Technical Memorandum ECO-6

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To: *Woody Frossard, TRWD*

From: *Bob Brashear, CDM*

Date: *28-Apr-2005*

Subject: *404(b)(1) Information for Draft EIS Appendix G*

Status: *Final Draft*

As requested, we have prepared a 404(b)(1) summary of project characteristics with the following exceptions:

- General project information will be obtained from previous submittals to the USACE Fort Worth District;
- Discussion of biota characteristics and impacts will be provided by the USACE Fort Worth District; and
- Discussion of compliance will be provided by the USACE Fort Worth District.

The information contained in this memorandum is provided to demonstrate, in part, compliance with the Clean Water Act (CWA) Section 404(b)(1) Guidelines and is organized based on those guidelines. The USACE Fort Worth District will be using this information to complete a document demonstrating the Fort Worth Central City Project's compliance with the 404(b)(1) guidelines.

1.0 Project Description

1.1 Location and General Description

See previous submittals.

1.2 Authority and Purpose

This document fulfills the requirements of Section 404(b)(1) of the Clean Water Act.

1.3 General Description of Fill Material

The project consists of four primary areas: the Riverbend Mitigation Site, the University Drive Mitigation Site, the Trinity Uptown/ Bypass Channel Area, and the Downstream Mitigation Sites. These areas are illustrated in **Figure 1**.

An initial geotechnical investigation consisting of a review of existing geotechnical and geologic data and geotechnical exploration was performed to determine general excavation/ fill material characteristics. A summary of this investigation follows. In general, the investigation found alluvial soils consisting primarily of clay and overlying generally fresh, unweathered limestone bedrock.

1.3.1 Fill Material Characteristics

A review of existing geologic data for the project area found that the geological deposits in the Fort Worth area date generally to the Cretaceous Period, during which sea levels alternately rose and fell across the area, leaving behind multiple layers of deposits (Scoggins 1993). The layers are generally thin, most are only tens of feet thick, and these formations represent several deposition environments: shallow marine, deltaic, beach, and coastal.

During the Tertiary and Quaternary Periods, the Trinity River carved out terraces through the Cretaceous deposits and deposited clays, sands, and gravel. In Tarrant County, the Paw Paw Formation, Denton Clay, Weno Limestone, Fort Worth Limestone, and the Duck Creek Formation are geologically undivided. Along the proposed bypass channel alignment, the Fort Worth Limestone and the Duck Creek Formation are overlain by alluvium. The Fort Worth Limestone and the Duck Creek Formation are both grayish to yellow-gray or yellow-brown. Both formations are limestone and difficult to differentiate.

The initial geotechnical exploration along the proposed bypass channel and Samuels Avenue dam site revealed alluvial soils overlying bedrock. The alluvial soils consisted primarily of clay and overlying generally fresh, unweathered limestone bedrock.

The majority of the clay can be described as having a medium potential for volume change, which is defined as clay with a Plasticity Index ranging from 15 to 28 percent and a Liquid Limit ranging from 35 to 50 percent. The results of permeability tests performed on the clay samples show permeability values are generally low and indicate that the soils are capable of water containment within the proposed bypass channel and levees.

Seams of sand and gravel overburden soils were found to occur primarily beneath the clay and directly over the limestone bedrock. There was no significant correlation between percent fines, sands, and gravels with depth.

Limestone with shale seams was encountered in borings above the proposed lower bypass channel bottom, indicating that some rock excavation would be necessary during construction of the bypass channel, which may then be used as fill elsewhere on the project. The limestone was found to be generally fresh and unweathered, and can be classified as moderately hard.

Site specific geotechnical explorations were not performed at each of the individual valley storage mitigation sites due to budgetary and access considerations, but the geological deposits are thought to be similar to that found in the areas investigated. The complete findings of the initial geotechnical investigation are included in Appendix B of the DEIS.

1.3.2 Fill Classification

Fill operations have been segregated into four classifications based on nature of the fill operation, proximity of the fill to the existing riverine system and elevation. The nature of each classification is described below and the location of each classification is shown in **Figure 2**.

- ***Embankment fill***. Material placed above the normal water surface and outside of the existing riverine system. Portions of the fill material would be within the Standard Protection Flood (SPF) and/or 100-yr floodway. Embankment fill that is required within the SPF or 100-yr floodplain would be compensated by other project related excavation activities.

