



St. Tammany Parish, Louisiana Feasibility Study



**Appendix D – Annex 8 - Cost Engineering for
Coastal Storm Risk Management**

April 2023

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Cost Estimate

Section 1. Cost estimate development

The project cost estimate was developed in the TRACES MII cost estimating software and used the standard approaches for a feasibility estimate structure regarding labor, equipment, materials, crews, unit prices, quotes, sub- and prime contractor markups. This philosophy was taken wherever practical within the time constraints. It was supplemented with estimating information from other sources where necessary such as quotes, bid data, and A-E estimates. The intent was to provide or convey a “fair and reasonable” estimate that which depicts the local market conditions. The estimates assume a typical application of tiering subcontractors. Given the long time over which this project/program is to be constructed and the unknown economic status during that time, demands from non-governmental civil works projects were not considered to dampen the competition and increase prices.

All the construction work (e.g., earthwork, floodwall, pumping plants etc.) are common to the gulf coast region.

Section 2. Estimate Structure:

The estimates are structured to reflect the projects performed. The estimates have been subdivided by USACE feature codes.

Section 3. Bid competition:

It is assumed that there will not be an economically saturated market and that bidding competition will be present.

Section 4. Contract Acquisition Strategy:

There are no declared contract acquisition plan/types at this time. Although it has not been declared, it is anticipated to be Hubzone or 8a small business.

Section 5. Labor Shortages:

It is assumed there will be a normal labor market.

Section 6. Labor Rates:

Local labor market wages are above the local Davis-Bacon Wage Determination and actual rates have been used. This is based upon local information and payroll data received from the New Orleans District Construction Representatives and estimators with experiences in past years.

Section 7. Materials:

Cost quotes are used on major construction items. Material prices quotes were also taken from previous job or historical data.

Section 8. Equipment:

Rates used are based on the latest USACE EP-1110-1-8, Region III. Adjustments are made for fuel and facility capital cost of money (FCCM). Judicious use of owned verses rental rates was considered based on typical contractor usage and local equipment availability. Only a few select pieces of marine \ marsh equipment are considered rental. Full FCCM/Cost of Money rate is

latest available; Mii program takes EP recommended discount, no other adjustments have been made to the FCCM.

Section 9. Fuel:

Fuels (gasoline, on and off-road diesel) were based on local market prices for on-road and off-road for the Gulf Coast area. The Team found that fuels fluctuate irrationally; thus, used the current price and placed a risk on the risk register.

Section 10. Crews:

Major crew and productivity rates were developed and studied by senior USACE estimators familiar with the type of work. All the work is typical to the New Orleans District. The crews and productivities were checked by local MVN estimators, discussions with contractors and comparisons with historical cost data. Major crews include haul, earthwork, piling, concrete, etc.

Most crew work hours are assumed to be 10 hrs 6 days/wk which is typical to the area.

Section 11. Unit Prices:

The unit prices found within the various project estimates will fluctuate within a range between similar construction units such as floodwall, earthwork, and piling. Variances are a result of differing haul distances, material inflation, small or large business markups, subcontracted items, designs and estimates by others.

Section 12. Relocation Cost:

Relocation costs are defined as the relocation of public roads, bridges, railroads, and utilities required for project purposes. In cases where potential significant impacts were known, costs were included within the cost estimate.

Section 13. Mobilization:

Contractor mobilization and demobilization are based on the assumption that most of the contractors will be coming from within the Gulf Coast/Southern region. Mob/demob costs are based on historical studies of detailed Government estimate mob/demobs which averaged 5% of the construction costs. With undefined acquisition strategies and assumed individual project limits for the large number of potential contracts in this program, the estimate utilizes a more comprehensive approx. 5% value applied at each contract rather than risking minimizing mob/demob costs by detailing costs based on an assumed number of contracts. The 5% value also matches well with the 5% value previously prescribed by Walla Walla District, which has studied historical rates.

Section 14. Field Office Overhead:

The estimate used a field office overhead rate based on the average of relevant jobs. The reason this was done is because similar work is being done and the job office overhead should also be similar.

Section 15. Overhead assumptions may include:

Superintendent, office manager, pickups, periodic travel, costs, communications, temporary offices (contractor and government), office furniture, office supplies, computers and software,

as-built drawings and minor designs, tool trailers, staging setup, camp and kitchen maintenance and utilities, utility service, toilets, safety equipment, security and fencing, small hand and power tools, project signs, traffic control, surveys, temp fuel tank station, generators, compressors, lighting, and minor miscellaneous.

Section 16. Home Office Overhead:

Estimate percentages range based upon consideration of 8(a), small business and unrestricted prime contractors. The rates are based upon estimating and negotiating experience, and consultation with local construction representatives. Different percents are used when considering the contract acquisition strategy regarding small business 8(a), competitive small business and large business, high to low respectively. This project will assume an acquisition strategy of small business and assume a Home Office Overhead of 9%.

Section 17. Taxes:

Local taxes will be applied, using an average between the parishes that contain the work. Reference the LA parish tax rate website: <http://www.laota.com/pta.htm>

Section 18. Bond:

Bond is assumed 1% applied against the prime contractor, assuming large contracts. No differentiation was made between large and small businesses.

