DRAFT INTEGRATED DETAILED PROJECT REPORT AND ENVIRONMENTAL ASSESSMENT

Continuing Authorities Program

Section 14

Emergency Streambank Protection

For

Mary Rhodes Pump Station

Bay City, Matagorda County, Texas

P2: 479839

August 2022

US Army Corps of Engineers®
Galveston District

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DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
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MARY RHODES PUMP STATION

BAY CITY, MATAGORDA COUNTY, TEXAS

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LIST OF ACRONYMS

ac-ft	Acre-Feet
ACE	Annual Chance Exceedance
CAP	Continuing Authorities Program
CFR	Code Of Federal Regulations
CHAT	Climate Hydrology Assessment Tool
DPR	Detailed Project Report
EA	Environmental Assessment
ft	Foot or Feet
GCM	Global Climate Models
HUC	Hydrologic Unit Code
LCR	Lower Colorado River
LCRA	Lower Colorado River Authority
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NFS	Non-Federal Sponsor
NID	National Inventory of Dams
PA	Programmatic Agreement
SHPO	State Historic Preservation Office
TX	Texas
USACE	US Army Corps Of Engineers
USGS	United State Geological Survey
VA	Vulnerability Assessment
YR	Year

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1 GENERAL INFORMATION

This draft Detailed Project Report and Environmental Assessment (DPR/EA) contains information relevant for both a Planning and Design Analysis used as a planning document by the U.S. Army Corps of Engineers (USACE) and an EA to satisfy the National Environmental Policy Act (NEPA).

1.1 Study Authority

The study Authority for this report is contained in Section 14 of the Flood Control Act of 1946 (33 CFR § 263.25), as amended by section 27 of the Water Resources Development Act approved March 7, 1974. Section 14 projects are part of a larger Continuing Authorities Program (CAP) under which the Secretary of the Army; acting through the Chief of Engineers, is authorized to plan, design, and implement certain types of water resources projects without additional project-specific authorization. The Section 14 authority allows the US Army Corps of Engineers (USACE) to construct bank protection works to protect endangered highways, highway bridge approaches, and other essential, important public works, such as municipal water supply systems and sewage disposal plants, churches, hospitals, schools, and non-profit public services and known cultural sites that are endangered by flood-caused bank or shoreline erosion. Privately owned property and facilities are not eligible for protection under this authority.

1.2 Study Area

The City of Corpus Christi's (City) intake structure, also known as the Mary Rhodes Pump Station, is located along the Lower Colorado River (LCR) near Bay City, Matagorda County, Texas (Figure 1 and Figure 2).

Bay City, the County Seat of Matagorda County, is 78 miles west of Houston, TX and 183 miles east-southeast from San Antonio. The estimated population, as of July 2018, is 17,534, down from 17,813[1] in 2010. The estimated unemployment rate for Bay City is 37.8%.

The project is located along the portion of the streambank upstream of the Texas State Highway 35 Bridge, which crosses over the LCR west of Bay City in Matagorda County (Figure 2).

The pump station facility covers 27 acres, including two water treatment ponds, pumping stations, water treatment purifiers and chlorinators, water lines, electrical lines, and access roads, on the LCR.

