the results of the inspection were transferred into the new inspection template, numerous potential deficiencies were documented based on visual inspections for each of the four components of the Dallas Floodway System, resulting in an overall system rating of "Unacceptable." This was the first time in its history that the Dallas Floodway System would not receive a satisfactory rating. Results of the inspection are reported in the PI Report, received by the City of Dallas in March 2009. In summary, the *PI Report* identified O&M as well as potential system-wide deficiencies. The report concluded that the Dallas Floodway System could potentially not meet current USACE design criteria regarding relevant factors of safety for embankment stability and seepage/underseepage gradients. The report includes a total of 198 O&M deficiencies consisting of 46 items with an "Unacceptable" rating, 130 items with a "Minimally Acceptable" rating, and 22 items that received an "Observed" rating. The *PI Report* concludes that the Dallas Floodway System is "Unacceptable." Reported O&M deficiencies include issues such as erosion, siltation, vegetation, channel instability, and damaged flood control structures.

The USACE memorandum dated January 18, 2007, *Supplemental Policy Guidance for the USACE 26 September 2006 Policy Guidance for Prioritization of Fiscal Year (FY) 07 Inspection of Completed Works (ICW), Operations and Maintenance (O&M), General (O&M Gen), Mississippi River and Tributaries (MR&T), and Flood Control & Coastal Emergencies (FCCE) Inspections Accounts*, indicates that a one-time only "maintenance deficiency correction period" (MDCP) of one year may be established to allow public sponsors sufficient time to correct project maintenance deficiencies before the project is placed in an inactive status in the RIP.

In accordance with the above-referenced memorandum, the City of Dallas prepared an *MDCP Plan* to address the "Unacceptable" rating for O&M noted in the *PI Report*. Because the City of Dallas successfully completed 122 out of 149 MDCP items before March 31, 2010, the USACE granted an extension of PL 84-99. PL 84-99 authorizes federal rehabilitation assistance to repair flood damage reduction systems (levees, pump stations, sluice gates, etc.) damaged by flood events. As of October 12, 2011, 193 of the 198 O&M items have been completed.

The draft *Levee Remediation Plan* (*LRP)* combined findings from the *PI Report* and the draft *PID Report* with geotechnical data to develop preliminary recommendations to address system-wide deficiencies identified in the draft *PID Report*. The draft *LRP* documented concerns with either stability or seepage/underseepage or both along many of the reaches of the East and West Levees and no stability or seepage/underseepage concerns along others. **Table 2-1** identifies the presence or absence of stability and/or seepage/underseepage concerns for each reach along the East and West Levees as determine by the City's EOR. In the table, reaches noted with an "X" indicate where factors of safety were found to be less than required. **Exhibit 3: Proposed Section 408 Modifications Map** in **Appendix A** depicts the locations of levee reaches along the East and West Levees.

Table 2-1: Summary of Levee Concerns Identified in the Draft *LRP*

Levee	Reach*	Stability			Seepage/Underseepage
		Long-term Landside (800-year level)	Normal Riverside (100-year level)	Rapid Drawdown	
East Levee	ER-1	X			X
	ER-2	X			X
	ER-3	X			X
	ER-4				
	ER-5	X			X
	ER-6	X			X
	ER-7	X			X
	ER-8				X
	ER-9	X			X
	ER-10	X			X
	ER-11	X			
West Levee	WR-1				
	WR-2	X			X
	WR-3	X			
	WR-4				
	WR-5				X
	WR-6				
	WR-7				
	WR-8	X		X	X
	WR-9	X	X		X
	WR-10	X			X
	WR-11	X			X
	WR-12	X			

Source: draft Levee Remediation Plan. HNTB. 2010; draft PID Report. HNTB. 2009.

**Levee reaches along the East Levee are coded as ER, and reaches along the West Levee are coded as WR.*

*Note: In some instances, stability and/or seepage/underseepage concerns along some reaches indicated in **Table 2-1** only occur along a small portion of the respective reach and do not indicate that the specified concern exists along the entirety of the specified reach. If a concern was identified along any portion of a reach, the presence of the concern for the respective reach is indicated in **Table 2-1**.*

As depicted in **Table 2-1**, the draft *LRP* summarized long-term landside stability issues identified in the draft *PID Report* along East Reach (ER)1-3, ER-5, ER 6-7, and ER 9-11. The draft *LRP* also recapped seepage/underseepage issues identified in the draft *PID Report* along reaches ER 1-3 and ER 5-10 for the East Levee. For the East Levee, the draft *LRP* recapped no stability or seepage/underseepage concerns along reach ER-4. The draft *LRP* summarized long-term landside stability concerns identified in the draft *PID Report* along West Reach (WR) 2-3 and WR 8-12. The draft *LRP* also recapped normal riverside stability issues along reach WR-9 and rapid drawdown stability concerns along reach WR-8 for the West Levee. The draft *LRP* summarized seepage/underseepage concerns identified in the draft *PID Report* along reaches WR-2, WR-5, and WR 8-11. Reaches WR-1, WR-4, and WR 6-7 revealed no stability or seepage/underseepage issues.

In 2011, cross-sections along the East and West Levees were evaluated to identify seepage/underseepage issues within the levee reaches. Sections within both the East and West Levees were identified as not meeting the USACE design guidance for levee seepage criteria *USACE EM 110-2-1913/USACE ETL 569.*

100-Year FEMA Accreditation

FEMA provides assistance for emergency preparedness and disaster relief, administers the National Flood Insurance Program (NFIP), and engages in floodplain management and flood hazard mapping. In addition, as part of its authority, FEMA provides accreditation of levees and levee systems. FEMA accreditation is the process FEMA uses to show a levee system on a Flood Insurance Rate Map (FIRM) as providing protection from the one percent annual chance exceedance (100-year base flood). FEMA's accreditation determination is based on the submittal of data and documentation as required by Section 65.10 of the NFIP regulations. Levee certification, is the process by which structural, operational, and maintenance requirements must be evaluated and certified by a professional engineer that the levee was adequately designed and constructed to reduce flood risk against the 100-year base flood. The purpose of levee certification is to determine how FEMA would map the floodplain protected by levees for flood insurance purposes. The City of Dallas is choosing to pursue levee certification for FEMA purposes.

As a result of the "Unacceptable" rating that the Dallas Floodway System received in March 2009, the USACE withdrew its letter of support to certify the system for the 100-year FEMA accreditation. Shortly after this withdrawal of support, FEMA began the de-accreditation process of the Dallas Floodway System. A de-accredited levee system is one that was once shown on a FIRM as providing protection from the one percent annual chance exceedance but is no longer accredited with providing this protection because of known structural deficiencies or because FEMA has not been provided with sufficient data and documentation to determine that the levee system continues to meet the NFIP regulatory requirements cited in 44 C.F.R. Section 65.10. FEMA is currently remapping the 100-year FIRM for the Dallas Floodway System. The City of Dallas is currently performing additional investigations, including the design of the Proposed Action Alternative, and working with FEMA in an effort to regain accreditation of the Dallas Floodway System.

The Proposed Action Alternative includes the implementation of Section 408 modification measures designed by the City and HNTB to address seepage/underseepage concerns within the Dallas Floodway System, which is federally-authorized by the USACE. Any proposed modification to an existing USACE project (either federally or locally maintained) that goes beyond those modifications required for normal O&M requires approval under Section 408. As stated in Section 408 requirements, there shall be no temporary or permanent alteration, occupation, or use of any public works including, but not limited to, levees, sea walls, bulkheads, jetties, and dikes for any purpose without the permission of the Secretary of the Army. Under the terms of Section 408, any proposed modification requires a determination by the Secretary of the Army that such proposed alteration, permanent occupation, or use of a federal project is not injurious to the public interest and will not impair the usefulness of such work.

It is anticipated that if the Proposed Action Alternative is implemented and documentation including supporting certification of the Dallas Floodway System is provided, the City of Dallas would regain 100-year FEMA accreditation prior to the release of the revised flood maps. However, if the Proposed Action Alternative is not implemented, FEMA would finalize and reissue the final effective 100-year FIRMs. Under the latter case, the existing structures within the remapped areas that have federally-backed mortgages and loans would be required to carry flood insurance. In addition, many privately-issued mortgages would also require flood insurance security. The remapped areas would also be subject to new constraints and more stringent requirements for development.

3.0 DESCRIPTION OF ALTERNATIVES

Subsequent to the USACE's noting of potential system-wide deficiencies in the *PI Report* associated with the Dallas Floodway System, the City of Dallas determined the location and extent of system-wide problems as documented in the draft *PID Report*. The draft *LRP*, composed by the City of Dallas to combine findings from the *PI Report* and draft *PID Report* with geotechnical data, summarizes stability and seepage/underseepage concerns identified in the draft *PID Report* and provides preliminary recommendations to address the identified system-wide deficiencies listed in **Table 2-1**.

3.1 Preliminary Section 408 Alternative Modification Measures Considered

In addition to summarizing the range of location-specific concerns identified in the draft *PID Report* by levee reach along the East and West Levees, the draft *LRP* provides a range of potential preliminary Section 408 modification measures to address the assortment of concerns identified. Preliminary alternative measures considered to address seepage/underseepage issues noted in the draft *LRP* included riverside fattening, landside relief wells, riverside cutoff walls, and landside levee drains. Measures considered to address long-term steady-state slope stability include landside berms and riverside shift with landside relief wells. In cases where the draft *PID Report* identified both seepage/underseepage and long-term steady-state slope stability issues, seepage/underseepage measures typically resolve both concerns. However, some cases require long-term steady-slope stability measures in conjunction with seepage/underseepage measures to resolve both concerns. In summary, the seven preliminary Section 408 alternative modification measures considered included:

- Riverside Cutoff Walls;
- Landside Relief Wells;
- Riverside Shift with Landside Relief Wells;
- Landside Berms;
- Landside Drains;
- Riverside Fattening; and
- Blind Drains or Sump Seepage Berms.

For many of the levee reaches along the East and West Levees, one or more alternative measures could relevantly apply to each stability and/or seepage/underseepage concern for each levee reach. For example, along one of the levees, multiple alternative measures could be considered to

address stability and/or seepage/underseepage concerns for one levee reach or only one alternative measure could be considered for another reach while some reaches may not be considered for any measures. Therefore, multiple combinations of alternative measures may be applied to each levee as well as each levee reach.

Table 3-1 provides the various combinations of potential alternative measures by levee reach as analyzed in the *Draft LRP*. As shown in the table, because there are multiple combinations of measures that could be applied to each levee as well as from levee reach to levee reach to address the identified stability and/or seepage/underseepage issues, in the interest of concision, the full range of potential alternatives considered are not discussed independently. Instead, this combination and range of potential alternatives considered is a collective representation of alternative measures considered along with the chosen preferred alternative referred to herein as the Proposed Action Alternative.

Table 3-1: Preliminary Section 408 Alternative Modification Measures Considered

Levee	Reach	Alternative Modification Measure Number						
		1- Riverside Cutoff Walls	**2- Landside Relief Wells**	**3- Riverside Shift with Landside Relief Wells**	**4- Landside Berms**	**5- Landside Levee Drains**	**6- Riverside Fattening**	**7- Blind Drains or Sump Seepage Berms***
East Levee	East Tie-back	X	X					X
	ER-1	X	X					X
	ER-2	X	X					X
	ER-3	X	X					X
	ER-4							X
	ER-5				X			X
	ER-6	X	X		X			X
	ER-7	X	X					X
	ER-8	X	X					X
	ER-9	X	X					X
	ER-10	X	X					X
	ER-11	X	X		X	X		X
West Levee	WR-1							X
	WR-2	X		X	X			X
	WR-3				X			X
	WR-4							X
	WR-5				X	X		X
	WR-6							X
	WR-7							X
	WR-8			X			X	X
	WR-9			X			X	X
	WR-10	X		X				X
	WR-11	X	X					X
	WR-12	X	X		X	X		X

Sources: Draft Levee Remediation Plan. HNTB. 2010.

*Note: Reaches noted with an "X" indicate that the corresponding alternative measure was considered. In some instances, measures considered along some reaches indicated in **Table 3-1** would only apply along a small portion of the respective reach and do not indicate that the specified considered alternative measure would be applicable along the entirety of the specified reach. If an alternative measure was considered along any portion of a reach, the measure considered for the respective reach is indicated in **Table 3-1**.*

3.2 No-Action Alternative

The No-Action Alternative represents the case in which the proposed Section 408 modification measures for the Dallas Floodway System are not implemented and the levees associated with the Dallas Floodway System are not accredited by FEMA. Under the No-Action Alternative, identified levee deficiencies related to seepage/underseepage pertaining to the one percent annual chance exceedance (100-year base flood) would not be remedied. This alternative would result in the Dallas Floodway System's continued "Unacceptable" rating and fall short of meeting the 100-year FEMA accreditation requirements. Under this alternative, as an indirect result of not implementing the proposed Section 408 modification measures, an abundance of land area located within the City of Dallas not currently located within the 100-year floodplain as designated by FEMA may be remapped as being included in the 100-year floodplain. This EA analyzes this No-Action Alternative using existing conditions as a baseline to establish and disclose the implications for examined resources of not implementing the proposed modifications.

3.3 Proposed Action Alternative

The selection of the Proposed Action Alternative as the preferred alternative among the preliminary alternative measures considered in the draft *LRP* is based on a number of variables. These variables include:

- Short-term capital costs of installation and construction;
- Long-term maintenance and operation costs of potential alternatives;
- The long-term burden of responsibility for maintaining and operating potential alternatives;
- Logistical feasibility of implementing the potential alternatives;
- Relationship to sump condition.

The consideration of these variables render the Proposed Action Alternative the most optimal solution and the only feasible and practicable alternative to potentially remedy levee seepage/underseepage concerns. Therefore, other potential preliminary alternative measures were dropped from further consideration.

Under the Proposed Action Alternative, the City of Dallas would implement Section 408 modifications designed by the City's EOR to address seepage/underseepage concerns along specific portions of the East and West Levees. The Proposed Action Alternative consists of the installation of approximately 18,300 linear feet of riverside cutoff walls along selected portions of the East and West Levees and concrete and riprap scour protection at the Hampton Pump Station outfall channels.

Cutoff Walls

The Proposed Action Alternative involves the construction of 18,300 linear feet of riverside cutoff walls consisting of mostly soil-bentonite or cement-bentonite backfill located along selected portions of the East and West Levees. The East Levee cutoff wall is approximately 15,700 feet long, with an anticipated trench depth of approximately 40 to 55 feet deep. At the Hampton Pump Station outfall channels, the cutoff wall would be cement-bentonite. The cutoff wall would be located a minimum distance of approximately 50 feet from the riverside levee toe.

The West Levee cutoff wall would be approximately 2,600 feet long, with an anticipated trench depth of 10 to 20 feet deep. The soil-bentonite cutoff wall would be located at a minimum distance of approximately 25 feet from the riverside levee toe.

In addition to the cutoff walls, concrete and riprap scour protection at the Hampton Pump Station outfall channels would be implemented for erosion protection.

The locations of the Proposed Action Alternative measures by type are provided in **Appendix A**, **Exhibit 3: Proposed Section 408 Modification Measures Map**. The typical sections and plan views of the proposed levee remediation measures associated with the Proposed Action Alternative are included in **Appendix C: Proposed Section 408 Modification Measures**. The Proposed Action Alternative as described above is the preferred alternative.

4.0 EXISTING ENVIRONMENT

4.1 Project Setting and Land Use

4.1.1 Region of Influence

As previously discussed, because of FEMA's current de-accreditation initiated in response to the USACE's withdrawal of continued support to certify the Dallas Floodway System, the indirect effect of FEMA's remapping of the City of Dallas may result in many areas currently and historically considered risk-averse from the one percent annual chance exceedance on FIRMs as being at risk for inclusion within such designation. As a result, FEMA may remap new areas of the City of Dallas as being included in a Special Flood Hazard Area (SFHA), which are areas subject to inundation by a flood that has a one percent or greater chance of being equaled or exceeded during any given year. This area is commonly referred to as the 100-year floodplain or base flood elevation.

The Flood-Disaster Protection Act of 1973 and the National Flood Insurance Reform Act of 1994 made the purchase of flood insurance through the NFIP mandatory for federally-backed mortgages on buildings located within SFHAs (FEMA, 2010). The requirement also applies to all forms of federal or federally-related financial assistance for buildings located in an SFHA and affects mortgages, loans, and grants for the purchase, construction, repair, or improvement of any publicly- or privately-owned building in an SFHA (FEMA, 2010). Federal regulations require purchase of structural insurance coverage equal to the amount of the loan or the maximum amount available from the NFIP, whichever is less (FEMA, 2010). The maximum amount available for a single-family home is $250,000 (FEMA, 2010). In addition to the requirement for buildings secured by federally-backed loans or buildings receiving any type of federal financial assistance, the vast majority of private lenders issuing mortgages or loans for the purchase, construction, repair, or improvement of buildings located within an SFHA also require the building to be covered by flood insurance issued through the NFIP. Further, as mandated by FEMA and the City of Dallas, the remapping of areas to be included in an SFHA would necessitate any new construction or renovation to comply with stricter building codes designed to

better protect structures from flood inundation and associated damage as well as to prevent adverse impacts to other properties in or near the floodplain (City of Dallas, 2010d).

Because the remapping of FIRMs by FEMA within the City of Dallas may increase the size of the SFHA under the No-Action Alternative to include areas beyond what is currently mapped by FEMA as included in the SFHA, the ROI for this land use assessment is defined by the area within the City of Dallas that may be located within the 100-year floodplain as designated by FIRMs issued by FEMA under the No-Action Alternative. More specifically, the land use ROI is the area that may be located within the 100-year floodplain that, under current FIRMs, is not designated to be in an SFHA as depicted in **Appendix A**, **Exhibit 4: Land Use ROI Map**. This ROI is designated as such because of the potential for the remapping of SFHAs to result in substantial land use and economic impacts and associated consequences to populations residing in or that are economically dependent on affected areas within the City of Dallas. Impacts to land use, land use and development plans, and land economics associated with the remapping of SFHAs are discussed in further detail in **Section 5.1.1: No-Action Alternative**. The land use ROI totals approximately 8,098 acres.

4.1.2 Project Setting

The setting of the land use ROI, depicted in **Appendix A**, **Exhibit 4: Land Use ROI Map**, is generally adjacent to the Dallas Floodway System along its landside northwest, west, and south of downtown Dallas. Modification measures associated with the Proposed Action Alternative are located in the existing 100-year floodplain of the Trinity River within the Dallas Floodway System along both the riversides of the East and West Levees as depicted in **Appendix A**, **Exhibit 3: Proposed Section 408 Modification Measures Map**.

The land use ROI contains portions of a major regional and national hub of commerce and economic activity for north central Texas, the southern Great Plains, and the U.S. as a whole. The North Central Texas Council of Governments (NCTCOG), a regional planning agency and Metropolitan Planning Organization (MPO) for the Dallas – Fort Worth (DFW) Metroplex, inventories major employers (those with greater than 250 employees) for specified areas, including cities, located within the DFW Metroplex. NCTCOG data reveal the presence of several major employers within the land use ROI. According to the NCTCOG, the City of Dallas contains 354 major employers with a total of approximately 258,000 employees. Of the 354 major employers within the City of Dallas, 44 major employers with a total of approximately 31,000 employees are located within the land use ROI accounting for approximately 12 percent of the City of Dallas's 354 major employers as well as 12 percent of the City of Dallas's employees attributed to major employers. Some of the largest major employers contained by the land use ROI include the UT-Southwestern Medical Center, the Dallas County Sheriff's Office, Hilton Anatole Hotel, Dallas County Community Supervision, the Conwell Corporation, Atrium Aluminum Companies, and Silverleaf Resorts, Inc. Additionally, major transportation infrastructure facilities, including four federal highways [IH 35E, IH 30, United States Highway (U.S.) 77, and U.S. 67], numerous freight rail lines, long-distance passenger rail lines (Trinity Railway Express and Amtrak), and light-rail lines (DART) border or traverse the land use ROI providing access to numerous nearby economic amenities and points of interest (Amtrak, 2010 and Mapsco, 2006).

4.1.3 Existing Terrain and Land Cover

Terrain within the land use ROI is generally level to gently rolling. NCTCOG elevation contour data reveal elevations within the land use ROI range from approximately 380 feet to 466 feet above sea level. Land cover within the land use ROI is predominantly comprised of impervious urban structures and transportation infrastructure with fragmented pockets of generally mixed herbaceous and woody vegetation outside the existing 100-year floodplain on the landside of the Dallas Floodway System and larger areas of maintained herbaceous and riparian woody vegetation within the 100-year floodplain. According to data generated by the NCTCOG, approximately 27.5 acres (0.3 percent) of land cover within the land use ROI are attributed to surface water.

4.1.4 Existing and Future Land Use

Existing Land Use and Zoning

The land use ROI totals approximately 8,098 acres and spans areas directly to the north and east of the East Levee and south and west of the West Levee. Since 1990, land uses in the land use ROI have evolved to adapt to changes in transportation accessibility and mobility; regional economic growth, vitality, and market forces in the region; residential and employment preferences; and the goals and objectives of the City of Dallas's land use planning efforts. The types, density, and character of land uses within the land use ROI are evolving toward consistency with locally-adopted land use policy guides as well as the land use and development implementation measures stemming from those guides such as zoning, subdivision regulations, and economic development incentives. Applicable policy guides and land use planning implementation tools are discussed later in this section.

According to land use inventory data generated by the NCTCOG at five-year intervals between 1990 and 2005, land use types within the land use ROI underwent considerable change and are continuing to diversify. **Table 4-1** summarizes the acreages of various land use categories within the land use ROI for 1990, 1995, 2000, and 2005.

Table 4-1: Acreages of Land Use Types within the Land use ROI, 1990-2005

Land Use Type	Year				Percent Change 1990-2005
	1990	1995	2000	2005	
Residential	1,905.1	1,827.8	1,426.9	1,079.5	-43.3%
Commercial	746.9	1,020.0	743.7	832.4	11.4%
Industrial	3,764.4	3,359.2	2,890.9	2,538.5	-32.6%
Public Use/Government	244.1	236.2	192.2	283.9	16.3%
Recreational/Park Space	52.8	54.2	50.7	119.2	125.8%
Surface Water	20.6	20.6	33.3	27.5	33.5%
Other Uses/Undeveloped/Infrastructure/ Parking	1,364.1	1,580.0	2,760.3	3,217.0	135.8%
Total	**8,098**	**8,098**	**8,098**	**8,098**	**N/A**

Source: NCTCOG, 2010. Accessed June 2010 at http://www.dfwmaps.com/clearinghouse/

From 1990 to 2005, the amount of land area attributed to residential and industrial uses declined, and land area attributed to commercial uses fluctuated. The amount of land area attributed to public use or government use; recreational or park space; surface water; and other uses, undeveloped land, infrastructure, or parking generally increased. Land area within the land use ROI attributed to residential use declined from approximately 1,905.1 acres to 1,079.5 acres, a decrease of approximately 825.6 acres or 43.3 percent. Although the amount of land area attributed to residential uses declined, denser residential development in the land use ROI has more than compensated for any corresponding reduction in dwelling units, which is consistent with data indicating population growth in the land use ROI and further indicating an increase in residential density. During the same period, the amount of land area within the land use ROI attributed to industrial use also declined from approximately 3,764.4 acres to approximately 2,538.5 acres, a decrease of approximately 1,225.9 acres or 32.6 percent. The amount of land area consumed by commercial uses fluctuated during the same period between approximately 743.7 and 1,020 acres and grew by approximately 11.4 percent from 1990 to 2005.

The location and amount of various land uses types as well as the character of development, improvements to the land, the erection of structures, land division, land preservation, urban design, and density can best be explained by land use controls in an area, including zoning and subdivision standards. All land within the City of Dallas is zoned and is subject to the City's locally-adopted zoning and subdivision standards (City of Dallas, 2010c). Zoning is a tool used by local or state jurisdictions to control the use and physical development of land and is traditionally applied at the parcel level, although the City of Dallas, like many other cities nationwide, has also become heavily dependent on planned unit development zoning. Planned unit development zoning intends to apply land use and development controls to larger areas than a single parcel or lot to collectively achieve a specific and unified multi-functional neighborhood character with mixed land uses having symbiotic relationships. The City of Dallas uses both traditional zoning approaches as well as planned unit developments, which are called planned development districts by the City of Dallas (City of Dallas, 2010e).

Subdivision or platting regulations and standards intend to ensure adequate and/or compatible lot sizes from land subdivision, safe and sufficient public access, the availability of public services to each lot, and fiscally-efficient short- and long-term use of land among other objectives. The City of Dallas enforces subdivision regulations and standards on new and existing redevelopment within its jurisdiction and within the land use ROI (City of Dallas, 2009). Both zoning and subdivision standards are two of the most effective implementation tools for furthering the goals and objectives for the City of Dallas's physical development and character identified in planning policy guides, including comprehensive plans, small area plans, corridor plans, and economic development plans.

Multiple zoning designations exist within the land use ROI. Large areas north and east of the East Levee are zoned for high-density industrial research uses and medium-density industrial manufacturing uses (City of Dallas, 2010c). Multiple large planned development and mixed-use districts instituting modern urban design standards with co-functional light commercial office and personal service uses and medium- to high-density residential uses also exist within the land use ROI in areas north and east of the East Levee (City of Dallas, 2010c). Smaller pockets of the land

use ROI north and east of the East Levee include areas zoned for low-density commercial services and high-density Central Business District (CBD) uses (City of Dallas, 2010c).

Large areas of the western portion of the land use ROI south and east of the West Levee near Mountain Creek and at the confluence of the Elm Fork and West Fork are zoned for low-density light industrial, high-density industrial manufacturing, medium-density industrial research uses, and small-lot single-family residential uses (City of Dallas, 2010c). Smaller areas of the western portion of the land use ROI south and east of the West Levee are zoned for low-density office, low-density neighborhood service, mobile home, low-density multi-family and townhome, and low-density commercial retail and service uses scattered throughout the West Dallas neighborhoods (City of Dallas, 2010c). Large areas of the eastern and southeastern portions of the land use ROI south and west of the West Levee on the west side of the Trinity River across from Dallas's CBD are zoned for small-lot single-family residential and medium-density industrial research uses as well as a variety of special-purpose mixed-use planned development districts (City of Dallas, 2010c). Smaller areas are zoned for high-density industrial manufacturing, low-density townhome, and low-density commercial retail and service uses (City of Dallas, 2010c).

Land Use Plans and Future Land Use

A number of land use and development planning policy guides adopted by the City of Dallas direct future land uses, future development and redevelopment patterns, neighborhood character, transportation infrastructure, economic development, and other vital community functions within the land use ROI. One such guide is the City of Dallas's Comprehensive Plan, *forwardDallas!*, which functions as the City of Dallas's overarching planning policy guide from which other smaller area plans and associated implementation tools emanate to collectively and comprehensively further the City of Dallas's goals and objectives regarding its physical character and development pattern. The *forwardDallas!* Plan was adopted by Dallas's City Council on June 14, 2006, and serves as the City's overall planning policy guide directing future land uses, community and neighborhood character, and corresponding infrastructural programming. The plan consists of a community vision, a policy plan, an implementation plan, and a monitoring plan. The community vision component of the plan is a collection of shared ideas provided by citizens of what they desire for the City in the future. The vision is a broad description of the future of Dallas reflecting the aspirations and core values of its stakeholders and residents.

The policy plan component, the actual development policy guide component of the plan, substantiates and provides guidance for the implementation of the City of Dallas's broad vision established by community participants. It provides a description of implementation strategies and policies organized into functional components to provide an institutional base for the *forwardDallas!* initiative and to guide public and private activities toward the vision. The goals and foci of the policy plan are:

- To improve the quality of life for all Dallas residents;
- To serve as a framework to guide Dallas as it grows and matures;
- To facilitate the growth of the economy, focusing on emerging economic engines and opportunities that bring prosperity to Dallas residents;

- To open new housing choices to citizens at all income levels;
- To guide the general location and pattern of future land uses;
- To foster strategic development in order to achieve the City's goals;
- To guide growth toward areas that will benefit the City as a whole, while steering away from stable residential areas; and
- To create development opportunities capitalizing on public transit options.

The implementation plan is a 5- to 7-year work program detailing specific actions to be undertaken. The City's action plan, a subset of the implementation plan, outlines a 1- to 2-year work program detailing specific actions for the immediate future because they are either systemically urgent issues or are targeted geographic areas with opportunities where immediate attention can yield quick success. The monitoring plan establishes benchmarks and a monitoring system to assess whether the goals of the vision and policy plan area are realized. It also provides specific methods to evaluate the performance of the overall plan.

The City of Dallas's *forwardDallas!* plan does not contain an official future land use map but does contain a *Vision Illustration* compiled from input provided by community vision participants. Suggestions for future land uses according to the *Vision Illustration* designate most land in the land use ROI north and east of the East Levee to be used as an urban mixed-use district or industrial area with smaller areas designated for use as business center or corridor and downtown land use districts. Suggestions for future land uses according to the *Vision Illustration* designate areas within the land use ROI along the West Levee to be used as residential neighborhoods, industrial areas, urban neighborhoods, and urban mixed-use districts. The area contained by the Dallas Floodway is generally designated as open space. Land use designations provided on the *Vision Illustration* are generally very broad as to details related to the character of development associated with each designation.

Although the *forwardDallas!* plan serves as the City of Dallas's overarching land use planning policy guide, it also serves to tie land use plans covering smaller and more specific targeted districts or areas within the City together. These plans provide more specific future land use designations for areas within the City and land use ROI and function more as future land use plans guiding the City of Dallas's decisions than the overarching *forwardDallas!* plan. Other specific and active smaller area land use plans and/or planning policy guides within the land use ROI include but are not limited the *Trinity River Corridor Comprehensive Land Use Plan* (*TRCCLUP*), the *Stemmons Corridor – Southwestern Medical District Plan*, the *South Dallas/Fair Park Economic Development Corridor Plan*, and the *West Dallas Comprehensive Land Use Study*. The City of Dallas employs over 250 plans, studies, and reports as policy guides for directing land use within the City (City of Dallas, 2010b).

Trinity River Corridor Comprehensive Land Use Plan (*TRCCLUP*)

The *TRCCLUP*, adopted March 2005, is the most comprehensive and relevant land use planning policy guide for areas located within the land use ROI and targets a 70-square mile region designated by the *TRCCLUP* as the Trinity River Corridor. The *TRCCLUP* is one guiding component for the future Trinity River Corridor and the use of adjacent land to further the goals and objectives of the overall Trinity River Corridor Project. The Trinity River Corridor Project

involves flood risk management, environmental restoration and recreation, transportation, and community and economic development projects and improvements for the Trinity River Corridor and the land use ROI (City of Dallas, 2005). The Trinity River Corridor Project was approved as a capital bond program in 1998 by the citizens of the City of Dallas and is composed of three central elements: building of levees, wetlands, downtown lakes, gateway parks, trails, etc.; expansion and preservation of the Great Trinity Forest; and transportation improvements (City of Dallas, 2005). In 2003, the City of Dallas adopted the *BVP* to guide the implementation of specific goals and interrelated projects associated with the overall Trinity River Corridor Project.

The primary objectives of the *TRCCLUP* are to reconnect northern and southern Dallas, establish the role of economic development along the Trinity River, create a vibrant central city, establish the Trinity River floodplain as the front yard to the City of Dallas, and enhance the City's urban form to increase the appeal of urban life (City of Dallas, 2005). The *TRCCLUP* suggests a wide variety of future land uses for the land use ROI. Future land uses for areas north and east of the East Levee within the land use ROI include a light industrial district in areas abutting the Elm Fork, regional corridor districts along IH 35E and SH 183, community corridor districts along Irving Boulevard and Mockingbird Lane, a mixed-use/adaptive reuse district for a large area between IH 35E and the East Levee, regional employment and office districts for areas generally east and north of IH 35E, a CBD district in downtown Dallas, small scattered and interspersed pockets of residential urban districts, and generally smaller and interspersed residential riverside districts adjacent to the East Levee (City of Dallas, 2005).

Future land uses for areas along the West Levee within the land use ROI include large areas of residential traditional districts; community corridor districts along urban arterials such as Singleton Boulevard, Westmoreland Road, and Hampton Road; a regional corridor district along Loop 12; a CBD district and mixed-use/adaptive reuse district adjacent to the West Levee directly west of downtown Dallas across the Dallas Floodway in West Dallas; residential riverside districts adjacent to the West Levee; small interspersed pockets of residential urban and light industrial districts; and transit center districts around future DART stations (City of Dallas, 2005).

Land use districts designated for the land use ROI by the *TRCCLUP* generally allow a mix of uses at varying degrees and flexibilities based on the type of district with the exception of the heavy industrial district. Districts themselves are planned to provide intra- and inter-district neighborhood-scale linkages as well as permeability and linkages to nearby amenities, open spaces, and the public realm. Designated land uses in the *TRCCLUP* are not designed to assign specific land use types to specific parcels but are designed for categorized districts to achieve a desired development pattern based on an optimal mix of primary and secondary uses taking into consideration the area's features, infrastructure and service needs, and the ability of the area to absorb the mix of uses. The *TRCCLUP* suggests the land use ROI will generally continue to develop or redevelop into higher density uses through the year 2050, especially for areas directly abutting the Dallas Floodway.

Stemmons Corridor – Southwestern Medical District Area Plan

The *Stemmons Corridor – Southwestern Medical District Area Plan*, adopted by the City of Dallas in 2010 and added as an implementation component to the *forwardDallas!* plan, covers a

substantial portion of the land use ROI north and east of the East Levee including a large area between Harry Hines Boulevard and the East Levee and a large portion of the IH 35E corridor traversing the land use ROI. The district functions as a major employment center for the City of Dallas, representing over 55,000 jobs (City of Dallas, 2010i). The purpose of the *Plan* is to better integrate the district with surrounding areas and future proposed plans and projects, emphasize growth targets for critical infrastructure planning to better connect the employment- and visitor-rich district to the rest of the City and the City's infrastructure, capitalize on improved transit access, and to provide a framework for long-term land use and zoning policy. Future land use designations provided in the *Plan* generally follow those of the *TRCCLUP* but with more detailed urban design and sub-district urban character specificity with regard to transit-oriented district planning, the incorporation of wide-ranging modes of transportation, and traditional neighborhood preservation.

West Dallas Comprehensive Land Use Study and West Dallas Strategy Economic Development and Neighborhood Preservation Study

The *West Dallas Comprehensive Land Use Study*, completed in April 1999 and revised in May 1999, covers the majority of the land use ROI adjacent to the West Levee. The purpose of the *Study* was to inventory all existing West Dallas land uses and identify zoning issues and strategic options that will influence the positive redevelopment and stability of the area (City of Dallas, 1999). Findings of the *Study* concluded that West Dallas contained a shortage of community-serving retail uses, and the underserved West Dallas neighborhood market relies on adjacent communities to acquire retail goods and entertainment services (City of Dallas, 1999). In addition, according to the *Study*, West Dallas has not reached is full economic potential because of the perceived risk of establishing or locating a business south of the Trinity River, which occurs despite attractively-priced land and incentives available for development (City of Dallas, 1999). These perceptions relate to crime, environmental conditions, and the public's general lack of knowledge of the area (City of Dallas, 1999). Further, the age and deteriorating condition of the housing stock have contributed to declining population and homeownership coinciding with a deteriorating economic environment, limiting opportunities for employment despite an available workforce (City of Dallas, 1999). The result on the landscape of West Dallas is the underutilization of commercial space that is now vacant and dilapidated.

In response to these documented issues in West Dallas, the *West Dallas Comprehensive Land Use Study* recommends future land uses for West Dallas. The recommendations focus on the need to stimulate economic redevelopment opportunities, stabilize housing resources, and better utilize existing community assets such as the Trinity River Greenbelt (City of Dallas, 1999). General future land use recommendations as provided in the *Study* include the incorporation of pockets of office, commercial service, mixed-use, and retail uses throughout the West Dallas neighborhoods at scattered locations to optimize community retail and service market capture at a localized neighborhood scale (City of Dallas, 1999). In addition, the *Study* recommends the establishment of light industrial land uses in an area abutting the West Fork adjacent to the West Levee near Loop 12 (City of Dallas, 1999).

The *West Dallas Strategy Economic Development and Neighborhood Preservation Study*, adopted March 1983, is a strategy for West Dallas development with the intent to assure that funds

generated by the Federal Urban Development Action Grant (UDAG) have a meaningful impact. The *Study* recommends and provides general guidelines to direct policy and future investment decisions concerning West Dallas.

Tax Increment Financing Districts

The land use ROI either partially or wholly contains a number of tax increment financing (TIF) districts including, but not limited to, the Fort Worth Avenue TIF District, the Design District TIF district, the Cedars TIF district, and the Oak Cliff Gateway TIF district. Tax increment financing is a public financing method generally used for redevelopment and community improvement projects and uses future gains in property taxes to finance current improvements that will theoretically create the conditions for future gains in tax revenues based on increased tax valuation assessments. In effect, it essentially borrows against future property tax revenue increases. TIF districts generally target distressed areas with the potential to be redeveloped and attract private investment if provided with adequate public improvements and TIF financing incentives. TIF districts generally have substantial implications for the type and intensity of land uses in areas where they are instituted.

The purpose of the Fort Worth Avenue TIF District, established in 2007 and partially located along Fort Worth Avenue and Commerce Street in the portion of the land use ROI south and west of the West Levee, is to make investing within the district more economically feasible by reimbursing developers for expenses related to environmental remediation; façade restoration; water, sewer, and utility line improvements; and streetscaping (City of Dallas, 2010g). According to the *Fort Worth Avenue TIF District FY 2010 Annual Report*, a total of six projects have used or propose to use TIF funding and include 1,062 dwelling units and 183,000 square feet of retail uses. As of September 2010, approximately $11.2 million in TIF funding has been approved by the Dallas City Council for multi-family and retail uses.

The purpose of the Design District TIF District, created in June 2005, is to provide a source of funding for public infrastructure improvements that will assist in redeveloping an existing industrial and warehouse district to take full advantage of the expanding DART light rail system, to promote transit-oriented development, to improve access to the Trinity River, and to improve the quality of development adjacent to the Trinity River Corridor (City of Dallas, 2006a). The Design District TIF's duration expires in 2027. Although relatively young in duration, according to the *Design District TIF District FY 2009 Annual Report*, a total of two projects have used or propose to use TIF funding and include 214 new dwelling units, 190 new hotel rooms, and 3,000 square feet of new retail space. As of September 2010, approximately $6 million in TIF funding has been approved by the Dallas City Council (City of Dallas, 2010f).

The purpose of the Cedars TIF District, created in 1992, is to redevelop and stabilize the Cedars area and to reverse the decline of the area's tax base (City of Dallas, 2010a). The Cedars area seeks to capitalize on the planned Trinity River development and proximity to downtown to secure growth and investment in the district (City of Dallas, 2010a). Since 1992, a number of small and large projects have utilized TIF funding and benefits including row home projects and multi-family apartment and condominium projects. According to the *Cedars TIF District FY 2009 Annual Report*, a total of seven projects have used TIF funding and include a total of 151

dwelling units and 11,368 square feet of retail space. As of September 2010, approximately $1.6 million in TIF funding has been approved by the Dallas City Council.

The purpose of the Oak Cliff Gateway TIF District, created in November 1992, is to promote redevelopment, growth, and stabilization within the district (City of Dallas, 2010h). The Oak Cliff Gateway TIF District seeks to achieve growth in the value of the area's tax base through the promotion of residential and retail development and a positive reversal of urban decay through the placement of critical infrastructure improvements (City of Dallas, 2010h). The Oak Cliff Gateway TIF District also supports the establishment of direct linkages with the Trinity River Corridor and the capitalization of that effort toward growth and increased tax base value in the district (City of Dallas, 2010h). According to the *Oak Cliff Gateway TIF District FY 2010 Annual Report*, a total of seven projects have used or propose to use TIF funding and include 509 new dwelling units and 33,010 square feet of new retail/commercial space. As of September 2010, approximately $11.4 million of TIF funding has been approved by the Dallas City Council.

4.1.5 Prime or Unique Farmland

There are three types of prime farmland soils located within the land use ROI. Heiden Clay, Ovan Clay, and Frio Silty Clay soils are located within the land use ROI in areas adjacent to the West Levee. The land within the land use ROI is planned and/or zoned for urban use; therefore, it is exempt from the requirements of the FPPA and a Farmland Conversion Impact Rating Form (Form AD-1006) would not be required. No coordination with the U.S. Department of Agriculture (USDA) - Natural Resources Conservation Service (NRCS) is necessary.

4.1.6 Real Estate

Existing Real Estate Inventory and Improvement Value

Because the remapping of the City of Dallas by FEMA may result in areas within the land use ROI currently and historically considered risk-averse from the one percent annual chance exceedance on FIRMs as being included within an area with such a designation, property within the land use ROI may be considered subject to inundation by a flood that has a one percent or greater chance of being equaled or exceeded during any given year. Consequently, buildings secured by federally-backed loans or buildings receiving any type of federal financial assistance as well as property financed by the vast majority of private lenders issuing mortgages or loans for the purchase, construction, repair, or improvement of buildings located within an SFHA may require flood insurance issued through the NFIP. In addition, the remapping of areas to be included in an SFHA may necessitate any new construction or renovation to comply with stricter building codes designed to better protect structures from flood inundation and associated damage as well as to prevent adverse impacts to other properties in or near the floodplain. Building codes within newly-mapped SFHAs may require first floors of structures and building entrances to be elevated above the 100-year base flood elevation. Further, older buildings may need to be retrofitted to elevate mechanical and electrical systems and equipment to building levels above the 100-year base flood elevation.

Inventories of existing and proposed real estate improvements within the land use ROI provide a foundation and baseline for what real estate improvement impacts could occur as a result of FEMA remapping. The Dallas Central Appraisal District (DCAD) provides tax-assessment-

related data for all tax parcels located within Dallas County. Among these data, DCAD provides total real estate values, improvement values, and land values separately for each parcel as well as a classification of the type of improvement as it relates to the property's or structure's use. Classifications for structures evaluated by DCAD include variations of commercial, industrial, multi-family residential, and single-family residential structures, among others. For the purposes of providing this inventory of real estate improvements for this analysis, structures are classified as either residential or nonresidential, which corresponds with FEMA's categorization of flood insurance rates for structures. **Table 4-2** summarizes the value of real estate improvements by structure classification within the land use ROI using DCAD data for tax year 2009.

Table 4-2: Tax-Assessed Real Estate Improvement Values in the Land Use ROI (2009)

Improvement/Land Use Type	Number of Parcels	Improvement Value	Percent of Total Improvement Value	Average Improvement Value Per Parcel
Residential	5,569	$334,452,850	13.7%	$60,056.18
Nonresidential	2,859	$2,054,664,192	84.3%	$718,665.33
Unassigned or Unclassified	28	$48,666,570	2.0%	$1,738,091.79
Total	**8,456**	**$2,437,783,612**	**100.0%**	**$288,290.40**

Source: Dallas Central Appraisal District (2010). Provided by the City of Dallas.
**2009 Tax Assessment*

According to DCAD data, a total of 12,978 tax parcels are either partially or wholly contained by the land use ROI, and of those, 8,456 tax parcels contain real estate improvements with a tax-assessed value as provided in **Table 4-2**. Of these 8,456 tax parcels, an approximate 5,569 tax parcels contain residential improvements, an approximate 2,859 tax parcels contain nonresidential improvements, and 28 are either unassigned or contain an unclassified improvement or structure. The remaining 4,522 tax parcels within the land use ROI are either undeveloped or do not have a tax-assessed improvement value. The total value of real estate improvements within the land use ROI is approximately $2,437,783,612, and the total value of land within the land use ROI is approximately $1,596,948,167. These values equate to a total property value of approximately $4,034,731,779 within the land use ROI.

As summarized in **Table 4-2**, tax parcels containing residential improvements account for approximately 14 percent of the total improvement value within the land use ROI. Tax parcels containing nonresidential improvements account for approximately 84 percent of the total improvement value. Tax parcels containing either unassigned or unclassified improvements account for approximately 2 percent of the total improvement value within the land use ROI. The average improvement value per parcel within the land use ROI is approximately $288,290. The average improvement value of tax parcels containing residential improvements within the land use ROI is approximately $60,056, while the average improvement value of tax parcels containing nonresidential improvements is approximately $718,665. The average improvement value of tax parcels containing unassigned or unclassified improvements within the land use ROI is approximately $1,738,092.

Proposed, Programmed, or Future Development within the Land Use ROI

The NCTCOG maintains a development monitoring database that tracks over 8,000 major physical land developments that are either existing, under construction, announced, or in the conceptual stages within the NCTCOG Metropolitan Planning Area (MPA). The NCTCOG MPA is an area for which the NCTCOG agency plans and programs transportation and related projects in accordance with the agency's responsibilities as an MPO and includes Collin, Dallas, Denton, Ellis, Johnson, Hood, Hunt, Kaufman, Rockwall, Parker, Tarrant, and Wise Counties in North Central Texas. Major developments constitute those exceeding 100,000 square feet and/or that employ 100 or more persons. Therefore, data associated with NCTCOG's development monitoring database associated with new construction may exclude other ensuing development projects not meeting those criteria. The NCTCOG provides further information for these major developments related to development type, location, size of development in square feet, number of dwelling units, and number of employees, if applicable. Within the land use ROI, for developments exceeding 100,000 square feet or that would employ over 100 persons, the Foro Dallas development equating to 250,000 square feet of retail real estate improvements has been announced. In addition to this announced development, a total of 8 projects equating to 1,911 dwelling units are announced or are under construction within the land use ROI.

4.2 Socioeconomic Conditions

4.2.1 Region of Influence

This assessment of socioeconomic conditions is analyzed at the same geographic extent as the land use ROI, which is the geographic area that may be located within the 100-year floodplain that, under current FIRMs, is not designated to be in an SFHA. There are two separate ROIs associated with this analysis of socioeconomic conditions that are each defined by either the census block groups or census tracts that are partially or wholly contained by the land use ROI: the LEP/low-income population ROI and the minority population ROI. These ROIs are designated as such because of the potential for the remapping of SFHAs to result in substantial social and economic consequences to populations residing in or that are economically dependent on affected areas within the City of Dallas.

The LEP/low-income population ROI is comprised of census tracts from *Census 2000* that are either partially or wholly contained by the land use ROI. Census tracts are the most localized census geographies for which the most recent LEP and low-income data are available from the U.S. Census Bureau, specifically from the *2005-2009 American Community Survey*. Data from the *2005-2009 American Community Survey* were collected and compiled using the same census geographies utilized for *Census 2000*. The LEP/low-income population ROI is comprised of 18 census tracts. The minority population ROI is comprised of census block groups from *Census 2010* that are either partially or wholly contained by the land use ROI. Census block groups are the most localized census geographies for which the most recent minority data are available from the U.S. Census Bureau, specifically from *Census 2010*. Data from *Census 2010* were collected and compiled using updated census geographies that have been modified since *Census 2000*. The minority population ROI is comprised of 31 census block groups. The LEP/low-income population ROI and minority population ROI and the census tracts and census block groups comprising them are depicted in **Appendix A**, **Exhibit 5: Socioeconomic ROIs Maps**.

4.2.2 Regional and Community Growth

According to the U.S. Census Bureau's *Census 2010,* the DFW Metroplex is the fourth largest metropolitan area in the U.S. Between 2000 and 2010, the U.S. Census Bureau estimates the DFW Metroplex added over 1.1 million residents, equating to a growth rate of approximately 22 percent. Such growth has pushed the DFW Metroplex ahead of 35 states with respect to total population, and between 2000 and 2010, the DFW Metroplex was the second fastest growing metropolitan area in the U.S. *Census 2010* also reveals continued growth in Dallas County and the City of Dallas during the same time period. From 2000 to 2010, Dallas County absorbed 149,240 new residents, and the City of Dallas gained 9,236 new residents, equating to growth rates of approximately 7 percent and 1 percent, respectively.

Vigorous economic growth also characterizes the DFW Metroplex relative to other metropolitan regions in the U.S. According to the U.S. Bureau of Economic Analysis, from 2001-2009, the DFW Metroplex experienced a 42 percent increase in economic output as measured by Gross Domestic Product (GDP). This compares to an approximate 38 percent growth rate during the same time period for all metropolitan regions of the U.S. as a whole. Total employment in the DFW Metroplex increased approximately 17 percent from 2001-2008, while total employment increased approximately 10 percent for all metropolitan regions in the U.S. during the same time period. The DFW Metroplex claims 26 percent of the state's population, 28 percent of the state's total employment, and generates 31 percent of the state's total economic output as measured by GDP (U.S. Bureau of Economic Analysis, 2011).

Household population projections generated by the NCTCOG, a regional planning agency for the DFW Metroplex and the DFW MPO, indicate dramatic growth will likely occur in the DFW MPA through the year 2040. The NCTCOG's *North Central Texas 2040 Demographic Forecast* projects Dallas County to grow to a household population of 3,265,190 residents by 2040, an increase of 897,051 persons and an approximate increase of 38 percent from its 2010 Census-documented population. The 12-county NCTCOG forecast area, which represents the DFW MPA and differs slightly from the counties comprising the DFW Metroplex as designated by the U.S. Census Bureau, is projected to grow to a household population of 10,543,336 residents by 2040, an increase of approximately 65 percent from the *Census 2010*-documented population of 6,371,773 residents for the DFW Metroplex.

Household population projections generated by the NCTCOG's *2040 Demographic Forecast* for North Central Texas also reveal robust growth for specific areas located partially within the socioeconomic ROI. According to the NCTCOG, the Dallas CBD, which partially lies within the socioeconomic ROI and is generally bound by IH 30 to the south, U.S. 75 to the east, IH 35E to the west, and the Woodall Rodgers Freeway (Spur 366) to the north, is projected to experience an increase in household population of approximately 651 percent from 3,172 residents in 2005 to 23,808 residents in 2040. Another specific area comprising most of the ROI that is generally defined as an area north and west of the Dallas CBD and generally bound by IH 35E and SH 183 on the north and east, IH 30 on the south, and Loop 12 on the west (referred to in this EA as Northwest Dallas Outer CBD) is projected to grow from a household population of 20,403 persons in 2005 to 49,822 persons in 2040, an increase of approximately 144 percent.

Employment projections provided by the NCTCOG indicate strong growth in employment in the DFW MPA, Dallas County, the Dallas CBD, and the Northwest Dallas Outer CBD. From 2005 to 2040, employment is projected to increase approximately 82 percent in the DFW MPA, nearly 58 percent in Dallas County, approximately 28 percent in the Dallas CBD, and approximately 30 percent in the Northwest Dallas Outer CBD. **Table 4-3** summarizes population and employment growth for the NCTCOG forecast area, Dallas County, the Dallas CBD, and the Northwest Dallas Outer CBD.

Table 4-3: Population and Employment Trends, 2000 - 2030

Geography	Household Population			Employment		
	2005 Total Household Pop.*	2040 Household Pop. Forecast	Percent Change: 2005 to 2040	2005 Employment	2040 Employment Forecast	Percent Change: 2005 to 2040
Dallas CBD	3,172	23,808	650.6	118,052	151,136	28.0
Northwest Dallas Outer CBD	20,403	49,822	144.2	80,221	104,490	30.3
Dallas County	2,273,250	3,265,190	43.6	1,895,059	2,988,916	57.7
DFW MPA	5,777,272	10,543,336	82.5	3,624,051	6,606,515	82.3

Source: North Central Texas Council of Governments, 2040 Demographic Forecast. http://www.nctcog.org.
**Population figures are taken from the NCTCOG demographic forecast and are not representative of the Census 2000- or 2010-documented populations for the given geographic areas.*

4.2.3 Community Cohesion

Community cohesion is a term that refers to an aggregate quality of a residential area. It is a social attribute that indicates a sense of community, common responsibility, and social interaction within a limited geographical area. It is the degree to which residents have a sense of belonging to their neighborhood or community or a strong attachment to neighbors, groups, and institutions as a continual association over time. Changes in community cohesion may include splitting neighborhoods, isolating a minority group or a portion of a neighborhood, generating new development, terminating residential roads, and separating residents from community facilities. Community is defined in part by common behavior patterns of individuals in a given area. These behavior patterns are expressed through daily social interactions, the use of local facilities, participation in local organizations, and involvement in activities that satisfy the population's social and economic needs.

The existing status of overall community cohesion in and around the socioeconomic ROI can be characterized as a somewhat fragmented series of independent neighborhoods adjacent to or surrounding the East and West Levees. The vast majority of land within the socioeconomic ROI adjacent to and surrounding the East Levee is comprised of commercial and industrial uses. However, the Arlington Park neighborhood, a residential area northwest of downtown Dallas, is contained by the socioeconomic ROI adjacent to the East Levee. Additionally, the redeveloping Dallas Design District is also located within the socioeconomic ROI north and east of the East Levee.

According to the Dallas Independent School District (DISD), the Arlington Park neighborhood is one of the oldest predominantly African-American neighborhoods in the City of Dallas. The Arlington Park neighborhood is home to a number of public and/or nonprofit facilities exhibiting neighborhood-scale associations among local residents. These facilities include the Arlington Park Recreation Center, the Arlington Park Baptist Church, the Arlington Park Community Learning Center, and a Ronald McDonald House. The Arlington Park Recreation Center is a City of Dallas Park and Recreation facility providing recreational sports services, summer playground camps, cultural events, and programs addressing community concerns such as juvenile violence, wellness, and life management skills. The Arlington Park Community Learning Center serves as a neighborhood elementary school with an enrollment of 227 students (DISD, 2010). The Arlington Park First Baptist Church is a local, neighborhood-serving place of worship, and the Ronald McDonald House is a temporary home serving and sustaining families of seriously ill or injured children receiving treatment in a Dallas hospital (Ronald McDonald House of Dallas, 2010). The Ronald McDonald House is a local resource intended to serve children seeking medical services at Children's Medical Center, Parkland Hospital, and UT-Southwestern Medical Center, which fall within the socioeconomic ROI.

The Design District is a redeveloping 186-acre neighborhood located between IH 35E and the East Levee just northwest of downtown Dallas. The neighborhood is contained by a TIF district, the Design District TIF, which is in place to provide a source of funding for public infrastructure improvements that will assist in redeveloping the existing predominantly industrial district. The neighborhood is currently transitioning into a medium-density, diversified, mixed-use, pedestrian-friendly environment with 1,279 multi-family residential units completed or scheduled to be completed by 2012. A sizable portion of downtown Dallas and the Cedars neighborhood, just south of downtown Dallas, are also located within the socioeconomic ROI. As mentioned, downtown Dallas (Dallas's CBD) is undergoing and is expected to continue to undergo rapid population growth primarily as a result of newly developed or converted, dense residential structures and towers despite recent recessed economic conditions. Current residential growth in the Dallas CBD is better connecting in-migrating residents with the range of economic, public, cultural, and institutional amenities and activities within and surrounding the CBD.

The Cedars neighborhood, also contained by a TIF (Cedars TIF), is traditionally the home of Dallas's Jewish Community and underwent a vast transformation through the mid- to late-1900s from an affluent, well-connected neighborhood to a fragmented series of lower-value homes scattered among a variety of industrial and heavy commercial land uses. However, the Cedars neighborhood is transitioning once again with the development of new townhomes and apartments and is becoming a home to artists and young professionals. The Cedars neighborhood is home to a DART station, the Dallas Police Department Headquarters, and popular entertainment venues.

Numerous independent neighborhoods exist near the West Levee in an area generally referred to as West Dallas in the socioeconomic ROI. Neighborhoods located in West Dallas include the Eagle Ford, Ledbetter Gardens, Westmoreland Heights, Lake West, Los Altos, La Loma, La Bajada, Muncie, Western Heights, and La L'aceate neighborhoods. Areas of these neighborhoods contained by the socioeconomic ROI accommodate a multitude of community-scale associations

including school facilities, places of worship, community centers, and other neighborhood-scale facilities. These West Dallas neighborhoods are served by eight public elementary schools, one public middle school, and one public high school (DISD, 2010). A total of approximately 106 places of worship, 11 community centers, 3 recreation centers, 4 neighborhood parks, and 11 neighborhood-based community service establishments are scattered throughout the West Dallas neighborhoods within the socioeconomic ROI and serve ROI residents (Google, 2010). Each of these facilities/establishments serves a unique and viable function in their respective neighborhood and community and is indicative of the neighborhood-scale link among residents throughout West Dallas.

The West Levee also extends into portions of scattered and/or isolated neighborhoods in the far northern expanse of the North Oak Cliff area of Dallas at the far southeastern extent of the West Levee. One concentrated residential area among these isolated neighborhoods contains three places of worship and one recreation center. The neighborhood also contains a sizable portion of public school attendance for three nearby public schools.

4.2.4 Limited English Proficiency (LEP) Populations

Executive Order 13166, "Improving Access to Services for Persons with Limited English Proficiency," requires federal agencies to examine the services they provide and identify any need for services to those with LEP. The EO requires federal agencies to work to ensure that recipients of federal financial assistance provide meaningful access to their LEP applicants and beneficiaries. Failure to ensure that LEP persons can effectively participate in or benefit from federally-assisted programs and activities may violate the prohibition under Title VI of the Civil Rights Restoration Act of 1987 and Title VI regulations against national origin discrimination.