- ***Out-of-bank fill***. Material that is placed completely outside the existing riverine system. This material would be placed outside the SPF or 100-yr floodway.

- ***Levee fill***. Material generally to be placed above the normal water surface and adjacent to the existing riverine system and/or proposed bypass channel and used to control floodwaters. Levee fill is to be placed adjacent to the flood isolation gate structures with some materials placed below the normal water surface. Levee material would be placed within the SPF or 100-yr floodway.

- ***In-channel fill***. Material that is placed below the normal water surface within the existing riverine system. This material would be placed in a controlled manner with erosion control facilities in place to protect adjacent aquatic areas. Placement would occur primarily in the "dry" by using coffer dams to segregate these areas prior to fill operations.

- ***Temporary Fill***. Material that is placed below the normal water surface and within the 100-year floodplain in order to facilitate construction of the project (e.g., fill associated with cofferdams) and which will be removed after construction is complete.

1.3.3 Fill Quantities

Approximately 4.4 million cubic yards (CY) of material are anticipated to be excavated and disposed of as part of the project. In addition, approximately 200,000 cubic yards of material which will form permanent structures will be placed within the waterway and the precise amount is dependent on final design.

The material excavated for this project is intended to be used for other project related activities and it is not expected that any excess material from the project would be transported outside of the project area. Contaminated material, if encountered, that is not suitable for placement within the project area would be disposed of at an appropriate licensed landfill facility. Contamination determination is discussed in Section 2.4 of this memo. Preliminary volume calculations for the currently proposed bypass channel, adjacent work areas, and valley storage mitigation sites are summarized in **Table 1**.

1.3.4 Source of Fill Material

The fill material for the FWCC project would be generated from excavation activities associated with the project or from the placement of structures within the waterway. The primary sources of fill material would be from the excavation of the bypass channel and construction of the valley storage mitigation sites shown in Figure 1. The bypass channel is approximately 8,400 ft long and consists of both cut and fill. Excavated material from the channel section would be used as the material source to construct the new levee (west) and out-of–bank area behind the retaining walls (east) on either side of the bypass channel. Excess excavated material from the bypass channel would be used as the fill source for the University Drive mitigation site.

The valley storage mitigation sites shown on **Figure 3** are the other primary source of fill material. Excavated materials at both the Riverbend and Downstream mitigation sites would be reused as fill at the same sites. Excavation of the preliminary interior water feature as shown on **Figure 3** would also provide fill for the bypass channel out-of-bank area and in-channel fill. **Table 2** provides a summary of the preliminary excavation volumes from each of the fill material source locations.

1.4 Proposed Discharge Sites

For documentation purposes, the discharge sites were grouped into four general locations as shown in **Figure 4** and described below. **Figure 4** also illustrates which of the fill discharges areas are generally within the 100-year floodplain.

1.4.1 Riverbend Mitigation Site

The Riverbend Mitigation Site, located along the West Fork upstream of White Settlement Road, is currently protected by an existing levee located on the eastern bank that runs the entire length of the proposed site. The site is undeveloped and primarily flat, consisting of grasslands with some medium to dense woody vegetation. The site is approximately 290 acres of which 215 acres are proposed to be impacted directly by the project.

The Riverbend Mitigation Site is currently located outside of the 100-yr floodplain; however, use of the site for valley storage mitigation would remove portions of the existing levee which currently protects this site. Use of the site for discharge is necessary to accommodate site preparation and ecosystem enhancement activities. Proposed grading on the site includes the construction of a levee on the eastern and southern sides of the site and excavation of drainage swales and lowlands for ecosystem enhancement. Grading plans are included in Appendix C of the Draft EIS.

All excavated material would be retained on site. A total of approximately 70 acres of this site would be used for fill discharge purposes including approximately 30 acres of levee fill and 40 acres of embankment fill. Fill materials would be confined from the existing river during construction by appropriate erosion control practices. Prior to the removal of the erosion control practice all exposed areas would be vegetated and stabilized.

