# **Appendix L**

## **ABREVIATED RISK ANALYSIS**

Project (less than \$40M): Houma Navigation Canal Deepening Project

Project Development Stage/Alternative: Feasibility (Alternatives)

Risk Category: Low Risk: Typical Construction, Simple

Alternative: 1A 15-Adjacent

Meeting Date: 11/2/2015

Total Estimated Construction Contract Cost = \$ 507,730,622

	<u>CWWBS</u>	Feature of Work	<u>Cor</u>	ntract Cost	% Contingency	\$	Contingency	<u>Total</u>
	01 LANDS AND DAMAGES	Real Estate	\$	_	0.00%	\$	- \$	-
_1_	02 RELOCATIONS	Relocations	\$	-	0.00%	\$	- \$	-
2	12 NAVIGATION, PORTS AND HARBORS	Dredging	\$	507,730,622	25.22%	\$	128,069,627 \$	635,800,249
3			\$	-	0.00%	\$	- \$	
4			\$	-	0.00%	\$	- \$	-
5			\$	-	0.00%	\$	- \$	
6			\$	-	0.00%	\$	- \$	-
7					0.00%	\$	- \$	<u>-</u>
8			\$	-	0.00%	\$	- \$	-
9			\$		0.00%	\$	- \$	<u>-</u>
10			\$	-	0.00%	\$	- \$	<u>-</u>
11			\$		0.00%	\$	- \$	<u>-</u>
12	All Other	Remaining Construction Items	\$	-	0.0% 0.00%	\$	- \$	
13	30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	\$	50,773,062	7.00%	\$	3,554,114 \$	54,327,177
14	31 CONSTRUCTION MANAGEMENT	Construction Management	\$	40,618,450	7.00%	\$	2,843,291 \$	43,461,741
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MUS				\$			
		Totals						
		Real Estate Total Construction Estimate Total Planning, Engineering & Design Total Construction Management	\$ \$	507,730,622 50,773,062 40,618,450	0.00% 25.22% 7.00% 7.00%	\$ \$ \$	- \$ 128,069,627 \$ 3,554,114 \$ 2,843,291 \$	- 635,800,249 54,327,177 43,461,741

				Base	50%	80%
	Total \$	599,122,134	22%	\$	134,467,033	\$ 733,589,167
Total Construction Mana	agement \$	40,618,450	7.00%	\$	2,843,291	\$ 43,461,741
Total Planning, Engineering &		50,773,062	7.00%	\$	3,554,114	\$ 54,327,177
Total Construction E	Estimate \$	507,730,622	25.22%	\$	128,069,627	\$ 635,800,249
Rea	al Estate \$	-	0.00%	\$	-	\$ -
Totals						

	Buoo	0070	00 /0
Range Estimate (\$000's)	\$599,122k	\$679,802k	\$733,589k

\* 50% based on base is at 5% CL.

Fixed Dollar Risk Add: (Allows for additional risk to be added to the risk analsyis. Must include justification. Does not allocate to Real Estate.

#### Houma Navigation Canal Deepening Project 1A 15-Adjacent

Abbreviated Risk Analysis

Feasibility (Alternatives) Meeting Date:

	<u>Risk Level</u>								
Very Likely	2	3	4	5	5				
Likely	1	2	3	4	5				
Possible	0	1	2	3	4				
Unlikely	0	0	1	2	3				
	Negligible	Marginal	Moderate	Significant	Critical				

Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level
Project Sco	ope Growth			Maximum Proje	ct Growth	40%
PS-1	Relocations	Some utility elevations could not be determined. Relocation costs are 6 years old. Unidentified utilities or oil/gas infrastructure could be located during construction.	The need for additional relocations are a possability, which would increase the scope of the project and mpact cost/schedule.	Negligible	Unlikely	0
PS-2	Dredging	A full Dredged Material Disposal Plan has not been developed. Some depths and elevations for proposed disposal areas were assumed, without survey data. Disposal quantities could also be increased based on low maintenance activities and old survey information. It could be determined that foreshore protection and rock retention could be required in additional areas other than those recommended. This could lead to the need for additional rock retention, foreshore protection, and floatation channel dredging.	The proposed disposal locations will be revisted during the design phase, but some changes to the costs associated with the current plan is likely. Additional quantities could require changes to the proposed disposal areas and lead to increases in scope. Any changes to the rock requirements could increase the project scope, but it would have a minimal impact on overall costs.	Marginal	Possible	1
PS-3	0			Moderate	Possible	N/A
PS-4	0			Negligible	Unlikely	N/A
PS-5	0			Negligible	Unlikely	N/A
PS-6	0			Negligible	Unlikely	N/A
PS-7	0			Negligible	Unlikely	N/A
PS-8	0			Negligible	Unlikely	N/A
PS-9	0			Negligible	Unlikely	N/A
PS-10	0			Negligible	Unlikely	N/A
PS-11	0			Negligible	Unlikely	N/A
PS-12				Marginal	Possible	N/A

PS-13	Planning, Engineering, & Design			Negligible	Unlikely	0
PS-14	Construction Management			Negligible	Unlikely	0
Acquisitio	n Strategy			Maximum Proje	ct Growth	30%
AS-1	Relocations	Contract could require specialized work associated with environmental impacts of pipeline relocation and proper containment of material. The offshore nature of the work could limit the number of bids received to larger contracting companies.	A specialized pipeline relocation contractor could require a higher unit cost with a less competative bid. The overall cost ramifications of this would be minimal when compared to overall project costs.	Negligible	Unlikely	0
AS-2	Dredging	Dredging methodology for channel deepening would be widely available within south Louisiana, but offshore nature of the work could limit the number of bids.	A reduced number of bids could result in higher unit costs. However, based on the amount of ongoing dredging work within the channel over the past 20 years, it is believed the likihood of this occuring is minimal.	Marginal	Possible	1
AS-3	0			Moderate	Likely	N/A
AS-4	0			Negligible	Unlikely	N/A
AS-5	0			Negligible	Unlikely	N/A
AS-6	0			Negligible	Unlikely	N/A
AS-7	0			Negligible	Unlikely	N/A
AS-8	0			Negligible	Unlikely	N/A
AS-9	0			Negligible	Unlikely	N/A
AS-10	0			Negligible	Unlikely	N/A
AS-11	0			Negligible	Unlikely	N/A
AS-12				Negligible	Unlikely	N/A
AS-13	Planning, Engineering, & Design			Negligible	Unlikely	0
AS-14	Construction Management			Negligible	Unlikely	0
Constructi	ion Elements			Maximum Proje	ct Growth	15%
CE-1	Relocations	Boat access would be required for relocations. Mobilization/Demobilization could take longer than anticipated. The potential exists for low-frequency weather events to delay work. Marine work could result in lower than anticipated productivity.	Impacts due to extended weather delays would be the most significant impact to cost and schedule, but the likelihood is low. With the amount of oil infrastructure existing in south Louisana, it is assumed a contractor familiar with the challenges of offshore pipeline relocation would be chosen. Therefore productivity issues would be minimal.	Negligible	Unlikely	0