Limited English proficiency persons are individuals with a primary or home language other than English who must, due to limited fluency in English, communicate in that primary or home language if the individuals are to have an equal opportunity to participate effectively in or benefit from any aid, service, or benefit provided by the applicable federal source or other federal agency recipient. Census tract data from the *2005-2009 American Community Survey* for "Ability to Speak English" for the resident population five years and older indicate approximately 22.2 percent of the population of residents five years and older in the LEP/low-income population ROI speak English "Not Well" or "Not at All." **Table 4-4** contains the percent LEP population for each census tract comprising the LEP/low-income population ROI. All 18 census tracts within the LEP/low-income population ROI contain resident populations. According to the *2005-2009 American Community Survey*, a total of 16 census tracts contain LEP populations within the LEP/low-income population ROI. LEP populations ranged from 0.0 percent to 45.2 percent among the census tracts. Specific LEP languages and respective percentages represented in the census tracts within the LEP/low-income population ROI include: Spanish (21.4 percent), Asian and Pacific Islander (0.7 percent), other Indo-European languages (< 0.1 percent), and other languages (< 0.1 percent). Field visits (windshield surveys) conducted during May 2010 revealed the presence of several billboards and other types of signage in the area printed in both Spanish and English.

Table 4-4: Percentage LEP Population

Map ID	Census Tract	Total Population 5 Years and Older	Total Number Who Speak English "Not Well" or "Not at All"	% LEP
1	CT 4.01	3,141	1,175	37.4
2	CT 4.03	7,626	1,837	24.1
3	CT 20.00	7,523	3,404	45.2
4	CT 21.00	641	0	0.0
5	CT 32.01	1,704	0	0.0
6	CT 33.00	2,542	553	21.8
7	CT 41.00	1,163	82	7.1
8	CT 42.01	4,074	1,067	26.2
9	CT 43.00	2,610	701	26.9
10	CT 100.00	11,716	424	3.6
11	CT 101.01	3,542	722	20.4
12	CT 101.02	3,126	931	29.8
13	CT 102.00	3,639	214	5.9
14	CT 104.00	562	29	5.2
15	CT 105.00	2,782	626	22.5
16	CT 106.01	6,563	1,786	27.2
17	CT 106.02	2,401	783	32.6
18	CT 107.01	3,657	973	26.6
Total		**69,012**	**15,307**	**22.2**

Source: U.S. Census Bureau, 2005-2009 American Community Survey. The American Community Survey presents detailed demographic data collected from a sample of households and weighted to represent the total population. Map IDs are references to census tracts identified on ***Exhibit 5: Socioeconomic ROIs Maps*** *in* ***Appendix A****.*

4.2.5 Environmental Justice

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" tasks "each federal agency to make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high adverse human health and environmental effects of its programs, policies, and activities on minority populations and low-income populations" (USEPA, 1994).

The Environmental Protection Agency (EPA) describes environmental justice as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies (USEPA, 2010). Fair treatment means that no group of people including racial, ethnic, or socioeconomic should bear a disproportionate share of the negative environmental consequences resulting from the execution of federal, state, local, and tribal programs and policies. The goal of fair treatment is not to shift risks among populations but to identify potential disproportionately high and adverse effects and identify alternatives that may mitigate these effects. Federal agencies must provide minority and low-income communities with access to information on matters relating to human health or the environment and opportunities for input in the NEPA process, including input on potential effects and mitigation measures.

For the purposes of the environmental justice analysis in this EA, a minority is defined as a person who is:

1) Black (having origins in any of the black racial groups of Africa);

2) Hispanic (of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race);

3) Asian American (having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands); or

4) American Indian and Alaska Native (having origins in any of the original people of North America and who maintains cultural identification through tribal affiliation or community recognition).

Executive Order 12898 further defines a minority population as a readily identifiable group of minority persons who live in geographic proximity, and if the circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who will be similarly affected by a proposed federally-funded program, policy, or activity.

Low-income is defined as a household income at or below the Department of Health and Human Services (DHHS) poverty guideline. In 2011, the DHHS poverty guideline for a four-person family is $22,350.

Under EO 12898, disproportionately high and adverse effects are defined as effects that "will be suffered by the minority population and/or low-income population and are appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population and/or non-low-income population."

An examination of existing low-income and minority populations involves socioeconomic data provided at the census tract and census block group levels, respectively. Low-income population data come from the *2005-2009 American Community Survey* and are provided for the LEP/low-income population ROI, and minority population data come from *Census 2010* and are provided for the minority population ROI. **Exhibit 5: Socioeconomic ROIs Maps** in **Appendix A** identifies the census tracts and census block groups located within each ROI.

Income Characteristics

Table 4-5 summarizes median household income and poverty status for census tracts within the LEP/low-income population ROI. Median household incomes of census tracts range from $11,875 to $79,750 according to the *2005-2009 American Community Survey*. For the purposes of this analysis, an environmental justice population is present when the median household income within each census tract comprising the LEP/low-income population ROI is at or below the 2011 DHHS poverty threshold of $22,350.

Table 4-5: Median Household Income and Poverty Status

Map ID	Census Tract	Population*	Median Household Income	Persons Below Poverty Level	
				Number	Percent
1	CT 4.01	3,321	$37,230	767	23.1
2	CT 4.03	8,222	$36,188	2,430	29.6
3	CT 20.00	8,102	$31,481	2,936	36.2
4	CT 21.00	641	$79,750	0	0.0
5	CT 32.01	1,737	$56,154	373	21.5
6	CT 33.00	2,638	$47,469	985	37.3
7	CT 41.00	1,284	$11,875	834	65.0
8	CT 42.01	4,261	$38,423	732	17.2
9	CT 43.00	2,963	$30,795	939	31.7
10	CT 100.00	2,513	$29,078	748	29.8
11	CT 101.01	3,966	$23,659	1,420	35.8
12	CT 101.02	3,437	$29,107	1,038	30.2
13	CT 102.00	4,104	$15,649	2,566	62.6
14	CT 104.00	289	$13,558	157	54.3
15	CT 105.00	3,144	$34,643	1,018	32.4
16	CT 106.01	7,020	$36,491	1,341	19.1
17	CT 106.02	2,947	$18,576	1,114	37.8
18	CT 107.01	4,045	$28,304	1,094	27.0
Low-Income Population Total		**64,634**	**N/A**	**20,492**	**31.7**

Source: U.S. Census Bureau, 2005-2009 American Community Survey. The American Community Survey presents detailed demographic data collected from a sample of households and is weighted to represent the total population. 100-percent data for income and poverty status are not available from the U.S. Census Bureau.

**Population for whom poverty status has been determined.*

Map IDs are references to census tracts identified on ***Exhibit 5: Socioeconomic ROIs Maps*** *in* ***Appendix A****.*

Of the 18 census tracts in the income and poverty analyses study area, 4 census tracts [Census Tract (CT) 41.00, CT 102.00, CT 104.00, CT 106.02] exhibit median household incomes below the 2011 DHHS poverty threshold of $22,350. The 4 census tracts with median household incomes below the poverty threshold account for 13.3 percent of the total population of census tracts within the LEP/low-income population ROI. The percentage of the total LEP/low-income population ROI's population with median household incomes below the poverty level is approximately 31.7 percent, and the range of percentages among census block groups of persons living below the poverty level is approximately 0.0 to 65.0 percent.

Minority Characteristics

For the purposes of this analysis, an environmental justice population is present when the total minority population percentage within the census block groups comprising the minority population ROI is equal to or greater than 51 percent. Using data from *Census 2010* for the 31 census block groups, **Table 4-6** contains the percent minority population for each census block group within the minority population ROI.

Table 4-6: Percent Minority Population

Map ID	Census Tract	Census Block Group	Total Population	Black or African American	American Indian and Alaskan Native	Asian-American	Pacific Islander	Hispanic or Latino	Total Minority Percentage
1	CT 4.06	5	1,730	72	4	446	0	820	77.6
2	CT 20.00	1	1,603	478	8	23	1	720	76.7
3	CT 20.00	2	774	211	6	0	0	447	85.8
4	CT 20.00	3	709	46	2	1	0	633	96.2
5	CT 21.00	1	447	128	3	14	1	60	46.1
6	CT 41.00	2	474	231	2	0	0	233	98.3
7	CT 42.01	1	728	9	8	9	0	96	16.8
8	CT 42.01	3	1,041	33	10	6	0	772	78.9
9	CT 43.00	1	421	37	2	7	0	333	90.0
10	CT 43.00	2	699	192	1	0	0	495	98.4
11	CT 43.00	3	1,255	15	4	17	0	1,144	94.0
12	CT 100.00	1	9,658	4,493	8	65	1	1,741	65.3
13	CT 100.00	2	2,122	1,106	3	14	1	672	84.6
14	CT 101.01	1	1,445	648	3	2	0	739	96.3
15	CT 101.01	2	1,245	758	1	0	0	480	99.5
16	CT 101.01	3	1,859	839	1	0	1	997	98.9
17	CT 101.02	1	958	20	2	0	0	908	97.1
18	CT 101.02	2	1,406	110	2	0	0	1,272	98.4
19	CT 101.02	3	814	22	2	0	0	771	97.7
20	CT 105.00	1	1,385	561	1	5	0	805	99.1
21	CT 105.00	2	1,413	575	0	3	0	821	99.0
22	CT 106.01	1	1,838	6	3	2	0	1,785	97.4
23	CT 106.01	2	3,056	200	1	0	0	2,786	97.7
24	CT 106.01	3	835	10	0	1	0	806	97.8
25	CT 106.02	1	1,738	87	4	3	0	1,585	96.6
26	CT 106.02	2	1,272	479	3	49	0	701	96.9
27	CT 107.01	1	3,808	277	16	16	0	3,170	91.4
28	CT 204.00	1	1,148	309	12	20	2	213	48.4
29	CT 204.00	3	2,330	827	15	68	2	325	53.1
30	CT 205.00	1	980	619	1	18	0	282	93.9
31	CT 205.00	2	3,840	2,170	6	176	10	1,323	96.0
Minority Population Total			**53,031**	**15,568**	**134**	**965**	**19**	**27,935**	**84.1**

Source: U.S. Census Bureau, Census 2010.
Map IDs are references to census block groups identified on ***Exhibit 5: Socioeconomic ROIs Maps*** *in* ***Appendix A****.*

The 31 census block groups within the minority population ROI contain a total of 53,031 persons. Overall, minorities account for approximately 84.1 percent of the minority population ROI. The 31 census block groups exhibit minority percentages ranging from 16.8 percent to 99.5 percent. Of the 31 census block groups comprising the minority population ROI, 28 exhibit minority populations equal to or greater than 51 percent. Of these 28 census block groups, Hispanics or Latinos and Blacks or African Americans are the dominant minority populations present.

Summary of Environmental Justice Populations

Within the LEP/low-income population ROI, environmental justice populations are present in 4 of the 18 census tracts (CTs 41.00, 102.00, 104.00, and 106.02). These 4 census tracts exhibit median household incomes below the 2011 DHHS poverty threshold of $22,350. Within the minority population ROI, environmental justice populations are present in 28 of the 31 census

block groups. These 28 census block groups exhibit minority populations equal to or greater than 51 percent of their total populations.

4.2.6 Public Safety

Public safety as it relates to flood risk is a relevant theme of the socioeconomic conditions of both the LEP/low-income and minority population ROIs. The most profound factor suggested by researchers that influence public safety in the event of a flood is the adequacy, effectiveness, and timeliness of warning systems. The City of Dallas' flood warning system, Automated Local Evaluation in Real Time (ALERT), which was originally developed by the National Weather Service, is a method of using remote sensors in the field to transmit environmental data to central computers in real time. In 1990, the City of Dallas installed two base station computers as well as ALERT sensors at 63 locations with the City's storm water automation project. According to the City of Dallas' Trinity Watershed Management Department, the City currently uses sensors in 88 locations. The sensors monitor rainfall, stream level, temperature, humidity, wind speed and direction, and lift station status at these various locations throughout the city. The information gathered through the ALERT system allows the City of Dallas Office of Emergency Management to plan for and implement emergency evacuations. The City of Dallas also utilizes the Flooded Roadway Warning System (FRWS) with sensors at 42 locations. Sensors associated with the FRWS monitor when flood water reaches the edge of a roadway and activate warning signs for residents and roadway motorists. The sensors also alert the central computer system.

4.3 Transportation

4.3.1 Region of Influence

The transportation ROI is identical to the land use ROI as shown in **Exhibit 4: Land Use ROI Map**, which is the area that may be located within the 100-year floodplain, or SFHA, as a result of FEMA's remapping of FIRMs in the absence of the Proposed Action Alternative. It is appropriate because of the strong nexus between land use type, density, and activity and the transportation facilities that provide access to them. This ROI also captures the transportation network that would be used for transporting project construction equipment and materials during project construction.

4.3.2 Existing Conditions

The transportation network in the transportation ROI includes major highways, regionally significant urban arterials; local collectors and streets; and light rail transit, commuter rail, freight rail, and pedestrian and bicycle facilities. All of these components of the transportation network facilitate the movement of people and goods into and through Dallas' urban core and link the DFW Metroplex to other regions across the U.S., rendering transportation facilities in the ROI among the most valuable assets to the economic prosperity of the DFW region.

Highways, Arterials, Collectors, and Local Streets

Major high-capacity highways within the transportation ROI include:

- IH 35E (also U.S. 77 and U.S. 67, and also known as the R.L. Thornton Freeway and Stemmons Freeway);

- IH 30 (also U.S. 67, and also known as the East R.L. Thornton Freeway);
- South Loop 12 (also known as Walton Walker Boulevard);
- SH 183 (also known as John Carpenter Freeway); and
- SH 366 (also known as Woodall Rodgers Freeway).

According to traffic data generated by the NCTCOG in 2009, these high-capacity, limited access highways each carry between 138,000 and 290,000 vehicles per day (vpd). These facilities serve as high-volume traffic carriers designed to move vehicles through the ROI and do not provide direct ingress/egress access to local land uses. In addition to these major high-capacity limited-access highways, major urban arterials located within the transportation ROI include: Singleton Boulevard, Canada Drive, Westmoreland Road, Hampton Road, Sylvan Avenue, Irving Boulevard, Harry Hines Boulevard, Commerce Street, Regal Row, and Mockingbird Lane. These facilities provide both a means to travel through neighborhoods and directly access land uses within the transportation ROI and intersect with the major limited-access highway facilities listed above. Local collectors and local streets in transportation ROI provide further access to less intense local land uses. The street network in the transportation ROI is generally designed in a grid pattern, which offers multiple means of access from multiple directions to land uses within the transportation ROI. Numerous bicycle and pedestrian routes are also available using urban arterials and local streets in transportation ROI.

Public Transportation

Within the transportation ROI, DART operates a number of bus routes and light rail transit facilities. Bus and light rail transit routes operated by DART are designed to bring transit riders from neighborhoods surrounding Dallas' CBD and surrounding municipalities into the CBD and primarily cater to employment commuting peak periods. Bus routes are scattered throughout the transportation ROI primarily along urban arterials. Light rail transit facilities within the transportation ROI include:

- The Green Line, which connects the Dallas CBD to neighborhoods and suburban municipalities to the northwest and inner-city neighborhoods to the southeast;
- The Red Line, which connects the Dallas CBD to neighborhoods and suburban municipalities to the northeast and inner-city neighborhoods to the southwest;
- The Blue Line, which connects the Dallas CBD to neighborhoods to the northeast and southwest; and
- The proposed Orange Line, which is proposed to connect the Dallas CBD to neighborhoods, other regionally-significant facilities, and the DFW International Airport to the northwest.

In addition to light rail service, the Trinity Rail Express (TRE) operates commuter rail service for more regionally-oriented trips between the Dallas CBD and Fort Worth to the west, and Amtrak operates long-distance passenger rail service through the transportation ROI.

Freight Rail

Although an abundance of freight moves through the transportation ROI on major, high-capacity limited-access highways, several railroad companies operate rail lines traversing the

transportation ROI that primarily function as means to transport freight to, from, and within the DFW Metroplex. Railroad companies with operations and facilities in the transportation ROI involving the transport of freight include the Burlington Northern Santa Fe Railway Company; Union Pacific Railroad (UPRR); and Atchison, Topeka, and Santa Fe (AT&SF) Railroad, among others.

Floodway Access
A number of access points to the Dallas Floodway are available for maintenance purposes. The Trinity River Flood Control District (TRFCD) uses maintenance roads to access sumps, pumps, and other features along and within the Dallas Floodway. Most of the access points used by the TRFCD are gated to discourage motorized vehicle travel by the public on levee-top roads but allow pedestrian and bicycle access. The only public vehicle roadway access to the Dallas Floodway is via Sylvan Avenue to Trammell Crow Park.

4.4 Climate, Geology, and Soils

4.4.1 Region of Influence

The ROI for climate, geology, and soils encompasses the areas at the levees that could incur temporary and permanent impacts resulting from the construction of the proposed Section 408 modification measures. The ROI at the East and West Levees encompasses the majority of the Dallas Floodway and extends from the approximate north bank of the West Fork Trinity River and the Elm Fork Trinity River to the AT&SF Railroad at the southern end of the Dallas Floodway. The ROI extends to the residential and commercial property boundaries on the east and west sides of the Dallas Floodway. The climate, geology, and soils; water resources; and, biological resources ROI collectively comprise the natural resources ROI. The natural resources ROI is shown on **Exhibit 6: Natural Resources, Utilities, and Hazardous, Toxic, and Radioactive Wastes ROIs Map** in **Appendix A**.

4.4.2 Existing Conditions

The North Central Texas region is considered to be humid subtropical with hot summers, although a wide range of extremes are common. The winters are fairly mild except for the sporadic cold fronts and sudden drops in temperature that occasionally occur throughout the season. Precipitation also varies, ranging from less than 20 inches to greater than 50 inches annually. Summer daytime temperatures frequently exceed 100 degrees Fahrenheit with low nighttime temperatures rarely exceeding 80 degrees Fahrenheit. A large part of the annual precipitation results from thunderstorm activity, with occasional heavy rainfall over brief periods of time. The major storms experienced in the project study area are produced by heavy rainfall from frontal-type storms which generally occur in the spring and summer months, but major flooding can also be produced by intense rainfall associated with localized thunderstorms. These thunderstorms may occur at any time during the year, but they are more prevalent in spring and summer months. Hail storms occur approximately two or three days a year, ordinarily with only slight and scattered damage. Windstorms occurring during thunderstorm activity are sometimes destructive. Snowfall in the DFW area is rare. The average length of the warm season (freeze-free period) in DFW is approximately 249 days. The average last occurrence of 32 degrees Fahrenheit or below is mid-March and the average first occurrence of 32 degrees Fahrenheit or

below is in late November (National Weather Service Weather Forecast Office, 2009).

The regional geology of the Upper Trinity River Basin reflects the various depositional phases and environments that took place during Pennsylvanian, Cretaceous, and Quaternary geologic eras. The oldest strata, which are exposed in the northwestern reaches of the basin, are Pennsylvanian in age and consist of marine and near shore sand, shale, and limestone strata. Cretaceous strata, consisting of near shore sand and marine shale and limestone are exposed at the surface over most of the Upper basin. The Cretaceous sediments, which dip gently toward the east and southeast, were deposited unconformably over the northwest-dipping Pennsylvanian strata after a period of lifting and erosion (Shuler, 1913). No unique geologic features or geologic hazards are located within the ROI.

The rocks outcropping in Dallas County are of the Upper Cretaceous Woodbine formation. The uppermost division of the Woodbine formation is the Lewisville beds. This division is composed of sands and sandy clays, and outcrops in a small area about six miles long and a mile wide along the western boundary of the county north of the Trinity River floodplain. Three broad belts of rock running slightly east and north divide the remainder of the county into sub-equal divisions. The western belt is underlain by bluish-black and gray shales of the Eagle Ford formation; the middle belt is underlain by the indurated chalks and shaly limestones of the Austin formation; and, the eastern belt is composed of the soft shales, marls, and clays of the Taylor formation (Shuler, 1913).

Three general soil types, which include the Trinity-Frio, Austin-Houston Black, and Silawa-Silstid-Bastsil are present within the ROI according to the *Soil Survey of Dallas County, Texas*, February, 1980, USDA – NRCS. The Trinity-Frio soil type consists of deep, nearly level, clayey soils; on floodplains. The Austin-Houston Black soil type consists of moderately deep and deep, nearly level to sloping, clayey soils; on uplands. The Silawa-Silstid-Bastsil soil type consists of deep, nearly level to sloping, loamy and sandy soils; on stream terraces (USDA-NRCS, 1980).

4.5 Water Resources

4.5.1 Region of Influence

The ROI for water resources encompasses the areas at the levees that could incur temporary and permanent impacts resulting from the construction of the proposed Section 408 modification measures. The ROI at the East and West Levees encompasses the majority of the Dallas Floodway and extends from the approximate north bank of the West Fork Trinity River and the Elm Fork Trinity River to the AT&SF Railroad at the southern end of the Dallas Floodway. The ROI extends to the residential and commercial property boundaries on the east and west sides of the Dallas Floodway. The climate, geology, and soils; water resources; and, biological resources ROI collectively comprise the natural resources ROI. The natural resources ROI is shown on **Exhibit 6: Natural Resources, Utilities, and Hazardous, Toxic, and Radioactive Wastes ROIs Map** in **Appendix A**.

4.5.2 Groundwater Resources

There are two water-bearing aquifers underlying the ROI, which include the Woodbine aquifer and the Paluxy formation. The Woodbine aquifer and Paluxy formation are part of the Trinity group, a major aquifer in the state of Texas. The Woodbine aquifer is composed of sandstone beds interbedded with shale and clay. This aquifer is divided into three water-bearing zones that differ in productivity and quality. The lower two zones of the aquifer are accessed to supply water for domestic and municipal uses. The upper Woodbine zone contains water of very poor quality. Heavy municipal and domestic uses have contributed to over 100 feet in water-level declines within these aquifers throughout North Central Texas. The aquifer reaches a maximum depth of 2,500 feet below land surface level with a maximum thickness of approximately 700 feet. The Paluxy formation, a minor aquifer, is a relatively thin stratigraphic unit composed of sandstone, limestone, and shale. This formation is charged with fresh to slightly saline water. The most extensive exploitation of the Paluxy formation has occurred around the DFW metropolitan area of Tarrant and western Dallas counties. Extensive development of these aquifers has occurred in the DFW region where water levels have historically dropped as much as 550 feet (Ashworth and Hopkins, 1995).

4.5.3 Wild and Scenic Rivers

There are no wild and scenic rivers in the ROI. Therefore, there would be no impacts to a river designated as a component or proposed for inclusion in the national system of Wild and Scenic Rivers.

4.5.4 Lakes, Rivers, and Streams

Three major waterways (West Fork Trinity River, Elm Fork Trinity River, and the Trinity River) are located within the ROI. The West Fork Trinity River and Elm Fork Trinity River converge at the north end of the East and West Levees flowing into the mainstem Trinity River. The mainstem Trinity River, or the man-made version of the channel, is a perennial first order river. The natural Trinity River channel was a continuous, meandering waterway that traversed the western portion of the present Dallas CBD. In 1908, a devastating flood inundated a large portion of the City of Dallas downtown area and transit operations between Oak Cliff and Dallas. Subsequently in 1926, the establishment of an assessment district known as the City and County of Dallas Levee Improvement District was formed which re-routed the hydraulic conveyance from the natural channel to the present-day straightforward alignment and location.

4.5.5 Waters of the U.S., including Wetlands (Executive Order 11990)

Pursuant to EO 11990 (Protection of Wetlands), Section 404 of the CWA, and Section 10 of the Rivers and Harbors Act of 1899, an investigation was conducted to identify potential jurisdictional waters of the U.S., including wetlands, within the ROI. According to the USACE, the federal agency having authority over waters of the U.S., wetlands are those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

The approved *Jurisdictional Determination for the Dallas Floodway and North Texas Tollway Authority Trinity Parkway*–USACE Project Number SWF-2000-00308 [USACE Approved

Jurisdictional Determination (J.D.)], the Dallas Floodway Approved J.D. Project Number SWF-2011-00049, National Wetland Inventory (NWI) maps, USACE Geographic Information Systems (GIS) data, and field observations were utilized to identify the jurisdictional and potentially jurisdictional water and wetland features within the ROI for the East and West Levees. The USACE Approved J.D. identified jurisdictional features within an area beginning at the southern limits of the levees north to just south of Irving Boulevard. This jurisdictional determination (J.D.) was originally approved on June 19, 2006, by the USACE, and it was re-approved on March 24, 2011, and is valid until March 24, 2016.

A total of 196 water and wetland features were identified within the natural resources ROI and the features total approximately 434.19 acres. Within the ROI there are 175 waters of the U.S., including wetlands. Of these, 146 (271.93 acres) are wetlands and 29 (74.23 acres) are waters. Additional information on all water and wetland features identified is provided in **Table D-1** in **Appendix D** and the locations of the features are shown on **Exhibit 7: Corridor Maps** in **Appendix A**. The USACE has verified all jurisdictional waters under the Approved J.D. that will be impacted by the proposed project. Potential jurisdictional waters outside of the Approved J.D. will not be impacted by the project. Water and wetland features located beyond the ROI were not assessed.

Wetlands within the ROI are shallow depressions located in the floodplain that seasonally flood and then dry out, becoming exposed mud flats or vegetated depressions. These features contain emergent plant species such as water primrose (*Ludwigia peploides*), smartweed (*Polygonum* spp.), balloonvine (*Cardiospermum halicacabum*), umbrella sedge (*Cyperus* spp.), sedges (*Carex* spp.), spike-rush (*Eleocharis* spp.), and curly dock (*Rumex crispus*). All of the wetland features within the ROI are considered jurisdictional according to the USACE Approved J.D.

Water features within the ROI are linear features that flow to the Trinity River. The Trinity River is located within the ROI as well as sections of the historic Trinity River channel. The Trinity River and historic Trinity River channels are Section 10 waters defined in the Rivers and Harbors Act of 1899. Several water features are man-made linear sumps and are not considered jurisdictional according to the USACE Approved J.D. The man-made linear sumps were formed as a result of the levee construction and are located adjacent to the landside toe of levee. The linear sumps provide for the conveyance of stormwater to the drainage sumps.

4.5.6 Floodplains (Executive Order 11988)

Executive Order 11988 pertains to floodplain management and directs all federal agencies to avoid, if possible, development and other activities in the 100-year floodplain. Where the base floodplain cannot be avoided, special considerations and studies for new facilities and structures are needed. Design and siting of facilities and structures are based on scientific, engineering, and architectural studies, such as, consideration of human life, natural processes, cultural resources, and the planned life span of the preferred alternative. Federal agencies are required to:

- Reduce the risk of flood loss;
- Minimize the impact of floods on human safety, health, and welfare; and,
- Restore and preserve the natural and beneficial values served by floodplains in carrying

out agency responsibilities.

USACE Engineering Regulation 1165-2-26 contains the USACE's policy and guidance for implementing EO 11988. Per Engineering Regulation 1165-2-26, the USACE must first determine whether there are practicable alternatives to placing a proposed project in a floodplain. In addition, Engineering Regulation 1165-2-26 specifies that all reasonable factors should be taken into consideration when determining practicability. These factors are: conservation; economics; visual; natural and beneficial values served by floodplains; impact of floods on human safety; locational advantage; the functional need for locating the development in the floodplain; historic values; fish and wildlife habitat values; endangered and threatened species; federal and state designations of wild and scenic rivers, refuges, etc.; and, in general, the needs and welfare of the people.

The *Trinity River Environmental Impact Statement (TREIS)* Record of Decision (ROD) criteria would need to be met as these projects would be constructed over and within the Trinity River floodplain. These projects would need to demonstrate, individually and cumulatively, that there is no increase in water surface elevations or valley storage for the 100-year and less than five percent valley storage loss for the 800-year event. Valley storage is defined as the water volume that occupies the floodplain during the passing of the flood event and is a measure of the floodplain capacity. Valley storage change is necessary to determine if a loss of valley storage would occur due to implementation of a project, and to quantify the magnitude of the change.

The FEMA FIRMs were reviewed to determine flood zones within the ROI. The Proposed Action Alternative is located within the FEMA Map Numbers 48113C0320J (Effective Date August 23, 2001), 48113C0310J (Effective Date August 23, 2001), 48113C0340J (Effective Date August 23, 2001), 48113C0345J (Effective Date August 23, 2001), and 48113C0505J (Effective Date August 23, 2001. The Levees within the ROI are designated as special flood hazard areas (SFHAs) inundated by the 100-year flood, Zone A, no base flood elevations determined, or Zone AE, base flood elevations determined. Other areas are designated as Zone X, areas determined to be outside the 500-year floodplain. Dallas County and the City of Dallas are participants in the NFIP.

The levees within the ROI are located within the FEMA designated 100-year floodplain as depicted on **Exhibit 2: FEMA Floodplain and USGS Quadrangle Map** in **Appendix A**. The levees within the ROI are also within the Trinity River Corridor Development Regulatory Zone.

Due to increasing urbanization within the DFW area during the past five decades, the quantity of flood waters produced by the Trinity River watershed has increased. In addition, growth of the Great Trinity Forest downstream of the Dallas Floodway has reduced the flood conveyance in the southern Trinity River corridor, reducing the conveyance within the Dallas Floodway upstream. Both of these factors have reduced the effectiveness of the Dallas Floodway System.

4.5.7 Water Quality

A portion of the Upper Trinity River watershed is located within the ROI. This portion of the watershed has undergone extensive development in the last several decades. As a result,

increased runoff from urban, industrial, and agricultural areas has entered the river system and has resulted in water quality issues including sediment, nutrients, and pesticides from nonpoint sources. Urban and industrial stormwater runoff carry pollutants from many sources, including oil and grease, heavy metals, chemicals, toxic substances, solid waste (trash and debris), wastewater, effluence, bacteria, sediment, and other waste streams. The amount of contaminants found in stormwater can vary depending on surrounding land use and the frequency and intensity of rain events. The Upper Trinity River (Segment 0805) is located within the ROI and is listed as threatened/impaired for bacteria and polychlorinated biphenyls (PCBs) in fish tissue in the 2008 CWA Section 303(d) list.

4.6 Biological Resources

4.6.1 Region of Influence

The ROI for biological resources encompasses the areas at the levees that could incur temporary and permanent impacts resulting from the construction of the proposed Section 408 modification measures. The ROI at the East and West Levees encompasses the majority of the Dallas Floodway and extends from the approximate north bank of the West Fork Trinity River and the Elm Fork Trinity River to the AT&SF Railroad at the southern end of the Dallas Floodway. The ROI extends to the residential and commercial property boundaries on the east and west sides of the Dallas Floodway. The climate, geology, and soils; water resources; and, biological resources ROI collectively comprise the natural resources ROI. The natural resources ROI is shown on **Exhibit 6: Natural Resources, Utilities, and Hazardous, Toxic, and Radioactive Wastes ROIs Map** in **Appendix A**.

4.6.2 Threatened and Endangered Species

The pertinent U.S. Fish & Wildlife Service (USFWS) and Texas Parks and Wildlife Department (TPWD) Annotated County list of Threatened, Endangered, and Rare Species were reviewed. **Table D-2** in **Appendix D** provides the federal listed and state listed threatened (T) and endangered (E) species indigenous to Dallas County, Texas.

Federal listed species are protected under the Endangered Species Act of 1973. In general, this act protects both the species and their habitat. State listed species are protected under the Texas Administrative Code, Title 31, Part 2, Chapter 65, Subchapter G, Rules 65.71 - 65.176 and under the TPWD Statutes Chapters 67 and 68 revised May 31, 2002. These regulations primarily address direct effects to the state listed species only and do not address their habitat.

The federally listed threatened or endangered species known to occur in Dallas County include the endangered whooping crane, interior least tern, black-capped vireo, golden-cheeked warbler and the threatened piping plover. These are all avian species that are considered migratory and as such, are also protected under the MBTA. Some specimens may be local residents year round but the species in general do migrate, such as the bald eagle, whooping crane, interior least tern, black-capped vireo, and the piping plover. The *USFWS Existing Habitat Conditions Planning Aid Report for the Dallas Floodway Project (April 2010)* and field reconnaissance were utilized to determine the presence of suitable habitat within the natural resources ROI for the listed species in Dallas County.

The federally endangered interior least tern nests in colonies on bare to sparsely vegetated sandbars along rivers and streams in Texas from May through August. Nesting areas are ephemeral, changing as sandbars form, move and become vegetated. Because natural nesting sites have become sparse, interior least terns have nested in atypical/non-natural areas, which provide similar habitat requirements. For example, one colony has been nesting for several years at the Southside Wastewater Treatment Plant in Dallas. Non-natural nesting sites include sandpits, exposed areas near reservoirs, gravel levee roads, dredged islands, gravel rooftops, and dike-fields. In recent years, interior least terns have been utilizing artificial habitat more frequently within the Dallas area with small colonies being established in highly developed areas.

Potential habitat may be present within the ROI for the bald eagle, which is Federally Listed as Recovered, but being monitored for the first five years. Suitable habitat is also present for the following State-listed species: American peregrine falcon, peregrine falcon, white-faced ibis, wood stork, alligator snapping turtle, and timber canebrake rattlesnake. Potential habitat was also observed at the East and West Levees for the following State Species of Concern: Arctic peregrine falcon, Texas garter snake, and cave myotis bat.

The bald eagle was formerly listed in Dallas County, but was removed from the federal threatened and endangered species list effective August 8, 2007. However, bald eagles are still afforded safeguards under MBTA and the bald and golden eagle Protection Act. Project construction activities should be conducted in accordance with the USFWS's National Bald Eagle Management Guidelines, which may be accessed at http://www.fws.gov/migratorybirds/issues/BaldEagle/NationalBaldEagleManagementGuidelines.pdf (USFWS, 2010).

American peregrine falcons and Arctic peregrine falcons prefer open areas, meadows, mudflats, beaches, marshes, and lakes where birds are abundant. This species may temporarily use portions of the ROI at the East and West Levees for resting or foraging during migration. The peregrine falcon usually hunts in open areas with cliffs or other high vantage points above rivers and coasts. Occasionally, peregrines may nest on bridges and buildings as well. The open areas with high vantage points such as bridges and tall trees present within the ROI provide suitable foraging habitat for the peregrine falcon. The peregrine falcon and both subspecies could potentially roost on the levees and forage in the floodplains or grasslands.

The white-faced ibis is listed as threatened by the state of Texas, but is not federally listed. The species prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats. It nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats. In Texas, it breeds and winters along the Gulf Coast. This species migrates through Dallas County and could use the ROI as a stopover location during migration.

The wood stork is listed as threatened by the state of Texas. The wood stork forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water. The species usually roosts communally in tall snags and inhabits mud flats and other wetlands. Suitable foraging habitat was observed within the ROI for the wood stork. The wood stork breeds

in Mexico and then moves into the Gulf States in search of mudflats and other wetlands. This species could use the ROI as a stopover location during migration.

The alligator snapping turtle is listed as threatened by the state of Texas. This species prefers perennial water bodies, deep water of rivers, canals, lakes and oxbows; also swamps, bayous, and ponds near deep running water and can usually be found inhabiting water with a mud bottom and abundant aquatic vegetation. The ROI contains perennial water bodies that this species could use.

The timber canebrake rattlesnake is listed as threatened by the state of Texas. The species prefers swamps, floodplains, upland woodlands, riparian zones, abandoned farmland; prefers dense ground cover, i.e. grapevines or palmetto in the floodway riparian zones. Suitable habitat is present in the floodway and riparian zones within the ROI for the timber canebrake rattlesnake.

The Texas garter snake is listed as a species of concern by the state of Texas. This species prefers wet or moist microhabitats usually associated with a permanent water source. Suitable habitat for this species is present at riparian zones within the ROI.

The cave myotis bat is listed as a species of concern by the state of Texas. This species roosts in rock crevices, old buildings, carports, under bridges, and even in abandoned cliff swallow nests. Suitable roosting habitat may be present at bridges located within the ROI.

4.6.3 Migratory Bird Treaty Act

The avian species that utilize the habitat within the ROI are considered migratory and are protected under the MBTA. The MBTA states that it is unlawful to kill, capture, collect, possess, buy, sell, trade, or transport any migratory bird, nest, young, feather, or egg in part or in whole, without a federal permit issued in accordance within the Act's policies and regulations.

4.6.4 Wildlife Habitat

The natural resources ROI is located within the TPWD-defined Blackland Prairie natural region of Texas, which encompasses approximately 23,500 square miles. Typical annual rainfall in the region is approximately 20 to 50 inches, with peak rainfall occurring in May or June. Rich, deep, and fertile black soils once supported the original tallgrass prairie communities. Agriculture and development have threatened the remaining grassland communities in Texas.

The 2000 Bureau of Economic Geology map of "The Vegetation/Cover Types of Texas" indicates that the ROI falls within the Urban vegetation classification. The Urban vegetation classification does not address specific plant species. Various vegetative species representative of urban areas were observed within the ROI and are described in more detail in the following paragraphs. The *USFWS Existing Habitat Conditions Planning Aid Report for the Dallas Floodway Project (April 2010)* and field reconnaissance were utilized to determine and describe the various habitat types present within the ROI. These habitat types consist of aquatic habitat, grassland, bottomland hardwood, and urban habitat and are described below.

Aquatic Habitat

Aquatic habitat is comprised of vegetation generally found in habitats associated with water, riverine, and herbaceous wetlands. This includes features that are considered jurisdictional and non-jurisdictional. Water habitat is dominated by permanent and relatively permanent ponded areas. Most vegetation associated with these areas is either aquatic vegetation or along the fringes of the water bodies. These open water areas provide habitat for numerous fish, reptile and amphibian species and foraging areas for wading birds and predators.

Aquatic riverine habitat is dominated by streams and rivers. The primary habitat is the Trinity River and associated streams that flow through the ROI. This habitat type is used by numerous fish, reptile, and amphibian species and as foraging areas for various bird and mammal species. Aquatic riverine habitat consists of deep ponds, snags, riffles, and runs within these streams. The banks of the streams are characterized by vegetative species including black willow (*Salix nigra*), green ash (*Fraxinus pennsylvanica*), oaks (*Quercus* spp.), cedar elm (*Ulmus crassifolia*), box elder (*Acer negundo*), eastern cottonwood (*Populus deltoides*), and various grasses and other herbaceous species

Herbaceous wetlands are dominated by non-woody vegetation. Vegetation is comprised primarily of rushes, sedges, wetland grasses, and hydrophytic plants. Typical plant species in these areas include sedges (*Carex* spp.), spike-rushes (*Eleocharis* spp.), rushes (*Juncus* spp.), smartweed (*Polygonum* sp.), balloonvine (*Cardiospermum halicacabum*), black willow, Roosevelt weed (*Baccharis neglecta*) and other hydrophytic vegetation.

Herbaceous wetlands provide food and cover for fish, reptiles, resident and migratory birds, small mammals, invertebrates, and the predators that feed on the other species. These areas provide important nesting and foraging habitat for wading birds and waterfowl.

Grassland

Typically, grasslands are dominated by native grasses or introduced grasses that are not regularly planted or mowed, and have a minimal canopy cover of 25 percent. Some woody vegetation may be present within the grassland habitat type. The grasslands within the ROI are routinely maintained by mowing several times each year. Grasslands provide open space, a food source, and cover for escape and nesting by means of tall grass, scattered brush piles and shrubs for a variety of animals. The grasslands within the ROI may generally be characterized as "managed" because these areas are routinely mowed. They are comprised of short native and introduced grasses and forbs, and occasional scattered trees. Grass species observed within the ROI include switchgrass (*Panicum virgatum*), Johnson grass (*Sorghum halepense*), Bermuda grass (*Cynodon dactylon*), foxtail grass (*Setaria* sp.), buffalograss (*Bouteloua dactyloides*) and dallisgrass (*Paspalum dilatatum*). Forb species observed within the ROI include woodsorrel (*Oxalis* sp.), daisy fleabane (*Erigeron strigosus*), dollarweed (*Hydrocotyle umbellata*), giant ragweed (*Ambrosia trifida*), snow on the prairie (*Euphorbia bicolor*), cocklebur (*Xanthium strumarium*), silverleaf nightshade (*Solanum elaeagnifolium*), false nettle (*Boehmeria* sp.), camphorweed (*Heterotheca subaxillaris*), sunflower (*Helianthus* sp.), blackberry (*Rubus* sp.), common yarrow (*Achillea millefolium*), Mexican hat (*Ratibida columnfera*), Indian blanket (*Gaillardia pulchella*), dandelion (*Taraxacum offinale*), Texas thistle (*Cirsium texanum*) and balloonvine.

Bottomland Hardwood
The bottomland hardwood cover type is defined as riparian areas dominated by deciduous trees, usually along streams, that are occasionally flooded. In optimum conditions, this cover type provides food, cover, nesting habitat, and living space to riparian forest dependent species. Riparian forest habitats are essential in maintaining biodiversity and providing important wildlife travel corridors. Located primarily along the Trinity River and its inflows, many of these woodlands are periodically flooded and are predominately composed of eastern cottonwood, cedar elm, green ash, pecan (*Carya illinoinensis*), black willow, and box elder. Other trees species present include bur oak (*Quercus macrocarpa*), red mulberry (*Morus rubra*), and sugar hackberry (*Celtis laevigata*).

Urban
Urban areas are defined as roads, parking lots, building, maintained landscape vegetation, and other aspects of urban development. These areas provide minimal habitat for wildlife; however, certain species that have adapted more readily to co-exist with an urban environment can utilize some of these vegetated urban areas for foraging and habitat.

Representative habitat types and associated acreages present within the natural resources ROI at the East and West Levees are described below.

The natural resources ROI along the East and West Levees encompasses approximately 3,652 acres. The acreages for the individual habitat types that are present at the East and West Levees are displayed in **Table 4-7** below.

Table 4-7: Habitat Types within the Natural Resources ROI

Habitat Type	Area (acres)
Aquatic Habitat	573
Grassland	2,725
Bottomland Hardwood	245
Urban	109
Total	**3,652**

Wildlife
The majority of the Floodway has been impacted to some degree by urban development. As a result, wildlife habitat within the natural resources ROI has and would continue to be utilized by species that are better able to adapt to urban life. Major mammalian predators like the bobcat (*Lynx rufus*) have been or soon would be lost from the general project area. Other predators like the coyote (*Canis latrans*), opossum (*Didelphis virginiana*) and the raccoon (*Procyon lotor*) may adapt better to urban development and remain longer. Specimens of the eastern fox squirrel (*Sciurus niger*), the eastern cottontail (*Sylvilagus floridanus*), and the swamp rabbit (*Sylvilagus aquaticus*) can still be found, though probably in lesser numbers, and still serve as prey items for various species of hawks, owls, and snakes. Many rodents, like the white-footed mouse (*Peromyscus leucopus*), deer mouse (*Peromyscus maniculatus*), northern pygmy mouse *(Baiomys taylori),* and the hispid cotton rat (*Sigmodon hispidus*) are likely to be found in the general project area, and some of these species may remain prolific for some time. As development occurs,

though, these rodents would be replaced in numbers by other rodent species like the Norway rat (*Rattus norvegicus*), roof rat (*Rattus rattus*), and the house mouse (*Mus musculus*).

The grassy fields and nearby emergent wetlands still serve as foraging areas for many local species and migratory avian species. Species observed during field reconnaissance include the mallard duck (*Anas platyrhynchos*), little blue heron (*Egretta caerulea*), green heron (*Butorides virescens*), cattle egret (*Bubulcus ibis*), great egret (*Ardea alba*), red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), turkey vulture (*Cathartes aura*), American crow (*Corvus barchyrhynchos*), killdeer (*Charadrius vociferous*), great-tailed grackle (*Quiscalus mexicanus*), European starling (*Sturnus vulgaris*), scissor-tailed flycatcher (*Tyrannus forficatus*), cliff swallow (*Petrochelidon pyrrhonota*), mourning dove (*Zenaida macroura*), white-wing dove (*Zenaida asiatica*), and rock dove (*Columba livia*). Several swallow nests were observed under bridge structures at the East and West Levees. These nests were primarily observed under bridges that span the entire floodway.

Numerous amphibian and reptilian species would also utilize the different wildlife habitats. The species would include various snakes, turtles, lizards, and frogs native to north-central Texas. During the field reconnaissance numerous red-eared sliders (*Trachemys scripta elegans*) were identified within the ROI.

4.6.5 Aquatic Resources

The types of aquatic systems that are present within the ROI include wetlands, shallow ponds, oxbow lakes or their remnants, and the Trinity River tributaries. The Trinity River system within the ROI is comprised of the mainstem, the West Fork, Mountain Creek, and the Elm Fork. Aquatic habitat in the ROI is minimal since the Trinity River within this area is a man-made channel. Stream banks are generally bare containing little or minimal vegetation. The river sediment composition in the ROI ranges from slippery, clayey mud to fine sand. Types of aquatic habitat in the ROI which may provide structure or shelter, feeding zones, or invertebrate colonization sites include bridge supports, concrete blocks, undercut banks, channel snags and channel bed shape irregularities.

Riverine and floodplain lakes within this area contain sediment and aquatic habitat features characteristic of both river and lake environments. Aquatic habitat in these lentic environments includes snags and dead fall timber, lake bed irregularities, aquatic and overhanging terrestrial vegetation, and animal burrows. A low diversity of aquatic invertebrate and fish species representative of an impacted environment are present in the ROI. Fisheries and aquatic invertebrate communities tend to be dominated by the more pollution-tolerate species such as carp (*Cyprinus carpio*), longnose gar (*Lepisosteus osseus*), shortnose gar (*Lepisosteus platostomus*), smallmouth buffalo (*Ictiobus bubalus*), river carpsucker (*Carpiodes carpio*), green sunfish (*Lepomus cyanellus*), longear sunfish (*Lepomis megalotis*), mosquitofish (*Gambusia affinis*), bullhead catfish (*Ameiurus nebulosus*), chironomid worms, and the corbicula clam (*Corbicula fluminea*). Riverine and floodplain lakes in the ROI contain fish and aquatic invertebrate assemblages representative of the Trinity River since periods of over bank flooding allow migration between the river and the lakes (Trinity River PEIS, 2000).

4.7 Noise

Sound is defined as mechanical energy produced by the movement of waves of compressed air radiating spherically from a source that can be sensed by the human ear. Although sounds are perceived differently from one person to another, they can be precisely measured. The strength of sound is commonly measured on a relative scale of sound pressure levels expressed in decibels or "dB." Noise is commonly defined as "unwanted" sound. Loudness is a term used to describe the manner in which people perceive the intensity of sound, and is considered to be subjective as it varies from person to person. In general, sound becomes unwanted when it either interferes with normal activities such as sleeping or conversation, or when it disrupts or diminishes a person's quality of life.

Sound is composed of a wide range of frequencies. Because humans are not capable of hearing all frequencies, an adjustment is made to high and low frequencies to approximate the average human response to sounds. These average levels are known as "A-weighted noise levels." As listed in **Table 4-8**, typical outdoor A-weighted noise levels in decibels (dBA) range from approximately 40 dBA for an urban setting at nighttime to approximately 110 dBA for a jet flyover. Indoor noise levels range from 40 dBA for a library and 110 dBA for a rock band at a distance of 16.4 feet.

Table 4-8: Common Sound/Noise Levels

Outdoor	dBA	Indoor
Air horn	110	Rock/blues band
Jet flyover at 1,000 feet		Baby crying
Leaf blower	100	Subway
Gas weed eater		Fire alarms
Riding lawn mower	90	Blender
Gas edger		Crowded restaurant
Police whistle	80	Disposal at 3 feet
Air conditioner compressor		Shouting at 3 feet
	70	
		Normal conversation at 3-5 feet
Normal conversation at 3 feet	60	Clothes dryer at 3 feet
Babbling brook		Large business office
Quiet urban (daytime)	50	Refrigerator
Quiet urban (nighttime)	40	Quiet office, library
Wilderness	30	
	20	Recording studio
	10	Threshold of hearing

Source: Texas Department of Transportation (TxDOT), 2011.

Because noise levels vary widely during the day, they can be averaged over time. The term Day-Night Average Level (Ldn) is used to describe the average noise level during a 24-hour day with a penalty of 9 dBA added to nighttime sound levels (10:00 p.m. to 7:00 a.m.). The Community Noise Equivalent Level (CNEL) is the average of sound levels within a 24-hour period, also with a 5 dBA penalty for noise events that occur in the evening (7:00 p.m. to 10:00 p.m.), as well as a dBA penalty for noise events at night (10:00 p.m. to 7:00 a.m.). Shorter measurement durations (typically 1 hour) are described as Equivalent Sound Levels (Leq), indicating the total energy contained by the sound over a given sample period. The Leq for 1 hour is the average noise level during the hour, specifically, the average noise based on the energy content (acoustic energy) of the sound. The Leq is the level of a continuous noise that has the same energy content as the fluctuating noise level.

Section 4(b) of the NCA of 1972 (PL 92-574) directs federal agencies to comply with applicable federal, state, and local noise requirements with respect to the control and abatement of environmental noise. Congress defined environmental noise in the NCA to mean the intensity, duration, and character of sounds from all sources. The most applicable federal guidelines for noise regulations derive from the Federal Transit Administration (FTA). The FTA guidelines classify three categories of land use with special sensitivity to noise. They are buildings or parks where quiet forms a basic element of their purpose; residences and buildings where people normally sleep (e.g., homes, hotels, hospitals), where nighttime noise is most annoying; and institutional land uses (e.g., schools, libraries, parks, churches) with primarily daytime and evening use.

Neither the State of Texas nor the Texas Commission on Environmental Quality (TCEQ) have adopted any noise regulations. The City of Dallas, however, does have a local noise ordinance (Dallas City Code: Volume II, Chapter 30). This ordinance contains time restrictions on specific types of noise producing activities, such as construction, and aims to protect citizens from offensively loud noise and vibrations. Planners often use time-averaged noise levels such as Ldn and CNEL as the basis for land use compatibility guidelines. For sounds that fluctuate constantly throughout the day, such as traffic, the Leq is commonly used (TxDOT 2011).

4.7.1 Region of Influence

The ROI for noise was defined as the developed parcels directly adjacent to the East and West Levees and within the Dallas Floodway with special sensitivity to noise (i.e., residences, hotels, hospitals, schools, libraries, parks, places of worship, etc.). Noise sensitive receivers at these locations represent land use activity areas that could be affected by an increase in noise. Representative noise sensitive receivers within the ROI include residential areas, places of worship, and motels. Most of the residential areas are located along the West Levee. A place of worship and a motel are adjacent to the ROI.

4.7.2 Existing Noise Environment

The Proposed Action Alternative is located within an urban setting, adjacent to parks, industrial, manufacturing, commercial, and residential properties. The predominant noise sources for the ROI consist of vehicular traffic traveling the existing transportation network and air traffic. The existing transportation network noise sources near the ROI include Loop 12, Regal Road, Irving Boulevard, Westmoreland Road, Hampton Road, Inwood Road, Sylvan Avenue, Continental Avenue, Commerce Street, IH 30, IH 35E, Beckley Avenue, Riverfront Boulevard, Houston Street, Lamar Street, Canada Drive, Industrial Boulevard, Singleton Boulevard, the Trinity Railway Express (TRE), the Union Pacific Railroad (UPRR) and the DART Railway. Existing air traffic noise is related to the Dallas Love Field Airport and DFW International Airport, located approximately 2 and 8 miles from the Dallas Floodway System respectively. Other contributors to the local noise environment within the Dallas Floodway include the Dallas Floodway System pumps, construction equipment performing O&M activities, and/or trash screens.

Existing noise levels near the ROI were measured in September 2009 during the development of the *Draft Environmental Impact Statement for the Dallas Floodway Project.* The existing noise levels reported for the sensitive receivers (R1 through R5) that represent the land use activity

areas adjacent to the Proposed Action Alternative are listed in **Table 4-9** and depicted in **Appendix A**, **Exhibit 7: Corridor Maps**.

Table 4-9: Existing Noise Levels within the Noise ROI

Representative Receiver	dBA Max	dBA Min	Time	Date	Site Location
*R1-Residential	58.0	44.6	11:27 AM	9/15/09	End of Mexicana Road
*R2-Residential	83.1	55.4	11:45 AM	9/15/09	Adjacent to N. Westmoreland Road near levee
*R3-Place of Worship	73.7	50.5	11:58 AM	9/15/09	At the parking lot
*R4-Motel	80.0	65.1	4:01 PM	9/15/09	Adjacent to Mockingbird Road
*R5-Apartments	65.0	NA	1:10 PM	9/15/09	Adjacent to Jefferson Viaduct

**Source: USACE, 2010.*

4.8 Utilities

4.8.1 Region of Influence

The ROI for the utilities encompasses the areas at the levees that could incur temporary and permanent impacts resulting from the construction of the proposed Section 408 modification measures. The utilities ROI encompasses the majority of the Dallas Floodway and extends from the approximate north bank of the West Fork Trinity River and the Elm Fork Trinity River to the AT&SF Railroad at the southern end of the Dallas Floodway. The ROI extends to the residential and commercial property boundaries on the east and west sides of the Dallas Floodway. The utilities ROI is the same as the natural resources ROI and as such, is not shown separately on **Exhibit 6: Natural Resources, Utilities, and Hazardous, Toxic, and Radioactive Wastes ROIs Map** in **Appendix A**.

4.8.2 Existing Utilities

Utilities present within, adjacent to, or crossing the utilities ROI were grouped together in categories and consist of gas and petroleum, communication, electric, and water. A brief discussion of the specific types of utilities within each category follows. Photographs of existing utilities and the area surrounding the project are provided in **Appendix B: Project Photographs**.

Gas and Petroleum

Atmos Energy provides natural gas service in the ROI via a network of various sized lines. Exxon-Mobil owns petroleum pipelines within the utilities ROI. Magellan Pipeline Company owns a jet fuel pipeline that is located within the western portion of the utilities ROI (CH2M HILL, 2008).

Communication
Communication cables within the ROI include telephone, cable television, and fiber optic lines. Companies with communication lines include, but are not limited to, AT&T, Level 3 Communications, Time Warner, Qwest, and 360 Networks.

Electric
Oncor provides electric service via power lines and towers that are prevalent throughout the utilities ROI. Other electric utilities are owned by Dallas Water Utilities (DWU), Dallas Public Works (DPW), and Dallas Public Utilities (DPU).

Water
The water utilities within the ROI consist of potable water, raw water, sanitary sewer, storm water, and waste water lines of various sizes. DWU provides potable drinking water to over 2.3 million people in a service area of approximately 6,700 square miles. The Park Cities Municipal Utilities District (MUD) has a raw water line within the utilities ROI. Sanitary sewer and waste water lines are operated by DWU. Storm water lines present within the utilities ROI are operated by DWU and DPW.

East and West Levees
Gas and petroleum, communication, electric, and water utilities are present within the utilities ROI. Several utilities extend across the levees and the floodplain, while others parallel the landside toe of the levees. The specific types of utilities present at the East Levee consist of Atmos gas lines; Magellan, petroleum transmission; Qwest, AT&T, Level 3 Communications, and 360 Networks communication lines; Oncor high voltage transmission lines; DWU waste water and water lines; DPU and DPW storm water lines; and the Park Cities MUD raw water line. The specific types of utilities present at the West Levee consist of Atmos and Exxon-Mobil gas lines; Magellan jet fuel lines; AT&T and Level 3 Communications communication lines; Time Warner utility transmission; Oncor high voltage transmission; DWU electric lines; DPW storm water lines; and DWU water and sludge lines.

4.9 Cultural Resources

4.9.1 Historic Resources

Cultural resources typically include archaeological, historical architectural, and traditional cultural properties associated with Native Americans or other groups. Section 106 of the National Historic Preservation Act (NHPA) of 1966 as amended, requires that all federal agencies take into account the effects of their undertakings on historic properties. These properties can include buildings, structures, locations, features, and objects older than 50 years and which are currently listed on, or eligible for nomination to, the National Register of Historic Places (NRHP). The NHPA defines a historic property as "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on the National Register…" (16 USC 470w).

Section 405(a) of the 2010 Supplemental Disaster Relief and Summer Jobs Act (PL 111-212) states that the USACE is not required to make determinations of eligibility under the NHPA for the Dallas Floodway. USACE Implementation Guidance dated October 19, 2010 directs the Fort

Worth District not to make determinations under the NHPA and to examine, describe, and consider the built environment that comprises the proposed project as cultural resources within the context of the scope of impacts that must be analyzed under NEPA. While the NHPA compliance process is usually used to satisfy NEPA requirements, PL 111-212 does not remove USACE requirements in regard to cultural resources under NEPA and other cultural resource related laws and regulations.

Separate from the requirements of the NHPA, NEPA requires consideration of important historic and cultural aspects of our natural heritage, implemented through the CEQ regulations. Council of Environmental Quality regulations, in Section 1502.16 (g), require a discussion of environmental consequences to include "urban quality, historic and cultural resources and the design of the built environment, including the reuse and conservation potential of various alternatives and mitigation measures."

To satisfy the requirements of NEPA, the USACE conducted a cultural resources survey of the Dallas Floodway with a narrative that describes the development, function, composition, and current operation of the Dallas Floodway and discusses the significance of this cultural resource's structural features and relationships with the historical development of the City of Dallas without explicit reference to the criteria used to determine NRHP eligibility (TEC, Inc., 2010). The resulting cultural resource survey independently establishes criteria to determine the presence of significant historic and cultural resources.

