INTEGRATED PLANNING AND DESIGN ANALYSIS AND ENVIRONMENTAL ASSESSMENT

CITY OF COLUMBUS
SECTION 14
EMERGENCY STREAMBANK AND SHORELINE PROTECTION

Prepared for

City of Columbus, Texas

by

US Army Corps of Engineers
Galveston District

August 2018

Finding of No Significant Impact

CITY OF COLUMBUS
SECTION 14 EMERGENCY STREAMBANK AND SHORELINE PROTECTION
COLORADO COUNTY, TEXAS
INTEGRATED PLANNING AND DESIGN ANALYSIS AND ENVIRONMENTAL ASSESSMENT

The U.S. Army Corps of Engineers, Galveston District (Corps), has conducted an environmental analysis in accordance with the National Environmental Policy Act of 1969, as amended. The Corps assessed the effects of the following actions in the Final Integrated Planning and Design Analysis and Environmental Assessment, dated July 31, 2018, for the City of Columbus Section 14 emergency streambank and shoreline protection project. The recommended plan consists of the following:

- The placement of fill material along approximately 130-foot of eroded streambank to restore a 2:1 slope using imported clay soils from a commercial upland source.
- Toe protection including a scour curtain and a vinyl (PVC) sheet pile would be embedded a minimum of 10 feet into the river bed.
- Erosion protection along the restored slope face would be provided by a 24-inch thick riprap layer underlain with 6-inch bedding stone and geotextile.

In addition to the "no action" alternative, two alternatives were evaluated, including the recommended plan. The recommended plan was identified as National Economic Development (NED) plan and is the environmentally preferable alternative. All practicable means to avoid and minimize adverse environmental effects have been incorporated into the recommended plan. The recommended plan would not result in any impacts to federally-listed threatened or endangered species or their designated critical habitat, would have no impact to sites listed on or eligible for inclusion on the National Register of Historic Places, and would not significantly affect any wetlands or water of the U.S., nor any important wildlife habitat. Therefore, no compensatory mitigation is required.

Technical and economic criteria used in the formulation of alternative plans were those specified in the Water Resource Council's 1983 Economic and Environmental Principles for Water and Related Land Resources Implementation Studies. All applicable laws, executive orders, regulations, and local government plans were considered in the evaluation of the alternatives. It is my determination that the recommended plan does not constitute a major federal action that would significantly affect the human environment; therefore, preparation of an Environmental Impact Statement is not required.

Date: _____ _____

Lars N. Zetterstrom
Colonel, Corps of Engineers
District Commander

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INTEGRATED EA AND PLANNING DESIGN REPORT

This integrated document contains information relevant to both an environmental assessment to satisfy the National Environmental Policy Act (NEPA) and a Planning and Design Analysis used as a planning document by the U.S. Army Corps of Engineers (USACE).

STUDY AUTHORITY

This study is conducted under the authority of the USACE Continuing Authorities Program, Section 14 of the Flood Control Act of 1946, as amended, which provides authority for the USACE to provide emergency stream bank protection for public facilities and services.

STUDY AREA

The study area is located in Colorado County in southeastern Texas, approximately 74 miles (119 km) west of Houston, along the right descending bank of the Colorado River. The Colorado River is very sinuous with an index of approximately 1.9, which describes the ratio of the actual length of the river channel to the length of the river valley. The river bed is composed of sand and gravel, and the channel banks contain higher percentages of silt and clay. Flows in the river are regulated by a reservoir located approximately 95 aerial miles upstream in Austin, Texas that is regulated by the Lower Colorado River Authority. The project site is located approximately 0.15-mile upstream from the Interstate-10 (I-10) bridge crossing of the Colorado River.

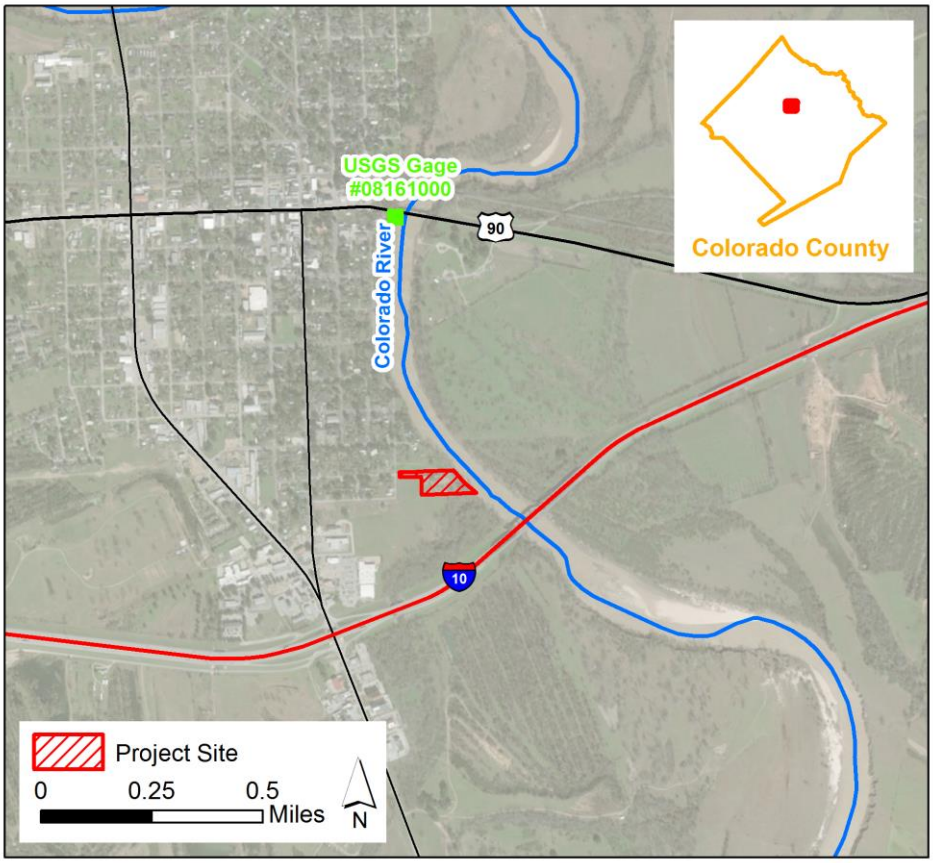

Figure 1: Project Location

PURPOSE AND NEED

The primary purpose of the City of Columbus Emergency Streambank Protection study is to develop a plan to protect the McCormick Wastewater Treatment Plant in the City of Columbus, Texas from encroaching erosion along the Colorado River bank. This includes assessing opportunities, evaluating alternatives, and selecting a plan from those alternatives. The selected plan must be technically sound, environmentally acceptable, economically feasible, and supported by the local sponsor, the City of Columbus, and the Federal Government.

Erosion and slope failure has occurred on the riverbank. A discharge pipe from the McCormick wastewater treatment plant is located within the portion of the bank experiencing significant erosion. This slope failure is exacerbated when the top of the bank becomes saturated and the toe is being undercut and the additional weight causes the slope to fail. In addition, rapid drawdown of the river, particularly after a prolonged period of high-water, further reduces the soil strength due to saturation. The subsequent slope failure has left a nearly 30 to 40-foot vertical bank void of vegetation over a 1,000-foot reach. The erosion induced slope instability problem demonstrates a need to investigate the opportunities and alternatives further to offer emergency streambank protection and the Federal Interest in this project.

AFFECTED FACILITY AND INFRASTRUCTURE

A site visit in May 2016, documented in a Trip Report prepared by USACE dated 01 June 2016 (Leimer, 2016), confirmed the site conditions: the discharge from the McCormick Wastewater treatment facility is conveyed via a discharge pipe (24-inch dia. concrete pipe) to the Colorado River. The erosion caused by high flow events on the river has resulted in the loss of a section of the discharge pipe. Erosional processes undercut the original bank at the end of the perched discharge pipe. The eroded area appears to have increased recently due to high river flows and is now encroaching on the perimeter fence of the wastewater facility as depicted below.

A second site visit was conducted in August 2016 with the assistance of river engineers from the USACE Engineering Research and Development Center (ERDC) to further assess site conditions and identify potential alternatives (May and Leach, 2016). Conditions as of this date are shown in figure 2 and 3.

A recent, temporary fix was undertaken in 2017, prior to Hurricane Harvey, which placed 163 tons of bull rock and other materials to extend the embankment out to a reasonable distance from the river (fig. 4). This effort was a matching grant of FEMA funds and cost $120,000.

Another site visit was conducted in March of 2018 at the outset of the feasibility phase of this CAP effort. Hurricane Harvey caused the failure of the emergency fix shown in figure 4 during on the receding limb of the event. Erosion progressed back to the fence line (fig. 5). Hurricane Harvey flows are noted in the hydraulic analysis. A temporary effluent pipe was added following Harvey and was in place during the March 2018 site visit (fig. 6).

Figure 2: Site conditions during a May 2016 site visit

Figure 3: Eroded Bank

Figure 4: Temporary repair completed in 2017 prior to Hurricane Harvey

Figure 5: Erosion following Hurricane Harvey

Figure 6: Site conditions as of March 2018 including the failed emergency repair and temporary pipe

HYDRAULIC ANALYSIS

The nearest gage station to the project site on the Colorado River is approximately 0.6 miles upstream of the site (United States Geological Survey (USGS) gage 08161000 at Columbus, TX) and has been in place since 1916. The maximum recorded discharge at the gage is 175,000 cubic feet per second (cfs) on July 29, 1938; Hurricane Harvey produced the second-largest event at the gage on August 29, 2017 with 165,000 cfs. Annual peak flow data was used in conjunction with methods from USACE (1993) and USGS (1982) to get a flow-frequency relationship. Figure 7 shows the flow-frequency relationship based on the available data.