[1] https://www.census.gov/quickfacts/baycitycitytexas

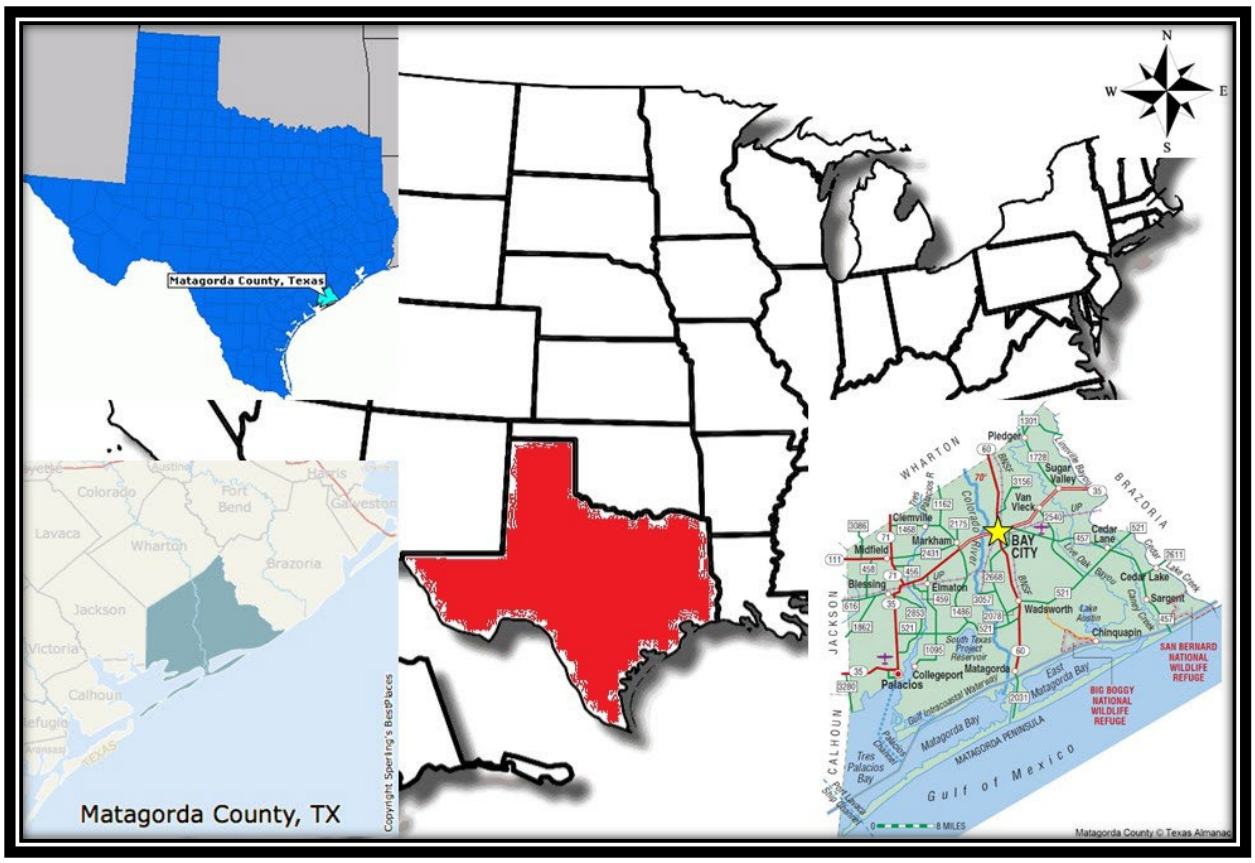

Figure 1 – General Location Map

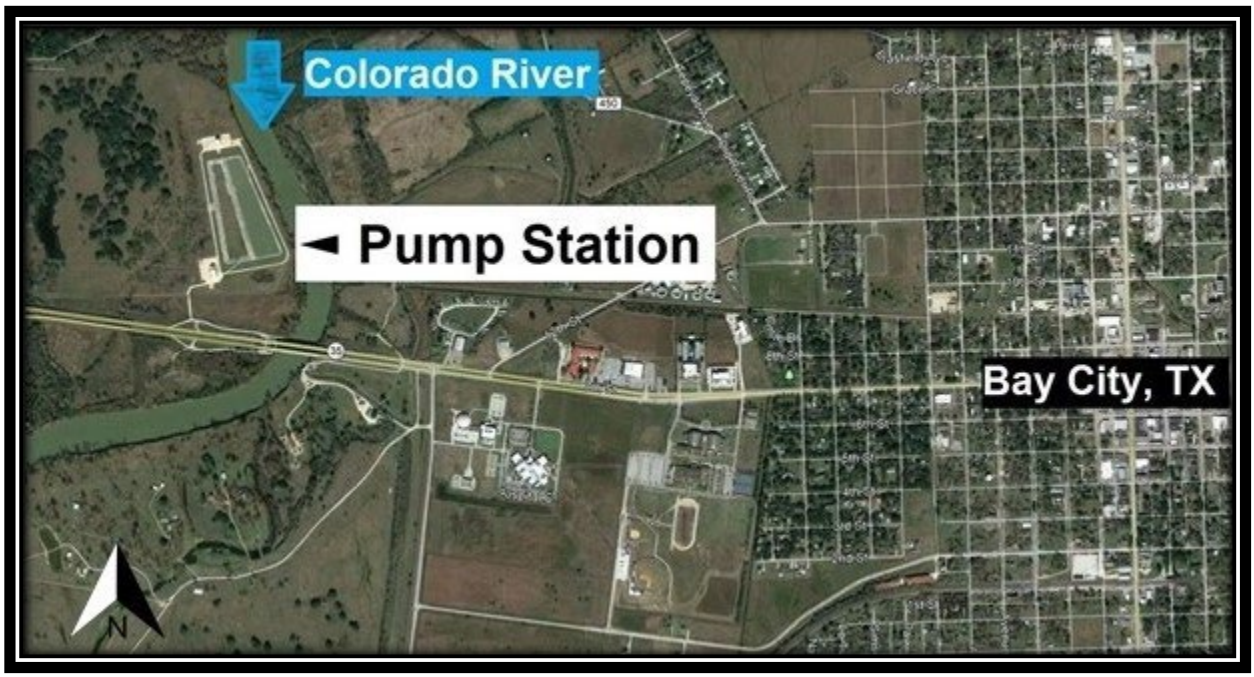

Figure 2 - Mary Rhodes Pump Station in Relation to Bay City, Texas

1.3 Affected Facility And Infrastructure

The Mary Rhodes Pipeline Phase II carries up to 298 acre-feet (ac-ft) per day of water pumped from the LCR, through 42 miles of pipeline to facilities at Lake Texana. This water then moves through another 101 miles of the Mary Rhodes Pipeline Phase I to the O.N. Stevens Water Treatment Plant at Corpus Christi, TX.

The Mary Rhodes Pipeline Phase II also consists of two pump stations and a sediment basin at the project site (Figure 3).

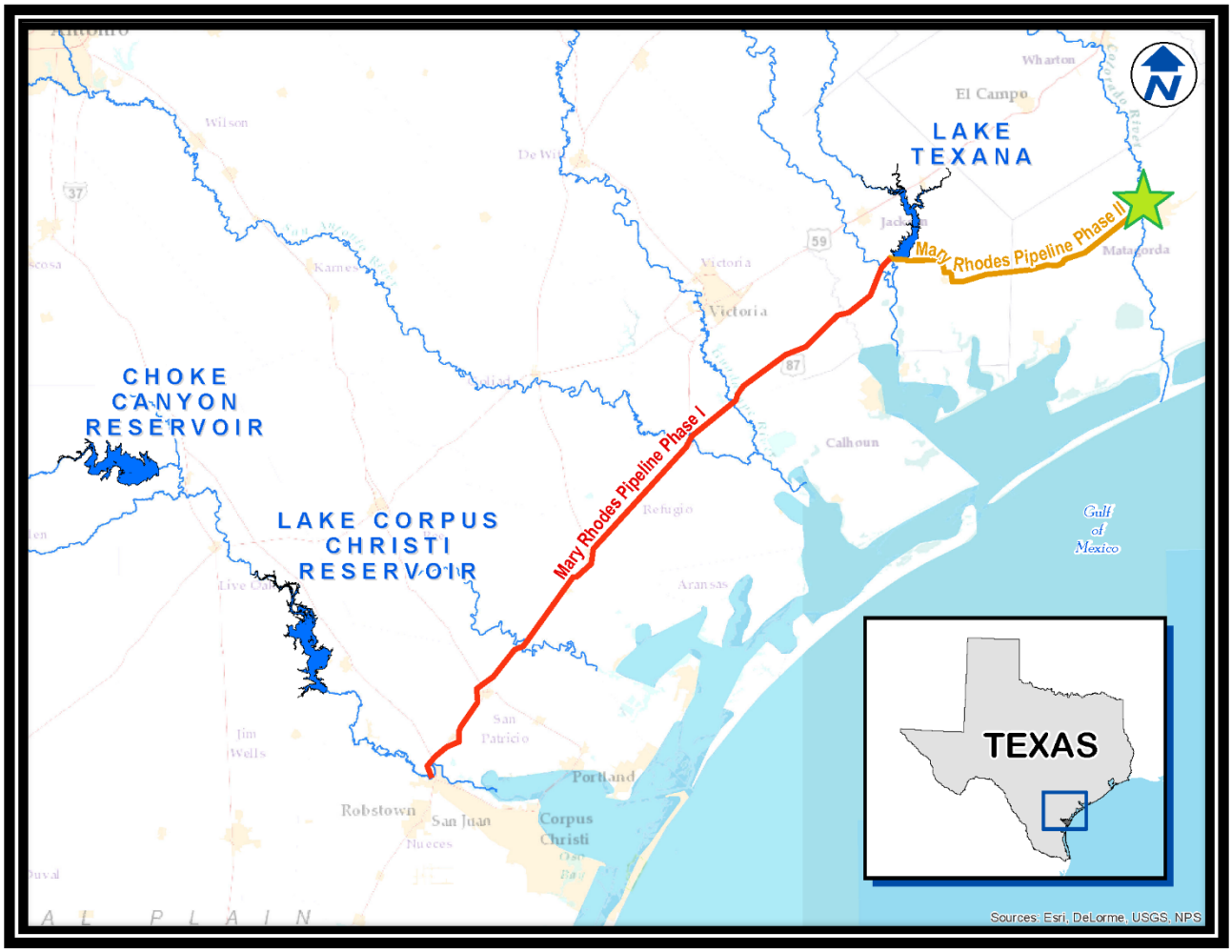

Figure 3 - Mary Rhodes Pipeline from Project Area to Corpus Christi, TX.

1.4 Study Purpose And Need

The primary purpose of the Mary Rhodes Pump Station Emergency Streambank Protection study is to develop a plan to protect the pump station facility in Bay City, Texas from encroaching erosion of the LCR. 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 Corpus Christi, and the Federal Government.

The City has dealt with significant streambank erosion along the portion of the Colorado River at the Mary Rhodes Pump Station. As such, infrastructure is being threatened. The erosion has caused the bank to recede up to 51' (Figure 4 through Figure 5).