CE-2	Dredging	Boat access would be required for survey crews and dredging equipment/crews. The potential exists for low-frequency weather events to delay work. Remote location of project could impact schedule if repairs are necessary to dredging equipment. Dredging methods would be fairly straight forward.	Dredging work is commonplace within the channel, so the risk of schedule delays or reduced productivity would center around the remote location or extreme weather events, not the dredging methods. The impact of a significant storm could be significant but liklihood is small.	Marginal	Possible	1
CE-3	0			Marginal	Possible	N/A
CE-4	0			Negligible	Unlikely	N/A
CE-5	0			Negligible	Unlikely	N/A
CE-6	0			Negligible	Unlikely	N/A
CE-7	0			Negligible	Unlikely	N/A
CE-8	0			Negligible	Unlikely	N/A
CE-9	0			Negligible	Unlikely	N/A
CE-10	0			Negligible	Unlikely	N/A
CE-11	0			Negligible	Unlikely	N/A
CE-12				Negligible	Unlikely	N/A
CE-13	Planning, Engineering, & Design			Negligible	Unlikely	0
CE-14	Construction Management			Negligible	Unlikely	0
Quantities	s for Current Scope			Maximum Proje	ct Growth	20%
Q-1	Relocations	The elevations of some pipelines are assumed or unkown. The potential exists for some unknown oil/gas infrastructure to be present. Shoaling rates utilized are based on past data, but the infrequency of maintenance dredging could result in pipelines found to be deeper than anticipated.	The potential exists for increased quantity requirements during the relocation phase of the project, but the cost impact would be small when compaed to the overall cost of the project.	Negligible	Unlikely	0
Q-2	Dredging	Disposal quantities could be underestimated based on the infrequent nature of maintenance dredging over the past 20 years. Pipeline distances may change is disposal areas are changed. Disposal area capacities are based on assumed depths without data from surveys.	Additional costs could be significant if additional dredging is required to achieve target depth. Dredging quantites required are based on dated survey information and assumed shoaling rates. Changes to the disposal plan during the design phase could increase costs.	Moderate	Possible	2
Q-3	0			Negligible	Likely	N/A
Q-4	0			Negligible	Unlikely	N/A

Q-5	0			Negligible	Unlikely	N/A
Q-6	0			Negligible	Unlikely	N/A
Q-7	0			Negligible	Unlikely	N/A
Q-8	0			Negligible	Unlikely	N/A
Q-9	0			Negligible	Unlikely	N/A
Q-10	0			Negligible	Unlikely	N/A
Q-11	0			Negligible	Unlikely	N/A
Q-12				Negligible	Unlikely	N/A
Q-13	Planning, Engineering, & Design			Negligible	Unlikely	0
Q-14	Construction Management			Negligible	Unlikely	0
<b>Specialty</b>	Fabrication or Equipment			Maximum Proje	ct Growth	50%
		Transportation of pipe and other relocation materials/equipment could take	Equipment transport of failure would likely be more expensive,			
FE-1	Relocations	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.	Marginal	Unlikely	0
FE-1	Relocations  Dredging	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small	Marginal Marginal	Unlikely	1
		longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the		·	
FE-2	Dredging	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal	Possible	1
FE-2	Dredging 0	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal Negligible	Possible Unlikely	1 N/A
FE-3 FE-4	Dredging 0	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible	Possible Unlikely Unlikely	1 N/A N/A
FE-2 FE-3 FE-4 FE-5	Dredging 0 0 0	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible	Possible  Unlikely  Unlikely  Unlikely	1 N/A N/A N/A
FE-2 FE-3 FE-4 FE-5 FE-6	Dredging 0 0 0	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible  Negligible	Possible  Unlikely  Unlikely  Unlikely  Unlikely	N/A N/A N/A N/A
FE-2 FE-3 FE-4 FE-5 FE-6 FE-7	Dredging 0 0 0	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible  Negligible  Negligible	Possible Unlikely Unlikely Unlikely Unlikely Unlikely	N/A N/A N/A N/A N/A

FE-10 0 0 Negliging United States   Negligin							
FE-11 0 FE-12 Randog Eightering, A Design FE-14 Construction Management  Cost Estimate Assumptions  The unit prices for pipeline reboliture are based on the 2009 external control of the prices for pipeline reboliture are based on the 2009 external control of the prices for pipeline reboliture are based on the 2009 external control of the prices for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for the unit protes of t	FE-10	0			Negligible	Unlikely	N/A
FE-13 Permit Engineering & Design  FE-14 Construction Management  Cost Estimate Assumptions  The surt prices for pipeline relocation are based on the 2009 estimate conducted by the Cusp. Cost at bit be received by 2015 review by 2015 received prices for the prices of the prices.  The surt prices for pipeline relocation are based on the 2009 estimate conducted by the Cusp. Cost at bit be received by 2015 review by 2015 received	FE-11	0			Negligible	Unlikely	N/A
FE 14 Construction Management  Cost Estimate Assumptions  The unit prices for peptine relocations are board on the 2000 estimate costs for the unit costs of relocations and prices for peptine relocations are board on the 2000 estimate costs for the unit costs of relocations to the construction to the construction of the pertine prices of the provided to the construction to the construction of the pertine prices of the provided to the construction to the construction of the pertine prices of the provided to the construction of the construction of the pertine prices of the provided to the construction of the construction	FE-12				Negligible	Unlikely	N/A
Cost Estimate Assumptions  Characteristic Processing Cost In the Company of Section 1 to Proceed the Cost In th	FE-13	Planning, Engineering, & Design			Negligible	Unlikely	0
The potential exists for the unit codes of relaborations to the consistency of the code of	FE-14	Construction Management			Negligible	Unlikely	0
The potential exists for the unit codes of relaborations to the consistency of the code of	Cost Estim	nate Assumptions			Maximum Proje	ct Growth	25%
development of dredging unit costs is based on assumptions associated with the existing disposal results are also based in assumed starting depth of the channel nation could could be increased one assumed starting depth of the channel and could could be increased one assumed starting depth of the channel nation could could be increased one assumptions as well.  CT-3 0			conducted by the Corps. Cost will be escilated to 2015 levels based on the Corps escalation indices. The elevation of some pipelines are unkown and	increased subsequent to the plannig phase of the project. This	Marginal	Unlikely	0
CT-4         0         Negligible         Unlikely         N/A           CT-5         0         Negligible         Unlikely         N/A           CT-6         0         Negligible         Unlikely         N/A           CT-7         0         Negligible         Unlikely         N/A           CT-8         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-2	Dredging	development of dredging unit costs is based on assumptions associated with the existing disposal areas. Dredging quantities are also based on an assumed starting depth of the channel and could could be increased once a survey is conducted. Productivity rates were developed via CEDEP which is	design phase of the project, once more information in know about the existing depths of the channel. This would result in moderate increases to the project costs. It is also possible that the dredged material disposal plan would be modified based on	Moderate	Possible	2
CT-5         0         Negligible         Unlikely         N/A           CT-6         0         Negligible         Unlikely         N/A           CT-7         0         Negligible         Unlikely         N/A           CT-8         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           Negligible         Unlikely         N/A         N/A	CT-3	0			Moderate	Possible	N/A
CT-6         0         Negligible         Unlikely         N/A           CT-7         0         Negligible         Unlikely         N/A           CT-8         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-4	0			Negligible	Unlikely	N/A
CT-7         0         Negligible         Unlikely         N/A           CT-8         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-5	0			Negligible	Unlikely	N/A
CT-7         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-6	0			Negligible	Unlikely	N/A
CT-8         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-7	0			Negligible	Unlikely	N/A
CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-8	0			Negligible	Unlikely	N/A
CT-10 0	CT-9	0			Negligible	Unlikely	N/A
CT-11 0 Negligible Unlikely N/A	CT-10	0			Negligible	Unlikely	N/A
	CT-11	0			Negligible	Unlikely	N/A
CT-13 Planning, Engineering, & Design Negligible Unlikely <b>0</b>	CT-12				Negligible	Unlikely	N/A
	CT-13	Planning, Engineering, & Design			Negligible	Unlikely	0