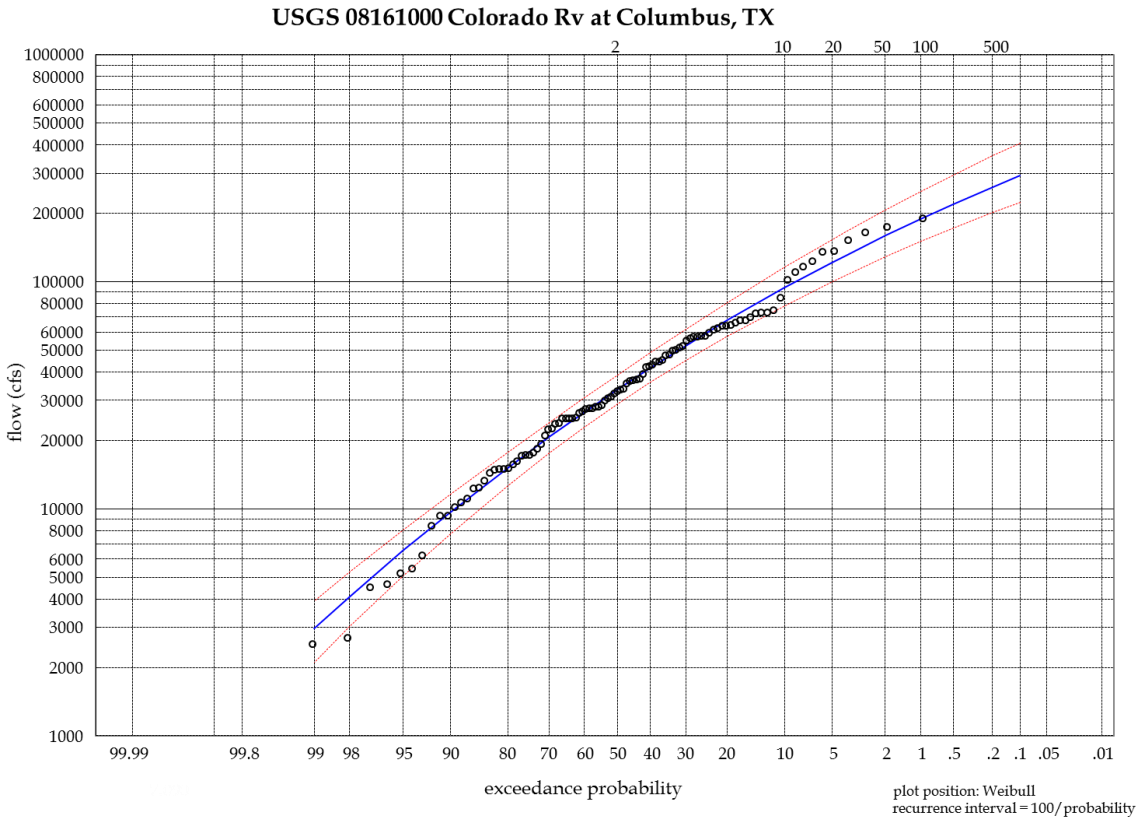

Figure 7: Flow frequency (blue line) based on annual peak gage data (circles) with 95% confidence intervals (red lines)

The flow-frequency was converted to a stage-frequency relationship by using a stage-flow rating curve. The rating curve for the upstream USGS gage was retrieved from the NWIS rating curve database (USGS, 2018). As a note, the USGS gage is related to National Geodetic Vertical Datum of 1929 (NGVD29); elevations were converted to National American Vertical Datum of 1988 (NAVD88) using VERTCON (NOAA/NGS, 2018). The difference is minimal in that NAVD88-NGVD29 = 0.062 ft. The 2-year stage is approximately 177.40 ft. NAVD88 (approximately 33,000 cubic feet per second) which is a good guide for the top of continuous bank protection.

Based on a cursory review of historical aerials, the river banks through the meanders have not moved significantly since 1995. One location of concern is approximately 700 feet upstream of the project site where the right bank has retreated approximately 60 feet since 1995. If this erosion translates downstream, which is certainly possible given its location toward the end of a cut bank, it could threaten to flank bank protection at the project site. However, this is not an imminent concern and should be monitored.

A temporary measure in response to prior bank retreat was implemented in 2017 using FEMA funds. Figure 3 shows the conditions prior to the bank repair, and Figure 4 shows the repair in place. The repair replaced the prior back slope and placed 163 tons of bull rock for stabilization. The flood event associated with Hurricane Harvey caused this repair to fail during the receding limb of the event.

The failed repair was still on the ground during a site visit conducted 05 March 2018 (Figure 6). Following the repair failure, a 36" corrugated plastic pipe (CPP) was installed to connect the upstream manhole to the effluent point closer to the bank.

Apart from the river-induced erosion, bank retreat can be exacerbated by the effluent discharge pipe causing toe erosion. The effluent pipe allowed free-outflow onto the bank which undermines the bank and is important to consider for repair measures. Adequate erosion protection is needed at the toe to ensure the repair is not undercut.

For this feasibility phase, no hydraulic modeling was done specifically for this project; an existing model was leveraged. The model was developed for a Texas Department of Transportation (TxDOT) scour study related to United States Route 90 (US-90) just upstream of the project site (Carle, 2015). The downstream extent of their model is the US-90 bridge (upstream of the project area). The final few cross-sections from this model were used for the purposes of feasibility evaluation in this study; an extension of the model may be appropriate for final design. From this model, the cross-sectionally averaged channel velocity used to determine the appropriate stone size was 12.0 ft/sec. Methods outlined in USACE Engineering Memo 1110-2-1601 (1994) were used to identify the appropriate stone size. The calculations yielded a stone size with a d_{30} of 18 inches.

MOST PROBABLE FUTURE WITHOUT PROJECT

If the stream bank erosion continues along the right descending bank of the Colorado River in the City of Columbus, Texas, the most likely future condition of the area is as follows:

1. Erosion of the stream bank will continue toward the McCormick Wastewater Treatment plant in the City of Columbus, Texas' McCormick wastewater treatment plant.

2. At some critical juncture, the structure will not operate as designed and wastewater management for the city and industries will be affected.

STUDY PURPOSE

The goal of this study is to provide emergency streambank protection at the McCormick Wastewater Treatment plant in the City of Columbus, Texas.

PLANNING OBJECTIVES

Planning objectives reflect an expression of public and professional issues or concerns about the use of water and related land resources resulting from the analysis of existing and future conditions in the study area. These planning objectives were used in guiding the development of alternative plans and their evaluation for the period of analysis.

1. Reduce the risk of erosion overtaking the City of Columbus wastewater treatment plant to avoid or minimize the cost associated with the wastewater treatment facility not operating as designed due to the effects of the nearby stream bank erosion

2. Provide an economically efficient solution

3. Minimize environmental impacts

PLANNING CONSTRAINTS

Constraints are restrictions that limit the planning process and they include legal and policy constraints that apply to every Corps study and study-specific constraints that may only apply to this study. In order to provide direction for the plan formulation efforts the following constraints were taken into account:

The top of the bank at the project site is extremely vulnerable to slope instability, therefore due to safety risks no improvements can be done from the top of bank.

AFFECTED ENVIRONMENT

The river is very shallow along the toe of the bank but the facility could still be threatened from geotechnical failures due to the 30 - 40 foot bank height and steep angle and from trees toppled by wind throw. The facility site is located near the middle of an approximately ½-mile long, fairly straight reach of the river. The next bend is located approximately 430 yards upstream of the facility, and it is unlikely that the site would be threatened by the down-valley migration of the bend in the near future. However, conditions could change, resulting in an attack on the toe of the bank. This most likely would be due to changes in the deposition area upstream of the site or flood flows which would change the low flow pattern and cause the river to be directed toward the bank toe at the facility.

There is a depositional area just south of the I-10 bridge evidenced by the presence of well-developed sand bars. Flows running directly along the toe of the bank are eroding and steepening the toe with tension cracks developing along the top bank. This is allowing overland drainage water to enter and saturate the banks. Geotechnical failure occurs and the material slumps to the toe of the bank. This material could provide some measure of stability but if it is not stabilized by vegetation it would be removed by the next significant flow event. This process would continue until the curvature of the bend becomes too severe and the point of river attack shifts down-valley, resulting in meandering of the river pattern. Also, it is possible that rapid drawdown of river stages due to reservoir operation may contribute to bank instability.

Climate – The average temperature in the winter in Colorado County is 51.5 degrees Fahrenheit (F). Summers in Colorado County are usually sunny and hot when temperatures reach 100 degrees F for several consecutive days. The average annual rainfall in Colorado County is about 41.63 inches, with 29.11 inches, or 70 percent, usually falling from April through September. Climate information for Colorado County was obtained from the Soil Survey of Colorado County, Texas, dated August 2006.

Physiography and Geology – Colorado County is located in the Southern Blackland Prairie, Southern Claypan Area, and the Coast Prairie Major Land Resource Areas; encompassing a mixture of deep dark loamy clays and rocky sandy loams. The soils located at the project site are characterized as alluvium or flood plain deposits, including low terrace deposits (https://txpub.usgs.gov/dss/texasgeology/). Thicknesses of alluvial deposits typically do not exceed 60 feet. The deposits consist of dark gray to dark brown clay and silt, sand with a high component of quartz, chert gravel and, high amounts of limestone, igneous and metamorphic rock fragments, probably reworked from terrace deposits. Fluvial morphology is well preserved with point bars, oxbows and abandoned channel segments clearly visible (Barnes, 1974; Proctor et al., 1974).

Air Quality - The Environmental Protection Agency (EPA) uses six "criteria pollutants" as indicators of air quality, and has established for each of them a maximum concentration above which adverse effects on human health may occur. These threshold concentrations are called National Ambient Air

Quality Standards (NAAQS). Areas of the country where air pollution levels persistently exceed the NAAQS may be designated as non-attainment areas. Conversely, areas of the country that do not persistently exceed the NAAQS are designated as attainment areas.

The study area is located in Colorado County which is currently a full attainment area for all air quality criteria pollutants of the EPA and Texas Commission of Environmental Quality (TCEQ).

Surface Water - The headwaters of the Colorado River begin in eastern Dawson County and flow approximately 600 miles southeasterly across the state of Texas to the Gulf of Mexico near Matagorda, Texas. The total drainage area of the Colorado River Basin in Texas is 39,893 square miles. The river bed is composed of sand and gravel, and the channel banks contain higher percentages of silt and clay.

The treated effluent from the McCormick Wastewater Treatment Plant is discharged from an outfall structure into the Colorado River within the project site. The McCormick Wastewater Treatment Plant has a Texas Pollutant Discharge Elimination System (TPDES) permit from the Texas Commission on Environmental Quality. The TPDES has conditions in place to ensure that the treated effluent does not adversely affect the Colorado River.

Ground Water – Colorado County contains portions of the Gulf Coast Aquifer (GCA) which contains formations that range in age from the Oligocene to Holocene. The GCA extends along an approximately 100-mile-wide band that runs from the Sabine River to the Rio Grande. The alluvium of the Colorado River is modeled by the Texas Water Development Board (TWDB) together with the underlying Gulf Coast Aquifer and is not treated as a distinct aquifer. In contrast, the alluvium of the Brazos River to the east has officially been designated as a 'minor aquifer' by TWDB. Water from the Colorado River alluvium is typically found near the river and is used primarily for rural domestic and livestock uses.

The Evangeline Aquifer is a zone within the GCA and is comprised largely of sediments from the Goliad Formation, which is Pliocene in age and consists mostly of non-marine fluvial plain deposits (Culotta et al., 1992) and the uppermost part of the Fleming Formation, which is composed predominantly of clay and subordinate amounts of sand and ranges in thickness from near surface in Lavaca and Fayette counties to 2,300 feet below mean sea level in Wharton County. Fresh water occurs in the Evangeline Aquifer throughout most of Colorado County and can occur as deep as 2,000 feet in east-central Wharton County (Loskot et al., 1982). The Evangeline is a large source of water for irrigation in the southern portion of Colorado County and domestic and livestock use in the northern part. The City of Columbus obtains its water from the Evangeline Aquifer. Information for this section was obtained from the Colorado County Groundwater Conservation District's Management Plan: http://www.ccgcd.net/media/8128c0bc1a97a294ffff8031ffaf2815.pdf

Terrestrial and Aquatic Resources - Vegetation within the site includes black willow (*Salix nigra*), green ash (*Fraxinus pennsylvanica*), soapberry (*Sapindus drummondii*), cedar elm (*Ulmus crassifolia*), hackberry (*Celtis laevigata*), sycamore (*Platanus occidentalis*), Bois d' arc (*Maclura pomifera*), side oats gramma (*Bouteloua curtipendula*), and ragweed (*Ambrosia artemisiifolia*). There is no aquatic vegetation in the immediate vicinity project area. The study area is highly disturbed, and sparsely vegetated due to heavy erosion during episodes of high water. Aquatic habitat in the area includes undercut banks, logs, root wads, and a sparse canopy of overhanging vegetation.