The bulk of the excavation and fill discharge work on this site is intended to be completed and stabilized prior to the use of this site for valley storage. Sequencing of the work in this fashion would confine the fill discharge operations from the existing aquatic environment until the new levee and embankment are vegetated and stabilized.

1.4.2 University Drive Mitigation Site

University Drive crosses the West Fork and is located upstream and to the west of the proposed bypass channel. The site is an existing roadway with several commercial businesses located to the east. The site is within the 100-yr and SPF floodplain. Minimal habitat exists in this area given the urban environment. The total site is approximately 24 acres of which 10 acres are roadway right-of-way and the remaining property used for commercial purposes.

Use of the University Drive Mitigation Site as a fill discharge site within the 100-yr floodplain is necessary as a key component in mitigating the loss of floodplain or valley storage. Site work would include raising the existing roadway profile and filling the commercial properties to the east to provide access to the raised roadway.

Construction of the University Drive embankment would occur outside the existing riverine system but within the 100-yr and SPF floodplain. Fill materials would be confined from the existing river during construction by appropriate erosion control practices. Prior to the removal of the erosion control practice all exposed areas would be vegetated and stabilized.

1.4.3 Bypass Channel/ Trinity Uptown Site

The Bypass Channel/Trinity Uptown site is the largest of the fill discharge sites. The existing site is primarily urban with a mixture of industrial and commercial sites. Minimal habitat exists in this area given the urban environment. The placement of in-channel fill covers approximately 35 acres. Filling the area, which would be out of the 100-year floodplain, is necessary to prepare for the proposed redevelopment within the Trinity Uptown area. The earthwork-related fill associated with the interior water feature of the Community Based Plan is necessary to maximize recreational and aesthetic uses of this water feature. The structures associated with the three isolation gates will result in approximately 280,000 cubic yards of permanent fill.

The remainder of the proposed filling of the existing West Fork, would be in the area from the proposed Clear Fork isolation gate downstream to the proposed TRWD isolation gate. This proposed filling of the existing river channel is associated with the urban design and is not a part of this project and is considered a connected action. Both the proposed project and connected actions envision water depths between 10 and 15 feet.

Levee fill is proposed on the west side of the bypass channel and adjacent to the TRWD and Clear Fork gate structures. Out-of-bank fill would be placed behind the hard edge retaining walls on the east side of the bypass channel and for the White Settlement Road and Henderson Street Bridge roadway approaches.

The majority of excavation and fill operations associated with the construction of the bypass channel would occur prior to the full use of the bypass channel to convey floodwaters. Precise sequencing of excavation and fill activities, including location and size of temporary coffer dams, would occur as a part of final design. Temporary coffer dams are anticipated near each of the three proposed isolation gates (Clear Fork gate, Trinity Point gate, and TRWD gate) and preliminary estimates anticipate approximately 35,000 cubic yards of temporary fill for this purpose. Fill materials would be confined from the existing river during construction by appropriate erosion control practices. Prior to the removal of the erosion control practice all exposed areas would be vegetated and stabilized.

1.4.4 Downstream Mitigation Sites

The Downstream Mitigation Sites, as shown on **Figure 4**, located along the West Fork downstream of Samuels Avenue, are within the current floodway. The sites are undeveloped and primarily flat, consisting of grasslands with some medium to dense woody vegetation in some locations. The total fill discharge areas for these sites cover approximately 60 acres and consist of both embankment and out-of-bank fill classifications.

All excavated material from the mitigation sites are retained on these sites. The embankment fill area (approximately 35 acres) is adjacent and on top of an existing landfill. Levee fill (approximately 6 acres) would be placed upstream of the Samuels Avenue dam on either side of the West Fork to control flow through the dam structure and maintain the normal pool elevation. The out-of-bank fill area (approximately 18 acres) consists of filling an old impound lot and is located outside of the existing floodway. The Samuels Avenue Dam structure will result in approximately 30,000 cubic yards of permanent material.

Precise sequencing of excavation and fill activities, including location and size of temporary coffer dams, would occur as a part of final design. A temporary coffer dam is anticipated for the construction of Samuels Avenue Dam and preliminary estimates anticipate approximately 15,000 cubic yards of temporary fill for this purpose. Fill materials would be confined from the existing river during construction by appropriate erosion control practices. Prior to the removal of the erosion control practice all exposed areas would be vegetated and stabilized.