Section 19. E&D and S&A:

USACE Costs to manage design (PED) and construction (S&A) are based on New Orleans District Programmatic Cost Estimate guidance:

- i) The PED cost includes such costs as project management, engineering, planning, designs, investigations, studies, reviews, value engineering and engineering during construction (EDC). Historically a rate of approximately 12% for E&D plus small percentages for other support features is applied against the estimated construction costs. Other USACE civil works districts such as St. Paul, Memphis, and St. Louis have reported values ranging from 10-15% for E&D. Additional support features might include project management, engineering, planning, designs, investigations, studies, reviews, and value engineering. A PED rate of 20.5% was applied for this project.
- ii) Supervision & Administration (S&A): Historically, New Orleans District used a range from 5% to 15% depending on project size and type applied against the estimated construction costs. Other USACE civil works districts such as St. Paul, Memphis and St. Louis report values ranging from 7.5-10%. Consideration includes that a portion of the S&A effort could be performed by contractors. Based on discussions with MVN Construction Division, an S&A cost based on contract durations was developed. Specific S&A costs were originally calculated and then that same percentage (11%) was carried forward on all future updates.

Section 20. Contingencies:

Contingencies were developed using the USACE Cost and Schedule Risk Analysis (CSRA) process and the Crystal Ball software that evaluates schedule and cost related risks. The contingency for is 34%. For more information see risk report. See summary in Risk Report.

Section 21. Escalation:

Escalation used in the TPCS is based upon the US Army Corps of Engineers Engineering Manual (EM) 1110-2-1304 Civil Works Construction Cost Index System (CWCCIS) revised 30 Sept 2022.

Section 22. HTRW:

The estimate includes no costs for any potential Hazardous, Toxic, and Radioactive Waste (HTRW) concerns.

Schedule

The project schedule was developed based on the construction of the individual features of work to include the entire Mile Branch alignment which includes construction of excavation, clearing and snagging and Bridges.

Total Project Cost Summary (TPCS)

**** TOTAL PROJECT COST SUMMARY ****

PROJECT: St. Tammany Parish Feasibility Study
PROJECT NO: P2 xxxxxx
LOCATION: Slidell, LA

DISTRICT: MVN
POC: CHIEF, COST ENGINEERING, xxx

PREPARED: 3/14/2023

This Estimate reflects the scope and schedule in report;

St. Tammany Report March 2023

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)					TOTAL PROJECT COST (FULLY FUNDED)				
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST (\$K)	CNTG (\$K)	CNTG (%)	TOTAL (\$K)	ESC (%)	COST (\$K)	CNTG (\$K)	TOTAL (\$K)	Program Year (Budget EC): 2024 Effective Price Level Date: 1 OCT 23		INFLATED (%)	COST (\$K)	CNTG (\$K)	FULL (\$K)
										Spent Thru: 1-Oct-22 (\$K)	TOTAL FIRST COST (\$K)				
A	B	C	D	E	F	G	H	I	J		K	L	M	N	O
02	RELOCATIONS	\$17,352	\$5,900	34.0%	\$23,252	2.9%	\$17,848	\$6,068	\$23,916	\$0	\$23,916	24.8%	\$22,277	\$7,574	\$29,851
06	FISH & WILDLIFE FACILITIES	\$45,108	\$15,337	34.0%	\$60,445	2.9%	\$46,398	\$15,775	\$62,173	\$0	\$62,173	8.0%	\$50,112	\$17,038	\$67,150
06	FISH & WILDLIFE FACILITIES	\$13,555	\$4,609	34.0%	\$18,164	2.2%	\$13,851	\$4,709	\$18,561	\$0	\$18,561	82.8%	\$25,327	\$8,611	\$33,938
11	LEVEES & FLOODWALLS	\$135,295	\$46,000	34.0%	\$181,296	2.9%	\$139,162	\$47,315	\$186,476	\$0	\$186,476	20.1%	\$167,199	\$56,848	\$224,046
11	LEVEES & FLOODWALLS	\$47,011	\$15,984	34.0%	\$62,995	2.9%	\$48,355	\$16,441	\$64,795	\$0	\$64,795	32.9%	\$64,286	\$21,857	\$86,144
11	LEVEES & FLOODWALLS	\$52,112	\$17,718	34.0%	\$69,830	2.9%	\$53,601	\$18,224	\$71,826	\$0	\$71,826	62.2%	\$86,959	\$29,566	\$116,525
11	LEVEES & FLOODWALLS	\$44,690	\$15,195	34.0%	\$59,885	2.9%	\$45,967	\$15,629	\$61,596	\$0	\$61,596	130.8%	\$106,076	\$36,066	\$142,141
11	LEVEES & FLOODWALLS	\$32,201	\$10,948	34.0%	\$43,150	2.0%	\$32,841	\$11,166	\$44,007	\$0	\$44,007	284.1%	\$126,145	\$42,889	\$169,035
11	LEVEES & FLOODWALLS	\$260,812	\$88,676	34.0%	\$349,488	2.9%	\$268,265	\$91,210	\$359,475	\$0	\$359,475	17.4%	\$314,938	\$107,079	\$422,017
11	LEVEES & FLOODWALLS	\$53,551	\$18,207	34.0%	\$71,758	2.7%	\$55,012	\$18,704	\$73,717	\$0	\$73,717	33.4%	\$73,373	\$24,947	\$98,319
13	PUMPING PLANT	\$538,868	\$183,215	34.0%	\$722,084	2.9%	\$554,272	\$188,453	\$742,725	\$0	\$742,725	16.9%	\$647,969	\$220,309	\$868,278
15	FLOODWAY CONTROL & DIVERSION STRUCTURE	\$84,605	\$28,766	34.0%	\$113,370	2.9%	\$87,023	\$29,588	\$116,611	\$0	\$116,611	15.2%	\$100,239	\$34,081	\$134,320
CONSTRUCTION ESTIMATE TOTALS:		\$1,325,161	\$450,555		\$1,775,716	2.8%	\$1,362,596	\$463,283	\$1,825,879	\$0	\$1,825,879	31.0%	\$1,784,900	\$606,866	\$2,391,765
01	LANDS AND DAMAGES	\$36,921	\$9,230	25.0%	\$46,152	2.9%	\$37,977	\$9,494	\$47,471	\$0	\$47,471	8.0%	\$41,017	\$10,254	\$51,271
30	PLANNING, ENGINEERING & DESIGN	\$271,658	\$92,364	34.0%	\$364,022	2.8%	\$279,339	\$94,975	\$374,314	\$0	\$374,314	9.7%	\$306,518	\$104,216	\$410,735
31	CONSTRUCTION MANAGEMENT	\$145,768	\$49,561	34.0%	\$195,329	2.8%	\$149,889	\$50,962	\$200,851	\$0	\$200,851	17.2%	\$175,681	\$59,732	\$235,413
PROJECT COST TOTALS:		\$1,779,508	\$601,710	33.8%	\$2,381,218		\$1,829,801	\$618,714	\$2,448,516	\$0	\$2,448,516	26.2%	\$2,308,116	\$781,068	\$3,089,184

