Mississippi Valley Division
Regional Planning and Environmental Division South

Upper Barataria Basin, Louisiana Feasibility Report

Appendix A: Annex 14 – Life Safety Risk Assessment

December 2021

US Army Corps of Engineers

Appendix A

Annex 14

Life Safety Risk Assessment

ANNEX 14

LIFE SAFETY RISK ASSESSMENT

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Upper Barataria Basin (UBB) Louisiana Feasibility Study

Life Safety Risk Assessment

1.0 Background

Project is a 100-year flood risk reduction system located in St. Charles and Lafourche Parishes, Louisiana. Project includes incorporation of existing systems, new work, and ties into the existing Mississippi River & Tributaries (MR&T) system at the eastern end and the higher banks of Bayou Lafourche in Raceland to the west. See Figure 1 for a project map. Total proposed system is 161,300 linear feet (30.6) miles long.

Figure 1 – Study Area Map

Figure 1 annotates the Hydraulic Reaches. Existing systems include the Davis Pond Freshwater Diversion Project (DPFDP) shown in Figure 1 as Segment A, St. Charles Parish Westbank Levee Project (SCLP) shown in Figure 1 as Segment B and Segment C, and the Sunset Drainage Project (SUN) shown in Figure 1 as Segment D and Segment E.

New segments include the area between Bayou des Allemands and Bayou Lafourche shown in Figure 1 as Segments G and H. Project also includes 29 structures as shown in Figures 2 and 3.