The portion of the Colorado River at the Mary Rhodes Pump Station is experiencing high levels of shear stress and erosion, which is typical of alluvial channels such as the LCR. It has been observed that the evolution of the erosional process on the river involves slumping of large masses of bank onto the toe of the riverbank, which is then washed away in subsequent high flows unless anchored by shrubs and trees.

The risk of the Mary Rhodes Pump station due to severe streambank erosion has demonstrated a need to investigate the opportunities and alternatives.

A site visit was conducted in 2019. Field observations during this visit suggested rotational failure as a bank loss mechanism. The bank had variable levels of vegetation, though the area near the intake pipe had relatively minimal vegetative cover. Other areas had some slump material that had revegetated that with time could offer a degree of stability locally. However, this material could be removed in subsequent flow events causing renewed erosive attack on the toe material. A second site visit was conducted in 2021, and similar observations were made (Figure 6 and Figure 7).

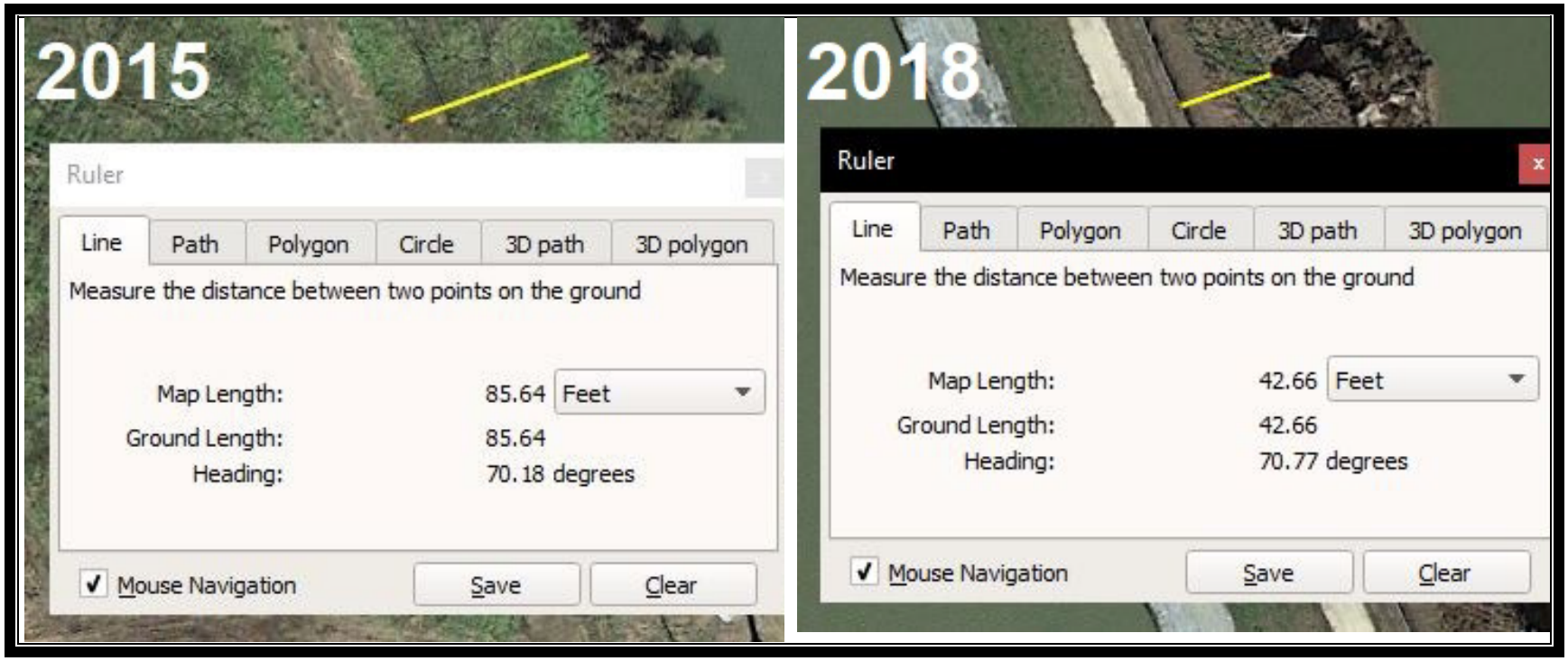

Figure 4 - Bank Erosion Measurement Site Three – 43 ft eroded in three years

Figure 5 - Bank Erosion Measurement Site Four – 51 ft eroded in three years

Figure 6 - Photo showing bank erosion encroaching on Mary Rhodes Pump Station Intake

Figure 7 – Photo showing bank erosion at site of the Mary Rhodes Intake

2 PLAN FORMULATION

Section 14 studies are designed to implement projects to protect public facilities and facilities owned by non-profit organizations that are used to provide public services that are open to all on equal terms. These facilities must have been properly maintained but be in imminent threat of damage or failure by natural erosion processes on stream banks and shorelines and must be essential and important enough to merit Federal participation in their protection. The streamlined formulation and justification procedures are in recognition of the urgency of addresses such projects.

Following a finding of eligibility, and given the narrow geographic focus, low cost of these projects, and the imminent threat to the facilities, the formulation and evaluation focuses on the least-cost alternative solution. The least cost alternative plan is considered to be justified if the total cost of the proposed alternative is less than the costs to relocate the threatened facility.

2.1 Specific Planning Problem

- LCR bank erosion is quickly moving towards the Mary Rhodes Pump Station facilities which supplies drinking water to Corpus Christi, Texas.

2.2 Specific Planning Objective

- To protect the Mary Rhodes Pump Station facilities from future bank erosion long enough for the non-federal sponsor to construct a permanent solution.

2.3 Specific Planning Constraints

- Avoid impeding LCR flows
- Avoid blocking intake structure for the facility

2.4 Risks and Uncertainties

- Lack of cultural resources surveys in the area which may impact location of staging areas, access routes, and any excavation
- Potential to encounter candidate mussel species in the area
- Real estate and construction issues with the powerline foundations

3 EXISTING CONDITIONS – AFFECTED ENVIRONMENT

3.1 Hydrology

There are four United States Geological Survey (USGS) gaging stations near the study area: one several miles upstream at Wharton, TX, one at Bay City, TX (study area), and two more downstream between the study area and the Gulf of Mexico. Information from these gages was used to produce a flow frequency analysis using HEC-SSP (statistical software package) and USGS Bulletin 17C methods.