CHIEF, COST ENGINEERING, xxx

ESTIMATED TOTAL PROJECT COST: **\$3,089,184**

PROJECT MANAGER, Amy Dixon

CHIEF, REAL ESTATE, xxx

CHIEF, PLANNING, xxx

CHIEF, ENGINEERING, xxx

CHIEF, OPERATIONS, xxx

CHIEF, CONSTRUCTION, xxx

CHIEF, CONTRACTING, xxx

CHIEF, PM-PB, xxx

CHIEF, DPM, xxx

Mii Cost Estimate

FOR OFFICIAL USE ONLY

Description of Work:

The levee and floodwall system would consist of a total of approximately 18.5 miles (97,700 ft) of earthen levee and floodwall which includes approximately 15 miles (79,500 ft) of levees constructed in separate (non-continuous) segments, and 3.5 miles (18,200 ft) of separate (non-continuous) segments of a floodwall. Construction of the levee alignment would impact approximately 521 acres of permanent ROW and it would require approximately 7,079,000 cubic yards of fill, including fill material required for future levee lifts (estimates include a 30 percent contingency).

Properties: See property notes for more documentation and quantity take offs used in this estimate.

1. Latest Labor template was used.
2. Latest Equipment template was used. MII Equipment 2022 Region 03.
3. Latest Cost Book was used. 2022 MII English Cost Book
4. Average of Fuel Prices Quotes for the last year.
5. CMR: 4.625
6. Sales Tax: 8.7%

Estimated by Steven Lowrie

Designed by MVN

Prepared by Steven Lowrie

Preparation Date 2/15/2023

Effective Date of Pricing 2/15/2023

Estimated Construction Time Days

Description	Quantity	UOM	ProjectCost
IGE Format			1,280,052,696.20
A-1 West Slidell	1	EA	<i>668,884,668.60</i> 668,884,668.60
1 Western Extension	1	JOB	<i>16,551,740.86</i> 16,551,740.86
1-1 Relocation	1	EA	<i>1,145,586.05</i> 1,145,586.05
1-2 Environmental Control Structure	1	EA	<i>3,187,004.10</i> 3,187,004.10
1-3 Levee	1	JOB	<i>9,810,835.29</i> 9,810,835.29
1-4 Access Gates	1	JOB	<i>2,408,315.42</i> 2,408,315.42
2 West Terminus to Bayou Paquet	1	JOB	<i>49,967,712.16</i> 49,967,712.16
2-1 Relocation	1	EA	<i>716,596.45</i> 716,596.45
2-2 Environmental Control Structure	1	EA	<i>2,749,917.74</i> 2,749,917.74
2-3 Levee	1	JOB	<i>38,664,345.13</i> 38,664,345.13
2-4 Floodwall	1	JOB	<i>7,836,852.83</i> 7,836,852.83
3 Bayou Paquet to Bayou Liberty	1	JOB	<i>178,805,035.25</i> 178,805,035.25
3-1 Relocation	1	EA	<i>214,797.98</i> 214,797.98
3-2 Levee	1	JOB	<i>29,751,483.92</i> 29,751,483.92
3-3 Floodwall	1	JOB	<i>48,734,920.35</i> 48,734,920.35
3-4 Access Gates	1	EA	<i>5,599,822.62</i> 5,599,822.62
3-5 Pump Plant	1	EA	<i>94,504,010.37</i> 94,504,010.37
4 Bayou Liberty to Bayou Bonfouca	1	JOB	<i>325,861,509.81</i> 325,861,509.81
4-2 Levee	1	JOB	<i>34,259,974.36</i> 34,259,974.36