Several other federal laws and regulations have been established to manage cultural resources, including the Archaeological and Historic Resources Preservation Act (1974), the Archaeological Resources Protection Act (1979), and the Native American Graves Protection and Repatriation Act (1990). Cultural resources are also protected by state and local legislation and regulations; for example, the Texas Parks and Wildlife Code, Antiquities Code of Texas, and the City of Dallas Development Code.

Coordination with federally recognized American Indian tribes (Comanche Nation, Mescalero Apache Tribe, Kiowa Tribe of Oklahoma, and Tonkawa Tribe of Oklahoma) must occur in accordance with the American Indian Religious Freedom Act (1978); EO 13007 Indian Sacred Sites; and EO 13175 Consultation and Coordination with Indian Tribal Governments, which emphasizes the importance of respecting and consulting with tribal governments on a government-to-government basis. This policy requires an assessment through consultation of the potential effect of proposed federal actions that could significantly affect tribal resources before decisions are made by the respective services.

4.9.1.1 Region of Influence

The ROI for historic resources is defined by the area within the City of Dallas that may be located within the 100-year floodplain as designated by FIRMs issued by FEMA under the No-Action Alternative, including the Dallas Floodway. The historic resources ROI is depicted in **Appendix A**, **Exhibit 8: Important Architectural NEPA Historic and Cultural Resources within the ROI Map.**

The proposed letting date for construction of this project is 2012. Therefore, the term "historic-age resource," as it is used in this report, refers to any buildings, structures, objects, and potential historic districts dating to circa 1962 (2012 minus 50 years) and before. The term "important architectural NEPA historic and cultural resources," as it is used in this report, refers to any resource or district listed in the NRHP, any resource or district previously determined eligible for the NRHP, resources recognized by the Texas Historical Commission (THC) such as properties identified by Official Texas Historical Markers (OTHM), and any resource or district the USACE determines as an important historical and cultural resource (**Appendix G**).

4.9.1.2 Existing Conditions

The methodology for determining the presence of NEPA-defined cultural resources within the ROI is based on existing data generated from previous cultural resource investigations and a recent cultural inventory of the Dallas Floodway conducted in the ROI (TEC, Inc., 2010).

Prior Historical Surveys

A search of the USACE files and the Texas Archaeological Sites Atlas Database in November 2009 identified previously recorded cultural resource investigations of buildings and structures within the ROI. The search identified 15 previously undertaken surveys and 37 previously recorded historical resources, described in the following sections and presented in **Table 4-10**. Previously identified cultural resources within the ROI include bridges, roadways, landscape features, and Dallas Floodway components.

Intensive Engineering Inventory of the Dallas Floodway

In December 2009, cultural resource professionals conducted an intensive cultural survey of the Dallas Floodway for the purpose of identifying historic resources (TEC, Inc., 2010). The report, included in **Appendix G**, is an inventory and evaluation of the engineering components associated with the Dallas Floodway Project, and includes a historic context of the Floodway as a flood control system and as the outgrowth of community planning. In accordance with USACE Implementation Guidance, the survey focuses on the Dallas Floodway as an engineering system and considers the cultural resource's importance without making explicit references to NRHP eligibility criteria.

Based on an analysis of the field and research data, this cultural survey demonstrates the Dallas Floodway, as a single engineering system for flood control and reclamation, is a historic and cultural resource with local historical associations with flood control and the history of planning and community developments in the City of Dallas, and is a statewide example of an engineering system designed for flood control and development enhancement. The period of significance of the Dallas Floodway is 1928–1959, corresponding to the years when the Floodway construction started and ended, respectively. The essential physical features of the Dallas Floodway are the levees, diversion channels, and overbank. The Dallas Floodway meets the NEPA definition of a historic and cultural resource.

The bulk of the following existing conditions discussion summarizes the content of the report provided in **Appendix G**.

Norman Alston Architects

Architectural resources located within the ROI were evaluated between 2000 and 2009 for their eligibility for nomination to the NRHP. In 2000 and 2001, Norman Alston Architects conducted a number of surveys in the Dallas Floodway. It was determined that the Baker Pumping Plant was eligible for nomination under criterion A for its contribution to historic events and criterion C for architectural merit. The State Historic Preservation Officer (SHPO) concurred in 2009 following a secondary report completed by the USACE Fort Worth District.

Project Pegasus

The 2004 Project Pegasus evaluated the East and West Levees as well as the Cadiz Pump House for their eligibility. It was determined at that time (and concurred by the SHPO) that the Levees were officially not eligible for nomination but the 1930 Cadiz Pump House was officially eligible for nomination to the NRHP.

Table 4-10: Previous Historical Surveys within the ROI

Date Published	Firm/Author	Title
1999	Burson, Elizabeth and Maynard B. Cliff	Cultural Resources Survey of the Proposed Environmental Restoration Areas Along the Old West For of the Trinity River, Dallas County, Texas
1999	Cliff, Maynard B., David Shanabrook, Steven M. Hunt, Whitney Autin, and Marsha Prior	Buried Archaeological Site Potential in the Dallas Floodway Project Area
2000	Buysse, Johnna L.	An Evaluation of Sites Within the Proposed Dallas Floodway Extension Project, Dallas County, Texas
2000	Norman Alston Architects	Cultural Resource Review for the Environmental Impact Statement Areas of Potential Effect of the Trinity River Parkway, Dallas, Texas
February 2001	Norman Alston Architects	Historic Resource Survey of the Building Displacements of the Trinity River Parkway, Dallas, Texas
2001	Shanabrook, David, Duane E. Peter, and Steven M. Hunt	Geoarchaeological Investigations of Wetland Cell D within the Dallas Floodway Extension Project Area, Dallas, Texas
2003	Skinner, Alan S.	The Trinity River Parkway Archival and Archaeological Evaluation Report
March 2004	Texas Department of Transportation, Dallas District	Project Pegasus Historic Resources Survey Report
September 2006	Carter Burgess	City of Dallas, Interior Levee Drainage Study – Phase I, Volume 1 of 2 – Report
2006	Frederick, Charles D., Lance K. Trask, and Alan S. Skinner	Archaeological Testing for the Trinity Parkway
2006	Skinner, Alan S.	Draft Archaeological Testing Report for the Trinity Parkway
2007	Sundermeyer, Scott A. and Charles D. Neel	Intensive Archaeological Resources Investigations of the Santa Fe Trestle Trail Borrow Pit, Dallas County, Texas
2008	Trask, Lance K., Jesse Todd, and Alan S. Skinner	Archaeological Testing of Site 41DL441 for the Trinity Parkway in Dallas, Dallas County, Texas
October 2008	Federal Highway	Supplemental Draft Environmental Impact Statement & Draft

Date Published	Firm/Author	Title
	Administration	Section 4(f) Evaluation, Trinity Parkway from IH 35E/SH 183 to US 175/SH 310 Dallas County, Texas
October 2009	Thomas P. Eisenhour, Ecological Communications Corporation	Non-Archaeological Historic-Age Resource Reconnaissance Survey Report Trinity Parkway: From IH 35E/SH 183 to US 175/SH 310 Dallas County, TxDOT Dallas District

Source: USACE and Draft Environmental Impact Statement for the Dallas Floodway Project, Dallas, Texas, December 2010.

Non-Archaeological Historic-Age Resources Reconnaissance Survey Report

The remaining architectural resources were evaluated in the *Non-Archaeological Historic-Age Resource Reconnaissance Survey Report* by the North Texas Tollway Authority (NTTA) and FHWA in October 2009. This survey upheld the previous eligibility determinations and recommended that the other five pumping plants (Able, Charlie, Delta, Hampton, and Pavaho) are not eligible for nomination to the NRHP. In addition, this report states that the associated sluices, pressure sewers, and interceptors were not eligible for nomination to the NRHP. Official determinations of eligibility of this report's findings are pending further research and evaluation, as directed by the THC. Additional research questions are partly being addressed by the cultural survey, *Intensive Engineering Inventory and Analysis of the Dallas Floodway* (**Appendix G**).

In addition, a number of historical investigations, including individual Historic American Engineering Record documentation of four bridges, have determined that 6 of the 19 bridges located within the Dallas Floodway are eligible for nomination to the NRHP. One bridge, the Houston Street Viaduct, is listed in the NRHP. The remaining 11 bridges have not been evaluated for their NRHP eligibility. One bridge has been demolished, the Proctor Street Bridge Pier. Previous investigations of bridges within the ROI are described in detail in the following sections.

Historic Background

A regional prehistoric cultural sequence developed for the upper Trinity River basin is summarized in **Table 4-11**. Because of a lack of other available lines of evidence, the key indicators of temporal periods for sites in the region focus on diagnostic projectile points (Shanabrook et al. 2001).

Table 4-11: American Indian Chronology for the Upper Trinity River Basin

Years Before Present	Temporal Period	Temporal Period Subdivisions
100	Historic Indian	None
250	Late Prehistoric	II
750		I
1250	Archaic	Late
3500		Middle
6000		Early
8500	Paleoindian	None
11,950		None

Source: USACE and Draft Environmental Impact Statement for the Dallas Floodway Project, Dallas, Texas, December 2010.

Paleoindian Period (8,500-11,950 Years Before Present)

The majority of evidence for the presence of Paleoindian peoples in the upper Trinity River basin comes from the presence of diagnostic projectile points recovered in stratigraphically mixed contexts or from surface collection. Plainview and Dalton type projectile points are typical in Paleoindian sites in the region (Shanabrook et al. 2001). Based on the poor context of these finds, evidence of Paleoindian activities in the upper Trinity River basin is limited. Typical interpretations of Paleoindian economy and subsistence have suggested a model of nomadic hunter/gatherers with a high degree of group mobility (based in large part on the diversity of non-local lithic materials used in tool manufacture). Paleoindians have been interpreted as big game hunters following herds of megafauna.

Recent work by Ferring (2001) at the Aubrey Site (41DN479), on the Elm Fork of the Trinity River north of Dallas, has suggested that Paleoindian subsistence was not as limited in scope as has been suggested in many regions. Evidence exists of the use of a wide variety of small and medium fauna in addition to the typical big game resources.

Archaic Period (1,250-8,500 Years Before Present)

In north-central Texas, the Archaic period has been divided into three major sub-periods. Early Archaic period (6,000-8,500 years before present [YBP].) sites are poorly known, and no discrete sites from this period are present in the upper Trinity River basin. In general, based on surface collections, sites of this period are hypothesized to be small and widely distributed. This is taken to reflect a continuance from the Paleoindian period of a high mobility hunter/gatherer economy. Diagnostic projectile points of the Early Archaic include Split Stemmed and possibly Angostura (Shanabrook et al. 2001).

The Middle Archaic period (3,500-6,000 YBP) is the most poorly represented period in north-central Texas. Work at the Calvert site (41DN102) indicates a foraging economy that relied heavily upon small game and deer. Repeated occupations of the site suggest a continuance of patterns of high mobility (Shanabrook et al. 2001). It has been suggested that this period represents the advent of regional differences in culture (Cliff et al. 1999). Diagnostic projectile points of the Middle

Archaic may include the Basal Notched group, Carrollton, Bulverde, Dawson, and Wells (Shanabrook et al. 2001).

The Late Archaic period (1,250-3,500 YBP) is characterized by a high population density represented by a significant increase in sites and a greater site distribution. Inter and intra site patterning suggests a significant decrease in group mobility. This in turn may have resulted in a decrease in interregional contact and an economy with more use of locally available floral and faunal resources. Evidence suggests that many Late Archaic sites were used for a limited period and reoccupied on a seasonal basis. Diagnostic dart points are characteristic of the Late Archaic and may include Elam, Godley, Yarbrough, Trinity, Gary, Dallas, Palmillas, Castroville, Edgewood, Ellis, and Marshall (Shanabrook et al. 2001).

Late Prehistoric (250-1,250 Years Before Present)
In the upper Trinity River basin, the Late Prehistoric period is broken into two major sub-periods. Late Prehistoric I (750 – 1,250 YBP) is most notable for the appearance of arrow points and pottery. Despite the advent of ceramics and bow and arrow technology, sites reflect a continuance of foraging systems common to the Late Archaic period. Late Prehistoric I projectile point assemblages are characterized by Scallorn, Alba, Steiner, and Catahoula arrow points. Ceramics of this period are sparse in the upper Trinity River basin, but are typically sand and grog tempered (Cliff et al. 1999).

Late Prehistoric II (250-750 YBP) has been differentiated from Late Prehistoric I based on the presence of shell-tempered Nocona Plain ceramics and unstemmed projectile points such as Harrell, Fresno, Washita, and Maud, as well as Perdiz points (Shanabrook et al. 2001). Coupled with a significant increase in bison procurement during this period, these shifts have been taken as a sign of intrusive Southern Plains influence. Limited evidence of horticultural activity is also present during this period. The sub-regional patterns of recovery for maize and other domesticates indicate that the adoption of agriculture was not necessarily consistent throughout the upper Trinity River basin, which raises the question of how important agriculture was to subsistence living during this period (Cliff et al. 1999).

Native American/Ethnohistoric Period (<250 Years Before Present)
Little is known archaeologically of the presence of Native Americans in the upper Trinity River basin during this period (Frederick et al. 2006). A lack of historic records relating to the Trinity River basin during the first half of the 1700s makes it difficult to determine which tribes were located in the area. From Spanish records, it is known that the Lipan (of the Apachean group) lived west of the ROI in the High Plains region prior to 1750. During the mid-1700s, several nomadic tribes migrated to present-day Texas including the Wichita, Comanche, Kiowa, and Kiowa Apache.

The Wichita moved into present-day Oklahoma beginning around 1700, but no records indicate they were in Texas prior to 1772, when they established a settlement along the Salt Fork or the Brazos River, west of Dallas. Traditionally, several linguistically related tribes have been called the Wichita, including the Wichita, Kichai, Waco, Iscani, Tasakoni, and Taovayas (Cliff et al. 1999). Known as Plains Villagers, these tribes were dependent on agriculture as well as bison. In

1843, the Wichita signed a treaty with the Republic of Texas, followed by two treaties with the U.S. in 1837 and 1856 (Cliff et al. 1999). Two of the Wichita tribes, the Waco and Tawakoni, were placed on the Fort Belknap reservation in 1855. The remainder of the Wichita lived between the Brazos and Trinity Rivers at this time. The remaining members of the Wichita moved to Kansas during the Civil War, and settled near Anadarko, Oklahoma in the late 1860s.

Similar to the Wichita, the Comanche began moving into Texas in the 1700s. A member of the Shoshonean group, the Comanche migrated to the Southern Plains due to the introduction of the horse to live a nomadic lifestyle. Accomplished horsemen, the Comanche drove the Apache out of Texas, forcing them westward. Known for their tendency to raid both Anglo and Native American settlements, the Comanche were often referred to as the "Lords of the South Plains."

The Comanche culture was divided into bands that lived independently of each other, though retaining the ability to unite against a common enemy. The bands of the Comanche each focused on different ranges, with the Yamparika along the Arkansas River, the Kotsoteka directly south of the Yamparika, the Nokoni along the Red River, the Quahadi on the High Plains, and the Peneteka at the edge of the timber belt of east Texas (Cliff et al. 1999). The Comanche's first venture into Texas occurred in 1758 when they joined the Wichita and Apache on the attack at San Sabá de la Santa Cruz. During the historic period, the Comanche continually raided Anglo settlements, creating an atmosphere of hostility.

Other Native American tribes located near the ROI were the Kiowa and Kiowa Apache. It is believed the Kiowa migrated to the Southern Plains from the headwaters of the Yellowstone and Missouri rivers in present-day Montana (Shanabrook et al. 2001). Of the Tanoan group, the Kiowa and their cousins the Kiowa Apache were known to battle the Comanche periodically and it is possible these two groups could have been the reason the Comanche migrated to the Southern Plains. Nomadic people, the Kiowa were divided into bands similar to those of the Comanche, and were typically found in Oklahoma and the panhandle of Texas. Kiowa interaction with Anglos settlers began in 1834, and in 1837, the tribe signed a treaty with the U.S.

During 1864, many of the Plains Indians, including the Comanche, Kiowa, and Kiowa Apache participated in what has been termed a general uprising. The result was the 1867 Medicine Lodge Treaty, signed in Medicine Lodge, Kansas. Upon signing this treaty, each tribe committed itself to moving to a newly created reservation in Oklahoma, removing them from Texas. Although a number of the bands of the Kiowa and Comanche chose to move to the reservation shortly after the treaty was signed, several bands refused to move and continued raiding settlements around Texas (Shanabrook et al. 2001).

Tension between the U.S. and the Native American tribes within Texas came to their final apex in 1874 at the Battle of Adobe Walls. Located at the Palo-Duro Canyon in the panhandle of Texas, the battle included warriors from the Comanche, Kiowa, and Cheyenne. The warriors were unable to defeat the camp of settlers at the Battle of Adobe Walls or in a series of resulting yearlong skirmishes with the U.S. Military. In 1875, the last bands of the Kiowa and Comanche moved onto the Oklahoma reservation.

Early History of Dallas and the Beginnings of Transportation (1830–1865)

As early as 1519, a Spanish explorer mapped the Texas coastline, and in 1542, the first Spanish explorers entered the area now known as Dallas. In 1813, the Spanish government allowed a U.S. citizen, Moses Austin, to form a colony of Anglo-Americans within Texas. Upon seizing control of Texas in 1821, Mexico allowed Stephen F. Austin, the son of Moses Austin, to bring 300 families to Texas.

The Texas Revolution began in 1832, although full-fledged violence did not break out until the battle at Gonzales in 1835. The Anglo settlers declared independence in 1835, establishing Texas as an independent country and allowing for further settlement of the area by U.S. citizens. One settler, John Neely Bryan followed the old Indian Trail from Arkansas to the Trinity River, stopping around the Three Forks area sometime around 1839. Due to the size of the river, Bryan, a land speculator, believed he found the perfect location for a trading fort that would have a navigable waterway with access to the Gulf of Mexico.

Following the removal of Native Americans in the area, Bryan's proposed trading fort was no longer a viable option, thus he turned his focus toward creating a town. Nearby settlers were invited to move to this new town, and five people chose to take Bryan up on his offer. The Texan Emigration and Land Company contracted with the Republic of Texas to bring 600 families to settle on a land grant encompassing areas in present-day Dallas, Denton, Cooke, Collin, Grayson, Ellis, and Wise counties (Cliff et al. 1999).

In 1847 Dallas County was divided from a larger county, with Bryan's settlement as its county seat. In 1849 Dallas became a base for those trying to cross the Trinity River on their way to the gold fields of California. Dallas' selection as county seat in 1850 was critical to the growth of Dallas and its becoming the dominant town in the county.

By the 1850s, businesses and industry (on a small scale) were developing in Dallas' largely agricultural region. The first factory in Dallas was opened by a French immigrant and made carriages and wagons. A general store, picture gallery, hotel, insurance agency, a boot and shoe shop, a milliner, two brickyards, and two saddle shops were also opened at this time (Hazel 1997).

Dallas' business leaders in the 1850s were the Cockrells. Alexander Cockrell built a covered toll bridge over the Trinity River. He also built a steam sawmill at the foot of Commerce Street. During the 1850s, the City of Dallas was separated from nearby settlements by the Trinity River due to an inability to cross the waterway. The first permanent, wood bridge was built across the Trinity River in 1855 near the current-day Commerce Street Viaduct. Constructed by Alexander Cockrell and the Dallas Bridge and Causeway Company, it was replaced in 1872 by an iron bridge, purchased by the City of Dallas in 1882, making the Commerce Bridge the first toll-free bridge across the Trinity River (FHWA 2009).

Trinity River and the Development of the Railroads (1866–1890)

Bryan's idea that the Trinity River could allow for sea traffic from the Gulf of Mexico to Dallas remained in the minds of Dallas residents. In 1866, the state legislature chartered the Trinity

Slack Water Navigation Company to improve the Trinity River for smooth navigation between Galveston and Dallas. Although the project did not begin construction, a 7-month-long journey from Galveston to Dallas, undertaken by Captain J. M. McGarvey, showed that while the Trinity River was superior to the upper Red River and upper Mississippi River, regular river service was not a practical endeavor. Despite this, the steamer Sallie Haynes, constructed in Dallas, made three trips downriver prior to being sunk; however, no data exist showing the Sallie Haynes traveled to Galveston (Cliff et al. 1999).

In the years following the Civil War, Dallas grew in size and prominence due to its location near cattle trails and railroad lines. The Houston & Texas Central Railroad (formerly the Galveston and Red River Railroad) reached Dallas in 1872, providing easy access to Dallas from the southern reaches of the state. In 1873, the Texas & Pacific Railway arrived in Dallas, providing travel to the eastern extents of the state. These important rail lines allowed Dallas to acquire the benefits of a large metropolis including a water distribution system, gas lighting, a private telegraph company, telephones, and electricity (Cliff et al. 1999). Population and land value increased, especially near the rail lines. More than 700 buildings were built in a single year during this era, which was dominated by the railroads. The railroad governed the growth of Dallas at this time, and there were few building codes, street designs, or any sort of municipal planning. The Houston & Texas Central Railroad was situated one mile east of the courthouse. Eighty percent of the population situated itself in a narrow band between these two areas (McDonald 1978). Cotton became the region's main cash crop with its market centered at Elm Street in Dallas. By 1900, one-sixth of the world's cotton was grown within a 150-mile radius of Dallas, and Dallas was also a leader in the manufacture of cotton gin machinery (Fitzgerald 2001).

When merchants realized that Dallas would be the dominant city for all of north Texas, many built stores in Dallas similar to the department stores of today. New jobs were created for store clerks, bank tellers, and teamsters, and Dallas began to experience a new diversified economy (Hazel 1997). However, despite this diversification the first city directory continued to list more saloons than any other business. An important enterprise in Dallas during the 1870s was the Todd Flour Mills at the corner of Pacific and Broadway. Founded by Sarah Cockrell and her son, it was the first mercantile mill in Dallas to buy raw wheat from local farmers and market the flour via the railroad for transport (McDonald 1978).

In the 1870s and 1880s, the arrival of the railroads created a period of great migration into the City of Dallas, both from people from other parts of the U.S. and foreign immigrants. Dallas' industries began to increase in size and number. In 1879, the Howard Oil Company built a large cottonseed oil mill at Polk Street. Several other factories and mills were constructed including two more steam flouring mills and two steam-driven corn mills, several broom-making plants, a barrel manufacturer, and several cement plants and brick kilns.

In 1886, Dallas received a charter to hold the Dallas State Fair and Exposition. The state fair attracted large numbers of people from throughout the state to the Dallas area and brought business to Dallas' barbers, livery men, saloon keepers, hand and express drivers, restaurants, hotels, and boarding houses. The City purchased the fairgrounds in 1904.

Urbanism and Suburbs (1890–1910)

By 1890, Dallas had most of the features of a major urban center: public utilities, public schools (although overcrowded), daily newspapers, and the State Fair (Hazel 1997). Dallas finally had an organized fire department in 1871 (Fitzgerald 2001). The spatial configuration of Dallas was changed with the development of the streetcar. Communities known as The Cedars, Highland Park, and Oak Cliff developed in areas surrounding Dallas. The development of these outlying suburbs, serviced by streetcars, led to a large expansion of the geographic boundaries of Dallas. By 1920, Dallas encompassed 23 square miles. Streetcars were especially important during the gas rationing times of World War II. Dallas also changed with the introduction of the automobile, as traffic increased through the City because it was centrally located in the growing national highway system.

The growth Dallas experienced in the 1870s and 1880s, as a result of the railroads, came to a halt in 1893 with an economic depression that came to be known as the Panic of 1893. Financial credit markets were destroyed, devastating the industrial sectors of the economy. Banks lacked the capital to loan money for any purpose including street railway car and real estate development in Dallas. Cotton prices dropped significantly. For the first time in its history, Dallas actually saw a reduction in its population, as some residents left to seek their fortunes elsewhere.

In the early 1900s, Dallas was the country's largest distribution center for farm machinery in the country. About 1900, several farm implement dealers began to build warehouses and showrooms north of the courthouse near the intersection of Elm and N. Jefferson. Today this area is known as the West End Historic District.

Dallas' first skyscraper, the 15-story Praetorian Building, was built in 1907, also when the first Neiman- Marcus store also opened. By the turn of the century, Dallas was the leading book, drug, jewelry, and wholesale liquor market in the Southwest. Dallas was a major printing center in the early twentieth century and published magazines and newspapers distributed throughout the South. The 1910s also brought progress to Dallas. White Rock Lake was constructed and the City of Dallas' water reservoir and water filtration plant was built in 1911, and Southern Methodist University opened in 1915 (Hazel 1997).

Though Dallas residents began embracing new forms of transportation and business, they continued to attempt to make the Trinity River navigable. In 1899, a plan to construct 37 locks and dams along the river between Dallas and the Gulf of Mexico to allow traffic flow along the river for 8 months each year was suggested (Shanabrook et al. 2001). Several other attempts to create successful riverine businesses using the Trinity River ensued.

After the City of Dallas purchased the old Commerce Street Bridge in 1882, they went on to build two new bridges, one near present-day Cadiz Street, and a second on Zang Boulevard near the present-day Houston Street Viaduct. These three early bridges were designed in a manner that made them susceptible to flooding, even during moderate flooding events that submerged the bridges and their approaches. Between 1822 and 1908, the Trinity River flooded seven times, including the devastating flood of 1908. Inundated with water from upstream storms and still saturated from a flood the month before, the area was not able to handle the drenching rains that

started on May 24, 1908. A 3-day period of rain inundated the area, leading to a flood gage reading of 52.6 feet in Dallas on May 26 (Furlong et al. 2003). Between five and eleven deaths were blamed on the flood and roughly 4,000 people became homeless. Considered the largest flood ever recorded in Dallas, this single event caused considerable damage. Estimates put the Trinity River at two miles wide during the flood, and left Dallas without telephone, telegraph, and rail services, while nearby Oak Cliff was only accessible by boat. The flood's destruction was a driving force behind the decision by local business to focus on developing a comprehensive flood control plan.

Community Planning and Flood Control (1900–1950)

Located across the Trinity River from Dallas, the town of Hord's Ridge, (later renamed Oak Cliff) was established in 1845. The Dallas, Cleburne, and Rio Grande Railway came to the area in 1880 and in 1887, Thomas L. Marsalis and John S. Armstrong purchased several hundred acres to develop into the residential area of Hord's Ridge. Once Marsalis and Armstrong began work on their new community, they renamed the settlement Oak Cliff. The partners intended to turn Oak Cliff into a resort community, but before this could occur, Marsalis and Armstrong ended their partnership. Following the dissolution of the partnership, Marsalis continued to plan the expansion of Oak Cliff and Armstrong went on to form the Highland Park neighborhood. Oak Cliff incorporated into a city in 1890 and had a population of 2,470, a 150-acre park, and the Marsalis Park and Zoo by that time (Nall 2009).

The population growth of Oak Cliff stagnated and plans for the town to become a resort community ceased during to the Panic of 1893; however, by the early 1900s, Oak Cliff's population began to expand with an influx of middle and working class families. The citizens of Oak Cliff voted for annexation to the neighboring City of Dallas in 1900, and Dallas officially annexed Oak Cliff in 1903. The Flood of 1908 made it apparent to city officials that a permanent all-weather bridge linking Dallas and Oak Cliff was necessary.

Support from local businessmen helped set into motion plans to construct a permanent bridge between Oak Cliff and Dallas. Well-known publisher of *The Dallas Morning News*, George Bannerman Dealey gathered a group of businessmen and sought the community's help in passing a bond issue to construct a viaduct at Houston Street. Although Dealey's proposal was met with resistance from members of the community who objected to the bridge's $609,797 estimated cost, the bond passed. Construction began on the Dallas-Oak Cliff Viaduct in October 1910. The bridge was completed in February 1912 at a cost of $675,000 (Jackson 1996).

Determined to initiate the Floodway plan, Dealey contacted German born, former Dallas resident, and landscape architect George E. Kessler in 1910. Hired by Dealey to design the State Fairgrounds in 1907, Kessler had worked on several bridge projects in Kansas. Kessler designed a plan for the City of Dallas that included a levee system for the Trinity River.

The outbreak of World War I delayed any actions concerning the recommended levee system. In 1918, the City of Dallas asked Kessler to revise and improve his original plan, resulting in widening the levees near downtown Dallas and raising the levee height (Furlong et al. 2003). In

addition, Kessler's plan included the creation of two parkways, the purchase of five municipal parks, and the construction of a series of boulevards.

During the 1920s, the City of Dallas continued to work on the Dallas Floodway, and in 1925 the City of Dallas appointed, the Ulrickson Committee to work on a more detailed version of the Kessler Plan with a focus on flood control. This committee submitted its final report to the City of Dallas in 1927. The report included a financial plan to build dozens of civic improvement projects, including a levee system and floodway to control 10,500 acres along the Trinity River, establish storm sewer systems, water works, traffic ways, and additional beautification (Furlong et al. 2003).

In July 1928, after purchasing the necessary property for the levees, construction for flood risk management began. The undertaking became one of the largest projects in the country during that year (Furlong et al. 2003). Completed in 700 working days, the project entailed the relocation of utilities, streetcars, oil and gas lines, water lines, and sewer lines for the new levee system. As part of the levee construction, the confluence of the Trinity River was moved three-and-one half miles west of its original location and the Trinity River channel was straightened (Jackson 1996). The levee's infrastructure included four pump stations and three pressure sewers.

Four new viaducts were constructed using Dallas County funds to span the Trinity River and connect Dallas with Oak Cliff and other communities located on the west side of the Trinity River. These four viaducts were the Corinth Street Viaduct, Cadiz Street Viaduct (now the eastbound side of the IH 35 Bridge), Commerce Street Viaduct, and the Lamar-McKinney Viaduct (now the Continental Street Bridge). Constructed by Dallas County, all four viaducts were designed by consulting engineer Francis Dey Hughes (Jackson 1996). Shortly after moving to Dallas in 1928, the City of Dallas awarded Hughes the contract for the four viaducts on the Trinity River in Dallas. Although Hughes' four new viaducts were not identical, they are very similar in style as each featured a reinforced concrete-and-steel framework and identical light standards. While the Floodway was being constructed, Dallas' skyline was also growing. The 29-story Magnolia building was completed in 1921. Downtown streets became lined with multi-story bank and office buildings. Construction of the levee system opened up thousands of acres for new development in Dallas along the Trinity River, an area that became known as an industrial district.

Dallas, like many American cities, was impacted by the Great Depression. The City of Dallas undertook a number of projects to create jobs, including the viaducts over the Trinity River and the land reclaimed by the levee project (Hazel 1997). Although no oil was ever discovered in Dallas County, Dallas benefited by the discovery of oil in East Texas in 1930. The City of Dallas was a convenient location for the headquarters of oil producers, investors, promoters, contractors, and corporations. By the early 1940s, 18 to 20 percent of those living in the Dallas area depended on the oil industry for their income (Hazel 1997).

In 1936, Dallas hosted the Texas Centennial Exposition, celebrating 100-years of Texas independence from Mexico. Fair Park, the location of the State Fair, was transformed over a

period of 18 months as laborers and artists constructed or remodeled 77 buildings. Six million visitors passed through Dallas for the exposition.

In 1946, the Dallas County Flood Control District was established to protect State resources (highways, bridges, government buildings and facilities) and control the maintenance of the levees (Furlong et al. 2003). During this same time, the U.S. Congress authorized the USACE to help repair and reconstruct the Dallas Floodway in response to a 1948 report by the USACE that cited the levees poor conditions and a need for improvements. The Dallas County Flood Control District advised the USACE to follow the original 1932 levee plans in order to abate the possibility of high costs and delays in the schedule.

The 1949 flood of the Trinity River led to Congress commissioning a new USACE District in Fort Worth, which opened in 1950. The district controlled all levee projects in Dallas and Fort Worth, and oversaw reservoir projects in the surrounding areas. The district produced six project reports detailing plans to strengthen components of the levee system. Construction of the Dallas Floodway began in 1953 and was completed in 1960. The project included building three new pump stations and two new pressure sewers. In addition, the river channel was moved 100 feet to the west of its original path between the Belleview Pressure Sewer and the Cadiz Bridge. The levee width was reduced by 30 feet by adding fill to the riversides of the levees (Furlong et al. 2003).

World War II and Urbanization (1940–present)

During World War II, many of Dallas' minorities joined the armed forces, and factories, such as the Ford Motor Plant, converted to war-time production and began to hire women. The postwar period was a time of rapid growth for Dallas. Between 1940 and 1960, the City of Dallas' area nearly doubled to 90 square miles. From 1945 to 1955, 151,000 new jobs were created in Dallas, resulting in the construction of 105,000 dwellings, 350 churches, 36 schools, and 25 major office buildings. During this era of new growth, Dallas experienced a dramatic change in the course of history. On November 22, 1963, the motorcade carrying President John F. Kennedy was assassinated as his motorcade turned down Elm Street at Dealey Plaza (Hazel 1997).

As Dallas grew, the City of Dallas and the neighboring City of Irving took control of the responsibilities of the Dallas Floodway upon the expiration of the Dallas County Flood District in 1968. Each city became responsible for the portion of the Dallas Floodway within their boundaries, while the USACE retained its oversight and inspection responsibilities.

By 1980, continued migration to Dallas increased its population to 904,078. Dallas expanded its boundaries to include 378 square miles. Farmland that surrounded Dallas was transformed into suburbs. Much of Dallas' historic architecture was lost to modern development, although the West End warehouse district on the edge of downtown was revived by historic preservationists and Deep Ellum became an eclectic mix of galleries, clubs, and dining spots (Hazel 1997).

Hydraulic Physical Features

The following discussion relies heavily on summarizing the findings of the *Intensive Engineering Inventory and Analysis of the Dallas Floodway* (TEC, Inc., 2010) which is included in this EA as

Appendix G. The report finds the Dallas Floodway, as a single engineering system for flood control and reclamation, is a historic and cultural resource with local historical associations with flood control and the history of planning and community developments in the City of Dallas, and is a statewide example of an engineering system designed for flood control and development enhancement. The essential physical features of the Dallas Floodway are the levees, diversion channels, and overbank.

The Dallas Floodway retains all of its essential physical feature and its ability to convey its significance to the observer (TEC, Inc., 2010). The Dallas Floodway meets the NEPA definition of a historic and cultural resource.

A total of 55 engineering resources comprising 10 different types of hydraulic physical features (levees, diversion channel, overbank, pumping plants, pressure sewers, outlet gate structures, intakes, sluices, sumps, and emergency control structures) associated with flood control are located within the Dallas Floodway and are listed in **Table 4-12**. Of note, only two of these features, the 1929 Baker Pumping Plant and the 1954 Pavaho Pumping Plant, have been determined officially eligible for inclusion to the NRHP. Conversely, the New Baker Pumping Plant (1975) and the New Pavaho Pumping Plant (1975) have been officially determined not eligible for inclusion in the NRHP.

Table 4-12 indicates whether a hydraulic physical feature is essential or not essential to the function of the Dallas Floodway. A function essential hydraulic physical feature is required to make the floodway operational; i.e., it redirects floodwaters through the city and drains the land for development. A function non-essential hydraulic physical feature provides a means to collect the stormwater runoff, but it does not function to convey, move, or discharge the water into or through the floodway (TEC, Inc., 2010).

Supporting or non-supporting physical features descriptions are also presented in **Table 4-12**. Supporting features of the Dallas Floodway are those physical features that survive from the period of influence (1928-1959), are associated with the areas of significance for the floodway, and retain sufficient ability to convey significance to represent their historic appearance and function and convey the character of the floodway at that time. Conversely, non-supporting physical features are those that have become part of the floodway since the period of significance and do not support the areas of significance of the floodway, or are features surviving from the period of significance that no longer possess the ability to convey significance (TEC, Inc., 2010).

Table 4-12: Important Hydraulic Physical Features of Dallas Floodway

Hydraulic Physical Feature and Type	Construction Date(s)	Essential/Non-Essential Function	Supporting/ Non-Supporting
East Levee Hydraulic Physical Feature 1: Levee	1929–1932 (B)* 1953 (M)*	Essential	Supporting
West Levee Hydraulic Physical Feature 1: Levee	1929–1932 (B) 1953 (M)	Essential	Supporting
Northwest Levee Hydraulic Physical Feature 1: Levee	1929–1932 (B) 1974 (M)	Essential	Non-Supporting –outside Floodway and insufficient ability to convey significance
Parallel Levee Channel Hydraulic Physical Feature 1: Levee	1929 (B) 1960s (M) 2007 (M)	Essential	Non-Supporting –outside Floodway and insufficient ability to convey significance
Trinity River Diversion Channel Hydraulic Physical Feature 2: Diversion Channel	1932 (B)	Essential	Supporting
Elm Fork Diversion Channel Hydraulic Physical Feature 2: Diversion Channel	1928 (B)	Essential	Supporting
West Fork Diversion Channel Hydraulic Physical Feature 2: Diversion Channel	1928 (B)	Essential	Supporting
Old Trinity River Channel Hydraulic Physical Feature 2: Diversion Channel	1928; 1932 (B)	Non-Essential	Supporting
Overbank Hydraulic Physical Feature 3: Overbank	1932 (B)	Essential	Supporting
Pumping Plant A (Able) Hydraulic Physical Feature 4: Pumping Plants	1929 (B)	Essential	Supporting
Pumping Plant A (Able) Hydraulic Physical Feature 4: Pumping Plants	1953 (B)	Essential	Supporting
Pumping Plant A (Able) Outlet Gate Structure Hydraulic Physical Feature 6: Outlet Gate Structures	1953 (B)	Essential	Supporting
Pumping Plant B (Baker) Hydraulic Physical Feature 4: Pumping Plants	1929 (B)	Essential	Supporting
Pumping Plant B (Baker) Hydraulic Physical Feature 4: Pumping Plants	1975 (B)	Essential	Non-Supporting – built after period of significance
Pumping Plant B (Baker) Outlet Gate Structure Hydraulic Physical Feature 6: Outlet Gate Structures	1956 (B)	Essential	Supporting
Pumping Plant C (Charlie) Hydraulic Physical Feature 4: Pumping Plants	1929 (B)	Essential	Supporting
Pumping Plant C (Charlie) Hydraulic Physical Feature 4: Pumping Plants	1956 (B)	Essential	Supporting
Pumping Plant C (Charlie) Outlet Gate	1956 (B)	Essential	Supporting

Hydraulic Physical Feature and Type	Construction Date(s)	Essential/Non-Essential Function	Supporting/ Non-Supporting
Structure Hydraulic Physical Feature 6: Outlet Gate Structures			
Pumping Plant D (Delta) Hydraulic Physical Feature 4: Pumping Plants	1929 (B)	Essential	Supporting
Pumping Plant D (Delta) Hydraulic Physical Feature 4: Pumping Plants	1956 (B)	Essential	Supporting
Pumping Plant D (Delta) Outlet Gate Structure Hydraulic Physical Feature 6: Outlet Gate Structures	1956 (B)	Essential	Supporting
Hampton Road Pumping Plant Hydraulic Physical Feature 4: Pumping Plants	1956 (B)	Essential	Supporting
Hampton Road Pumping Plant Hydraulic Physical Feature 4: Pumping Plants	1975 (B)	Essential	Non-Supporting – built after period of significance
Hampton Road Pumping Plant Outlet Gate Structure Hydraulic Physical Feature 6: Outlet Gate Structures	1956 (B)	Essential	Supporting
Pavaho Pumping Plant Hydraulic Physical Feature 4: Pumping Plants	1954 (B)	Essential	Supporting
Pavaho Pumping Plant Hydraulic Physical Feature 4: Pumping Plants	1975 (B)	Essential	Non-Supporting – built after period of significance
Pavaho Pumping Plant Outlet Gate Structure Hydraulic Physical Feature 6: Outlet Gate Structures	1954 (B)	Essential	Supporting
"New" Pump House (Northwest Levee) Hydraulic Physical Feature 4: Pumping Plants	ca. 1995 (B)	Essential	Non-Supporting – outside Floodway and built after period of significance
"Old" Pump House (Northwest Levee) Hydraulic Physical Feature 4: Pumping Plants	1974 (B)	Essential	Non-Supporting – outside Floodway built after period of significance
Belleview Pressure Sewer Hydraulic Physical Feature 5: Pressure Sewers	1928–1931 (B)	Essential	Supporting
Belleview Pressure Sewer Outlet Gate Structure Hydraulic Physical Feature 6: Outlet Gate Structures	1950s (B)	Essential	Supporting
Old Coombs Creek Pressure Sewer Hydraulic Physical Feature 5: Pressure Sewers	1928–1931 (B)	Essential	Supporting
Old Coombs Creek Pressure Sewer Outlet Gate Structure Hydraulic Physical Feature 6: Outlet Gate Structures	1989 (B)	Essential	Non-Supporting - built after period of significance

Hydraulic Physical Feature and Type	Construction Date(s)	Essential/Non-Essential Function	Supporting/ Non-Supporting
Coombs Creek Pressure Sewer Hydraulic Physical Feature 5: Pressure Sewers	1957 (B)	Essential	Supporting
Coombs Creek Pressure Sewer Outlet Gate Hydraulic Physical Feature 6: Outlet Gate Structures	1957 (B)	Essential	Supporting
Dallas Branch Pressure Sewer Hydraulic Physical Feature 5: Pressure Sewers	1932 (B)	Essential	Supporting
Dallas Branch Pressure Sewer Outlet Gate Structure Hydraulic Physical Feature 6: Outlet Gate Structures	1950s (B)	Essential	Supporting
Lake Cliff Pressure Sewer Hydraulic Physical Feature 5: Pressure Sewers	1952–1955 (B)	Essential	Supporting
Lake Cliff Pressure Sewer Outlet Gate Structure Hydraulic Physical Feature 6: Outlet Gate Structures	1955 (B)	Essential	Supporting
Turtle Creek Pressure Sewer Hydraulic Physical Feature 5: Pressure Sewers	1953–1957 (B)	Essential	Supporting
Turtle Creek Pressure Sewer Outlet Gate Structure Hydraulic Physical Feature 6: Outlet Gate Structures	1953–1957 (B)	Essential	Supporting
Woodall Rodgers Pressure Sewer Hydraulic Physical Feature 5: Pressure Sewers	1979 (B)	Essential	Non-Supporting – built after period of significance
Woodall Rodgers Pressure Sewer Outlet Gate Structure Hydraulic Physical Feature 6: Outlet Gate Structures	1979 (B)	Essential	Non-Supporting – built after period of significance
Elm Fork Sluice Outlet Gate Hydraulic Physical Feature 6: Outlet Gate Structures	1960s (B)	Essential	Non-Supporting – built after period of significance
Coombs Creek Intake Hydraulic Physical Feature 7: Intakes	1957 (B)	Essential	Supporting
Lake Cliff Intake Hydraulic Physical Feature 7: Intakes	1950s (B)	Essential	Supporting
Turtle Creek Intake Hydraulic Physical Feature 7: Intakes	1955–1956 (B)	Essential	Supporting
Eagle Ford Sluice Hydraulic Physical Feature 8: Sluices	1928–1931 (B)	Non-Essential	Supporting
Elm Fork Sluice Hydraulic Physical Feature 8: Sluices	1928–1931 (B)	Non-Essential	Supporting
Ledbetter Dike CSG Hydraulic Physical Feature 8: Sluices	1950s (B)	Non-Essential	Supporting
Northwest Levee Sluices Hydraulic Physical Feature 8: Sluices	1928 (B)	Non-Essential	Non-Supporting – outside Floodway

Hydraulic Physical Feature and Type	Construction Date(s)	Essential/Non-Essential Function	Supporting/ Non-Supporting
Northwest Levee Sluices Hydraulic Physical Feature 8: Sluices	1974 (B)	Non-Essential	Non-Supporting – outside Floodway and built after period of significance
Grauwyler CSG Hydraulic Physical Feature 9: Sumps and Culverts	1950s (B)	Non-Essential	Supporting
60-inch Emergency Control Structure Hydraulic Physical Feature 10: Emergency Control Structures	1950s (B)	Non-Essential	Supporting
East Bank Interceptor Hydraulic Physical Feature 10: Emergency Control Structures	1950s (B)	Non-Essential	Supporting

*(B) = Year(s) built; (M) = Year(s) of major modification.

Source: USACE and Draft Environmental Impact Statement for the Dallas Floodway Project, Dallas, Texas, December 2010.

Based on an analysis of the field and research data, the Dallas Floodway, as a single engineering system for flood control and reclamation, is a historic and cultural resource with locally important historical associations with flood control and the history of planning and community developments in the City of Dallas, and is a statewide example of an engineering system designed for flood control and development enhancement. The period of significance of the Dallas Floodway is 1928–1959, corresponding to the years when the Floodway construction started and ended, respectively. The essential physical features of the Dallas Floodway are the levees, diversion channels, and overbank.

The Dallas Floodway retains all of its essential physical features and its ability to convey its significance to the observer (TEC, Inc., 2010). The Dallas Floodway meets the NEPA definition of a significant historic and cultural resource.

Bridges/Underpasses

Seven of the 19 bridges that cross the Dallas Floodway within the ROI have been evaluated previously for their eligibility for nomination to the NRHP (**Table 4-13**). These seven historic bridges are the AT&SF Railroad Bridge; the UPRR Bridge; the Houston Street Viaduct; the Commerce Street Viaduct; the Corinth Street Viaduct; the Continental Street Viaduct; and the Chicago, Rock Island, and Pacific Railroad Bridge/DART Bridge. One of these seven bridges, the Houston Street Viaduct, is currently listed in the NRHP. The remaining 11 bridges have not been evaluated for their NRHP eligibility, and one bridge, the Proctor Street Bridge, has been demolished.

One underpass within the ROI, the Corinth Street Underpass, is eligible for nomination to the NRHP.

Table 4-13: Summary of Existing NRHP Status for Bridges/Underpasses within the ROI

Resource Description	Resource Date/Date of Construction	Evaluated for NRHP-Eligibility	Eligibility to the NRHP
AT&SF Railroad Bridge	1926	Evaluated	Eligible under Criteria C
UPRR Bridge (formerly the Southern Pacific Railroad Bridge)	Pre-1930	Evaluated	Eligible under Criteria C
Houston Street Viaduct	1911	Evaluated	Listed on the NRHP (August 9, 1984)
Commerce Street Viaduct	1930	Evaluated	Eligible under Criteria A and C (2001)
Corinth Street Viaduct	1931	Evaluated	Eligible under Criteria A
Cadiz Street Viaduct/IH 35 Bridge	1929-1931	Not Evaluated	Not Evaluated
Continental Street Viaduct (formerly the Lamar-McKinney Viaduct)	1934	Evaluated	Eligible under Criteria A and C (2001)
Hampton Road Bridge	Currently undergoing reconstruction	Not Evaluated	Not Evaluated
Sylvan Avenue Bridge	1958	Not Evaluated	Not Evaluated
Westmoreland Bridge	1990	Not Evaluated	Not Evaluated
Chicago, Rock Island, and Pacific Railroad Bridge (CRI&)/DART Bridge	Ca. 1930s; later alterations	Evaluated	Eligible, C
Proctor Street Bridge Pier	Ca. 1930s	Evaluated	NA Demolished
Jefferson Street Bridge	Unknown	Not Evaluated	Not Evaluated
Irving Bridge	Unknown	Not Evaluated	Not Evaluated
IH 35E Bridge	Unknown	Not Evaluated	Not Evaluated
SH 183 Bridge	Unknown	Not Evaluated	Not Evaluated
IH 30 Bridge	Unknown	Not Evaluated	Not Evaluated
IH 30 Bridge near Houston Street Viaduct	Unknown	Not Evaluated	Not Evaluated
Loop 12 Bridge	Unknown	Not Evaluated	Not Evaluated
Corinth Street Underpass	1932	Evaluated	Eligible under Criteria A and C

Source: USACE and Draft Environmental Impact Statement for the Dallas Floodway Project, Dallas, Texas, December 2010. NTTA and Draft Trinity Parkway Section 106 Effects Report (March 2011).

Historic Districts

Two NRHP Historic Districts have been identified within the ROI; three NRHP Historic Districts are located immediately adjacent to the ROI. **Appendix A, Exhibit 8: Important Architectural NEPA Historic and Cultural Resources within the ROI Map** identifies the boundaries of these five historic districts. The two NRHP Historic Districts which are located within the ROI include the West End Historic District and the Dallas Union Terminal Historic District.

The West End (or Westend) Historic District is one of the most complete collections of historic buildings in the City of Dallas and played a vital role in the early economic development of the city. Comprised primarily of commercial and government buildings, the West End Historic District represents the economic boom of the first two decades of the twentieth century, when Dallas became a major shipping point. The current boundaries of the district reflect historic zoning patterns, and include features not related to the initial period of significance such as the JFK Memorial. The district is primarily significant under Criterion C for its collection of architecture, and under Criterion A for its roll in economic development and civic government.

The West End Historic District appears much as it did at the time of nomination, with changes in building tenants and associated signage being the primary difference (FHWA, 2009).

The Dallas Union Terminal Historic District, located between Jackson and Young Streets at 400 S. Houston Street, is an excellent example of the Beaux-Arts Classicism that pervaded architecture in America around the turn of the twentieth century. Designed by the noted Chicago architect Jarvis Hunt in 1914, the building was completed and opened to the traveling public in October, 1916. Built at a time when railroad travel was at its peak, the station was used to capacity only prior to 1920 and during World War II. Despite its infrequent use over the last decade, the facility remains virtually intact today (THC Atlas).

The three NRHP Historic Districts which are located immediately adjacent to the ROI include the Dealey Plaza Historic District, the Lake Cliff Historic District, and the Tenth Street Historic District.

Summary

Table 4-14 presents a summary of important architectural NEPA historic and cultural resources within the ROI and their status under existing conditions and **Appendix A, Exhibit 8: Important Architectural NEPA Historic and Cultural Resources within the ROI Map** displays their locations.

Table 4-14: Summary of Important Architectural NEPA Historic and Cultural Resources within the ROI

Historic and Cultural Resource No.*	Historic and Cultural Resource	Current Status	Important Architectural NEPA Historic and Cultural Resource? (Yes or No)
Hydraulic Physical Features			
HCR -7	Old Pavaho Pumping Plant	Officially Eligible	Yes
HCR -8	Old Baker Pumping Plant	Officially Eligible	Yes
HCR -10	Turtle Creek Pump Station	Listed in NRHP	Yes
HCR-20	Dallas Floodway	Important as a Historic Resource under NEPA	Yes
Bridges/Underpasses			
HCR-1	AT&SF Railroad	Officially Eligible	Yes
HCR-2	Corinth Street Viaduct	Officially Eligible	Yes
HCR-3	Houston Street Viaduct	Listed in NRHP	Yes
HCR-4	Commerce Street Viaduct	Officially Eligible	Yes
HCR-5	UPRR	Officially Eligible	Yes
HCR-6	Continental Street Viaduct	Officially Eligible	Yes
HCR-9	Chicago, Rock Island, and Pacific Railroad Bridge/DART	Officially Eligible	Yes
HCR-14	Corinth Street Underpass	Officially Eligible	Yes
Various Resources			
HCR-11	Shipping/Warehouse Facility	Officially Eligible	Yes
HCR-12	Shipping/Warehouse Facility	Officially Eligible	Yes
HCR-13	Oak Cliff Box Company Office Building	Officially Eligible	Yes
HCR-15	Salinas International Freight Bldg.	Officially Eligible	Yes
HCR-16	Atlas Metal Works	Officially Eligible	Yes
HCR-17	Clifton Carpets	Officially Eligible	Yes
HCR-18	Trinity Portland Cement Company Cemetery	OTHM Designation	Yes
HCR-19	La Reunion Cemetery	OTHM Designation	Yes
Historic Districts			
HCRD-1**	Dealey Plaza Historic District	Listed in NRHP	Yes
HCRD-2	West End Historic District	Listed in NRHP	Yes
HCRD-3**	Lake Cliff Historic District	Listed in NRHP	Yes
HCRD-4	Dallas Union Terminal Historic District	Listed in NRHP	Yes
HCRD-5**	Tenth Street Historic District	Listed in NRHP	Yes

Sources: USACE and Draft Environmental Impact Statement for the Dallas Floodway Project, Dallas, Texas, December 2010. NTTA and Non-Archeological Historic-Age Resource Reconnaissance Survey Report (October 2009) and Draft Trinity Parkway Section 106 Effects Report (March 2011). THC Atlas (http://atlas.thc.state.tx.us/), accessed April 2011.

** Historic and Cultural Resource No.: identifies the NRHP listed/confirmed eligible resources or other important historic and cultural resources within the ROI and corresponds to Appendix A, Exhibit 8: Important Architectural NEPA Historic and Cultural Resources within the ROI Map.*

*** NRHP District which is not located within the ROI, but is located immediately adjacent to the ROI.*

4.9.2 Archeological Resources

4.9.2.1 Region of Influence

The ROI for archeological resources consists of the construction area depicted in **Appendix A**, **Exhibit 7: Corridor Maps.**

4.9.2.2 Existing Conditions

Prior Archeological Surveys

The THC Archaeological Sites Atlas was examined to identify additional existing cultural resources within the ROI (**Table 4-15**). To date, the majority of the Dallas Floodway has not had archaeological surveys carried out (THC 2009). Most of the cultural resource work done within the Dallas Floodway has been associated with the footprints of various development projects. The Dallas Floodway has been disturbed by previous Floodway and levee construction and is considered to have a low probability for containing intact archaeological sites (FHWA 2009). Although the potential for surface sites is low, there is a potential for presently unknown buried archaeological sites in the Dallas Floodway. The Trinity River could carry away ephemeral *in situ* cultural resources, as some cultural remains may exist buried beneath meters of silt and detritus.

Table 4-15: Previous Archaeological Surveys within or Immediately Adjacent to the ROI

Date Published	Firm/Author	Title	Study Information
1981	Environment Consultants, Inc./J. Bennett	Cultural Resources Survey of the Dallas Floodway Extension	Survey
1982	Archaeological Survey Associates/B. Kozloff and J. Bruseth	Archaeological Survey of Four Parks for the Dallas County Open Space Program	Survey
1983	AR Consultants	Neuhoff Plant Development file	Testing
1986/1988/1990	North Texas State University/B. Yates and C. Ferring/N. Reese C. Pegues, and B. Yates/C. Ferring	An Assessment of the Cultural Resources in the Trinity River Basin, Dallas, Tarrant, and Denton Counties, Texas/Historical Archaeology in the Metroplex: Floodplain Sites/Late Quaternary Geology and Geoarchaeology of the Upper Trinity River Drainage Basin, Texas	Records review and Site survey
1988	W. Young	Y-41DL18: A Mixed Archaic and Neo-American Site in Southern Dallas County	Monitoring and Testing
1994	Archaeological Research Program of Mercyhurst Archaeological Institute/D. Jurney and S. Andrews	Archaeological Investigations at 41DL279, Site of the John F. Kennedy Exhibit, Dallas County Administration Building, Dallas, Texas.	Excavation and Limited Deep Testing
1990	AR Consultants/A. Skinner, W. Young, and B. Whorton	Cultural Resource Investigations of the Rochester Park Levee, Dallas, Texas	Testing
1991	AR Consultants/A. Skinner, B. Whorton, and W. Young	Cultural Resource Assessment of the Central Waste Water Treatment Plant Expansion, Dallas, Texas	Testing and Monitoring
1991/1992	Archaeological Research Program of Mercyhurst Archaeological Institute/J. Adovasio	Trinity River Floodplain Monitoring Results/Letter Report RE: Summary of Results of Archaeological Monitoring of Bridge Pier Construction Activities Associated with the DART South Oak Cliff Corridor Light Rail Project, Line Section OC-2-Trinity River Aerial Structure	Monitoring
1993	AR Consultants/A. Skinner and B. Whorton	Archaeological Survey of the Little Lemmon Lake Project	Survey
1997	AR Consultants/L. Trask, B. Whorton, and A. Skinner	Archaeological Monitoring of the West Bank Relief Interceptor Dallas, Texas	Survey and Monitoring
1996	AR Consultants/A. Skinner, B. Whorton, and L. Trask	The Archaeological Monitoring of the Dallas Floodway Channel Modifications and Levee Fill Modifications Phase I	Monitoring
1996	AR Consultants/A. Skinner, B. Whorton, L. Trask, R. Scott, S. Caran, and J. Dillon	Archaeological Investigations of the South Oak Cliff Line and DART Cultural Resources Management	Deep Testing
1997	AR Consultants/A. Skinner	An Archaeological Evaluation of the TU Electric Site, Dallas, Texas	Testing
1998	Geo-Marine, Inc./M. Cliff, S. Hunt, M. Prior, S. Gaither, and W. Autin	Archaeological, Architectural, Archival, and Geoarchaeological Investigations of the Proposed Dallas Floodway Extension Project, Dallas County, Texas	Records review, Site survey, and Architectural Evaluations

Date Published	Firm/Author	Title	Study Information
1999	Geo-Marine, Inc./E. Burson and M. Cliff	Cultural Resources Survey of the Proposed Environmental Restoration Areas Along the Old West Fork of the Trinity River, Dallas County, Texas	Survey, Testing, and Deep Testing
2001	AR Consultants/A. Skinner	The Trinity River Channel in Downtown Dallas	Monitoring
1999	Geo-Marine, Inc./M. Cliff, D. Shannabrook, S. Hunt, W. Autin, and M. Prior	Buried Site Potential in the Dallas Floodway Extension Project, Dallas County, Texas	Deep Testing
2000	Geo-Marine, Inc./J. Buysse	An Evaluation of Sites within the Proposed Dallas Floodway Extension Project, Dallas County, Texas	Testing
2001	Geo-Marine, Inc./ D. Shannabrook, D. Peter, and S. Hunt	Geoarchaeological Investigations of Wetland Cell D within the Dallas Floodway Extension Project Area, Dallas, Texas	Testing
2006	AR Consultants/C. Frederick, L. Trask, and A. Skinner	Archaeological Testing for the Trinity Parkway	Testing
2007	LopezGarcia Group/S. Sundermeyer and C. Neel	Intensive Cultural Resources Investigations of the Santa Fe Trestle Trail Borrow Pit, Dallas County, Texas	Testing
2008	AR Consultants/L. Trask, J. Todd, and A. Skinner	Archaeological Testing of Site 41DL441 for the Trinity Parkway in Dallas, Dallas County, Texas	Testing

Source: Trask, Todd, and Skinner 2008

Several cultural resource studies in the Floodway area have excavated trenches to a depth of 1 to 3 meters (Burson and Cliff 1999, Buyusse 2000, Frederick et al. 2006, Shanabrook et al. 2001, Sundermeyer and Neel 2007, Trask et al. 2008) or boreholes to a depth of approximately 14 meters (Cliff et al. 1999). Shanabrook et al. (2001) reported that recent (post-1932) alluvium in a number of areas was as much as 3 meters thick, and possibly greater in some areas. A cultural resources survey in 2006 (Frederick et al. 2006) identified the most likely locations for finding buried archaeological sites: at the confluence and on terraces at the northern and southern ends of the Floodway. However, for most of the investigations, no potentially prehistoric or significant historic resources were discovered; thus, the potential for buried intact cultural resources in the Dallas Floodway is considered low.