CT-14	Construction Management			Negligible	Unlikely	0
External P	Project Risks			Maximum Proje	ct Growth	20%
EX-1	Relocations	Fuel prices used for the estimate are near a two-year low, so the potential for increased fuel costs exiits. This would increase the cost of equipment operation and material/crew transport.	Increases in fuel prices are likely to impact costs. These impacts would be moderate due to the heavy reliance on fuel to operate equipment and transport material. Overall the impacts to cost would be moderate.	Marginal	Unlikely	0
EX-2	Dredging	Extreme weather events are a possibility in Coastal Louisiana, with the potential to delay the project significantly or damage construction equipment. Shoaling rates would also increase during such an event, potentially impacting dredging quantities. Fuel prices used for the estimate are near a two-year low, so the potential for increased fuel costs exitis.	Increases in fuel prices are likely and the cost impact would be moderate. Storm impacts could be significant, but the liklihood is small. The cost and schedule impacts would be marginal. Overall the impacts to cost would be moderate.	Moderate	Possible	2
EX-3	0			Marginal	Possible	N/A
EX-4	0			Negligible	Unlikely	N/A
EX-5	0			Negligible	Unlikely	N/A
EX-6	0			Negligible	Unlikely	N/A
EX-7	0			Negligible	Unlikely	N/A
EX-8	0			Negligible	Unlikely	N/A
EX-9	0			Negligible	Unlikely	N/A
EX-10	0			Negligible	Unlikely	N/A
EX-11	0			Negligible	Unlikely	N/A
EX-12				Negligible	Unlikely	N/A
EX-13	Planning, Engineering, & Design			Negligible	Unlikely	0
EX-14	Construction Management			Negligible	Unlikely	0

# Houma Navigation Canal Deepening Project 1A 15-Adjacent Feasibility (Alternatives) Abbreviated Risk Analysis

<u>WBS</u>	Potential Risk Areas	Project Scope Growth	Acquisition Strategy	Construction Elements	Quantities for Current Scope	Specialty Fabrication or Equipment	Cost Estimate Assumptions	External Project Risks	Cost in Thousands
01 LANDS AND DAMAGES	Real Estate								\$0
02 RELOCATIONS	Relocations	0	0	0	0	0	0	0	\$0
12 NAVIGATION, PORTS AND HARBORS	Dredging	1	1	1	2	1	2	2	\$507,731
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
All Other	Remaining Construction Items	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	0	0	0	0	0	0	0	\$50,773
31 CONSTRUCTION MANAGEMENT	Construction Management	0	0	0	0	0	0	0	\$40,618
									\$599,122
Risk		\$ 10,618	\$ 10,024	\$ 50,665	\$ 16,828	\$ 11,103	\$ 18,400	\$ 16,828	\$134,467
ixed Dollar Risk Allocation		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$0
	Risk	\$ 10,618	\$ 10,024	\$ 50,665	\$ 16,828	\$ 11,103	\$ 18,400	\$ 16,828	\$134,467
								Total	\$733,589

Project (less than \$40M): Houma Navigation Canal Deepening Project

Project Development Stage/Alternative: Feasibility (Alternatives)

Risk Category: Low Risk: Typical Construction, Simple

Alternative: 1A 18-Adjacent

Meeting Date: 11/2/2015

Total Estimated Construction Contract Cost = \$ 103,352,500

	<u>CWWBS</u>	Feature of Work		Contract Cost	% Contingenc	<u>\$</u>	Contingency	<u>Total</u>
	01 LANDS AND DAMAGES	Real Estate	\$	-	0.00%	\$	- \$	-
1	02 RELOCATIONS	Relocations	\$	14,201,300	23.25%	\$	3,301,121 \$	17,502,421
2	12 NAVIGATION, PORTS AND HARBORS	Dredging	\$	87,139,127	32.02%	\$	27,898,686 \$	115,037,813
3			\$	-	0.00%	\$	- \$	
4			\$	-	0.00%	\$	- \$	
5			\$	-	0.00%	\$	- \$	
6			\$	-	0.00%	\$	- \$	<u>-</u>
7					0.00%	\$	- \$	<u>-</u>
8			\$	-	0.00%	\$	- \$	<u> </u>
9			\$	-	0.00%	\$	- \$	<u> </u>
10			\$	-	0.00%	\$	- \$	<u> </u>
11			\$		0.00%	\$	- \$	<u> </u>
12	All Other	Remaining Construction Items	\$	2,012,073	2.0% 0.00%	\$	- \$	2,012,073
13	30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	\$	10,335,250	16.15%	\$	1,668,740 \$	12,003,990
14	31 CONSTRUCTION MANAGEMENT	Construction Management	\$	8,268,200	16.15%	\$	1,334,992 \$	9,603,192
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, ML	IST INCLUDE JUSTIFICATION SEE BELOW)				\$	-	
		Totals	Real Estate \$		0.00%	\$	- \$	-

·		•	Base		50%		80%
Total	\$	121,955,950	28%	\$	34,203,539	\$	156,159,489
Total Construction Management	\$	8,268,200	16.15%	\$	1,334,992	\$	9,603,192
Total Planning, Engineering & Design		10,335,250	16.15%	\$	1,668,740	\$	12,003,990
Total Construction Estimate	*	103,352,500	30.19%	\$	31,199,807	\$	134,552,307
Real Estate	\$	-	0.00%	\$	-	\$	-
otals	•		0.000/	•		•	

Range Estimate (\$000's) \$121,956k \$142,478k \$156,159k

Fixed Dollar Risk Add: (Allows for additional risk to be added to the risk analsyis. Must include justification. Does not allocate to Real Estate.