Description	Quantity	UOM	ProjectCost
4-3 Pump Plant	1	EA	291,601,535.44
			<i>291,601,535.44</i>
5 Bayou Bonfouca South Bank	1	JOB	97,698,670.52
			<i>97,698,670.52</i>
5-1 Relocation	1	EA	297,774.09
			<i>297,774.09</i>
5-2 Environmental Control Structure	1	EA	5,242,797.86
			<i>5,242,797.86</i>
5-3 Levee	1	JOB	87,442,405.14
			<i>87,442,405.14</i>
5-4 Access Gates	1	EA	4,715,693.44
			<i>4,715,693.44</i>
A-2 South Slidell	1	EA	611,168,027.61
			<i>611,168,027.61</i>
6 Oak Harbor Extension	1	JOB	89,761,228.61
			<i>89,761,228.61</i>
6-1 Relocation	1	EA	8,975,057.22
			<i>8,975,057.22</i>
6-2 Levee	1	JOB	22,576,166.09
			<i>22,576,166.09</i>
6-3 Floodwall	1	JOB	48,416,970.82
			<i>48,416,970.82</i>
6-4 Access Gates	1	EA	9,793,034.48
			<i>9,793,034.48</i>
7 Slidell Ring I-10 to HWY 433	1	EA	55,238,241.23
			<i>55,238,241.23</i>
7-1 Relocation	1	EA	1,575,799.31
			<i>1,575,799.31</i>
7-2 Levee	1	JOB	53,662,441.92
			<i>53,662,441.92</i>
8 Old Spanish Trail Extention	1	JOB	24,977,749.15
			<i>24,977,749.15</i>
8-1 Relocation	1	EA	80,500.79
			<i>80,500.79</i>
8-2 Levee	1	JOB	8,316,823.30
			<i>8,316,823.30</i>
8-3 Floodwall	1	JOB	14,060,296.73
			<i>14,060,296.73</i>
			<i>2,520,128.33</i>

Description	Quantity	UOM	ProjectCost
8-4 Access Gates	1	EA	2,520,128.33
9 Hwy 433 to Kings Point	1	JOB	157,763,490.50
9-1 Relocation	1	EA	393,779.94
9-2 Levee	1	JOB	16,534,708.61
9-3 Pump Plant	1	EA	56,230,216.38
9-4 Floodway Control and Diversion Structures	1	JOB	84,604,785.56
10 Kings Point to HWY 190B	1	EA	40,255,168.06
10-2 Levee	1	JOB	9,683,302.17
10-3 Pump Plant	1	EA	30,571,865.89
11 Substation Enclo. near HWY 190B	1	JOB	45,053,691.80
11-1 Relocation	1	EA	619,140.57
11-2 Floodwall	1	JOB	42,525,612.72
11-3 Access Gates	1	EA	1,908,938.50
12 Eastern Extention	1	JOB	198,118,458.25
12-1 Relocation	1	EA	3,332,912.13
12-2 Environmental Control Structure	1	EA	2,375,281.72
12-3 Levee	1	EA	607,530.65
12-4 Floodwall	1	JOB	99,237,083.10
12-5 Access Gates	1	EA	26,604,881.64
12-6 Pump Plant	1	EA	65,960,769.01

Cost and Schedule Risk Analysis (CSRA)

The CSRA process for this project includes an analysis on the Relocations, Floodwalls and Levees, Pumping Plants, Sector Gates and Sluice Gates features. The results of the analyses are determined by qualifying and quantifying all potential cost risks and running a Monte Carlo simulation to produce the frequency spectrum and probability range for the applied risk costs. The cost contingency is obtained from the 80-percent contingency as determined by this analysis.

Initial Risk Register considered over 53 risk items. A total of 16 potential risk items for the Relocations, Floodwalls and Levees, Pumping Plants, Sector Gates and Sluice Gates features were developed by the CSRA PDT team and applied to a risk registry for analysis. Assumptions were made for each risk item before running the Monte Carlo simulation. The result of the simulation gave a 34% percent (rounded) contingency respectively at the 80-percent confidence level.

The contingency cost for this project was utilized for a Micro Computer Aided Cost Estimating System (MCACES) estimation of the costs associated with the Coastal Storm Risk Management project. The potential cost risks developed during this analysis also serve as an indicator of how to avoid unforeseen escalation of project costs throughout project implementation and therefore, may be used as a valuable tool in all future aspect of the project study, design, and construction planning and estimation.

The major contributors to the resulting total project cost contingency for the Floodwalls and Levees, Pumping Plants, Sector Gates and Sluice Gates Features were:

- Contract Acquisition Impacts
- Construction Contract Modification
- Hydraulics Uncertainty #1.

The major contributor to the resulting total project contingency for the Schedule feature was:

- N/A

The corresponding Total Cost including contingency (cost & schedule) for the Floodwalls and Levees, Pumping Plants, Sector Gates and Sluice Gates is presented on table 1.