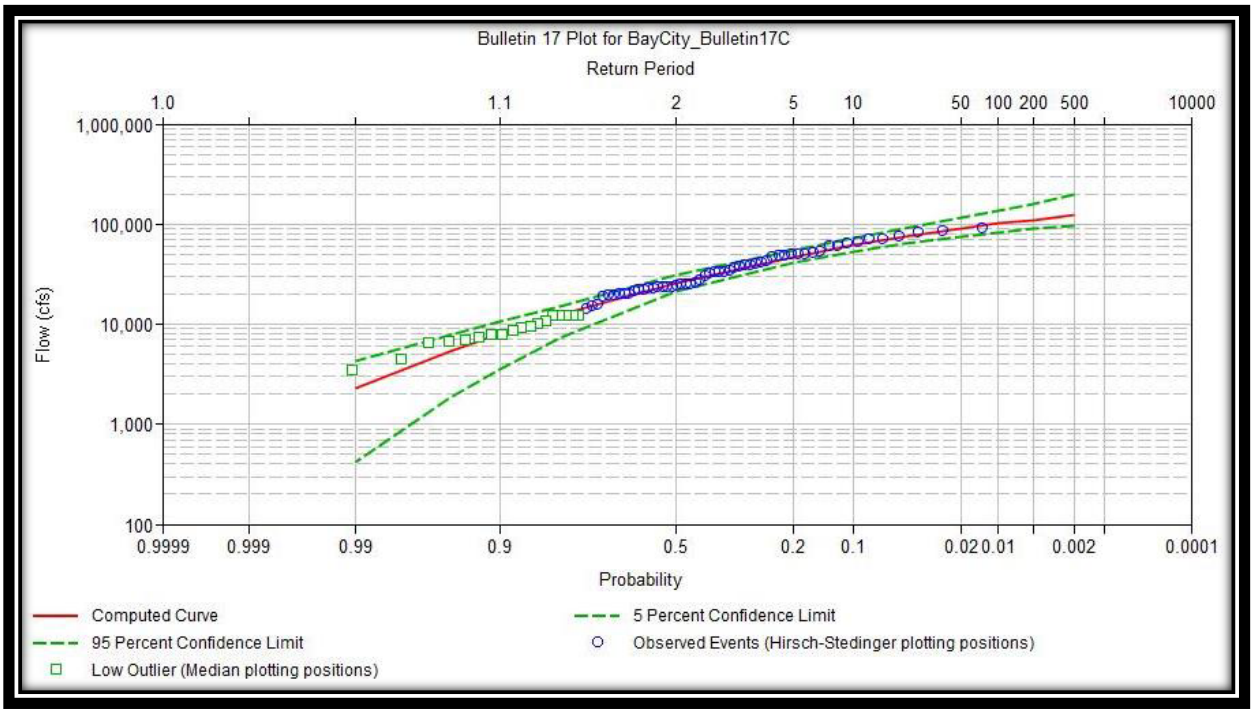

Figure 8 - Flow Frequency relationship for Bay City gage (USGS #08162500)

The Mary Rhodes Pump Station is approximately 7,000 ft upstream of the Lower Colorado Authority (LCRA) Bay City Dam. The LCRA impounds water upstream of the dam for pumping operations related to their water supply operation. The target water-surface elevation upstream of the dam is 26.5-ft NAVD 88. The dam is fully opened when the upstream flow rate exceeds approximately 3,000 cfs and is returned to a closed position on the receding limb of the flood wave. The dam is practically open for large flow events and is not a hydrologic control on design conditions for this project. For more information, see Appendix A – Engineering, Section 3.1 Hydrology.

3.2 Hydraulic Analysis

Hydraulic conditions at the project site were evaluated using a HEC-RAS model obtained from Schiebe Consulting. Their firm completed a floodplain study of the Colorado River through the three counties nearest the terminus at Matagorda Bay. Four frequency events were modeled, 50%, 10%, 2% and 1% Annual Chance Exceedance (ACE).

Table 1 - Flow frequency, simulated channel velocity, local velocity, and water-surface elevations.

ACE [%]	Avg. Return Period [yr.]	Flow [cfs]	WSEL [ft]	Avg. Chan. Velocity [ft/sec]	Local Velocity (U/S Bend) [ft/sec]	Local Velocity (at facility) [ft/sec]
50	2	26,175	35.02	3.62	4.06	4.35
10	10	61,500	45.88	5.47	6.01	6.44
2	50	89,930	52.48	6.03	6.53	6.93
1	100	100,670	54.05	6.16	6.69	7.02

It was determined that the most damaging flows, those that caused greatest bank sloughing and migration, were the more frequent flows at 10% ACE or greater. For more information, see Appendix A – Engineering, Section 3.2 Hydraulics.

3.3 Climate Impacted Hydrology

USACE's Climate Hydrology Assessment Tool (CHAT) was used to investigate potential future stream flow trends for Hydrologic Unit Code (HUC) 1209 - Lower Colorado – San Bernard Coastal Subregion.