Due to the extremely disturbed nature of the riverbank, habitat for terrestrial animals in the project area is extremely limited. Birds that have been observed in the area include barn swallows (*Hirundo rustica*), American robins (*Turdus migratorius*), cardinals (*Cardinalis cardinalis*), common grackles (*Quiscalus quiscula*), house sparrows (*Passer domesticus*), and mockingbirds (*Mimuspolyglottos spp.)*. Herpetofauna include aquatic and terrestrial reptile and amphibian species. Common reptiles found in

Colorado County include the Texas rat snake (*Elaphe obsoleta*), patch-nosed snake (*Salvadora grahamiae*), northern fence lizard (*Sceloperus undulatus*), and ground skink (*Scincella lateralis*). LCRA survey records indicate that 42 species of fish frequent the Colorado River in or around Austin, Texas. Some of the fish found in the river in that area include largemouth (*Micropterus salmoides)* and Guadalupe bass (*Micropterus treculii*), flathead (*Pylodictis olivaris*) and channel catfish (*Ictalurus punctatus*), bluegill (*Lepomis macrochirus*), long ear sunfish (*Lepomis megalotis*), common carp (*Cyprinus carpio*), blue sucker (*Cycleptus elongates*), stoneroller (*Campostoma anomalum*), gizzard shad (*Dorosoma cepedianum*), green striped topminnow (*Fundulus notatus*), mosquito fish (*Gambusia spp.*), and three species of darters (logperch (*Percina caprodes*), rainbow darter (*Etheostoma caeruleum*) and dusky darter (*Percina sciera*)). There were no fish or aquatic invertebrates observed within the immediate project area most likely due to poor habitat caused by heavy erosion.

Floodplains- The project location is within the 100-year floodplain of the Colorado River. Since the project site is located at an existing waste water treatment facility with outfall requirements, locating the recommended action in the floodplain would be the only practicable alternative. As such, modifications to the river would be designed to minimize potential harm to or within the floodplain.

Threatened and Endangered Species - The U.S. Fish and Wildlife Service's Information for Planning and Consultation website listed several threatened, endangered, or candidate species as being potentially affected by activities at the project location. Specifically, the search yielded five threatened or endangered bird species, the Attwater's Greater Prairie-Chicken (*Tympanuchus cupido attwateri*), the Least Tern (*Sterna antillarum*), the Piping Plover (*Charadrius melodus*), the Red Knot (*Calidris cantus rufa*), and the Whooping Crane (*Grus Americana*)). The search yielded one endangered amphibian species, the Houston Toad (*Bufo houstonensis*); and three candidate clam species, the Smooth Pimpleback (*Quadrula houstonensis*), the Texas Fawnsfoot (*Truncilla macrodon*) and the Texas Pimpleback (*Quadrula petrina*).

Critical Habitat – Terrestrial and aquatic habitat resources are very fragmented within the study area. There is no critical habitat within the study area.

Cultural Resources - Background research conducted using the Texas Historical Commission's Atlas database indicates that there are no previously recorded historic properties present and no systematic cultural resource surveys have been conducted in the immediate study area. Seven archaeology sites have been recorded within a 1.5-mile radius of the project site; two of these (41DC135, 41CD158) are pre-contact era sites extending 60-80 cm below surface and containing lithic debitage, tools, and burned rock. The Tait Plantation House Block (41CD153) was built ca. 1854-56 and is located within ½-mile of the project. Extant structures include the plantation house and garage; associated archaeological resources have been identified in the area surrounding these structures and the site is considered potentially eligible for listing in the National Register of Historic Places (NRHP). Other known sites within a 1.5-mile radius include concrete bridge supports from the pre-1932 bridge crossing the Colorado River (41CD126), an historic farmstead (41CD136), an historic dump site containing hand-made bricks (41CD134), and a multicomponent site containing lithic debitage and historic debris (41CD157). The Colorado County Courthouse Historic District was listed in the NRHP in 1978; it is located 0.5 mile from the project location and contains two structures that are also individually listed in the NRHP, the Colorado County Courthouse and the Stafford Bank and Opera House. Finally, Columbus' Old City Cemetery is located approximately 1 mile from the project location.

The project site is located near the confluence of Ratliff Creek and the Colorado River, on an elevated river terrace consisting of fine to coarse silt loam alluvium. Previous disturbances include construction of the wastewater treatment facility, replacement of a 24-inch diameter concrete outfall pipe, and extensive bank erosion caused by high-water events. The adjacent shoreline has undergone surficial disturbance

from these activities but does not appear to be otherwise disturbed. Therefore, any excavation into the bluff to lay it back or tie structures into the bank may have the potential to impact buried sites.

Hazardous Material - No visual indication of possible contamination concerns are present at the proposed site. A record search was conducted in accordance with the requirements of ASTM E1527-13 *Standard Practice for Environmental Site Assessments*, and ER 1165-2-132 *HTRW Guidance for Civil Works Projects*. The purpose of this search was to identify any sites where hazardous substances or petroleum products have been released or are likely to have been released to soil, groundwater, or surface water in the proposed project area. In order to conduct the records search, an Environmental Data Resources, Inc. (EDR) report was purchased in June 2018.

The governmental records search yielded one result. State records show that a leaking petroleum storage tank was present at a Texaco Service Station located at 2215 Highway 71 South, in Columbus. The site is just under a half mile to the southwest, and is currently occupied by a Shell gas station and a convenience store. The case was opened in 1993 and concluded in 1997. The records indicate that final concurrence for closure was issued, meaning that either the tank was removed and cleaned up to the satisfaction of the State, or that the leak was fixed and it was determined that no exposure to the contents had occurred. Due to the extended period of time since the case was closed, as well as the nearly half mile distance from the proposed project to the site, no impact from this site is expected.

Aesthetics - Areas or resources of aesthetic and potential public value were identified from recent aerial photography and photographs. The survey of areas available to the public or designated by a public agency includes those areas or resources that are potentially valued by community residents.

Aesthetic features in the vicinity of the project area are long scenic viewscapes of the Colorado River Valley, which include vegetation diversity and landscape variety (e.g. rocky outcroppings, bluffs and ridgelines). The erosion along the project site has created a cut bank that is mostly devoid of vegetation. There is a temporary plastic pipe that has been placed on the end of the failed outfall structure that runs along the cut bank (see Figure 6).

ALTERNATIVE PLANS CONSIDERED

In accordance with the guidelines outlined in ER 1105-2-100, the development and evaluation of alternatives reflected the magnitude and scope of a Section 14 study. A non-structural solution, vegetation and/or slope grading, was considered but discounted based on engineering experience and judgment. The lack of available land to cut back the slope, and the inability to establish vegetation, eliminated any type of "soft" erosion protection project from further consideration. The alternatives for addressing the imminent threat to the remainder of the outfall pipe at the wastewater treatment facility considered typical structural solutions using the following steps:

- Identify the slope instability problem
- Identify the cause(s) of the slope instability problem
- Develop alternatives based on engineering judgment and experience that address the slope instability problem threatening the wastewater treatment plant
- Based on engineering judgment and experience, decide on the alternative that would address the slope instability problem in the least costly manner

<u>No Action</u>

If no action is taken, erosion of the stream bank would continue. If the erosion continues, the wastewater treatment plant function will be interrupted. If the water treatment structure were to be undermined, the City of Columbus could no longer use this facility to treat wastewater for residents and businesses. Furthermore,

this area could become a public safety hazard because of the highly eroded stream bank. Eventually, this "no action" alternative would lead to the City of Columbus undertaking more frequent, temporary repairs until there is an interruption in service.

Alternative 1 - Fill and Riprap

Alternative 1 consists of placing semi-compacted buttress fill at a 2H:1V slope using imported clayey soils. The fill would match the existing toe of slope and occupy approximately 65 feet horizontally to match the elevation at the existing top of slope. Toe protection along the extents of the fill will be provided by a scour curtain. A vinyl (PVC) sheet pile (SG-325) will be embedded a minimum of 10 feet into the river bed. Erosion protection along the slope face will be provided by a 24-inch thick riprap layer underlain by a 6-inch thick bedding stone. The effluent pipe from the WWTP will be extended to the slope face before being turned to run along the repaired slope and discharging near the toe of slope. The proposed semi-compacted fill surface outside the riprap zone will be covered by appropriate turfing. The outfall pipe will be secured post-construction with a series of straps that tie into posts embedded in the fill material, or by truncating the outfall pipe at the bank. Figure 8 presents a conceptual cross section of Alternative 1.

Alternative 2 – Fill and Tiered Sheet Piles

Alternative 2 restores more area above the top of bank by using tiered sheet-pile walls. Semi-compacted buttress fill of imported clayey soils will be placed at a 2H:1V slope. A vinyl (PVC) sheet pile embedded a minimum of 10 feet will act as toe protection for the placed fill. Two additional vinyl sheet piles would act as retaining walls along the slope. The walls would be embedded 10 feet and emergent 5 feet and be placed at the intersection of the buttress fill at elevations 166 feet and 176 feet. Erosion protection along the slopes between retaining walls will be provided by a 24-inch thick layer of riprap underlain by a 6-inch thick bedding stone. The WWTP effluent pipe will be extended to the upslope retaining wall, then be turned to match the prevailing slope down to the toe of slope where it will discharge to the river. The proposed semi-compacted fill surface outside the riprap zone will be covered by appropriate turfing. The outfall pipe will be secured post-construction with a series of straps that tie into posts embedded in the fill material, or by truncating the outfall pipe at the bank. Figure 9 presents a conceptual cross section of Alternative 2.

Alternative 3 - Relocation

An alternative considered to demonstrate cost effectiveness of the emergency repair alternative is relocation of the wastewater treatment plant. The resulting relocation would require acquisition of real estate, construction, and operation on a more landward or entirely different site. The relocation of the wastewater treatment plant would also require the construction of a new facility on a new site which would disturb additional resources. The economic guidance in ER1105-2-100 directs us to compare the alternatives to the facility being protected.