Traditional Cultural Properties

The file search with the THC Archaeological Sites Atlas identified no known Traditional Cultural Properties within the ROI.

Archeological Resources

There are no known archeological sites within the archeology ROI. However, there are eleven known archeological sites within the Dallas Floodway. The eligibility of six sites is unknown at this time, while the remaining five sites are all officially not NRHP eligible. The 11 known sites within the Dallas Floodway are shown in **Table 4-16.**

Table 4-16: Known Archeological Sites within the Dallas Floodway

Trinomial	Site Size (meter^2)	Time Period*	National Register of Historic Places Eligibility Status	Report Citation	Dallas Floodway
41DL21	97,200	Late Prehistoric	Officially Not Eligible	Recorded by Kirkland 1941	Non-Contributing
41DL64	Unknown	Prehistoric; Holocene	Officially Not Eligible	See *Dallas Archeological Potential*	Non-Contributing
41DL222	8	Prehistoric; Holocene	Unknown	Archaeological Survey Associates 1982	Non-Contributing
41DL224	Unknown	Holocene	Unknown	Recorded 1983; Yates and Ferring 1986	Non-Contributing
41DL225	Unknown	Holocene	Unknown	Recorded 1983; Yates and Ferring 1986	Non-Contributing
41DL323	1,800	Historic (1890 – 1930s)	Officially Not Eligible	Recorded by Jan and Paul Lorrain 1991; THC Site Atlas	Non-Contributing
41DL370	3,885	Historic (1920s)	Officially Not Eligible	Skinner, Whorton, and Trask 1996	Non-Contributing
41DL371	Unknown	Historic (1880s – 1920s)	Officially Not Eligible*	Skinner, Whorton, and Trask 1996	Non-Contributing
41DL414	60 meters in length	Historic (1903-1931)	Unknown	Jan and Paul Lorraine 2000	Non-Contributing
41DL440	Unknown	Historic (late nineteenth century)	Unknown	Frederick et al. 2006	Non-Contributing
41DL441	Unknown	Historic	Unknown	Frederick et al. 2006; Trask et al. 2008	Non-Contributing

Sources: Draft Assessment of the Potential for Significant Archeological Properties within the Dallas Floodway System, July 2010. USACE and Draft Environmental Impact Statement for the Dallas Floodway Project, Dallas, Texas, December 2010.

* Site 41DL371 was recommended for designation as a State Archeological Landmark but has not been designated.

4.10 Hazardous, Toxic and Radioactive Wastes

The Hazardous, Toxic and Radioactive Wastes (HTRW) assessment performed for this EA broadly follows guidance provided by the American Society for Testing and Materials (ASTM) E1527-05 standard; however, it is noted that this HTRW assessment is a limited Phase I Environmental Site Assessment (ESA).

4.10.1 Region of Influence

The ROI for the HTRW assessment encompasses the majority of the Dallas Floodway and extends from the approximate north bank of the West Fork Trinity River and the Elm Fork Trinity River to the AT&SF Railroad at the southern end of the Dallas Floodway. The ROI also extends 500 feet from the toe of levee on the landside along the East and West Levees. This ROI includes all areas that could potentially be disturbed during the proposed construction activities, as well as areas that may have the potential to impact the proposed construction activities, should offsite migration of contaminants of concern (COCs) occur. The HTRW ROI is shown on **Exhibit 6: Natural Resources, Utilities, and Hazardous, Toxic, and Radioactive Wastes ROIs Map** in **Appendix A**.

4.10.2 Existing Conditions

Visual Survey
A visual survey of the ROI was conducted for evidence of hazardous substances and/or contamination on June 14 and 15, 2010. The survey included a visual observation of properties within the ROI which could be viewed either from the levees or from public right-of-way. The survey was conducted to identify the release or threatened release of petroleum products or other hazardous substances. The sites identified in the database searches and those verified in the field were assessed for the potential to be encountered during construction. Sites beyond the ROI were not field-verified because it was determined, based on the nature of the proposed construction activities, that the possibility of encountering those sites during the construction of the Section 408 modification measures would be low.

Regulatory Records Review
Environmental regulatory databases for the East and West Levees were provided by Environmental Data Resources (EDR) dated February 19, 2010, to identify known sites producing, storing, and/or disposing of toxic or hazardous materials within the ROI. These databases, included in **Appendix H**, were obtained directly from government sources. The assessment was conducted in general accordance with the ASTM E1527-05, with exceptions to accommodate the particular situations and needs of the Section 408 modification activities.

An environmental records/database (EDR, 2010) review of all applicable federal, state and tribal records was conducted for use in a Phase I ESA report for Dallas Floodway at the East and West Levees. This Phase I ESA was also conducted in compliance with ASTM E 1527-05, Standard Phase I ESA process. A total of 77 federal, state, local, and tribal databases were searched. The Phase I ESA report identified 963 known hazardous/toxic sites within the ASTM standard search area for the East and West Levees, as shown in **Table 4-17**. **Tables 4-18** through **4-21** list and rank the documented hazardous materials sites identified within the ROI based on the risk the hazardous materials site(s) may pose to the proposed construction activities.

Table 4-17: Hazardous/Toxic Sites within Search Distance of the West and East Levees

Name of Database	Database Abbreviation	Number of Sites
Federal Records		
National Priority List	NPL	1
Comprehensive Environmental Response, Compensation, and Liability Information System	CERCLIS	7
CERCLIS No Further Remedial Action Planned	CERC-NFRAP	19
CERCLA Lien Information	LIENS	2
Corrective Action Report	CORRACTS	4
Resource Conservation and Recovery Act – Treatment, Storage and Disposal	RCRA-TSDF	5
RCRA - Large Quantity Generators	RCRA-LQG	10
RCRA - Small Quantity Generators	RCRA-SQG	37
RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators	RCRA-CESQG	26
RCRA-NonGen: RCRA - Non Generators	RCRA-NonGen	434
US ENG CONTROLS: Engineering Controls Sites List	US ENG Controls	1
Emergency Response Notification System	ERNS	156
Hazardous Materials Information Reporting System	HMIRS	1452
Incident and Accident Data	DOT OPS	4
A Listing of Federal Brownfields Sites	US BROWNFIELDS	16
Record of Decision	ROD	1
Toxic Chemical Release Inventory System	TRIS	17
Toxic Substances Control Act	TSCA	4
FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA	FTTS	14
FIFRA/TSCA Tracking System Administrative Case Listing	HIST FFTS	14
Section 7 Tracking Systems	SSTS	23
Integrated Compliance Information System	ICIS	70
PCB Activity Database System	PADS	2
Facility Index System/Facility Registry System	FINDS	1273
RCRA Administrative Action Tracking System	RAATS	3
State and Local Records		
Innocent Owner/Operator Program	IOP	25
Permitted Solid Waste Facilities	SWF/LF	15
Closed Landfill Inventory	CLI	10
Underground Injection Wells Database Listing	UIC	8
Leaking Petroleum Storage Tank Database	LPST	271
Underground Petroleum Storage Tank Database	UST	529
Aboveground Petroleum Storage Tank Database	AST	64
Spills Database	SPILLS	120
Sites with Controls	AUL	25
Voluntary Cleanup Program Database	VCP	76
Drycleaner Registration Database Listing	DRYCLEANERS	6
Dry Cleaner Remediation Program Prioritization List	PRIORITYCLEANERS	1
State Brownfields Site Assessments	BROWNFIELDS	5
Notice of Violations Listing	ENF	64
Industrial & Hazardous Waste Database	IHW	570
Current Emission Inventory Data	AIRS	59

Name of Database	Database Abbreviation	Number of Sites
	USD	7
TIER 2: Tier 2 Chemical Inventory Reports	TIER 2	177
Tribal records		
None	n/a	0
EDR Proprietary Records		
Manufactured Gas Plants	n/a	2

Source: EDR, 2010; TEC, Inc., 2010.
Note: Some sites may be listed in more than one database.

Of the 963 mapped sites identified in the ASTM search radius of the East and West Levees, 220 mapped sites are located within the hazardous materials ROI (EDR, 2010). Several of the 220 mapped sites represent more than one property, and each property may contain more than one database record. Of the 220 mapped sites identified within the ROI, two properties are located within or immediately adjacent to the East and West Levees and Floodway. These two properties may pose a high risk to the proposed construction activities. Typically, sites considered likely to be contaminated within the properties directly impacted by construction activities, or sites having potential for encountering contamination during construction of the proposed project, are categorized as "high risk".

Table 4-18 contains details of the high risk sites as well as the gradient of the site with respect to the levees. All of the hazardous materials sites within the ROI are listed as "Up gradient." Even though the contour lines for the Dallas Floodway are primarily at 400 and 410 feet above mean sea level, and land above the floodplain outside the levees is primarily 410 feet above mean sea level, the analyst has determined that adjacent sites would be Up gradient with respect to potential groundwater contamination and possible flow paths toward the levees (TEC, Inc., 2010). Therefore, all hazardous materials sites are listed as Up gradient even though portions of the levees structures can be higher than adjacent properties (i.e. 430 feet above mean sea level). **Exhibit 7: Corridor Maps** in **Appendix A** displays the location of the high risk sites designated in the legend as a Superfund Site or Hazardous Material Site.

Table 4-18: High Risk Hazardous Materials Sites

Site No.[1]	Site Name and Address in Dallas	Database Listing	Regulatory Status	Distance, Direction, and Gradient With Respect to the ROI
1-14, 16	RSR Corporation Westmoreland Road & Singleton Boulevard	NPL CERCLIS LIENS 2 CORRACTS RCRA-TSDF RCRA-NonGen US ENG CONTROLS ROD FINDS	NPL (ID# TXD079348397) – The site is a former smeltering plant and the affected area encompasses an area approximately 13.6 square miles in size. It is currently on the final NPL. ROD (ID# TXD079348397) – Currently on the final NPL. Media affected is groundwater, soil, and sediments. Contaminants are arsenic, antimony, lead, cadmium, metals. CERCLIS (ID# TXD079348397) – Currently on the final NPL.	0.001 mile West; Up gradient
391	FMI Recycling 1137 Conveyor Lane Dallas, TX 75247	SWL/LF	Active status	Within 100 feet East Up gradient

[1] *The Site Number listed corresponds to the Map ID listed in EDR Report (2010). Source: EDR, 2010.*

Murmur Corporation Site 3/RSR Corporation (Sites 1-14, 16): The Murmur Corporation Site 3/RSR Corporation is located at the corner of North Westmoreland Road and Singleton Boulevard. COCs are arsenic, cadmium, and lead. This site encompasses approximately 13.6 square miles in West Dallas. Historically, this site was used as a secondary lead smeltering operation from the early 1930s until 1984. In the early 1990s, the EPA began soil sampling, and completed remedial investigations and human health risk assessments on residential areas by the end of the decade. The EPA spent several years performing removal and remediation of contaminated soil in affected residential areas. The site is currently on the Final NPL (Superfund), scheduled for priority cleanup and is in a remediation phase. The Murmur Corporation Site is a National Priority List and CERCLA case. It is also listed on the LIENS, CORRACTS, RCRA-TSDF, RCRA-NonGen, US ENG CONTROLS, ROD, and FINDS databases.

The history of the site, the nature of contamination, and the status of the site as a Superfund site are the reasons the site is listed as high risk, even though it is not in the ROI based on site delineation from the database search. The boundary of the affected area does extend into the ROI for the West Levee along North Beckley Avenue/Canada Drive. The entire area impacted by the Superfund site encompasses 13.6 square miles and is shown on **Exhibit 7: Corridor Maps** in **Appendix A**. From the 1930s to 1984, the facility was an operating smelting facility that recycled used batteries and other lead-bearing materials. The contamination resulted from the fallout of air emissions from the smelter stack and from "residential use of lead slag and battery casing chips as fill material in residential driveways and yards" and from disposal of smelter wastes, among other contamination. The information obtained from the EDR Report does not extend the boundary of the Superfund site to the Trinity River or its floodplain (2010), but it does

abut the West Levee on the landside. There are no formal federal or state records reviewed for this assessment that have determined whether or not these fallout materials remain in the river or its floodplain. However, a Phase II ESA discussed later in this section confirms the presence of metals [including arsenic, barium, cadmium, chromium (total), lead, mercury, selenium and silver] from sites sampled within the ROI (C2HM Hill, 2008).

Freedman Metals, Inc. (FMI) Recycling (Site 391): This site is located on 1137 Conveyor Lane in Dallas. It is an active solid waste landfill and is listed in the SWL/LF and FINDS databases.

"Moderate risk" sites are those sites containing a hazardous materials release without out a remedial status, or with material having the potential to migrate offsite relatively close to the proposed construction activities. There are three sites considered moderate risk for the East and West Levees. **Table 4-19** contains details of the moderate risk sites as well as the gradient of the site with respect to the levees. **Exhibit 7: Corridor Maps** in **Appendix A** displays the location of the moderate risk sites designated in the legend as a Hazardous Material Site.

Table 4-19: Moderate Risk Hazardous Materials Sites

Site No.[1]	Site Name and Address in Dallas	Database Listing	Regulatory Status	Distance, Direction, and Gradient With Respect to the ROI
304	Yellow Transportation 4444-4500 Irving Boulevard Dallas, TX 75247	RCRA-SQG FINDS LPST AST SPILLS IHW ICIS TIER 2 HMIRS	LPST 28512: IMPACTED GW DISCHARGES TO SW USED BY HUMAN,ENDGR SPEC < 500ft status: FINAL CONCURRENCE ISSUED, CASE CLOSED The 276 HMIRS reports were related to self-reported shipping-related accidents and spills. RCRA-SQG 1000291222 FINDS TXD044627933 AST SPILLS Ind. Haz Waste ICIS 1011617686 TIER 2 S108889902	Within 500 feet North Up gradient
356	96040313 (4800 Irving Boulevard)	HMIRS	03/23/1996 Commodity name: 1-METHOXY-2-PROPONAL Amount: 1.5 GAL, Spillage	0.0 mile Up gradient
392	3699 Doug Street Dallas, TX	ERNS	ERNS 2004722053 Materials release, illegal dumping Medium affected: Water, drainage ditch to Trinity River Levee Remedial action: dissipate naturally, clean up complete	Within 200 feet North Up gradient

[1] *Site No. corresponds to the Map ID# listed in EDR Report (2010).*

Yellow Transportation (Site 304): The site, located at 4444 Irving Boulevard, contained a LPST record for impacted groundwater within 500 feet of water source used by humans and endangered species. The current status is final concurrence issued, case closed. The site had 276 HMIRS reports, which were related to self-reported shipping-related accidents and spills. The site is also identified on the RCRA-SQG, FINDS, AST, SPILLS, IHW, ICIS, and TIER 2 databases.

HMIRS 96040313 (4800 Irving Boulevard) (Site 356): Site 356, HMIRS 1 96040313 (4800 Irving Boulevard) is located at 4800 Irving Boulevard, Dallas. On March 23, 1996, a freight hauler spilled 1.5 gallons of 1-methoxyl-2-proponal on Irving Boulevard due to improper loading procedures. No environmental contamination was noted. The spill was cleaned up. The HMIRS 96040313 (4800 Irving Boulevard) site is listed on the HMIRS database.

ERNS 2004722053 (Site 392): This site is located at 3699 Doug Street. The ERNS record involved a material release discovery involving illegal dumping. The medium impacted included water, and a drainage ditch within the Trinity River levee. The Remedial Action included allowing the unknown material to dissipate naturally.

Sites are categorized as "low risk" if available information indicates that some potential for contamination exists, but the site is not likely to pose a contamination problem to the levee remediation construction. There are three properties located within the ROI characterized as low risk for the East and West levees. These sites are considered "low risk" due to their location and the nature of the proposed levee remediation activities. **Table 4-20** contains details of the low risk sites as well as the gradient of the site with respect to the levees. **Exhibit 7: Corridor Maps** in **Appendix A** displays the location of the low risk sites designated in the legend as a Hazardous Material Site.

Table 4-20: Low Risk Hazardous Materials Sites

Site No.[1]	Site Name and Address in Dallas	Database Listing	Regulatory Status	Distance, Direction, and Gradient With Respect to the ROI
304	A B F Freight Systems 4444 Irving Boulevard Dallas, TX 75247	RCRA-NonGen 1000102430 FINDS TXD981604945 LPST UST IHW	LPST 3030 GW IMPACTED, NO APPARENT THREATS OR IMPACTS TO RECEPTORS FINAL CONCURRENCE ISSUED, CASE CLOSED RCRA-NonGen 1000102430 FINDS TXD981604945	Within 500 feet North Up gradient
305	Penske Truck Leasing 4435 Irving Boulevard Dallas, TX 75247	RCRA-NonGen FINDS LPST UST IHW	RCRA-NonGen 1000383056 FINDS TXD982558462	Within 500 feet North Up gradient
885	Therm Processes Inc. 1609 E. Eighth Street Big D Auto Parts 1623 E. 8th Street	SSTS FINDS AST ICIS	Active SSTS 1011623956 FINDS 1005438062 AST 1004601762 ICIS 1010705951	Within 500 feet Southwest Up gradient

In addition to the sites listed on the EDR Report for the East and West Levees, the Texas and Pacific Railway runs along the south side of the West Levee and along portions of the northern, landside of the East Levee. A UPRR railroad bridge bisects the East and West Levees near Continental Avenue. While the potential risk from the close proximity of these rail facilities is low, the nature of both the materials used in the construction of the rail facilities and the materials potentially transported along these lines should be considered in planning the proposed construction activities.

Historic Results of East and West Levee Floodway Soil Sampling

Historical environmental reports were reviewed to compile information regarding soil analytical data within the floodway. The dates of the reports ranged from 1984 to 2010. The reports reviewed are described below.

Terra-Mar, Inc., Geotechnical/Environmental Investigation, Trinity River Implementation Plan, Dallas, Texas, prepared for Halff Associates, Inc. Dallas, Texas, October 12, 1999:

A total of 13 soil boring tests were performed. The soil borings were located within the Trinity River Floodplain, between Corinth Street and IH 30. Selected soil samples were collected from the soil borings and analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), the eight Resource Conservation and Recovery Act (RCRA) metals, and herbicides and pesticides. Two samples were also analyzed for the toxicity characteristic leaching procedure (TCLP) for chromium, lead and mercury. Installation of groundwater monitoring wells and groundwater sampling were not performed for this study. The results of four previous studies were used in preparation of the Terra-Mar report. These additional studies include:

- Alan Plummer and Associates, Inc., *Sampling and Testing of Existing Soils and Sediment in the Trinity River Flood Plain and Channel,* prepared for the City of Dallas, January 18, 1984. A total of six borings were performed in the vicinity of the Commerce Street, IH 30 and Corinth Street bridges. Selected soil samples were analyzed for metals and pesticides. Installation of groundwater monitoring wells and groundwater sampling were not performed for this study.

- Carter & Burgess, *Chain of Lakes Park – an Alternative to Town Lake*, prepared for Mr. Trammel Crow, December 3, 1984. A total of 20 soil boring tests were performed in the floodplain, between Corinth Street and IH 30. Selected soil samples were analyzed for total metals, total pesticides, EP Tox metals and EP Tox pesticides. Installation of groundwater monitoring wells and groundwater sampling were not performed for this study.

- Maxim Engineers, *Upper Trinity River Channel Sampling and Analysis for Dallas Floodway Channel Modifications,* prepared for the City of Dallas, November 19, 1990. A total of 18 environmental soil boring tests were performed in the floodplain between Corinth Street and the Mockingbird Bridge. The purpose for this study was to evaluate the suitability of the soils within the river channel to construct levees. Six composite soil samples were analyzed for priority pollutant metals (total and leachate), pesticides and total PCBs. Installation of groundwater monitoring wells and groundwater sampling were not performed for this study.

- Maxim Technologies, *Trinity River Sediment Sampling and Geotechnical Investigation, Trinity River Floodplain Modification,* prepared for the City of Dallas, September 1, 1995. A total of 10 soil boring tests were performed in the floodplain, east of Corinth Street. This report supplemented Maxim's report dated November 19, 1990. Additional work was performed to investigate the presence of priority pollutant metals and to investigate locations for borrow materials for a dredge spoils cap. Installation of groundwater monitoring wells and groundwater sampling were not performed for this study.

CH2M Hill, Phase II Environmental Site Assessment, Dallas Floodway, Upper Trinity River, Dallas, Texas, prepared for U.S. Army Corps of Engineers, Fort Worth District, February 2008:
The CH2M Hill report presents the results of environmental analysis conducted within the Trinity River Floodplain. A total of 96 soil probes were performed for this study. The soil borings were located within the Trinity River Floodplain, between Corinth Street and the John Carpenter Freeway/183 Bridge for the East Levee and the Loop 12 Bridge for the West Levee. Selected soil samples were collected from the soil probes and analyzed for VOCs, SVOCs, the eight RCRA metals, herbicides, pesticides and PCBs. Installation of groundwater monitoring wells and groundwater sampling were not performed for this study.

Xenco Laboratories, Soil Analytical Laboratory Data, October 27, 2008 (text of report not available; however, the laboratory report was provided to HVJ Associates):
A total of 29 soil boring tests were performed for the study. The soil borings were located within the floodplain, between Corinth Street and west of the Westmoreland Road/Mockingbird Lane

Bridge. Soil samples were collected from the soil borings and analyzed for VOCs, polynuclear aromatic hydrocarbons (PAHs) and the eight RCRA metals. Selected soil samples were analyzed for pesticides. Installation of groundwater monitoring wells and groundwater sampling were not performed for this study.

Stell Environmental Enterprises, Inc. and Tetra Tech NUS, Inc., Soil and Groundwater Sampling Report, Phase I Site Investigation, Upper Chain of Wetlands, Dallas Floodway Extension, Dallas Texas, prepared for U.S. Army Corps of Engineers, Fort Worth District, Fort Worth, Texas, January 2010:
A total of 71 soil boring tests were performed for this study, and temporary monitoring wells were installed at 68 boring locations. Selected soil samples were analyzed for VOCs, SVOCs, the eight RCRA metals, pesticides, herbicides, PCBs, and total petroleum hydrocarbons (TPH). Installation of temporary groundwater monitoring wells and groundwater sampling were conducted as part of this study as mentioned above. The locations where these groundwater samples were collected are within areas where there will be no construction activities below the water table.

The soil analytical data from the historic reports was compared to TCEQs Tier 1 protective concentration levels (PCLs), dated March 31, 2010, and Texas Risk Reduction Program (TRRP) dated November 19, 2010. For the TCEQ Tier 1 PCLs, the residential scenario for a 30-acre source area concentrations have been used for comparison purposes for this work because the floodway is considered a park (Trinity River Greenbelt Park) and according to TCEQ regulatory guidance (TCEQ, October 2008) "parks" are classified as residential land use. There were no soil concentrations exceeding the TRRP Critical PCLs within or nearby the proposed levee construction areas.

The historical studies completed for the Dallas Floodway did not contain groundwater analytical data within the construction areas. From the soil analytical data reviewed, there was only one isolated case (EB-13) where there was a soil concentration (1.96 mg/kg) slightly above the TRRP Tier 1 PCL protection to groundwater standard (0.75 mg/kg). Therefore; there is likely not a significant concern with groundwater COCs associated with proposed construction activities.

2009-2010 Floodway Soil Boring Results: Dallas Floodway and Dallas Floodway Extension
Approximately 525 hollow stem auger soil borings were advanced in mid-2009 to mid-2010 as part of the geotechnical engineering study for the Dallas Floodway and Dallas Floodway Extension project (HNTB, 2009). During the geotechnical exploration phases of the project petroleum hydrocarbon odors were noted in 11 soil borings. Ten were located adjacent to the West Levee and one adjacent to the East Levee in a channel boring. In 10 of these samples, an odor was detected by the field crew via sensory notice (i.e., olfactory) in soils, and in one sample a sheen was observed in groundwater extracted from a geotechnical observation well. Potential contamination in these soil borings was not confirmed analytically, as the samples were not sent to a laboratory for formal environmental analysis of COCs.

Of the soil boring tests performed in the previous reports, there are five soil borings (SB053, SB054, SB063, SB065, and SB067) located with the proposed construction areas and four soils

borings (SB051, SB062, SB066, and SB-3) located near the proposed construction areas. These soil boring locations are shown on **Exhibit 7: Corridor Maps** in **Appendix A**. Due to the results of the field observations, these areas are considered high risk for the proposed construction activity at the East and West Levees.

Dallas Floodway System Utility Corridors
Various utility corridors are located adjacent to and throughout the Dallas Floodway System. No recorded hazardous materials concerns result from these utilities as the environmental databases did not report any utility releases from underground pipelines. However, the presence of these facilities pose a slight risk for the proposed construction activities for two reasons; primarily the accidental discovery of previously unknown leaks during construction, and secondarily, the fill materials used in the utility corridor may serve as a conduit for hazardous materials from adjacent properties.

Dallas Floodway System Hazardous Material Use and Waste Generation
Maintenance operations performed by the City of Dallas throughout the floodway system utilize various materials classified as hazardous materials, including pesticides/herbicides for weed abatement, solvents, cleaning agents, paints, adhesives, and other products necessary to perform facility and equipment maintenance. Routine activities also produce a variety of wastes, including: paint solvents; spent antifreeze; aerosols; contaminated filters, rags and absorbents; and sludges. Also generated are items managed as universal wastes, such as used batteries and fluorescent light tubes. Hazardous wastes are handled, stored, and transported in accordance with applicable state and federal regulations. The waste materials are collected and transferred to a central storage area where they may be stored for no longer than 90 days before being transported offsite for treatment or disposal. The City arranges for the transport and disposal of its hazardous waste by appropriately licensed waste management and transportation companies.

4.11 Air Quality

In order to protect human health and the environment, the CAA of 1970 mandated the establishment of the National Ambient Air Quality Standards (NAAQS) and regulations to reduce air pollutants. These air pollutants are also known as criteria pollutants.

4.11.1 Region of Influence

The Proposed Action Alternative is located in Dallas County, which is part of the EPA's designated nine county serious non-attainment area for the 8-hour standard for the pollutant ozone. For purposes of this EA, the ROI for evaluating potential impacts to air quality associated with the NAAQS was designated as the nine-county serious non-attainment area for the 8-hour ozone standard, which includes Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant Counties. Dallas County is included in the Federal Air Quality Control Region (AQCR) 215. The air quality ROI is depicted in **Appendix A**, **Exhibit 9: Air Quality ROI Map**.

Criteria Pollutants

The criteria pollutants include ozone, carbon monoxide, sulfur dioxide, nitrogen dioxide, lead, and particulate matter (PM2.5 and PM10). Air quality is regulated nationally by the EPA. The EPA delegates authority to the TCEQ Office of Air Quality for monitoring and enforcing air quality regulations in Texas. The NAAQS consist of the maximum concentration above which adverse effects on human health may occur. Refer to **Table 4-21** for a list of the NAAQS. As required by the CAA Amendments, the EPA reevaluates the NAAQS every five years.

Table 4-21: National Ambient Air Quality Standards

Pollutant	Primary Standards*		Secondary Standards**	
	Level	Averaging Time	Level	Averaging Time
Carbon Monoxide	9 ppm (10 mg/m^3)	8-hour: Not to be exceeded more than once per year.	None	
	35 ppm (40 mg/m^3)	1-hour: Not to be exceeded more than once per year.		
Lead	0.15 $\mu g/m^3$ (Final rule signed on October 15, 2008.)	Rolling 3-month average	Same as Primary	
	1.5 $\mu g/m^3$	Quarterly average	Same as Primary	
Nitrogen Dioxide	0.053 ppm (100 $\mu g/m^3$)	Annual (arithmetic mean)	Same as Primary	
	0.100 ppm	1-hour: To attain this standard, the 3-yr average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.100 ppm (effective January 22, 2010).	None	
Particulate Matter (PM10)	150 $\mu g/m^3$	24-hour: Not to be exceeded more than once per year on average over 3 years.	Same as Primary	
Particulate Matter (PM2.5)	15.0 $\mu g/m^3$	Annual (arithmetic mean): To attain this standard, the 3-yr average of the weighted annual mean $PM^{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 $\mu g/m^3$.	Same as Primary	
	35 $\mu g/m^3$	24-hour: To attain this standard, the 3-yr average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 $\mu g/m^3$ (effective December 17, 2006).	Same as Primary	
Ozone	0.075 ppm (2008 std)	8-hour: To attain this standard, the 3-yr average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm. (effective May 27, 2008).	Same as Primary	
	0.08 ppm (1997 standard)	8-hour: (a) To attain this standard, the 3-yr average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm. (b) The 1997 standard—and the implementation rules for that standard—will remain in place for implementation purposes as EPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard. (c) EPA is in the process of reconsidering these standards (set in March 2008).	Same as Primary	
	0.12 ppm	1-hour: (a) EPA revoked the 1-hour ozone standard in all areas, although some areas have continuing obligations under that standard ("anti-backsliding"). (b) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is < 1	Same as Primary	
Sulfur Dioxide	0.03 ppm	Annual (arithmetic mean)	0.5 ppm (1300 $\mu g/m^3$)	3-hour: Not to be exceeded more than once per year.
	0.14 ppm	24-hour: Not to be exceeded more than once per year.		
	75 ppb	1 hr: To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 ppb. Final rule signed June 2, 2010.	None	

Source: EPA http://www.epa.gov/air/criteria.html
**Primary NAAQS: the levels of air quality that the EPA judges necessary, with an adequate margin of safety, to protect the public health.*
***Secondary NAAQS: the levels of air quality that the EPA judges necessary to protect the public welfare from any known or anticipated adverse effects.*
$\mu g/m^3$: Micrograms per cubic meter, mg/m^3: Milligrams per cubic meter

Carbon Monoxide: colorless, odorless gas that is formed when carbon in fuel is not burned completely. It is a component of motor vehicle exhaust, which contributes about 56 percent of all carbon monoxide emissions nationwide. Other non-road engines and vehicles (such as construction equipment and boats) contribute about 22 percent of all carbon monoxide emissions nationwide. Higher levels of carbon monoxide generally occur in areas with heavy traffic congestion. Other sources of carbon monoxide emissions include industrial processes (such as metals processing and chemical manufacturing), residential wood burning, and natural sources such as forest fires (EPA, 2010d).

Lead: in the past, motor vehicles were the major contributor of lead emissions to the air. As a result of EPA's regulatory efforts to reduce lead in gasoline, air emissions of lead from the transportation sector, and particularly the automotive sector, have greatly declined over the past two decades. Today industrial processes, primarily metals processing, are the major source of lead emissions to the air. The highest air concentrations of lead are usually found near lead smelters. Other stationary sources are waste incinerators, utilities, and lead-acid battery manufacturers (EPA, 2010b).

Nitrogen Dioxide: one of a group of highly reactive gases known as "oxides of nitrogen," or "nitrogen oxides." Other nitrogen oxides include nitrous acid and nitric acid. While EPA's NAAQS cover this entire group of nitrogen oxides, nitrogen dioxide is the component of greatest interest and the indicator for the larger group of nitrogen oxides. Nitrogen dioxide forms quickly from emissions from cars, trucks and buses, power plants, and off-road equipment. It contributes to the formation of ground-level ozone and fine particle pollution (EPA, 2010f).

Particulate Matter (PM 10 and PM 2.5): particle pollution (also called particulate matter or PM) is the term for a mixture of solid particles and liquid droplets found in the air. Particle pollution includes "inhalable coarse particles" with diameters larger than 2.5 micrometers and smaller than 10 micrometers and "fine particles" with diameters that are 2.5 micrometers and smaller. Some particles, known as primary particles are emitted directly from a source, such as construction sites, unpaved roads, fields, smokestacks, or fires. Others form in complicated reactions in the atmosphere of chemicals such as sulfur dioxide and nitrogen oxides, that are emitted from power plants, industries, and automobiles. These particles, known as secondary particles, make up most of the fine particle pollution in the country (EPA, 2010c).

Ozone: ground-level ozone is not emitted directly into the air but is created by chemical reactions between nitrogen oxides and VOCs in the presence of sunlight. Emissions from industrial facilities and electric utilities, motor vehicle exhaust, gasoline vapors, and chemical solvents are some of the major sources of nitrogen oxides and VOCs (EPA, 2010a).

Sulfur Dioxide: the largest sources of sulfur dioxide emissions are from fossil fuel combustion at power plants (73 percent) and other industrial facilities (20 percent). Smaller sources of sulfur dioxide emissions include industrial processes such as extracting metal from ore and the burning of high sulfur containing fuels by locomotives, large ships, and non-road equipment (EPA, 2010e).

Federal, State and Local Requirements

In 1990, the CAA Amendments established specific criteria which must be met for the air quality non-attainment areas. These criteria are based on the severity of the air pollution problem and include the development and implementation of a State Implementation Plan (SIP). A SIP is a collection of requirements that delineates how a state would reduce emissions to attain the NAAQS. The SIP must be approved by EPA. The most important section of the SIP is Control Strategy section. The Control Strategy section details the effort to meet NAAQS by describing the targets, plans, and control strategies for each area in the state designated to be in non-attainment.

Local municipalities, as well as the TCEQ, may adopt more stringent air quality standards than the EPA. Areas determined by the EPA to exceed the NAAQS are designated as non-attainment areas.

4.11.2 Existing Air Quality Conditions

Attainment Status

The Proposed Action Alternative is located in Dallas County, which is part of the EPA's designated nine-county serious non-attainment area for the 8-hour standard for the pollutant ozone. The applicable criteria pollutant *de minimis* levels are 50 tons/year for the ozone precursors VOCs and nitrogen oxides (EPA 2010f; TCEQ 2010a, TCEQ 2010b).

Air Quality Monitoring Data

The TCEQ monitors for various air pollutants in the state using an established air monitoring network. This network of monitors measures air quality and determines the levels of the various pollutants in the air. Not all monitors sample for the same pollutants, and not all monitors have one year of complete data for any given pollutant. Latest available monitoring data for the counties within the ROI are included in **Table 4-22.** These data indicate that in general, criteria pollutant concentrations decreased in 2008.

Table 4-22: Monitoring Data for the NAAQS within the ROI

Criteria Pollutant	2007	2008	County
Carbon Monoxide (1hr/8hr) in ppm	2.2/1.5	1.7/1.4	Dallas
Lead (quarterly) in µg/m^3	0.63, 0.01	1.19, NA	Collin, Dallas
Nitrogen Oxides (annual) in ppm	0.016, 0.009, 0.009, 0.004, 0.015	0.013, 0.007, 0.010, 0.004, 0.013	Dallas, Denton, Ellis, Kaufman, Tarrant
Particulate Matter 10 (annual) in µg/m^3	23	26	Dallas
Particulate Matter 2.5 (annual) in µg/m^3	12.95, 11.61	11.72, 12.70	Dallas, Ellis
Ozone (8-hour) in ppm	0.08,0.08,0.089, 0.076, 0.087, 0.074, 0.088, 0.074, 0.089	0.079, 0.077, 0.084, 0.072, 0.083, 0.069, 0.077, 0.073, 0.085	Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, Tarrant
Sulfur Dioxide (annual) in ppm	0.001, 0.003, 0.001	0.001, 0.002, 0.001	Dallas, Ellis, Kaufman

Source: EPA http://www.epa.gov/air/data (March 2011).

Year 2008 data from monitoring sites located in close proximity to the Proposed Action Alternative, C60 and C312, are listed in **Table 4-23**. The official monitor data for this table and the previous table can be found on EPA's national air quality monitor web site (http://www.epa.gov/air/data).

Table 4-23: Local Monitoring Data for the NAAQS

Air Monitor Site	Activation Date	Carbon Monoxide (1hr/8hr) in ppm - 2008	Lead in µg/m^3 - 2008	Nitrogen Oxides (annual/1hr) in ppm - 2008	Particulate Matter 10 in µg/m^3 -2008	Particulate Matter 2.5 in µg/m^3 -2008	Ozone (1-hour/8-hour) in ppm - 2008	Sulfur Dioxide (annual/24-hour) in ppm - 2008	Approximate Distance (miles) from Project
C60-481130069	1/1/1986	1.7/1.4	NA	0.013/0.072	NA	NA	0.078/0.066	0.001/0.003	1
C312-481130050	1/1/1979	NA	NA	NA	NA	NA	NA	NA	3/4

Source: EPA http://www.epa.gov/air/data (March 2011).
C60-481130069: 1415 Hinton Street, Dallas, TX.
C312-481130050: 717 South Akard Street., Dallas, TX.
NA: data was not reported by EPA for this compound at this monitoring site.
Note: EPA disclaimer regarding these data: "Readers are cautioned not to infer a qualitative ranking order of geographic areas based on Air Data reports. Air pollution levels measured in the vicinity of a particular monitoring site may not be representative of the prevailing air quality of a county or urban area. Pollutants emitted from a particular source may have little impact on the immediate geographic area and the amount of pollutants emitted does not indicate whether the source is complying with applicable regulations."

In 2011, the EPA designated the ROI as serious non-attainment for the 8-hour ozone in accordance with the NAAQS. As previously mentioned, Dallas County is located within the designated serious non-attainment area for ozone. Although there have been year-to-year fluctuations in ozone concentrations, these concentrations demonstrate a reduction over time, which indicates improvements to air quality over time. Ozone trends continue to show improvement as the number of daily exceedances of the federal standards for ozone has decreased within the past decade. This trend of air quality improvement in the DFW region is attributable in part to the effective integration of highway and alternative modes of transportation, cleaner fuels, improved emission control technologies, and the MPO regional clean air initiatives.

Major Emission Sources

Approximately 70 percent of the DFW region's air pollution originates from mobile sources such as cars, trucks, airplanes, construction equipment, and lawn equipment. The majority of pollutants emitted from motor vehicles include VOCs, nitrogen oxides, carbon monoxide, and particulate matter. The City of Dallas is implementing several initiatives to improve air quality and reduce

ozone levels, including: green fleet/vehicles, ordinances, commute solutions, and outreach programs (Green Dallas, 2010).

Within the ROI, approximately 33 percent of VOC emissions and 50 percent of NOx emissions that cause ozone pollution are produced by on-road mobile sources which include cars, trucks, buses, motorcycles, and other registered vehicles. Other sources of volatile organic compound emissions include non-road engines (24 percent), point sources (5 percent), and area sources (38 percent). Sources of NOx include non-road (36 percent), point sources (5 percent), and area sources (9 percent) (NCTCOG, 2009).

Several industrial facilities along and near the Trinity River contribute to the ambient air quality of the region. These facilities include, but are not limited to, chemical plants, cement plants, semi-conductor facilities, printing operations, and oil and gas facilities. The six existing pumping plants are electrically powered and do not use generators (City of Dallas, 2009b).

Greenhouse Gas Emissions

Gases that trap heat in the atmosphere are often called greenhouse gases (GHGs). Some GHGs such as carbon dioxide occur naturally and are emitted to the atmosphere through natural processes and human activities. Other GHGs such as fluorinated gases are created and emitted solely through human activities. The principal GHGs that enter the atmosphere because of human activities are carbon dioxide, methane, nitrous oxide, and fluorinated gases. These gases are believed to contribute to climate change. The EPA defines "climate change" as any substantial change in measures of climate (such as temperature, precipitation, or wind) lasting for an extended period (decades or longer). Predictions of long-term environmental impacts due to global climate change include sea level rise, changing weather patterns with increases in the severity of storms and droughts, changes to local and regional ecosystems including the potential loss of species, and a significant reduction in winter snow pack. In Texas, predictions of these effects include exacerbation of air quality problems, increased storm frequency, and drastic impacts from sea level rise (USACE, 2010).

On February 18, 2010, the CEQ issued draft guidance on incorporating GHGs considerations into NEPA review of federal actions. The draft guidance was published in the Federal Register, Tuesday, February 23, 2010. If finalized, the guidance will establish protocols for how federal agencies should analyze the direct and indirect effects of GHG emissions and the potential effects of climate change on the environment that may result from proposed federal actions. Federal agencies are, on a national scale, addressing emissions of GHGs by reductions mandated in federal laws and EOs, most recently EO 13514, Federal Leadership in Environmental, Energy, and Economic Performance (signed on October 5, 2009); which expanded upon the energy reduction and environmental performance requirements of EO 13423 (signed on January 24, 2007), Strengthening Federal Environmental, Energy, and Transportation Management.

An emissions inventory that identifies and quantifies a country's primary anthropogenic sources and sinks of GHGs is essential for addressing climate change. The EPA prepares the national greenhouse gas inventory report annually in which it presents estimates of U.S. greenhouse gas emissions and sinks for the years 1990 through 2008. According to the *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2008* (April 2010), total U.S. emissions have risen

by approximately 14 percent from 1990 to 2008. Emissions declined from 2007 to 2008 by 2.9 percent. This decrease is primarily a result of a decrease in demand for transportation fuels associated with the record high costs of these fuels that occurred in 2008. Additionally, electricity demand declined in 2008 in part due to a substantial increase in the cost of fuels used to generate electricity. In 2008, temperatures were cooler in the United States than in 2007, both in the summer and the winter. This lead to an increase in heating related energy demand in the winter, however, much of this increase was offset by a decrease in cooling related electricity demand in the summer.

Several states have promulgated laws as a means to reduce statewide levels of GHG. In particular, Texas Senate Bill 184 (September 1, 2009), requires the State Comptroller to develop strategies to reduce GHGs, and the Texas Emission Reductions Plan, established in 2001, provides incentives to reduce emissions and improve and maintain air quality in Texas (Texas Comptroller of Public Accounts, 2009). The City of Dallas is taking an active role in further creating a more sustainable city through the reduction of GHGs emitted from its city operations. The City of Dallas initiatives to reduce GHGs include the following (Green Dallas, 2010):

- In 2006, the Mayor of Dallas signed the U.S. Mayors Climate Change Agreement which is a commitment by mayors around the country to reduce GHGs in their own cities and communities to 7 percent below 1990 levels by the year 2012.
- In 2005, the City conducted an emissions inventory to better understand the source and location of its emissions.
- The City of Dallas has completed a GHGs inventory of municipal and community emissions. This inventory shows the City's impact on air quality, broken down by sector, and the next steps for addressing those areas where the City can make a difference.
- The City of Dallas is currently working on a sustainability plan. This plan will include goals, principles and strategies required to support and implement the vision of Dallas becoming a more sustainable community.

4.12 Aesthetics

Aesthetics and visual resources are the natural and man-made features that comprise the visual qualities of a given area. Such features form the overall impression that an observer may receive of an area or its landscape character. Topography, water, vegetation, man-made features, and the degree of available panoramic view are examples of visual characteristics.

4.12.1 Region of Influence

The ROI for aesthetics and visual resources is defined as the area from which the Dallas Floodway System is visible or can be viewed. This area varies depending on an observer's sight range and the presence of sight obstructions such as structures and other infrastructure. The ROI includes the Dallas Floodway; the East and West Levees; areas adjacent to the levees along the levees' landsides; and areas at ground elevation from which the East and West Levees are visible, which typically include the first tier of development adjacent to the landsides of the levees. The first tier of development is typically 250 – 500 feet from the toe or sump areas on the landsides of the levees.

4.12.2 Aesthetic and Visual Variables and Elements

Five characteristics of a visual frame of reference influence the description and assessment of visual resources. These include viewsheds, visual character, visual quality, visual sensitivity, and observation points.

A viewshed, or vista, is an area of the landscape that is visible from a particular location, such as an overlook or series of points along a road, pathway, or trail. To identify the importance of views of a resource, a viewshed may be broken into distance zones of foreground, middleground, and background. Generally, the closer a resource to the viewer, the more dominant it is and the greater its importance to the viewer. Visual character is based on defined attributes of an area. A change in visual character cannot be described as having positive or negative attributes until it is compared to the viewer's response to that change. Visual quality is determined by analyzing the memorization of landscape components as they combine in striking or distinctive visual patterns, the visual integrity of the natural and artificial landscape and its freedom from encroaching elements, and the visual coherence and compositional harmony of the landscape considered as a whole. Visual sensitivity is based on the visibility of resources in the landscape, the proximity of viewers to the visual resource, the relative elevation of viewers to the visual resource, and the types and expectations of individuals and viewer groups. Key observation points are points on the landscape that individuals identify as providing a location with which to take in noteworthy views.

4.12.3 Existing Visual Resources

This analysis of existing visual resources is divided into two distinct visual environments within the aesthetics and visual resources ROI. The first environment contains the aesthetic and visual characteristics of the Dallas Floodway within the floodway on the riverside of the Dallas Floodway System. The second environment contains the aesthetic and visual resources of areas adjacent to the levees along the levees' landsides as well as areas at ground elevation from which the East and West Levees are visible, which would generally include the first tier of development on the landside of the levees.

Floodway Visual Environment

The visual environment for the Dallas Floodway component of the aesthetics and visual resources ROI bound by the East and West Levees includes marshes, riparian trees lining the river channel, scattered water features, open herbaceous meadows of mostly native turf grasses, and isolated pockets of woody vegetation, all of which are bound by earthen, grass-covered berm levees rising approximately 30 feet above the ground elevation of the Dallas Floodway. Several transportation and utility infrastructure crossings are also dominantly visible within the Dallas Floodway. In addition, several storm water outfalls and other drainage structures are located throughout the Dallas Floodway and contribute to the visual environment. The Trinity River, usually confined to its channel, is itself also an attribute of the visual environment within the floodway. One park containing active recreational amenities, Trammell Crow Park, is visible within the Dallas Floodway straddling the riverside of the East Levee near Sylvan Avenue's Dallas Floodway crossing.

A number of views prevail within the Dallas Floodway looking outside the floodway. In far western areas of the aesthetics and visual resources ROI straddling the landside of the West Levee along the West Fork of the Trinity River and Mountain Creek, areas of small single-family residences with a few pockets of industrial areas are visible. In the far northern areas of the aesthetics and visual resources ROI straddling the East Levee along the Elm Fork, vast expanses of industrial structures and supporting infrastructure are visible. In areas within the Dallas Floodway where both the East and West Levees parallel each other running east-west, industrial structures and supporting infrastructure dominate the view to the north, while single-family residential neighborhoods and interspersed neighborhood-scale institutional structures dominate the view to the south. In areas within the floodway where both the East and West Levees parallel each other running northwest-southeast, there are expansive and striking views of Dallas's CBD as well as the North Oak Cliff area. Background views of tall, modern office towers and bulky lower-rise structures are visible from many locations within the Dallas Floodway with the levees in the middleground. Areas further downstream between the East and West Levees just south of Dallas's CBD provide dominant views of utility and transportation infrastructure as well as small, single-family residential structures.

Landside Visual Environment

On the landsides of the East and West Levees of the Dallas Floodway System from the first tier of development adjacent to the levees' landsides looking toward the Dallas Floodway, in most cases, the raised, grass-covered, earthen berm of the levees is the most dominant visible element. Topping the berms are intermittent views of utility and roadway bridge crossings. In some cases, dense and high-rise development, where it exists, is visible from one side of the Trinity River floodplain to the other as well as thick woody vegetation, where it exists, in the middleground between the levees. Interspersed pump stations associated with the City of Dallas's interior drainage system are also visible looking toward the levees from the landsides.

4.13 Section 408 - Engineering Considerations

Under Section 408, any proposed modification to an existing USACE project, whether federally or locally maintained, that goes beyond those modifications required for normal O&M requires a determination by the Secretary of the Army that the proposed alteration, permanent occupation, or use of a federal project would not be injurious to the public interest and would not impair the usefulness of such work. Therefore, any modification requires this determination. Any proposed temporary or permanent alteration, occupation, or use of any public works, for any purpose is only allowable with the permission of the Secretary of the Army. The authority to make this determination and approve modifications to federal works under Section 408 has been delegated to the Chief of Engineers, USACE.

Engineering considerations or technical criteria include those criteria developed and documented by the USACE that demonstrate consistency with the technical aspects of the USACE mission, namely flood risk management. These criteria will assist in determining the Proposed Action's impact on the technical integrity of the Dallas Floodway System, which is an existing USACE project. A project must meet the following technical criteria:

1. Proposed modifications are not injurious to the function and operation of the existing Federal project.
2. Project complies with all relevant laws.
3. Geotechnical Criteria:
    - Technical data: to be provided to validate and verify side slope stability, stability of slope protection, and constructability of excavations.
4. Civil Criteria:
    - Layout Plans: provide plan and profile information.
5. Hydrology and Hydraulics Criteria:
    - The project would not degrade the stream system by causing stream bank instability, increasing sediment deposition in stream channels, increasing lateral erosion of stream banks causing widening of the channel, or causing vertical erosion of the channel bed leading to channel incision and head cutting.

The proposed Section 408 modification measures were developed in accordance with the City of Dallas and EOR interpretation of the USACE engineering manuals (EM) and guidelines. Engineering manuals EM-1110-2-1901, which provides guidance on seepage analysis, and EM-1110-2-1913, which provides guidance for design and construction of levees were applied to the design of the levee remediation measures. The proposed design was reviewed by USACE to ensure no harm is inflicted on the system.

The Fort Worth Engineering Division has performed a technical review of the geotechnical data and analyses report and 35% construction plans and specifications, and determined that the proposed modification meets USACEs' engineering and safety standards for construction and meets minimum factors of safety for slope stability in the short term (construction) and long term (post construction). The USACE has determined that the proposed action does not increase the risk to public safety.

1988 Upper Trinity River Environmental Impact Statement (TREIS) Record of Decision

Based on the *TREIS* findings, the USACE issued a ROD in April 1988 specifying criteria the USACE would use to evaluate Section 408 permit applications in the Trinity River Corridor, specifically, projects located within the 800-year floodplain of the Elm Fork, Mountain Creek, the West Fork, and the main stem of the Trinity River. The criteria as presented in the ROD are as follows:

1. Hydraulic Impacts: no rise in the 100-year or 800-year elevation for the proposed condition will be allowed;
2. Storage Capacity: the maximum allowable loss in storage capacity for the 100-year and 800-year discharges will be 0 percent and 5 percent, respectively; and,
3. Water Velocity: alterations in the floodplain may not create or increase an erosive water velocity on- or off-site.

The USACE has used the Upper Trinity River ROD hydrology and hydraulics criteria since the signing of the ROD in 1988 as a measure to evaluate the impacts of proposed developments in the

TREIS study area for Section 408 permit actions. These criteria are applicable to the Proposed Action Alternative.

A Section 408 Report providing additional details to supplement this environmental document has been prepared and will be coordinated with the USACE Headquarters. The Section 408 Report was prepared according to the *Policy and Procedural Guidance* dated October 2006 and the *Clarification Guidance on the Policy and Procedural Guidance for the Approval of Modifications and Alterations of Corps of Engineers Projects* dated November 2008.

In addition to the information provided in this EA, which evaluates the social, economic, and environmental impacts resulting from the proposed improvements as per the NEPA requirements, the Section 408 Report provides additional discussion on modification measures the City and the EOR propose to help the City regain 100-year FEMA accreditation. A system performance assessment summary is included in this EA (**Section 5.13 Section 408 - System Performance Assessment).** The assessment summarizes the following:

- Geotechnical Report describing the EOR's interpretation of the geotechnical conditions in the Dallas Floodway and potential modification measures;
- Hydraulic and Hydrology Technical Report developed by the EOR describing changes in water surface profiles and flow distribution, local and system-wide effects, and effects to floodplain management and address EO 11988 including practicable alternatives determinations; and
- O&M requirements of the federal project and changes to water control management plans.

EO 11988 requires Federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practical alternative.

4.13.1 Hydraulics and Hydrology, Geotechnical, and O&M

While the technical component of the Section 408 Report includes the EOR's technical analysis and adequacy of design including hydraulic and hydrology (i.e., changes in inflow, changes in water surface profiles and flow distribution, assessment of local and system-wide resultant impacts, upstream and downstream impacts, etc.), geotechnical evaluation (i.e., stability, seepage/underseepage, material usage/borrow/waste/transport/hauling, etc.), and O&M requirements (applicant facilities and water control management plan), the USACE provides no opinion as to the efficacy of the proposed modifications to provide flood risk management benefits.

4.13.2 Risk Assessment Requirements

Risk is the probability an area will be flooded, resulting in undesirable consequences. The primary purpose of the Dallas Floodway System is to provide flood risk management from flooding. The levee system currently protects thousands of acres of essential infrastructure, commercial, industrial, and residential interests including parts of downtown Dallas and West Dallas.

Risk analysis is an approach to evaluation and decision making that explicitly, and to the extent practical, analytically incorporates considerations of risk and uncertainty in a flood damage reduction study. A risk analysis can be applied to capture and quantify the extent of the risk and uncertainty in the various planning and design components of a project. A risk analysis for the Proposed Action Alternative would be performed in accordance with ER 1105-2-101. A summary of the results of the analysis are included in the **Section 7.0 Risk Assessment**.

Variables in a Risk Analysis
A variety of planning and design variables may be incorporated into risk analysis in a flood risk management study. For the hydrologic and hydraulic analyses, the principal variables are discharge and stage. Uncertainty in discharge and stage exists because record lengths are often short or do not exist where needed, and the effectiveness of flood flow regulation measures is not precisely known. Uncertainty in discharge also comes from estimation of parameters used in rainfall runoff computations, such as precipitation and infiltration. Uncertainty factors that affect stage might include conveyance, roughness, cross-section geometry, debris accumulation, ice effects, sediment transport, flow regime, bed form, and others. In addition to uncertainty in these variables, uncertainty arises from imprecise analysis methods (i.e., mathematical computations do not perfectly represent natural processes) (USACE, 2006).

5.0 ENVIRONMENTAL CONSEQUENCES

The potential environmental consequences resulting from the No-Build and Proposed Action Alternative are discussed in the sections below. In general, environmental consequences can be considered temporary or permanent in nature. Permanent impacts are those anticipated to last indefinitely. Temporary impacts consist of those that would result from construction activities (i.e., construction staging, excavation, hauling, access, etc.) anticipated to last for some period of time but that would eventually revert to pre-construction conditions. Pre-construction activities/site preparation activities include installation of best management practices (BMPs) such as erosion control devices in accordance with the storm water pollution prevention plan (SW3P). Prior to construction, the construction contractor would be responsible for the preparation and submittal of an emergency action plan to the City of Dallas Flood Control District for their approval. The plan would be implemented in the event of imminent flooding during construction and address emergency actions to be implemented during above normal river stages for the entire length of the project and duration of project construction. Construction equipment, excess material, supplies, forms, building, etc. shall not be placed or stored in the floodway during construction activities. Limiting the items that may be present within the construction areas that could be transported by flood flows and possibly contain contaminants would reduce the risk to water quality.

Estimates of the potential environmental impacts resulting from the Proposed Action Alternative were based on the following assumptions:

Cutoff Walls

Construction of the proposed Section 408 modification measures would occur simultaneously in order to complete the project by early the end of 2012. The most time consuming, and therefore critical path for construction would be the cutoff wall for the East Levee. Cutoff wall excavation would occur continuously from the starting point to the finishing point of the cutoff wall. Construction would occur over approximately up to6 months, starting in the spring/summer of 2012. In order to complete construction in a maximum of 6 months, construction activities are programmed to occur over 12 hours a day, 6 days a week. However, if the project is delayed unexpectedly (i.e., inclement weather, late project start, etc.), construction activities may need to occur over 24 hours a day, 7 days a week. This working schedule is not anticipated to exceed conformity *de minimis* levels and would not result in violations to the NAAQS.

The proposed cutoff walls would be approximately a maximum of 36 inches in width. The East Levee cutoff wall would be approximately 15,700 feet in length, with an anticipated trench depth of approximately 40 to 55 feet deep, and located at a minimum distance of 50 feet from the riverside of the levee toe. The East Levee cutoff wall would mostly consist of soil-bentonite, except for a 650-foot long section constructed of cement-bentonite, which would be needed along the Hampton Pump Station outfall channels. The West Levee cutoff wall would consist of soil-bentonite, would be approximately 2,600 feet in length, with an anticipated trench depth of 10 to 20 feet deep. The West Levee cutoff wall would be located at a minimum distance of 25 feet from the riverside levee toe. The cutoff walls would extend from approximately 3 feet below the existing ground surface to 5 feet into the bedrock.