#### Houma Navigation Canal Deepening Project 1A 18-Adjacent

Feasibility (Alternatives)
Abbreviated Risk Analysis
Meeting Date: 2-Nov-15

 Risk Level

 Very Likely Likely Possible Unlikely
 2
 3
 4
 5
 5

 Unlikely
 1
 2
 3
 4
 5

 Negligible
 0
 1
 2
 3
 4

 Negligible
 Marginal
 Moderate
 Significant
 Critical

Risk Element	Feature of Work		PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level
Project Sc	ope Growth			Maximum Proje	40%	
PS-1	Relocations	Some utility elevations could not be determined. Relocation costs are 6 years old. Unidentified utilities or oil/gas infrastructure could be located during construction.	The need for additional relocations are a possability, which would increase the scope of the project and mpact cost/schedule.	Marginal	Possible	1
PS-2	Dredging	A full Dredged Material Disposal Plan has not been developed. Some depths and elevations for proposed disposal areas were assumed, without survey data. Disposal quantities could also be increased based on low maintenance activities and old survey information. It could be determined that foreshore protection and rock retention could be required in additional areas other than those recommended. This could lead to the need for additional rock retention, foreshore protection, and floatation channel dredging.	The proposed disposal locations will be revisted during the design phase, but some changes to the costs associated with the current plan is likely. Additional quantites could require changes to the proposed disposal areas and lead to increases in scope. Any changes to the rock requirements could increase the project scope, but it would have a minimal impact on overall costs.	Moderate	Possible	2
PS-3	0			Moderate	Possible	N/A
PS-4	0			Negligible	Unlikely	N/A
PS-5	0			Negligible	Unlikely	N/A
PS-6	0			Negligible	Unlikely	N/A
PS-7	0			Negligible	Unlikely	N/A
PS-8	0			Negligible	Unlikely	N/A
PS-9	0			Negligible	Unlikely	N/A
PS-10	0			Negligible	Unlikely	N/A
PS-11	0			Negligible	Unlikely	N/A
PS-12				Marginal	Possible	N/A

PS-13	Planning, Engineering, & Design			Moderate	Likely	3
PS-14	Construction Management			Significant	Possible	3
Acquisitio	n Strategy			Maximum Proje	ct Growth	30%
AS-1	Relocations	Contract could require specialized work associated with environmental impacts of pipeline relocation and proper containment of material. The offshore nature of the work could limit the number of bids received to larger contracting companies.	A specialized pipeline relocation contractor could require a higher unit cost with a less competative bid. The overall cost ramifications of this would be minimal when compared to overall project costs.	Marginal	Possible	1
AS-2	Dredging	Dredging methodology for channel deepening would be widely available within south Louisiana, but offshore nature of the work could limit the number of bids.	A reduced number of bids could result in higher unit costs. However, based on the amount of ongoing dredging work within the channel over the past 20 years, it is believed the likihood of this occuring is minimal.	Marginal	Possible	1
AS-3	0			Moderate	Likely	N/A
AS-4	0			Negligible	Unlikely	N/A
AS-5	0			Negligible	Unlikely	N/A
AS-6	0			Negligible	Unlikely	N/A
AS-7	0			Negligible	Unlikely	N/A
AS-8	0			Negligible	Unlikely	N/A
AS-9	0			Negligible	Unlikely	N/A
AS-10	0			Negligible	Unlikely	N/A
AS-11	0			Negligible	Unlikely	N/A
AS-12				Negligible	Unlikely	N/A
AS-13	Planning, Engineering, & Design			Negligible	Unlikely	0
AS-14	Construction Management			Negligible	Unlikely	0
Construct	<u>ion Elements</u>			Maximum Proje	ct Growth	15%
CE-1	Relocations	Boat access would be required for relocations. Mobilization/Demobilization could take longer than anticipated. The potential exists for low-frequency weather events to delay work. Marine work could result in lower than anticipated productivity.	Impacts due to extended weather delays would be the most significant impact to cost and schedule, but the likelihood is low. With the amount of oil infrastructure existing in south Louisana, it is assumed a contractor familiar with the challenges of offshore pipeline relocation would be chosen. Therefore productivity issues would be minimal.	Moderate	Possible	2

CE-2	Dredging	Boat access would be required for survey crews and dredging equipment/crews. The potential exists for low-frequency weather events to delay work. Remote location of project could impact schedule if repairs are necessary to dredging equipment. Dredging methods would be fairly straight forward.	Dredging work is commonplace within the channel, so the risk of schedule delays or reduced productivity would center around the remote location or extreme weather events, not the dredging methods. The impact of a significant storm could be significant but liklihood is small.	Moderate	Possible	2
CE-3	0			Marginal	Possible	N/A
CE-4	0			Negligible	Unlikely	N/A
CE-5	0			Negligible	Unlikely	N/A
CE-6	0			Negligible	Unlikely	N/A
CE-7	0			Negligible	Unlikely	N/A
CE-8	0			Negligible	Unlikely	N/A
CE-9	0			Negligible	Unlikely	N/A
CE-10	0			Negligible	Unlikely	N/A
CE-11	0			Negligible	Unlikely	N/A
CE-12				Negligible	Unlikely	N/A
CE-13	Planning, Engineering, & Design			Negligible	Unlikely	0
CE-14	Construction Management			Negligible	Unlikely	0
Quantities	for Current Scope			Maximum Proje	ct Growth	20%
Q-1	Relocations	The elevations of some pipelines are assumed or unkown. The potential exists for some unknown oil/gas infrastructure to be present. Shoaling rates utilized are based on past data, but the infrequency of maintenance dredging could result in pipelines found to be deeper than anticipated.	The potential exists for increased quantity requirements during the relocation phase of the project, but the cost impact would be small when compaed to the overall cost of the project.	Marginal	Possible	1
Q-2	Dredging	Disposal quantities could be underestimated based on the infrequent nature of maintenance dredging over the past 20 years. Pipeline distances may change is disposal areas are changed. Disposal area capacities are based on assumed depths without data from surveys.	Additional costs could be significant if additional dredging is required to achieve target depth. Dredging quantites required are based on dated survey information and assumed shoaling rates. Changes to the disposal plan during the design phase could increase costs.	Moderate	Possible	2
Q-3	0			Negligible	Likely	N/A
Q-4	0			Negligible	Unlikely	N/A