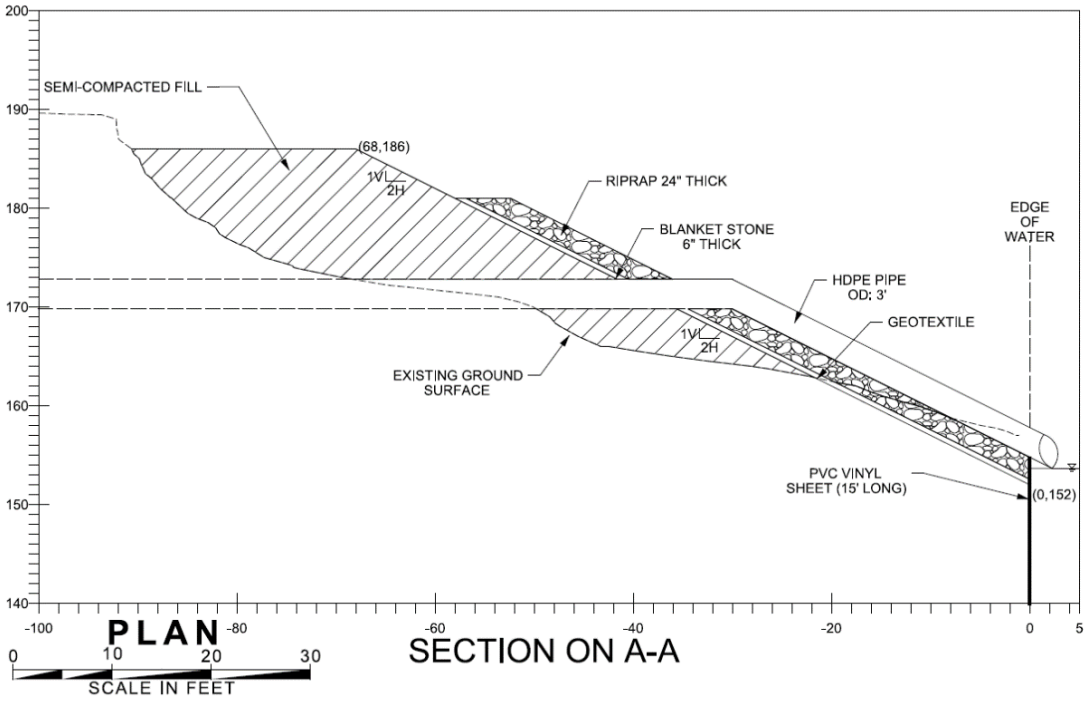

Figure 8: Alternative 1 – Fill and Riprap

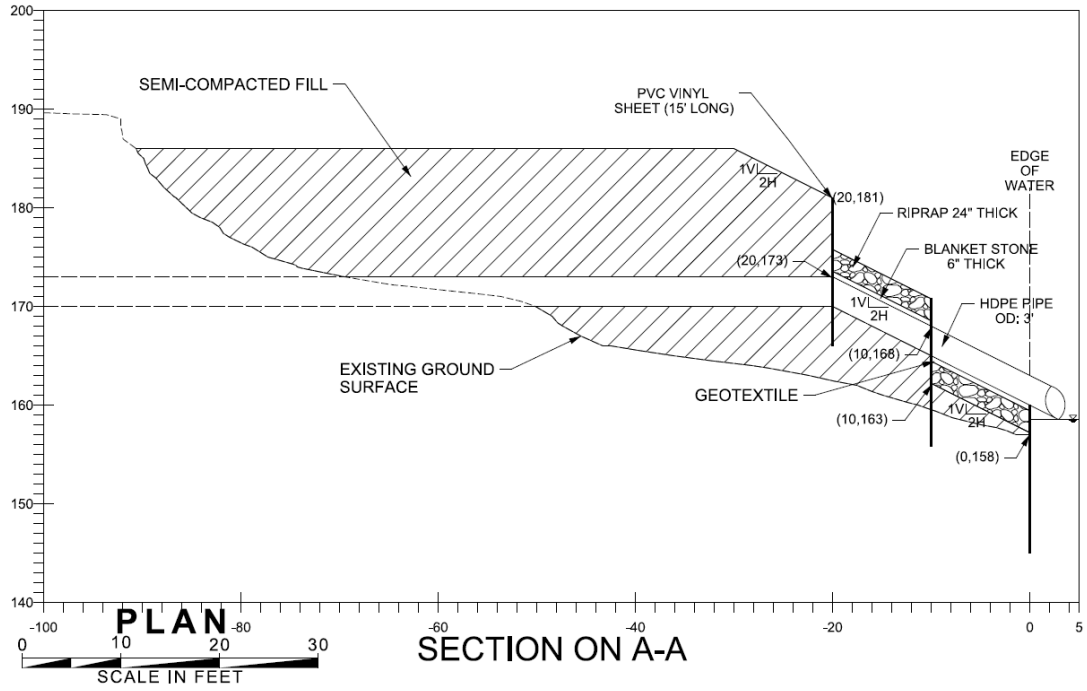

Figure 9: Alternative 2 – Fill and Tiered Sheet Piles

REAL ESTATE CONSIDERATIONS

The area along the river bank where the repair, equipment storage, construction, operation, and maintenance would take place is assumed to be owned by the City of Columbus. Therefore, no real estate acquisition is expected for the project. A right of entry (ROE) will be obtained for construction. Access for construction would be accomplished by using an entry point assumed to be owned by the City of Columbus. The total project acreage, including storage areas for equipment, will comprise an area of approximately 3.6 acres. Pursuant to ER 1105-2-100, the NFS will not receive LERRD credit for this project, designed to protect the land and McCormick Wastewater Treatment Plant structure.

SELECTING THE RECOMMENDED PLAN

As prescribed in ER 1105-2-100, evaluation and formulation should focus on the least cost alternative plan, and that plan is considered economically justified if the total cost of the proposed alternative is less than the cost to relocate the threatened facility. Given that the city has only a single plant to treat wastewater, shutting down the plant and relocating is not the likely scenario. It would be more likely to construct a new plant at a more protected location and then decommission the existing plant once the new plant is online. Therefore, the cost of constructing a new plant should be a reasonable parametric cost for relocating the existing facility. For this evaluation, the construction cost of a new plant of similar capacity (600,000 gallons per day (gpd)) was estimated from the RS Means Construction Cost Estimation publication dated February 2018. Based on that publication, the construction cost of a similar capacity sewage treatment plant would range from $7.70 per gpd to $8.45 per gpd, or $4,620,000 to 5,070,000. For a conservative comparison, the lower estimate was used, and given the magnitude of the cost, neither real estate costs nor costs of decommissioning of the existing plant were included.

First costs for Alternatives 1 and 2 were developed and are presented in Table 1.

Table 1: Estimated First Costs for Alternatives 1 and 2, October 2018 Prices

Construction Item	**Alternative 1**	**Alternative 2**
16 - Bank Stabilization	$392,000	$602,000
30 - Planning, Engineering, and Design	$117,000	$104,000
31 - Construction Management	$57,000	$72,000
Project First Cost*	**$566,000**	**$778,000**
* Inclusive of a 23% contingency		

OMRR&R costs were developed for the two action alternatives. For Alternative 1, the annual operation and maintenance cost is $1,700, and $22,100 of rehabilitation and replacement costs are estimated every 15th year over the 50 year period of analysis. Using IWR Planning Suite's annualizer, a period of analysis of 50 years and an interest rate of 2.875%, the average annual OMRR&R cost for Alternative 1 is $3,000. Likewise, the annual operation and maintenance cost for Alternative 2 was estimated at $1,700, and a rehabilitation and replacement estimate of $30,700,000 every 15th year of the period of analysis, which yields an annual average OMRR&R cost of $3,000. OMRR&R costs for the no federal action plan (constructing a new plant) are assumed to be the same as the existing facility, therefore a sunk cost.

Estimated first costs for each alternative, the estimated cost of constructing a new plant (no action alternative), average annual OMRR&R costs, and average annual costs are presented in Table 2. Alternative 1 is the least costly alternative of Alternative 1 and 2 by comparing first cost ($566,000 compared to $784,000) and annual cost ($24,500 compared to $32,800). Alternative 1 is also economically justified as that cost is lower than Alternative 3, constructing a new plant ($566,000 compared to $4,620,000 in first costs; $24,500 compared to $180,400 in average annual costs).

Table 2: Estimated First Costs, Investment Costs, Average Annual OMRR&R, and Average Annual First Costs (October 2018 Prices, 2.875% Interest Rate, 50 year period of analysis)

Investment	**Alternative 1**	**Alternative 2**	**Alternative 3**
Estimated First Cost	$566,000	$784,000	$4,620,000
Annual Interest Rate	2.875%	2.875%	2.875%
Period of Analysis (years)	50	50	50
Interest During Construction	$870	$1,580	$133,500
Investment Costs	$566,870	$785,580	$4,753,500
Annual Costs (rounded to nearest $100)			
Interest	$116,300	$22,600	$136,700
Amortization	$5,200	$7200	$43,700
OMRRR	$3,000	$3,000	$0
Average Annual Costs	**$24,500**	**$32,800**	**$180,400**

RECOMMENDED PLAN

Alternative 1 is the most economical solution to the slope instability problem. This would protect the bank from further erosion and prevent the loss of the outflow pipe and ultimately impair the function of the McCormick Wastewater Treatment Plant. As previously stated, the plan restores the slope by placing a semi-compacted buttress fill at 2H: 1V slope gradient using imported clayey soils. The toe of the buttress fill shall be protected by a scour curtain; vinyl (PVC) sheet piling (SG-325) (with a minimum embedment of 10-foot into the riverbed) along the toe of the buttress fill, within the project limits. The slope face of the buttress fill shall be protected by 24-inch thick riprap and 6-inch thick bedding stone against potential erosion as shown in Figure 8. This plan reduces the immediate vulnerability to erosion over Alternative 3 and comparable to Alternative 2, at a lower cost.

ENVIRONMENTAL CONSEQUENCES

NO ACTION ALTERNATIVE

Under the No Action plan, eventual failure of the bank is likely and the wastewater treatment plant would be compromised, making it unusable. This facility is critical infrastructure to support the City of Columbus, Texas. The Colorado River at the project site would continue to change and move to accommodate the change in flow regimes from increased surface runoff, flows in the watershed, and storm events. Absent any remedial action, the bank retreat shows no signs of abating. The existing bank is sufficiently steep to be unstable and impractical to treat in place. Turbidity issues would continue as bank instability hinders vegetation establishment at the project site. Over time the bends in the river would become more severe and trees adjacent to the channel would continue to succumb to erosive processes, eventually falling down into the river. The river would eventually return to a natural state shaped by the increases in flow events and velocities leaving the wastewater treatment facility and the neighboring residential area vulnerable to structural failure making them a public safety hazard.

RECOMMENDED PLAN (ALTERNATIVE 1 - FILL AND RIPRAP)

Soils. Disturbances to soil would be primarily from excavation of the stream bank sides and the addition of fill and armor material from backhoe activities. Further disturbance to soils would be from construction equipment access as well as site preparation and minor grading for vegetative plantings following construction. Direct and indirect impacts would come from sedimentation during rainfall events that occur during construction and before vegetation is established. A Storm Water Pollution Prevention Plan would be implemented using best management practices before construction would commence to minimize the temporary impacts to soils during construction.

Land Use. Land use in the area includes a nearby residential area that can only be accessed by Milam Street, a City Park (Beason's Park), and commercial operations along the I-10 corridor. The proposed alternative for stream bank stabilization would benefit the City of Columbus by allowing the water facility to continue to operate.

Surface Water. Construction activities associated with the proposed alternative would have temporary direct and indirect impacts to water quality by causing an increase in river turbidity. This would directly affect the adjacent waters and have further indirect effects for a short distance downstream until the sediment is diluted. This short-term increase in turbidity would cause a reduction in river dissolved oxygen levels by shading the oxygen-producing phytoplankton. These impacts would occur immediately in the vicinity of the construction activity. The proposed bank protection would provide long-term beneficial impacts to water quality by eventually eliminating the source of stream bank erosion. The stabilized soils will allow for improved water quality comparable to pre-erosion conditions. As water quality increases, plant and microorganisms would increase to create a diversified aquatic habitat for fish and wildlife to use.