1.5 Description of Discharge Method

The discharge of fill material would be primarily by cut and fill operations using bulk scrapers. Additional materials would be transported by haul truck from the point of excavation to the designated discharge site where scrapers are infeasible or uneconomical based on haul distances. Excavated material would be sorted and handled on site prior to placement in the designated fill discharge area. Fill would be placed in suitable lifts and compacted as required for structural and soil stability design criteria. Contaminated material would be hauled by truck to appropriate landfills for discharge if not acceptable for use on the project.

2.0 Factual Determinations

2.1 Physical Substrate Determinations

2.1.1 Substrate Elevation and Slope

The new bypass channel would connect to the existing Clear Fork and West Fork of the Trinity River at the same elevation as existing channel.

2.1.2 Sediment Type

No previous sediment transport studies in the Trinity River reaches potentially affected by the FWCC project were found. The sediments in the project area are anticipated to be similar to that found in the geotechnical investigation performed for the project and other portions of the Trinity floodplain which have been described as alluvium floodplain deposits including indistinct low terrace deposits, gravel, sand, silt, silty clay and organic matter.

2.1.3 Fill Material Movement

Excavated material would be used for subsequent fill operations on the project. Fill material as placed during the FWCC project would be permanently stabilized to minimize the potential for movement or erosion of these areas. Permanent soil stabilization practice would include slope vegetation with native plantings and in potential high energy area large rip-rip or other armor would be used to protect the areas and minimize adverse impacts to aquatic and terrestrial habitat.

2.1.4 Physical Effects on Benthos

USACE to address

2.1.5 Other Effects

None.

2.1.6 Actions Taken to Minimize Impacts

Every effort was made to avoid or preserve valuable aquatic and terrestrial habitat concurrent with achieving the project and flood damage reduction goals. Adverse impacts during construction would be minimized through the implementation of erosion control and storm water pollution prevention control measures such as silt fences, temporary and permanent soil stabilization practices, and turbidity barriers. To compensate for unavoidable adverse impacts, a conceptual ecosystem mitigation plan has been developed and would be implemented concurrently with construction of the project.

In particular the following actions were taken to minimize impacts:

- Excavation/ fill areas have been chosen to impact the least amount of forested areas as possible.
- Mitigation sites are to include ecosystem enhancements.
- Use of the Riverbend and University Drive mitigation sites minimize the total number and extent of valley storage mitigation sites that would otherwise be required to mitigate the floodplain and valley storage loss. This reduces the total amount of area and habitat affected by the project.
- Downstream mitigation sites were grouped together and located at the Samuel's Avenue dam site to limit the total impacted area.

2.2 Water Circulation, Fluctuations, and Salinity Determinations

2.2.1 Water Chemistry

The State of Texas biennial inventory indicates historical compliance with standards for all water quality parameters in the stream segments affected by the project. The proposed project is not expected to change this.

The impact of the proposed project on dissolved oxygen (DO), nutrients, biochemical oxygen demand (BOD), and phytoplankton (as measured by chlorophyll a) as functions of stream hydrology and hydraulics, upstream loadings, instream kinetics, and environmental conditions (temperature, light levels, and wind speed) was assessed. The United States Environmental Protection Agency (USEPA) Water Quality Analysis Simulation Program (WASP) version 6.0.0.12 (USEPA 2004) was used to perform the majority of the analyses.

2.2.1.1 Salinity
Not applicable.

2.2.1.2 Clarity
There would be a temporary increase in turbidity when the bypass channel and dam structure is opened to the flow of the river; however this should be limited to the initial stabilization period. Coffer dams would be used during construction to minimize erosion around work zones open to flow from the river.

2.2.1.3 Color
Not applicable

2.2.1.4 Odor
Not applicable

2.2.1.5 Taste
Not applicable

2.2.1.6 Dissolved Gas Levels
Table 3 contains the associated water quality standards for DO to achieve the high aquatic life designated use associated with the stream segments affected by this project. Modeling results show that DO concentrations within the waterway proposed under the project would be maintained above the State of Texas standard of 5 mg/L and vary little from current conditions.