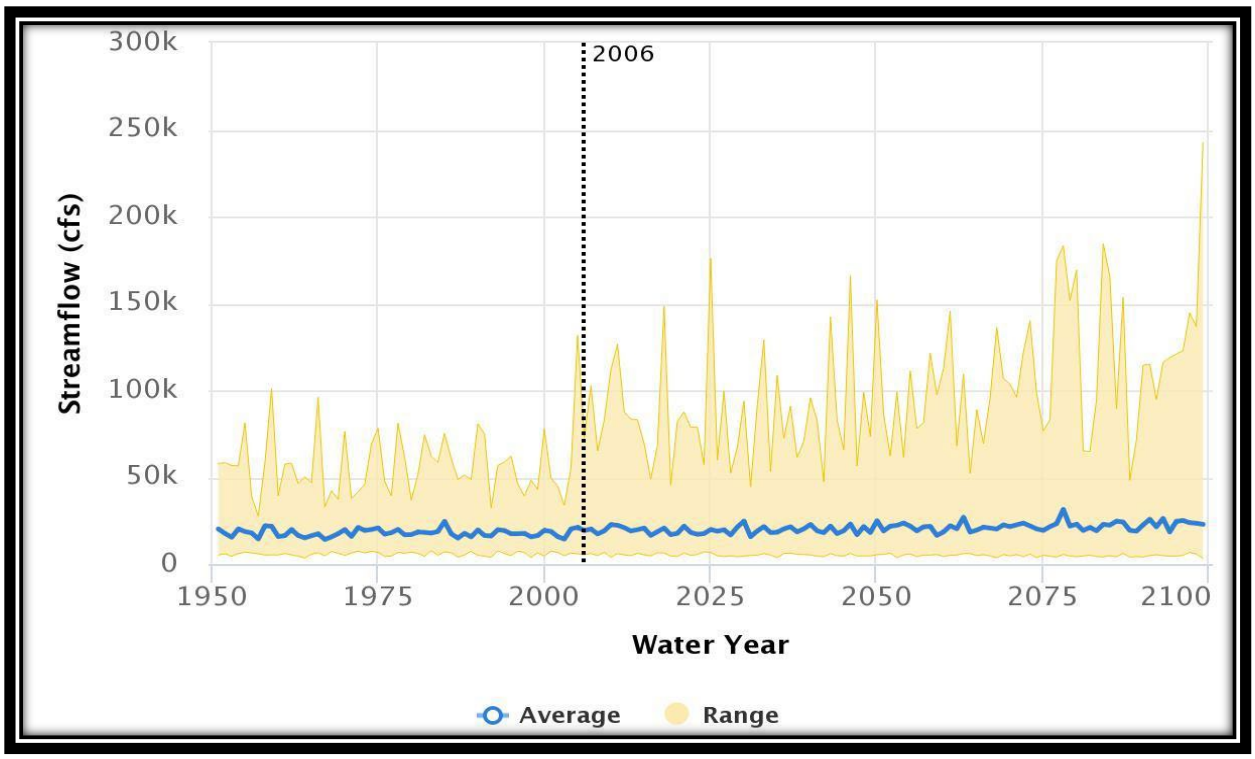

Figure 9 - Range of 93 Climate-Changed Hydrology Models of HUC 1209

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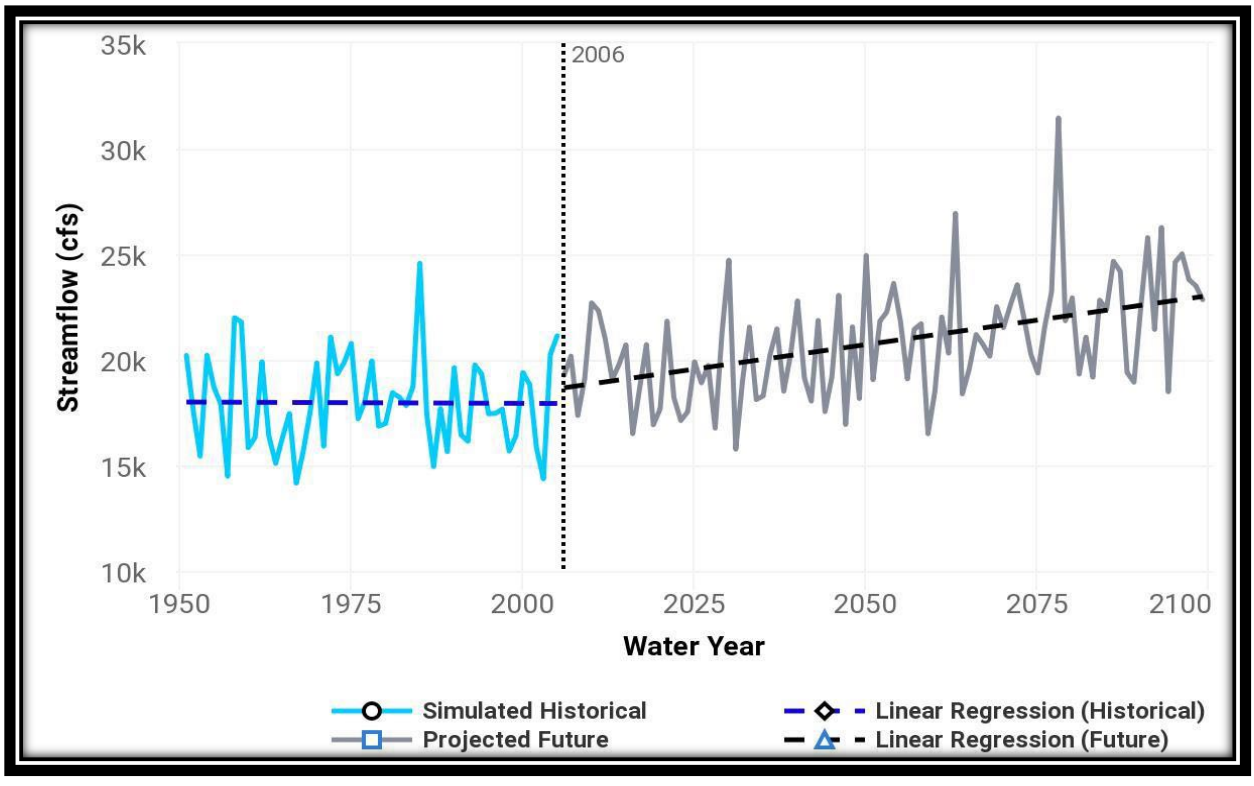

Figure 10 - Trends in Mean of 93 Climate-Change Hydrology Models of HUC 12090302

Figure 9 shows the wide range of projected annual maximum monthly streamflow for the 4-digit HUC 1209 basin. Though the range is large the mean is relatively consistent. The further downscaled information in Figure 10 shows an increasing trend in maximum annual monthly mean streamflow. A significant caveat to the projections both on the HUC 1209 and the South Llano HUC 12090203 basin is that the streamflow projections are for an unregulated condition. The Lower Colorado River has seven dams in the USACE National Inventory of Dams (NID). Not all significantly regulate flows, though some are on the main stem of the river. The LCRA also has a series of dams along the Colorado River basin which regulate flow. One additional caveat to the streamflow projections is that they are based on average monthly data. The projections don't necessarily inform average maximum values or associated flow frequency. While the projection would indicate a somewhat wetter future (at least for a particular month during the year), it does not indicate a particular increase in flow associated with a particular frequency event.

USACE's Vulnerability Assessment (VA) Tool was used to qualitatively characterize flood risk management climate vulnerability in the four-digit HUC 1209 watershed. This tool uses runoff estimated from Global Climate Models (GCM) projections. The VA did not indicate vulnerability in the Flood Risk Reduction business line for any of the four future climate scenarios in the four-digit HUC 1209 watershed. For more information, see Appendix A – Engineering, Section 3.3 Climate Change.

3.4 Environmental Resources

The study area is disturbed from previous construction of the water treatment facility and also extensive erosion of the right bank of the Colorado River. Due to the disturbed nature of the project area, habitat for terrestrial animals in the project area is extremely limited. There is no critical habitat within the study area. However, two species of clams, the Texas fawnsfoot and the Texas pimpleback, have a potential to occur within the project area.

The project area is located within Matagorda County, Texas, and is part of an area designated as in attainment, meaning concentrations of criteria pollutants are below the levels established by the National Ambient Air Quality Standards (NAAQS). Due to the de minimis finding and the area's NAAQS attainment status, a General Conformity determination is not required.

3.5 Cultural Resources

According to the Texas Historical Commission's Atlas database, no previously recorded historic properties are present with the study area. A single systematic cultural resources survey was conducted within the project area, to the south of the pumping station. Archaeological site 41MG136, the remains of a 20th century railroad bed, was recorded within this survey area. The site was determined ineligible for the NRHP. Four historic properties are located east of the Colorado River within the city center of Bay City, the closest of which is over 1.8 miles away; these include the Hensley-Gusman

House, the Bay City USO Building, Judge William Shields Holman House and the Matagorda County Monument.

The study area is located within the eastern boundary of the original plat owned by Tomas Cayce, where the historic Elliott's Ferry was establish and operated. Despite the movement of the river across the landscape, the landform comprising the APE appears to be relatively intact aside from the impacts associated with the construction of the Mary Rhodes Pumping Station. Thus, any excavation into the riverbank has the potential to affect buried cultural resources if present.

The USACE has consulted with the Texas State Historic Preservation Office (SHPO), the Comanche Nation, Caddo Nation, Apache Tribe, Alabama-Coushatta Tribe of Texas, Coushatta Tribe of Louisiana, Tonkawa Tribe of Indians, and the Wichita and Affiliated Tribes regarding the undertaking. Consultation is ongoing and will continue throughout the feasibility, design, and construction phases of the project.

A Programmatic Agreement (PA) is in development between the USACE and SHPO. A draft of the PA is included in Appendix B and the final DPR/EA will include the final executed PA. Fulfillment of the stipulations set forth in the PA by the USACE prior to construction is required to ensure compliance with Section 106 of the NHPA and a finding of no significant impact to cultural resources under NEPA.

4 FUTURE WITHOUT PROJECT CONDITIONS

If streambank erosion continues next to the Mary Rhodes Pump Station, the most likely future condition of the area is as follows:

- Erosion of the streambank will continue toward the Mary Rhodes Pump Station's facilities in Bay City, Texas.
- At some point, the structure will not operate as designed and drinking water for the population in Corpus Christi will be negatively impacted.