Ground Water. Stabilizing the bank would allow improved water quality by slowing or eliminating the amount of siltation and debris that sloughs into waters from storm runoff or high swift moving waters. Improving the water quality within the study area would most likely benefit ground water resources given the fact that the aquifer catchment areas usually occur along the riverbed.

Floodplains. Consistent with Executive Order 11988, Floodplain Management, locating the recommended action in the floodplain would be the only practicable alternative. As such, modifications to the river would be designed to minimize potential harm to or within the floodplain. In addition, the recommended project would not increase the base flood elevation to a level that would violate applicable floodplain regulations or ordinances.

Terrestrial and Aquatic Resources. Stream bank preparation would be required during implementation of the proposed alternative. The preparation would involve contouring, and soil removal or relocation. These construction activities would initially eliminate all terrestrial habitat in the riparian zone and adversely impact organisms utilizing this area. Noise and other disturbances associated with construction would also temporarily adversely impact terrestrial species utilizing wildlife habitats adjacent to the project site. Materials used for the construction of the proposed project would provide some habitat for terrestrial animals. Once established, the stone riprap toe protection for this project would provide suitable habitat for small mammals, reptiles, and birds which utilize subterranean sites for shelter.

Aquatic organisms presently utilizing shoreline or near shore habitats adjacent to the project site would be displaced through any construction activity which requires bank removal or contouring. Aquatic habitat provided by shading structures (such as overhanging vegetation), root wads, and undercut banks, would be eliminated by any bank preparation activities. Since the desired outcome of the project would be to alter local hydraulics and the resultant erosional characteristics of the river, the aquatic species adapted to the present hydraulic regime of the Colorado River at, or near, the project site, would be adversely impacted through changes in aquatic habitat. In addition to the water quality improvements previously identified that would benefit the aquatic resources, the proposed alternatives would provide additional beneficial impacts to fish, aquatic invertebrate, and other aquatic resources in the Colorado River by providing substrate for colonization, feeding, spawning, and refuge.

Threatened and Endangered Species. Due to the fragmented nature of the area and ongoing impacts from heavy erosion, it is unlikely that the subject property would support any of the protected wildlife species for other than transitory purposes. Should any protected wildlife species be sited during construction, all activities would stop. U.S. Fish & Wildlife and Texas Parks and Wildlife Department biologists would be contacted to determine if construction activities can continue without adverse effects to protected wildlife species.

A site visit was conducted on 7 September 2018 to perform a freshwater mussel survey at the project site. The site visit and freshwater mussel survey was performed at the requested of the U.S. Fish and Wildlife Service. A representative from the U.S. Fish and Wildlife Service attended the site visit and assisted Corps staff with performing the freshwater mussel survey. The freshwater mussel survey was conducted using the protocol provided by the Texas Parks and Wildlife Department's Kills and Spills Team (https://tpwd.texas.gov/publications/pwdpubs/media/pwd_lf_t3200_1957.pdf). No state listed or federal Candidate mussels were found within proposed project area. The representative from the U.S. Fish and Wildlife Service submitted an email on 6 September 2018 stating that they do not see any issue with the project moving forward, provided Best Management Practices are in place.

Cultural Resources. In accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, and it's implementing regulation 36 CFR Part 800, USACE is required to consider the impacts the project may have on cultural resources. While the area has a high potential for intact subsurface deposits, the preferred alternative to place rip rap along the toe of the eroding bank and install PVC sheet piling in the river bed at the toe of the buttress fill would have no adverse affect on those resources. Rather, this alternative would serve to protect potentially significant deposits from further erosion.

Consideration of the American Indian Religious Freedom Act with regard to potential interments or burials is necessary during project construction activities. Should human remains or funerary objects be observed during construction, all activity in vicinity of the find will cease immediately and the USACE Cultural Resources specialist will be called so that appropriate action and consultation can be undertaken without delay.

Hazardous Material. A review of Colorado County records indicates there is no history of past storage, use, release, and disposal of any hazardous substances or petroleum products within the study area. If a site is discovered during construction, activities would be stopped until the hazardous and toxic waste material is properly contained and disposed of.

Air Quality. Impacts to air quality from the recommended alternative would be temporary in nature during construction, primarily from the use of heavy equipment such as front-end loaders, back hoes, and dump trucks. Limiting the number of units required for construction activities and routine equipment inspections would be used to minimize emissions from heavy equipment. Using these practices would allow air quality to stay within attainment standards during construction.

Noise. Residents near the proposed construction site would experience some disturbance due to the operation of heavy equipment and maintenance vehicles. During construction activities, noise levels would increase. However, these noise disturbances would be temporary and limited to day time working hours. No long-lasting adverse environmental effects are expected to occur.

Socioeconomic and Environmental Justice. The proposed alternative would not separate, or isolate any distinct neighborhoods, ethnic groups, or other specific groups. There are no disproportionate impacts on any minority and/or low-income populations associated with the project. Therefore, the requirements of Executive Order 12898 (Environmental Justice) are satisfied.

Aesthetic Resources. The proposed alternative for bank stabilization within the study area would involve adding vegetation, specifically, grass seed to the banks aiding in erosion protection. The addition of vegetation would greatly improve the landscape of the area and add habitat diversity for wildlife allowing nearby residents to enjoy the benefits of improved scenery and opportunities to view wildlife.

Irreversible and Irretrievable Commitments of Resources. The recommended action would not entail any significant irretrievable or irreversible commitments of resources. Construction of a longitudinal peaked stone toe dike would require consumption of petroleum products (just enough to run the construction equipment for a few weeks), and importing materials such as rock, soil, and gravel. However, the recommended action would entail long-term commitment and environmental stewardship to ensure the long-term sustainability of restored environmental resources.

ENVIRONMENTAL CONSEQUENCES COMPARISON OF CONSTRUCTION ALTERNATIVES

The Recommended Plan (Alternative 1 - Fill and Riprap) would incur less temporary impacts than Alternative 2 – Fill and Tiered Sheet Piles because installing sheet piles includes extra work, specifically, additional excavation. None of the alternatives would result in significant adverse impacts to the environment.

Alternative 2 is anticipated to incur the greatest temporary impacts to surface water quality due to the excavation that would have to occur to install the tiered sheet piles.

Noise impacts for the Recommended Plan and Alternative 2 would be similar. It is anticipated that longer construction periods for Alternative 2 would create longer duration of noise as compared to the Recommended Plan, but would still be considered insignificant.

Both Alternative 1 and Alternative 2 will have fewer impacts than the No Action alternative, since the impacts will be shorter in duration than the continued erosion and multiple repairs of the No Action alternative.

Impacts to ground water, land use, floodplains, hazardous material, and cultural resources are expected to be similar for both Alternative 2 and the Recommended Plan. Similarly, it is very likely that the recommended plan or Alternative 2 would not affect protected wildlife species because of the lack of supporting habitat due to the fragmented nature of the area. Because of the rock type and quantity of fill material used in Alternative 2, differences in terrestrial and aquatic resources are anticipated to be only slightly different, but very minor, from the use of riprap under the Recommended Plan.

Alternative 2 requires installation of multiple PVC sheet pilings in the existing river bank, whereas the Recommended Plan (Alternative 1) requires installation of a single sheet piling within the river bed, where there is little to no potential for intact archaeological deposits.

CUMULATIVE IMPACTS

This section addresses the cumulative impacts associated with the implementation of the Recommended Plan and other concurrent/future activities affecting the environment.

Past Activities

Past activities that have occurred in the project area include development along the west bank of the Colorado River, including the construction of the McCormick Wastewater Treatment Plant, a nearby residential community, and the construction of the I-10 corridor. Erosion problems in the vicinity of the McCormick Wastewater Treatment Plant have been documented for approximately 5 years. A recent, temporary fix was undertaken in 2017 which placed 163 tons of bull rock and other materials to extend the embankment out to a reasonable distance from the river. High flows associated with the Hurricane Harvey event caused the temporary fix to fail and accelerated the erosion to the fence line of the McCormick Wastewater Treatment Plant.

Present and Reasonable Foreseeable Future Activities

Present and future activities occurring in the project area would be the continued maintenance of the I-10 corridor, low impact recreation such as kayaking or fishing, and development of the nearby residential community.

Cumulative Impacts with Recommended Plan

The Recommended Plan would not add any significant cumulative impacts to soils, air quality, noise, existing land use (including local residential development), aesthetic resources, social economic, environmental justice, potential presence for hazardous materials, existing flood plains, terrestrial/aquatic wildlife, endangered or threatened species, and surface or ground water resources.

The recommended alternative, placing riprap at the toe of the bank and followed by seeding and hyro-mulching any areas disturbed by construction activities would have minor temporary impacts to resources within the project vicinity. Temporary impacts would include short-term increased turbidity, short-term displacement of terrestrial and aquatic organisms within and near the project area due to physical disturbances from construction activities, and short-term increase of fugitive dust related to construction activities. These temporary impacts associated with fugitive dust are very minor in comparison to impacts associated with ongoing area sand and gravel mining operations, and is not considered to be a significant contribution of overall fugitive dust to create major cumulative surface water and air quality concerns.

Stabilization of the stream bank to prevent further erosion would protect the integrity and prevent structural failure of the outfall structure. After project implementation, soils would stabilize by seeding disturbed areas with hydro-mulch while water quality would increase due to less turbidity promoting a more productive system for aquatic organisms at the site. Terrestrial organisms in the project vicinity

temporarily displaced by construction activity would begin to reoccupy the area. The Recommended plan would not alter maintenance activities going on within the I-10 corridor, it would not negatively affect low impact recreation activities, nor would it alter the development of the residential area adjacent to the project site.

REGULATORY COMPONENT

Since this is an emergency streambank protection project, there would be no other practical alternatives to conducting proposed activities within the flood plain. Nationwide Permit 13 (NWP 13) authorizes bank stabilization activities necessary for erosion prevention. Under the terms and conditions of NWP 13 any project over 500 feet in length requires a written notice to USACE Regulatory Branch requesting this requirement to be waived. This project would be approximately 1,000 feet long and would require an approved waiver in order to use NWP 13. Adverse impacts to aquatic resources from implementing proposed bank protection would be minimal. The project has been designed to require the minimum amount of fill with the minimum foot print to successfully protect the eroding streambank. Therefore, the project would qualify for authorization under NWP 13, which does not require an individual alternatives analysis and evaluation pursuant to Section 404(b)(1) guidelines. Since the TCEQ has issued 401 water quality certification for NWP 13, the proposed project would be in compliance with Section 401 of the Clean Water Act (CWA.)

Section 402 of the Clean Water Act and Chapter 26 of the Texas Water code require construction activities that disturb areas greater than 1 acre to obtain a National Pollution Discharge Elimination System (NPDES) Construction General Permit. Bank stabilization construction operations would meet water quality standards set forth by Section 402 of the Clean Water Act and Chapter 26 of the Texas Water Code by preparing and following a Storm Water Pollution Plan (SWPPP) approved by the USACE and the Texas Commission of Environmental Quality (TCEQ). This SWPPP would outline measures for the contractor to implement during construction activities to minimize pollution in storm water runoff. A TCEQ Notice of Intent (NOI) would be filed at least 48 hours prior to any ground disturbing activities. As required a copy of this NOI and the prepared SWPPP would be posted on site.