A clay cap, approximately 3 feet in depth, would be placed between the top of the cutoff wall and the existing ground surface. Access to construction areas along the East Levee may occur either at the existing Hampton Pump Station access road or at the existing levee maintenance road that intersects with Westmoreland Road/Mockingbird Lane, which further feeds into SH 183 and IH 35E. Access to construction areas along the West Levee would occur from existing levee roads at Eads Avenue, which feeds into Colorado Boulevard and further into IH 35E.

A 10-foot wide concrete pathway (maintenance way) 6 inches thick would be constructed along the West Levee cutoff wall for maintenance. The maintenance path would be approximately 1-mile long and extend rom just east of IH 35E and end just west of the AT&SF railroad tracks.

The construction area for the East Levee cutoff wall would extend approximately 150 feet from the riverside levee toe except for an area near the Hampton Pump Station outfall channels. At the outfall channels, the construction area would extend out a maximum of approximately 790 feet from the levee toe to accommodate an 8 acre borrow area, the proposed work at the Old Hampton Pump Station outfall channel, the New Hampton Pump Station outfall channel, and proposed Section 404 mitigation site. The construction area for the proposed project is depicted in **Exhibit 7: Corridor Maps** in **Appendix A**. The construction area may be needed to mix the soil-bentonite for placement back into the trench. The construction area for the West Levee would extend from a minimum of 50 feet to 100 feet from the riverside levee toe to accommodate for the cutoff wall and maintenance way construction. The construction contractor would be responsible for the preparation and submittal of a flood emergency action plan that would be

implemented in the event of imminent flooding during construction and address emergency actions to be implemented during above normal river stages for the entire length of the project and duration of project construction. **Section 7.1 Operation and Maintenance Considerations** details the components of the flood emergency plan.

The Hampton Pump Station outfall channels at the East Levee would be temporarily filled to allow for construction of the cutoff wall. A temporary cofferdam would be necessary to allow construction activities at this location.

In summary, construction of the cutoff walls would be accomplished by excavating a trench, backfilling it with a slurry mix, and capping the walls with a layer of clay. The compacted clay cap would be graded within the excavated area to match the existing grade. A different methodology involving mixing the soil-bentonite inside the trench instead of excavating and backfilling may be employed by the contractor. The final construction methodology has not been determined.

Material from a borrow area would be necessary for cutoff wall cap and protection. The borrow area, located within construction limits of the East Levee cutoff wall, would be approximately 8 acres in size. The borrow area is anticipated to be 3 feet deep. After construction, this borrow area would be returned to pre-construction elevations. The location of the borrow area would be located within the floodplains as shown in **Exhibit 7: Corridor Maps**. Spoil material would be used to restore rutted and ponding riverside levee maintenance roads to their original condition. The specific maintenance roads to be restored would be determined based on the amount of spoil material available after construction, on the existing condition of the maintenance road, and on its proximity to the construction area. The maintenance roads would be restored to the floodplain floor elevation by placing 2 to 3 feet of material over the 20-foot roadway width. The surface material would then be graded and compacted to drain toward the river. Preliminary calculations indicate that all of the spoil material soil would be utilized for restoring the levee maintenance roads. The potential location and limits of the levee maintenance road improvements are depicted in **Exhibit 7A: Potential Limits of Levee Maintenance Road Improvements** in **Appendix A**.

Approximately 719,729 square feet of soil-bentonite cutoff walls, and 17,350 square feet of cement-bentonite cutoff walls would be constructed. Besides bentonite, no other fill material is anticipated to be brought on-site for the construction of the cutoff walls. Other material such as riprap would be brought on-site for the proposed work at the Hampton Pump Station outfall channels. The impacts associated with the construction of the East Levee cutoff walls are considered temporary, except at the Hampton Outfall Channels and adjacent wetland, because a clay cap would be placed on top of the cutoff walls and the areas would be returned to pre-existing contours. The New and Old Hampton Pump Station outfall channels would have concrete and riprap placed at the bottom of the channels to address erosion concerns to the existing channel slopes and riverside cutoff wall that would be located below the existing outfall channel. Riprap would be placed in a small area of a wetland located west of the outfall channels to reduce erosion concerns at this location. The impacts associated with the concrete maintenance way are considered permanent because a 10-foot wide, 6 inches thick, approximately 1-mile long

would be constructed. Approximately 978 cubic yards of concrete would be required for the maintenance way.

Concrete and Riprap Scour Protection at the Hampton Pump Station Outfall Channels
The Hampton Pump Station outfall channels (old and new) would be stabilized with concrete and riprap to address potential erosion concerns near the riverside cutoff wall locations. At the Old Hampton Pump Station outfall channel, an area extending 30 feet out from the existing concrete apron would be paved. Riprap would then be placed from this point for an additional distance of approximately 82 feet. At the New Hampton Pump Station outfall channel, an area extending out approximately 20 feet from the existing concrete apron would be paved. Riprap would then be placed in the channel from this point for an additional distance of approximately 60 feet. Riprap would also be placed in a small area of a wetland west of the outfall channels where it drains into the Old Hampton Pump Station outfall channel. In total, approximately 369 square yards of concrete, 1,520 cubic yards of heavy riprap, 2,086 cubic yards of light riprap, and 2,081 cubic yards of compacted fill (clay cap) material would be placed at the outfall channels. The impacts associated with the proposed concrete and riprap at the Hampton Pump Station outfall channels and wetland would be considered permanent.

Site restoration and clean up would occur in accordance with the TCEQ construction general permit (CGP), SW3P, and the Cutoff Wall Installation Work Plan. Disturbed areas would be restored to their original grade, watered, fertilized, and reseeded or sodded if necessary. The areas would be periodically checked to ensure that grass coverage is properly maintained. The SW3P would insure that all disturbed areas are properly revegetated prior to the notice of termination (NOT) being filed. Clean up would occur in accordance to the Cutoff Wall Installation Work Plan which would be prepared and submitted for City of Dallas and USACE review and approval prior to initiation of the construction activities. The Cutoff Wall Installation Work Plan would include, among other elements, construction sequencing, installation, maintenance and removal of working platforms, mixing and farming layout areas, temporary spoil layout areas and haul roads; equipment set-up and site use layout including temporary storage areas, haul roads and working platform dimensions; procedure for bentonite slurry mixing and transportation; procedure for trench excavation and backfilling; contractor control of drainage, spills, wastes, etc.; clean-up, spoils disposal, slurry disposal; and, final grading plan/procedure to restore area to original grade**.**

5.1 Project Setting and Land Use

5.1.1 No-Action Alternative

Under the No-Action Alternative, the Proposed Action Alternative would not be implemented, and the Dallas Floodway System would not undergo modification measures. Consequently, the land use ROI may be remapped by FEMA as being included in an SFHA, and property owners within the land use ROI may be subject to NFIP flood insurance requirements and more stringent building and development codes within the newly mapped floodplain. As a result, real property within the land use ROI may absorb substantial indirect economic impacts. This section provides an examination of indirect economic, land use planning, and real estate impacts of the No-Action Alternative.

General Economic Environment

Numerous substantial indirect economic impacts are likely to occur with the No-Action Alternative. A study produced by the Sacramento Regional Research Institute in April 2008 investigated a number of potential economic impacts to an area located in Sacramento and Sutter Counties, California, and partially located within the City of Sacramento, known as the Natomas Basin. The Natomas Basin area may be subject to FEMA remapping and a re-designation as being located within an SFHA. As a result, the study identifies numerous substantial land use and corresponding economic impacts to the Sacramento region that are conceptually commutative to the land use ROI and circumstances surrounding the Dallas Floodway System under the No-Action Alternative. The following discussion of general economic impacts under the No-Action Alternative applies many of the analytical concepts provided in the Sacramento Regional Research Institute study related to the potential economic impacts of flood zone remapping to the land use ROI.

One such potential impact of FEMA's re-designation of the land use ROI as an SFHA is a likely cessation of current planned or programmed private development projects. Developers or builders with current plans to develop within the land use ROI may need to rework existing plans to account for changes in building and development codes associated with building in an area designated as a 100-year floodplain. In addition, many developers may terminate projects based on the risk of developing in a floodplain, the additional cost of adjusting plans to account for floodplain development regulations, and the additional cost of flood insurance on top of existing financing costs. Such a cessation of development and building within the land use ROI may result in both direct development-related job losses as well as adverse impacts related to the indirect and induced economic benefits of the construction activity. A cessation in planned development projects may also further result in a loss of potential capture of industry employment associated with what would otherwise be developed within the land use ROI. The cessation of planned developments of potential employers may slow the creation of jobs within the land use ROI or contribute to a loss of jobs. A resulting loss of household consumption activities may ensue from the loss of residents that would have occupied planned dwelling units, reducing or slowing growth in consumer buying power within the land use ROI.

Another direct impact of potential FEMA remapping of the land use ROI as an SFHA includes the requirement for property owners to carry flood insurance whether their properties are financed with federally-backed financing, they receive federal financial assistance, or rely on private lenders that may require the purchase of the insurance through the NFIP. Flood insurance costs may alter spending and consumption behaviors within the land use ROI. Property owners, especially homeowners for which flood insurance would represent a greater proportional cost, may direct a portion of income they would otherwise spend under their typical consumption patterns to payment of flood insurance premiums. This alteration of household spending patterns could further result in loss of potential revenue for commercial interests in the land use ROI that depend on local households to sustain business activity. As a result, potential losses in revenue could further result in the loss of jobs because of a reduction in local economic output associated with the reduction in household consumer spending. In addition to these potential foreseen economic land use impacts, a causal ripple effect may occur in the local economy as a result of linkages spreading to suppliers of goods and services and consumer spending.

Other general potential economic land use impacts associated with the No-Action Alternative include repercussions for the housing market, economic development, and local government revenue generation. These impacts are conceptual and are by economic theory associated with housing and development market alterations. It is probable that residential properties in designated flood zones would sell for less than comparable homes located outside SFHAs. A reduction of value may arise from a potentially higher risk of loss as well as the added cost of required flood insurance premiums. Home values may decrease as they respond to this effect and further reduce home equity and net worth on top of the potential reduction or loss of disposable income as a result of required flood insurance premiums. Reductions in home values may further result in reductions in tax-assessed values within the land use ROI and contribute to a reduction in property tax revenues that may further create localized economic externalities.

Economic development within the land use ROI may be challenged by a number of factors. Economic principles suggest that under the No-Action Alternative, nonresidential properties and undeveloped land zoned for business locations may foresee discounted values. Because many business location and expansion projects are heavily influenced by perceived risk to capital and tangible investments, the land use ROI's designation as an SFHA may make the area generally unattractive to the business development community. Businesses could become increasingly apprehensive about investing in an area viewed as a possible danger to property, equipment, and employees. Associated risk aversion may also make it more challenging to attract tenants at current prevailing commercial property rental rates, to use commercial property as security for bonds or debts, or to sell and dispose of affected properties. If businesses relocate or divert investment decisions away from the land use ROI, vacancy rates would rise. Further, developable land for a number of uses within the land use ROI may be removed from the regional inventory, especially industrial uses considering the amount of land within the land use ROI zoned for industrial use. The removal of developable land from regional inventories and economic losses from planned projects could have a substantial compounding effect on the land economics of the land use ROI, rendering the land use ROI less valuable for many current and future plans and proposals for development and land uses prescribed in the City of Dallas' land use and development planning policy guides.

The designation of the land use ROI as an SFHA may result in substantial fiscal impacts involving local government revenues. Reductions in property values and consequent reductions in tax-assessment values may provide fewer fiscal resources for providing services within the land use ROI and City of Dallas. Moreover, employment losses associated with planned project cessation and reductions in economic output associated with a reduction in household consumption may further reduce the amount of tax revenue collected by taxing authorities within and potentially beyond the land use ROI.

Future of Land Use Goals and Plans

Under the No-Action Alternative, as provided in **Section 4.1.4: Existing and Future Land Use**, a number of the City of Dallas' plans with goals to reshape development patterns in the land use ROI, which generally require the attraction of investment, may slow or be abandoned as the land economics of the land use ROI transform in response to potential FEMA remapping. Much of the undeveloped or underdeveloped land within the land use ROI ripe for reinvestment or

redevelopment may no longer present as much of an incentive to develop or redevelop as flood insurance premiums, strict building codes requiring alterations to finished floor elevations, the potential elimination of existing commercial space on structures' lower levels, perceived risk of potential flood-related loss, a lack of commercial and residential market demand necessary for development, and the associated ripple effect of economic losses deter or steer development plans and projects to other areas or vanquish them altogether. The indirect effects of the No-Action Alternative would be incompatible with the goals and objectives of the City of Dallas' land use planning policy guides and economic incentives as numerous projects guided and/or prescribed by the City's plans may be financially infeasible as a result of the aforementioned constraints.

The loss of value of the land within the land use ROI relative to the rest of the region may work to slow or reduce any public benefit contribution to the development or redevelopment of the area and may potentially jeopardize the financial foundation and benefit of TIF districts if public revenues decline in response to lower property values. New development and structures may be required to be built at or above the 100-year base flood elevation, introducing an expensive and possibly impractical challenge to dense urban development in a floodplain. Many urban development projects furthering the City of Dallas' goals of densification and implementation of neighborhood-scale design and functionality may be cost-prohibitive as structure elevation requirements within the floodplain, in some cases, may require moving dirt in an already developed and impervious environment to raise finished floor elevations above the 100-year base flood elevation.

Future of Real Estate

The No-Action Alternative may render indirect accounting cost impacts to properties associated with the requirement for structures within the land use ROI to attain flood insurance through the NFIP. According to FEMA, NFIP flood insurance premiums vary according to a building's square footage, characteristics, date of construction, use (e.g. commercial or residential), and the FEMA-designated flood zone within which a building is located, among other factors. To simplify the calculations and estimation of flood insurance premiums, FEMA provides generalized flood insurance policy rates for residential and nonresidential structures and structures' contents based on flood zone, risk, and the amount of coverage required or desired for structures up to the maximum amount of coverage required for each type of structure. **Tables 5-1** and **5-2** summarize the FEMA-simplified NFIP standard annual premiums for flood insurance based on the amount of building and/or contents coverage required or desired for high-risk areas (A zones). High-risk areas (A zones) are chosen to represent the worst case scenario for which flood zone remapping may occur within the land use ROI under the No-Action Alternative because they represent areas at or below the 100-year base flood elevation or those areas that may be located within SFHAs.

Table 5-1: Residential Flood Insurance Costs Per Amount of Building Coverage

Building and Contents		Building Only		Contents Only	
Coverage	**Annual Premium**	**Coverage**	**Annual Premium**	**Coverage**	**Annual Premium**
$35,000/$10,000	$472	$35,000	$376	$10,000	$136
$50,000/$15,000	$634	$50,000	$490	$15,000	$184
$75,000/$20,000	$848	$75,000	$656	$20,000	$232
$100,000/$30,000	$1,100	$100,000	$806	$30,000	$334
$125,000/$40,000	$1,357	$125,000	$956	$40,000	$441
$150,000/$50,000	$1,614	$150,000	$1,106	$50,000	$548
$250,000/$100,000	$2,734	$250,000	$1,691	$100,000	$1,083

Source: NFIP, FEMA, http://www.floodsmart.gov/floodsmart/pages/residential_coverage/policy_rates.jsp
Rates effective January 1, 2011.

Table 5-2: Nonresidential Flood Insurance Costs Per Amount of Building Coverage

Building and Contents		Building Only		Contents Only	
Coverage	**Annual Premium**	**Coverage**	**Annual Premium**	**Coverage**	**Annual Premium**
$100,000/$50,000	$1,755	$50,000	$530	$50,000	$850
$200,000/$100,000	$3,471	$100,000	$945	$100,000	$1,660
$300,000/$200,000	$5,916	$200,000	$1,851	$200,000	$2,975
$400,000/$300,000	$8,056	$300,000	$2,981	$300,000	$3,985
$500,000/$400,000	$10,181	$400,000	$4,111	$400,000	$4,995
$500,000/$500,000	$11,191	$500,000	$5,226	$500,000	$6,005

Source: NFIP, FEMA, http://www.floodsmart.gov/floodsmart/pages/commercial_coverage/policy_rates.jsp
Rates effective January 1, 2011.

Using these simplified rates, improvement value assessments generated by DCAD, information about structure or improvement type generated by DCAD, and the type of flood risk area within which structures located in the land use ROI may fall (high-risk areas), an estimation of total flood insurance rates within the land use ROI is calculated to reveal the total potential annual accounting cost impact to properties as a result of FEMA's potential remapping of the land use ROI as being contained within an SFHA. For the purposes of this analysis, as summarized in **Table 5-3**, flood insurance rate calculations assume all property improvements on parcels either partially or wholly contained by the land use ROI would be located in an area designated by FEMA as high risk, or located within an A Zone. The calculations also assume that all structural improvements on parcels either partially or wholly contained by the land use ROI would require the purchase of flood insurance for the total value of the improvements to represent the worst case scenario associated with the total annual accounting cost to properties within the land use ROI as a result of flood insurance. **Table 5-3** summarizes flood insurance costs for both residential and nonresidential improvements within the land use ROI. Calculations for costs provided in **Table 5-3** do not account for the 28 properties within the land use ROI with unclassified or unassigned improvement types as shown in **Table 4-2**.

Table 5-3: Annual Real Estate Cost Impacts

Improvement /Land Use Type	Number of Parcels	Building Coverage				Contents Coverage		Total Accounting Cost of Flood Insurance	Percent of Total Cost of Flood Insurance
		Average Improvement Value	Flood Insurance Rate Per $100 of Average Improvement Value for Building Coverage	Average Flood Insurance Cost per Property for Building Coverage	Total Cost of Flood Insurance – Building Coverage	Average Flood Insurance Cost per Property for Contents Coverage	Total Cost of Flood Insurance – Contents Coverage		
Residential	5,569	$60,056.18	$0.98	$588.55	$3,277,634.95	$184	$1,024,696	$4,302,331	10.0
Nonresidential	2,859	$718,665.33	$1.05	$7,545.99	$21,573,985.41	$6,005	$17,168,295	$38,742,280	90.0
Total	**8,428**	**N/A**	**N/A**	**N/A**	**$24,851,620.36**	**N/A**	**$18,192,991**	**$43,044,611**	**100.00**

Source: National Flood Insurance Program, FEMA, http://www.floodsmart.gov/floodsmart/pages/residential_coverage/policy_rates.jsp and http://www.floodsmart.gov/floodsmart/pages/commercial_coverage/policy_rates.jsp.

5.1.2 Proposed Action Alternative

With the implementation of the Proposed Action Alternative, no impacts to existing terrain, land cover, or prime or unique farmland are likely to occur. Elevations within the land use ROI would continue to fall within the existing range of approximately 380 feet to 466 feet and would not be altered as a result of the Proposed Action Alternative. Existing land cover, comprised of impervious urban structures and transportation infrastructure with fragmented pockets of generally mixed herbaceous and woody vegetation outside the existing 100-year floodplain on the landside of the Dallas Floodway System and larger areas of maintained herbaceous and riparian woody vegetation within the 100-year floodplain, would also not be altered or impacted as a result of the Proposed Action Alternative. Because land located within the land use ROI is planned and/or zoned for urban or nonagricultural uses, and no alterations to soils or agricultural uses would occur as a result of the Proposed Action Alternative, no impacts to prime or unique farmland are anticipated. The Proposed Action Alternative would not change or impact land use types within the land use ROI.

Benefits related to land use impacts as a result of the Proposed Action Alternative would be realized by averting substantial indirect adverse economic consequences associated with the No-Action Alternative. It is anticipated that the implementation of the Proposed Action Alternative would indirectly result in the recertification of the Dallas Floodway System and its subsequent accreditation by FEMA. Moreover, the land use ROI would likely be mapped by FEMA as being excluded from an SFHA and as being risk-averse to the one percent annual chance exceedance on FIRMs as existing active FIRMs dictate. Consequently, land uses within the land use ROI would continue to evolve in accordance with existing trends, adopted land use plans, corresponding zoning and subdivision implementation tools, and TIF district goals and development incentives. Additionally, the economic environment, associated development trends, and real estate values within the land use ROI would likely continue to progress in accordance with current and projected patterns. Although the implementation of the Proposed Action Alternative would spur a minor and temporary infusion of economic activity specific to project construction, funds used to implement the Proposed Action Alternative would be redirected from other projects that would be implemented in the absence of the Proposed Action Alternative. Therefore, any gainful economic activity perceptively realized with the Proposed Action Alternative would be a mere redirection of economic activity that would have occurred in the absence of the Proposed Action Alternative.

5.2 Socioeconomic Conditions

5.2.1 No-Action Alternative

Under the No-Action Alternative, the Proposed Action Alternative would not be implemented, and the Dallas Floodway System would not undergo modification measures. Consequently, the LEP/low-income population and minority population ROIs may be remapped by FEMA as being included in an SFHA, and resident populations within the LEP/low-income population and minority population ROIs may be subject to NFIP flood insurance requirements and more stringent building and development codes within the newly mapped floodplain. As a result, populations within the LEP/low-income population and minority population ROIs may absorb substantial social and/or economic impacts. Many impacts that reach the scope of analysis for

both land use and socioeconomics are discussed in **Section 5.1.1: No-Action Alternative**. This analysis of the No-Action Alternative's implications for socioeconomics builds upon the provided conceptual impacts discussed under the No-Action Alternative for land use within the LEP/low-income population and minority population ROIs and qualitatively analyzes the indirect repercussions of those anticipated impacts on both ROIs' socioeconomic compositions.

Under the No-Action Alternative, population growth trends may change within the LEP/low-income population and minority population ROIs and throughout the region and City of Dallas. It is likely that population and employment growth, as indicated by the NCTCOG, would slow in a portion of the Dallas CBD as well as portions of the Northwest Dallas Outer CBD. This may ensue as a result of an added disincentive to further develop housing and business establishments supplying employment opportunities due to the added costs associated with flood insurance and stricter building codes, which would make many development projects contributing to population growth financially infeasible. The variables and assumptions currently used to forecast future populations and employment by the NCTCOG assume that the momentum of existing population and employment growth as well as current development trends would continue uninterrupted and do not account for the remapping by FEMA of subject areas. Therefore, the NCTCOG projections for future population and employment may prove inaccurate and over-estimated.

Although these effects to population and employment growth would most likely be concentrated in the LEP/low-income population and minority population ROIs, it is possible that growth in the City of Dallas and Dallas County may slow as a whole given that much of the land targeted for development, redevelopment, publicly-endorsed TIF incentives, and higher-density uses falls within the LEP/low-income population and minority population ROIs and may be subject to FEMA remapping. However, if the DFW Metroplex continues on its current population and employment growth pattern as projected by the NCTCOG, it is also likely that development, redevelopment, investment, and the densification of neighborhoods would be re-sited and occur elsewhere either within the City of Dallas or other municipalities in the region. Such a rearrangement of active development locations may require the City of Dallas to alter many of its planning policy guides to account for the reduced demand in the LEP/low-income population and minority population ROIs and reapply similar development and redevelopment goals elsewhere within the city.

Under the No-Action Alternative, neighborhood-scale associations in neighborhoods located within the LEP/low-income population and minority population ROIs may be reduced or eliminated. FEMA remapping of the LEP/low-income population and minority population ROIs may further isolate and separate cohesive neighborhoods as the presence of a potentially higher-risk flood hazard may deter private and public investment in the affected area that normally contributes to neighborhoods' development, growth, and implementation of neighborhood services and facilities. Because residents within the LEP/low-income population and minority population ROIs rely on schools, places of worship, community centers, and other neighborhood-scale associations that are publicly or privately funded, disinvestment in those neighborhoods as a result of flood insurance costs, stricter building codes, reduced property values, and consequent tax revenue decreases may reduce the availability of and investment in neighborhood-serving amenities and corresponding residents' attachments to them. In addition,

the lack of investment related to the City of Dallas' goals for development, redevelopment, and providing greater connectivity between north and south Dallas as well as both sides of the Dallas Floodway in response to the burden of consequences related to FEMA remapping may slow the establishment of inter-neighborhood linkages and general connectivity, further reducing the LEP/low-income population and minority population ROIs' levels of community cohesion.

It is not anticipated that LEP populations would be impacted under the No-Action Alternative. However, low-income and minority populations are anticipated to be disproportionately impacted. The LEP/low-income population ROI, which already contains a substantial low-income population with approximately 31.7 percent of persons below the poverty level, would absorb an additional economic burden of flood insurance costs, stricter building codes, neighborhood disinvestment, and consequent tax-funded service cuts. The additional cost of flood insurance may be absorbed by many low-income populations and could cause substantial financial hardship on residents' abilities to spend money on basic goods and services as their consumptive buying power and already limited levels of disposable income may be directed toward the purchase of flood insurance.

Additional costs to low-income residents are more profound than to non-low-income residents because the additional costs would account for a higher proportion of their total income, leaving fewer financial resources to address other needs. The increased cost of development and the cost of maintenance and retrofitting existing development as a result of stricter building codes may additionally compound this cost to low-income populations and may be passed on as increases in rent and capital costs associated with retrofitting structures. Consequent tax-funded social services may also likely suffer as a result of the economic and subsequent fiscal fall-out of FEMA remapping, disproportionately affecting low-income populations who are more likely to rely on such services. Because approximately 84.1 percent of persons in the minority population ROI are minorities, minority populations would also be disproportionately subjected to the aforementioned social and economic hardships.

Public Safety

Under the No-Action Alternative, the risk to public safety associated with the Dallas Floodway not providing protection from the one percent annual chance exceedance would prevail. As previously mentioned, FEMA is currently in the process of remapping the 100-year FIRMs.

Although warning systems are instrumental in reducing risk to public safety, risk is also dependent on the type and speed of the onset of flooding that could be experienced as a result of levee failure or overtopping. Levee failures or breaches are most likely to occur when a flood event has already transpired and pressure and/or erosion from flood waters has jeopardized the structural integrity of the levees and their ability to hold flood waters back. Levee breaches are often associated with rapidly flowing water that further increases the risk to public safety because of the flood waters' dangerous velocity and sudden onset. However, because levee breaches are more likely to occur when a flood event has already transpired, much of the public has already been notified of the risk of a levee breach, or an emergency management action plan is initiated that recognizes the risk of a breach in advance and results in evacuations or other safety precautions. While risk to public safety may be slightly greater under the No-Action

Alternative, these factors in conjunction with the City of Dallas' warning system would greatly minimize risk. Therefore, impacts associated with risk to public safety are expected to occur but would be minor.

5.2.2 Proposed Action Alternative

The implementation of the Proposed Action Alternative is not anticipated to affect the NCTCOG *2040 Demographic Forecast* projections provided in **Section 4.2.2**, and regional and community population and employment growth would likely continue to occur at projected rates. The Proposed Action Alternative would not change the region's or community's populations or the variables and assumptions used to forecast future populations. To summarize from **Section 4.2.4**, according to the U.S. Census Bureau, the LEP/low-income population ROI contains an LEP population of approximately 22.2 percent. To summarize from **Section 4.2.5**, income analysis reveals that approximately 31.7 percent of persons in the LEP/low-income population ROI reside in households earning less than the 2011 DHHS-established poverty threshold ($22,350), and 4 census tracts within the LEP/low-income population ROI exhibit median household incomes below the poverty threshold. These 4 census tracts account for approximately 13.3 percent of the total population of the census tracts located within the LEP/low-income population ROI. Minority populations account for approximately 84.1 percent of the minority population ROI with minority percentages in census block groups comprising the ROI ranging from 16.8 percent to 99.5 percent. Of the 31 total census block groups in the minority population ROI, 28 census block groups exhibit minority populations equal to or greater than 51 percent.

The Proposed Action Alternative would not adversely impact community cohesion and would likely contribute to greater connectivity and integration of neighborhoods and between existing neighborhoods, including the Arlington Park neighborhood, the Design District, the Cedars neighborhood, and the neighborhoods comprising West Dallas currently considered risk-averse to the one percent annual chance exceedance that may be remapped as being located within a FEMA-designated SFHA in the absence of the Proposed Action Alternative would continue to be considered risk-averse from the one percent annual chance exceedance. Vital components of these existing neighborhoods that otherwise may be located within a re-mapped SFHA would not be severed from remaining portions of the neighborhoods that would jeopardize the neighborhoods' cohesion. Plans that are underway to continue to redevelop some transitioning neighborhoods within the LEP/low-income population and minority population ROIs as medium- to high-density, diversified, mixed-use, pedestrian-friendly environments with improved intra-neighborhood cohesion and greater connectivity to surrounding neighborhoods would secure greater assurance against both perceived flood risk and the flood risk as designated by FEMA remapping. Greater reassurance would likely have a positive impact on current and future investment in subject neighborhoods. The Proposed Action Alternative would not separate or isolate any existing distinct neighborhoods, ethnic groups, or other specific groups in the LEP/low-income population and minority population ROIs.

Effects to LEP, low-income, or minority populations in portions of the LEP/low-income population and minority population ROIs are not anticipated to occur as a result of the Proposed Action Alternative. However, under the Proposed Action Alternative, under which alternative the

levees would regain FEMA accreditation; flood insurance would continue to be available to property owners as an individual choice, at a reduced cost. LEP, low-income, and minority populations would indirectly benefit from the social and economic advantages of the implementation of the Proposed Action Alternative as they relate to enhanced flood risk aversion and avoiding the effects of FEMA remapping.

Public Safety
The Proposed Action Alternative is not anticipated to affect public safety with respect to the one percent annual chance exceedance because if Section 408 modifications are implemented, the Dallas Floodway System would regain FEMA accreditation and there would not be remapping of the 100-year FIRMs. Prior to construction, the construction contractor would prepare and submit an emergency action plan. The plan would be implemented in the event of imminent flooding during construction and address emergency actions to be implemented during above normal river stages for the entire length of the project and duration of project construction. More information on the emergency action plan can be found in **Section 7.1**. The existing flood warning systems would prevail under the Proposed Action Alternative as for the No-Action Alternative.

Summary
In summary, the Proposed Action Alternative is not anticipated to affect regional and community growth; community cohesion; LEP, low-income, and/or minority populations; or public safety in the LEP/low-income population and minority population ROIs. It is likely that socioeconomic components of the LEP/low-income population and minority population ROIs would benefit from the implementation of the Proposed Action Alternative as related to avoiding the effects of newly mapped SFHAs in the absence of the Proposed Action Alternative.

5.3 Transportation

5.3.1 No-Action Alternative
Under the No-Action Alternative, many transportation facilities in the transportation ROI could be subject to location within designated flood zones. As established in **Section 5.1.1**, the anticipated indirect adverse economic and land use impacts associated with FEMA remapping may have a precluding effect on the implementation of some land use and redevelopment components of future projects surrounding the Dallas Floodway System as well as the continued economic prosperity of the transportation ROI. As a result, the demand for traveling to, from, and within the transportation ROI may not be as pronounced as forecasted, and the assumptions made to plan transportation improvements based on demand may change to reveal that proposed transportation projects or improvements may no longer be a reasonable use of available resources to address growing traffic demands and needs. The No-Action Alternative would result in substantial impacts to transportation.

5.3.2 Proposed Action Alternative
As a permanent physical action, the Proposed Action Alternative would have no adverse effect on the existing transportation network within the transportation ROI. Transportation facilities and activities within the transportation ROI would realize the benefits since avoidance of FEMA

remapping would allow existing and projected travel demands to continue to define the need for future transportation projects and improvements.

Temporary impacts associated with construction activities may occur. Access to construction areas along the East Levee may occur either at the existing Hampton Pump Station access road, which feeds into Conveyor Lane and further into Inwood Road and IH 35E, or at an existing levee maintenance road that intersects with Westmoreland Road/Mockingbird Lane, which further feeds into SH 183 and IH 35E. Access to construction areas along the West Levee would occur from existing levee maintenance roads at Eads Avenue, which feeds into Colorado Boulevard and further into IH 35E. Trucks and construction equipment would enter and exit the Dallas Floodway System at these access points and would travel along these routes. As a result of construction activity, Conveyor Lane, Inwood Road, Westmoreland Road/Mockingbird Lane, Colorado Boulevard, SH 183, and IH 35E may experience temporary increases in traffic congestion and a slight increase in traffic hazard risk. Local streets used to access the Dallas Floodway directly are not heavily traveled thoroughfares and do not regularly experience high levels of traffic on a daily basis.

Streets that would be used to access the East Levee and potentially haul excess soil from the Dallas Floodway are either concentrated in an industrial/warehouse area already experiencing daily but low-volume truck trips or commercial/industrial areas already experiencing daily and high-volume truck trips. Therefore, no impacts to traffic-sensitive land uses are anticipated in the transportation ROI as a result of trucks accessing the East Levee. The portion of Eads Avenue that would be used by trucks to access the West Levee separates a neighborhood of primarily residential and institutional uses from the interchange of Colorado Boulevard and IH 35E. Trucks using this route to access the Dallas Floodway and to potentially haul excess soil from the Floodway could temporarily impact one housing unit along Eads Avenue leading to its intersection with Colorado Boulevard and one housing unit that abuts Colorado Boulevard leading to its intersection with IH 35E. Impacts to these housing units would be limited to frequent truck traffic and associated externalities (i.e. congestion, traffic noise, etc.).

Although Eads Avenue serves residential trips, the truck route along Eads Avenue would be concentrated along a portion of the street not typically used for residential trips or destinations. Because of Colorado Boulevard's configuration at its intersection with IH 35E and its likelihood for serving normal truck trips on a regular basis, the residential property abutting Colorado Avenue is not likely to experience excessive traffic-related impacts associated with construction activities beyond what normally may be experienced. Further, no detours, lane closures, or rerouting of traffic related to construction activities are anticipated because construction activities would be limited to occurring within the Dallas Floodway. Travel on local thoroughfares associated with emergency services would not be impeded or interrupted as a result of the Proposed Action Alternative.

5.4 Climate, Geology, and Soils

5.4.1 No-Action Alternative

Under the No-Action Alternative, there would be no change to the climate, soils, or geologic character of the area. As the Trinity River flows year round, the natural processes of erosion and siltation would continue to occur, resulting in minor changes to the geomorphology in the ROI. These changes would be typical of a river system and would not likely result in significant impacts to geological resources.

5.4.2 Proposed Action Alternative

Soils would be disturbed during construction and maintenance activities associated with the Proposed Action Alternative. The proposed cutoff walls would replace approximately 118,000 cubic yards of existing soils and replace them with mostly a soil-bentonite slurry mix. This would reduce the ability of nutrients to disperse in some locations within the ROI. This is limited to a small area and would not adversely affect the vegetation present within the soils. Soil disturbance could result in temporarily increased erosion rates until the disturbed areas re-vegetate. However, this temporary increase would be mitigated through engineering measures during construction and maintenance activities and using BMPs included as part of the Proposed Action Alternative. These BMPs could include silt fences, rock filter dams, inlet protection, and vegetation removal. Disturbed areas that are seeded or resodded would be checked periodically to ensure that grass coverage is properly maintained and would be watered, fertilized, and reseeded or sodded if necessary. These additional actions would help reduce erosion.

The spoil material would be used to restore rutted and ponding riverside levee maintenance roads to their original condition. The maintenance roads would be restored to the floodplain floor elevation by placing 2 to 3 feet of material over the 20-foot roadway width. The surface material would then be graded and compacted to drain toward the river. Preliminary calculations indicate that all of the spoil material would be utilized for restoring the levee maintenance roads. The specific maintenance roads to be restored would be determined based on the amount of spoil material available after construction, on the existing condition of the maintenance road, and on proximity to the construction area.

Implementation of the Proposed Action Alternative would result in less than significant impacts to geology and soils. The proposed project will likely not result in climate change, which is believed to be caused by the accumulation of GHGs in the atmosphere.

5.5 Water Resources

5.5.1 Groundwater Resources

5.5.1.1 No-Action Alternative

Under the No-Action Alternative, potential impacts to groundwater resources directly associated with the construction of the Proposed Action Alternative would not occur.

5.5.1.2 Proposed Action Alternative

Construction activities related to the Proposed Action Alternative, which would occur within relatively small areas of the Trinity River floodplain, are not anticipated to reach the depths of aquifers utilized to pump groundwater, or use materials that would potentially contaminate groundwater. Groundwater within the floodplain flows downstream parallel to the levees. Because the proposed cutoff walls would be constructed parallel to the levees, the groundwater is anticipated to flow unimpeded. There are no domestic or irrigation wells within or immediately adjacent to the proposed cutoff walls. The Proposed Action Alternative would not negatively affect recharge of the landside groundwater because recharge occurs from the landside and not from the riverside of the levees. Potential impacts to groundwater resources are not likely to occur as a result of the Proposed Action Alternative.

5.5.2 Lakes, Rivers, and Streams

5.5.2.1 No-Action Alternative

Under the No-Action Alternative, potential impacts to lakes, rivers, and streams directly associated with the construction and maintenance of the Proposed Action Alternative would not occur.

5.5.2.2 Proposed Action Alternative

During construction and maintenance of the Proposed Action Alternative, there could be direct impacts to major water ways within the ROI. The runoff from proposed improvements would discharge directly into the Upper Trinity River (Segment 0805), which is listed as threatened/impaired for bacteria and PCBs. The Trinity River may be used as an additional water source to supply water for mixing the bentonite for the cutoff walls. Before water from the Trinity River could be used, a TCEQ Water Rights Permit application would have to be completed and then approved by TCEQ.

Impacts to storm water would be minimized as much as possible by utilizing approved temporary and permanent erosion sediment control BMPs as specified by TCEQ CGP (TXR 150000). These BMPs would help to insure that water quality in the ROI is minimally impacted as part of the Proposed Action Alternative. Implementation of the Proposed Action Alternative would result in less than significant permanent impacts to water quality.

5.5.3 Waters of the U.S., including Wetlands (EO 11990)

5.5.3.1 No-Action Alternative

Under the No-Action Alternative, potential impacts to water and wetland features directly associated with the construction and maintenance of the Proposed Action Alternative would not occur.

5.5.3.2 Proposed Action Alternative

The Approved *Jurisdictional Determination for the Dallas Floodway and North Texas Tollway Authority Trinity Parkway*–USACE Project Number SWF-2000-00308 (USACE Approved J.D.), Dallas Floodway Approved J.D. Project Number SWF-2011-00049, NWI maps, USACE GIS

data, and field observations were utilized to identify the jurisdictional and potentially jurisdictional water and wetland features within the ROI for the East and West Levees areas. The proposed improvements to the East and West Levees would result in permanent and temporary impacts to jurisdictional waters, including wetlands, within the natural resources ROI. Of the approximately 271.93 acres of jurisdictional wetlands within the ROI, approximately 0.03 acres would be permanently impacted and 3.51 acres would be temporarily impacted. Of the approximately 74.23 acres jurisdictional waters within the ROI, approximately 0.44 acres would be permanently impacted and 1.43 acres would be temporarily impacted. The permanent impacts would be a result of concrete paving sections of the New and Old Hampton Outfall Channels and the placement of riprap within the delineated boundaries of these outfall channels and in an adjacent wetland feature. The temporary impacts would be the result of temporary fill placed within jurisdictional features to facilitate the construction of the cutoff walls. The water and wetland features with permanent and temporary impacts are shown on **Exhibit 7: Corridor Maps**. **Table 5-4** contains the anticipated impacts for each water and wetland feature.

Table 5-4: Impacts to Waters of the U.S., including Wetlands, within the Natural Resources ROI

Area	Feature	Type of Feature	Feature Name/Type	Water of the U.S.? (Yes/No)	Proposed Work or Structure	Approximate Permanent Impacts (Acres/ Linear Feet)	Approximate Temporary Impacts (Acres/ Linear Feet)	Corridor Sheet Number
East Levee	E-24	Open Water	Drainage Sump	Yes	Paving and Riprap	0.44/ 172	0.32/ 243	5, 6, and 7B
	E-27	Emergent Wetland	N/A	Yes	N/A	0.03/ NA	0.81/ NA	5, 6 and 7B
	E-29	Emergent Wetland	N/A	Yes	N/A	0.00/ NA	1.35/ NA	6 and 7
	E-32	Open Water	N/A	Yes	N/A	0.00/ 0	1.11/ 1,149	7 and 10
	E-35	Emergent Wetland	N/A	Yes	N/A	0.00/ NA	1.35/ NA	10
					Wetland Total	**0.03/ NA**	**3.51 NA**	
					Water Total	**0.44/ 172**	**1.43/ 1,392**	
					Totals	**0.47/ 172**	**4.94/ 1,321**	

The placement of temporary or permanent dredge or fill material in waters of the U.S., including wetlands, that are determined to be jurisdictional or potentially jurisdictional would be authorized by Regional General Permit 12 (RGP-12), *Modifications and Alterations of Corps of Engineers Projects*. RGP-12 authorizes the discharge of dredged or fill material into waters of the U.S., including wetlands, and work in or affecting navigable waters of the U.S. associated with modifications and alterations of Corps of Engineers projects that receive USACE approval under 33 USC 408 (Section 408) and that meet the conditions of RGP-12. State of Texas water quality certification, issued on January 21, 2010, is provided through the conditions of RGP-12.

The New and Old Hampton Pump Station outfall channel (Feature E-24) located within the construction area of the East Levee would be temporarily filled to allow for construction of the cutoff wall. After construction of the cutoff wall is completed, the temporary fill would be removed and sections of the outfall channels would have concrete and riprap placed at the bottom of the channels to address erosion concerns to the riverside cutoff wall that would be located below the existing outfall channel. At the Old Hampton Pump Station outfall channel, an area extending 30 feet out from the existing concrete apron would be paved. Riprap would be placed from this point for an additional distance of approximately 82 feet. At the New Hampton Pump Station outfall channel, an area extending approximately 20 feet from the existing concrete apron would be paved. Riprap would be placed in the channel from this point for an additional distance of approximately 60 feet. Riprap would also be placed at the delineated boundaries of Feature E-27 (emergent wetland), west of the outfall channels, where it drains into the Old Hampton Pump Station outfall channel. This riprap is necessary to reduce future erosion concerns at this location. See **Exhibit 7B: Section 404 Impacts** for the proposed work at waters of the U.S. (including wetlands).

The impacted waters of the U.S. are within maintained outfall channels built for the purpose of conveying water from the Hampton Pump Station to the Trinity River. The outfall channels have a low diversity of aquatic and riparian vegetation, minimal habitat for various wildlife species, and the banks are maintained by mowing; therefore, the outfall channel is considered low quality. The wetland feature is also considered low quality due to a low diversity of vegetation and it is maintained periodically throughout the year by mowing.

Mitigation options considered were the purchase of mitigation bank credits or on-site mitigation. On-site mitigation is considered more appropriate for this proposed project because it would occur within the same area as the impacted features and provide benefits such as increasing wildlife habitat, water storage, and water filtration, and improving water quality. On-site mitigation options considered included the modification of the existing outfall channels and/or the creation of a wetland. Mitigating for the impacts by modifying the outfall channels was not considered feasible. These are stable systems at the moment and any modifications could result in erosion of the channels downstream. Erosion would release sediment into the Trinity River and could reduce water quality. If this occurred, additional riprap or other bank and channel stabilization would be necessary resulting in additional permanent impacts. It was determined that appropriate mitigation would be to construct a wetland adjacent to the Features E-24 and E-27. The proposed mitigation site (0.50 acre) is located west of the Old Hampton Pump Station outfall channel and would be contoured using multiple elevation gradients to a maximum depth of 3 feet to allow for the establishment of a wetland and allow for re-vegetation with appropriate wetland herbaceous species such as sedges, spike-rush, curly dock, and water primrose.

Jurisdictional features within the construction areas would be temporarily impacted by the placement of fill within their delineated boundaries to provide a more level surface for the contractor to work. Temporary berms would be built adjacent to the proposed cutoff walls within the construction areas from the material excavated for the cutoff walls. Cofferdams would be placed in the New and Old Hampton Outfall Channels for the construction of the cutoff

walls. Features outside of the construction areas would not be impacted. After construction is completed, the temporary fill, berms, and cofferdams would be removed and the features returned to pre-existing contours. Restoring the existing maintenance roads would not result in the placement of fill within any waters of the U.S., including wetlands.

RGP-12 states that adverse impacts to waters of the U.S., including wetlands, shall be avoided and minimized to the extent practicable through the use of alternatives that have less adverse impact on the aquatic environment. Complete avoidance of the jurisdictional features would only occur if the proposed Section 408 modifications were not constructed. Because this option does not meet the purpose and need of the proposed project it was eliminated from further consideration.

Because only minor permanent impacts to waters of the U.S., including wetlands, are anticipated, implementation of the Proposed Action Alternative would result in less than significant impacts**.**

5.5.4 Floodplains (EO 11988, including Corridor Development Certificate)

5.5.4.1 No-Action Alternative

Under the No-Action Alternative, no direct impacts to floodplains in accordance with EO 11988 are anticipated. Additionally, the No-Action Alternative would not require a Corridor Development Certificate (CDC) permit for impacts to the Trinity River Corridor Development Regulatory Zone. However, if the Proposed Action Alternative is not implemented, the Section 408 modification measures designed to help the City regain 100-year FEMA accreditation would not be undertaken. Not implementing the Proposed Action Alternative would, therefore, not meet FEMA requirements, which would consequently not allow the City of Dallas to regain the 100-year FEMA accreditation. This would result in a substantial indirect impact to floodplains because under these circumstances, FEMA would issue revised 100-year floodplain maps which results in the expansion of the 100-year floodplain.

5.5.4.2 Proposed Action Alternative

A hydraulic and hydrology analysis was prepared by the EOR to demonstrate that the implementation of the Proposed Action Alternative would maintain hydraulic neutrality within the Trinity River Floodway. Results of the analysis indicate that the proposed cutoff walls would have no hydraulic impacts on the levees or the hydraulics within the Dallas Floodway. Therefore, the proposed modification measures for the Dallas Floodway System meet the 1988 USACE ROD hydraulic criteria and EO 11988. No reduction in storage capacity and no impacts to the floodplain elevation are anticipated from the proposed project. The proposed project is within the Trinity River Corridor Development Regulatory Zone; therefore, coordination with the Local Floodplain Administrator would be required to determine if a CDC permit is required or whether the proposed project would be exempt per Section 1.6.1 of the *Corridor Development Certificate Manual, Fourth Edition* (City of Dallas, et. all 2009). The detailed hydraulic and hydrology analysis is available under the Section 408 *Project Summary Report* for the project.

Under the Proposed Action Alternative, the proposed Section 408 modification measures would be implemented and yield to FEMA accreditation. The 100-year floodplain would not be remapped.

5.5.5 Water Quality

5.5.5.1 No-Action Alternative

Under the No-Action Alternative, potential impacts to water quality directly associated with the construction of the Proposed Action Alternative would not occur.

5.5.5.2 Proposed Action Alternative

During construction of the Proposed Action Alternative, there could be direct impacts to water quality within the ROI. The runoff from proposed improvements would discharge directly to the Upper Trinity River (Segment 0805), which is listed as threatened/impaired for bacteria and PCBs. The impacts to existing water features would be minimized as much as possible by utilizing approved temporary and permanent erosion and sediment control BMPs as specified by TCEQ CGP (TXR 150000). The CGP requires that a SW3P, Notice of Intent (NOI), and NOT be prepared for the project improvements proposed as part of the Proposed Action Alternative. The SW3P would detail what BMPs would be utilized and where they would be utilized to reduce storm water impacts to the maximum extent practicable. The SW3P would also ensure that all disturbed areas were properly re-vegetated prior to the NOT being filed. This project is located within the boundaries of the City of Dallas Municipal Separate Storm Sewer System (MS4), and would also need to comply with the applicable MS4 requirements.

Prior to construction, the construction contractor would be responsible for the preparation and submittal of an emergency action plan to the City of Dallas Flood Control District for their approval. The plan would be implemented in the event of imminent flooding during construction and address emergency actions to be implemented during above normal river stages for the entire length of the project and duration of project construction. Construction equipment, spoil material, supplies, forms, building, etc. shall not be placed or stored in the Floodway during construction activities. Limiting the items that may be present within the construction areas that could be transported by flood flows and possibly contain contaminants would reduce the risk to water quality.

All these activities would help to ensure that water quality in the ROI is minimally impacted as part of the Proposed Action Alternative. Implementation of the Proposed Action Alternative would result in less than significant permanent impacts to water quality.

5.6 Biological Resources

5.6.1 Threatened and Endangered Species

5.6.1.1 No-Action Alternative

Under the No-Action Alternative, potential impacts to threatened or endangered species directly associated with the construction of the Proposed Action Alternative would not occur.

5.6.1.2 Proposed Action Alternative

Suitable foraging and resting habitat may be present at locations with high vantage points within the natural resources ROI at the East and West Levees for the American peregrine falcon and peregrine falcon (both state-listed threatened), Arctic peregrine falcon (state species of concern), and the bald eagle (Federally delisted, but being monitored first five years). No temporary or permanent impacts would occur to high vantage points such as bridges. Permanent impacts may occur to eight mature trees within the ROI; however, other suitable mature trees are present within the Floodplain that could be utilized by these species. No effects to these species are anticipated to occur as a result of the Proposed Action Alternative.

Suitable habitat for the interior least tern (Federally listed) may be present within the ROI. Interior least terns have been utilizing artificial habitat more frequently within the Dallas area with small colonies being established in highly developed areas. Ground disturbance related to construction activities at and near the levees may incidentally create areas that are attractive to interior least terns for use as potential nesting sites. The species breeding season extends from May through August and construction is planned to begin in the spring/summer of 2012 and be completed by the end of 2012. Because construction would occur during the breeding season, large areas (greater than one acre) cleared to bare soil and left idle for more than one week would be surveyed prior to resuming construction activities. Should interior least terns happen to utilize any of the project areas during construction activities, the USFWS should be notified to discuss alternative development plans or the need for consultation under Section 7 of the Endangered Species Act (USFWS, 2010). Because this section of the Trinity River is not typically utilized during nesting season and there are established nesting areas in the Dallas area, no effects to the species are anticipated to occur as a result of the Proposed Action Alternative.

Suitable habitat for the white-faced ibis and wood stork (both state-listed threatened) may be present within the floodplain and wetlands within the ROI. Minimal permanent and temporary impacts to wetlands would occur within the ROI, but due to the abundance of available habitat within the floodway, no effects to these species are anticipated to occur as a result of the Proposed Action Alternative.

Suitable roosting habitat may be present at bridges within the ROI for the cave myotis bat, a listed species of concern by the state of Texas. There would be no permanent or temporary impacts to bridge structures within the ROI at the East and West Levees; therefore, no effects to the cave myotis bat are anticipated as a result of the Proposed Action Alternative.

Suitable habitat may be present for the alligator snapping turtle within small perennial water bodies within the ROI at the East and West Levees. Minimal permanent and temporary impacts to these water features may occur within the ROI, but due to the abundance of available habitat within the floodway, no effects to this species is anticipated to occur as a result of the Proposed Action Alternative.

Suitable habitat may be present within the ROI at the East and West Levees for the timber canebrake rattlesnake and the Texas garter snake, both state-listed threatened species. The riparian zones at the East and West Levees are frequently maintained by mowing. The area is also disturbed by other frequent human activity, such as vehicles driving along the levee maintenance roads. Minimal temporary impacts to riparian zones could occur within the ROI, but due to the abundance of available habitat within the floodway, no effects to these species are anticipated to occur as a result of the Proposed Action Alternative.

Summary
After reviewing habitat requirements and conducting field visits on May 20-21 and May 25-26, 2010, it was determined that the Proposed Action Alternative would have no effect on any federal-listed threatened or endangered species, their habitat, or designated critical habitat, nor would it affect any state-listed species. In a letter dated July 2, 2010, from the USFWS, its determination also indicated it is unlikely that any threatened or endangered species would be present in the area of or affected by the Proposed Action Alternative (**Appendix F**). The Proposed Action Alternative would have no effect on threatened and endangered species.

5.6.2 Wildlife Habitat

5.6.2.1 No-Action Alternative
Under the No-Action Alternative, potential impacts to wildlife habitat directly associated with the construction of the Proposed Action Alternative would not occur.

5.6.2.2 Proposed Action Alternative

The *USFWS Existing Habitat Conditions Planning Aid Report for the Dallas Floodway Project (April 2010)* and field reconnaissance were utilized to determine and describe the various habitat types present within the natural resources ROI. These habitat types consist of aquatic habitat, grassland, bottomland hardwood, and urban habitat. Detailed descriptions of the individual habitat types are in **Section 4.6.4**. Due to its proximity to the proposed project, the *Pavaho Final EA (2010)* was also utilized in assessing potential impacts to wildlife and habitat within the ROI.

There are approximately 3,652 acres of available habitat in the natural resources ROI at the East and West Levees. Implementation of the Proposed Action Alternative may temporarily impact approximately 75.7 acres of habitat types and permanently impact approximately 1.68 acres of habitat types at the East and West Levees. **Table 5-5** below presents the potential temporary and permanent impacts to habitat types within the natural resources ROI at the East and West Levees**.**

Table 5-5: Impacts from the Proposed Action Alternative

Habitat Type	Temporary (acres)	Permanent (acres)	Total (acres)
Aquatic Habitat	4.9	0.47	5.37
Grassland	70.2	1.20	71.4
Bottomland Hardwood	0	0	0
Urban	0.6	0.01	0.61
Total	**75.7**	**1.68**	**77.38**

In addition to the impacts to the habitat types, a total of ten mature trees would potentially be impacted as they are located within the construction areas. In the East Levee construction area there are eight trees present and there are two trees located within the West Levee construction area. Efforts to protect the trees during construction would occur as it may be possible to preserve those located near the edge of the construction areas. After construction is completed, the areas of bare ground resulting from the construction activity would be reseeded/revegetated. The vegetation free zone that currently exists on the levees and adjacent to the levee toe would be extended to include the cutoff wall. The vegetation free zone allows for herbaceous vegetation to be present, except for trees growing near the cutoff walls. These trees would be removed to protect the cutoff walls structural integrity.

Hazardous Wildlife Attractants on or Near Airports

The implementation of the Proposed Action Alternative includes the implementation of riverside cutoff walls and concrete and riprap scour protection at the Hampton Station outfall channels to address seepage along specific portions of the Dallas Floodway System at the East and West Levees. An airport, Dallas Love Field is located northeast of the northern limit of the East Levee. The Federal Aviation Administration (FAA) Advisory Circular on Hazardous Wildlife Attractants on or Near Airports provides guidance on locating certain land uses having the potential to attract hazardous wildlife to or in the vicinity of public use airports. In this guidance, the FAA recommends specific separation distances between the airports aircraft movement areas, loading ramps, or aircraft parking areas and the possible wildlife attractant. Parts of the Proposed Action Alternative are located approximately 13,500 feet south of the north-south runway at Dallas Love Field. This is beyond the 10,000 feet recommended distance cited for airports serving turbine-powered aircraft; however, it is within the 5 statute miles of approach or departure airspace. The Proposed Action Alternative would be implemented within an area that is routinely maintained through mowing. It is not anticipated that it would become a preferred attractant to wildlife because the proposed construction would not provide sufficient habitat and the entire Dallas Floodway System presently contains numerous other areas that are utilized by wildlife. The proposed construction is not anticipated to result in additional concerns to Dallas Love Field Airport regarding wildlife threats to aircraft. It is not recommended that this area be monitored during and after construction because the area would not be an attractant for wildlife.

Summary

Implementation of the Proposed Action Alternative would disturb or displace wildlife from the areas of construction and immediately surrounding areas. These activities could heavily impact individuals of the smaller, less mobile and burrowing species, whereas mobile species would disperse to surrounding areas. Individuals dispersing away from the activity would likely

experience increased risks of predation, reduced foraging or reproductive success, and energetic costs. The overall impact on wildlife populations would be relatively small, proportional to the relatively small areas of habitat affected. The majority of the vegetation within the ROI impacted by the Section 408 modification measures is routinely maintained by mowing. A soil cap would be placed over the East Levee flood side cutoff wall, except at the Hampton Pump Station the outfall channels. The soil cap and other areas disturbed by construction would be reseeded/revegetated with herbaceous species. A 10-foot wide concrete maintenance way would extend from just east of IH 35E to just west of the AT&SF Railway parallel to the West Levee. The section parallel to the West Levee cutoff wall would be located between the cutoff wall and the levee, 10 feet away from the cutoff wall. The maintenance way is approximately 1 mile long. The remaining areas disturbed as a result of the West Levee cutoff wall construction activities would be reseeded/revegetated with herbaceous species. In areas temporarily impacted, wildlife species would likely re-colonize the available habitat area after construction. No long-term impacts to wildlife populations are anticipated as a result of the Proposed Action Alternative. If active bird nests are encountered during the implementation of the Proposed Action Alternative, the nests would be avoided. Due to the low quality of the habitat surrounding the majority of proposed project area and the small area of impact, the impacts to wildlife, including migratory birds, would be considered minor. Therefore, implementation of the Proposed Action Alternative would result in less than significant adverse impacts to wildlife.

5.6.3 Aquatic Resources

5.6.3.1 No-Action Alternative

Under the No-Action Alternative, potential impacts to aquatic resources directly associated with the construction of the Proposed Action would not occur.