5 PLAN SELECTION

As prescribed in EP 1105-2-58, Paragraph 29.d, given the narrow geographic focus, low cost of these (CAP Section 214) projects, and imminent threat to the facilities, the formulation and evaluation will focus on the least-cost alternative solution. The least-cost alternative plan is considered to be justified if the first cost of the proposed alternative is less than the costs to relocate the threatened facility.

The cost of constructing a new facility should be a reasonable parametric cost for relocating the existing facility.

5.1 Management Measures Considered

A. Rebuilding streambank – building bank out to some past extent
B. Bank Sloping – construction such that the top of the slope is slanted inland
C. Slope riprap – riprap above the toe to the top of the bank along the slope
D. Toe riprap – riprap that covers the toe of the bank and below water
E. Steel or vinyl sheet piles – an underwater wall driven into the riverbed
F. Facility relocation – full or partial relocation of the endangered facility
G. Bendway Weir – a submerged rock structure angled upstream to move a waterway away from a length of streambank
H. Bioengineering – terracing bank with rock, soil and vegetation
I. Bank Paving – paving the bank with bentonite, concrete or asphalt
J. Articulated Concrete Block – covering the bank with blocks on concrete connected to each other with wire or cable

5.2 Management Measures Removed from Further Consideration

Measure G – Bendway Weirs were removed as they can cause erosion issues on the opposite bank further downstream. There is a bridge and then a LCRA weir downstream of the project area.

Measure H – Bioengineering was removed since high flows could cause this measure to come apart placing debris into the river.

Measure I – Bank Paving was removed as costing more than riprap as it takes special equipment to install.

Measure J – Articulated Concrete Block was removed as costing more than riprap as it takes special equipment to install.

5.3 Initial Array of Alternatives

1. Alternative 1 – No Action
2. Alternative 2 – A (Rebuild bank out alone)
    a. Why Removed from further consideration? Would erode away again without some kind of engineering protection
3. Alternative 3 – A + B (Rebuild bank out + Bank sloping)
    a. Why Removed from further consideration? Would erode away again without some kind of engineering protection
4. Alternative 4 – A + B + C (Rebuild bank out + Bank sloping + Slope riprap)
    a. Why Removed from further consideration? Doesn't provide adequate toe protection where erosion is occurring.
5. Alternative 5 – A + B + D (Rebuild bank out + Bank sloping & stabilization + Toe riprap)
6. Alternative 6 – A + B + C + D (Rebuild bank out + Bank sloping & stabilization + Slope riprap + Toe riprap)
7. Alternative 7 – B + C + D (Bank sloping & stabilization + Slope riprap + Toe riprap)

a. Why Removed from further consideration? Without building the bank back out, there's not enough room at the top for creating the slope necessary for the riprap.

8. Alternative 8 – A + B + C + D + E (Rebuild bank out + Bank sloping & stabilization + Slope riprap + Toe riprap + sheet piles)
    a. Why Removed from further consideration? Sheet piles not needed with riprap
9. Alternative 9 – F (Relocate pump station)

5.4 Final Array of Alternatives

Management measures were mixed and matched for a total of nine alternatives. Each alternative was measured as to whether it would solve the specific planning problem, meet the specific planning objectives while avoiding the specific planning constraints. Each alternative considered known risks and uncertainties. The final array of alternatives are shown below.

1. Alternative 1 – No Action – Erosion would continue to occur along the edge of the Lower Colorado River further endangering the facility.
2. Alternative 5 – Rebuild bank + Bank sloping + Toe riprap (Figure 11 and Figure 12)
3. Alternative 6 – Rebuild bank + Bank sloping + Slope riprap + Toe riprap (Figure 13)
4. Alternative 9 – Facility Relocation