BEST MANAGEMENT PRACTICES

Final project designs would use measures to avoid and minimize impacts to natural and cultural resources. The following is a list of measures that would be used to mitigate impacts to natural and cultural resources.

- No excessive fill material would be used for stream bank protection.
- Dust control would be used during construction.
- Use of heavy equipment would be limited to only essential equipment required to perform necessary repair tasks and no more than 10 hours per day in order to limit noise and air emissions.
- Heavy equipment would operate on matting and would not remain in the Colorado River channel for prolonged periods of time.
- Appropriate soil erosion and sediment controls would be used and maintained in effective operating condition during construction, and all exposed soils would be permanently stabilized at the earliest practicable date.
- As much as possible, construction work would be performed during periods of low or no flow.
- Vegetation lost during clearing and grading activities would be replaced with native vegetation on a one to one basis.
- Impacts to undisturbed portions of the river bank will be minimized to the utmost extent practicable. It is expected that heavy machinery will have to traverse stable sections of the river bank during construction. The impacts associated with these activities will be minimized through the use of Best Management Practices, possibly construction matting.

PUBLIC INVOLVEMENT

A draft of this Integrated Environmental Assessment will be sent to the following resource agencies for review and comment in accordance with coordination requirements as set forth by NEPA: Texas Parks & Wildlife Department; U.S. Fish and Wildlife Department; U.S. Environmental Protection Agency; Texas Historic Commission, and the Texas Commission on Environmental Quality. The EA will undergo a 30 day public comment period. Any comments received during the comment period will be included as an Appendix.

REAL ESTATE

The proposed repair falls within a parcel owned by City of Columbus and no change in ownership is required for construction or maintenance, delineated in Figure 10. Project costs include the administrative costs of confirming ownership and developing one ROE.

Figure 10: Tract Ownership of Project Site

COST ESTIMATE OF RECOMMENDED PLAN

It is not necessary to account for interest during construction in project costs for Section 14 projects. This cost estimate is based on a preliminary design. Table 3 below is a summary of the cost estimate breakdown for the Recommended Plan and Table 4 presents the cost-share.

Table 3: Recommended Plan Cost Estimate

Task	Cost
Bank Stabilization	392,000
Planning Engineering and Design	117,000
Construction Management	57,000
Total Estimated Cost	**566,000**

ESTIMATED COST APPORTIONMENT

The total project cost would be cost shared between the non-federal sponsor, City of Columbus and the Federal Government on a 35% and 65% proportion, respectively. The non-Federal share is estimated to be approximately $177,900, along with annual costs of approximately $3,000 for operations, maintenance, repair, rehabilitation, and replacement. The federal share is estimated at approximately $ 330,391.

Table 4: Cost Apportionment

City of Columbus	
LERRD	7,300
Cash Contribution	170,603
Total Non-Federal Sponsor Share	177,903
Federal Government	
Total Federal Share	$330,391

PROJECT IMPLEMENTATION

Once a letter of intent is received from the City of Columbus, efforts would continue on the development of plans and specifications for the Recommended Plan. When the plans and specifications are sufficiently complete, project approval and a commitment of Federal funds for construction would be requested. Once received, the Project Partnership Agreement (PPA) would be executed, followed by advertisement of a construction contract. **Error! Reference source not found.** below displays the major project milestones and their completion date.

Table 5: Project Implementation

Milestone	Completion Date
Initiate Plans and Specifications	Jan 2019
Receive Project Approval	Feb 2019
Execute PPA	Feb 2019
Acquire Real Estate	NA
Advertise Construction Contract	TBD
Award Contract	TBD

COMPLIANCE WITH ENVIRONMENTAL LAWS

Endangered Species Act of 1973, as amended – Due to the fragmented nature of the area and ongoing impacts from heavy erosion, it is unlikely that the subject property would support any of the protected wildlife species for other than transitory purposes. Therefore, there are no anticipated adverse impacts on threatened or endangered species resulting from the proposed bank stabilization project.

Executive Order (EO) 13186 (Migratory Bird Habitat Protection) – Sections 3a and 3e of EO 13186 direct Federal agencies to evaluate the impacts of their actions on migratory birds, with emphasis on species of concern, and inform the U.S. Fish and Wildlife Service of potential negative impacts on migratory birds. The proposed bank stabilization would not result in adverse impacts on migratory birds or their habitats.

Migratory Bird Treaty Act – The Migratory Bird Treaty Act of 1918 extends Federal protection to migratory bird species. The nonregulated "take" of migratory birds is prohibited under this act in a manner similar to the prohibition of "take" of threatened and endangered species under the Endangered Species Act. The proposed bank stabilization project is would not involve the clearing of trees or shrubs for access and would not result in adverse impacts on migratory birds or their habitats.

Clean Water Act (CWA) of 1977 – **–** The Recommended Plan is in compliance with all state and Federal CWA regulations and requirements. Since this is an emergency streambank protection project, there would be no other practical alternatives to conducting proposed activities within the flood plain. Nationwide Permit 13 (NWP 13) authorizes bank stabilization activities necessary for erosion prevention. Under the terms and conditions of NWP 13, any project over 500 feet in length requires a written notice to USACE Regulatory Branch requesting this requirement to be waived. This project would be approximately 130 feet long and would not require an approved waiver in order to use NWP 13. Adverse impacts to aquatic resources from implementing proposed bank protection would be minimal. The project area does not include any special aquatic sites including wetland and so the project would not involve discharge of dredged or fill material into any special aquatic sites. The project has been designed to require the minimum amount of fill with the minimum foot print to successfully protect the eroding streambank. Therefore, the project would qualify for authorization under NWP 13, which does not require an individual alternatives analysis and evaluation pursuant to Section 404(b)(1) guidelines. Since the TCEQ has issued 401 water quality certification for NWP 13, the proposed project would be in compliance with Section 401 of the Clean Water Act (CWA). Construction activities will be carried out to meet the terms and conditions of NWP 13.

Section 402 of the Clean Water Act and Chapter 26 of the Texas Water code require construction activities that disturb areas greater than 1 acre to obtain a National Pollution Discharge Elimination System (NPDES) Construction General Permit. Bank stabilization construction operations would meet water quality standards set forth by Section 402 of the Clean Water Act and Chapter 26 of the Texas Water Code by preparing and following a Storm Water Pollution Plan (SWPPP) approved by the USACE and the Texas Commission of Environmental Quality (TCEQ). This SWPPP would outline measures for the contractor to implement during construction activities to minimize pollution in storm water runoff. A TCEQ Notice of Intent (NOI) would be filed at least 48 hours prior to any ground disturbing activities. As required a copy of this NOI and the prepared SWPPP would be posted on site. Farmland Protection Policy Act (FPPA) of 1980 and 1995 – The FPPA's purpose is to minimize the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to non-agricultural uses. There is no Prime Farmland within the project area.

National Historic Preservation Act (NHPA) of 1966, as amended – Please see the section/subsection of this document: ENVIRONMENTAL CONSEQUENCES/Cultural Resources, for additional information regarding compliance with the NHPA.

Clean Air Act of 1977 – Please see the section/subsection of this document: ENVIRONMENTAL CONSEQUENCES/Air Quality, for additional information regarding compliance with the Clean Air Act of 1977.

Farmland Protection Policy Act (FPPA) of 1980 and 1995 – The FPPA's purpose is to minimize the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to non-agricultural uses. There is no Prime Farmland within the project area.

EO 11990, Protection of Wetlands – EO 11990 requires Federal agencies to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in executing Federal projects. There are no wetlands within the project area and therefore the Recommended Plan is in compliance with EO 11990.

EOs Concerning Floodplain Management – EO 13690 was enacted on January 30, 2015 to amend EO 11988, enacted May 24, 1977, in furtherance of the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 et seq.), the National Flood Insurance Act of 1968, as amended (42 U.S.C. 4001 et seq.), and the Flood Disaster Protection Act of 1973 (Public Law 93-234, 87 Star.975). The purpose of the EO 11988 was 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 or indirect support of floodplain development wherever there is a practicable alternative. EO 13690 builds on EO 11988 by adding climate change criteria into the analysis. However, EO 13690 was partially repealed by EO 13807, Presidential Executive Order on Establishing Discipline and Accountability in Environmental Review and Permitting Process for Infrastructure as a means to increase infrastructure investment.

The EOs state that each agency shall provide and shall take action to reduce the risk of flood loss, to minimize the impacts of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities for:

- Acquiring, managing, and disposing of federal lands and facilities;
- Providing federally undertaken, financed, or assisted construction and improvements; and
- Conducting federal activities and programs affecting land use, including, but not limited to water and related land resources planning, regulation, and licensing activities.

The project is consistent with the requirements found in the EOs described above. The recommended plan does not increase the base flood elevation.

EO 12898, Environmental Justice – Please see the section/subsection of this document: ENVIRONMENTAL CONSEQUENCES/Socioeconomic and Environmental Justice, for additional information regarding compliance with the Clean Air Act of 1977. The Recommended Plan is in compliance with EO 12898.

CONCLUSIONS AND RECOMMENDATIONS

The findings of this study indicate that there is a need for stream bank protection along the right descending bank of the Colorado River adjacent to the McCormick Wastewater Treatment Plant located in the City of Columbus, Texas. A failure to do so would result in failure of the stream bank and the loss of service of a municipal wastewater facility. The recommended plan would provide stream bank protection against further erosion and save the affected facilities and restore the area to conditions comparable to pre-erosion and pre-flood conditions. This report with integrated EA discloses the potential environmental and cultural impacts associated with the proposed emergency stream bank stabilization project along the Colorado River in the City of Columbus, Texas.

The recommended plan, Alternative 1, Fill and Riprap, would result in minimal temporary adverse impacts to the natural environment. The stabilization would reduce stream bank erosion and subsequently improve local water quality by decreasing the turbidity in the Colorado River that has been caused by erosion and transport. It is the finding of this assessment that implementation of the recommended plan, the use of backfill and riprap would cause no significant environmental impacts and would not constitute a major Federal action requiring the preparation of an Environmental Impact Statement (EIS).

REPORT PREPARERS

The people who were primarily responsible for conducting the preparation of this Planning Design Report and Integrated Environmental Assessment are listed in Table 6.

Table 6: List of Report Preparers

Name	Discipline/Expertise
Andrew Weber/Lisa Mairs	CAP Project Manager/Project Manager
Jeff Pinsky	Environmental Resource Planner
Leslie Crippen	Cultural Resources
Caroline McCabe	Plan Formulation
Norm Lewis	Economist
Ratnam Tharmendira	Geotech and Civil Design
Brandon Crawford	Cost Engineering
Paul Hamilton, Ph.D.	Hydrology and Hydraulic
Nichole Schlund	Real Estate

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APPENDIX A –
REAL ESTATE PLAN

City of Columbus Section 14 Emergency Streambank and Shoreline Protection

December 2018

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This Real Estate Plan has been prepared in accordance with ER 405-1-12 dated 1 May 1998.