Table 1. Floodwalls and Levees, Pumping Plants, Sector Gates and Sluice Gates Features Contingency Analysis Table

**INITIAL CONSTRUCTION
Contingency Analysis**

Base Estimate ->	\$1,759,482,400	
Confidence Level	Contingency Value	Contingency
0%	-87,974,120	-5%
10%	228,732,712	13%
20%	316,706,832	18%
30%	369,491,304	21%
40%	404,680,952	23%
50%	457,465,424	26%
60%	492,655,072	28%
70%	545,439,544	31%
80%	598,224,016	34%
90%	668,603,312	38%
100%	967,715,320	55%

The rounded contingency percentage for Relocations, Floodwalls and Levees, Pumping Plants, Sector Gates and Sluice Gates features (**34.0%**) were transferred to the TPCS for final calculation of total contingency and cost. Lands and Damages cost and contingency are not included in the above. (NOTE: The rounding of the contingencies causes the totals on the TPCS to be slightly higher than and not add up to exactly the costs above.)

Table 3. Risk Register – Modeled Items

1	1 - Project & Program Management (PM)	Project Priority	Project competing with other projects, funding and resources. Experienced staff will not be available for this project because of other higher-priority project requirements. If additional budget is required, additional funds may be difficult to obtain if there are competing project priorities.	\$4 Billion dollar project will have high priority. Since multiple high priority projects are occurring, it is possible that experienced staff will not be available causing delays. It is possible that we can attain help for other districts and AEs to complete work. It is possible that due to competing high priority projects funding will be difficult to obtain. The engagement of the congressional delegation indicates high priority status for funding. Cost will have a negligible impact. The schedule will possibly be affect but the impact will be negligible due to outsourcing.	Low	Low
2	1 - Project & Program Management (PM)	Project Personnel Resources	Gov't personnel resources for project management and execution may be insufficient during peak periods of PED and Procurement.	Do not feel will be an issue. Personnel turnover and reassignments have been relatively low. Project will be a priority.	Low	Low
3	1 - Project & Program Management (PM)	E&D and S&A costs	Typical E&D and S&A percentages measured against construction were assumed. Actual costs could be different.	Template E&D and S&A percentage used. Actual costs could be vary from the assumed. This would be, in part, due to changed efforts related to project design changes, extended years resulting in more product updates and contracts. Policy are being made in order for less design issue during PED.	Medium	Low
4	1 - Project & Program Management (PM)	Scope Maturity	Based on the current level of design and data available, the project scope/features could vary based upon results of further detailed investigation of the proposed sites.	Multiple discussion have occurred and it is very likely that scope maturity will occur. The risks have been accounted for in individual risk below.	Low	Low
5	1 - Project & Program Management (PM)	Accelerated schedule	Pressure to deliver project on an accelerated schedule	The present program does not have significant pressure to have an accelerated schedule. Risk remains low.	Low	Low
6	4 - External Risks (EX)	Funding Availability	Project has not been authorized but not has been appropriate for construction. Design and construction delays could occur pending funding, resulting in increased escalation costs.	Delay in funding availability is unlikely to affect to program schedule. Assumed that any delays caused by funding issues will be covered under regular annual inflation adjustments.	Low	Low
7	4 - External Risks (EX)	Bid Protest Potential	Bid protests causing issues with award	Large project with significant profit potential may increase likelihood of bid protest. This may result in award to "less than" lowest price and/or impact/delay the schedule. However, given the long duration of the overall project, any 1 contract delay would have little overall impact. Bid protest in LA for civil works projects are unlikely. PDT Discussion.	Low	Low
8	4 - External Risks (EX)	Market Conditions	Construction Market and bidding competition	To project market conditions 50 years into the future is difficult. Competition of levee and structures work has been robust in recent years. Do not foresee an issue in the future but due to the length of program durations, the project could experience worsening market conditions. Since worsening market conditions could happen, a medium risk was assumed. Low 0% High 2%.	Medium	Low
9	4 - External Risks (EX)	Fuel Cost	Potential for escalating fuel prices	If fuel prices escalate dramatically with global recovery, could increase costs of constructing project, especially levees with much of it truck hauled.	Medium	Low
10	4 - External Risks (EX)	Pile steel cost	Potential for escalating steel prices (H-Pile, Pipe Pile and Sheet pile)	H-Piles and sheet pile prices have fluctuated significantly. Assume High 10% increase.	Medium	Low