Negligible   United   NVA							
0.7 0 0 Nedgible Urbitaly N/A 0.8 0 Nedgible Urbitaly N/A 0.9 0 Nedgible Urbitaly N/A 0.10 0 Nedgible Urbitaly N/A 0.11 0 Nedgible Urbitaly N/A 0.12 Nedgible Urbitaly N/A 0.13 Planning Engreening & Design 0.14 Construction Management 0.15 Planning Engreening & Design 0.14 Construction Management 0.15 Planning Engreening & Design 0.16 Nedgible Urbitaly N/A 0.17 Nedgible Urbitaly N/A 0.18 Nedgible Urbitaly N/A 0.19 Nedgible Urbitaly N/A	Q-5	0			Negligible	Unlikely	N/A
0.7 0 0.8 0 0.8 Negligible 0.9 Negligible 0.10 Negligible 0.10 Negligible 0.10 Negligible 0.10 Negligible 0.10 Negligible 0.11 Negligible 0.12 Negligible 0.13 Negligible 0.14 Contendation Manugement 0.14 Contendation Manugement 0.15 Negligible 0.16 Negligible 0.17 Negligible 0.18 Negligible 0.18 Negligible 0.18 Negligible 0.19 Negligible 0.18 Negli	Q-6	0			Negligible	Unlikely	N/A
Ce United Constitution of Equipment    Part   Constitution Management   Constitution Management	Q-7	0			Negligible	Unlikely	N/A
O-19 0 0 Negligible Unitkey N/A  O-10 0 Negligible Unitkey N/A  O-12 Negligible Unitkey N/A  O-13 Parming, Engineering, & Design  O-14 Construction Management Negligible Unitkey O  Specialty Fabrication or Equipment  Relocations  FE-1 Diredging  Remote Equipment  Remote Equipment International United State Proper is well an international parameter excellent in pasts could take longer is well. An increased life ord of opporent failure could state from excellent in an international parameter excellent in an international parameter excellent in a manufacture international international parameter excellent international international parameter excellent international international parameter excellent international internatio	Q-8	0			Negligible	Unlikely	N/A
C-11 0 C-12   Negligible   Unikely   N/A C-12   Negligible   Unikely   N/A C-13   Planning, Engineering, & Design C-14   Construction Management   Negligible   Unikely   O C-14   Construction Management   Negligible   Unikely   O Specialty Fabrication or Equipment    Selectations   Transportation of pipe and other relocation materials/legipment could take bright and articipated due to remote becation of work. Equipment remote of failure would likely be more expensive, inspirely of an articipated due to remote becation of work. Equipment remote of failure would likely be more expensive, inspirely of an articipated due to remote out of equipment failure could calculate the piper as well. An increased unit could design an articipated and in the more of piper and other piper and articipated and in the more of piper and other piper and articipated and in the more of piper and other piper and other piper and articipated and in the more of piper and of the committee of the count bright piper an articipated and in the more of piper and other piper and articipated and in the more of piper and other piper and articipated and in the more of piper and articipated and in the country of	Q-9	0			Negligible	Unlikely	N/A
Q-12   Negligible   Unlikely   N/A   Q-13   Planning, Engineering, & Design   Negligible   Unlikely   N/A   Q-14   Construction Management   Negligible   Unlikely   Q    Specialty Fabrication or Equipment   Maximum Project Growth   Relocations   Transportation of pape and other relocation materials/equipment coult take longer as well. An increased life load of equipment failure could seast from vorking an anamier environment.   FE-1   Design   Planning is provided in the control of the control project could seast from vorking an anamier environment.   FE-2   Design   Planning is provided in the control of pape and other relocation of work Equipment ransport of failure would likely be more expension, resulting in increased unit costs and schedule sizes during contraction. However, these costs would represent a small potential project cost.   FE-2   Design   Planning is beauting in reduced productivity.   FE-3   Design   Planning is beauting in reduced productivity.   FE-4   Design   Planning is beauting in reduced productivity.   FE-5   Design   Planning is beauting in reduced productivity.   FE-6   Design   Planning is beauting in reduced productivity.   FE-6   Design   Planning is beauting in reduced productivity.   FE-7   Design   Planning is beauting in reduced productivity.   FE-8   Design   Planning is beauting in reduced productivity.   FE-9   Planning is beauting in reduced p	Q-10	0			Negligible	Unlikely	N/A
Planning, Engineering, & Design  Q-14 Construction Management  Regiculator Fabrication or Equipment  Relocations  Relocati	Q-11	0			Negligible	Unlikely	N/A
Q-14 Construction Management  Specialty Fabrication or Equipment  Relocations  Remote location of project could impact cost and schedule if repairs are necessary to dredging aquipment. The transport of crew and equipment and elevery outling in not case and schedule delayed using outlet from working in a marrine environment.  FE-2  Dredging  Remote location of project could impact cost and schedule if repairs are necessary to dredging aquipment. The transport of crew and equipment and elevery outlet increase both costs and the schedule. However, it is believed that the impacts due to this same would be immined when compared to the overall project cost.  FE-3  0  Regigible  In decreased productivity resulting from longer than anticipated maintenance and equipment and elevery outle increase both costs and the schedule. However, it is believed that the impacts also size would be a minned when compared to the overall cost of the project.  Regigible  Unlikely  N/A  FE-5  0  Regigible  Unlikely  N/A  FE-6  0  Regigible  Unlikely  N/A  Negligible  Unlikely  N/A  Negligible  Unlikely  N/A  Negligible  Unlikely  N/A  Negligible  Unlikely  N/A	Q-12				Negligible	Unlikely	N/A
Specialty Fabrication or Equipment  Relocations  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment could take longer than anticipated, resulting in reduced productivity.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment could take longer than anticipated, resulting in reduced productivity.  Resulting in increased on observative from every could increase both costs and the schedule. However, it is believed that the impacts do to these issues would be minimal when compared to the overall project.  The decreased productivity resulting from longer than anticipated costs and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment and relevance and equipment plant relevance to the overall project cost.  The decreased productivity resulting from longer than anticipated with relationship of the overall project cost.  The decreased productivity resulting from longer than anticipated with relationship of the overall project cost.  The decreased productivity resulting from longer than anticipated with relationship of the overall project cost.  The decreased productivity resulting from longer than anticipated with relationship of the overall project cost.  The decreased productivity resulting from longer than anticipated with relationship of the overall project cost.  The decreased productivity resulting from longer than anticipated with relationship of the overall project cost.  The decreased productivity resulting from longer than anticipated with relationship of the overall project cost.  The decreased productivity results are the	Q-13	Planning, Engineering, & Design			Negligible	Unlikely	0
Relocations  FE-1  Fe-2  Dredging  Remote location of pipe and other relocation materials/equipment could take longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased illihood of equipment failure could exist from working in a mainte environment.  FE-2  Dredging  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment and equipment part delivery could increase both costs and the schedule. However, it is believed that the impacts when the vioral cost of the project.  FE-3  0  Regligible  Unlikely  N/A  FE-6  0  Regligible  Unlikely  N/A  FE-7  0  Regligible  Unlikely  N/A	Q-14	Construction Management			Negligible	Unlikely	0
Relocations bonger than anticipated due to remote location of work. Equipment repairs could take longer as well, an increased althood of equipment failure could exist from working in a marine environment.  FE-2 Dredging Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment could take longer than anticipated, resulting in reduced productivity.  FE-3 0	Specialty 1	Fabrication or Equipment			Maximum Proje	ct Growth	50%
Remote location of project could impact cost and schedule if repairs are necessary to deciding equipment. The project could take longer than anticipated, resulting in reduced productivity.  FE-3 0 Negligible Unlikely N/A  FE-6 0 Negligible Unlikely N/A  FE-7 0 Negligible Unlikely N/A  FE-8 0 Negligible Unlikely N/A  FE-8 0 Negligible Unlikely N/A		Relocations	longer than anticipated due to remote location of work. Equipment repairs	resulting in increased unit costs and schedule delays during	Marginal	Possible	1
FE-4 0 Negligible Unlikely N/A  FE-5 0 Negligible Unlikely N/A  FE-6 0 Negligible Unlikely N/A  FE-7 0 Negligible Unlikely N/A  FE-8 0 Negligible Unlikely N/A  Negligible Unlikely N/A  Negligible Unlikely N/A  Negligible Unlikely N/A	FE-1				Warginai	1 0001510	•
FE-5         0         Negligible         Unlikely         N/A           FE-6         0         Negligible         Unlikely         N/A		Dredging	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the			
FE-6 0 Negligible Unlikely N/A  FE-7 0 Negligible Unlikely N/A  FE-8 0 Negligible Unlikely N/A  Negligible Unlikely N/A  Negligible Unlikely N/A	FE-2		exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal	Possible	1
FE-7 0 Negligible Unlikely N/A FE-8 0 Negligible Unlikely N/A Negligible Unlikely N/A	FE-2	0	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal Negligible	Possible Unlikely	1 N/A
FE-7 0 Negligible Unlikely N/A  Negligible Unlikely N/A  Negligible Unlikely N/A	FE-2 FE-3 FE-4	0	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible	Possible Unlikely Unlikely	1 N/A N/A
FE-8 V Negliqible Unlikely N/A	FE-2 FE-3 FE-4 FE-5	0 0	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible	Possible Unlikely Unlikely Unlikely	1 N/A N/A N/A
FE-9 0 Negligible Unlikely N/A	FE-2 FE-3 FE-4 FE-5	0 0 0 0	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible  Negligible	Possible  Unlikely  Unlikely  Unlikely  Unlikely	N/A N/A N/A N/A
	FE-2 FE-3 FE-4 FE-5 FE-6 FE-7	0 0 0 0	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible  Negligible  Negligible	Possible  Unlikely  Unlikely  Unlikely  Unlikely  Unlikely	N/A N/A N/A N/A N/A