PREPARED BY:

Nichole L. Schlund
Realty Specialist
Galveston District
U.S. Army Corps of Engineers

RECOMMENDED BY:

Timothy J. Nelson
Chief, Real Estate Division
Galveston District
U.S. Army Corps of Engineers

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1 General Background

This Real Estate Plan (REP) is the real estate work product of the U.S. Army Corps of Engineers (USACE), Galveston District, Real Estate Division that supports project plan formulation for the City of Columbus Section 14 Emergency Streambank and Shoreline Protection Project. It identifies and describes the lands, easements, rights-of-way, relocations, and disposals (LERRD) required for the construction, operation and maintenance of the proposed project, including those required for relocations (i.e., P.L. 91-646 relocations and utility/facility relocations), borrow material, and dredged or excavated material disposal.

2 Project Type & Purpose

Under the USACE Continuing Authorities Program, the Galveston District of the Corps conducted a feasibility study to develop a plan for a portion of the Colorado River streambank that is eroding and threatening the stability of the McCormick Wastewater Treatment Plant in the City of Columbus, TX. Slope failure along the streambank has left a 30 to 40-foot vertical bank void of vegetation over a 1,000-foot reach. The erosion-induced slope instability problem demonstrated a need to further investigate the opportunities and alternatives to offer emergency streambank protection and the Federal interest in this project. The eroded area appears to have increased recently due to high river flows and is now encroaching on the perimeter fence of the wastewater facility.

The study included the assessment and evaluation of alternatives, and the selection of a plan from those alternatives that is technically sound, environmentally acceptable, economically feasible, and supported by the local sponsor and the Federal Government.

3 Authority

This project is authorized under the authority of the USACE Continuing Authorities Program, Section 14 of the Flood Control Act of 1946 (Public Law 79-526), as amended. This authority allows USACE to provide emergency streambank protection for public facilities and services.

4 Project Location

The study area is located in the City of Columbus within Colorado County in southeastern Texas. The McCormick Wastewater Treatment Plant on the west bank of the Colorado River is located along I-10, approximately 73 miles west of Houston (Figure 1).

5 Non-Federal Sponsor

The Non-Federal Sponsor (NFS) for this project is the City of Columbus, Texas. The City of Columbus has the authority and capability to furnish lands, easements, and rights-of-way for this project (Exhibit B). However, the proposed repair falls within a single parcel of land already owned by the City of Columbus (Figure 2). No change in ownership or land acquisition will be required for construction or maintenance of the project.

6 Sponsor Notification of Risk

A copy of the letter notifying the NFS of the risk in acquiring lands prior to the signing of the Project Partnership Agreement (PPA) is shown in Exhibit C. The risk letter has been signed by the NFS acknowledging their risks in the event acquisition of land is needed for this project.

7 Proposed Project Alternatives

The development and evaluation of alternatives reflected the magnitude and scope of a Section 14 study, in accordance with the guidelines outlined in ER 1105-2-100.

7.1 Future without Project Conditions

Without the project, erosion of the streambank would continue toward the McCormick Wastewater Treatment Plant. Eventually, the structure will not operate as designed and wastewater management for the City of Columbus will be affected.

7.2 Alternatives

- No Action: Erosion of the streambank will continue if no action is taken. More frequent and temporary repairs to the streambank would be necessary and eventually, operations of the City of Columbus' only wastewater treatment facility would be interrupted. Additionally, an eroded streambank could become a public safety hazard.
- Alternative 1: This alternative would use a combination of fill and riprap to restore the slope and provide protection to the restored slope.
- Alternative 2: This alternative would use a combination of fill and tiered sheet piles to restore the slope and provide protection to the restored slope.
- Alternative 3: This alternative involves the relocation of the wastewater treatment plant to a more landward site through the acquisition of real estate and the construction of a new facility.

7.3 Recommended Plan

Alternative 1, using the combination of fill and riprap, provides the most economical solution to prevent further erosion and protect the bank and wastewater treatment facility. As stated in the main report, Alternative 1 will restore the slope using imported clay soils from a commercial upland source. A scour curtain and vinyl sheet pile would provide toe protection. Erosion protection along the slope would be provided by 24-inch thick riprap and 6-inch bedding stone.

8 Real Estate Requirements

8.1 Existing Federally-Owned Real Estate

There are no USACE property interests within the City of Columbus or in the project vicinity.

8.2 Existing NFS-Owned Real Estate

It is assumed the City of Columbus owns the single tract of land required for the project (Figure 2). The 19.86 acre property was conveyed to the City of Columbus, excluding only mineral rights, on 17 May 1950, and recorded in Vol. 150, Page 533 of the deed records of Colorado County, TX. Due to conflicting ownership information appearing in Colorado County Appraisal District records, the City of Columbus has ordered title work to confirm ownership of the tract for USACE. This section of the REP will be updated once ownership has been confirmed.

8.3 Real Estate Requirements for Recommended Plan

Since it is assumed the City of Columbus owns the property required for this project, the only real estate requirements are a Right-of-Entry (ROE) for construction. The ROE is required for the purposes of access, staging, and construction. No additional real estate acquisition will be required.

8.5 Access/Staging Area

The project's access and staging areas will be contained within the tract of land owned assumed to be owned by the City of Columbus. It is expected that project access, equipment storage, construction, operation, and maintenance would require the use of 3.6 acres of the 19.86 acre property described in section 8.2 above.

8.6 Mitigation

No compensatory mitigation is required for this project.

9 Borrow Material

The proposed project does not require borrow material.

10 Recreation Features

There are no recreation features proposed for this project.

11 Timber Rights and Mineral/Energy Activity

There is no known timber activity within the project area. No mineral exploration or production activity would be impacted by this project.

12 Facility/Utility/Pipeline Relocations

This project will not require the relocation of facilities or utilities. There are no pipelines or wells located within the project footprint or near the project area.

ANY CONCLUSION OR CATEGORIZATION CONTAINED IN THIS REPORT THAT AN ITEM IS A UTILITY OR FACILITY RELOCATION TO BE PERFORMED IS PRELIMINARY ONLY. THE GOVERNMENT WILL MAKE A FINAL DETERMINATION OF THE RELOCATIONS NECESSARY FOR THE CONSTRUCTION, OPERATION, AND MAINTENANCE OF THE PROJECT AFTER FURTHER ANALYSIS AND COMPLETION AND APPROVAL OF FINAL ATTORNEY'S OPINIONS OF COMPENSABILITY FOR EACH OF THE IMPACTED UTILITIES AND FACILITIES.

13 Zoning

Due to the nature of the project and NFS-owned lands, zoning does not apply.

14 Hazardous, Toxic, and Radioactive Waste or Other Environmental Contaminants

Reviews indicated no indications of possible contamination or environmental concerns within the study area. No impact from this project is expected.

15 Navigation Servitude

Navigational Servitude is not applicable to this project.

16 Induced Flooding

There will be no induced flooding as a result of the construction project.

17 Attitudes of the Landowners

The NFS is the owner of the project lands and is supportive of the project. No public meeting was held. It is expected reactions to the project from neighboring land owners and city residents will be positive.

18 Public Law 91-646 Relocations

There are no residential houses, businesses, or farms that would require relocation associated with PL 91-626.

19 Baseline Cost Estimate for Real Estate

The tract of land owned by the City of Columbus is being protected by this project. Pursuant to ER 1105-2-100, the NFS will, therefore, not receive LERRD crediting for this project. As such, the administrative costs of coordinating with the NFS to confirm tract ownership and develop one ROE, will be reflected in the 30 account as outlined below.

Table 1: Baseline Cost Estimate for Real Estate

Account	Activity	Cost
30	**Acquisition** *(Costs of providing proof of tract ownership; $150/hr x 10 hrs.)*	$1,500.00
30	**Project-Related Administration** *(Costs of providing proof of tract ownership, coordination with Realty Specialist, and development of one ROE. Assumption of $150/hr x 24 hrs.)*	$3,600.00
	Non-Federal Total	**$5,100.00**
30	**Acquisition** *(Costs of reviewing proof of tract ownership; $150/hr x 5 hrs.)*	$750.00
30	**Federal Project-Related Administration** *(Costs of reviewing ownership, coordination with the NFS, development of one ROE. Assumption of $150/hr x 36 hrs.)*	$5,400.00
	Federal Total	**$6,150.00**
	Subtotal	**$11,250.00**
	Contingency (25%)	**$2,812.50**
	TOTAL	**$14,062.50**

20 Acquisition Schedule

Real Estate has coordinated with the PDT and the NFS in the development of Real Estate milestones. Milestones are based on the Project Partnership Agreement being signed.

Table 2: Acquisition Schedule

Milestone	Completion Date
Develop one ROE	Within 60 days of executing the PPA and 60 days prior to advertising construction contract.

