

# **APPENDIX I**

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## **Conveyance Corridor Design Analysis**

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# CONVEYANCE CORRIDOR DESIGN ANALYSIS

## 1.0 INTRODUCTION

The Conveyance Corridor Design Analysis were completed in support of the Preliminary Design Phase for the Riverine Sand Mining / Scofield Island Restoration Project (Project). The Project is sponsored by the Louisiana Department of Natural Resources (LDNR), State of Louisiana Office of Coastal Protection and Restoration (OCPR) and NOAA Fisheries. The Project design is funded and authorized in accordance with the provisions of the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) (16 U.S.C.A., Sections 3951-3956) and has been approved by the Public Law 101-646 Task Force. The Project's CWPPRA designation is BA-40.

The scope of services included detailed review of prior surveys and analyses, evaluation of bathymetric, magnetometer, and petroleum pipeline probing survey data; petroleum pipeline and navigation crossing designs; and refinement of the corridor alignment. The design analysis was conducted by C.H. Fenstermaker and Associates, Inc. (CHF) and reviewed by SJB Group, LLC. (SJB) and Coastal Engineering Consultants, Inc. (CEC).

### 1.1 Summary of Prior Work

The selection of the Project Conveyance Corridor was based on the review of prior surveys and analyses that identified multiple corridors from the Mississippi River borrow areas to Scofield Island. The primary sources of this information included transport methodology and conveyance corridor analysis (SJB and CEC, 2007) and the Feasibility Study Phase analyses (SJB and CEC, 2008). The surveys and analyses completed in support of the Preliminary Design Phase for the corridor included the Conveyance Corridor Survey – Upland Segment (Appendix F), Conveyance Corridor Survey – Over Water Segment (Appendix G), and Environmental Mapping of the Conveyance Corridor and Scofield Island (Appendix H).

### 1.2 Project Area and Location

The Conveyance Corridor includes two segments. The Upland Segment is approximately 1,120 feet wide and extends approximately one mile from the western bank of the Mississippi River in Empire, Plaquemines Parish, southwest to the rock breakwater at the Empire Locks. The Open Water Segment is approximately 8.8 miles long, beginning at the Empire Locks and extending south through the Empire Waterway, crossing the eastern side of Caprien Bay, and entering the Gulf of Mexico through the jetties just west of Pelican Island. Scofield Island is a 2.4 mile long barrier island located east of Pelican Island between Scofield Bayou and the merger of Bay Coquette and the Gulf of Mexico. The Project area is shown in Figure 1.

Figure 1: Project Area Location Map

## **2.0 SUMMARY OF DESIGN SURVEYS**

Data acquisition for the preliminary design level surveys was comprised of: 1) one additional survey track line down the axis of the Empire Waterway, primarily for magnetometer data acquisition; 2) additional magnetometer and bathymetric data at navigation crossings of the Empire Waterway; and 3) additional magnetometer and bathymetric data at proposed booster pump locations. The additional bathymetric data allowed for a more comprehensive depiction of the bottom contours. Magnetometer data were then assimilated with the magnetometer data acquired in the Feasibility Study Phase (SJB and CEC, 2008) in order to perform magnetic alignment correlation analysis that provides indications of possible existing petroleum pipelines. Physical probing verification of petroleum pipeline indications, provided from the magnetometer data analysis and also from historical information of charted petroleum pipeline positions, was then performed to a depth below the waterway channel bottom of 10 to 20 feet. Qualification annotations were made regarding the depth that pipelines were detected or if pipelines were not detected by probing. Petroleum pipelines undetected by probing may indicate a greater burial depth.

## **3.0 PROJECT PARAMETERS**

The Empire Waterway is a commercial transit corridor that vessels utilize it to transit between Empire and the Gulf of Mexico. It is maintained by the U.S. Army Corps of Engineers (USACE). Therefore, sufficient water depth for tug and barge access to install the sediment pipeline should be available. The design criterion for water depth at the proposed booster pump sites was set at -8 feet NAVD88 to provide a relatively large pool area to obtain the necessary cooling water. The booster pump sites shall be further evaluated in the Final Design Phase to develop the buffer distance from the navigation channel.