FE-10	0			Negligible	Unlikely	N/A
FE-11	0			Negligible	Unlikely	N/A
FE-12				Negligible	Unlikely	N/A
FE-13	Planning, Engineering, & Design			Negligible	Unlikely	0
FE-14	Construction Management			Negligible	Unlikely	0
Cost Estim	nate Assumptions			Maximum Proje	ct Growth	25%
CT-1	Relocations	The unit prices for pipeline relocations are based on the 2009 estimate conducted by the Corps. Cost will be escilated to 2015 levels based on the Corps escalation indices. The elevation of some pipelines are unkown and need to be assumed for this phase of the project.	The potential exists for the unit costs of relaocations to be increased subsequent to the plannig phase of the project. This would result in marginally increased cost for the overall project.	Marginal	Possible	1
CT-2	Dredging	Shoaling rates are based on past data and the disposal plan used for development of dredging unit costs is based on assumptions associated with the existing disposal areas. Dredging quantities are also based on an assumed starting depth of the channel and could could be increased once a survey is conducted. Productivity rates were developed via CEDEP which is based on disposal plan assumptions as well.	It is possible that dredging quantities would increase during the design phase of the project, once more information in know about the existing depths of the channel. This would result in moderate increases to the project costs. It is also possible that the dredged material disposal plan would be modified based on new data, potentially increasing costs.	Moderate	Likely	3
CT-3	0			Moderate	Possible	N/A
CT-4	0			Negligible	Unlikely	N/A
CT-5	0			Negligible	Unlikely	N/A
CT-6	0			Negligible	Unlikely	N/A
CT-7	0			Negligible	Unlikely	N/A
CT-8	0			Negligible	Unlikely	N/A
CT-9	0			Negligible	Unlikely	N/A
CT-10	0			Negligible	Unlikely	N/A
CT-11	0			Negligible	Unlikely	N/A
CT-12				Negligible	Unlikely	N/A
CT-13	Planning, Engineering, & Design			Negligible	Unlikely	0

CT-14	Construction Management			Negligible	Unlikely	0
External P	roject Risks			Maximum Proje	ct Growth	20%
EX-1	Relocations	Fuel prices used for the estimate are near a two-year low, so the potential for increased fuel costs exiits. This would increase the cost of equipment operation and material/crew transport.	Increases in fuel prices are likely to impact costs. These impacts would be moderate due to the heavy reliance on fuel to operate equipment and transport material. Overall the impacts to cost would be moderate.	Moderate	Possible	2
EX-2	Dredging	Extreme weather events are a possibility in Coastal Louisiana, with the potential to delay the project significantly or damage construction equipment. Shoaling rates would also increase during such an event, potentially impacting dredging quantities. Fuel prices used for the estimate are near a two-year low, so the potential for increased fuel costs exits.	Increases in fuel prices are likely and the cost impact would be moderate. Storm impacts could be significant, but the liklihood is small. The cost and schedule impacts would be marginal. Overall the impacts to cost would be moderate.	Moderate	Possible	2
EX-3	0			Marginal	Possible	N/A
EX-4	0			Negligible	Unlikely	N/A
EX-5	0			Negligible	Unlikely	N/A
EX-6	0			Negligible	Unlikely	N/A
EX-7	0			Negligible	Unlikely	N/A
EX-8	0			Negligible	Unlikely	N/A
EX-9	0			Negligible	Unlikely	N/A
EX-10	0			Negligible	Unlikely	N/A
EX-11	0			Negligible	Unlikely	N/A
EX-12				Negligible	Unlikely	N/A
EX-13	Planning, Engineering, & Design			Negligible	Unlikely	0
EX-14	Construction Management			Negligible	Unlikely	0

# Houma Navigation Canal Deepening Project 1A 18-Adjacent Feasibility (Alternatives) Abbreviated Risk Analysis

<u>WBS</u>	Potential Risk Areas	Project Scope Growth	Acquisition Strategy	Construction Elements	Quantities for Current Scope	Specialty Fabrication or Equipment	Cost Estimate Assumptions	External Project Risks	Cost in Thousands
01 LANDS AND DAMAGES	Real Estate								\$0
02 RELOCATIONS	Relocations	1	1	2	1	1	1	2	\$14,201
12 NAVIGATION, PORTS AND HARBORS	Dredging	2	1	2	2	1	3	2	\$87,139
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
All Other	Remaining Construction Items	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$2,012
30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	3	0	0	0	0	0	0	\$10,335
31 CONSTRUCTION MANAGEMENT	Construction Management	3	0	0	0	0	0	0	\$8,268
			ı						\$121,956
Risk		\$ 5,809	\$ 2,001	\$ 11,390	\$ 3,147	\$ 2,216	\$ 6,282	\$ 3,359	\$34,204
xed Dollar Risk Allocation		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$0
	Risk	\$ 5,809	\$ 2,001	\$ 11,390	\$ 3,147	\$ 2,216	\$ 6,282	\$ 3,359	\$34,204
								Total	\$156,159