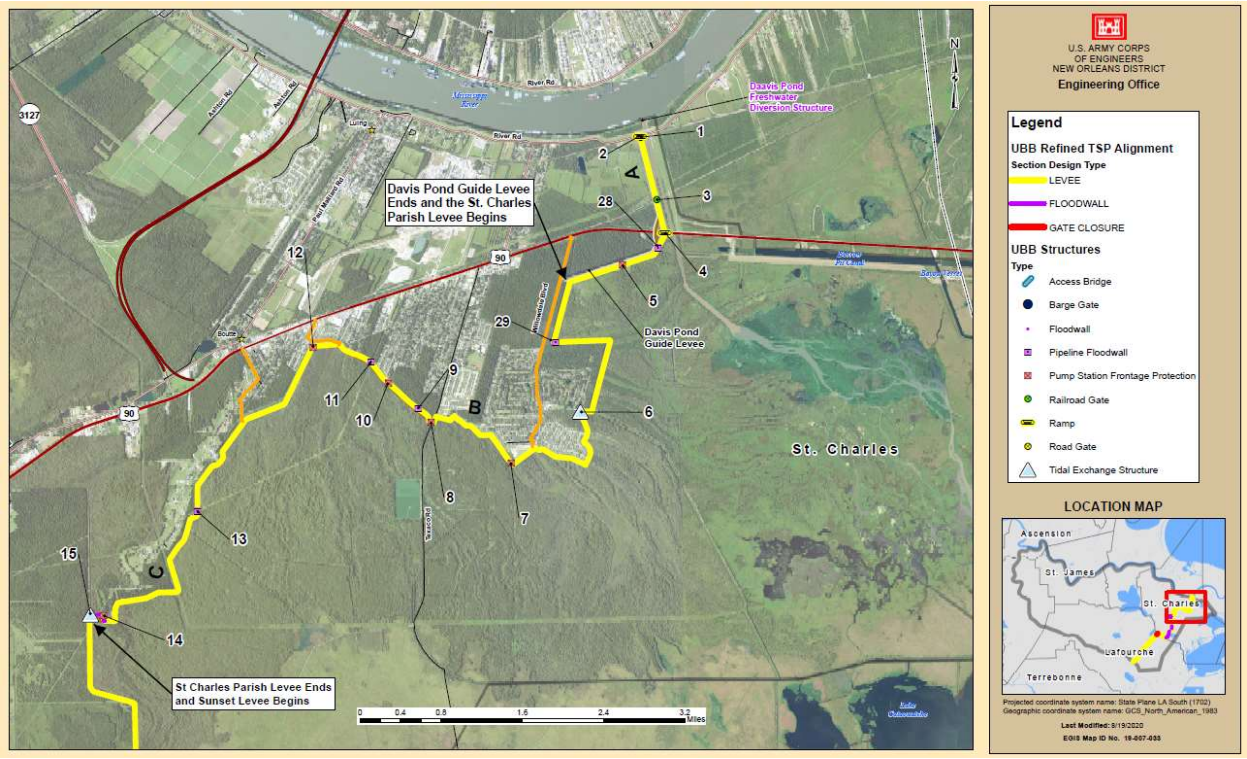

Figure 2 – Northern Portion of Project with Structure Locations

List of structures included in the project as numbered on Figure 2 are provided below.

1	River Road crossing ramp	10	Kellogg Pump Station frontage protection
2	Union Pacific Railroad crossing	11	T-wall section for West Gas Pipeline
3	BNSF Railroad crossing	12	Ellington Pump Station Frontage Protection
4	US Highway 90 Crossing Ramp	13	T-wall section for Magnolia Pipeline
5	Davis Pond Pump Station frontage protection	14	Magnolia Ridge Pump Station Frontage Protection
6	Willowdale Pump Station, two new tidal exchange structures	15	Existing Paradis Control Structure
7	Willowridge Pump Station frontage protection	28	T-wall section, Enterprise and Shell Pipeline Crossing (Davis Pond Crossing #1)
8	Cousins Pump Station Frontage Protection	29	T-wall section, Bridgeline Enlink Pipeline Crossing (Davis Pond Crossing #2)
9	T-wall section for East Gas Pipeline		