2.2.1.7 Nutrients and Eutrophication
For the majority of the year, the Clear and West Forks of the Trinity River through downtown Fort Worth are essentially lakes. Low water dams/grade control structures throughout these reaches impound water into quiescent linear lakes. Measured chlorophyll a concentrations (up to 50 – 90 μg/l) are indicative of possible eutrophication (Chapra 1998) in this system. However, these values are associated with warm, extended low-flow conditions and storm flows quickly “flush” the system. This is not expected to change in the proposed system.

2.2.2 Current Patterns and Circulation

2.2.2.1 Hydrologic Regime

The West Fork of the Trinity River in downtown Fort Worth is formed by the confluence of the West Fork and the Clear Fork. The West Fork above the Clear Fork drains 2085 square miles while the Clear Fork drains 521 square miles. A major impoundment, Lake Worth, was constructed upstream on the West Fork in 1914. Benbrook Lake was constructed in 1952 upstream on the Clear Fork. These impoundments have a profound effect on the flow regime in the downtown area.

The West Fork flow regime would be altered during extreme storm events by the proposed Riverbend and University Drive Mitigation improvements. Under proposed conditions there is no anticipated alteration of the current Clear Fork flow regime. Major changes between 7th Street and Samuels Avenue would occur due to construction of the Bypass Channel and interior water feature. During low flows, water levels would be maintained at approximately 524.3 feet, which would create a slackwater situation from Samuels Avenue Dam, upstream on the West Fork above the confluence for a distance of 32,000 ft (6.1 miles) and along the Clear Fork above the confluence for 4,650 ft (0.88 miles).

United States Geological Survey (USGS) gauge records are available for the Clear Fork just above the existing confluence and for the West Fork just downstream of the confluence. Only flows recorded since October 1956 were used; thus the effects of Lake Worth and Benbrook Lake are included in the analysis. The mean flow in the West Fork during this period was 423 cubic feet per second (cfs), with an average of 148 cfs contributed by the Clear Fork. The median flows of the West Fork and Clear Fork were 34 cfs and 19 cfs, respectively. These flows are subject to substantial seasonal and year-to-year variability. Mean annual flows on the West Fork have been as low as 25 cfs (recorded in 1978) and as high as 1828 cfs (recorded in 1990). Drought years in the mid-1950s produced even lower flows. Seasonal variations are shown in Figures 2-1 and 2-2. The average West Fork flow follows a seasonal pattern that peaks in May and falls to an annual minimum in August. The median mean August flow is 39 cfs and the median minimum daily flow of the year is 3.9 cfs.

2.2.2.2 Current Pattern and Flow

The flow supply to the Trinity Uptown area would continue in much the same quantity as under current conditions. After construction of the bypass channel, circulation in the system would be altered and maintaining adequate water circulation throughout the proposed waterway would be included as a part of final design.

2.2.2.3 Velocity

Velocity increases in the project area during storm flows are generally less than 1.0 ft/s with the exception of the entrance to the proposed bypass channel and at University Drive Mitigation site where appropriate armoring would be included in facilities design.

2.2.2.4 Stratification

It is expected that the waterway as proposed would stratify thermally. Stratification has been observed at times in the existing waterway and historical data from these impoundments demonstrate compliance with the DO standard in the epilimnion (as required by the State of Texas), further reinforcing that the proposed project would meet water quality standards.

2.2.3 Normal Water Level Fluctuations

No fluctuation in water levels is expected under normal flows because Samuels Avenue Dam would be used to control water levels. However, during extreme storm conditions, water level variations can be expected. Water surface elevations under such conditions are summarized in **Table 4**. Storm event water levels under proposed conditions are generally less than existing conditions.

2.2.4 Salinity Gradients

Not applicable.

2.2.5 Actions to be Taken to Minimize the Impacts

The impact on water quality for the proposed project configuration was analyzed as a part of the preliminary design of the project. The analysis demonstrates that the project would have no significant impact on water quality (TRWD 2005). The assessment did recognize that because flows during dry periods are slight (approximately 5 cubic feet per second), it may be beneficial to implement practices to manage circulation and water quality and aesthetics in the system. Several options to accomplish this would be considered during final design:

- *Augmenting flow with other sources*. The supply augmentation options discussed in Section 3.0 would provide the benefits of increasing circulation within the system.