Project (less than \$40M): Houma Navigation Canal Deepening Project

Project Development Stage/Alternative: Feasibility (Alternatives)

Risk Category: Low Risk: Typical Construction, Simple

Alternative: 1A 18-Adjacent

Meeting Date: 11/2/2015

Total Estimated Construction Contract Cost = \$ 512,947,174

	<u>CWWBS</u>	Feature of Work	<u>C</u>	ontract Cost	% Contingend	<u>cy</u> \$	Contingency	<u>Total</u>
	01 LANDS AND DAMAGES	Real Estate	\$	-	0.00%	\$	- \$	-
1	02 RELOCATIONS	Relocations	\$	_	0.00%	\$	- \$	<u> </u>
_2	12 NAVIGATION, PORTS AND HARBORS	Dredging	\$	512,947,174	25.22%	\$	129,385,446 \$	642,332,620
3			\$	-	0.00%	\$	- \$	
4			\$	-	0.00%	\$	- \$	
5			\$	-	0.00%	\$	- \$	
_6			\$	-	0.00%	\$	- \$	
7					0.00%	\$	- \$	
8			\$		0.00%	\$	- \$	-
9			\$		0.00%	\$	- \$	-
10			\$		0.00%	\$	- \$	-
11			\$		0.00%	\$	- \$	-
12	All Other	Remaining Construction Items	\$	-	0.0% 0.00%	\$	- \$	
13	30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	\$	51,294,717	7.00%	\$	3,590,630 \$	54,885,348
14	31 CONSTRUCTION MANAGEMENT	Construction Management	\$	41,035,774	7.00%	\$	2,872,504 \$	43,908,278
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MU	ST INCLUDE JUSTIFICATION SEE BELOW)				\$	-	
		Totals	Real Estate \$		0.00%	\$	- \$	_

		Bas	se	50%	80%
Total	\$ 605,277,665	22%	\$	135,848,581	\$ 741,126,246
Total Construction Management	\$ 41,035,774	7.00%	\$	2,872,504	\$ 43,908,278
Total Planning, Engineering & Design	51,294,717	7.00%	\$	3,590,630	\$ 54,885,348
Total Construction Estimate	\$ 512,947,174	25.22%	\$	129,385,446	\$ 642,332,620
Real Estate	\$ -	0.00%	\$	-	\$ -
Totals					

	Duoc	0070	0070
Range Estimate (\$000's)	\$605,278k	\$686,787k	\$741,126k
		* 50% based on base is at 5% CL.	

Fixed Dollar Risk Add: (Allows for additional risk to be added to the risk analsyis. Must include justification. Does not allocate to Real Estate.

#### Houma Navigation Canal Deepening Project 1A 18-Adjacent

Feasibility (Alternatives)
Abbreviated Risk Analysis
Meeting Date: 2-Nov-15

 Risk Level

 Very Likely Likely Possible Unlikely
 2
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Risk Element	Feature of Work		PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level
Project Sc	ope Growth			Maximum Proje	ct Growth	40%
PS-1	Relocations	Some utility elevations could not be determined. Relocation costs are 6 years old. Unidentified utilities or oil/gas infrastructure could be located during construction.	The need for additional relocations are a possability, which would increase the scope of the project and mpact cost/schedule.	Negligible	Unlikely	0
PS-2	Dredging	A full Dredged Material Disposal Plan has not been developed. Some depths and elevations for proposed disposal areas were assumed, without survey data. Disposal quantities could also be increased based on low maintenance activities and old survey information. It could be determined that foreshore protection and rock retention could be required in additional areas other than those recommended. This could lead to the need for additional rock retention, foreshore protection, and floatation channel dredging.	The proposed disposal locations will be revisted during the design phase, but some changes to the costs associated with the current plan is likely. Additional quantites could require changes to the proposed disposal areas and lead to increases in scope. Any changes to the rock requirements could increase the project scope, but it would have a minimal impact on overall costs.	Marginal	Possible	1
PS-3	0			Moderate	Possible	N/A
PS-4	0			Negligible	Unlikely	N/A
PS-5	0			Negligible	Unlikely	N/A
PS-6	0			Negligible	Unlikely	N/A
PS-7	0			Negligible	Unlikely	N/A
PS-8	0			Negligible	Unlikely	N/A
PS-9	0			Negligible	Unlikely	N/A
PS-10	0			Negligible	Unlikely	N/A
PS-11	0			Negligible	Unlikely	N/A
PS-12				Marginal	Possible	N/A

PS-13	Planning, Engineering, & Design			Negligible	Unlikely	0
PS-14	Construction Management			Negligible	Unlikely	0
Acquisitio	n Strategy			Maximum Proje	ct Growth	30%
AS-1	Relocations	Contract could require specialized work associated with environmental impacts of pipeline relocation and proper containment of material. The offshore nature of the work could limit the number of bids received to larger contracting companies.	A specialized pipeline relocation contractor could require a higher unit cost with a less competative bid. The overall cost ramifications of this would be minimal when compared to overall project costs.	Negligible	Unlikely	0
AS-2	Dredging	Dredging methodology for channel deepening would be widely available within south Louisiana, but offshore nature of the work could limit the number of bids.	A reduced number of bids could result in higher unit costs. However, based on the amount of ongoing dredging work within the channel over the past 20 years, it is believed the likihood of this occuring is minimal.	Marginal	Possible	1
AS-3	0			Moderate	Likely	N/A
AS-4	0			Negligible	Unlikely	N/A
AS-5	0			Negligible	Unlikely	N/A
AS-6	0			Negligible	Unlikely	N/A
AS-7	0			Negligible	Unlikely	N/A
AS-8	0			Negligible	Unlikely	N/A
AS-9	0			Negligible	Unlikely	N/A
AS-10	0			Negligible	Unlikely	N/A
AS-11	0			Negligible	Unlikely	N/A
AS-12				Negligible	Unlikely	N/A
AS-13	Planning, Engineering, & Design			Negligible	Unlikely	0
AS-14	Construction Management			Negligible	Unlikely	0
Constructi	ion Elements		Maximum Proje	ct Growth	15%	
CE-1	Relocations	Boat access would be required for relocations. Mobilization/Demobilization could take longer than anticipated. The potential exists for low-frequency weather events to delay work. Marine work could result in lower than anticipated productivity.	Impacts due to extended weather delays would be the most significant impact to cost and schedule, but the likelihood is low. With the amount of oil infrastructure existing in south Louisana, it is assumed a contractor familiar with the challenges of offshore pipeline relocation would be chosen. Therefore productivity issues would be minimal.	Negligible	Unlikely	0