5.6.3.2 Proposed Action Alternative

During construction of the Proposed Action Alternative, anticipated impacts would include temporary impacts and minimal permanent impacts to aquatic resources and habitat. The impacted resources are associated with the jurisdictional and non-jurisdictional aquatic features within the natural resources ROI. This would represent a very limited loss of forage, shelter, and breeding habitat for various wildlife species that utilize the habitat within the ROI. There are numerous other aquatic resources within the ROI that can be utilized by terrestrial, avian, and aquatic species.

The diversity of fish, aquatic macroinvertebrates, and other aquatic biota in an aquatic system is closely tied to water quality and available habitat. Many of the species inhabiting the ROI presently are pollution-tolerant. The minimal loss of aquatic habitat as a result of the Proposed Action Alternative may result in a reduction of species abundance within the ROI, but it would not diminish the capacity of a population to sustain itself.

Impacts to aquatic resources due to natural causes, such as erosion and flood events, and man-made disturbances, such as mowing and other maintenance activities, would continue to occur. Implementation of the Proposed Action Alternative would result in less than significant permanent adverse impacts to aquatic resources.

5.7 Noise

5.7.1 No-Action Alternative

Under the No-Action Alternative, the increase in overall noise levels associated with construction activities of the Proposed Action Alternative would not occur.

5.7.2 Proposed Action Alternative

During construction of the Proposed Action Alternative, construction and ground-disturbing activities could create localized, temporary noise impacts from construction equipment and vehicles. Construction equipment and vehicles can generate noise levels of approximately 72 to 95 dBA at a distance of approximately 50 feet (EPA, 1971). Because sensitive receivers R1 through R5, identified within the noise ROI, are located between 200 and 400 feet away from the Dallas Floodway System, an increase in the background noise at these receivers is expected during construction. However, once construction is completed, background noise levels would return to usual levels.

Because construction is normally limited to daylight hours when occasional loud noises are more tolerable, the exposure periods imposed on any one receiver would be temporary. Extended disruption of normal activities, if any, is unlikely. Provisions would be included in the plans and specifications that require the contractor to make every reasonable effort to minimize construction noise through abatement measures such as work-hour controls and proper maintenance of muffler systems. Any noise impacts resulting from the construction of the Proposed Action Alternative would be temporary in nature.

Prior to implementation of the Proposed Action Alternative, the City of Dallas would notify nearby residents of the construction schedule. Staging areas would be sited to minimize impacts to surrounding areas. Implementation of the Proposed Action Alternative would result in less than significant impacts to noise.

5.8 Utilities

5.8.1 No-Action Alternative

Under the No-Action Alternative, impacts to utilities associated with construction activities of the Proposed Action Alternative would not occur.

5.8.2 Proposed Action Alternative

Utilities are present within the alignment of the cutoff walls along both the East and West Levees. A temporary "window" will be left around the crossing utility. These window areas will follow the excavated cutoff construction with a jet grout cutoff tying into the already constructed cutoff wall. The utility windows are recommended to be 1 trench depth or a minimum of 25 feet, whichever is larger.

The cutoff wall construction under the Westmoreland Road and Corinth Street bridges will be with estimated vertical clearances of 33 and 22 feet, respectively. It is recommended directional and/or low clearance equipment or lower work platforms, as necessary, be used in these areas for

Jet grout cutoff wall construction. Similar to the excavated cutoff wall, the jet grout cutoff wall will be a minimum 2 foot wide. Transitions from cutoff wall (soil-bentonite to cement-bentonite) or to the jet grout windows accommodate the specified alignment tolerances such that gaps between different wall types do not occur.

The implementation of the Proposed Action Alternative would not result in a decrease in utility services. Implementation of the Proposed Action Alternative would result in less than significant impacts to the utilities at the East and West Levees.

5.9 Cultural Resources

5.9.1 Historic Resources

As stated in Chapter 4.8, Section 405(a) of the 2010 Supplemental Disaster Relief and Summer Jobs Act (PL 111-212) states that the USACE is not required to make determinations of eligibility under the NHPA for the Dallas Floodway. To satisfy the requirements of NEPA, the USACE conducted a cultural resources survey of the Dallas Floodway with a narrative that describes the development, function, composition, and current operation of the Dallas Floodway and discusses the significance of this cultural resource's structural features and relationships with the historical development of the City of Dallas without explicit reference to the criteria used to determine NRHP eligibility (TEC, Inc., 2010).

5.9.1.1 No-Action Alternative

Under the No-Action Alternative, potential impacts to historic and cultural resources directly associated with the construction of the Proposed Action Alternative would not occur. However, impacts to historic and cultural resources due to natural causes such as age, wear, erosion, and flood events would continue.

Table 5-6 presents a summary of anticipated indirect impacts to historic and cultural resources under the No-Action Alternative.

Table 5-6: Summary of Indirect Impacts to Historic and Cultural Resources Under the No-Action Alternative

Historic and Cultural Resource No.*	Historic and Cultural Resource	Important Architectural NEPA Historic and Cultural Resource? (Yes or No)	Impact Under the No-Action Alternative
Hydraulic Physical Features			
HCR -7	Old Pavaho Pumping Plant	Yes	Negative
HCR -8	Old Baker Pumping Plant	Yes	Negative
HCR -10	Turtle Creek Pump Station	Yes	Negative
HCR-20	Dallas Floodway	Yes	Negative
Bridges/Underpasses			
HCR-1	AT&SF Railroad	Yes	Negative
HCR-2	Corinth Street Viaduct	Yes	Negative
HCR-3	Houston Street Viaduct	Yes	Negative
HCR-4	Commerce Street Viaduct	Yes	Negative

Historic and Cultural Resource No.*	Historic and Cultural Resource	Important Architectural NEPA Historic and Cultural Resource? (Yes or No)	Impact Under the No-Action Alternative
HCR-5	UPRR	Yes	Negative
HCR-6	Continental Street Viaduct	Yes	Negative
HCR-9	Chicago, Rock Island, and Pacific Railroad Bridge/DART	Yes	Negative
HCR-14	Corinth Street Underpass	Yes	Negative
Various Resources			
HCR-11	Shipping/Warehouse Facility	Yes	Negative
HCR-12	Shipping/Warehouse Facility	Yes	Negative
HCR-13	Oak Cliff Box Company Office Building	Yes	Negative
HCR-15	Salinas International Freight Bldg.	Yes	Negative
HCR-16	Atlas Metal Works	Yes	Negative
HCR-17	Clifton Carpets	Yes	Negative
HCR-18	Trinity Portland Cement Company Cemetery	Yes	Negative
HCR-19	La Reunion Cemetery	Yes	Negative
Historic Districts			
HCRD-1**	Dealey Plaza Historic District	Yes	Negative
HCRD-2	West End Historic District	Yes	Negative
HCRD-3**	Lake Cliff Historic District	Yes	Negative
HCRD-4	Dallas Union Terminal Historic District	Yes	Negative
HCRD-5**	Tenth Street Historic District	Yes	Negative

Sources: USACE and Draft Environmental Impact Statement for the Dallas Floodway Project, Dallas, Texas, December 2010. NTTA and Non-Archeological Historic-Age Resource Reconnaissance Survey Report (October 2009) and Draft Trinity Parkway Section 106 Effects Report (March 2011). THC Atlas (http://atlas.thc.state.tx.us/), accessed April 2011.

** Historic and Cultural Resource No.: identifies the NRHP listed/confirmed eligible resources or historical markers within the ROI and corresponds to Appendix A, Exhibit 8: Important Architectural NEPA Historic and Cultural Resources within the ROI Map.*

*** NRHP District which is not located within the ROI, but is located immediately adjacent to the ROI.*

5.9.1.2 Proposed Action Alternative

Implementation of the Proposed Action Alternative involves work along the levees necessary for the installation of cutoff walls along the East and West Levees and concrete and riprap scour protection at the Hampton Pump Station outfall channels. The Section 408 modification measures would be constructed within the historic and cultural resources ROI; therefore, the Proposed Action Alternative has the potential to impact historic and cultural resources. However, after construction, the cutoff walls will not be visible and would not adversely impact the ability of the Dallas Floodway to convey its significance as a historic and cultural resource as defined under NEPA. The Proposed Action Alternative would enhance the ability of the Dallas Floodway to convey its significance by protecting the integrity of the levees and would allow the Dallas Floodway to function as it was designed.

The Proposed Action Alternative would minimize consequences associated with floodwater inundation within the City of Dallas that would adversely impact NEPA-defined important historic and cultural resources.

5.9.2 Archeological Resources

5.9.2.1 No-Action Alternative

Under the No-Action Alternative, potential impacts to archeological resources directly associated with the construction of the Proposed Action Alternative would not occur. However, impacts to archeological resources due to natural causes such as erosion and flood events would occur and could result in damages to surface sites. Additionally, if new drainage features are formed under flooding conditions, buried sites could either be washed away or buried deeper by sediment and silt.

5.9.2.2 Proposed Action Alternative

There are no known archeological sites within the ROI. Archeological resources monitoring is recommended for three locations along the East Levee cutoff wall and one location along the West Levee cutoff wall as depicted in **Appendix A**, **Exhibit 8: Important Architectural NEPA Historic and Cultural Resources within the ROI Map**. These four areas of archeological monitoring are recommended because the proposed cutoff wall locations intersect with areas of high probability to contain cultural deposits (Shanabrook et al., 2010).

Material from a borrow area would be necessary for cutoff wall cap and protection. The borrow area, located at the East Levee would be approximately 8 acres in size. The borrow area is anticipated to be 3 feet deep. After construction, this borrow area would be returned to pre-construction elevations. Spoil material would be used to restore existing maintenance roads.

It was determined that Section 404 mitigation for permanent impacts to waters of the U.S., including wetlands, would be to construct a 0.5-acre wetland. The proposed mitigation site is located west of the Old Hampton Pump Station outfall channel and would be contoured using multiple elevation gradients to a maximum depth of 3 feet to allow for vegetation with appropriate wetland herbaceous species such as sedges, spike-rush, curly dock, and water primrose.

If archeological sites are discovered during construction, the USACE will evaluate the sites and provide appropriate guidance to the City of Dallas so the City can perform mitigation, as necessary. If Native American human remains and/or objects subject to the Native American Graves Protection and Repatriation Act (25 USC 3001 et seq.) are encountered during proposed construction activities, the USACE will consult with appropriate federally recognized Tribe(s) to determine appropriate treatment measures regarding NEPA historic and cultural properties.

The Proposed Action Alternative would minimize consequences associated with erosion and flood events which could result in damages to surface sites and the formation of new drainage features which could wash away or further bury archeological sites.

5.10 Hazardous, Toxic, and Radioactive Wastes

5.10.1 No-Action Alternative

Under the No-Action Alternative, no impacts to HTRW are anticipated.

5.10.2 Proposed Action Alternative

The Proposed Action Alternative would consist of levee cutoff walls along the riverside of East Levee Reaches 8, 9, and 10, and within West Levee Reach 1 as shown in **Appendix A, Exhibit 3**. Of the documented hazardous materials sites listed in **Tables 4-18** through **4-20,** two high risk sites, three moderate risk sites, and three low risk sites are located adjacent to proposed construction areas.

High Risk Sites

The boundary of **Sites 1-14** and **16** (**Appendix A, Exhibit 7: Sheets 3** through **9 of 12**), the Murmur Corporation Site 3/RSR Corporation, extends to the West Levee. A portion of the delineated superfund site shares a boundary line with the West Levee, from IH 30 to the western end of the West Levee on the landside of the levee. Remediation activities have already occurred to assess and clean up a portion of the contaminated Murmur Corporation Site 3/RSR Corporation superfund site. The current EPA status of the Murmur Corporation Site 3/RSR Corporation superfund site is listed as "construction complete" on the Superfund Information System database (EPA, 2010). The same online superfund database notes that the Murmur Corporation Site 3/RSR Corporation site "currently does not meet the criteria for Sitewide Ready for Anticipated Use; however, parts of the site may be suitable for reuse" (EPA, 2010). Even though this site is not located within the ROI and would not be physically impacted by the proposed construction activities, the boundary of the affected area does extend into the ROI along the West Levee. The possibility that contamination has extended into the floodway is high; therefore, this site is considered high risk.

Site 391 (**Appendix A, Exhibit 7: Sheet 5 of 12**), is located on 137 Conveyor Lane, adjacent to East Levee Reach 9. The site is considered a high risk to the Proposed Action Alternative because it is an active solid waste landfill (EDR, 2010). This site would not be physically impacted by the proposed construction activities; however, there is a possibility that contamination may have extended into the proposed construction area.

Moderate Risk Sites

Sites 304 and **356** (**Appendix A, Exhibit 7: Sheet 10 of 12**), are located adjacent to the proposed levee cutoff wall at East Levee Reach 10. Both were considered to pose a moderate risk to the Proposed Action Alternative. **Site 304** had the following database records: one LPST, 276 HMIRS, RCRA-SQG, FINDs, AST, SPILLS, IHW, ICIS and TIER 2. The LPST has a final "concurrence issued, case closed;" however, groundwater used by humans and/or endangered species was impacted. **Site 304** is a HMIRS record of a 1-methoxy-2-proponal release (EDR, 2010). These sites would not be physically impacted by the proposed construction activities; however, a possibility exists that contamination could have extended into the proposed construction area.

Site 392 (**Appendix A, Exhibit 7: Sheet 6 of 12**), adjacent to East Levee Reach 10, was a documented case of illegal dumping into a drainage ditch leading to the Trinity River Levee. The type of material is unknown, and no remedial action was documented; therefore, this site poses a moderate risk to the Proposed Action Alternative (EDR, 2010). This site would not be physically impacted by the proposed construction activities; however, a possibility exists that contamination could have extended into the proposed construction area.

Low Risk Sites

The three low risk sites (**Sites 304, 305,** and **885**) are located within 500 feet of the landside levee toe. **Sites 304** and **305** are adjacent to the East Levee Reach 10 and **Site 855** is located adjacent to West Levee Reach 1. Due to their location and the nature of the proposed levee mitigation measures, it is anticipated that none of these low risk sites are likely to affect the project since levee mitigation measures near these sites will occur on the riverside of the levee. These sites would not be physically impacted by the proposed construction activities; however, a slight possibility exists that contamination could have extended into the proposed construction area.

Historic Results of East and West Levee Floodway Soil Sampling

The Soil Constituents of Concern (COC) for the proposed construction activities are considered heavy metals. These are, primarily arsenic, lead and mercury; and, in one case, barium. The nine total soil borings located within or near the proposed construction areas are included in **Table 5-7**. The table also includes the COCs for each of the soil borings. The table contains the detected maximum concentration levels of each of the COCs relevant to the current TCEQ Tier 1 PCLs, the Texas-Specific Soil Background Concentrations (TSSBC), and the potential exposure scenario of the TRRP Tier 1 PCLs of the total soil combined ($^{Tot}Soil_{Comb}$) pathway. The table includes several soil analytical results that have a "J" flag, indicating that the reported result is an estimated value.

Table 5-7: Summary of Constituents of Concern

Levee	Soil Boring ID	COCs	Depth (feet bgs)	Concentration Levels (mg/Kg)	TSSBC (mg/Kg)	$^{Tot}Soil_{Comb}$ (mg/Kg)
East Levee	SB062	Arsenic	0-2 & 3-5	7.19 J & 7.37 J	5.9	24.2
		Chromium	0-2	30.2 J	30	23,054
		Lead	0-2 & 3-5	15.8 & 113	15	500
	SB063	Arsenic	0-2	6.07 J	5.9	24.2
		Lead	0-2 & 13-15	17 & 18.8	15	500
	SB053	Arsenic	0-2 & 4-6	6.03 J & 7.73 J	5.9	24.2
		Lead		17.1 & 21.7	15	500
	SB054	Arsenic	0-2 & 4-6	6.01 & 6.24 J	5.9	24.2
		Barium	4-6	309	300	7,841
		Lead	0-2	17.1 J	15	500
	SB051	Arsenic	0-2 & 13-15	6.27 J & 6.43 J	5.9	24.2
		Lead	0-2	75.8 J	15	500
		Mercury	0-2	0.0426 J	0.4	500
West Levee	SB065	Arsenic	12-14	19.1 J	5.9	24.2
		Lead	0-2	25.7	15	500
		Mercury	0-2	0.0472 J	0.04	2.1
	SB067	Arsenic	0-2 (FD)	6.7 FD	5.9	24.2
		Lead		78.4 & 127 FD	15	500
		Mercury		0.0555 FD	0.04	2.1
	SB066	Arsenic	0-2 & 9-11	7.07 & 20.8	5.9	24.2
		Lead	0-2	31.6	15	500
	SB-3	Lead	0-5	28.0	15	500

Notes:
J –Reported result is an estimate
FD – Field duplicate
bgs – below the ground surface
NA –Not Available
*(1) – Protection to groundwater standard (*GW-Soil-Ing)

The reviewed reports indicate there is no available analytical data in the vicinity of the proposed cutoff wall within Reach 8 of the East Levee. One previous environmental soil probe (SB063) that was performed during the CH2M Hill study in 2008 appears to be within the construction limits of the proposed cutoff wall within Reach 9 of the East Levee. Soil samples from this probe were analyzed for VOCs, SVOCs, the eight RCRA metals, pesticides, herbicides and PCBs. Soil samples were collected from depths of 0 to 2 feet below ground surface (bgs) and 3 to 5 feet bgs at this location. The metals analyses indicated that arsenic concentrations exceeded the TSSBC standards in the 0 to 2-foot sample, and lead concentrations exceeded the TSSBC standards in both the 0 to 2-foot and the 3 to 5-foot sample. The VOCs, SVOCs, pesticides, herbicides and PCBs analyses indicated no reported concentrations exceeding the TRRP Critical PCLs. Other nearby environmental soil samples from the CH2M Hill study in 2008 included soil probe SB062, which is located 250 feet or less from the toe of slope on the riverside. The soil probe SB062 had concentrations of arsenic, chromium and lead exceeding the TSSBC standards for 0 to 2 feet bgs, and arsenic and lead for the 13 to 15 feet bgs sample. The VOCs, SVOCs, pesticides, herbicides and PCBs analyses indicated no concentrations exceeding the TRRP Critical PCLs.

Soil probes SB053 and SB054, performed during the CH2M Hill study in 2008, appear to be within the construction limits of the proposed cutoff wall within Reach 10 of the East Levee. Soil samples for both of these probes were analyzed for VOCs, SVOCs, the eight RCRA metals, pesticides, herbicides and PCBs. Soil samples were collected from 0 to 2 feet bgs and 4 to 6 feet bgs for SB053 and SB054. The metals analyses indicated that arsenic concentrations exceeded the TSSBC standards at SB053 (0 to 2 feet bgs and 4 to 6 feet bgs) and SB054 (0 to 2 feet bgs and 4 to 6 feet bgs) with lead exceeding the TSSBC standard at SB053 (0 to 2 feet bgs and 4 to 6 feet bgs) and SB054 (0 to 2 feet bgs). The reported concentrations of barium for sample SB054 (4 to 6 feet bgs) also exceeded the TSSBC standards. The VOCs SVOCs, pesticides, herbicides and PCBs analyses indicated that there were no reported concentrations above the TRRP Critical PCLs at either SB053 or SB054.

Other nearby soil samples from the CH2M Hill study in 2008 included soil probe SB051, which is located 300 feet or less from the East Levee toe of slope on the riverside within Reach 10. The soil probe SB051 had reported concentrations of arsenic which exceeded the TSSBC standards for 0 to 2 feet bgs and 13 to 15 feet bgs, and also lead and mercury for the 0 to 2 foot bgs sample. The VOCs SVOCs, pesticides, herbicides and PCBs analyses indicated that there were no concentrations exceeding the TRRP Critical PCLs.

There are two previous environmental soil probes that appear to be within the construction limits of the proposed West Levee cutoff wall. These soil probes (SB065 and SB067) were conducted during the CH2M Hill study in 2008. Soil samples for both of these probes were analyzed for VOCs, SVOCs, the eight RCRA metals, pesticides, herbicides and PCBs. Soil samples were collected from 0 to 2 feet bgs and 12 to 14 feet bgs at SB065, and 0 to 2 feet bgs and 4 to 6 feet bgs at SB067. The VOC analysis indicated that methylene chloride was detected at a concentration that exceeded the soil PCL protective Class 1 and Class 2 groundwater standard at SB067. The metals analyses indicated lead and mercury concentrations that exceeded the TSSBC standards for sample SB065 (0 to 2 feet bgs) and arsenic (12 to 14 feet bgs). Arsenic, lead and mercury concentrations in the field duplicate sample SB067 (0 to 2 feet bgs) exceeded the TSSBC standards. The SVOCs, pesticides, herbicides and PCBs analyses indicted that there were no concentrations exceeding the TRRP Critical PCLs for either SB065 or SB067. Other nearby soil samples from the CH2M Hill study in 2008 included soil probe SB066 and soil boring SB-3 from the Terra-Mar, Inc. study in 1999, which were both located 200 to 300 feet or less from the toe of slope on the riverside. The soil probe SB066 had concentrations of arsenic and lead exceeding the TSSBC standards at 0 to 2 feet bgs and arsenic at 9 to 11 feet bgs. The soil boring SB-3 had lead concentrations that exceeded the TSSBC standard at 0 to 5 feet bgs.

2009-2010 Floodway Soil Boring Results: Dallas Floodway and Dallas Floodway Extension
During the field geotechnical exploration phases of the project conducted in 2009 and 2010, petroleum hydrocarbon odors were noted in 11 geotechnical soil borings. The locations of these along the West Levee were basically located in two groupings; within Reach 2 and 3 generally within the IH 30 and the Texas and Pacific Railway area and generally within the IH 30 and the Texas and Pacific Railway area within Reach 12. A geotechnical soil boring in which a piezometer was installed (i.e., FWR-12-12-DBP) has a sheen in the water upon well development within Reach 12. The remaining soil boring was located adjacent to the East Levee

(Reach 10) in a channel boring near the Trinity River. The origin of these petroleum impacts is currently unknown; however, there were no exceedances of hydrocarbons-type COCs (such as VOCs and SVOCs) above the TRRP PCLs for the proposed construction footprint.

Summary

Based on review of the environmental data, the East Levee boring sites do not appear to pose a significant risk to the proposed construction activities. The high risk site on the West Levee is the Murmur Corporation Site 3/RSR Corporation. The site is a listed Superfund site that appears on several other environmental databases. This site encompasses approximately 13.6 square miles in West Dallas and the contamination resulted from the fallout of air emissions (COC were heavy metals) from the smelter stack. Because the northern boundary of this Superfund site abuts the West Levee, it is likely that these anthropogenic sources of airborne emissions have been dispersed into the Dallas Floodway System. Moreover, through the analysis of this report, the West Levee's site does not appear to pose a significant risk to the proposed construction activities.

The COCs for this project are heavy metals: primarily arsenic, lead, mercury, and in one case, barium. Of the environmental soil probes and soil borings reviewed for this study, there were no VOCs, SVOCs, pesticides, herbicides or PCBs at concentrations exceeding the State of Texas Critical PCLs near the planned construction areas. The detected maximum concentrations of each of the COCs are below the relevant potential exposure scenario of the TRRP Tier 1 PCLs of the total soil combined pathway. In fact, the majority of the detected metals concentrations reported from all investigations on the Levees are at- or below- Texas background concentrations.

The main exposure pathway for the reported heavy metals detected throughout the Dallas Floodway is by inhalation of fugitive dust generated during construction activities; however, keeping the materials damp would help reduce exposure. The plans and specifications for the project will include a notice to contractors informing them of the heavy metals known at this time. The project specifications will require that a "Site-Specific Health and Safety Plan" be drafted by the prime contractor and any pertinent subcontractors working with soils within the Dallas Floodway.

The potential risk of encountering HTRW contamination during construction of the proposed Section 408 modification measures is further addressed in the HTRW Work Plan for the proposed Action Alternative and available under separate cover. The HTRW Work Plan summarizes readily available soil analytical data that was collected by others, for subsurface investigations that were performed for various projects within the limits of the Dallas Floodway. The available data was compared to current regulatory standards established by the State of Texas and compared to the locations of proposed modification measures to evaluate the potential for encountering contaminated soil during the construction activities. In addition to the soil analytical data, the data from the environmental databases was reviewed for the relevancy of impacts to the planned levee mitigation measures construction activities. The HTRW Work Plan includes an evaluation of the next steps that will likely be needed to be implemented prior to project construction activities.

Any unanticipated hazardous materials encountered during construction would be handled according to applicable federal, state, and local regulations. A contingency plan that outlines steps to be taken before and during construction activities to document soil conditions, as well as procedures to be followed if unexpected conditions are encountered would be prepared. It is recommended that the contingency plan include the following sections and information.

- Soil Sampling Plan:
  - During construction, but prior to major excavating activities, soil samples will be collected every 1,500 linear feet along the proposed cutoff wall by an environmental consultant retained by the contractor.
  - Soil samples are to be collected from 0 to 4 feet bgs and just above the groundwater table. The soil samples will be screened in the field with a photoionization detector (PID) for total VOCs and an X-Ray Fluorescence (XRF) analyzer for the eight RCRA metals.
  - During construction, but prior to excavation activities, it is recommended that three soil samples be collected (equally spaced) within the proposed 0.5 of an acre wetland mitigation area from 0 to 4 feet bgs.
  - If soil samples are above 100 instrument units on the PID, then laboratory soil samples will be collected for VOCs and SVOCs analyses.
- Surplus Soil Management:
  - The cutoff wall construction activities will generate surplus soil that would be reused within the existing Dallas Floodway for repair of the existing levee maintenance roads.
  - Soils that have concentrations lower than the TRRP Tier 1 $^{Tot}Soil_{Comb}$ PCLs for the residential scenario will be considered suitable for reuse.
- Impacted Soils and Solid Waste Management:
  - If soil concentrations exceed the TRRP Tier 1 $^{Tot}Soil_{Comb}$ PCLs for the residential scenario they will be managed as a non-hazardous solid waste (in accordance with Subtitle D of RCRA) and properly disposed of at the nearest local licensed landfill facility.
  - If soil concentrations are higher than outlined in 40 C.F.R. 261.24 they will be managed as a hazardous solid waste (in accordance with Subtitle C of RCRA) and properly handled and disposed of at the nearest licensed hazardous waste landfill facility.

The actual contents of the contingency plan would be coordinated with the City of Dallas and USACE. The project plans and specifications would contain the necessary information to address contingencies related to potential COCs.

The HTRW Work Plan, prepared for the City of Dallas by HNTB, summarizes readily available soil analytical data that was collected by others for various projects within the limits of the Dallas Floodway and evaluates the potential for encountering impacted soil during the construction of the modification measures. The Contingency Plan, prepared by HNTB, will outline steps to be taken before and during construction activities to document soil conditions, as well as procedures to be followed if unexpected conditions are encountered would be prepared.

The prime contractor, and any pertinent subcontractors, will be responsible for the preparation of a Site-Specific Health and Safety Plan detailing the basic safety requirements for working with soils within the Dallas Floodway. The contractor and any subcontractors will be required to comply with the steps outlined in the Contingency Plan and the Site-Specific Health and Safety Plan.

The Proposed Action Alternative is not expected to include the demolition of building structures at any of the levees. If demolition of any structures is required, a determination as to whether the structure contains asbestos or lead based paint is required. Asbestos/lead inspections, specification, notification, license, accreditation, abatement and proper disposal, as applicable, would comply with federal and state regulations. Asbestos containing materials and lead based paint issues would be addressed prior to construction.

The contractor would take appropriate measures to prevent, minimize, and control the spill of hazardous materials in the construction staging area. The use of construction equipment within sensitive areas would be minimized or eliminated entirely. All construction materials used for this project would be removed as soon as work schedules permit**.**

5.11 Air Quality

On April 5, 2010, EPA finalized revisions to the General Conformity Rule. The rule improves the process federal entities use to demonstrate that their actions will not contribute to a violation of the NAAQS. The rule states that if an action is determined to cause emissions above the *de mininis* thresholds in any nonattainment or maintenance area and the action is not otherwise exempt, "presumed to conform," or included in the existing emissions budget of the SIP or Transportation Improvement Program (TIP), the agency must conduct a conformity determination before it takes the action (EPA, 2010g). The TIP is a staged, multiyear listing of surface transportation projects for funding by federal, state, and local sources within the DFW metropolitan area. It is developed through a cooperative effort of the Regional Transportation Council, TxDOT, local governments, and transportation authorities.

Because the Proposed Project is not the type of project that would be included in the existing emissions budget of the SIP or the TIP (i.e., transportation project) and because it is located in the 8-hour "serious" nonattainment area for ozone, the General Conformity Rule applies.

5.11.1 No-Action Alternative

Under the No-Action Alternative, air quality degradation from dust and exhaust gases associated with the construction of the Proposed Action Alternative would not occur.

5.11.2 Proposed Action Alternative

Non-road mobile sources are a subset of the area source category. This subcategory includes aircraft operations, marine vessels, recreational boats, railroad locomotives, and a very broad category of equipment that includes everything from 600-horsepower engines mounted on construction equipment to 1-horsepower string trimmers. Potential air quality impacts from the Proposed Action Alternative would occur during construction activities and derive mainly from

non-road mobile sources (i.e., construction equipment such as backhoes and material handling equipment such as heavy forklifts) with some contribution from on-road equipment (construction trucks).

The emissions released during the construction of the Proposed Action Alternative were estimated in order to determine if a conformity determination would be required for the Proposed Action Alternative in accordance with the latest General Conformity Rule. Total emissions for implementation year 2012 (assuming that construction would take six months to complete) were estimated for the worst case scenario for diesel vehicles using standard emission factors. The annual emissions were then compared to the *de minimis* values for ozone precursors [(VOCs and nitrogen oxides (NOx)], carbon monoxide (CO), sulfur oxides (SOx), PM10 and PM2.5. Calculation methods for emissions from non-road engine sources are based on information about equipment population, engine horsepower, load factor, emission factor, and annual usage. On-road emissions were estimated using vehicle miles traveled (VMT), number of trucks, duration of operation, emission rates, etc.

Construction of the Proposed Action Alternative would result in the temporary increase in criteria pollutant emissions. Approximately 29,138 cubic yards of excavated soils from the cutoff construction (spoil material) would be used to repair the existing levee maintenance roads within the floodplains. The spoil material would be used to restore rutted and ponding riverside levee maintenance roads to their original condition. The maintenance roads would be restored to the floodplain floor elevation by placing 2 to 3 feet of material over the 20-foot roadway width. The surface material would then be graded and compacted to drain toward the river. In addition, a 6-foot thick concrete pathway, 10-feet wide, approximately 1 mile long would be constructed along the West Levee for maintenance.

Construction of the Proposed Action Alternative is planned for completion in six months starting in the spring/summer of 2012 and ending by the end of 2012. Therefore, air emissions were determined for 144 days in 2012.

The air analysis concluded that *de minimis* thresholds for applicable criteria pollutants would not be exceeded as a result of implementation of the Proposed Action Alternative under the worst case scenario. The emissions data supporting these conclusions are shown in **Table 5-8**, which is a summary of the calculations, methodology, data, and references included in **Appendix E: Record of Non-Applicability (RONA) and Air Quality Data**. In accordance to the April 5, 2010, EPA General Conformity Rule, implementation of the Proposed Action Alternative would not require a formal conformity determination under Section 176(c) of the CAA.

Table 5-8: Estimated Emissions Resulting from the Proposed Action Alternative

Estimated Emissions in tons/year	Pollutant					
	VOC[1]	NOx[1]	CO[2]	SOx[2]	PM10[2]	PM2.5[2]
Annual Emissions (2012)	4.93	48.73	18.31	0.56	3.37	2.39
De minimis threshold in tons/year	50	50	50	50	50	50
Exceedance of *de minimis* threshold (Yes/No)	**No**	**No**	**No**	**No**	**No**	**No**

Source: Source: USEPA, 2010g.

Notes: [1]Because the Proposed Action Alternative is located within a "serious" nonattainment area for ozone, emissions for the ozone precursors (VOC and NOx), were compared to de minimis value thresholds.

[2]The Proposed Action Alternative is located within an attainment area for the rest of the NAAQS. Therefore, the estimated emissions were compared to de minimis values for CO, SOx, PM10 and PM2.5 for planning purposes only.

In recent guidance regarding the consideration of GHGs impacts in NEPA analysis, CEQ identified annual emissions of more than 25,000 metric tons of carbon dioxide-equivalent (CO2e) as the threshold level that agencies need to consider as meaningful in assessing the direct impacts of a project's GHG emissions. The GHGs associated with the construction of the Proposed Action Alternative were estimated in order to determine if there would be an exceedance of the CEQ threshold. According to the analysis, construction of the Proposed Action Alternative would generate 475 metric tons of CO2e which is well below the 25,000 CO2e threshold. The Proposed Action Alternative is not anticipated to cause direct emissions of 25,000 metric tons of CO2e GHG emissions or more. The concentration of GHGs in CO2e was determined using the EPA *Greenhouse Gas Equivalencies Calculator* (EPA, 2011). Calculations of the GHG emissions for the project (carbon dioxide and methane) are included in **Appendix E** (**Tables E-3** and **E-4**).

Vehicle emissions generated by the Proposed Action Alternative construction activities would be short-term and temporary. No long-term increases in vehicle emissions would occur under the Proposed Action Alternative. Emissions associated with construction-related vehicles and equipment would be minor, as most vehicles would be driven to and kept at the relevant site until project activities are complete.

The primary construction related emissions are particulate matter (fugitive dust) from site preparation and construction and non-road mobile source air toxics from construction equipment and vehicles. The primary mobile source air toxic emission related to construction is diesel particulate matter from diesel powered construction equipment and vehicles. These emissions are temporary in nature, only occurring during actual construction. The potential impacts of particulate matter emissions could be minimized by dust control measures such as covering or treating disturbed areas with dust suppression techniques, sprinkling, covering loaded trucks, and other dust abatement controls, as appropriate. No long-term increase in mobile or stationary source emissions as a result of the Proposed Action Alternative is anticipated.

Considering the temporary and transient nature of construction related emissions as well as the mitigation actions to be utilized, it is not anticipated that emissions from construction of the Proposed Action Alternative would have any significant impact on air quality in the area. Similarly, the proposed project will likely not result in climate change.

5.12 Aesthetics

5.12.1 No-Action Alternative

Under the No-Action Alternative, the Proposed Action Alternative would not be implemented, and the Dallas Floodway System would not undergo modifications to help the City regain 100-year FEMA accreditation. As a result, the existing visual environment would not change.

5.12.2 Proposed Action Alternative

The implementation of the Proposed Action Alternative with corresponding ground disturbing activities would likely result in short-term impacts to aesthetics and visual resources due to the presence of construction equipment, vehicles, and modification measures construction activities. These effects would likely manifest as temporarily disturbed soil and grass areas on both the land and riversides of the levees and would primarily be most visible in the foreground view looking toward the levees from the first tier of development on the levees' landsides and in the middleground view looking from the Dallas Floodway toward areas outside the floodway. However, the end result on aesthetics and visual resources of the Proposed Action Alternative would be the same as if the Proposed Action Alternative did not occur. The same aesthetic and visual characteristics of an earthen, grass-covered berm rising approximately 30 feet above the ground elevation of the Dallas Floodway currently associated with the levees would prevail.

Objects arranged to form existing visual features and viewsheds within the Dallas Floodway such as utility and transportation infrastructure crossings, storm water outfalls and other drainage structures, the existing Trinity River channel, and existing park space and active recreational amenities would not change. In addition, objects arranged to form existing visual features and viewsheds looking from the Dallas Floodway toward areas outside the floodway such as areas of single-family residences, industrial structures and supporting infrastructure, interspersed neighborhood-scale institutional structures, and modern office towers would also not change. Therefore, the Proposed Action Alternative would result in no permanent aesthetic or visual impacts.

5.13 Section 408 – System Performance Assessment

While the technical component of the Section 408 Report includes the EOR's technical analysis and adequacy of design including hydraulic and hydrology component (i.e., changes in inflow, changes in water surface profiles and flow distribution, assessment of local and system-wide resultant impacts, upstream and downstream impacts, etc.), geotechnical analysis (i.e., stability, seepage/underseepage, material usage/borrow/waste/transport/hauling, etc.), and O&M, the USACE provides no opinion as to the efficacy of the modifications to provide flood risk management benefits.

Hydrology and Hydraulic Analysis

The hydraulic and hydrology analysis was prepared to demonstrate that the implementation of the Proposed Action Alternative would maintain hydraulic neutrality within the Dallas Floodway.

Results of the analysis indicate that the proposed cutoff walls and concrete and riprap scour protection at the Hampton outfall channel would result in no hydraulic impacts on the levees or the hydraulics within the Dallas Floodway. Therefore, the proposed modifications to the Dallas Floodway System meet the 1988 USACE ROD hydraulic criteria and should be allowed in order to help the City regain 100-year FEMA accreditation. The hydraulic and hydrology analysis (available under Appendix 2 of the Section 408 *Project Summary Report*) includes the analysis in detail.

Geotechnical

Soil borings and cone penetrometer tests (CPTs) along the levee crown, toe and mid-slopes, as well as within the floodway channel were taken, along with thousands of historic borings analyzed to determine soil classifications, stratigraphy, and other geotechnical properties. A series of isolines, contours and stratigraphy roll plots with geomorphologic interpretation have been developed for the East and West Levees to the downstream limits of the Dallas Floodway; more information about these can be found in Appendix 1, Geotechnical Analyses of the Section 408 *Project Summary Report*.

In addition to the geotechnical appendix to this document, refer to the following documents for detailed information regarding the geotechnical investigation and analysis:

- *Preliminary Design Information Report – Geotechnical, Hydrology and Hydraulics (H&H), and Civil Design, Dallas Floodway System (DFS) Preliminary Analysis and Design Check of Current Levee System* (HNTB, August 2009)
- *Draft Preliminary Analysis and Design Check of the Levee Systems for the 100-Year Flood Event and Current Standard Project Flood (SPF) Level Report, Dallas Floodway System* (HNTB, December 2009)
- *Draft Levee Remediation Plan, Dallas Floodway System* (HNTB, February 2010)

Installation of the proposed riverside cutoff walls would help reduce the potential for underseepage. Likewise, the slope stability analyses demonstrate the recommended improvements do "no harm" to the existing project as determined in coordination with USACE/CESWF. The cutoff wall was iteratively positioned away from the riverside levee toe until the minimum CESWF required factor of safety (FoS) of 1.0 during construction was met.

To meet seepage criteria, as developed by the EOR for the Proposed Action Alternative, the cutoff material required a hydraulic conductivity of 1×10^{-7} feet/sec (3.0×10^{-6} cm/sec) or less and per EOR, in order to meet stability criteria, the cutoff wall would need to be approximately one trench depth (H) from the riverside levee toe, which is approximately 25 to 50 feet, depending on location. The East Levee cutoff wall trench depth is anticipated to be approximately 40 to 55 feet deep; therefore, the minimum distance from the riverside levee toe is recommended to be 50 feet. The West Levee cutoff wall trench depths are anticipated to be approximately 10 to 20 feet deep; therefore, the minimum distance from the riverside levee toe is recommended to be 25 feet.

The cutoff wall material was modeled as an equivalent fluid pressure with no strength and met CESWF's required FoS; therefore, it is recommended the cutoff backfill consist of soil-bentonite (s-b) per HNTB's April 4, 2011 submittal (DFS – 100-Year Levee Remediation 408 Application Draft Geotechnical Appendix). The soil-bentonite backfill is anticipated to consist of water, bentonite, and excavated soils. In the area of the Hampton Pump Station Outfalls, the cutoff wall backfill is recommended to consist of cement-bentonite so that quicker set and strength gain of the material occurs to aid construction in this area. In areas of crossing utilities, windows or gaps will be left temporarily open in the cutoff wall. These open windows are recommended to be jet grouted after the cutoff wall installation to reduce potential damage to existing utilities, while providing cutoff to the basal sands

Operation and Maintenance

The Proposed Action Alternative may impact existing maintenance roads during construction. Maintenance roads would be restored to their pre-construction condition and location following construction completion as applicable.

The existing levees and floodway are currently being maintained by the City of Dallas Flood Control District. The cutoff walls would be completely buried underground and would not increase maintenance requirements for the City's Flood Control staff. The concrete and riprap scour protection at the outfall channels would be additional features for the City's Flood Control staff to monitor; however, as they already monitor the sump and outfall channel slopes closely, the improvements would actually improve their access and ease of O&M duties. These features would be added to the City's O&M Manual for the East Levee.

The construction contractor shall be required to submit an Emergency Action Plan to detail the construction procedures for trench backfill or other measures required prior to a flood, removal of personnel and equipment from the floodway, and procedures for backfilling and buttressing if a trench collapse or progressive trench failure were to occur. After contractor selection and prior to notice to proceed for construction, the contractor shall be required to submit an Emergency Action Plan to the City of Dallas for their review and approval.

Real Estate Analysis

The City of Dallas owns in fee simple of all real estate interests required for construction of the Proposed Action Alternative. All access and haul routes to and from the identified work areas would be via existing levee maintenance roads.

Existing riverside maintenance roads within the floodway that have sunken below the adjacent floodway floor ground surface will be filled with cutoff wall spoil material. The soil will be compacted to an elevation to match the adjacent top of ground and will be sloped to drain towards the river channel.

Summary

The Fort Worth Engineering Division has performed a technical review of the geotechnical data and analyses report and 35% construction plans and specifications, and determined that the proposed modification meets USACE's engineering and safety standards for construction and

meets minimum factors of safety for slope stability in the short term (construction) and long term (post construction). The USACE has determined that the proposed action does not increase the risk to public safety. Final plans and specifications will be reviewed prior to issuance of Section 408 construction approval. In addition to a technical review of the geotechnical analyses, a technical review of the hydraulic analysis was performed. The findings of this review indicate that the proposed project will produce no significant adverse hydraulic impacts.

The final Section 408 Report will contain documentation of public and agency reviews and the determination and recommendations of the Section 408 Report. Any additional details required by the USACE guidance would be provided. Completion of the final Section 408 Report is anticipated to occur by the spring of 2012.

5.14 Summary of Potential Impacts

In accordance with NEPA, a focused analysis of the following resources potentially affected by implementation of the No-Action and the Proposed Action Alternatives was performed: project setting and land use; socioeconomic conditions; transportation; climate, geology, and soils; water resources; biological resources; noise; utilities; historic resources; archeological resources; HTRW; air quality; and aesthetics.

Table 5-9 summarizes the impacts to all resources investigated under the Proposed Action and No-Action Alternatives whether they would occur as a direct or indirect result of each Alternative.

Table 5-9: Summary of Potential Impacts

Resource		No-Action Alternative	Proposed Action Alternative
Project Setting and Land Use		•	+
Socioeconomic Conditions		•	+
Transportation		•	+
Climate		--	--
Geology		--	*
Soils		--	*
Water Resources	Groundwater Resources	--	--
	Lakes, Rivers, and Streams	--	*
	Waters of the U.S., including wetlands	--	*
	Floodplains	•	--
	Water Quality	--	*
Biological Resources	Threatened and Endangered Species	--	--
	Wildlife Habitat	--	*
	Aquatic Resources	--	*
Noise		--	*
Utilities		--	*
Cultural Resources	Historic Resources	--	+
	Archeological Resources	•	+
HTRW		--	*
Air Quality		--	*
Aesthetics		--	*

*Notes: **Table 5-9** reflects what impacts are anticipated to occur as an exclusive direct or indirect result of implementing the Proposed Action or not implementing the Proposed Action.*

Symbols:

\+ *= Beneficial Impact*

-- *= No Impact*

* *= Minor Impact (this category includes less than significant impacts and temporary impacts resulting from construction activities)*

• *= Substantial Impact*

6.0 CUMULATIVE IMPACTS

The CEQ regulations to implement NEPA require the assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts are defined as the "impacts on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 C.F.R. 1508.7). Cumulative impacts can result from individually minor but collectively substantial actions taking place over a period of time. Cumulative impacts result when the impacts of an action are added to or interact with

other impacts in a particular place and within a particular time period. The combination of such impacts and any resulting environmental consequences should be the focus of a cumulative impact analysis (U.S. Environmental Protection Agency, 1999). Therefore, this cumulative impacts assessment and analysis focuses on the combination of past, present, and reasonably foreseeable actions, how they are connected, and their resulting collective effects in conjunction with the Proposed Action, regardless of the source of the actions. The Proposed Action Alternative under consideration in this cumulative impacts assessment would consist of the installation of cutoff walls within the Dallas Floodway, in addition to concrete and riprap and scour protection at the Hampton Pump Station outfall channels.

Although the definition for cumulative impacts as stated in 40 C.F.R. 1508.7 only suggests that cumulative impacts be investigated from the perspective of examining past, present, and reasonably foreseeable future actions in conjunction with the incremental impacts of the Proposed Action Alternative, this cumulative impacts assessment also investigates cumulative impacts of past, present, and reasonably foreseeable future actions in conjunction with the No-Action Alternative. As demonstrated in **Table 5-9**, the No-Action Alternative would result in substantial indirect impacts to five resources. Considering the relative potential magnitude of indirect impacts associated with the No-Action Alternative compared to the Proposed Action Alternative's overall impacts, the investigation of the No-Action Alternative provides essential context regarding the necessity and value of implementing the Proposed Action Alternative.

A reasonably foreseeable action is an action that is sufficiently likely to occur such that a person of ordinary prudence would take it into account in making a decision. Factors that would indicate that a project or action is reasonably foreseeable include funding approvals for an anticipated project, pending funding before an agency to begin a project, and whether there is evidence of active preparation to make a decision on alternatives to a project. When relevant and credible quantified impact data are available for reasonably foreseeable actions, this cumulative impacts assessment combines those quantified impacts to affected resources with those of the No-Action Alternative and Proposed Action Alternative to provide an overall quantified cumulative impact measure on respective resources. However, readily available quantified data do not exist for all reasonably foreseeable actions considered because either impact analyses have not been performed to reveal such information for all reasonably foreseeable projects or analyses are pending. Further, because cumulative impacts can be uncertain and are therefore more difficult to quantify, impacts that are quantified are rough estimates. To control for the availability of quantified impact data associated with some reasonably foreseeable actions, the lack of quantified impact data for others, and the uncertain nature of future impacts, this cumulative impacts assessment employs a combination qualitative and quantitative approach to both generalize potential combined impacts and to disclose quantified measures of what resource impacts are known.

Cumulative Impacts Temporal and Geographic Constraints

For the purposes of this assessment, past, present, and reasonably foreseeable future actions and associated cumulative impacts in the cumulative impacts study area are included and analyzed. The cumulative impacts study area is defined as the geographic extent of all of the resource-specific ROIs combined, with the exception of air quality, as depicted in **Appendix A**, **Exhibit**

10: Cumulative Impacts Study Area Map. This region, defined as the cumulative impacts study area, is formed by combining all of the ROIs, except the air quality ROI, for resources assessed in this EA and utilizing the furthest geographic extent of the ROIs' boundaries to capture all past, present, and reasonably foreseeable future actions in conjunction with potential impacts of the No Action Alternative and Proposed Action Alternative that may affect resources within those resources' assessed areas. The ROI for air quality is excluded from this combination of resources because of its considerably larger geographic extent that would dwarf the scale of analysis pertinent to other resource impacts. Regardless of the air quality ROI's inclusion in the cumulative impacts study area, cumulative impacts to air quality are still assessed based on the nine-county serious non-attainment area for the eight-hour ozone standard, which includes Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant Counties.

The temporal boundaries for assessing cumulative impacts are from circa 1870 to 2050. The year 1870 is chosen because it encapsulates the early development of transportation and utility infrastructure in the City of Dallas, which are noteworthy features contributing to the City of Dallas' evolving physical character. The year 2050 is chosen because it comprehensively captures the extent of reasonably foreseeable proposed actions within the cumulative impacts study area in accordance with existing planning efforts. Although this cumulative impacts assessment investigates potential impacts that may occur during this mostly future temporal time frame, it also considers past actions leading up to current conditions within the cumulative impacts study area.

Past, Present, and Reasonably Foreseeable Actions

For the purposes of assessing cumulative impacts in this EA, past, present, and reasonably foreseeable future actions in the cumulative impacts study area are categorized as either being associated with 1) flood risk management, 2) recreation and environmental restoration, or 3) transportation/utility infrastructure. Past, present, and reasonably foreseeable future actions categorized as such are also inherently interconnected with reasonably foreseeable future land use and community development actions proposed as part of the *BVP* for the Trinity River Corridor Project and *TRCCLUP*. Therefore, past, present, and reasonably foreseeable actions related to land use and community development are also considered in this cumulative impacts assessment to further provide a contextual baseline against which to compare cumulative impacts and to examine the long-term effects of related actions in conjunction with those relating to flood risk management, recreation and environmental restoration, and transportation/utility infrastructure. **Table 6-1** contains a list of 34 projects that are approved for funding, construction, or that are reasonably foreseeable and for which their impacts are cumulatively assessed in conjunction with the No Action Alternative and the Proposed Action Alternative. For the purposes of this cumulative impacts assessment, these projects are considered as either present or reasonably foreseeable future actions. **Table 6-1** provides a map identification number matching the locations of each project on **Exhibit 10** in **Appendix A**.

Table 6-1: Present and Reasonably Foreseeable Cumulative Projects in the Cumulative Impacts Study Area

Map ID	Project Name	Project Type
1*	O&M Related Deficiencies Corrected as Part of MDCP	Flood Risk Management
2*	O&M Related Deficiencies Corrected in FRM Phase	
3*	BVP Flood Risk Management	
4*	Interior Drainage Plan	
5	Baker Pump Station & Gas Lines	
6	Pavaho Pump Station	
7	Dallas Floodway Extension Project	
8	Irving Levee	
9	BVP Ecosystem Restoration	Recreation and Environmental Restoration
10	BVP Parks & Recreation	
11	Pavaho Wetlands	
12	Trinity Overlook Park	
13	Trinity Strand Trail	
14	Santa Fe Trestle Trail	
15	Continental Avenue Pedestrian Bridge	
16	Trinity River Standing Wave	
17	Belleview Trail Connector	
18	Bernal Trail	
19	Dallas Watersports Complex	
20	IH 35E Bridges	Transportation/Utility Infrastructure
21*	Dallas Water Utilities (DWU) Waterlines	
22	IH 30 / Margaret McDermott Bridge	
23	Jefferson-Memorial Bridge	
24	Trinity Parkway	
25	Margaret Hunt Hill Bridge	
26	Hampton Bridge	
27	DART Orange Line	
28	West Levee Norwood 345kV Transmission Line	
29	Sylvan Avenue Bridge	
30	Beckley Avenue Extension	
31	SH 183 Bridge	
32	Pegasus Project	
33	Riverfront Boulevard	
34	Trinity Lakes Street Car Loop	

Source: USACE, 2010

*For projects 1-4 and 21, identifications are not provided on **Exhibit 10** in **Appendix A** as a result of those projects' more expansive coverage than can be locally or pointedly depicted. Components of projects 1-4 and 21 extend over a wider geographic area and include other projects provided in **Table 6-1**.

6.1 Past Actions

6.1.1 Flood Risk Management (1908 - present)

Originally, the Trinity River channel was a continuous meandering waterway traversing the western portion of the present Dallas CBD. In 1908, a devastating flood inundated a large portion of the City of Dallas' downtown area as well as transit operations between Oak Cliff and Dallas (Furlong et al., 2003). Subsequently in 1926, an assessment district, known as the City and County of Dallas Levee Improvement District, was established that re-routed the hydraulic conveyance from the natural channel to the present-day straightforward alignment and location (Furlong et al., 2003). In the early 1930s, the existing East and West Levees were constructed to serve this goal and were designed to have 2,000 to 3,000 feet of distance between the inside footings (Furlong et al., 2003). In the late 1950s, the USACE modified the East and West Levees by shifting the levee footprints toward the riverside, fattening the levees' landside slopes, and increasing the levee crest width to approximately 16 feet. Simultaneous improvements to the interior drainage system also occurred. The East and West Levees were originally designed to confine a flood of about two and one half times the size of the 1908 flood, but major urban development, land use changes, and surrounding increases in impervious surface coverage since project completion in 1958 reduced that level of flood risk management.

Two separate actions during the past four decades further diminished the Dallas Floodway System's ability to contain the 800-year event to 300-year protection (Furlong et al., 2003). First, significant urbanization in the DFW Metroplex, particularly upstream of the East and West Levees, substantially increased the quantity of flood waters produced by the Trinity River (Furlong et al., 2003). In 1960, the estimated 800-year discharge was 226,000 cfs as compared with 270,000 cfs in 2003 (Furlong et al., 2003). Second, downstream of the East and West Levees, the Great Trinity Forest's growth and abundance of trees significantly reduced flood conveyance in the southern Trinity River Corridor and ultimately within the Dallas Floodway (Furlong et al., 2003). Aside from relatively minor repairs and improvements performed by the USACE and the City of Dallas throughout the following decades, the 1958 measures constitute the physical configuration of the East and West Levees and associated interior drainage system as they exist today.

After Hurricane Katrina struck New Orleans, the USACE began assessing the LSP and reviewing criteria for evaluating levee systems. The USACE implemented a new LSP with a more comprehensive and rigorous levee inspection process to aid in communicating to local sponsors and the public the overall condition of levee systems and recommending actions to reduce flood risk.

During December 3-5, 2007, the USACE performed a periodic inspection of the Dallas Floodway System resulting in the *PI Report* received by the City of Dallas in March 2009. The USACE documented numerous potential deficiencies based on its visual inspection for each of the four levees within the Dallas Floodway System, resulting in an overall system rating of "Unacceptable." As a result, the City of Dallas and its EOR performed an independent assessment (the results of which are contained in the draft *PID Report*) of the condition of the Dallas Floodway System and evaluated modification alternatives to address potential system-

wide deficiencies (contained in the draft *LRP*). The results of this assessment led to the design of the proposed Section 408 modifications and the preparation of the Section 408 Application report and associated EA.

6.1.2 Recreation and Environmental Restoration (1929 - present)

In 1929, the City and County of Dallas Levee Improvement District, originally established for land management purposes in the Dallas Floodway, offered the entire inter-levee area existing at the time (approximately 3,300 acres) to the Dallas Park Board to be developed and maintained as a park (Furlong et al., 2003). From 1929 to the 1970s, the offer sat unaccepted until U.S. Representative James M. Collins secured approximately $2.2 million in federal funds from the Department of Housing and Urban Development to help the City obtain property between the East and West Levees (Furlong et al., 2003). Further, the Industrial Properties Corporation donated approximately 933 acres to the City, and the City contributed approximately $1.1 million to complete the acquisitions by January 1974 (Furlong et al., 2003).

6.1.3 Transportation/Utility Infrastructure (circa 1870 - present)

Past transportation projects in the cumulative impacts study area include the original plan for Dallas' downtown street grid and subsequent platted local streets; the Corinth Street, Houston Street, Jefferson Viaduct Boulevard, Commerce Street, Continental Avenue, Sylvan Avenue, Hampton Road, Westmoreland Road, and Irving Boulevard bridges across the Trinity River as well as subsequent improvements since construction; IH 30, SH 183, Loop 12, and IH 35E; and numerous freight and passenger rail lines. As land use densities in downtown Dallas increased throughout the twentieth century, the need for greater capacity to move a higher volume of motor vehicles at faster speeds became more pronounced, and consequently, numerous transportation projects were completed to alleviate congestion, improve mobility, increase access, and enhance safety as downtown Dallas continued to develop as an employment destination for workers throughout the DFW Metroplex. Throughout Dallas' development, the City of Dallas expanded electric, water, sewer, wastewater, and other utility services and associated infrastructure throughout the cumulative impacts study area to aid in its development. All of the City of Dallas' utility services and associated infrastructure were extended across the Dallas Floodway to aid in the development of areas south and west of Dallas' CBD.

6.1.4 Land Use and Community Development (circa 1908 - present)

Past changes in land development in the cumulative impacts study area, including downtown Dallas and Oak Cliff, are characterized by a transition from a traditional, early twentieth century mix of land uses to a modern downtown, CBD environment. Prior to World War II, land uses in the cumulative impacts study area were generally more intensive, medium-density residential, commercial, public, and industrial uses concentrated along the Trinity River, railways, and major multi-modal thoroughfares. After World War II, like many other large and rapidly growing cities in the U.S., land uses in the cumulative impacts study area transitioned to a generally higher density, but less intensive, mixed-use environment with a variety of residential, retail, office, service commercial, public, and light industrial uses and densities scattered across downtown Dallas and Oak Cliff. Land uses on the north and east side of the Trinity River have typically evolved into relatively dense, typical large city, employment-concentrated environments collectively serving the city and region as a job, arts, convention, and business

destination hub accommodating numerous interconnected and agglomerated economic functions. Much of the land on the south and west sides has retained its lower density mix of single-family residential, service commercial, and light industrial uses.

6.2 Present and Reasonably Foreseeable Actions

6.2.1 Flood Risk Management

In addition to the Proposed Action Alternative, as part of the Trinity River Corridor Project, flood risk management measures currently underway or that are planned to continue in the cumulative impacts study area seek to strengthen the Dallas Floodway's flood water conveyance ability through a number of actions. As listed in **Table 6-1**, these actions include existing levee and interior drainage improvements, the Dallas Floodway Extension Project including the construction of two levees and the establishment of a "Chain of Wetlands," and other *BVP* Trinity River Corridor projects.