- *Inducing large scale circulation mechanically*. Several mechanical means could be used to induce circulation throughout the waterway. Subsurface pumps could be employed to force large volumes of water to move within the channels associated with the system. The proposed stormwater pump station for the interior waterway could be configured to accomplish this in addition to its primary function of conveying larger storm flows.

- *Inducing localized circulation mechanically.* Surface aerators (commonly seen as fountains) could induce circulation in localized areas if needed. Pumps could be used to pull water from the waterway and allow it to return to the waterway over cascades or other aesthetic features on a localized basis.

- *Provide additional hydraulic structures to direct flow as needed.* Hydraulic structures could be configured within the waterway such that low flows are distributed as desired to have complete circulation within the system. These structures, likely subsurface and analogous to grade control structures, would have no effect on the performance of the system in regards to larger flood flows.

2.3 Suspended Particulate/ Turbidity Determinations

2.3.1 Expected Changes at Discharge Sites

There could be temporary increases in suspended particulate and turbidity levels during storm events prior to permanent stabilization. These increases, however, would be of a short duration and tolerable to aquatic organisms downstream. Construction design and phasing have been planned to minimize turbulence and generation of suspended particulates through the use of temporary erosion control measures and soil management plan protocols.

2.3.2 Effects on Chemical and Physical Properties of the Water Column

2.3.2.1 Light Penetration

The proposed project would not change the depth to which light penetrates within the water column.

2.3.2.2 Dissolved Oxygen

Water quality models demonstrate that dissolved oxygen concentrations would be changed very little by the proposed project and would remain well above the State of Texas standard of 5 mg/L.

2.3.2.3 Toxic Metals and Organics

The State of Texas listed one mile of Segment 0829 (Clear Fork Trinity River below Benbrook Lake) upstream of its confluence with the West Fork, as not meeting water quality standards because of high levels of chlordane in fish tissue. This designation requires the development and implementation of a Total Maximum Daily Load (TMDL) process specific for that waterway and pollutant.

The Texas Commission on Environmental Quality (TCEQ) has prepared an implementation document for this TMDL and will continue to monitor chlordane in fish tissue in the Fort Worth area. The TMDL monitoring data showed that chlordane is declining in the environment because improved environmental practices. Recent sampling by the United States Fish and Wildlife Services (USFWS) found that chlordane concentrations in fish tissue have decreased slightly within the project area (USFWS 2004). After evaluation, there is no known reason why the proposed project would increase the likelihood of chlordane in the waterway. However, the project is being structured such that all construction will comply with the TMDL plan set forth by TCEQ which requires appropriate management practices to limit sediment discharge.

Regional stormwater monitoring and an assessment of other permitted discharges in the region indicate that ni other toxic metals or organics are expected in the waterway currently or as a result of the proposed project.

2.3.2.4 Pathogens
Currently, the State of Texas river segments of the Trinity River encompassed by the proposed project, Segments 0806 and 0829, meet the State water quality standards for bacterial indicators (E. coli and fecal coliforms). Assessment indicates that the proposed project would not cause these standards to be exceeded.

2.3.2.5 Aesthetics
As discussed in 2.2.5, several options will be considered in final design to maintain aesthetics including:

- Augmenting flow with other sources;
- Inducing large scale circulation mechanically;
- Inducing localized circulation mechanically; and
- Provide additional hydraulic structures to direct flow as needed.

A universal impact to water aesthetics in urban areas is floatable material. Typically litter that has washed into drainageways with stormwater runoff, floatable material can aggregate on waterway banks and collect on structures creating unslightly clutters of trash. In conjunction with the additional hydraulic assessments associated with final design of the project, the project will investigate how floatable material would interact within the system and implement design strategies to minimize this. This may be in the form of refining how flow moves through the system or in the form of floatable control practices (e.g., netting, booms, etc.) design to catch and remove floatables.

2.3.2.6 Others as Appropriate
None.

2.3.3 Effects on Biota

Because the Trinity River through downtown Fort Worth is currently impounded by low water dams, the extension of that impoundment by the construction of Samuels Avenue Dam would not have any effect on biota within the Trintiy River itself. Changes is the type of aquatic habit is possible because of the effect of the impoundment on Marine Creek. This requires further assessment during design, but a preliminary mitigation plan has been developed to recreate similar types and amounts of habitat on Lebow Creek.