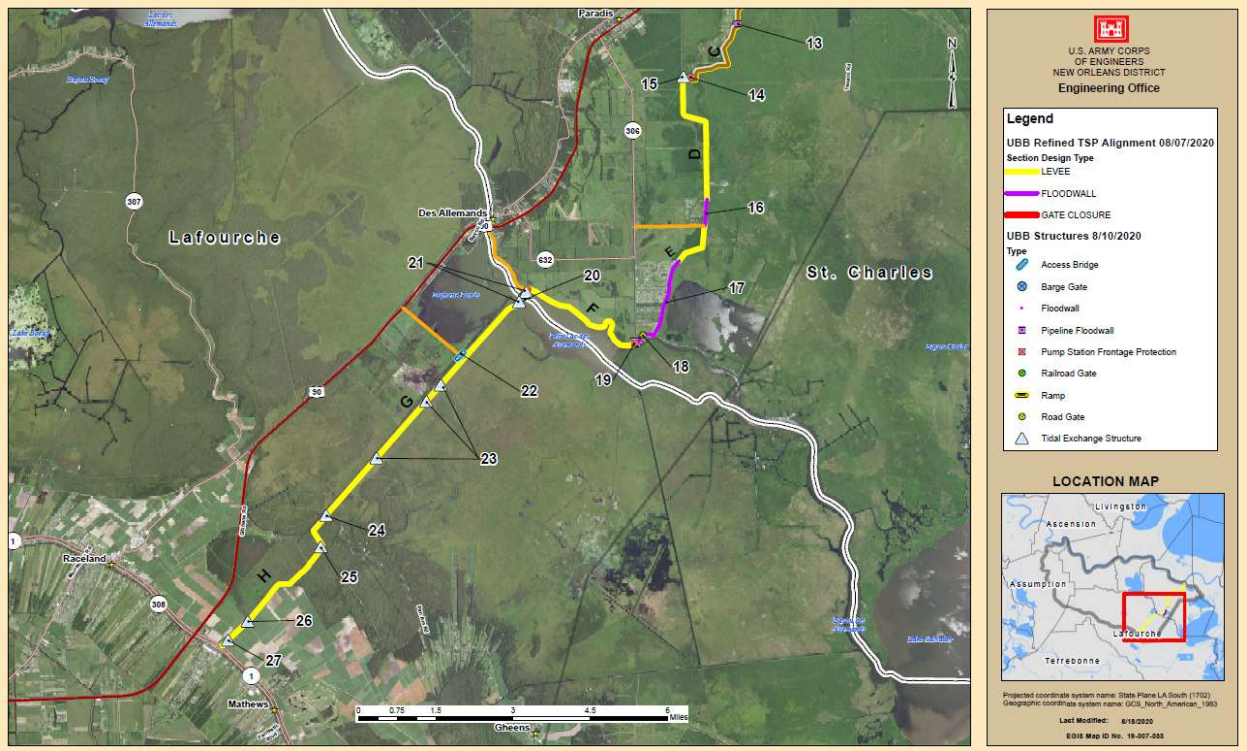

Figure 3 – Southern Portion of Project with Structure Locations

List of structures included in the project as numbered on Figure 3 are provided below.

13	T-wall section for Magnolia Pipeline	21	Environmental structures on either side of the Bayou Des Allemands Barge Gate, 12-15 X 20 foot box culverts with sluice gates
14	Magnolia Ridge Pump Station Frontage Protection	22	Godchaux Canal Bridge TOW El. 9.5
15	Existing Paradis Control Structure	23	Drainage Structure – 4-6 X 6 foot RC box culverts with sluice gates in 3 locations
16	Floodwall section in Hydraulic Reach D TOW El. 15.0	24	Drainage Structure – 4-6 X 6 foot RC box culverts with sluice gates
17	Floodwall section in Hydraulic Reach E TOW El. 18.5	25	Drainage Structure – 4-6 X 6 foot RC box culverts with sluice gates
18	45 foot Highway 306 (Bayou Gauche) Roller Gate TOW El. 18.5	26	Drainage Structure – 2-84 inch RCP culverts with sluice gates
19	Crawford Canal P.S. Fronting Protection TOW El 18.5 (50 LF of wall)	27	Drainage Structure – 1-60 inch RCP culvert with sluice gates
20	270 foot Barge Gate crossing Bayou Des Allemands TOW El. 18.5		

Many reaches of the project are site unseen by design team due to remote location at the date of this Appendix.

Implementation: PDT is still preparing feasibility report with submission scheduled for March 2021.

2. Consequences

Limited modeling has been done to inform the benefit to cost ratio (B:C). PDT made the determination to complete HEC-LifeSIM during Preconstruction Engineering and Design (PED) Phase. Planning PDT does not include a HEC-LifeSIM modeler. H&H input is required to generate consequences. Time and cost will be needed to finalize determination of initiation.

3. Loading:

3.1 No significant seismic concerns are expected. Seismic chapter will be produced in the Preconstruction Engineering and Design Phase (PED).

3.2 HEC-RAS (2D) and ADCIRC modeling is complete. Additional iterations will be made with barge gate in place for Bayou des Allemands. Additional RAS modeling needed may impact barge gate dimensions and operating procedures. Modeling has not been District Quality Control (DQC) reviewed per date of Appendix.

3.3 Sea Level Rise. Sea level rise and subsidence considerations must be investigated for both design and future risk assessment.

4.0 Engineering Concerns

4.1 Geotechnical Exploration. No additional exploration will be made during the feasibility study. Limited existing data exists along the Davis Pond Guide Levee.

4.2 Coordination with local entities for St. Charles Parish Levee and the Sunset Drainage District has not yielded deign surveys, design reports, as-built drawings, or monitoring reports. Historic records should include levees and structures (fronting protection). This data will influence the data exploration needed and better inform existing system performance in the risk assessment.

4.3 Very limited data exists at the barge gate location in Bayou des Allemands. Previous field investigations in the vicinity for possible mitigation efforts were not pursued due to foundation concerns. Current design efforts are on assumed foundation parameters.