The Conveyance Corridor extends over the Mississippi River Levee and Hurricane Protection Levee in accordance with USACE standards. The assumption of a 42-inch casing was made to accommodate a 30" sediment pipeline based on interviews with contractors and professional experience. The sediment pipeline will be jacked and bored under the two-lane Highway 11 and under the four-lane Highway 23 in accordance with standards of the Louisiana Department of Transportation and Development (LADOTD). In order to avoid leakage in the sediment pipeline joints and to minimize the size of the casings required under these highways, welded pipe joints should be used for the Upland Segment of the Conveyance Corridor. For crossings under Highways 11 and 23, a minimum of 5 feet of cover is required from the top of the casing pipe to the top of the road surface. For petroleum pipeline crossings the amount of cover would be that required by the petroleum pipeline owner or 4 feet, whichever is greater. If that cover is not available the sediment pipeline could be installed with floats for a distance of 100 feet on either

side of the buried petroleum pipeline. Reevaluation of the design assumptions and detailed design plans for the crossings shall be performed in Final Design.

#### **4.0 CONVEYANCE CORRIDOR PLAN DESIGN**

##### **4.1 Plan Overview**

In the Mississippi River segment of the Conveyance Corridor, to be designed in the Final Design Phase, the sediment would be transported either by the sediment pipeline or hopper dredge; with a booster pump station in the river when required. The Upland Segment would involve transporting the sediment from the Mississippi River to the Empire Waterway. Included in this segment would be crossings of the Mississippi River Levee, Hurricane Protection Levee, and Highways 11 and 23. The Open Water Segment would be within the Empire Waterway, cross potentially 28 petroleum pipelines and 6 navigation channels, and include two booster pump sites. The total pumping distance would range from 19 to 22 miles depending on the borrow area used. The Conveyance Corridor preliminary design plan set is presented in Annex I1.

##### **4.2 Mississippi River Borrow Areas**

To allow the contractor maximum flexibility, two borrow areas, MR-E-09 and MR-B-09 (figure 1), shall be made available. The maximum volume of sand to be excavated from each borrow area is established in the borrow area design (Main Report and Appendix E). The two dredge plants anticipated for Project construction include either a hydraulic cutterhead or a hopper dredge. If a hydraulic cutterhead dredge were to be used at Borrow Area MR-B-09, a submerged sediment pipeline crossing the navigation channel of the Mississippi River would be required. If a hydraulic cutterhead dredge were to be used at Borrow Area MR-E-09 the sediment pipeline in the Mississippi River would be routed along the riverbank for a distance of approximately three miles to a booster pump site located at approximately River Mile Marker (MM) 28.9. The sediment pipeline could be either submerged or floating, at the contractor's discretion, and subject to the USACE and U.S. Coast Guard (USCG). The hydraulic cutterhead dredge would pump to a river booster pump site from Borrow Area MR-E-09 using on-board pumping capacity. If a cutterhead dredge were to be used from Borrow Area MR-B-09, the river booster pump site would not be necessary.

The hopper dredge, whether using Borrow Area MR-B-09 or Borrow Area MR-E-09, would dock temporarily adjacent to the river pump-out site while discharging into the sediment pipeline. The pump-out site details will be determined in the Final Design Phase.

### **4.3 Environmental Mapping**

Environmental Mapping of the Conveyance Corridor Upland and Over Water Segments and Scofield Island are presented in Appendix H. The alignments shown in the Conveyance Corridor Design Plan have been sited to minimize impacts on the sensitive habitats as identified in the Environmental Mapping.

### **4.4 Upland Segment**

The sediment pipeline meets the shoreline of the Mississippi River at approximately MM 28.9, a location determined primarily on the basis of land ownership. From that point the Conveyance Corridor extends in a generally southwesterly direction for just under one mile to the Empire Waterway. This segment will be a combination of the routes recommended by the Environmental Mapping. The Conveyance Corridor crosses both the Mississippi River levee and Hurricane Protection levee. The sediment pipeline will be placed on top of those levees. Requirements from the USACE and Levee Board regarding access across or around the sediment pipeline will be accommodated and accomplished in accordance with USACE and Levee Board regulations. The sediment pipeline will also need to cross under Highway 11 and Highway 23. The plan is to place a 42-inch casing under the highways for the 30-inch sediment pipeline. After crossing the Mississippi River levee, the Conveyance Corridor would continue parallel to and just northwest of the Empire Pit; a capped landfill area. Welded pipe joints should be used to avoid any leakage into the landfill. Close coordination with LADOTD and Plaquemine Parish will be needed throughout the construction period to minimize traffic problems associated with this construction effort.