11	4 - External Risks (EX)	Concrete Cost	Potential for escalating Concrete	Concrete Material Prices have increased continuous in the couple of years. There is a possibility that it can increase more. Assume a likely 10% increase.	Medium	Low
12	4 - External Risks (EX)	Sponsor Funding	Sponsor is responsible for LERRDS and cost share.	Sponsor funding should not be an issue. Project is a typical cost sharing, sponsor is responsible for LERRDS.	Low	Low
13	4 - External Risks (EX)	Environmental Community	Lawsuits have been filed previously over project impacts.	USACE has successfully defended lawsuits in the past through full disclosure of impacts in the EIS. Future litigation will likely also not result in changes to the project. Project work continued during previous litigation and would likely be able to continue during any future litigations. Overall Lawsuit Risk is considered Low.	Low	Low
14	4 - External Risks (EX)	Political factors change at local, state or federal	Gov't Turnover	Turnover at any level government can affect priority of project and potential affect funding stream. Possibly affect authorization date and then we would not be able to construction because of lack of funding. Due to the project being high priority it is unlikely that a huge delay in schedule will occur due gov't turnover.	Low	Low
15	4 - External Risks (EX)	Hurricane Risk	Hurricane Effects	Hurricane often occur and a process is already in place. Cost and Schedule changes will be taken into account under the construction risk category item mods.	Low	Low
16	5 - Contract Acquisition Risks (CA)	Contract Acquisition Impacts	Acquisition strategy	Acquisition strategy not yet defined. D/B/B, not in time crunch, could be small business and possibly 8a. Estimate already assumes small business/set-a-side consistent with MN goals (levees). Estimate assumes typical sub-contracting. If other acquisition strategies are used on any one/or selected projects, would have small impact on overall project cost and little or no impact on overall schedule but since the program is over 50 years, change is possible	Medium	Low
17	7 - General Technical Risk (TR)	Hydraulics Uncertainty#1	Confidence in hydraulic models. ADCIRC Model - Coastal Modeling	ADCIRC Modeling was performed and the 100 year storm was selected to determine elevations for the West and South Slidell alignment. If the alignment does not change, risk of elevations changing are unlikely using the results with the 2021 CHS ADCIRC mesh from ERDC. In the event ERDC updates the ADCIRC mesh in the coming years (factoring in future subsidence and SLR) then there is a greater risk of future year design elevations changing. Uncertainty factor in model has been accounted for; but it is possible elevation change can occur. Due to embankment quantities having a 30% contingency (from Civil) (review with PDT team) impact is negligible. Will discuss with planning and see how high the risk for alignment change and structure to move to another body of water. Alignment change - risk is low.	Low	Low
18	8 - General Technical Risk (TR)	Hydraulics Uncertainty#1	Confidence in hydraulic models. HEC-RAS Model - Riverine Modeling	The HEC-RAS model was used to size pumping stations and drainage gates along the alignment using the 10 year frequency event. Due to lack of surveyed bathymetry data (estimated bathymetry was used in the model terrain), pumping capacity estimates and drainage gates sizes are anticipated to change along the West and South Slidell Levee alignment. Moderate differences between the surveyed bathymetry and what was estimated may result in a significant change in pumping capacity and drainage gate sizes. It has been determined that a 25% increase in cost of all sluice gates, sector gates and pumping stations adequately captures the posed risk of changes to sizes once representative surveys are integrated into the HEC-RAS model.	High	Low
19	7 - General Technical Risk (TR)	Hydraulics Uncertainty#1	Confidence in hydraulic models. HEC-HMS Model - Hydrology Modeling	The HEC-HMS model was used to compute the precipitation boundary condition for the HEC-RAS model. The loss methodology along with the basin model domain used to compute the precipitation boundary condition are both elements of the HMS model that may be overestimating hydrologic runoff in the study area.	Low	Low
20	7 - General Technical Risk (TR)	DESIGN DEVELOPMENT - Structural #1	What level of design? Confidence in scope, investigations, design and critical qty's..	The go-by steel design for sluice and access gate did not consider surge in design; therefore, it is likely that the steel quantity will increase by 10% to 15%. The go by steel design for sluice and access gates scaled to account for the different sizes. Some of them were scaled to a much large gate. This would cause the members to become thicker and this was not take into account in scaled quantities. It is likely that the steel quantity will increase by 10% to 15%.	High	Low

21	7 - General Technical Risk (TR)	DESIGN DEVELOPMENT - Structural #2	Site conditions Change: Lidar vs Surveys and Hydraulic Change	The access gate and sluice gates will have minimal change due receiving survey but could have significant change if hydraulics Has model has risk. See REF 17.	Low	Low
22	7 - General Technical Risk (TR)	DESIGN DEVELOPMENT - Levee	What level of design? Confidence in scope, investigations, design and critical qlys.	Civil Discussion: Confident in levee quantities comes from the 30% contingency alrighty added to the quantity. The 30% take into account a possible change in alignment, accurate elevation (need confirmation from hydraulics) and change in levee slope (steepness or width of levee section). Since the alignment has changed several time, it is possible that the alignment can change and likely become longer.	Low	Low
23	7 - General Technical Risk (TR)	Borrow/fill source identified/secured	Are borrow sources identified? Are the borrow sources secured?	Estimate assumes an average of 8 mile haul to proposed borrow pits. Also if the borrow sources is not secured then it is possible that a borrow source will not be occupied and another pit may be needed which could increase haul distance.	Medium	Low
24	7 - General Technical Risk (TR)	Adequate access for Constructability	Access to Wildlife Refuge from a railroad	Access Wildlife Refuge is over a railroad track. Due to the railroad traffic and the one access to Bayou Bonfouca South Bank the typical embankment production rate will need to be decreased. See Ref 41	Low	Low
25	7 - General Technical Risk (TR)	Civil / Geotechnical Uncertainty #1	What level of design? Confidence in scope, investigations, design and critical qlys..	West Slidell Alignment is an underdeveloped area. We do not have project specific borings and surveys, but we have some information from other projects in the area. With the available Geotech information, it was assumed that the West Slidell portion levees would be built on marshy/mucky ground surface. Due to the marshy/mucky ground surface, it is likely that a 6' sand base will be needed for all levees.	High	Low
26	7 - General Technical Risk (TR)	Civil / Geotechnical Uncertainty #2	Width of ROW Changes	The ROW for West Slidell alignment is 300' and considers worse Case scenario cross-section. If the ROW width becomes smaller, it possible that width of the cross-section will need to be adjusted. Geotech would need to mitigate change in ROW without affecting the strength of the Levee. (Mitigation Methods include deep soil mixing, vertical and horizontal wick drains, etc.) The risk of the ROW getting smaller is unlikely. (Need to speak with environmental, real estate and PM)	Low	Low
27	7 - General Technical Risk (TR)	Civil / Geotechnical Uncertainty #3	Potential for Piles Length Changes	Used conservative pile capacity design parameters for all piles other than the pump stations. Due to the area being underdeveloped and the lack of Geotech information, it is assumed that the pile lengths could increase by 10% to 15% across the entire alignment. The pump stations used the 65% design for WSLP. The WSLP referenced pump stations site and soil condition are considered worse than most areas in LA. Due to the lack of Geotech information, it is assumed that the pile lengths could increase by 10% to 15%. Pile load test are likely to occur on this project. If the pile test fails, it is possible that that the pile length could change. It is assumed that this change in length is included in the 10% to 15% pile length increase discussed above.	Medium	Low
28	7 - General Technical Risk (TR)	Civil / Geotechnical Uncertainty	Geotech Change cross-section Change of Shape, Width, or berm	Usually, the reaches would be divided in multiple cross-sections with slightly different shapes, widths, berm length, etc. Due to the cross-section being the worse case scenario, it unlikely the difference shapes, widths, berm lengths, etc. would affect the quantities.	Low	Low
29	7 - General Technical Risk (TR)	Civil / Geotechnical Uncertainty #4	Ground Surface Elevation Across Alignment	The ground surface alignment elevation was based on lidar information. Geotech assume all ground surface elevation to be 0'. If ground surface elevation is below 0, it could cause the levee to be higher and wider or be mitigated with additional or stronger reinforced geotextile. Since the lidar information provided shows most of the alignment above 0', it is unlikely any mitigation will need to be applied due to elevations being below 0'	Low	Low
30	7 - General Technical Risk (TR)	Civil / Geotechnical Uncertainty #5	ROW Change and Geotech Information – South and East Slidell Alignment	Due to shorter right of way and lack of Geotech information, it is possible the reinforced geotextile will need to be added to the levees that are not related to the ring levee. 70' wide and +13,000 lb/in strength	Low	Low