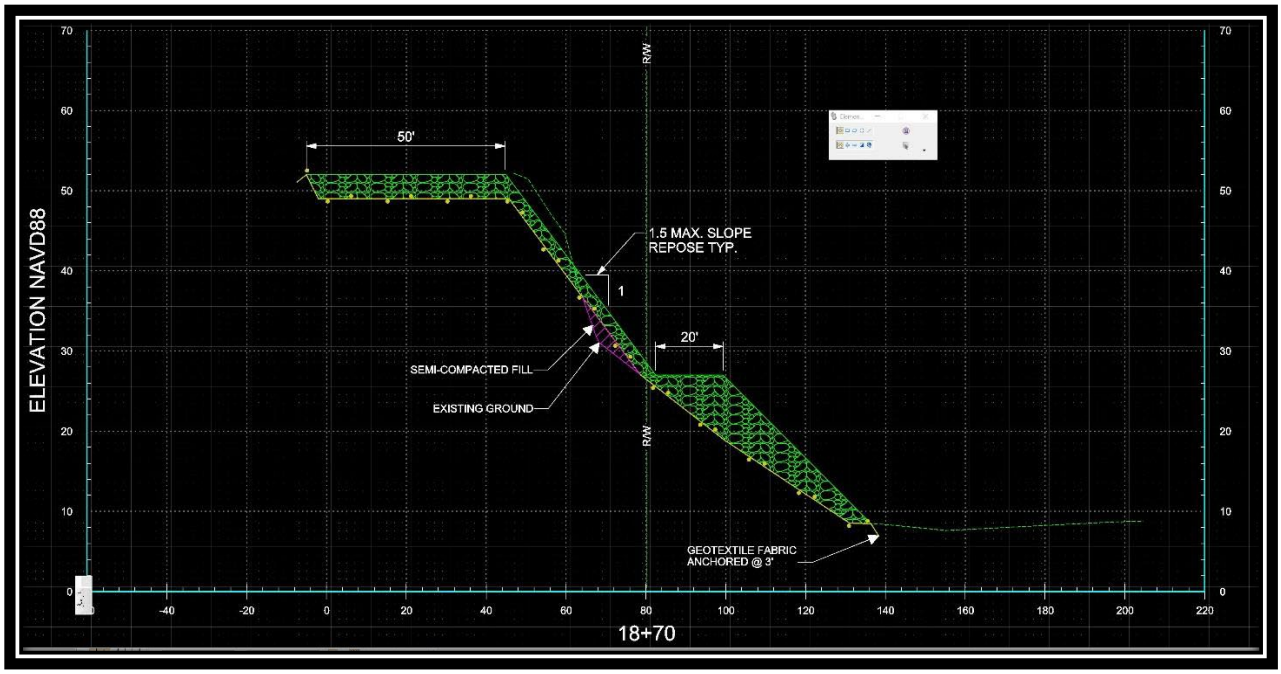

Figure 11 - Alternative 5 Typical Cross Section

Figure 12 - Example of Alternative 5 Type Bank Protection

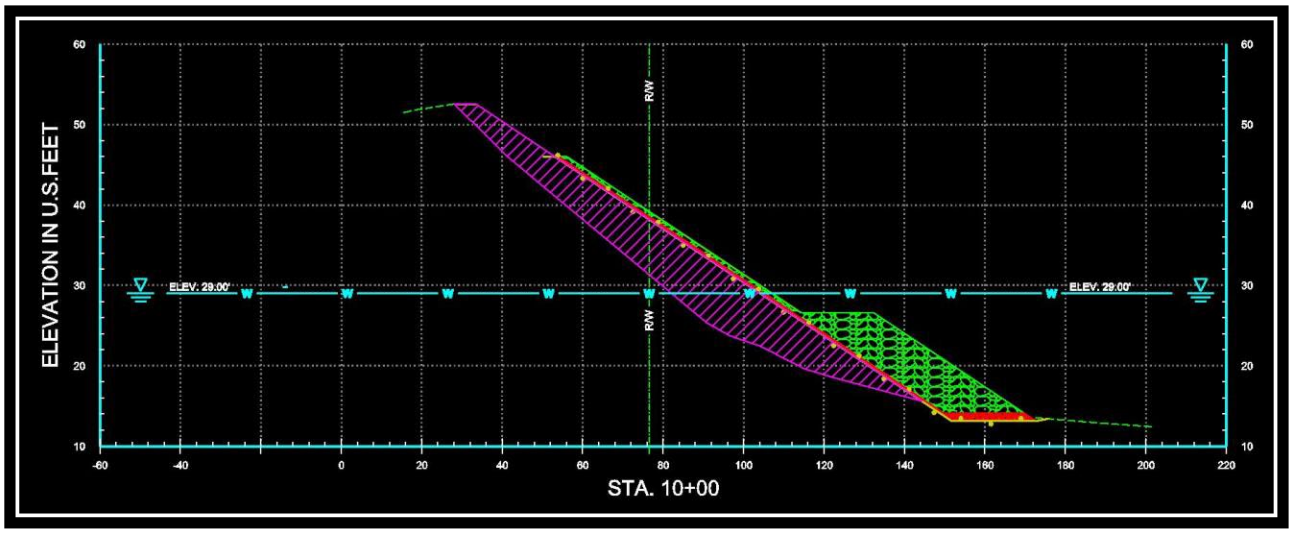

Figure 13 - Alternative 6 Typical Cross Section

Facility Relocation: The cost of constructing a new facility should be a reasonable parametric cost for relocating the existing facility. For this evaluation, the sponsor's costs for constructing the existing facility were considered. The existing facility consists of:

- Water intake structure
- River pump station
- Sedimentation basins
- Booster pump station

- 41 miles of 54” pipeline to Lake Texana and tie-ins to the exiting Mary Rhodes Phase I pipeline that carries water from Lake Texana to Corpus Christi for treatment
- Fiber optic communication lines

To relocate the facility, the intake structures, two pump stations, and sedimentation basis would have to be reconstructed. The cost of the pumps themselves were not considered, as they could be moved and not need to be purchased. The cost of reconstructing these features was estimated at approximately $42 million. It should be noted that relocating the facility would also require realignment of at least a portion of the pipeline and communication lines, including real estate requirements, which would significantly add to the costs. However, without knowing a specific location, the costs related to the pipeline have a great deal of uncertainty, they were not estimated for this comparison. The costs of relocating the selected features alone will address the question as to whether the proposed structural solution at the current site is less expensive than relocating the facility.

First costs for Alternatives 5, 6, and 9 were estimated and are presented in Table 2. The first cost for Alternative 5 is estimated to be approximately $7.9 million, Alternative 6 at $13.8 million, and Alternative 9 (relocation) is $42 million.

Table 2 - Estimated First Costs ($1,000, FY 2022 Price Levels)

Construction Item	Alternative 5	Alternative 6	Alternative 9
01 - Lands and Damages	$63	$63	
02 - Relocation			$37,644
06 – Environmental Mitigation	$60	$369	
16 - Bank Stabilization	$6,675	$11,423	
18 – Cultural Resources Preservation	$75	$75	
30 - Planning, Engineering, and Design	$667	$1,142	$1,813
31 - Construction Management	$400	$685	$2,155
Project First Cost	**$7,940**	**$13,757**	**$41,632**

Operations, Maintenance, Repair, Rehabilitation and Replacement (OMRRR) schedules were developed over the 50-year period of analysis costs for the two structural alternatives. Using net present value procedures, an average annual OMRRR cost was estimated. For Alternative 5, the estimated average annual OMRRR is $73 thousand and for Alternative 6 it is $80 thousand. OMRRR costs for the no federal action plan

(constructing a new facility) are assumed to be the same as the existing facility, therefore a sunk cost.

Average annual costs are the amortized investment cost (first cost plus interest during construction) over a 50-year period of analysis using the FY 2022 Federal Discount Rate of 2.25%, plus the average annual OMRRR. Both alternatives are economically justified since they are less than the annual cost to relocate the plant. Alternative 5 is the least cost alternative of the two structural alternatives, with a first cost of $7.9 million and an average annual cost of $341 thousand).

Table 3 - Derivation of Average Annual Costs ($1,000, FY 2022 Price Levels, 50 Year Period of Analysis, 2.25% Federal Interest Rate)

Investment	Alternative 5	Alternative 6	Alternative 9
Estimated First Cost	$7,940	$13,757	$41,632
Construction Time (Months)	9	9	24
Interest During Construction	$67	$115	$940
Investment Costs	$8,007	$13,872	$42,572
Annual Charges			
Interest	$180	$312	$958
Amortization	$88	$153	$469
OMRRR	$73	$80	
Total Annual Charges	**$341**	**$545**	**$1,427**

6 RECOMMENDED PLAN – ALTERNATIVE 5

Alternative 5 is the recommended plan to address the bank instability problem because it is the least-cost alternative and is economically justified given its cost is less than the cost to relocate the threatened facility. This would protect the bank from further erosion and prevent encroachment upon the facility.

Alternative 5 consists of rebuilding the bank out, bank sloping and toe rip rap (longitudinal fill stone toe protection). The steepest reconstructed slope for this alternative will be approximately 1.5H:1V with minimal slope rebuilding.

A major feature consists of 50-foot riprap tiebacks embedded under the top of the bank approximately every 500 feet along the project length. Tieback thickness is three feet of riprap. The toe protection is approximately 2,630 feet of longitudinal fill stone along the entire project length. The launching stone quantity will be approximately 14.7 tons per linear foot. The height from the bottom of the toe protection to the top of the tiebacks is approximately 44 feet (Figure 11 and Figure 12).

6.1 Environmental Compliance

Table 4 - Compliance with State and Federal Laws

Applicable Statute	In-Progress
Clean Air Act of 1977	X
Clean Water Act, as amended	X
EO 13186 Migratory Bird Habitat Protection	X
Endangered Species Act, Section 7	X
EO 11990 Wetland Protection	X
Migratory Bird Treaty Act	X
Farmland Protection Policy Acts	X
Floodplain Management Eos	X
Federal Water Project Recreation Act	X
EO 12898 Environmental Justice	X
National Historic Preservation Act	X

For more information, see Appendix B – Environmental, Section 4.0 Consistency with Other State and Federal Laws.

6.2 Real Estate Considerations

The project's access and staging areas will be contained within the tract of land owned by the City of Corpus Christi. It is expected that project access, equipment storage, construction, operation, and maintenance would require the use of approximately 4.86 acres of the 73.975-acre property.