OCPR should seek “Hold Harmless” agreements from the owners of the landfill to avoid the possibility of being named a Principal Responsible Party (PRP) for any pollution that results from the landfill. With the use of welded pipe no impacts to the landfill are foreseen; however, any project that touches a potentially hazardous dumpsite could be a candidate for a future lawsuit. PRP’s are often found liable for damages from pollution that is caused or discovered many years after the original project construction.

After passing the landfill, the Conveyance Corridor would continue south and cross the Empire Harbor Canal. The sediment pipeline would be submerged under the canal with a minimum cover of three feet. Details of the canal crossing shall be determined in Final Design. After emerging from the canal, the Conveyance Corridor would extend northwest of and parallel to the service road for the marina. An existing drainage swale approximately 100 feet from the waters edge would be available for placement of the sediment pipeline. Continuing past the marina, the sediment pipeline would pass under Highway 23 and its service roads. The sediment pipeline would then cross over the Hurricane Protection levee and transit approximately 0.3 miles of

saltwater marsh before crossing the rock breakwater for the Empire Canal Lock and reaching the Empire Waterway.

#### **4.5 Open Water Segment**

The Open Water Segment extends from the terminus of the Upland Segment to the Gulf of Mexico along the Empire Waterway, a distance of approximately 8.8 miles. The Conveyance Corridor would be located in the Empire Waterway along the left descending bank.

Included in this segment are two primary booster pump sites and multiple secondary sites. The booster pump sites are positioned approximately 5 miles apart in areas where water depths, lack of obstructions, and access are optimized, and property ownership issues are minimized.. Secondary locations were based solely on property ownership and water depths and have not been surveyed in detail for magnetic anomalies, petroleum pipelines, obstructions, and environmental attributes.

The Conveyance Corridor also includes potentially crossing 28 petroleum pipelines. Only one of these petroleum pipeline crossings will impact the sediment pipeline if it is not floating. This 26-inch Tennessee Gas Pipeline gas pipeline traverses across the Empire Waterway where it is coincident with a side channel entry into the Empire Waterway and has a burial depth of 11 feet or more. The owner of the petroleum pipeline has been contacted and the clearance designated is 18” with the sediment pipeline on top of the petroleum pipeline. The contractor will need to coordinate the petroleum pipeline crossings with the owners.

The Environmental Mapping listed only the saltwater marsh areas and oyster leases as being environmentally sensitive areas. Oyster leases are scattered over 75% of the Conveyance Corridor and exist in the area of the northern primary booster pump site. However, they do not impact the southern primary booster pump site. The Conveyance Corridor has been designed to avoid or minimize crossing these areas.

There are six navigation crossings within the corridor along the Empire Waterway where navigational access will need to be maintained. This will require burying the sediment pipeline to a burial depth of 3 feet through the navigation crossing for a distance of approximately 250 feet as shown on the plans (Annex I1).

#### **4.6 Scofield Island**

From the mouth of the Empire Waterway, the Conveyance Corridor would then extend into the Gulf of Mexico to a water depth as not to be a hazard to vessel navigation. From this point the sediment pipeline would proceed eastward to Scofield Island, arriving onshore within the access



channel to the Scofield Island Restoration Area as described in the Main Report and the Scofield Island Restoration Area Design Analysis (Appendix M). The primary route from offshore of the Empire Waterway jetties, in the Gulf of Mexico, and over to Scofield Island shall be considered in Final Design. This segment shall be subject to state and federal regulations and notification requirements.

## **5.0 CONCLUSION**

The Conveyance Corridor Design Plan describes a sediment pipeline corridor to transport sediment from the Mississippi River Borrow Areas to Scofield Island. The Conveyance Corridor gives consideration to access, environmental impacts, infrastructure conflicts, and land ownership. While it is not the only feasible solution, based on the information available, it would allow the contractors to efficiently and effectively utilize their equipment.

## **6.0 REFERENCES**

SJB Group, LLC and Coastal Engineering Consultants, Inc. 2008. Draft Feasibility Study Report. Mississippi River Riverine Sand Mining / Scofield Island Restoration (BA-40). LDNR Contract No. 2511-07-02. March 10, 2008. Submitted to Louisiana Department of Natural Resources, Coastal Engineering Division.

## **ANNEX I1**

# **CONVEYANCE CORRIDOR DESIGN PLAN**