31	9 - Lands and Damages Risk (RE)	Real Estate Plan	Do we have a RE plan?	<p>We have the RE plan. No real property acquisition have been done or authorized. # of affected landowners has been estimated. Real estate cost will be very small % of total project cost. Environmental mitigation has been identified. Mitigation included in project plan. LERDs is a Local Sponsor responsibility. (Non voluntary acquisition)</p> <p>We have some documentation from USFWS indicating they are amenable to the proposed plan. Only issue is timing of proposed land exchange. Delays to schedule possible but team is assuming that land exchange can be done concurrent with PED. The impact to the schedule is likely negligible.</p>	Low	Low
32	9 - Lands and Damages Risk (RE)	Relocation Plan	Do we have a plan? Have the owners been contacted and provided input?	<p>Cannot currently access all potential reaches in the proposed alignment. We are using 3 available databases for locating pipeline utilities etc. There is a small degree of uncertainty because while the owners have been contacted, they have provided little information. At this point most relocation plans are assumptions. Compensability report will be included, most will likely be compensable. Locals are building in these areas now.</p> <p>Residential and business relocations are included in the RE plan.</p>	Low	Low
33	9 - Lands and Damages Risk (RE)	Induced Flooding - Areas Outside of Levees	May require a takings analysis	The team utilized hydraulic modeling and looked at flooding affects/water level with project in place and the increase to areas outside of the system were negligible. However, full analysis to be completed in PED. The chances of the need for more property rights due to flooding affects is negligible.	Low	Low
34	9 - Lands and Damages Risk (RE)	Acquisition Costs and Schedule	Acquisition costs and schedule could be impacted if eminent domain proceedings are required.	If it is necessary to acquire through condemnation proceedings, the schedule and costs could be impacted. The project is generally supported by the Non Federal Sponsors. It is unlikely that the project schedule will be delayed due to condemnation proceedings. The real estate plan includes a contingency for possible extra condemnations. Cost impact is negligible.	Low	Low
35	10 - Relocations (RL)	unknown Utilities	Unknown utilities due to lack information	The lack of information could cause the identification of relocations to be missed. Relocations took worst case scenarios. Assumed it's likely to have unidentified utilities which would case a moderate impact to the relocation cost. Assume 15% to 20% relocation cost impact.	Medium	Low
36	13 - Construction (CO)	Construction Contract Modifications	construction contract modifications can impact construction cost and schedule growth.	Technical complexities and site conditions could result in increased risk of contract modifications. Will impact costs, but little overall impact to larger project timeline. Cost Impact: Best Case - 5%, Likely - 9.8% and Worst Case - 17%. (From Construction Division)	Medium	Low
37	13 - Construction (CO)	Alignment Revisions	Alignment revisions can impact Lands and Damages, Real Estate, Relocations, Environmental Mitigation and Utilities.	Staying on authorized alignment.	Low	Low
38	13 - Construction (CO)	WEATHER	impacts to project	Long overall project schedule so flexibility included. Typical conditions are already included in the schedule and costs. Levee affect by rain only 39% schedule. -Minor delays will not affect the overall program.	Low	Low
39	13 - Construction (CO)	ACCELERATED CONTRACT SCHEDULE	will jobs be rushed	Schedule will be mainly driven by funding.	Low	Low
40	13 - Construction (CO)	Unknown Utilities	Unknown utilities may impact costs.	Investigations done with all available databases. Could Schedule delays if unknown utilities are found. Schedule is on a overall 50 year program. Low Risk Cost would be handle in the modification, see Ref 37.	Low	Low