As indicated by Texas Railroad Commission there are three pipelines within the vicinity of our project, as shown in Figure 6 below. Preliminary outreach to the utility owner to determine the precise location of these lines has begun, but at the time of this report the PDT cannot definitively say if a relocation will be required for this project. Further research will be completed, and this report will be updated accordingly.

Any riprap placement under the ordinary high-water mark will be completed under Navigational Servitude.

For more information, see Appendix C – Real Estate Plan.

6.3 Total Estimated Costs

Statutory Federal Participation Limits for Section 14 projects is $5,000,000.

Following selection as the recommended plan, the costs were refined, and an abbreviated risk analysis (ARA) was done to better identify the proper contingency based on risks. As shown in, Table 5, the project first cost of the recommend plan, rounded to the nearest $1,000, is estimated to be approximately $10,799,000.

Table 5 - First Costs for the Recommended Plan (FY 2022 Price Levels)

Construction Item	Alternative 5
01 - Lands and Damages	$63,000
02 – Relocation	
06 – Environmental Mitigation	$82,000
16 - Bank Stabilization	$9,096,000
18 – Cultural Resource Preservation	$102,000
30 - Planning, Engineering, and Design	$910,000
31 - Construction Management	$546,000
Project First Cost	**$10,799,000**

The cost share allocation is shown in Table 6. The construction cost allocation for CAP Section 14 projects is 65% Federal and 35% Non-Federal Sponsor, with a $5 million maximum on the Federal contribution (inclusive of planning costs). As shown in the table, based on a 65%/35% allocation, the Federal share would exceed $5 million. The non-federal sponsor will have to pay the overage of $2,019,000. The final column table shows the allocation adjusted for the Federal cap and the overage being added to the remaining Non-Federal Sponsor share line. This results in a Federal share of $5 million (46%) and a Non-Federal Sponsor share of approximately $5.8 million (54%).

Table 6 - Cost Share Allocation, FY 2022 Price Levels

Cost Category	Allocation based on 65%/35%	Allocation Adjusted for Maximum Federal Limit
Total Federal Share	**$7,019,000**	**$5,000,000**
LERRDS	$63,000	$63,000
Cash Requirement (5%)	$540,000	$540,000
Remaining Non-Federal Sponsor Share	$3,177,000	$5,196,000
Total Non-Federal Sponsor Share	**$3,780,000**	**$5,799,000**
Project First Cost	**$10,799,000**	**$10,799,000**

The cost allocation does not include the costs of the feasibility study, however the Federal limit of $5 million would include the Federal costs of the study once the final study costs are determined.

7 ENVIRONMENTAL CONSEQUENCES

This section discusses the environmental consequences of the reasonable Action Alternatives chosen, as required under NEPA. The information used to determine environmental consequences of the No-Action and the Recommended Plan Alternatives is derived from initial descriptions and draft engineering drawings of the alternatives, field reconnaissance and desktop analysis. For more information, see Appendix B, Section 3.0.

7.1 No Action Alternative

Under the No Action plan, eventual failure of the bank is likely, and the MRPS would be compromised, making it unusable. 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.

7.2 Recommended Plan – Alternative 5

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. Direct and indirect impacts would come from sedimentation during rainfall events that occur during construction and before vegetation is established.

Land Use - Land use in the area includes the current Mary Rhodes pump station. The proposed alternative for stream bank stabilization would benefit the City of Corpus Christi and surrounding communities by allowing the MRPS 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.

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.

Floodplain - 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 Resources - Construction activities would initially eliminate all terrestrial habitat in the riparian zone and temporarily 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 Resources - 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 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. 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. A site visit will likely need to be conducted to perform a freshwater mussel survey at the project site to determine the presence of any Candidate mussel species.

Cultural Resources - Affects to cultural resources cannot be determined until a cultural resources survey is conducted during the preconstruction engineering and design phase (PED). No significant historic structures are located within the viewshed of the

area of potential effect. In accordance with 36 CFR 800.14, the USACE is drafting a programmatic agreement (PA). A copy of the PA is provided in Appendix B.

Hazardous Materials - A review of Matagorda 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. No sites were identified within one mile of the project area or adjacent areas that could be reasonably expected to affect the bank project, or vice versa.

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.

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 daytime 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.

Irreversible and Irretrievable Commitments of Resources - The recommended action would not entail any significant irretrievable or irreversible commitments of resources.

For more information, see Appendix B – Environmental, Section 3.0 Environmental Consequences.

7.3 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 may be used to mitigate impacts to natural and cultural resources from construction activities:

- Stormwater Pollution Prevent Planning
- Construction Site Planning and Management
- Erosion Control
- Runoff Control
- Sediment Control, and
- Good Housekeeping and Materials Management

7.4 Public Involvement

Public review of the draft decision document begins on 27 May 2022 and ends 27 June 2022. Notices of the availability of the draft decision document will go out through emails and notices in local newspapers.

The draft decision document will be available for viewing and download from the Galveston District internet. No public meeting is planned.

8 OBLIGATIONS OF THE PARTIES

Projects implemented under Section 14 have the same project cost sharing requirement as structural flood risk management projects implemented under specific congressional authorization. The non-Federal sponsor is responsible for a minimum of 35% of total project costs to a maximum of 50% of total project costs during the design and implementation phase.

Federal implementation of the project will be subject to the execution of a binding PPA. The appropriate model PPA will be used unless a deviation is approved by the appropriate USACE authority. A deviation will be requested as the estimate total project cost is above the statutory federal participation limit of $5,000,00.

9 REPORT PREPARERS

The following table lists the Project Delivery Team and their technical specialties. Each was primarily responsible for the feasibility level study tasks and report preparation.

Table 7 - Report Preparers

NAME	TECHNICAL DISCIPLINE
Gretchen Brown	Project Management
Kathy Skalbeck	Plan Formulation
Norman Lewis	Economics
Amanda Hafemeister	Hydrology and Hydraulic Engineering
Paul Hamilton	Hydrology and Hydraulic Engineering
Amanda Pesce	Cultural and Environmental Resources
John Campbell	Cultural and Environmental Resources
Ratnam Tharmendira	Geotechnical Engineering
Konstantinos Kostarelos	HTRW
Quinton Johnson	Civil Engineering
Sarah Xie-DeSoto	Cost Engineering
Haley Tucker	Real Estate
Thomas Barham	Surveying

10 DISTRIC ENGINEER'S RECOMMENDATION

I recommend that the emergency streambank plan as generally describe in the FINAL Detailed Project Report and Integrated Environmental Assessment, be implemented under the authority of Section 14 of the Flood Control Act of 1946, as amended, Emergency Streambank and Shoreline Protection, with such modifications as within the discretion of the appropriate authority may be deemed advisable. The total project first cost is currently estimated to be $9,647,000.

Prior to the commencement of construction, local interests must agree to meet the requirements of Local Sponsor responsibilities as outlined in this report and future legal documents. The City of Corpus Christi, Texas has demonstrated that they have the authority and financial capability to provide all Local Sponsor requirements for the implementation, operation and maintenance of the project. The recommendations contained herein reflect the information available at the time and current Department of the Army policies governing formulation, evaluation and development of individual projects under the US Army Corps of Engineers Continuing Authorities Program.

_____ _____

DATE

Col. Timothy R. Vail
District Commander

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