The Irving Levee, also known as the Northwest Levee, is located on the west bank of the Elm Fork of the Trinity River in Irving, Texas. The levee, approximately 14,500 feet long, is maintained by the City of Irving through the Irving Flood Control District, Unit 1. Components of the Irving Levee include drainage channels, storm water sumps, and storm water pump stations. Currently, the Irving Levee is in need of remediation to regain the 100-year FEMA accreditation. Areas needing remediation are the "duck bill" gates that serve as backflow prevention devices on the sump discharge pipes, pump station upgrades, and a slurry trench cutoff wall to prevent seepage/underseepage under the levee. Currently the "duck bill" gates and the pump station upgrades are underway, while the slurry trench cutoff wall design is being reviewed under Section 408. Approximately $7 million dollars have been spent on repairs since 2005. The City of Irving is currently addressing environmental impacts of the proposed remediation measures under a separate EA.

Interior drainage improvements underway or that are reasonably foreseeable include the construction and/or improvement of the Baker and Pavaho Pump Stations. The Dallas Floodway Extension Project proposes the construction of two additional levees to function in conjunction with the existing East and West Levees. The proposed Lamar Levee on the east side of the Trinity River and the proposed Cadillac Heights Levee on the west side would tie into the existing East and West Levees to more effectively convey floodwaters downstream toward the Great Trinity Forest. The establishment of the "Chain of Wetlands," which are ultimately expected to divert excess water away from the Trinity River and further reduce flood elevations as well as provide a secondary route for Trinity River floodwaters to move through the Great Trinity Forest downstream, are currently underway with four wetland cells south of the Central Wastewater Treatment Plant and three additional wetland cells proposed upstream from the plant. The "Chain of Wetlands" is proposed to be located within the Dallas Floodway just south of the cumulative impacts study area but is anticipated to have a floodwater conveyance effect upstream within the Dallas Floodway.

6.2.2 Recreation and Environmental Restoration

Many of the proposed recreational improvements in the cumulative impacts study area are programmed or planned as part of the proposed *BVP* Ecosystem Restoration and Parks and Recreation projects. One such component of *BVP* Ecosystem Restoration and Parks and Recreation projects proposed for the heart of the Dallas Floodway amid the City of Dallas' densest urban districts is the planned Trinity Lakes Park project. Trinity Lakes Park improvements involve the establishment of three lakes inside the Dallas Floodway between the East and West Levees to serve specific recreational functions. Both passive and active recreational spaces are planned for areas between the East and West Levees adjacent to the lakes. West Dallas Lake, proposed to be approximately 6,560 feet long and 129 total acres, would provide both recreational and competitive boating opportunities for the community and region, while an amphitheater adjacent to the lake would provide a viewing area for rowing competitions. Urban Lake and its associated promenade and arrival plaza would be established under the Margaret Hunt Hill (MHH) Bridge crossing of the Trinity River and would be adjacent to the East and West Levees. The promenade would accommodate 19,000 people during peak events and activities. A water maze appealing to children is also proposed to be adjacent to Urban Lake.

Between Urban Lake and the third proposed lake, Natural Lake, a proposed isthmus would provide an opportunity for canoeists and kayakers to navigate between two water courses. A series of floating wetlands is also proposed for Natural Lake to serve as a design aesthetic, educational demonstration, habitat, and water quality improvement measure. Natural Lake would also feed into the proposed Corinth Wetlands and Oxbow Lake area, designed to be a passive observation area for understanding and appreciating wetland habitats and systems. This proposed environment would be an attraction for migratory birds and other wetland and riparian wildlife. The area would also include birding observation areas, boardwalks, tree groves, and shaded respites. Other recreational amenities associated with the planned *BVP* Ecosystem Restoration and Parks and Recreation projects are proposed upstream and downstream from the East and West Levees.

Other current and reasonably foreseeable recreation and/or environmental restoration projects in the cumulative impacts study area include additional wetlands, trails, the conversion of the Continental Avenue Bridge from a vehicular facility to a bicycle/pedestrian facility, two water sport recreational facilities, and the Trinity Overlook Park. Among the recently constructed and proposed trails are the Trinity Strand Trail, the Santa Fe Trestle Trail, the Belleview Trail Connector, and the Bernal Trail. The planned Dallas Watersports Complex is proposed to include a waterskiing cableway, a pro-shop, snack bar, full-service restaurant, and viewing deck and was scheduled to open in 2011 but has encountered development delays (Dallas Watersports Complex, 2011). The Trinity River Standing Wave includes the construction of an in-stream standing wave for recreational use with additional recreational shore components consisting of a canoe launch, small trails, a parking area, and ingress/egress points (launch and take-out) supported by retaining walls (City of Dallas, 2011). Construction of the Trinity River Standing Wave was completed in 2011 (City of Dallas, 2011). In 2008, the Trinity Overlook Park was completed at Beckley Avenue and Commerce Street (City of Dallas, 2010). The purpose of the

park is to provide a view of the proposed construction of additional improvements planned as components of the Trinity River Corridor Project (City of Dallas, 2010).

6.2.3 Transportation/Utilities Infrastructure

Current and proposed transportation improvements in the cumulative impacts study area include the construction of the MHH Bridge, the construction of the proposed Trinity Parkway, the Hampton Bridge reconstruction, and the proposed reconstruction of the Sylvan Avenue Bridge, among many others. The MHH Bridge, which would provide a connection from Woodall Rodgers Freeway to the west side of the Trinity River from downtown Dallas, is one of three proposed "signature" bridges planned to span the Dallas Floodway. The Trinity Parkway, a proposed nine-mile limited access thoroughfare is proposed to connect U.S. 175 near its juncture with IH 45 to the SH 183/IH 35E juncture to the northwest. The Hampton Bridge reconstruction is planned to result in a new six-lane bridge facility to replace the current four-lane bridge. The Sylvan Avenue Bridge crossing of the Trinity River is the last of the low water crossings and is proposed to be replaced with an improved facility that follows current design and safety standards and would include sidewalks, four travel lanes, and two additional shared bicycle and vehicular lanes. Other transportation projects include, but are not limited to, the planned DART Orange Line proposed to connect existing DART lines to the Irving/Las Colinas area and ultimately provide rail service to the Dallas/Fort Worth International Airport; enhancements to Beckley Avenue; a new bridge crossing the Elm Fork as part of an overall development plan for SH 183; a redesign of IH 30 from Sylvan Avenue to IH 45 and IH 35E from Eighth Street to north of SH 183; enhancements to Riverfront Boulevard; and a proposed streetcar loop that would provide an additional alternative connection between Oak Cliff, West Dallas, and downtown Dallas. Proposed utility projects primarily involve the installation of new infrastructure and the consolidation of existing infrastructure to better serve the evolving goals of the City of Dallas and its interface with the Dallas Floodway.

6.2.4 Land Use and Community Development

Present and reasonably foreseeable land use and community development actions that are inherently related to reasonably foreseeable actions associated with flood risk management, environmental restoration and recreation, and transportation/utilities in the cumulative impacts study area generally involve the revitalization, redevelopment, adaptive reuse, and some preservation of the existing urban landscape. According to the *TRCCLUP*, with the implementation of proposed improvements to the Trinity River Corridor, CBD land uses currently confined to downtown Dallas are planned to extend westward across both the East and West Levees and planned park spaces to the opposite side of the Dallas Floodway. Land west and south of the Dallas Floodway and West Levee is targeted for mixed-use and adaptive reuse development patterns. Many of the existing single-family neighborhoods directly south of the West Levee are proposed to be preserved as traditional residential zones, enhanced, and tied into the river greenbelt. High-density residential development is planned for the area directly south of the IH 30 Bridge crossing the Trinity River. Further high-density residential development is planned for areas adjacent to the Dallas Floodway and East Levee extending north of the Continental Avenue Bridge. Additional mixed-use, transit-oriented developments are planned at DART stations throughout the cumulative impacts study area. The conversion of the Dallas Floodway into a large recreational and environmental observation area is expected to

substantially increase property values and enhance areas of the city adjacent to the floodway and in the cumulative impacts study area.

6.3 Consideration of Resources

In accordance with CEQ regulations regarding cumulative impacts, in order for a cumulative impact to a resource to occur as a result of a proposed action, the proposed action must first have a direct or indirect impact on the respective resource. Cumulative impacts to resources are investigated for both beneficial and adverse direct or indirect impacts as a result of a proposed action. Further, to result in a cumulative impact, resources impacted by a proposed action must also be impacted permanently to the extent that the impacts would have the potential to affect the quality of the resource in the subject environment throughout the temporal scope of the cumulative impacts analysis. Therefore, temporary impacts to resources that would not affect the quality of the resource to the year 2050, which is the temporal horizon for this cumulative impacts analysis, are not considered to have a potential cumulative impact on examined resources. As previously mentioned, because of the substantial indirect impacts related to the No-Action Alternative, and to provide relevant context for cumulative impacts associated with the Proposed Action Alternative, resources indirectly impacted by the No-Action Alternative are also examined in this cumulative impacts assessment.

As represented in **Table 5-9** and discussed in **Sections 5.1** through **5.14**, five resources (land use; socioeconomic conditions; transportation; water resources, specifically floodplains; and archeological resources are anticipated to be adversely impacted by the No-Action Alternative. As represented in **Table 6-2**, six resources (land use; socioeconomic conditions; transportation; water resources, specifically waters and wetlands; biological resources, specifically wildlife habitat and aquatic resources; and cultural resources, including both historic and archeological resources) are anticipated to be permanently impacted, either directly or indirectly and either beneficially or adversely, by the Proposed Action Alternative. The other resources examined (i.e., climate, geology, soils, noise, utilities, HTRW, air quality, and aesthetics/visual resources) will endure only temporary impacts or no impacts. **Table 6-2** considers the anticipated direct/indirect impacts in addition to other reasonably foreseeable future actions to determine the potential for cumulative impacts to various resources associated with the No-Action and Proposed Action Alternatives within the cumulative impacts study area. Resources indicative of cumulative impacts are carried forward in the following cumulative impacts analyses. Those resources that are not anticipated to result in cumulative impacts are not carried forward for further analysis.

Table 6-2: Assessment of Potential Cumulative Impacts by Resource

Resource Category		No-Action Alternative			Proposed Action Alternative		
		Direct/Indirect Impacts + Other Actions = Cumulative Impacts			Direct/Indirect Impacts + Other Actions = Cumulative Impacts		
		Direct/Indirect Impacts*	Other Actions	Cumulative Impacts	Direct/Indirect Impacts*	Other Actions	Cumulative Impacts
Land Use		+	+	+	+	+	+
Socioeconomic Conditions		+	+	+	+	+	+
Transportation		+	+	+	+	+	+
Climate		--	•	•	--	•	•
Geology		--	•	•	--	•	•
Soils		--	•	•	--	•	•
Water Resources	Groundwater Resources	--	•	•	--	•	•
	Lakes, Rivers, and Streams	--	•	•	--	•	•
	Waters of the U.S., including wetlands	--	•	•	+	+	+
	Floodplains	+	+	+	--	•	•
	Water Quality	--	•	•	--	•	•
Biological Resources	Threatened and Endangered Species	--	•	•	--	•	•
	Wildlife Habitat	--	•	•	+	+	+
	Aquatic Resources	--	•	•	+	+	+
Noise		--	•	•	--	•	•
Utilities		--	•	•	--	•	•
Cultural Resources	Historic Resources	+	+	+	+	+	+
	Archeological Resources	+	+	+	+	+	+
HTRW		--	•	•	--	•	•
Air Quality		--	•	•	--	•	•
Aesthetics/Visual Resources		--	•	•	--	•	•

*Notes: *Permanent beneficial or adverse direct or indirect impacts, not temporary impacts, constitute whether or not a cumulative impact is anticipated. Permanent impacts would exist through the temporal horizon, 2050, and thus are accounted as contributing to cumulative impacts.*

Symbols:
+ = Permanent Impact Anticipated
-- = No Permanent Impact Anticipated
• = Not Applicable

6.4 Data and Methodology

Further analyses of cumulative impacts to identified resources rely heavily on adequate, relevant, credible, and readily available data documenting the anticipated impacts of present and reasonably foreseeable future actions on the same resources within the cumulative impacts study area to examine the combined effect of such actions in conjunction with both the No-Action and Proposed Action Alternatives. Data and information sources reviewed and/or used in these cumulative impacts analyses from which anticipated impacts associated with reasonably foreseeable future actions come include the *TRCCLUP*, *Final Programmatic Environmental Impact Statement for the Upper Trinity Basin* (2000), the *Final Supplement 1 to Environmental Impact Statement for the Dallas Floodway Extension* (2003), the City of Dallas' *BVP for the Trinity River Corridor* (2003), the *Trinity Parkway Supplemental Draft Environmental Impact Statement & Draft Section 4(f) Evaluation* (2009), the *Proposed Pavaho Pumping Plant Improvements Final Environmental Assessment* (2010), the NCTCOG *Environmental Review Process for Local Projects Checklist* for the Trinity Strand Trail (2010), the *Northwest Corridor LRT Line to Irving/DFW Airport Final Environmental Impact Statement* (2008), and the *Draft Sylvan Avenue at Trinity River Categorical Exclusion* (2011). It should be noted that the data and information sources consulted are not inclusive of all present and reasonably foreseeable projects investigated in this EA. Additionally, because impacts to potentially affected resources should be investigated from the perspective of how the No-Action Alternative or Proposed Action Alternative would contribute to cumulative impacts, not all impact analyses information included in this cumulative impacts assessment comes from these sources. As a result, some qualitative impact analyses associated with other present or reasonably foreseeable future actions are performed independently of these aforementioned sources. Because the aforementioned sources are limited in scope to investigating only those projects known to be planned or proposed at the time of these studies' production, it is possible that other projects outside the scope of these studies that are implemented between 2011 and 2050 may result in further cumulative impacts to examined resources that these data sources do not capture. Further, because these studies examine resource impacts for various geographic extents that do not match this EA's cumulative impacts study area, cumulative impacts to resources are generally examined using the entire extent of the project limits associated with each reasonably foreseeable project.

Because minimal quantified impact data for land use, socioeconomics, transportation, floodplains, and historic and archeological resources associated with other present or reasonably foreseeable future actions exist or would be difficult to ascertain, the cumulative impact analysis for each of these resources generally qualitatively assesses impacts of both the No-Action and Proposed Action Alternatives in conjunction with other present and reasonably foreseeable future actions and generalizes impacts conceptually. However, sufficient quantified data exist regarding impacts to water resources and biological resources associated with other present and reasonably foreseeable future projects. Therefore, cumulative impact analyses regarding water and biological resources apply a predominantly quantitative approach. These cumulative impacts analyses assume that all present and reasonably foreseeable future actions would be implemented regardless of whether the Proposed Action is implemented and do not assume that there would be a precluding effect on present and reasonably foreseeable future projects if the Proposed Action Alternative is not implemented.

6.5 Cumulative Impacts of the No-Action Alternative

6.5.1 Land Use

As discussed in **Section 5.1.1** and summarized in **Table 6-3**, the No-Action Alternative is anticipated to result in FEMA remapping and more stringent development and building codes. The No-Action Alternative's indirect effect of FEMA remapping is anticipated to further result in the requirement of property owners to purchase flood insurance, the alteration of household consumption activities, the loss of potential revenue for commercial interests, reductions in property values, and reductions in local government tax revenues. The No-Action Alternative's indirect effect of the requirement for development and redevelopment to comply with more stringent development and building codes is anticipated to further result in the likely cessation or delay of currently planned or programmed private development, development-related job losses, and the general ineffectiveness of planning policy guides and economic development plans. The total estimated annual cost to property owners for flood insurance premiums would amount to approximately $43,044,611.

Table 6-3 summarizes impacts to land use associated with other present and reasonably foreseeable future actions. As provided in **Table 6-3**, the majority of anticipated impacts to land uses associated with other present and reasonably foreseeable future actions within the cumulative impacts study area are based on conceptual impact results and are not practicably feasible to quantify. Present and reasonably foreseeable future actions and their corresponding impacts to land use are categorized as either being associated with flood risk management, recreation and environmental restoration, or transportation/utility infrastructure in **Table 6-3**.

As provided in **Table 6-3**, when combined with the effects of the No-Action Alternative, present and reasonably foreseeable future actions that may otherwise collectively contribute to the goal of spurring revitalization within the cumulative impacts study area would likely be suppressed or eliminated by the negative consequences of potential FEMA remapping and more stringent development and building codes. As summarized in **Table 6-3**, aside from this overall effect, the No-Action Alternative in conjunction with other present and reasonably foreseeable future actions would additionally result in the reclamation of approximately 617 acres of land from the floodplain and provide additional protection from flooding for 12,500 additional structures. Approximately 391.2 to 700.2 acres of land would also be converted to transportation, trail, or recreation ROW and easements, and approximately 99 to 177 acres of land would be developed or redeveloped for other uses or development intensities.

6.5.2 Socioeconomic Conditions

As discussed in **Section 5.2.1** and summarized in **Table 6-3**, the No-Action Alternative is anticipated to indirectly result in substantial adverse consequences to socioeconomic conditions. Specific potential indirect impacts involve populations, including low-income and minority populations, absorbing substantial economic impacts of NFIP flood insurance requirements and more stringent development and building codes, deceleration or reversal of population and employment growth trends, the potential disintegration of neighborhood-scale associations and community cohesion, and increased risks to public safety.

Table 6-3 summarizes impacts to socioeconomic conditions associated with other present and reasonably foreseeable future actions. As provided in **Table 6-3**, the majority of anticipated impacts to socioeconomic conditions associated with other present and reasonably foreseeable future actions within the cumulative impacts study area are based on conceptual impact results and are not practicably feasible to quantify. Present and reasonably foreseeable future actions and their corresponding impacts to socioeconomic conditions are categorized as either being associated with flood risk management, recreation and environmental restoration, or transportation/utility infrastructure in **Table 6-3**.

As provided in **Table 6-3**, when combined with the effects of the No-Action Alternative, present and reasonably foreseeable future actions that may otherwise collectively contribute to the preservation and improvement of community cohesion, support continued population and employment growth, contribute to potential increases in land values and socioeconomic status, and partially contribute to redevelopment and revitalization within the cumulative impacts study area would likely be suppressed or eliminated by the negative economic consequences of potential FEMA remapping and more stringent development and building codes. As summarized in **Table 6-3**, aside from this overall effect, the No-Action Alternative in conjunction with other present and reasonably foreseeable future actions would additionally result in approximately 43 to 57 displacements.

6.5.3 Transportation

As discussed in **Section 5.3.1** and summarized in **Table 6-3**, the No-Action Alternative is anticipated to indirectly result in substantial adverse consequences to transportation facilities and activities in the transportation ROI. The FEMA remapping may impose negative effects on future development or redevelopment within the surrounding area and result in a lack of reasonable travel demands for future transportation projects or improvements.

Table 6-3 summarizes impacts to transportation associated with other present and reasonably foreseeable future actions. As provided in **Table 6-3**, the majority of anticipated impacts to transportation associated with other present and reasonably foreseeable future actions within the cumulative impacts study area are based on conceptual impact results and are not practicably feasible to quantify. Present and reasonably foreseeable future actions and their corresponding impacts to transportation are categorized as either being associated with flood risk management, recreation and environmental restoration, or transportation/utility infrastructure in **Table 6-3**.

As provided in **Table 6-3**, when combined with the effects of the No-Action Alternative, the effects of present and reasonably foreseeable future actions that may otherwise collectively improve access, connectivity, and mobility and result in less risk from flood-related impediments to the movement of goods and people would likely be discouraged by potentially being located in a designated flood zone. Further, the effects of FEMA remapping may continue to impose negative effects on future development or redevelopment within the surrounding area and result in a lack of reasonable travel demands for future transportation projects or improvements.

6.5.4 Floodplains

As discussed in **Section 5.5.4.1** and summarized in **Table 6-3**, the No-Action Alternative is anticipated to indirectly result in substantial adverse consequences to floodplains. The No-Action Alternative would not meet FEMA requirements, which would consequently not allow the City of Dallas to regain the 100-year FEMA accreditation. This would result in substantial indirect impact to floodplains because under these circumstances, FEMA may issue revised FIRMs indicating an expanded coverage of the 100-year floodplain.

Table 6-3 summarizes impacts to floodplains associated with other present and reasonably foreseeable future actions. As provided in **Table 6-3**, many of the anticipated impacts to floodplains associated with other present and reasonably foreseeable future actions within the cumulative impacts study area are based on conceptual impact results and are not practicably feasible to quantify. Present and reasonably foreseeable future actions and their corresponding impacts to floodplains are categorized as either being associated with flood risk management, recreation and environmental restoration, or transportation/utility infrastructure in **Table 6-3**.

As provided in **Table 6-3**, cumulatively, the No-Action Alternative may require FEMA to issue revised FIRMs indicating an expanded coverage of the 100-year floodplain, which would potentially require CDC permits for other present and reasonably foreseeable future projects planned within the newly mapped floodplain. Aside from this overall effect, cumulative impacts would result in a +0.15 to +1.21-foot maximum increase in 100-year flood elevations and a -0.7 percent to +2.4 percent change in 100-year flood valley storage within the Dallas Floodway. Some present and reasonably foreseeable future actions would contribute beneficial impacts to the 800-year valley storage within the 100-year floodplain, while others would reduce 800-year valley storage.

6.5.5 Historic and Cultural Resources

As discussed in **Sections 5.9.1.1** and **5.9.2.1** and summarized in **Table 6-3**, the No-Action Alternative is anticipated to indirectly result in substantial adverse consequences to cultural resources. Impacts to historic and cultural resources due to natural causes such as age, wear, erosion, and flood events would continue. Impacts to archeological resources due to natural causes, such as erosion, and flood events would occur and could result in damages to surface sites. Additionally, if new drainage features are formed under flooding conditions, buried archeological sites could either be washed away or buried deeper by sediment and silt.

Table 6-3 summarizes impacts to historic and cultural resources associated with other present and reasonably foreseeable future actions. As provided in **Table 6-3**, the majority of the anticipated impacts to historic and cultural resources associated with other present and reasonably foreseeable future actions within the cumulative impacts study area are based on conceptual impact results and are not practicably feasible to quantify. Present and reasonably foreseeable future actions and their corresponding impacts to historic and cultural resources are categorized as either being associated with flood risk management, recreation and environmental restoration, or transportation/utility infrastructure in **Table 6-3**.

As provided in **Table 6-3**, present and reasonably foreseeable future actions would result in impacts to a range of 2 to 7 historical resources within the cumulative impacts study area. Minor alterations to historic and cultural properties (e.g. Pavaho Pump Station, East and West Levees, and Continental Avenue Bridge) are anticipated but are not considered to be adverse by TxDOT and/or the SHPO. Potential archeological artifacts may be uncovered during construction. Impacts to historic and cultural resources due to natural causes such as age, wear, erosion, and flood events would occur. Specifically, in the event that the levees are breached, floodwaters would inundate developed areas of the City of Dallas and adversely impact NEPA-defined important historic and cultural resources within the cumulative impacts study area. Impacts to archeological resources due to natural causes such as erosion and flood events would also continue to occur and could result in damages to surface sites. Additionally, if new drainage features are formed under flooding conditions, buried archeological sites could either be washed away or buried deeper by sediment and silt.

Table 6-3: Summary of Anticipated Cumulative Impacts - No-Action Alternative

Project Name	Data/Information Source	Resource				
		Land Use	Socioeconomic Conditions	Transportation	Floodplains	Historic and Cultural Resources
FLOOD RISK MANAGEMENT PROJECTS						
O&M Related Deficiencies Corrected as Part of MDCP	City of Dallas	No impacts anticipated.	No impacts anticipated.	No impacts anticipated.	No impacts anticipated.	No impacts anticipated.
O&M Related Deficiencies Corrected in FRM Phase	City of Dallas	No impacts anticipated.	No impacts anticipated.	No impacts anticipated.	No impacts anticipated.	No impacts anticipated.
***BVP* Flood Risk Management**	*TRCCLUP* (2005); *Trinity Parkway Supplemental Draft Environmental Impact Statement & Draft Section 4(f) Evaluation* (2009)	Would reduce flood risk adjacent to the Dallas Floodway and potentially render beneficial impacts to land economics.	Would reduce flood risk adjacent to the Dallas Floodway and render better protection for adjacent populations. May contribute to preservation of community cohesion. May support continued population and employment growth within the cumulative impacts study area.	Would reduce flood risk adjacent to the Dallas Floodway and render better protection against potential flooding of transportation facilities and corresponding economic consequences.	Would result in beneficial effects to 800-year valley storage within the 100-year floodplain.	The reduction of flood risk would improve the flood conveyance integrity of the Dallas Floodway System and generally reduce the risk of flooding to other NEPA-defined important historic and cultural resources within the cumulative impacts study area. Potential archeological artifacts may be uncovered during construction.
Interior Drainage Plan	*TRCCLUP* (2005)	Would improve storm water conveyance, thus decreasing flood risk and corresponding adverse effects to land economics.	Would improve storm water conveyance, thus decreasing flood risk and the corresponding adverse economic effects to adjacent populations. May contribute to preservation of community cohesion. May support continued population and employment growth within the cumulative impacts study area.	Would improve storm water conveyance and better protect against flash flooding of transportation facilities and corresponding economic consequences.	Unknown	The management of storm water conveyance would improve the flood conveyance integrity of the Dallas Floodway System and generally reduce the risk of flooding to other NEPA-defined important historic and cultural resources within the cumulative impacts study area. Potential archeological artifacts may be uncovered during construction.
Baker Pump Station & Gas Lines	*TRCCLUP* (2005)	Would improve storm water conveyance, thus decreasing flood risk and corresponding adverse effects to land economics.	Would improve storm water conveyance, thus decreasing flood risk and the corresponding adverse economic effects to adjacent populations. May contribute to preservation of community cohesion. May support continued population and employment growth within the cumulative impacts study area.	Would improve storm water conveyance and better protect against flash flooding of transportation facilities and corresponding economic consequences.	Unknown	The management of storm water conveyance would improve the flood conveyance integrity of the Dallas Floodway System and generally reduce the risk of flooding to other NEPA-defined important historic and cultural resources within the cumulative impacts study area. Potential archeological artifacts may be uncovered during construction.
Pavaho Pump Station	*Proposed Pavaho Pumping Plant Improvements Final Environmental Assessment* (2010); *TRCCLUP* (2005)	Would improve storm water conveyance, thus decreasing flood risk and corresponding adverse effects to land economics.	Would improve storm water conveyance, thus decreasing flood risk and the corresponding adverse economic effects to adjacent populations. May contribute to preservation of community cohesion. May support continued population and employment growth within the cumulative impacts study area.	Would improve storm water conveyance and better protect against flash flooding of transportation facilities and corresponding economic consequences.	No impacts anticipated.	Would involve alterations, including removing and replacing certain components, to the existing NRHP-eligible Pavaho Pump Station. Would improve the storm water conveyance integrity of interior drainage areas and generally reduce the risk of flooding to other NEPA-defined important historic and cultural resources within the cumulative impacts study area.
Dallas Floodway Extension Project	*Trinity Parkway Supplemental Draft Environmental Impact Statement & Draft Section 4(f) Evaluation* (2009); *TRCCLUP* (2005)	Although impacts associated with this project would be located mostly outside the cumulative impacts study area, the project would reclaim approximately 417 acres of industrial land uses and 200 acres of residential uses from the floodplain. An additional approximately 10,000 structures in Downtown Dallas would have a reduced flood risk with as many as 2,500	The project could result in primarily commercial displacements. South of the cumulative impacts study area, the project would reduce flood risks adjacent to the Dallas Floodway and render better protection for adjacent populations and likely strengthen economic conditions. May contribute to preservation and improvement of community cohesion. May support continued population and	South of the cumulative impacts study area, the project would reduce flood risk adjacent to the Dallas Floodway and render better protection against potential flooding of transportation facilities and corresponding economic consequences.	Would result in beneficial effects to 800-year valley storage within the 100-year floodplain.	No anticipated effect to historical buildings, bridges, or districts in the area. Potential for archeological impacts are likely due to construction of levees, wetlands, and river realignment within the floodway.

Project Name	Data/Information Source	Resource				
		Land Use	**Socioeconomic Conditions**	**Transportation**	**Floodplains**	**Historic and Cultural Resources**
		structures having increased flood risk management along the southern Trinity River corridor.	employment growth within the cumulative impacts study area.			
Irving Levee	N/A	Unknown	Unknown	Unknown	Unknown	
RECREATION AND ENVIRONMENTAL RESTORATION PROJECTS						
BVP* Ecosystem Restoration/*BVP* Parks &Recreation	*Trinity Parkway Supplemental Draft Environmental Impact Statement & Draft Section 4(f) Evaluation* (2009); *TRCCLUP* (2005)	Conversion of approximately 405 acres of land to waters and wetlands within the Dallas Floodway. Conversion of approximately 54 acres of land to ROW. Approximately 50 acres of undeveloped land immediately outside the levees would be developed with no displacements. Plan would result in benefits associated with the creation of additional open space and vegetative buffers and may partially contribute to redevelopment and revitalization as an additional urban recreational and aesthetic amenity that attracts additional investment.	The project would result in no displacements. The establishment of both active and passive open space within and along the Dallas Floodway may partially contribute to increased land values adjacent to the Floodway, increase the socioeconomic status of the general area, and may partially contribute to redevelopment and revitalization.	The project's facilitation of multimodal transportation access would provide a broader range of transportation options and increase mobility and connectivity within the cumulative impacts study area.	Would result in beneficial effects to 800-year valley storage within the 100-year floodplain.	Would likely result in beneficial effects on prevailing historical buildings, bridges, and districts through preservation. Potential archeological artifacts may be uncovered during the creation of lakes, the reconfiguration/realignment of the river, and other development constructed within the Dallas Floodway.
Pavaho Wetlands	*Trinity Parkway Supplemental Draft Environmental Impact Statement & Draft Section 4(f) Evaluation* (2009); *TRCCLUP* (2005)	Conversion of approximately 60 acres to emergent wetlands near the Pavaho Pump Station. No change in availability or amount of developable land within the cumulative impacts study area. The establishment of wetlands as an additional urban aesthetic amenity may partially contribute to redevelopment and revitalization.	Establishment of the Pavaho Wetlands may partially contribute to increased land values, increased socioeconomic status, and may partially contribute to redevelopment and revitalization.	No impacts anticipated.	Would result in beneficial effects to 800-year valley storage within the 100-year floodplain.	Would result in no effect to prevailing historical buildings, bridges, or districts in the area. Potential archeological artifacts may be uncovered due to the construction of wetlands.
Trinity Overlook Park	*TRCCLUP* (2005)	This urban recreational amenity that could attract additional investment may partially contribute to redevelopment and revitalization.	May partially contribute to increased land values, increased socioeconomic status, and may partially contribute to redevelopment and revitalization.	Unknown	Unknown	Unknown
Trinity Strand Trail	NCTCOG *Environmental Review Process for Local Projects Checklist* for the Trinity Strand Trail (2010)	The creation of this additional urban recreational and transportation amenity could attract additional investment and may partially contribute to redevelopment and revitalization.	May contribute to better integration of communities and neighborhoods. May partially contribute to increased land values, increased socioeconomic status, and may partially contribute to redevelopment and revitalization.	The project's implementation of multimodal non-motorized transportation access would provide a broader range of transportation options and increase mobility and connectivity within the cumulative impacts study area.	No impacts anticipated.	No impacts are anticipated per coordination with THC.
Santa Fe Trestle Trail	*Trinity Parkway Supplemental Draft Environmental Impact Statement & Draft Section 4(f) Evaluation* (2009); *TRCCLUP* (2005)	Acquisition of approximately 6.2 acres of easements located within Oncor ROW. The creation of an additional urban recreational and transportation amenity that attracts additional investment may partially contribute to redevelopment and revitalization.	May contribute to better integration of communities and neighborhoods. May partially contribute to increased land values, increased socioeconomic status, and may partially contribute to redevelopment and revitalization.	The project's implementation of multimodal non-motorized transportation access would provide a broader range of transportation options and increase mobility and connectivity within the cumulative impacts study area.	Would result in slightly decreased water surface elevations downstream of the AT&SF bridge structure and minor rises (0.01 feet) at a few locations within the Dallas Floodway during a 100-year storm event.	Would result in no effect to prevailing historical buildings, bridges, or districts, including the AT&SF trestle bridge. Potential archeological artifacts may be uncovered during construction.
Continental Avenue Pedestrian Bridge	*Trinity Parkway Supplemental Draft Environmental Impact Statement & Draft Section 4(f) Evaluation* (2009); *TRCCLUP* (2005)	Conversion to a pedestrian/bicycle bridge as an additional urban recreational and transportation amenity may partially contribute to redevelopment and revitalization.	May contribute to better integration of communities and neighborhoods. May partially contribute to increased land values, increased socioeconomic status, and may partially contribute to redevelopment and revitalization.	The project's implementation of multimodal non-motorized transportation access would provide a broader range of transportation options and increase mobility and connectivity within the cumulative impacts study area.	No impacts anticipated.	No anticipated effect to historical buildings, bridges, or districts in the area. Coordination with the THC occurred related to the proposed conversion to a pedestrian/bicycle bridge. No archeological impacts are anticipated.
Trinity River Standing Wave	*TRCCLUP (2005)*	This urban recreational amenity that attracts additional investment may partially contribute to redevelopment and revitalization.	May partially contribute to increased land values, increased socioeconomic status, and may partially contribute to redevelopment and revitalization.	No impacts anticipated.	Unknown	Unknown
Belleview Trail Connector	N/A	Unknown	Unknown	Unknown	Unknown	Unknown

Project Name	Data/Information Source	Resource				
		Land Use	**Socioeconomic Conditions**	**Transportation**	**Floodplains**	**Historic and Cultural Resources**
Bernal Trail	N/A	Unknown	Unknown	Unknown	Unknown	Unknown
Dallas Watersports Complex	N/A	Unknown	Unknown	Unknown	Unknown	Unknown
TRANSPORTATION/UTILITY INFRASTRUCTURE PROJECTS						
IH 35 Bridges	N/A	Unknown	Unknown	Unknown	Unknown	Unknown
Dallas Water Utilities (DWU) Waterlines	N/A	Unknown	Unknown	Unknown	Unknown	Unknown
IH 30/Margaret McDermott Bridge	*Trinity Parkway Supplemental Draft Environmental Impact Statement & Draft Section 4(f) Evaluation* (2009); *TRCCLUP* (2005)*;* TxDOT	The bridge replacement and added capacity project would likely result in improved access to land uses within the cumulative impacts study area and may partially contribute to redevelopment and revitalization.	Improved access to land within the cumulative impacts study area and potentially induced redevelopment and revitalization may indirectly increase the socioeconomic status of the cumulative impacts study area.	The project involves a bridge replacement and increased capacity; it also is a candidate for a signature design concept.	No impacts anticipated.	Would result in no effect to prevailing historical buildings, bridges, or districts. Potential archeological artifacts may be uncovered during construction.
Jefferson Memorial Bridge	*Trinity Parkway Supplemental Draft Environmental Impact Statement & Draft Section 4(f) Evaluation* (2009); *TRCCLUP* (2005)	Demolition, reconstruction, and realignment of bridge structure would likely result in improved access to land uses within the cumulative impacts study area and may partially contribute to redevelopment and revitalization.	May contribute to better integration of communities and neighborhoods. Improved access to land within the cumulative impacts study area and potentially induced redevelopment and revitalization may indirectly increase the socioeconomic status of the cumulative impacts study area.	The project involves the demolition and reconstruction of the bridge structure and the realignment of the bridge structure 100 to 300 feet downstream of its current crossing of the Trinity River.	No impacts anticipated.	Would result in no effect to prevailing historical buildings, bridges, or districts. Potential archeological artifacts may be uncovered during construction.
Trinity Parkway	*Trinity Parkway Supplemental Draft Environmental Impact Statement & Draft Section 4(f) Evaluation* (2009); *TRCCLUP* (2005)	Approximately 128 – 437 acres of land would be converted to transportation use. Approximately 49 – 127 acres of land redevelopment would be induced by the project. Project would likely result in improved access to land uses within the cumulative impacts study area and may partially contribute to redevelopment and revitalization.	A range of approximately 6 – 20 residential structures could be displaced in predominantly low-income or minority areas depending on the chosen alignment. The economic impacts of tolling would result in a higher proportion of low-income populations' incomes paying for tolls. Improved access to land within the cumulative impacts study area and potentially induced redevelopment and revitalization may indirectly increase the socioeconomic status of the cumulative impacts study area.	The project involves a nine-mile new location tollway that would connect U.S. 175 near its juncture with IH 45 to the SH 183/IH 35E juncture to the northwest. Would provide an ultimate six-lane reliever route generally to the west of downtown Dallas. The project would ease congestion and improve access and mobility within the cumulative impacts study area.	The project would result in +0.14 to +1.20 feet maximum increase in 100-year flood elevation and +0.03 to +0.71 feet maximum increase in the 800-year elevation depending on the chosen alignment. The project would also result in a -0.7% to +2.4% change in 100-year flood valley storage and a -2.1% to +0.1% change in 800-year valley storage depending on the chosen alignment.	Impacts to historic properties range from 3 to 7 resources depending on the chosen alignment. Impacts to archeological artifacts would be limited to areas of high potential. Potential archeological artifacts may be uncovered during construction.
Margaret Hunt Hill Bridge	*Trinity Parkway Supplemental Draft Environmental Impact Statement & Draft Section 4(f) Evaluation* (2009); *TRCCLUP* (2005)	Approximately 30 acres of land converted to transportation use. Project would likely result in improved access to land uses within the cumulative impacts study area and may partially contribute to redevelopment and revitalization.	Would result in a total of 3 non-residential displacements. May contribute to better integration of communities and neighborhoods. Improved access to land within the cumulative impacts study area and potentially induced redevelopment and revitalization may indirectly increase the socioeconomic status of the cumulative impacts study area.	The project would involve a new bridge crossing over the Trinity River from downtown Dallas to West Dallas. Project would provide better motorized connectivity between the Dallas CBD and West Dallas, ease congestion, and improve access and mobility within the cumulative impacts study area.	No impacts anticipated.	Would result in no effect to prevailing historical buildings, bridges, or districts. Potential archeological artifacts may be uncovered during construction.
Hampton Bridge	*Trinity Parkway Supplemental Draft Environmental Impact Statement & Draft Section 4(f) Evaluation* (2009); *TRCCLUP* (2005)	Approximately 1 acre of land converted to transportation use. Project would likely result in improved access to land uses within the cumulative impacts study area and may partially contribute to redevelopment and revitalization.	May contribute to better integration of communities and neighborhoods. Improved access to land within the cumulative impacts study area and potentially induced redevelopment and revitalization may indirectly increase the socioeconomic status of the cumulative impacts study area.	Reconstruction of Hampton Bridge and increased capacity. Project would better connect neighborhoods and communities separated by the Dallas Floodway. Project would ease congestion and increase access and mobility within the cumulative impacts study area.	No impacts anticipated.	Would result in no effect to prevailing historical buildings, bridges, or districts. Potential archeological artifacts may be uncovered during construction.
DART Orange Line	*Northwest Corridor LRT Line to Irving/DFW Airport Final*	Approximately 28 acres of would be converted to use as transit stations, and approximately 49 acres of land would be converted to transportation use	May contribute to better integration of communities and neighborhoods. Improved access to land within the cumulative impacts study area and potentially	Project would connect existing DART lines to the Irving/Las Colinas area and ultimately provide rail service to the	No impacts anticipated.	No impacts to historic properties (NRHP listed or eligible) are anticipated per coordination with the SHPO. The SHPO

Project Name	Data/Information Source	Resource				
		Land Use	**Socioeconomic Conditions**	**Transportation**	**Floodplains**	**Historic and Cultural Resources**
	Environmental Impact Statement (2008); *TRCCLUP* (2005)	for the transit line alignment throughout the entire limits of the project. Project would support more efficient mixed land uses and development/redevelopment.	induced redevelopment and revitalization may indirectly increase the socioeconomic status of the cumulative impacts study area.	Dallas/Fort Worth International Airport. Project would expand multimodal transportation access between key destinations within the region and within the cumulative impacts study area and would provide better connectivity between neighborhoods and communities.		also concurred that the project would not adversely affect archeological resources (NRHP listed or eligible); however, DART committed to geoarcheological backhoe trenching in the floodplain adjacent to Spur 482 prior to construction. If archeological deposits are discovered, the SHPO will be consulted to determine appropriate action and mitigation.
West Levee Norwood 345kV Transmission Line	*Trinity Parkway Supplemental Draft Environmental Impact Statement & Draft Section 4(f) Evaluation* (2009)	No impacts anticipated.	No impacts anticipated.	No impacts anticipated.	No impacts anticipated.	Would result in no effect to prevailing historical buildings, bridges, or districts. Potential archeological artifacts may be uncovered during construction.
Sylvan Avenue Bridge	*Draft Sylvan Avenue at Trinity River Categorical Exclusion* (2011)	Reconstruction of the Sylvan Avenue Bridge and access improvements to Trammell Crow Park may contribute to an accelerated rate of redevelopment with higher density, mixed uses.	The project would help to better connect and integrate neighborhoods currently separated by the Dallas Floodway. Improved access to land within the cumulative impacts study area and potentially induced redevelopment and revitalization may indirectly increase the socioeconomic status of the cumulative impacts study area.	The reconstruction of the Sylvan Avenue Bridge with increased capacity would better connect neighborhoods and communities separated by the Dallas Floodway. Project would ease congestion, and increase access and mobility within the cumulative impacts study area.	No impacts anticipated.	TxDOT historians determined that the project would result in no adverse effect to the East and West Levees. The SHPO concurred that the project would not affect archeological sites or cemeteries.
Beckley Avenue Extension	*Trinity Parkway Supplemental Draft Environmental Impact Statement & Draft Section 4(f) Evaluation* (2009); *TRCCLUP* (2005)	Approximately 5 acres of land converted to transportation use. Project would likely result in improved access to land uses within the cumulative impacts study area and may partially contribute to redevelopment and revitalization.	Improved access to land within the cumulative impacts study area and potentially induced redevelopment and revitalization may indirectly increase the socioeconomic status of the cumulative impacts study area.	Project would involve widening for increased capacity. Project would better connect neighborhoods and communities and improve access and mobility within the cumulative impacts study area.	No impacts anticipated.	Would result in no effect to prevailing historical buildings, bridges, or districts. Archeological impacts are not likely due to highly urbanized development within the surrounding area.
SH 183 Bridge	*Trinity Parkway Supplemental Draft Environmental Impact Statement & Draft Section 4(f) Evaluation* (2009); *TRCCLUP* (2005)	Approximately 1 acre of land converted to transportation use. Project would likely result in improved access to land uses within the cumulative impacts study area and may partially contribute to redevelopment and revitalization.	Would result in 2 non-residential displacements. Improved access to land within the cumulative impacts study area and potentially induced redevelopment and revitalization may indirectly increase the socioeconomic status of the cumulative impacts study area.	Project would involve added capacity that would improve access and mobility in the region and within the cumulative impacts study area.	No impacts anticipated.	Would result in no effect to prevailing historical buildings, bridges, or districts. Archeological impacts are not likely due to highly urbanized development within the surrounding area.
Pegasus Project	*Trinity Parkway Supplemental Draft Environmental Impact Statement & Draft Section 4(f) Evaluation* (2009); *TRCCLUP* (2005)	Approximately 73 acres of land converted to transportation use. Project would likely result in improved access to land uses within the cumulative impacts study area and may partially contribute to redevelopment and revitalization.	Would result in an estimated 22 total displacements. Improved access to land within the cumulative impacts study area and potentially induced redevelopment and revitalization may indirectly increase the socioeconomic status of the cumulative impacts study area.	Project would reconstruct the IH 30/IH 35E interchange and increase highway capacity that would improve access and mobility in the region and within the cumulative impacts study area.	No impacts anticipated.	Would result in no effect to prevailing historical buildings, bridges, or districts. Provides for the rehabilitation of the Houston Street viaduct under a mitigation agreement with the THC. Archeological impacts are not likely due to highly urbanized development within the surrounding area.
Riverfront Boulevard	*Trinity Parkway Supplemental Draft Environmental Impact Statement & Draft Section 4(f) Evaluation* (2009); *TRCCLUP* (2005)	Approximately 16 acres of land converted to transportation use. Project would likely result in improved access to land uses within the cumulative impacts study area and may partially contribute to redevelopment and revitalization.	Would result in an estimated 10 non-residential displacements. May contribute to better integration of communities and neighborhoods. Improved access to land within the cumulative impacts study area and potentially induced redevelopment and revitalization may indirectly increase the socioeconomic status of the cumulative impacts study area.	Project would increase capacity and improve access and mobility within the cumulative impacts study area.	No impacts anticipated.	Potential impacts to 2 historic structures; however, coordination with the SHPO would result in no effect on prevailing historic buildings, bridges, or districts. Archeological impacts are not likely due to highly urbanized development within the surrounding area.

Project Name	Data/Information Source	Resource				
		Land Use	**Socioeconomic Conditions**	**Transportation**	**Floodplains**	**Historic and Cultural Resources**
Trinity Lakes Street Car Loop	N/A	Unknown	Unknown	Unknown	Unknown	Unknown
NO-ACTION ALTERNATIVE	Sections 5.1.1, 5.2.1, 5.3.1, 5.5.4.1, 5.9.1.1, and 5.9.2.1 of this EA.	The No-Action Alternative would result in FEMA remapping, which would further result in the requirement of property owners to purchase flood insurance, alteration of household consumption activities, loss of potential revenue for commercial interests, reduction in property values, and reduction in local government tax revenue as well as more stringent development and building codes. These adverse impacts would further result in the likely cessation or delay of currently planned or programmed private development, development-related job losses, and the general ineffectiveness of planning policy guides and economic development plans. The total estimated annual cost to property owners for flood insurance premiums would amount to approximately $43,044,611.	Potential indirect impacts include low-income and minority populations absorbing substantial economic impacts of NFIP flood insurance requirements and more stringent building and development codes, deceleration or reversal of population and employment growth trends, potential disintegration of neighborhood-scale associations and community cohesion, and increased risks to public safety.	The No-Action Alternative would result in FEMA remapping, which may impose negative effects on future development or redevelopment within the surrounding area and result in a lack of reasonable travel demands for future transportation projects or improvements.	The No-Action Alternative would not meet FEMA requirements, which would consequently not allow the City of Dallas to regain the 100-year FEMA accreditation. This would result in a substantial indirect impact to floodplains because under these circumstances, FEMA may issue revised FIRMs indicating an expanded coverage of the 100-year floodplain.	Impacts to historic, cultural, and archeological resources due to natural causes such as erosion and flood events would occur and could result in damages to surface sites.
CUMULATIVE IMPACTS SUMMARY		Flood risk management, recreation and environmental restoration, and transportation/utility infrastructure projects that would otherwise collectively contribute to the goal of spurring revitalization within the cumulative impacts study area would likely be suppressed or eliminated by the negative economic consequences of potential FEMA remapping and more stringent development and building codes. Reclamation of approximately 617 acres of land from the floodplain and additional protection from flooding for 12,500 structures. Conversion of approximately 391.2 to 700.2 acres of land to transportation, trail, or recreation ROW and easements. Development or redevelopment of approximately 99 to 177 acres of land to other uses or development intensities.	Flood risk management, recreation and environmental restoration, and transportation/utility infrastructure projects that may otherwise collectively contribute to the preservation and improvement of community cohesion, support continued population and employment growth, contribute to potential increases in land values and socioeconomic status, and partially contribute to redevelopment and revitalization would likely be suppressed or eliminated by the negative economic consequences of potential FEMA remapping, more stringent development and building codes, and lack of reduced flood risk adjacent to the Dallas Floodway System. Present and reasonably foreseeable future actions would result in approximately 43 to 57 displacements.	Flood risk management, recreation and environmental restoration, and transportation/utility infrastructure projects that may otherwise collectively improve access, connectivity, and mobility would likely be discouraged as a result of being located in designated flood zones with the No-Action Alternative. FEMA remapping may impose negative effects on future development or redevelopment within the surrounding area and result in a lack of reasonable travel demands for future transportation projects or improvements.	The No-Action Alternative may require FEMA to issue revised FIRMs indicating an expanded coverage of the 100-year floodplain, which would potentially require CDC permits for projects planned within the newly mapped floodplain. Present and reasonably foreseeable future actions would result in + 0.15 to +1.21 feet maximum increase in 100-year flood elevations within the Dallas Floodway. Present and reasonably foreseeable future actions would result in a -0.7% to +2.4% change in 100-year flood valley storage. Some projects would contribute beneficial impacts to 800-year valley storage within the 100-year floodplain while others would reduce the 800-year valley storage.	Present and reasonably foreseeable future actions would result in impacts to a range of 2 to 7 historic and cultural resources within the cumulative impacts study area. Minor alterations to historic and cultural properties (e.g. Pavaho Pump Station, East and West Levees, and Continental Avenue Bridge) are anticipated but are not considered to be adverse by TxDOT and/or the SHPO. Potential archeological artifacts may be uncovered during construction. Impacts to historic, cultural, and archeological resources due to natural causes such as age, wear, erosion, and flood events would occur and could result in damages to surface sites.

*The BVP Ecosystem Restoration and Parks and Recreation projects were combined because of their mutually complementary effects.
When an impact is indicated as unknown, no credible and readily available data sources provide information for those projects revealing impacts to examined resources. When an impact is indicated as "No impact," data sources or other analyses indicate that the respective present or reasonably foreseeable project would not result in an impact to examined resources.

6.6 Cumulative Impacts of the Proposed Action Alternative

6.6.1 Land Use

As discussed in **Section 5.1.2** and summarized in **Table 6-4**, the Proposed Action Alternative would result in beneficial indirect impacts to land use. Specifically, the Proposed Action Alternative is anticipated to result in the Dallas Floodway System's aversion of substantial adverse indirect economic consequences as a result of reaccreditation by FEMA and avoidance of substantial economic consequences stemming from more stringent development and building codes.

Table 6-4 summarizes impacts to land use associated with other present and reasonably foreseeable future actions. As provided in **Table 6-4**, the majority of anticipated impacts to land uses associated with other present and reasonably foreseeable future actions within the cumulative impacts study area are based on conceptual impact results and are not practicably feasible to quantify. Present and reasonably foreseeable future actions and their corresponding impacts to land use are categorized as either being associated with flood risk management, recreation and environmental restoration, or transportation/utility infrastructure in **Table 6-4**.

As provided in **Table 6-4**, when combined with the effects of the Proposed Action Alternative, present and reasonably foreseeable future actions related to flood risk management would reduce flood risk adjacent to the Dallas Floodway and improve storm water conveyance of interior drainage areas rendering beneficial impacts to land use and socioeconomics conditions. Present and reasonably foreseeable future actions combined with the Proposed Action Alternative may also result in potential increases in land values, additional and accelerated investment, and induced redevelopment and revitalization. As summarized in **Table 6-4**, aside from these overall effects, the Proposed Action Alternative in conjunction with other present and reasonably foreseeable future actions would additionally result in the reclamation of approximately 617 acres of land from the floodplain and provide additional protection from flooding for 12,500 additional structures. Approximately 391.2 to 700.2 acres of land would also be converted to transportation, trail, or recreation ROW and easements, and approximately 99 to 177 acres of land would be developed or redeveloped for other uses or development intensities.

6.6.2 Socioeconomic Conditions

As discussed in **Section 5.2.2** and summarized in **Table 6-4**, the Proposed Action Alternative is anticipated to indirectly result in beneficial impacts to socioeconomic conditions. Specific potential indirect impacts include the avoidance of the adverse effects of FEMA remapping and stricter development and building codes on existing populations and on population and employment growth. This effect would additionally allow low-income and minority populations to avoid the economic and financial consequences of FEMA remapping. The Proposed Action Alternative would also likely contribute to greater connectivity and integration of neighborhoods and between neighbor hoods, which would preserve and perhaps improve community cohesion.

Table 6-4 summarizes impacts to socioeconomic conditions associated with other present and reasonably foreseeable future actions. As provided in **Table 6-4**, the majority of anticipated impacts to socioeconomic conditions associated with other present and reasonably foreseeable

future actions within the cumulative impacts study area are based on conceptual impact results and are not practicably feasible to quantify. Present and reasonably foreseeable future actions and their corresponding impacts to socioeconomic conditions are categorized as either being associated with flood risk management, recreation and environmental restoration, or transportation/utility infrastructure in **Table 6-4**.

As provided in **Table 6-4**, when combined with the effects of the Proposed Action Alternative, present and reasonably foreseeable future actions may result in an increase in socioeconomic status of population within the cumulative impacts study area, support for continued population and employment growth, and better integration of communities and neighborhoods. Cumulative actions would also result in reduced flood risk adjacent to the Dallas Floodway and improved storm water conveyance of interior drainage areas that would strengthen economic conditions and improve community cohesion. As summarized in **Table 6-4**, in addition to these beneficial effects, the Proposed Action Alternative in conjunction with other present and reasonably foreseeable future actions would result in approximately 43 to 57 displacements.

6.6.3 Transportation

As discussed in **Section 5.3.2** and summarized in **Table 6-4**, the Proposed Action Alternative is anticipated to result in beneficial impacts to transportation. Avoidance of FEMA remapping would allow existing and projected travel demands to continue to define the need for future transportation projects and improvements.

Table 6-4 summarizes impacts to transportation associated with other present and reasonably foreseeable future actions. As provided in **Table 6-4**, the majority of anticipated impacts to transportation associated with other present and reasonably foreseeable future actions within the cumulative impacts study area are based on conceptual impact results and are not practicably feasible to quantify. Present and reasonably foreseeable future actions and their corresponding impacts to transportation are categorized as either being associated with flood risk management, recreation and environmental restoration, or transportation/utility infrastructure in **Table 6-4**.

As provided in **Table 6-4**, when combined with the effects of the Proposed Action Alternative, the effects of present and reasonably foreseeable future actions would improve access, connectivity, and mobility and less risk from flood-related impediments to the movement of goods and people and corresponding economic consequences. Further, avoidance of FEMA remapping would allow existing and projected travel demands to continue to define the need for future transportation projects and improvements.

6.6.4 Water Resources

As discussed in **Section 5.5.3.2** and summarized in **Table 6-4**, the Proposed Action Alternative is anticipated to result in minor permanent impacts to waters of the U.S., including wetlands. More specifically, the Proposed Action Alternative may potentially permanently impact approximately 0.44 acre of water features and 0.03 acre of wetlands, equating to a total impact of 0.47 acre.

Table 6-4 summarizes impacts to water resources, specifically waters and wetlands, associated with other present and reasonably foreseeable future actions. As provided in **Table 6-4**, anticipated impacts to water resources associated with other present and reasonably foreseeable future actions within the cumulative impacts study area are quantified as acres that would be impacted. Present and reasonably foreseeable future actions and their corresponding impacts to water resources are categorized as either being associated with flood risk management, recreation and environmental restoration, or transportation/utility infrastructure in **Table 6-4**.

As provided in **Table 6-4**, cumulative impacts to water resources within the cumulative impacts study area would involve the approximately 0.47 acre of permanent impacts to waters of the U.S., including wetlands, associated with the Proposed Action Alternative combined with the net gain or loss of additional water resources as a result of other present and reasonably foreseeable future actions. The total cumulative impact to water resources involves a gain of approximately 346.7 acres to 453.7 acres of water or wetland features within the cumulative impacts study area as summarized in **Table 6-4**.

6.6.5 Biological Resources

As discussed in **Section 5.6.2.2** and summarized in **Table 6-4**, the Proposed Action Alternative is anticipated to result in minor permanent impacts to biological resources, specifically wildlife habitat and aquatic resources. More specifically, the Proposed Action Alternative may potentially permanently impact approximately 1.2 acres of grassland habitat, 0.01 acre of urban habitat, and 10 mature trees.

Table 6-4 summarizes impacts to biological resources, specifically wildlife habitat, associated with other present and reasonably foreseeable future actions. As provided in **Table 6-4**, anticipated impacts to wildlife habitat associated with other present and reasonably foreseeable future actions within the cumulative impacts study area are quantified as acres that would be impacted. Present and reasonably foreseeable future actions and their corresponding impacts to wildlife habitat are categorized as either being associated with flood risk management, recreation and environmental restoration, or transportation/utility infrastructure in **Table 6-4**.

As provided in **Table 6-4**, cumulative impacts to wildlife habitat within the cumulative impacts study area would involve the approximately 1.2 acres of permanent impacts to grassland habitat, 0.01 acre of permanent impacts to urban habitats, and 10 mature trees associated with the Proposed Action Alternative combined with the net gain or loss of additional wildlife habitat as a result of other present and reasonably foreseeable future actions. The total cumulative impact to wildlife habitat involves a net loss of approximately 753.31 acres to 1,314.31 acres of urban/grassland/herbaceous habitat, a net gain of 346.8 acres to 453.8 acres of aquatic/wetland habitat, a net gain 224.3 acres to 249.3 acres of woodland habitat, and a loss of 10 mature trees.

6.6.6 Historic and Cultural Resources

As discussed in **Sections 5.9.1.2** and **5.9.2.2** and summarized in **Table 6-4**, the Proposed Action Alternative is anticipated to indirectly result in beneficial impacts to cultural resources. The Proposed Action Alternative has the potential to impact historic and cultural resources; however, after construction, the cutoff walls would not be visible and would not adversely impact the

ability of the Dallas Floodway to convey its significance as a historic and cultural resource as defined under NEPA. The Proposed Action Alternative would enhance the ability of the Dallas Floodway to convey its significance by protecting the integrity of the levees and would allow the Dallas Floodway to function as it was designed.