41	13 - Construction (CO)	Work location/ site condition	Marshy area. Work will be over/on water	Common South LA work condition, water related work already assumed in costs and schedule. It's possible that the production could decrease for embankment due to marshy conditions (only initial construction excluding existing ring levee). Production Rate to 1000 CY/DAY.	Medium	Low
42	13 - Construction (CO)	Poor Performing Contractor	Poor performing contractors can significantly delay individual contracts.	Individual contracts will be impacted by poor performing contractors. Overall program schedule is not likely to be impacted. Contracts are independent. Program Risk is low and not modeled.	Low	Low
43	13 - Construction (CO)	Site Access and Site Constraints	Bayou Bonfouca South Bank Alignment has 1 access and railroad tracks on the access. Conflicts with other contracts	See Ref 24. Other access roads can be mitigated at a low cost.	Low	Low
44	14 - Estimate and Schedule Risks (ES)	LABOR & equipment AVAILABILITY/PRICING	Labor shortages and increase rates	National economy is in a slump, lots of available local labor	Low	Low
45	14 - Estimate and Schedule Risks (ES)	MATERIAL AVAILABILITY/PRICING	Material shortages and increased cost	Projects are using standard materials, quotes for all major materials, long overall project timeline - no rush.	Medium	Low
46	14 - Estimate and Schedule Risks (ES)	Government Furnish vs Contractor Furnished.	Changing from Government to Contractor furnished	It possible that portion of the Government furnish borrow will be converted to Contractor Furnished. Assume 20%.	Medium	Low
47	21 - Environmental & Cultural/Historical Resources (EC)	Impacts to High Value Habitats	Impacts to High Value Habitats (incl Essential fish habitat)	Pine Savannah and Fresh Intermediate Marsh will be impacted by the alignment. Overall cost impacts to the project are small. A more refined model will be done for Pine Savannah during PED. Any changes will be captured in the existing contingency with provide cost. After the running the model it is possible that more mitigation will be needed. The addition of mitigation is included in the contingencies mentioned above. Alignment changes can impact cost but are minimal unless a dramatic change in alignment occurs. Fresh Intermediate Marsh Unless alignment changes or bigger, the WVA model would not need to rerun. Environmental is confident with Cost provided.	Low	Low
48	21 - Environmental & Cultural/Historical Resources (EC)	HAZARDOUS WASTE SITE ANALYSIS	HTRW Phase I site assessment is already completed.	Avoiding all HTRW issues. Nothing in alignment triggered Phase II investigation. As long as alignment doesn't change, there is a low likelihood of triggering HTRW. Without right of entry, a drive by occurred and personnel got as close as possible to assess the area that are in the subject right of way. When right of entry is granted, HTRW assumption can be confirmed.	Low	Low
49	21 - Environmental & Cultural/Historical Resources (EC)	NEPA	more NEPA required?	If there are changes to the project than addition NEPA will be conducted during PED. It is likely based on design changes which are very likely to occur.	Low	Low
50	21 - Environmental & Cultural/Historical Resources (EC)	endangered species	Redcapped Woodpecker	If the project alignment changes on the refuge there could be adverse impacts to the RCW. More impacts to the RCW = more mitigation. Additional mitigation already in contingency discussed in habit impacts. Additional NEPA for PED will be need but the impact is negligible.	Low	Low
51	21 - Environmental & Cultural/Historical Resources (EC)	Section 106 (NHPA) Compliance	Study requires the negotiation of a Programmatic Agreement (PA).	CEMNM has initiated Section 106 consultation and has developed a PA in consultation with the NFS, LA SHPO, Advisory Council on Historic Preservation (ACHP), federally-recognized tribes, and other interested parties, that will establish procedures to satisfy the agency's Section 106 responsibilities pursuant to 36 CFR Part 800.14(b). As of October 2022, the final PA is with OC for review. CEMNM may not proceed with issuing a ROD in compliance with NEPA and Section 106 of the NHPA without the successful execution of the PA.	Low	Low
52	21 - Environmental & Cultural/Historical Resources (EC)	Inability to avoid and/or minimize adverse effects to potential historic properties	A significant amount of the study area has not been surveyed for cultural resources. Cultural resources assessment uses existing data and information only since survey will be completed in PED.	CEMNM has developed a Programmatic Agreement (PA) to fulfill its Section 106 procedures. The PA outlines the steps needed to identify and evaluate cultural resources and make determinations of effects. If direct adverse effects to cultural resources are identified and cannot be avoided or minimized, such impacts would be mitigated through the procedures outlined in the PA.	Low	Low
53	21 - Environmental & Cultural/Historical Resources (EC)	Inadvertent discovery of cultural resources during construction	Cultural resources or historic properties may unexpectedly be encountered during project construction based on the project location or type of work. These unforeseen finds are called an inadvertent discovery, which could increase project construction costs, delay construction schedule, or require modifications to the project.	Discoveries of previously unidentified historic properties or unanticipated adverse effects to known historic properties are not anticipated; however, if there is an inadvertent discovery or unanticipated effect, CEMNM will ensure the stipulations in the Programmatic Agreement (PA) will be fulfilled.	Low	Low