2.3.4 Actions taken to Minimize Impacts

Additional water quality data collection and refinement of water quality and hydraulic modeling tools will be undertaken during the course of project design and implementation in order to guide activities in a manner that minimize impacts to water quality.

.2.4 Contamination Determinations

Prior to excavation activities and particularly for the bypass channel or interior water features, Phase II Environmental Site Assessments (ESAs) will be conducted in areas with known or potential soil contamination. The results from the Phase II ESA(s), and any following contaminant delineations that may be required, would be used to determine the proper handling procedures during excavation of the impacted areas. A soil management plan will be developed for areas with soil contamination. The plan would include a description of the nature and extent of the contamination, including figures, with delineation of contamination, volume of expected contaminated material, and soil handling methodologies (screening, segregation, treatment/discharge methods, etc.).

If contaminated soils that exceed regulatory standards are found during construction, they would be handled and disposed of in accordance with all State and federal regulations that could include (but are not limited to):

- Placement in a Subtitle D landfill;
- Placement in a Subtitle D landfill after on-site treatment; or
- Placement in a Subtitle C hazardous waste landfill/discharge facility.

The appropriate discharge method would be determined by the chemical characteristics of the soil, effectiveness of the method for protecting the environment, regulatory requirements and cost.

Soil handling and discharge would be conducted in accordance with the applicable local, state, and federal laws, regulations, and rules. Coordination with the appropriate regulatory agencies would help guide the soils excavation, remediation, reuse, and discharge efforts during the establishment of the Trinity River bypass channel.

2.5 Aquatic Ecosystem and Organism Determinations

USACE to provide

2.6 Proposed Discharge Site Determinations

USACE to provide

2.7 Determination of Cumulative Effects on the Aquatic Ecosystem

USACE to provide

2.8 Determination of Secondary Effects on the Aquatic Ecosystem

USACE to provide

3.0 Findings

USACE to provide

4.0 References

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5.0 Attachments

Tables

Table 1: Preliminary Fill Quantities

Table 2: Preliminary Excavation Quantities

Table 3: Dissolved oxygen criteria for waterways in the Central City area

Table 4: Water surface elevations at specified stations along the Trinity River

Figures

Figure 1: Project Location

Figure 2: Fill Material Classification

Figure 3: Proposed Source Material Locations

Figure 4: Proposed Discharge Sites

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Table 1: Preliminary fill quantities

Description	Volume (cu. yd.)	Volume (cu yd) within 100-year floodplain
Embankment Fill	1,518,000	835,000
Levee Fill	1,130,000	515,000
Out-of-bank Fill	1,565,000	0
In-Channel Fill	310,000*	310,000*
Temporary Fill	50,000	50,000
Total	**4,573,000**	**1,710,000**

* approximately 50 percent earth work, 50 percent structures

Table 2: Preliminary excavation quantities

Description	Volume (cu. yd.)
Riverbend Mitigation Site	1,262,000
Bypass Channel	1,585,000
Interior Water Feature	485,000
Downstream Mitigation Sites*	1,241,000
Total	**4,573,000**

* includes all excavation associated with
Samuels Ave Dam including Lebow Creek redirect

Table 3: Dissolved oxygen criteria for waterways in the Central City area.

Mean (mg/l)	Minimum (mg/l)	Spring Mean (mg/l)	Spring Minimum (mg/l)
5.0	3.0	5.5	4.5

Source: Texas Commission on Environmental Quality Chapter 307: Texas Surface Water Quality Standards

Table 4: Water surface elevations at specified stations along the Trinity River.

	Existing Conditions				
Station	Median flows	Annual average flows	2-yr	10-yr	100-yr
237615	500.7	501.3	511.1	517.5	522.9
243471	500.7	501.3	512.1	518.7	525.1
280042	520.2	521.2	539.6	544.7	549.7
	Proposed Conditions				
Station	Median flows	Annual average flows	2-yr	10-yr	100-yr
237615	500.7	501.3	511.1	517.5	522.9
243471	524.3	524.3	512.4	518.8	525.0
280042	524.3	524.4	539.5	544.6	549.7