Table 6-4 summarizes impacts to historic and cultural resources associated with other present and reasonably foreseeable future actions. As provided in **Table 6-4**, the majority of the anticipated impacts to historic and cultural resources associated with other present and reasonably foreseeable future actions within the cumulative impacts study area are based on conceptual impact results and are not practicably feasible to quantify. Present and reasonably foreseeable future actions and their corresponding impacts to historic and cultural resources are categorized as either being associated with flood risk management, recreation and environmental restoration, or transportation/utility infrastructure in **Table 6-4**.

As provided in **Table 6-4**, when combined with the effects of the Proposed Action Alternative, present and reasonably foreseeable future actions may result in impacts to a range of 2 to 7 historical resources within the cumulative impacts study area, minor alterations to historic and cultural properties (e.g. Pavaho Pump Station, East and West Levees, and Continental Avenue Bridge), uncovering of potential archeological artifacts, and protection of the integrity of the levees which would allow the Dallas Floodway to continue to function as it was designed.

Table 6-4: Summary of Anticipated Cumulative Impacts - Proposed Action Alternative

Project Name	Data/Information Source	Resource					
		Land Use	Socioeconomic Conditions	Transportation	Water Resources	Biological Resources	Historic and Cultural Resources
FLOOD RISK MANAGEMENT PROJECTS							
O&M Related Deficiencies Corrected as Part of MDCP	City of Dallas	No impacts anticipated.	No impacts anticipated.	No impacts anticipated.	No impacts anticipated.	No impacts anticipated.	No impacts anticipated.
O&M Related Deficiencies Corrected in FRM Phase	City of Dallas	No impacts anticipated.	No impacts anticipated.	No impacts anticipated.	No impacts anticipated.	No impacts anticipated.	No impacts anticipated.
***BVP* Flood Risk Management**	*TRCCLUP* (2005); *Trinity Parkway Supplemental Draft Environmental Impact Statement & Draft Section 4(f) Evaluation* (2009)	Would reduce flood risk adjacent to the Dallas Floodway and potentially render beneficial impacts to land economics.	Would reduce flood risk adjacent to the Dallas Floodway and render better protection for adjacent populations. May contribute to preservation of community cohesion. May support continued population and employment growth within the cumulative impacts study area.	Would reduce flood risk adjacent to the Dallas Floodway and render better protection against potential flooding of transportation facilities and corresponding economic consequences.	Unknown	Unknown	The reduction of flood risk would improve the flood conveyance integrity of the Dallas Floodway System and generally reduce the risk of flooding to other NEPA-defined important historic and cultural resources within the cumulative impacts study area. Potential archeological artifacts may be uncovered during construction.
Interior Drainage Plan	*TRCCLUP* (2005)	Would improve storm water conveyance, thus decreasing flood risk and corresponding adverse effects to land economics.	Would improve storm water conveyance, thus decreasing flood risk and the corresponding adverse economic effects to adjacent populations. May contribute to preservation of community cohesion. May support continued population and employment growth within the cumulative impacts study area.	Would improve storm water conveyance and better protect against flash flooding of transportation facilities and corresponding economic consequences.	Unknown	Unknown	The management of storm water conveyance would improve the flood conveyance integrity of the Dallas Floodway System and generally reduce the risk of flooding to other NEPA-defined important historic and cultural resources within the cumulative impacts study area. Potential archeological artifacts may be uncovered during construction.
Baker Pump Station & Gas Lines	*TRCCLUP* (2005)	Would improve storm water conveyance, thus decreasing flood risk and corresponding adverse effects to land economics.	Would improve storm water conveyance, thus decreasing flood risk and the corresponding adverse economic effects to adjacent populations. May contribute to preservation of community cohesion. May support continued population and employment growth within the cumulative impacts study area.	Would improve storm water conveyance and better protect against flash flooding of transportation facilities and corresponding economic consequences.	Unknown	Unknown	The management of storm water conveyance would improve the flood conveyance integrity of the Dallas Floodway System and generally reduce the risk of flooding to other NEPA-defined important historic and cultural resources within the cumulative impacts study area. Potential archeological artifacts may be uncovered during construction.
Pavaho Pump Station	*Proposed Pavaho Pumping Plant Improvements Final Environmental Assessment* (2010)	Would improve storm water conveyance, thus decreasing flood risk and corresponding adverse effects to land economics.	Would improve storm water conveyance, thus decreasing flood risk and the corresponding adverse economic effects to adjacent populations. May contribute to preservation of community cohesion preservation. May support continued population and employment growth within the cumulative impacts study area.	Would improve storm water conveyance and better protect against flash flooding of transportation facilities and corresponding economic consequences.	-1.37 acres total (-0.09 acre of jurisdictional waters and -1.28 acres of non-jurisdictional waters)	-0.95 acre urban/grassland habitat -1.37 acres of aquatic/wetland habitat	Would involve alterations, including removing and replacing certain components, to the existing NRHP-eligible Pavaho Pump Station. Would improve the storm water conveyance integrity of interior drainage areas and generally reduce the risk of flooding to other NEPA-defined important historic and cultural resources within the cumulative impacts study area.

Project Name	Data/Information Source	Resource					
		Land Use	**Socioeconomic Conditions**	**Transportation**	**Water Resources**	**Biological Resources**	**Historic and Cultural Resources**
Dallas Floodway Extension Project	*Trinity Parkway Supplemental Draft Environmental Impact Statement & Draft Section 4(f) Evaluation* (2009); *TRCCLUP* (2005)	Although impacts associated with this project would be located mostly outside the cumulative impacts study area, the project would reclaim approximately 417 acres of industrial land uses and 200 acres of residential uses from the floodplain. An additional approximately 10,000 structures in Downtown Dallas would have a reduced flood risk with as many as 2,500 structures having increased flood risk management along the southern Trinity River corridor.	The project could result in primarily commercial displacements. South of the cumulative impacts study area, the project would reduce flood risks adjacent to the Dallas Floodway and render better protection for adjacent populations and likely strengthen economic conditions. May contribute to preservation and improvement of community cohesion. May support continued population and employment growth within the cumulative impacts study area.	South of the cumulative impacts study area, the project would reduce flood risk adjacent to the Dallas Floodway and render better protection against potential flooding of transportation facilities and corresponding economic consequences.	No impacts anticipated within the cumulative impacts study area.	No impacts anticipated within the cumulative impacts study area.	No anticipated effect to historical buildings, bridges, or districts in the area. Potential for archeological impacts are likely due to construction of levees, wetlands, and river realignment within the floodway.
Irving Levee	N/A	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
RECREATION AND ENVIRONMENTAL RESTORATION PROJECTS							
BVP* Ecosystem Restoration/*BVP* Parks &Recreation	*Trinity Parkway Supplemental Draft Environmental Impact Statement & Draft Section 4(f) Evaluation* (2009); *TRCCLUP* (2005)	Conversion of approximately 405 acres of land to waters and wetlands within the Dallas Floodway. Conversion of approximately 54 acres of land to ROW. Approximately 50 acres of undeveloped land immediately outside the levees would be developed with no displacements. Plan would result in benefits associated with the creation of additional open space and vegetative buffers and may partially contribute to redevelopment and revitalization as an additional urban recreational and aesthetic amenity that attracts additional investment.	The project would result in no displacements. The establishment of both active and passive open space within and along the Dallas Floodway may partially contribute to increased land values adjacent to the Floodway, increase the socioeconomic status of the general area, and may partially contribute to redevelopment and revitalization.	Project's facilitation of multimodal transportation access would provide a broader range of transportation options and increase mobility and connectivity within the cumulative impacts study area.	+ 405 acres of waters of the U.S., including wetlands	-665 acres of grassland/herbaceous habitat +405 acres of aquatic/wetland habitat +260 acres of woodland habitat	Would likely result in beneficial effects on prevailing historical buildings, bridges, and districts through preservation. Potential archeological artifacts may be uncovered during the creation of lakes, the reconfiguration/realignment of the river, and other development constructed within the Dallas Floodway.
Pavaho Wetlands	*Trinity Parkway Supplemental Draft Environmental Impact Statement & Draft Section 4(f) Evaluation* (2009); *TRCCLUP* (2005)	Conversion of approximately 60 acres to emergent wetland near the Pavaho Pump Station. No change in availability or amount of developable land within the cumulative impacts study area. The establishment of wetlands as an additional urban aesthetic amenity may partially contribute to redevelopment and revitalization.	Establishment of the Pavaho Wetlands may partially contribute to increased land values, increased socioeconomic status, and redevelopment and revitalization.	No impacts anticipated.	+ 60 acres of emergent wetlands	-60 acres of grassland/herbaceous habitat + 60 acres aquatic/wetland habitat	Would result in no effect to prevailing historical buildings, bridges, or districts in the area. Potential archeological artifacts may be uncovered due to the construction of wetlands.
Trinity Overlook Park	*TRCCLUP* (2005)	This urban recreational amenity that could attract additional investment may partially contribute to redevelopment and revitalization.	May partially contribute to increased land values, increased socioeconomic status, and may partially contribute to redevelopment and revitalization.	Unknown	Unknown	Unknown	Unknown
Trinity Strand Trail	NCTCOG *Environmental Review Process for Local Projects Checklist* for the Trinity Strand Trail (2010)	The creation of this additional urban recreational and transportation amenity could attract additional investment and may partially contribute to redevelopment and revitalization.	May contribute to better integration of communities and neighborhoods. May partially contribute to increased land values, increased socioeconomic status, and may partially contribute to redevelopment and revitalization.	The project's implementation of multimodal non-motorized transportation access would provide a broader range of transportation options and increase mobility and	-0.02 acre of jurisdictional waters	-3.45 acres of urban grassland habitat -0.02 acre of aquatic/wetland habitat	No impacts are anticipated per coordination with THC.

Project Name	Data/Information Source	Resource					
		Land Use	**Socioeconomic Conditions**	**Transportation**	**Water Resources**	**Biological Resources**	**Historic and Cultural Resources**
				connectivity within the cumulative impacts study area.			
Santa Fe Trestle Trail	*Trinity Parkway Supplemental Draft Environmental Impact Statement & Draft Section 4(f) Evaluation* (2009); *TRCCLUP* (2005)	Acquisition of approximately 6.2 acres of easements located within Oncor ROW. The creation of an additional urban recreational and transportation amenity that attracts additional investment may partially contribute to redevelopment and revitalization.	May contribute to better integration of communities and neighborhoods. May partially contribute to increased land values, increased socioeconomic status, and may partially contribute to redevelopment and revitalization.	The project's implementation of multimodal non-motorized transportation access would provide a broader range of transportation options and increase mobility and connectivity within the cumulative impacts study area.	-2.40 acres (-0.88 acre of forested wetlands and -1.52 acres of emergent wetlands)	-4.23 acres of grassland/herbaceous habitat -2.40 acres of aquatic/wetland habitat -1.07 acres of woodland habitat	Would result in no effect to prevailing historical buildings, bridges, or districts, including the AT&SF trestle bridge. Potential archeological artifacts may be uncovered during construction.
Continental Avenue Pedestrian Bridge	*Trinity Parkway Supplemental Draft Environmental Impact Statement & Draft Section 4(f) Evaluation* (2009); *TRCCLUP* (2005)	Conversion to a pedestrian/bicycle bridge as an additional urban recreational and transportation amenity may partially contribute to redevelopment and revitalization.	May contribute to better integration of communities and neighborhoods. May partially contribute to increased land values, increased socioeconomic status, and may partially contribute to redevelopment and revitalization.	The project's implementation of multimodal non-motorized transportation access would provide a broader range of transportation options and increase mobility and connectivity within the cumulative impacts study area.	No impacts anticipated.	No impacts anticipated.	No anticipated effect to historical buildings, bridges, or districts in the area. Coordination with the THC occurred related to the proposed conversion to a pedestrian/bicycle bridge. No archeological impacts are anticipated.
Trinity River Standing Wave	*TRCCLUP (2005)*	The creation of an additional urban recreational amenity that attracts additional investment may partially contribute to redevelopment and revitalization.	May partially contribute to increased land values, increased socioeconomic status, and may partially contribute to redevelopment and revitalization.	No impacts anticipated.	Unknown	Unknown	Unknown
Belleview Trail Connector	N/A	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Bernal Trail	N/A	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Dallas Watersports Complex	N/A	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
TRANSPORTATION/UTILITY INFRASTRUCTURE PROJECTS							
IH 35 Bridges	N/A	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Dallas Water Utilities (DWU) Waterlines	N/A	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
IH 30/Margaret McDermott Bridge	*Trinity Parkway Supplemental Draft Environmental Impact Statement & Draft Section 4(f) Evaluation* (2009); *TRCCLUP* (2005*);* TxDOT	Bridge replacement and added capacity project would likely result in improved access to land uses within the cumulative impacts study area and may partially contribute to redevelopment and revitalization.	Improved access to land within the cumulative impacts study area and potentially induced redevelopment and revitalization may indirectly increase the socioeconomic status of the cumulative impacts study area.	The project involves a bridge replacement and increased capacity; it is also is a candidate for a signature design concept.	No impacts anticipated.	No impacts anticipated.	Would result in no effect to prevailing historical buildings, bridges, or districts. Potential archeological artifacts may be uncovered during construction.
Jefferson Memorial Bridge	*Trinity Parkway Supplemental Draft Environmental Impact Statement & Draft Section 4(f) Evaluation* (2009); *TRCCLUP* (2005)	Demolition, reconstruction, and realignment of bridge structure would likely result in improved access to land uses within the cumulative impacts study area and may partially contribute to redevelopment and revitalization.	May contribute to better integration of communities and neighborhoods. Improved access to land within the cumulative impacts study area and potentially induced redevelopment and revitalization may indirectly increase the socioeconomic status of the cumulative impacts study area.	The project involves the demolition and reconstruction of the bridge structure; Realignment of bridge structure 100 to 300 feet downstream of its current crossing of the Trinity River.	No impacts anticipated.	No impacts anticipated.	Would result in no effect to prevailing historical buildings, bridges, or districts. Potential archeological artifacts may be uncovered during construction.
Trinity Parkway	*Trinity Parkway Supplemental Draft Environmental Impact Statement & Draft Section 4(f) Evaluation* (2009); *TRCCLUP*	Approximately 128 – 437 acres of land would be converted to transportation use. Approximately 49 – 127 acres of land redevelopment would be induced by the project. Project would likely result in	A range of approximately 6 – 20 residential structures could be displaced in predominantly low-income or minority areas depending on the chosen alignment. The economic impacts of tolling would result in a higher proportion of low-income populations' incomes paying for tolls. Improved access to land within the cumulative	The project involves a nine-mile new location tollway that would connect U.S. 175 near its juncture with IH 45 to the SH 183/IH 35E juncture to the northwest. Would provide an ultimate six-lane	-4 acres to -111 acres of water or wetland features	-12 acres to -573 acres of grassland/herbaceous habitat -4 acres to -111 acres of aquatic/wetland habitat	Impacts to historic properties range from 3 to 7 resources depending on the chosen alignment. Impacts to archeological artifacts would be limited to areas of high potential. Potential archeological artifacts may

Project Name	Data/Information Source	Resource					
		Land Use	**Socioeconomic Conditions**	**Transportation**	**Water Resources**	**Biological Resources**	**Historic and Cultural Resources**
	(2005)	improved access to land uses within the cumulative impacts study area and may partially contribute to redevelopment and revitalization.	impacts study area and potentially induced redevelopment and revitalization may indirectly increase the socioeconomic status of the cumulative impacts study area.	reliever route generally to the west of downtown Dallas. The project would ease congestion and improve access and mobility within the cumulative impacts study area.		-5 acres to -30 acres of woodland habitat	be uncovered during construction.
Margaret Hunt Hill Bridge	*Trinity Parkway Supplemental Draft Environmental Impact Statement & Draft Section 4(f) Evaluation* (2009); *TRCCLUP* (2005)	Approximately 30 acres of land converted to transportation use. Project would likely result in improved access to land uses within the cumulative impacts study area and may partially contribute to redevelopment and revitalization.	Would result in a total of 3 non-residential displacements. May contribute to better integration of communities and neighborhoods. Improved access to land within the cumulative impacts study area and potentially induced redevelopment and revitalization may indirectly increase the socioeconomic status of the cumulative impacts study area.	The project would involve a new bridge crossing over the Trinity River from downtown Dallas to West Dallas. Project would provide better motorized connectivity between the Dallas CBD and West Dallas, ease congestion, and improve access and mobility within the cumulative impacts study area.	-0.10 acre of water or wetland features	-0.50 acre of riparian woodland habitat	Would result in no effect to prevailing historical buildings, bridges, or districts. Potential archeological artifacts may be uncovered during construction.
Hampton Bridge	*Trinity Parkway Supplemental Draft Environmental Impact Statement & Draft Section 4(f) Evaluation* (2009); *TRCCLUP* (2005)	Approximately 1 acre of land converted to transportation use. Project would likely result in improved access to land uses within the cumulative impacts study area and may partially contribute to redevelopment and revitalization.	May contribute to better integration of communities and neighborhoods. Improved access to land within the cumulative impacts study area and potentially induced redevelopment and revitalization may indirectly increase the socioeconomic status of the cumulative impacts study area.	Reconstruction of Hampton Bridge and increased capacity. Project would better connect neighborhoods and communities separated by the Dallas Floodway. Project would ease congestion and increase access and mobility within the cumulative impacts study area.	No impacts anticipated.	No impacts anticipated.	Would result in no effect to prevailing historical buildings, bridges, or districts. Potential archeological artifacts may be uncovered during construction.
DART Orange Line	*Northwest Corridor LRT Line to Irving/DFW Airport Final Environmental Impact Statement* (2008); *TRCCLUP* (2005)	Approximately 28 acres of would be converted to use as transit stations, and approximately 49 acres of land would be converted to transportation use for the transit line alignment throughout the entire limits of the project. Project would support more efficient mixed land uses and development/redevelopment.	May contribute to better integration of communities and neighborhoods. Improved access to land within the cumulative impacts study area and potentially induced redevelopment and revitalization may indirectly increase the socioeconomic status of the cumulative impacts study area.	Project would connect existing DART lines to the Irving/Las Colinas area and ultimately provide rail service to the Dallas/Fort Worth International Airport. Project would expand multimodal transportation access between key destinations within the region and within the cumulative impacts study area and would provide better connectivity between neighborhoods and communities.	-1.93 acres of water or wetland features	-1.93 acres of aquatic/wetland habitat	No impacts to historic properties (NRHP listed or eligible) are anticipated per coordination with the SHPO. The SHPO also concurred that the project would not adversely affect archeological resources (NRHP listed or eligible); however, DART committed to geoarcheological backhoe trenching in the floodplain adjacent to Spur 482 prior to construction. If archeological deposits are discovered, the SHPO will be consulted to determine appropriate action and mitigation.
West Levee Norwood 345kV Transmission Line	*Trinity Parkway Supplemental Draft Environmental Impact Statement & Draft Section 4(f) Evaluation* (2009)	No impacts anticipated.	No impacts anticipated.	No impacts anticipated.	No impacts anticipated.	No impacts anticipated.	Would result in no effect to prevailing historical buildings, bridges, or districts. Potential archeological artifacts may be uncovered during construction.
Sylvan Avenue Bridge	*Draft Sylvan Avenue at Trinity River Categorical Exclusion* (2011)	Reconstruction of the Sylvan Avenue Bridge and access improvements to Trammell Crow Park may contribute to an accelerated rate of redevelopment with higher density, mixed uses.	The project would help to better connect and integrate neighborhoods currently separated by the Dallas Floodway. Improved access to land within the cumulative impacts study area and potentially induced redevelopment and revitalization may indirectly increase the socioeconomic status of the cumulative impacts	The reconstruction of the Sylvan Avenue Bridge with increased capacity would better connect neighborhoods and communities separated by the Dallas Floodway. Project would ease	No impacts anticipated.	-6.50 acres of grassland/herbaceous habitat -0.13 acre of woodland habitat	TxDOT historians determined that the project would result in no adverse effect to the East and West Levees. The SHPO concurred that the project would not affect archeological sites or cemeteries.

Project Name	Data/Information Source	Resource					
		Land Use	**Socioeconomic Conditions**	**Transportation**	**Water Resources**	**Biological Resources**	**Historic and Cultural Resources**
			study area.	congestion, and increase access and mobility within the cumulative impacts study area.			
Beckley Avenue Extension	*Trinity Parkway Supplemental Draft Environmental Impact Statement & Draft Section 4(f) Evaluation* (2009); *TRCCLUP* (2005)	Approximately 5 acres of land converted to transportation use. Project would likely result in improved access to land uses within the cumulative impacts study area and may partially contribute to redevelopment and revitalization.	Improved access to land within the cumulative impacts study area and potentially induced redevelopment and revitalization may indirectly increase the socioeconomic status of the cumulative impacts study area.	Project would involve widening for increased capacity. Project would better connect neighborhoods and communities and improve access and mobility within the cumulative impacts study area.	No impacts anticipated.	No impacts anticipated.	Would result in no effect to prevailing historical buildings, bridges, or districts. Archeological impacts are not likely due to highly urbanized development within the surrounding area.
SH 183 Bridge	*Trinity Parkway Supplemental Draft Environmental Impact Statement & Draft Section 4(f) Evaluation* (2009); *TRCCLUP* (2005)	Approximately 1 acre of land converted to transportation use. Project would likely result in improved access to land uses within the cumulative impacts study area and may partially contribute to redevelopment and revitalization.	Would result in 2 non-residential displacements. Improved access to land within the cumulative impacts study area and potentially induced redevelopment and revitalization may indirectly increase the socioeconomic status of the cumulative impacts study area.	Project would involve added capacity that would improve access and mobility in the region and within the cumulative impacts study area.	No impacts anticipated.	-4 acres of riparian woodland habitat	Would result in no effect to prevailing historical buildings, bridges, or districts. Archeological impacts are not likely due to highly urbanized development within the surrounding area.
Pegasus Project	*Trinity Parkway Supplemental Draft Environmental Impact Statement & Draft Section 4(f) Evaluation* (2009); *TRCCLUP* (2005)	Approximately 73 acres of land converted to transportation use. Project would likely result in improved access to land uses within the cumulative impacts study area and may partially contribute to redevelopment and revitalization.	Would result in an estimated 22 total displacements. Improved access to land within the cumulative impacts study area and potentially induced redevelopment and revitalization may indirectly increase the socioeconomic status of the cumulative impacts study area.	Project would reconstruct the IH 30/IH 35E interchange and increase highway capacity that would improve access and mobility in the region and within the cumulative impacts study area.	-1.00 acre of water or wetland features	-1.00 acre of aquatic/wetland habitat	Would result in no effect to prevailing historical buildings, bridges, or districts. Provides for the rehabilitation of the Houston Street viaduct under a mitigation agreement with the THC. Archeological impacts are not likely due to highly urbanized development within the surrounding area.
Riverfront Boulevard	*Trinity Parkway Supplemental Draft Environmental Impact Statement & Draft Section 4(f) Evaluation* (2009); *TRCCLUP* (2005)	Approximately 16 acres of land converted to transportation use. Project would likely result in improved access to land uses within the cumulative impacts study area and may partially contribute to redevelopment and revitalization.	Would result in an estimated 10 non-residential displacements. May contribute to better integration of communities and neighborhoods. Improved access to land within the cumulative impacts study area and potentially induced redevelopment and revitalization may indirectly increase the socioeconomic status of the cumulative impacts study area.	Project would increase capacity and improve access and mobility within the cumulative impacts study area.	No impacts anticipated.	No impacts anticipated.	Potential impacts to 2 historic structures; however, coordination with the SHPO would result in no effect on prevailing historic buildings, bridges, or districts. Archeological impacts are not likely due to highly urbanized development within the surrounding area.
Trinity Lakes Street Car Loop	N/A	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
PROPOSED ACTION ALTERNATIVE	Sections 5.1.2, 5.2.2, 5.3.2, 5.5.3.2, 5.6.2.2, 5.9.1.2, and 5.9.2.2 of this EA.	The Proposed Action Alternative would result in the Dallas Floodway System's aversion of substantial adverse indirect economic consequences as a result of enabling the City of Dallas to get reaccredited by FEMA, and avoidance of substantial adverse economic consequences stemming from more stringent development and building codes.	The Proposed Action Alternative would result in the avoidance of the adverse effects of FEMA remapping and stricter development/building codes on existing populations and on population and employment growth. May contribute to greater connectivity and integration of neighborhoods and between neighborhoods, improving community cohesion. Low-income and minority populations would benefit from avoiding the economic and financial consequences of FEMA remapping.	The Proposed Action Alternative would result in less risk from flood-related impediments to the movement of goods/people and possible corresponding economic consequences. Avoidance of FEMA remapping would allow existing and projected travel demands to continue to define the need for future transportation projects and improvements.	-0.47 acre total of water/wetland features (-0.44 acre water features and -0.03 acre wetland features)	-1.2 acres of grassland habitat 0.01 acre of urban habitat -0.47 acre total of aquatic/wetland habitat -10 mature trees	The Proposed Action Alternative has the potential to impact historic and cultural resources. However, after construction, the cutoff walls will not be visible and would not adversely impact the ability of the Dallas Floodway to convey its significance as a historic and cultural resource as defined under NEPA. The Proposed Action Alternative would enhance the ability of the Dallas Floodway to convey its significance by protecting the integrity of the levees and would allow the Dallas Floodway to function as it was designed. The Proposed Action Alternative would

Project Name	Data/Information Source	Resource					
		Land Use	**Socioeconomic Conditions**	**Transportation**	**Water Resources**	**Biological Resources**	**Historic and Cultural Resources**
							minimize consequences associated with floodwater inundation within the City of Dallas that would adversely impact NEPA-defined important historic and cultural resources. Archeological resources monitoring is recommended for three locations along the East Levee cutoff wall and one location along the West Levee cutoff wall. These four areas of archeological monitoring are recommended because the proposed cutoff wall locations intersect with areas of high probability to contain cultural deposits. If archeological sites are discovered during construction, the USACE will evaluate the sites and provide appropriate mitigation guidance to the City of Dallas so the City can perform mitigation, as necessary.
CUMULATIVE IMPACTS SUMMARY		Reduced flood risk adjacent to the Dallas Floodway and improved storm water conveyance of interior drainage areas rendering beneficial impacts to land economics. Reclamation of approximately 617 acres of land from the floodplain and additional protection against flooding for 12,500 structures. Conversion of approximately 391.2 to 700.2 acres of land to transportation, trail, or recreation ROW and easements. Development or redevelopment of approximately 99 to 177 acres of land to other uses or development intensities. Aversion of substantial adverse indirect economic consequences associated with FEMA remapping and more stringent development/building codes.	Increase in socioeconomic status. Support for continued population and employment growth. Improved flood risk reduction adjacent to the Dallas Floodway and improved storm water conveyance of interior drainage areas that would strengthen economic conditions and improve community cohesion. Better integration of communities and neighborhoods. Present and reasonably foreseeable future actions would result in approximately 43 to 57 displacements. Aversion of substantial adverse indirect economic consequences associated with FEMA remapping and more stringent development/building codes.	Avoidance of FEMA remapping would allow existing and projected travel demands to continue to define the need for future transportation projects and improvements.	+ 346.7 acres to +453.7 acres of water or wetland features	-1,314.31 acres to -753.31 acres of urban/grassland/ herbaceous habitat +346.8 acres to +453.8 acres of aquatic/wetland habitat +224.3 acres to +249.3 acres of woodland habitat -10 mature trees	Present and reasonably foreseeable future actions would result in direct impacts to a range of 2 to 7 historical resources within the cumulative impacts study area. Minor alterations to historic and cultural properties (e.g. Pavaho Pump Station, East and West Levees, and Continental Avenue Bridge) are anticipated but are not considered to be adverse by TxDOT and/or the SHPO. Potential archeological artifacts may be uncovered during construction. If archeological artifacts are discovered during construction, appropriate mitigation would be sought through coordination with the THC.

*The BVP Ecosystem Restoration and Parks and Recreation projects were combined because of their mutually complementary effects related to water resources and biological resources.
When an impact is indicated as unknown, no credible and readily available data sources provide information for those projects revealing impacts to examined resources. When an impact is indicated as "No impact," data sources or other analyses indicate that the respective present or reasonably foreseeable project would not result in an impact to examined resources.

6.7 Summary of Cumulative Impacts

In summary, the No-Action Alternative in conjunction with other past, present, and reasonably foreseeable future actions in the cumulative impacts study area is anticipated to result in substantial adverse impacts to land use, socioeconomic conditions, transportation, and floodplains. The No-Action Alternative may have the general effect of restraining or eradicating many of the beneficial and intended impacts of many of the present and reasonably foreseeable future actions. Conversely, the Proposed Action Alternative in conjunction with other past, present, and reasonably foreseeable future actions is anticipated to result in beneficial impacts to land use, socioeconomic conditions, transportation, and historic and cultural resources and less than significant impacts to water resources and biological resources through the year 2050. The cumulative impacts of the Proposed Action Alternative in conjunction with other present and reasonably foreseeable future actions would result in the avoidance of many of the adverse consequences to land use, socioeconomic conditions, transportation, and floodplains associated with the cumulative impacts of the No-Action Alternative. The Proposed Action Alternative's impacts to water resources and biological resources relative to those of other present and reasonably foreseeable future actions are relatively minor with only comparably negligible acreages of water resources and wildlife habitat affected.

7.0 RISK ASSESSMENT

Implementation of the proposed project would help the City regain 100-year FEMA accreditation and help regain the 100-year accreditation. Consequently, there would be no increase in the level of risk to life and property attributed to the implementation of the Proposed Action Alternative.

7.1 Operation and Maintenance Considerations

Until December 1968, the Dallas County Flood Control District was responsible for the Dallas Floodway System O&M responsibilities until its "sunset provisions" expired. The City of Dallas and the City of Irving jointly entered into an agreement with the Dallas County Flood Control District on September 6, 1968 that established both cities responsibilities to carry on with the O&M responsibilities held by the Dallas County Flood Control District. The USACE continues its oversight and inspections, and coordinates with both Cities regarding the levee systems.

Any O&M roads disturbed during construction of the Proposed Action Alternative would be restored to their pre-construction condition and location as expeditiously as possible following completion of each section of cutoff wall as applicable. Other maintenance roads that may be impacted by construction equipment access to and from the floodway will also be restored to their pre-construction condition.

The existing levees and floodway are currently being maintained by the City of Dallas Flood Control District. The cutoff walls will be completely buried underground and will not increase maintenance requirements for the City's Flood Control staff. The concrete and riprap scour protection at the outfall channels will be additional features for the City's Flood Control staff to monitor, however as they already monitor the outfall channel slopes closely; the improvements

will actually improve their access and ease of O&M duties. These features will be added to the City's O&M Manual for the East Levee.

Flood Emergency Plan

The construction contractor would be responsible for the preparation and submittal of a flood emergency action plan to the City of Dallas Flood Control District for their approval prior to construction. The plan would be implemented in the event of imminent flooding during construction and address emergency actions to be implemented during above normal river stages for the entire length of the project and duration of project construction. Equipment and personnel must be removed from the floodway when the Trinity River at Dallas gauge located near Commerce Street in Dallas reaches 30 feet.

The contractor shall maintain an emergency backfill volume equal to 2 times the open trench volume. The emergency backfill shall consist of the excavated trench spoils. The contractor will be required to have tracked/off-road equipment, such as bulldozers and dump trucks, available on site for the emergency backfill placement. Once the above elevations are triggered or after a trench collapse, the contractor will be required to have the ability to backfill the trench within approximately 4 hours, and prior to the river reaching flood stage (30 feet). Material shall be bladed into the trench and walked into place with tracked equipment to provide a temporary compacted cap.

Emergency backfill stockpiles shall not be permitted between the cutoff wall and the levee toe. Stockpiles shall only be permitted riverwards of the cutoff area. Stockpiles must be located over an area large enough to permit processing and where they will not interfere with peripheral drainage around the excavation and will not overload the slopes of any excavations. Prior to construction, the contractor must submit plans for stockpiling materials located a distance equal to the excavation depth or less from the edge of any excavation to the contracting officer for approval.

According to USACE pamphlet No. 1150-2-1 - *Criteria for Construction within the Limits of Existing Federal Flood Protection Projects*, Section 4g, *General Criteria for Construction within a Floodway*, which indicates that construction equipment, spoil material, supplies, forms, buildings, etc. should not be placed or stored in the floodway during construction activities. Specifically, any item that can be transported by flood flows should not be permanently stored within the floodway.

When the Trinity River stage approaches 32 to 34 feet the water level may reach the riverside toes of the levees. Therefore, the contractor will have to address how they will protect the integrity of any cutoff backfill already placed and how they propose to terminate any in-progress cutoff construction so loss of slurry and/or backfill is not an issue or concern.

Additionally, as river stage rises, so may the groundwater level in the area of the cutoff wall which could reduce the effectiveness of the in-trench slurry. The contractor will be required to account for this in their action plan. Data from existing piezometers in the Dallas Floodway System will be made available to the contractor to supplement the proposed piezometers as part

of the QA/QC plan to determine safe limits of the in-trench slurry during a rising river stage event as well as safe re-start conditions based on falling piezometric levels. The contractor shall submit his own emergency action plan for approval, but it shall meet the minimum requirements set forth.

The contractor shall observe current gauge readings as well as predicted river flood levels, as of the time of this report, at the National Oceanic and Atmospheric Administration (NOAA) website at the following internet link:
http://water.weather.gov/ahps2/hydrograph.php?wfo=fwd&gage=dalt2&view=1,1,1,1,1,1,1,1

If the river stages exceed the trigger elevations specified in the plans and specs, based on NOAA predictions, the contractor shall not work in the floodway.

7.2 Flood Fighting Ability

The Dallas Floodway System was designed to safely contain flooding and protect life and property. As such, any proposed developments near the Dallas Floodway System must keep the safe passage of floodwater as the first priority. The role of the City of Dallas is to maintain the integrity of the levees while preventing negative effects from flooding. The USACE does not allow the safety or the design capacity of the Dallas Floodway System to be compromised.

Implementation of the Proposed Action Alternative would not adversely impact system-wide performance (i.e., it would not adversely affect the structural integrity, flood carrying capacity, access and egress, or safe and efficient O&M of the floodway). The Proposed Action Alternative would not potentially decrease levee stability or protection of areas behind the levees from flooding. The Proposed Action Alternative would not include any actions that would result in the increased potential for levee erosion and therefore decrease the existing level of flood risk management. The Proposed Action Alternative would implement Section 408 modification measures to help the City regain 100-year FEMA accreditation.

8.0 CONSTRUCTION SEQUENCING AND METHODOLOGY

It is the goal of the City of Dallas to complete all construction of the proposed Section 408 modifications in the summer of 2012. This may result in the 100-year event FEMA re-accreditation prior to the release of the revised FIRM maps. In order to meet this goal it would be necessary to construct the proposed modification measures simultaneously. The most time consuming, and considered to be the critical path for construction would be the East Levee cutoff wall. Because the cutoff wall construction would require the most consideration during construction so that the existing levees are not adversely affected, construction methodology considerations were developed to include the following:

- Cutoff Wall Construction
- Trench Excavation
- Trench Stability
- Soil-Bentonite Cutoff Wall/Cement-Bentonite backfill during Cutoff Wall

- Jet Grout Windows at Crossing Utilities
- Cutoff Wall Cap and Protection
- Cutoff Wall Quality Control/Assurance Considerations/Recommendations
- Emergency Action Plan
- Flood Events and/or Rising River Stages
- Progressive Failure

Additional details regarding these construction methodology considerations are available for further review in the Section 408 *Project Summary Report.*

9.0 AGENCY COORDINATION AND PUBLIC INVOLVEMENT

As part of the NEPA process, the USACE and the City of Dallas involved government agencies and the public in an attempt to solicit input regarding the Proposed Action Alternative. This section describes how the USACE and the City of Dallas coordinated with government agencies and involved the public regarding this project's NEPA process.

9.1 Agency Coordination

On June 3, 2010, the USACE mailed letters to 25 federal, state, and local agencies notifying them of the USACE's intent to prepare an EA for proposed Section 408 modifications to the Dallas Floodway System (**Appendix F**). In addition to these letters, on June 23, 2010, the City of Dallas mailed letters to specific federal and state agencies, including the FAA, TCEQ, TPWD, EPA, and USFWS, requesting resource-specific information relevant to the proposed modification measures (**Appendix F**).

As of August 2010, two responses were received from agencies for which specific applicable information was solicited (**Appendix F**). A letter dated July 2, 2010, from the USFWS indicated it is unlikely that any threatened or endangered species would be present in the area or adversely impacted by the Proposed Action Alternative. A letter dated July 12, 2010, from the TPWD indicated that a project funded by the TPWD appears to be located within the scope of the Section 408 modifications footprint that was assisted with federal Land and Water Conservation Funds (LWCF). The project and recreational space to which TPWD is referring is an approximately 230-acre tract located north of the northern extent of the East Levee in the City of Dallas along the Elm Fork of the Trinity River. It was determined that the Proposed Action Alternative and corresponding construction activities would have no impact on this area identified by the TPWD.

Throughout the course of the NEPA process, the USACE will continue to coordinate and correspond with these and other federal, state, and local government agencies.

9.2 Public Involvement

The USACE and City of Dallas held a public scoping meeting for the Dallas Floodway Project EIS on November 17, 2009, that included information on the proposed measures that were presented as part of the *LRP* and *BVP* Flood Risk Management measures. None of the

comments received during or after the meeting regarded the proposed Section 408 modification measures to the Dallas Floodway System.

The USACE will make the Draft EA available for public and agency comment with the publication of the Notice of Availability (NOA) in three local newspapers (**Appendix F**). Copies of the draft EA will be made available in at least two City of Dallas libraries and electronically on the USACE-Fort Worth District website. The 25 federal, state, and local agencies notified of the USACE's intent to prepare an EA and those included in the project mailing list will receive an NOA. The project mailing list contains contacts for interested parties, ranging from elected and appointed officials to local governments in the DFW region to special-purpose organizations. Hard copies of the NOA and EA will be sent to the USFWS, EPA, THC, TPWD, TCEQ, and FAA. The 15-day Public Review Period for the Public Draft of the EA is tentatively scheduled to run in the winter of 2011. The USACE will consider and respond to (as appropriate) all relevant comments received during the Public Review Period.

10.0 REGULATORY REQUIREMENTS, PERMITS AND AGENCY COORDINATION

This EA was prepared in accordance with the institutional/regulatory criteria (i.e., statutes, regulations, EOs, etc.) listed in **Section 1.3.1**. The status of the established impact analysis criteria and their applicability is discussed appropriately throughout the EA (i.e., EO 12898 is addressed under **Section 4.2.5**. - Environmental Justice). This section contains a summary of the status of each institutional/regulatory criterion provided in **Section 1.3.1** as it relates to the Proposed Action. Further, this section discusses specific permitting activities and agency coordination for each regulatory requirement, if applicable.

National Environmental Policy Act (NEPA)
This EA was prepared in accordance with the NEPA of 1969 (42 U.S.C. § 4321), as implemented by CEQ regulations (40 C.F.R. §§ 1500-1508), and USACE ER 200-2-2. This EA analyzes the potential impacts of the Proposed Action and No-Action Alternatives and purports to provide sufficient analyses to reveal only less than significant impacts to resources associated with the Proposed Action.

CEQ Regulations (40 C.F.R. 1500-1508)
The CEQ, established under NEPA, implements and oversees federal processes. The CEQ regulations implement the procedural provisions of NEPA to ensure that federal programs comply with the guidelines of NEPA. The CEQ issues the Regulations for Implementing Procedural Provisions of NEPA (40 C.F.R. §§ 1500-1508). The development of this EA adheres to the CEQ Regulations.

U.S. Army Corps of Engineers Engineering Regulation 200-2-2
The USACE ER 200-2-2, *Procedures for Implementing NEPA*, establishes USACE procedures for implementing NEPA and CEQ regulations. The implementing procedures in ER 200-2-2

provide a framework for complying with the NEPA and CEQ requirements for all applicable USACE actions. The development of this EA adheres to USACE ER 200-2-2.

Farmland Protection Policy Act (FPPA)
The FPPA is intended to minimize the impact federal programs have on the unnecessary and irreversible conversion of farmland to non-agricultural uses. Because the Proposed Action would occur in an urban environment with no prime or unique farmland and land within the land use ROI is planned and/or zoned for urban use, the Proposed Action is exempt from the FPPA.

Civil Rights Restoration Act of 1987
The Civil Rights Restoration Act of 1987 prohibits discrimination on the basis of race, color, or national origin in programs and activities receiving federal financial assistance. It also prohibits the exclusion of participation in or benefits of any program or activity receiving federal financial assistance. Analyses in this EA reveal that the Proposed Action comply with the Civil Rights Act of 1987 as no persons would experience discrimination, be denied benefits, or lack participation associated with the execution of the Proposed Action Alternative based on race, color, or national origin.

Executive Order 13166 – Improving Access to Services for Persons with Limited English Proficiency
Executive Order 13166 requires federal agencies to work to ensure that recipients of federal financial assistance provide meaningful access to their LEP applicants and beneficiaries. Failure to ensure that LEP persons can effectively participate in or benefit from federally-assisted programs and activities may violate the prohibition under Title VI of the Civil Rights Restoration Act of 1987 and Title VI regulations against national origin discrimination. Analyses in this EA reveal that the Proposed Action comply with EO 13166 as no persons with LEP would experience discrimination, be denied benefits, or lack participation associated with the execution of the Proposed Action Alternative.

Executive Order 12898 – Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations
Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" tasks "each federal agency to make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high adverse human health and environmental effects of its programs, policies, and activities on minority populations and low-income populations" (USEPA, 1994). Analyses in this EA reveal that the Proposed Action comply with EO 12898 as minority or low-income populations would not experience disproportionately high adverse human health and environmental effects as a result of the Proposed Action Alternative.

Executive Order 11990 – Protection of Wetlands
The purpose of EO 11990 it to "minimize the destruction, loss of degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands." The EO requires federal agencies to consider alternatives to wetland sites and limit potential damage if an activity

affecting a wetland cannot be avoided. The Proposed Action Alternative would comply with EO 11990.

Clean Water Act (CWA)
The CWA establishes the basic structure for regulating discharges of pollutants into waters of the U.S. and regulating quality standards for surface waters. As specified by TCEQ CGP (TXR 150000), the proposed project would require a SW3P, NOI, and NOT. The SW3P would detail what BMPs would be utilized and where they would be utilized to reduce storm water impacts to the maximum extent practicable. The SW3P would also insure that all disturbed areas are properly revegetated prior to the NOT being filed. The Proposed Action Alternative would comply with the CWA.

The placement of temporary dredge or fill material in waters of the U.S. (including wetlands) that are determined to be jurisdictional is anticipated to be authorized by RGP-12, which authorizes the discharge of dredged or fill material into waters of the U.S., including wetlands, and work in or affecting navigable waters of the U.S. associated with modifications and alterations of Corps of Engineers projects that receive USACE approval under Section 408 and meets the conditions of RGP-12. State of Texas water quality certification, issued on January 21, 2010, is provided through the conditions of RGP-12.

Rivers and Harbors Act of 1899
The Rivers and Harbors Act of 1899 generally prohibits the construction of structures over or in navigable waters of the U.S. without Congressional approval, which has been delegated to the United States Coast Guard (USCG). The Rivers and Harbors Act of 1899 also prohibits excavation or fill within navigable waters of the U.S. without the approval of the USACE.

General Bridge Act of 1946
The General Bridge Act of 1946 prohibits the construction of any bridge across navigable waters of the U.S. unless first authorized by the USCG. The Proposed Action Alternative does not involve the construction of a bridge across navigable waters of the U.S. and therefore will not require USCG review or approval.

Executive Order (EO) 11988 – Floodplain Management
As discussed in **Section 4.5.6**, EO 11988 requires federal agencies to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. The Proposed Action Alternative would not increase the base flood elevation to a level that would violate applicable floodplain regulations and ordinances. The proposed project is within the Trinity River Corridor Development Regulatory Zone; therefore, coordination with the Local Floodplain Administrator would be required to determine if a CDC permit is required or whether the proposed project would be exempt per Section 1.6.1 of the *Corridor Development Certificate Manual, Fourth Edition* (City of Dallas, et. all 2009). Coordination with the local floodplain administrator would be required. The Proposed Action Alternative would comply with EO 11988.

Endangered Species Act of 1973

Section 7 of the Endangered Species Act requires federal agencies to ensure that any action authorized, funded, or carried out by such agencies is not likely to jeopardize the continued existence of listed species or modify their existing habitat. No adverse impact on any species that are proposed to be or are listed as threatened or endangered under the Endangered Species Act is anticipated as a result of the Proposed Action Alternative. The Proposed Action Alternative would comply with the Endangered Species Act of 1973.

Migratory Bird Treaty Act (MBTA)

The MBTA states that it is unlawful to kill, capture, collect, possess, buy, sell, trade, or transport any migratory bird, nest, young, feather, or egg in part or in whole, without a federal permit issued in accordance within the Act's policies and regulations. Migration patterns would not be affected by the Proposed Action Alternative. In the event that migratory birds are encountered on-site during project construction, every effort would be made to avoid take of protected birds, active nests, eggs, and/or young. Analyses in this EA reveal that the Proposed Action Alternative would comply with the MBTA.

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c), enacted in 1940, and amended several times since, prohibits anyone without a permit issued by the Secretary of the Interior from "taking" bald eagles, including their parts, nests, or eggs. In the event that a bald or golden eagle is encountered on-site during project construction, every effort would be made to avoid take or these species, their active nests, their eggs, and/or their young. Analyses in this EA reveal that the Proposed Action Alternative and corresponding environmental processes of implementation would comply with the Bald and Golden Eagle Protection Act.

National Historic Preservation Act

As stated in **Chapter 4.8**, Section 405(a) of the 2010 Supplemental Disaster Relief and Summer Jobs Act (PL 111-212) states that the USACE is not required to make determinations of eligibility under the NHPA for the Dallas Floodway. To satisfy the requirements of NEPA, the USACE conducted a cultural resources survey of the Dallas Floodway with a narrative that describes the development, function, composition, and current operation of the Dallas Floodway and discusses the significance of this cultural resource's structural features and relationships with the historical development of the City of Dallas without explicit reference to the criteria used to determine NRHP eligibility. Analyses in this EA find that the Proposed Action Alternative will have no significant impact to historic and cultural resources and archeological impacts may be mitigated below the threshold of significance through data recovery**.**

Noise Control Act (NCA)

As discussed in **Section 4.7**, Section 4(b) of the NCA of 1972 (PL 92-574) directs federal agencies to comply with applicable federal, state, and local noise requirements with respect to the control and abatement of environmental noise. During construction of the Proposed Action Alternative, construction and ground-disturbing activities could create localized, temporary noise impacts from construction equipment and vehicles. However, once construction is completed, background noise levels would return to usual levels. Analyses in this EA reveal that the

Proposed Action Alternative and corresponding environmental processes of implementation would comply with the NCA.

Clean Air Act (CAA)
The CAA of 1970 mandated the establishment of the NAAQS and regulations to reduce air pollutants. These air pollutants are also known as criteria pollutants. Construction of the Proposed Action Alternative would result in the temporary increase in criteria pollutant emissions. The air analysis concluded that *de minimis* thresholds for applicable criteria pollutants would not be exceeded as a result of implementation of the Proposed Action Alternative. Implementation of the Proposed Action Alternative would not trigger a formal conformity determination under Section 176(c) of the CAA. Therefore, analyses in this EA indicate that the Proposed Action Alternative would comply with the CAA.

11.0 MITIGATION AND MONITORING COMMITMENTS

Water Quality
Impacts to storm water would be minimized as much as possible by utilizing approved temporary and permanent erosion and sediment control BMPs as specified by TCEQ CGP (TXR 150000). The CGP requires that a SW3P, NOI, and NOT be prepared for the project improvements proposed as part of the Proposed Action Alternative. The proposed project is located within the boundaries of the City of Dallas MS4, and would need to comply with the applicable MS4 requirements.

The construction contractor would be responsible for the preparation and submittal of a flood emergency action plan to the USACE and City of Dallas Flood Control District for their approval. The plan would be implemented in the event of imminent flooding during construction and address emergency actions to be implemented during above normal river stages for the entire length of the project and duration of project construction. The plan would be submitted to the USACE and the City of Dallas Flood Control District prior to the start of construction.

Construction equipment, spoil material, supplies, forms, building, etc. shall not be placed or stored in the floodway during construction activities. Any item that may be transported by flood flows shall not be stored within the floodway. Locations of construction trailers and stockpile areas shall be included on project plans and approved by the USACE and the City of Dallas.

Waters of the U.S., including Wetlands
The placement of temporary or permanent dredge or fill material into waters of the U.S., including wetlands, that are determined to be jurisdictional would be authorized by RGP-12, Modifications and Alterations of Corps of Engineers Projects. State of Texas water quality certification, issued on January 21, 2010, is provided through the conditions of RGP-12. On-site mitigation for Section 404 impacts would occur adjacent to the permanently impacted water and wetland. The proposed 0.50 acre area is located within the floodway and would be contoured using multiple elevation gradients to allow for the establishment of a wetland. The mitigation site would be revegetated with appropriate wetland herbaceous species. Temporary crossings

would be utilized during the construction activities. However, the temporary crossings would be removed after construction, the areas returned to preconstruction contours, and revegetated**.**

Floodplains
The proposed project is within the Trinity River Corridor Development Regulatory Zone; therefore, coordination with the Local Floodplain Administrator would be required to determine if a CDC permit is required or whether the proposed project would be exempt per Section 1.6.1 of the *Corridor Development Certificate Manual, Fourth Edition* (City of Dallas, et. all 2009).

Threatened and Endangered Species Act
The federally endangered interior least tern nests in colonies on bare to sparsely vegetated sandbars along rivers and streams in Texas from May through August. Ground disturbance related to construction activities at and near the levees may incidentally create areas that are attractive to interior least terns for use as potential nesting sites. Should interior least terns arrive at any of the project areas during construction activities, the USFWS should be notified to discuss alternative development plans or the need for consultation under Section 7 of the Endangered Species Act.

Because construction would occur during the breeding season, large areas (greater than one acre) cleared to bare soil and left idle for more than one week would be surveyed prior to resuming construction activities. Should interior least terns happen to utilize any of the project areas during construction activities, the USFWS should be notified to discuss alternative development plans or the need for consultation under Section 7 of the Endangered Species Act (USFWS, 2010).

Migratory Bird Treaty Act
In the event that migratory birds are encountered on-site during project construction, adverse impacts on protected birds, active nests, eggs, and/or young would be avoided. If species are present, work should cease at that location and USACE and City of Dallas personnel should be contacted. If any active nests are found, the local USFWS biologist would be contacted by the USACE to determine an appropriate plan of action.

Archeological Sites
Archeological resources monitoring is recommended for three locations along the East Levee cutoff wall and one location along the West Levee cutoff wall as depicted in **Appendix A**, **Exhibit 8: Important Architectural NEPA Historic and Cultural Resources within the ROI Map**. These four areas of archeological monitoring are recommended because the proposed cutoff wall locations intersect areas of high probability to contain cultural deposits (Shanabrook et al., 2010). If archeological sites are discovered during construction, the USACE will evaluate the sites and provide appropriate guidance to the City so the City can perform mitigation, as necessary.

If Native American human remains and/or objects subject to the Native American Graves Protection and Repatriation Act (25 USC 3001 et seq.) are encountered during proposed construction activities, the USACE will consult with appropriate federally recognized Tribe(s) to determine appropriate treatment measures regarding NEPA historic and cultural properties.

Hazardous Materials

Any unanticipated hazardous materials encountered during construction would be handled according to applicable federal, state, and local regulations. The HTRW Work Plan will be provided to the City of Dallas by HNTB, which summarizes readily available soil analytical data and evaluates the potential for encountering impacted soil during the construction of the modification measures. The Contingency Plan will outline steps to be taken before and during construction activities to document soil conditions, as well as procedures to be followed if unexpected conditions are encountered would be prepared. The prime contractor, and any pertinent subcontractors, will be responsible for the preparation of a Site-Specific Health and Safety Plan detailing the basic safety requirements for working with soils within the Dallas Floodway. The contractor and any subcontractors will be required to comply with the steps outlined in the Contingency Plan and the Site-Specific Health and Safety Plan. The project plans and specifications will contain the necessary information to address contingencies related to potential COCs.

The contractor would take appropriate measures to prevent, minimize, and control the spill of hazardous materials in the construction staging area. The use of construction equipment within sensitive areas would be minimized or eliminated entirely. All construction materials used for this project would be removed as soon as work schedules permit**.**

If demolition of any structures is required, a determination as to whether the structure contains asbestos or lead based paint is required. Asbestos/lead inspections, specification, notification, license, accreditation, abatement and proper disposal, as applicable, would comply with federal and state regulations. Asbestos containing materials and lead based paint issues would be addressed prior to construction.

Air Quality

The potential impacts of particulate matter emissions could be minimized by dust control measures such as covering or treating disturbed areas with dust suppression techniques, sprinkling, covering loaded trucks, and other dust abatement controls, as appropriate.

Noise

Prior to implementation of the Proposed Action Alternative, the City of Dallas would notify nearby residents of the construction schedule. Staging areas would be sited to minimize impacts to surrounding areas.

O&M

All maintenance roads must be inspected by the City of Dallas prior to completion of the Proposed Action Alternative.

12.0 FINDINGS AND CONCLUSIONS

The proposed Action Alternative consists of the installation of approximately 18,300 linear feet of riverside cutoff walls along selected portions of the East and West Levees and concrete and riprap scour protection at the Hampton Pump Station outfall channels.

Analyses performed in this EA reveal that the No-Action Alternative would likely indirectly result in substantial floodplain, land use, and socioeconomic impacts in relation to the economic integrity of land abutting the Dallas Floodway System associated with potential FEMA remapping, population and economic growth in the City of Dallas, community cohesion, low-income and minority populations, the City of Dallas' fiscal health, and the City of Dallas' planning goals and economic development incentives. Further, analyses also reveal the No-Action Alternative would likely indirectly result in adverse impacts to transportation functions.

No substantial impacts to other resources investigated were revealed by the analyses performed in this EA. This EA reveals that the long-term effects of the No-Action Alternative would likely be detrimental because identified levee deficiencies related to seepage/underseepage pertaining to the one percent annual chance exceedance (100-year base flood) would not be remedied. This alternative would result in the Dallas Floodway System's continued "Unacceptable" rating and fall short of meeting the 100-year FEMA accreditation requirements. The No-Action Alternative does not meet the purpose and need of the project.

Analyses performed for the Proposed Action Alternative indicate that it is likely that land use, socioeconomic conditions, transportation, and historic and archeological resources would benefit from the implementation of the Proposed Action Alternative as it would avert potential FEMA floodplain remapping. The Proposed Action Alternative would result in minor permanent impacts to water resources (waters of the U.S., including wetlands) and biological resources (wildlife habitat and aquatic resources). Potential temporary impacts that may result from construction activities associated with the Proposed Action Alternative include impacts to geology; soils (soil disturbance); water resources (lakes, rivers, and streams and water quality); the noise environment; utilities; HTRW; air quality; and aesthetics and visual resources. Analyses also indicate that there would be no anticipated adverse impacts to climate, groundwater resources, floodplains, or federal- or state–listed threatened or endangered species or their habitat**.**

The placement of temporary or permanent dredge or fill material in waters of the U.S. (including wetlands) that are determined to be jurisdictional or potentially jurisdictional would be authorized by RGP-12, *Modifications and Alterations of Corps of Engineers Projects*. RGP-12 authorizes the discharge of dredged or fill material into waters of the U.S., including wetlands, and work in, or affecting navigable waters of the U.S., associated with modification and alterations of Corps of Engineers projects that receive USACE approval under 33 USC 408 (Section 408) and that meet the conditions of RGP-12. State of Texas water quality certification, issued on January 21, 2010, is provided through the conditions of RGP-12. Because minimal temporary and permanent impacts to waters of the U.S., including wetlands are anticipated, implementation of the Proposed Action Alternative would result in less than significant impacts.

Construction of the Proposed Action Alternative would result in the temporary increase in criteria pollutant emissions. The air analysis concluded that *de minimis* thresholds for applicable criteria pollutants would not be exceeded as a result of implementation of the Proposed Action Alternative. The Proposed Action Alternative would likely result in short-term impacts to aesthetics and visual resources due to the presence of construction equipment, vehicles, and construction activities. Any noise impacts resulting from the construction of the Proposed Action Alternative would be temporary in nature.

Archeological resources monitoring is recommended for a total of four areas. If archeological sites are discovered during construction, the USACE will evaluate the sites and provide appropriate guidance to the city so they can perform mitigation as necessary.

The Proposed Action Alternative has the potential to impact historic and cultural resources. However, after construction, the cutoff walls will not be visible and would not adversely impact the ability of the Dallas Floodway to convey its significance as a historic and cultural resource as defined under NEPA. The Proposed Action Alternative would enhance the ability of the Dallas Floodway to convey its significance by protecting the integrity of the levees and would allow the Dallas Floodway to function as it was designed. The Proposed Action Alternative would minimize consequences associated with floodwater inundation within the City of Dallas that would adversely impact NEPA-defined important historic and cultural resources.

The Proposed Action Alternative would meet the need and purpose of the project. As a result, the Proposed Action Alternative is the preferred alternative. It can be concluded that based on this EA, the Proposed Action Alternative would likely not result in significant impacts to the social, economic, or human and natural environment.

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