Exhibits A

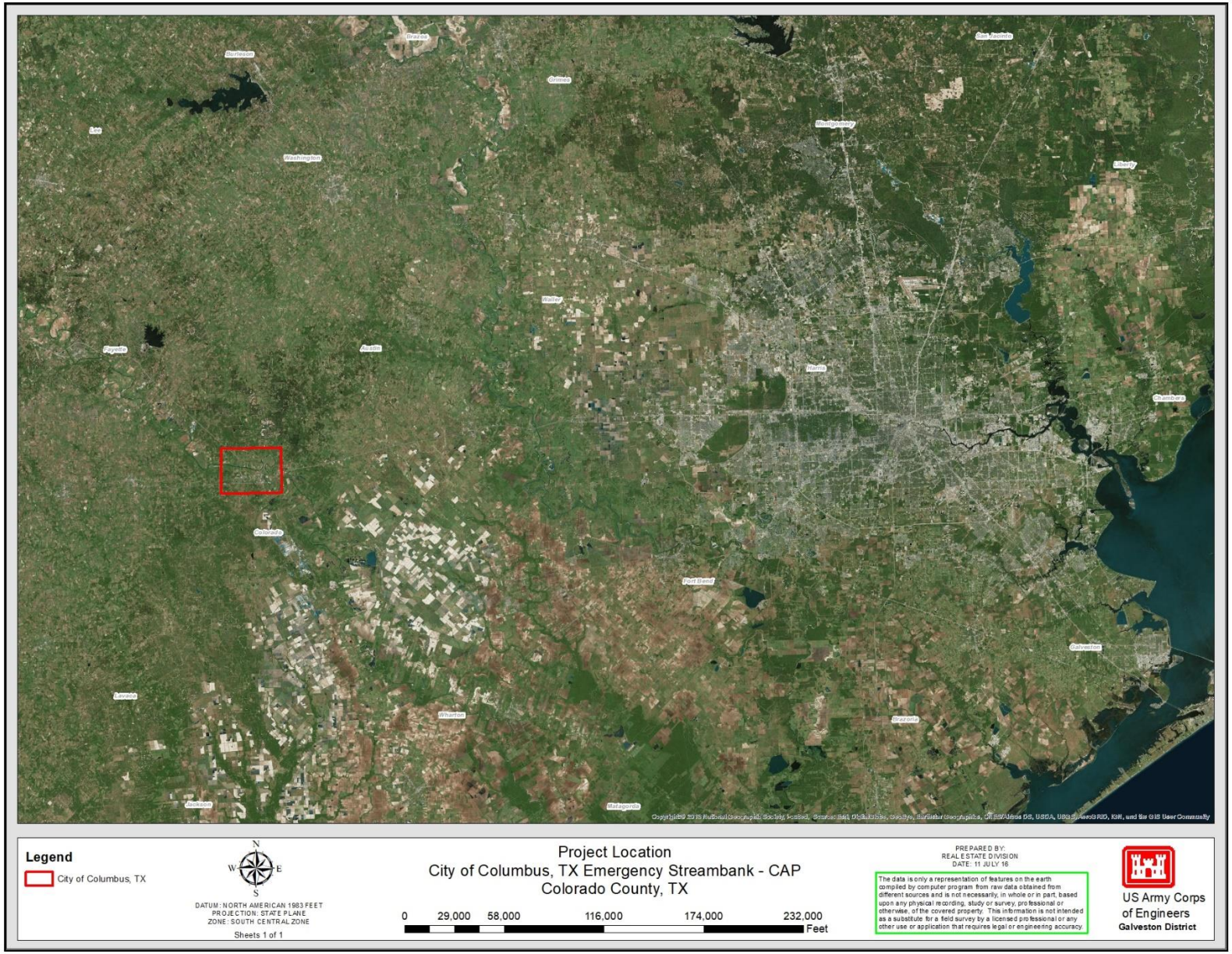

Figure 1: Project Location

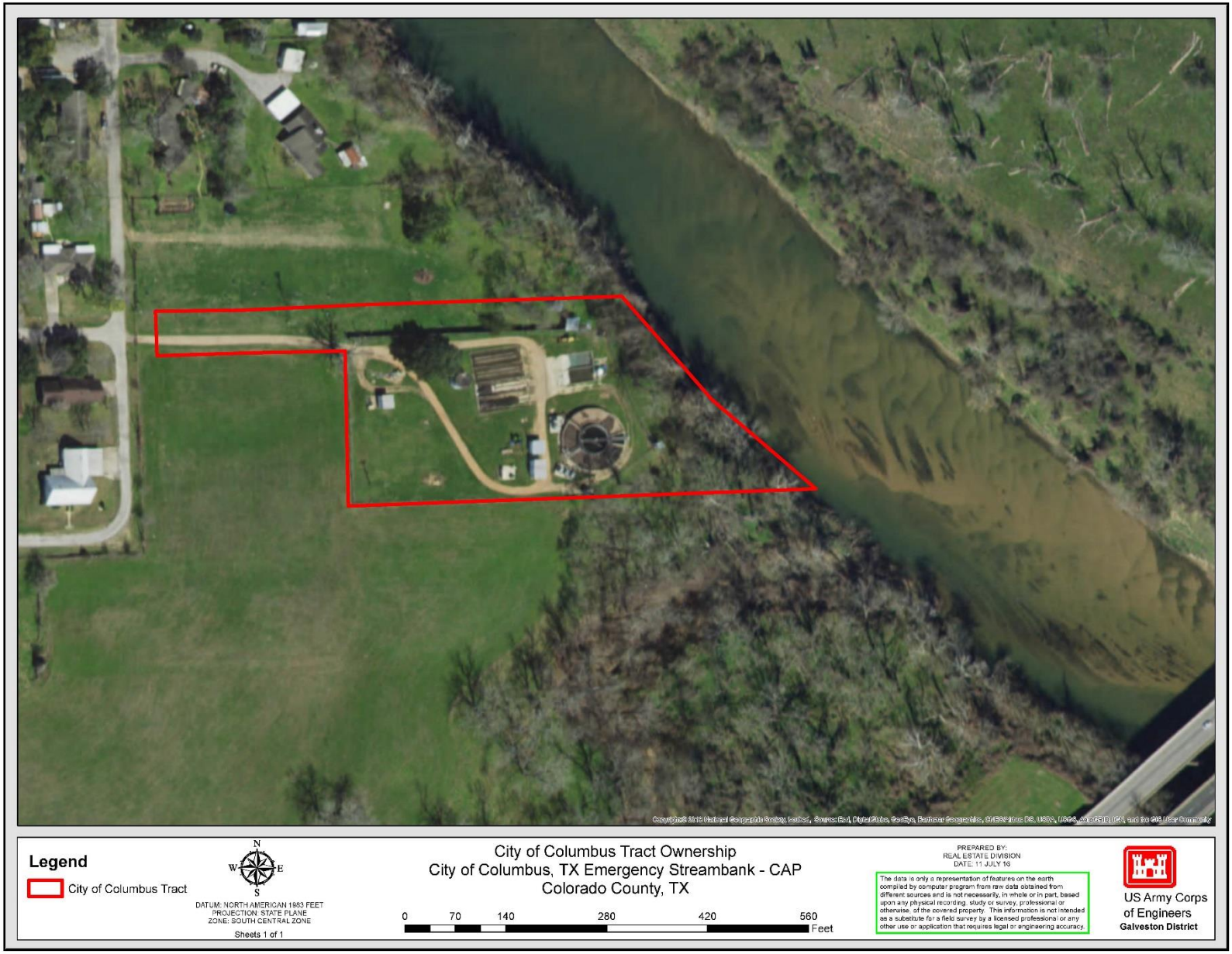

Figure 2: City of Columbus Tract Ownership (Awaiting Title Confirmation)

Exhibit B

Assessment of Non-Federal Sponsor's Real Estate Acquisition Capabilities

DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
P.O. BOX 1299
GALVESTON, TEXAS 77553-1299

REPLY TO
ATTENTION OF: USACE-SWG-RE

CITY OF COLUMBUS SECTION 14 EMERGENCY STREAMBANK AND SHORELINE PROTECTION
CITY OF COLUMBUS, TX – NON FEDERAL SPONSOR

ASSESSMENT OF NON-FEDERAL SPONSOR'S REAL ESTATE ACQUISITION CAPABILITY

I. Legal Authority:

a. **Does the sponsor have legal authority to acquire and hold title to real property for project purposes? (yes/no)**

YES. The sponsor holds title to the property required for this project and has provided proof to the Realty Specialist.

b. **Does the sponsor have the power of eminent domain for this project? (yes/no)**

NOT APPLICABLE. The sponsor owns all lands required for the project.

c. **Does the sponsor have "quick-take" authority for this project? (yes/no)**

NOT APPLICABLE. The sponsor owns all lands required for the project.

d. **Are any of the lands/interests in land required for the project located outside the sponsor's political boundary? (yes/no)**

NO.

e. **Are any of the lands/interests in land required for the project unable to be condemned by the sponsor? (yes/no)**

NO.

II. Human Resource Requirements:

a. **Will the sponsor's in-house staff require training to become familiar with the real estate**

requirements of Federal projects including Public Law 91-646 (Home Relocation Assistance), as amended? (yes/no)

NO.

b. If the answer to II.a. is "yes," has a reasonable plan been developed to provide such training? (yes/no)

NOT APPLICABLE.

c. Does the sponsor's in-house staff have sufficient real estate acquisition experience to meet its responsibilities for the project? (yes/no)

NOT APPLICABLE.

d. Is the sponsor's projected in-house staffing level sufficient considering its other work load, if any, and the project schedule? (yes/no)

NOT APPLICABLE.

e. Can the sponsor obtain contractor support, if required in a timely fashion? (yes/no)

NOT APPLICABLE.

f. Will the sponsor likely request USACE assistance in acquiring real estate? (yes/no) (If "yes," provide description)

NOT APPLICABLE.

III. Other Project Variables:

a. Will the sponsor's staff be located within reasonable proximity to the project site? (yes/no)

YES.

b. Has the sponsor approved the project/real estate schedule/milestones? (yes/no)

YES.

IV. Overall Assessment:

a. Has the sponsor performed satisfactorily on other USACE projects? (yes/no/not applicable)

NOT APPLICABLE.

b. With regard to this project, the sponsor is anticipated to be: highly capable/fully capable/moderately capable/marginally capable/ insufficiently capable. (If sponsor is believed to be "insufficiently capable," provide explanation)

HIGHLY CAPABLE.

V. **Coordination:**

a. **Has this assessment been coordinated with the sponsor? (yes/no)**

YES

b. **Does the sponsor concur with this assessment? (yes/no)**

YES

Accepted by the Non-Federal Sponsor:

(Signature)

City Manager
(Title)

11/8/2018
(Date)

Prepared by:

NICHOLE L. SCHLUND
Realty Specialist
Real Estate Division
Galveston District
US Army Corps of Engineers

Reviewed by:

BRIAN MURPHY
Branch Chief, Support Services Branch
Real Estate Division
Galveston District
US Army Corps of Engineers

Approved by:

11/8/18

TIMOTHY J. NELSON
Chief, Real Estate Division
Galveston District
US Army Corps of Engineers

Exhibit C

Risk Letter

DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
P.O. BOX 1229
GALVESTON, TEXAS 77553-1229

REPLY TO
ATTENTION OF:

Real Estate Division
Support Branch

29 October 2018

Mr. Donald R. Warschak, P.E.
City Manager
City of Columbus, Texas
605 Spring
Columbus, TX 78934

Subject: City of Columbus, TX Section 14 Emergency Streambank and Shoreline Protection

Dear Mr. Warshak:

The intent of this letter is to formally advise the City of Columbus, as potential Non-Federal Sponsor for the proposed project, of the risks associated with land acquisition prior to the execution of a Project Partnership Agreement (PPA) or prior to the Government's formal notice to proceed with acquisition. If a Non-Federal Sponsor deems it necessary to commence acquisition prior to an executed PPA for whatever reason, the Non-Federal Sponsor assumes full and sole responsibility for any and all costs, responsibility, or liability arising out of the acquisition effort.

Generally, these risks include, but may be not be limited to, the following:

(1) Congress may not appropriate funds to construct the proposed project;

(2) The proposed project may otherwise not be funded or approved for construction;

(3) A PPA mutually agreeable to the non-Federal sponsor and the Government may not be executed and implemented;

(4) The non-Federal sponsor may incur liability and expense by virtue of its ownership of contaminated lands, or interests therein, whether such liability should arise out of local, state, or Federal laws or regulations including liability arising out of CERCLA, as amended;

(5) The non-Federal sponsor may acquire interests or estates that are later determined by the Government to be inappropriate, insufficient, or otherwise not required for the project;

(6) The Non-Federal Sponsor may initially acquire insufficient or excessive real property acreage which may result in additional negotiations and/or benefit payments under P.L. 91-646 as well as the payment of additional fair market value to affected landowners which could have been avoided by delaying acquisition until after PPA execution and the Government's notice to commence acquisition and performance of LERRD;

(7) The Non-Federal Sponsor may incur costs or expenses in connection with its decision to acquire or perform LERRD in advance of the executed PPA and the Government's notice to proceed which may not be creditable under the provisions of Public Law 99-662 or the PCA as referenced in *ER 405-1-12 (Change 31; 1 May 98) Section 12-31 Acquisition Prior to PCA Execution.*

Please acknowledge that the Non-Federal Sponsor for the proposed project has been notified and accepts these terms and conditions.

For any questions, please contact Nichole Schlund, Realty Specialist within the USACE Galveston District Real Estate Division, at Nichole.L.Schlund@usace.army.mil or 409-766-3146.

Accepted on behalf of the Non-Federal Sponsor:

_____ (Signature)

City Manager (Title)

Prepared by:

_____

Timothy Nelson
Chief, Real Estate Division
Galveston District
U.S. Army Corps of Engineers