4.4 Additional loading on pile founded pipeline crossings in Davis Pond vicinity.

4.5 Historic channel crossing with new levee alignment. Concerns include both foundation settlement and seepage.

5.0 Cost Concerns

5.1 Borrow. Borrow source for levee construction has not been completed. Figure 6-3.1 and 6-3.2 of the Main Report shows potential sites in Raceland. Approximately 75% (7.9Mcy/10.6Mcy) of the borrow is assumed to come from these sites. Quantity and quality have not been calculated to ensure compliance with project needs over the project life as these are undeveloped sites. Final selection will affect cost including land acquisition and site preparation. Material cost from a commercial source with greater haul distance is still a possibility. The remaining 2.7Mcy are assumed to be available under previous HSDRRS projects.

5.2 Barge gate Operation and Maintenance (O&M) costs. Confined space concerns.

5.3 Construction methods and monitoring especially at gates and structural tie-ins.

5.3 Limited Access. Portion west of Bayou des Allemands has very limited access. One current proposal is to build an access port along the southwestern boundary of the de Allemands crawfish ponds (see Figure 6-10 of Main Report). Repeated truck loading will induce high settlement if not designed properly.

5.4 Construction Phasing. Project is subject to tidal inundations, especially significant during tropical storm season. New construction subject to wave environment due to proximately to coastal lakes.

5.5 Environmental Mitigation. During PDT meeting with Risk Assessment Team, final alignment for Davis Pond to St. Charles Parish levee system was still under construction. New segment from Bayou des Allemands to LDB of Bayou Lafourche will require clearing for access and construction. Tidal action is still needed to support wetlands interior of the new system. In addition, Bayou des Allemands is a possible scenic stream with construction impacts likely requiring mitigation.

5.6 Current project cost is over $2.0 billion dollars. No duration was provided. Multiple lifts are included in the current cost but not developed due to limited geotechnical information.

6.0 Semi-Quantitative Risk Assessment (SQRA)

6.1 SQRA is targeted for an early PED activity should the project be authorized and appropriated. High cost and low B:C ratio has pushed SQRA into PED phase.

6.2 Potential Failure Mode Analysis (PFMA) is an early function of the SQRA. PFMS will be accomplished with PDT design team and risk assessment team. Risk assessment team members chosen at this time have experience with design of the project features. Shared experience with existing design PDT can assist with proposed exploration plan and subsequently ensure all current guidelines are met.

6.3 Risk Drivers chosen during SQRA process will assist in design criteria. Overtopping rates will consider the 100 year, 0.1 cfs overtopping. Discussion during elicitation on risk drivers may inform construction sequencing. Sea level rise and subsidence along with storm frequencies beyond the current project scope will be included in the risk assessment. Ongoing land loss rates will be checked to assess future conditions. Project life is 50 years.

6.4 Completed SQRA will meet current Risk Management Center (RMC) criteria and greatly assist subsequent need for National Flood Insurance Protection (NFIP) analysis.

6.5 A Life Safety Measure/Plan Evaluation Matrix was generated in conjunction with design PDT and provided below.

Measure	Metric							
	Estimated Economic Damage	Expected Annual LL[1]	Flood Velocity LLR	Warning Time LLR[2]	Evacuation LLR	Vulnerable Population > 2ft[3]	Incremental Risk[3,4,5]	Project Costs
No Action	High	Low	Medium	Low	Low	-	Low	Low
Non-Structural	Medium	Low	Medium	Low	Low	-	Low	High
HSDRRS TSP	Low	Low	Low	Low	Low	-	High	High

Notes:
LL – Life Loss, LLR – Life Loss Risk

1. Expected annual life loss is assumed to be low for all scenarios based on population density
2. Warning time based on the tropical storm forecasting days in advance of event
3. Inundation maps generated through HEC-LifeSIM were unavailable at time of assessment
4. Potential depth of inundation may be significant based on size of polder and height of flood event
5. Historic settlement and anticipated no tidal activities inside the polder mean the higher population areas are on higher ground.