CE-2	Dredging	Boat access would be required for survey crews and dredging equipment/crews. The potential exists for low-frequency weather events to delay work. Remote location of project could impact schedule if repairs are necessary to dredging equipment. Dredging methods would be fairly straight forward.	Dredging work is commonplace within the channel, so the risk of schedule delays or reduced productivity would center around the remote location or extreme weather events, not the dredging methods. The impact of a significant storm could be significant but liklihood is small.	Marginal	Possible	1
CE-3	0			Marginal	Possible	N/A
CE-4	0			Negligible	Unlikely	N/A
CE-5	0			Negligible	Unlikely	N/A
CE-6	0			Negligible	Unlikely	N/A
CE-7	0			Negligible	Unlikely	N/A
CE-8	0			Negligible	Unlikely	N/A
CE-9	0			Negligible	Unlikely	N/A
CE-10	0			Negligible	Unlikely	N/A
CE-11	0			Negligible	Unlikely	N/A
CE-12				Negligible	Unlikely	N/A
CE-13	Planning, Engineering, & Design			Negligible	Unlikely	0
CE-14	Construction Management			Negligible	Unlikely	0
Quantities	s for Current Scope			Maximum Proje	ct Growth	20%
Q-1	Relocations	The elevations of some pipelines are assumed or unkown. The potential exists for some unknown oil/gas infrastructure to be present. Shoaling rates utilized are based on past data, but the infrequency of maintenance dredging could result in pipelines found to be deeper than anticipated.	The potential exists for increased quantity requirements during the relocation phase of the project, but the cost impact would be small when compaed to the overall cost of the project.	Negligible	Unlikely	0
Q-2	Dredging	Disposal quantities could be underestimated based on the infrequent nature of maintenance dredging over the past 20 years. Pipeline distances may change is disposal areas are changed. Disposal area capacities are based on assumed depths without data from surveys.	Additional costs could be significant if additional dredging is required to achieve target depth. Dredging quantites required are based on dated survey information and assumed shoaling rates. Changes to the disposal plan during the design phase could increase costs.	Moderate	Possible	2
Q-3	0			Negligible	Likely	N/A
Q-4	0			Negligible	Unlikely	N/A

Q-5	0			Negligible	Unlikely	N/A
Q-6	0			Negligible	Unlikely	N/A
Q-7	0			Negligible	Unlikely	N/A
Q-8	0			Negligible	Unlikely	N/A
Q-9	0			Negligible	Unlikely	N/A
Q-10	0			Negligible	Unlikely	N/A
Q-11	0			Negligible	Unlikely	N/A
Q-12				Negligible	Unlikely	N/A
Q-13	Planning, Engineering, & Design			Negligible	Unlikely	0
Q-14	Construction Management			Negligible	Unlikely	0
<b>Specialty</b>	Fabrication or Equipment			Maximum Proje	ct Growth	50%
		Transportation of pipe and other relocation materials/equipment could take	Equipment transport of failure would likely be more expensive,			
FE-1	Relocations	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.	Marginal	Unlikely	0
FE-1	Relocations  Dredging	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small	Marginal Marginal	Unlikely	1
		longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the		·	
FE-2	Dredging	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal	Possible	1
FE-2	Dredging 0	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal Negligible	Possible Unlikely	1 N/A
FE-3 FE-4	Dredging 0	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible	Possible Unlikely Unlikely	1 N/A N/A
FE-2 FE-3 FE-4 FE-5	Dredging 0 0 0	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible	Possible  Unlikely  Unlikely  Unlikely	1 N/A N/A N/A
FE-2 FE-3 FE-4 FE-5 FE-6	Dredging 0 0 0	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible  Negligible	Possible  Unlikely  Unlikely  Unlikely  Unlikely	N/A N/A N/A N/A
FE-2 FE-3 FE-4 FE-5 FE-6 FE-7	Dredging 0 0 0	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible  Negligible  Negligible	Possible Unlikely Unlikely Unlikely Unlikely Unlikely	N/A N/A N/A N/A N/A

FE-10 0 0 Negliging United States   Negligin							
FE-11 0 FE-12 Randog Eightering, A Design FE-14 Construction Management  Cost Estimate Assumptions  The unit prices for pipeline reboliture are based on the 2009 external control of the prices for pipeline reboliture are based on the 2009 external control of the prices for pipeline reboliture are based on the 2009 external control of the prices for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for the unit protes of t	FE-10	0			Negligible	Unlikely	N/A
FE-13 Permit Engineering & Design  FE-14 Construction Management  Cost Estimate Assumptions  The surt prices for pipeline relocation are based on the 2009 estimate conducted by the Cusp. Cost at bit be received by 2015 review by 2015 received prices for the prices of the prices.  The surt prices for pipeline relocation are based on the 2009 estimate conducted by the Cusp. Cost at bit be received by 2015 review by 2015 received	FE-11	0			Negligible	Unlikely	N/A
FE 14 Construction Management  Cost Estimate Assumptions  The unit prices for peptine relocations are board on the 2000 estimate costs for the unit costs of relocations and prices for peptine relocations are board on the 2000 estimate costs for the unit costs of relocations to the construction to the construction of the pertine prices of the provided to the construction to the construction of the pertine prices of the provided to the construction to the construction of the pertine prices of the provided to the construction of the construction of the pertine prices of the provided to the construction of the construction	FE-12				Negligible	Unlikely	N/A
Cost Estimate Assumptions  Characteristic Processing Cost In the Company of Section 1 to Proceed the Cost In th	FE-13	Planning, Engineering, & Design			Negligible	Unlikely	0
The potential exists for the unit codes of relaborations to the consistency of the code of	FE-14	Construction Management			Negligible	Unlikely	0
The potential exists for the unit codes of relaborations to the consistency of the code of	Cost Estim	nate Assumptions			Maximum Proje	ct Growth	25%
development of dredging unit costs is based on assumptions associated with the existing disposal results are also based in assumed starting depth of the channel nation could could be increased one assumed starting depth of the channel and could could be increased one assumed starting depth of the channel nation could could be increased one assumptions as well.  CT-3 0			conducted by the Corps. Cost will be escilated to 2015 levels based on the Corps escalation indices. The elevation of some pipelines are unkown and	increased subsequent to the plannig phase of the project. This	Marginal	Unlikely	0
CT-4         0         Negligible         Unlikely         N/A           CT-5         0         Negligible         Unlikely         N/A           CT-6         0         Negligible         Unlikely         N/A           CT-7         0         Negligible         Unlikely         N/A           CT-8         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-2	Dredging	development of dredging unit costs is based on assumptions associated with the existing disposal areas. Dredging quantities are also based on an assumed starting depth of the channel and could could be increased once a survey is conducted. Productivity rates were developed via CEDEP which is	design phase of the project, once more information in know about the existing depths of the channel. This would result in moderate increases to the project costs. It is also possible that the dredged material disposal plan would be modified based on	Moderate	Possible	2
CT-5         0         Negligible         Unlikely         N/A           CT-6         0         Negligible         Unlikely         N/A           CT-7         0         Negligible         Unlikely         N/A           CT-8         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           Negligible         Unlikely         N/A         N/A	CT-3	0			Moderate	Possible	N/A
CT-6         0         Negligible         Unlikely         N/A           CT-7         0         Negligible         Unlikely         N/A           CT-8         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-4	0			Negligible	Unlikely	N/A
CT-7         0         Negligible         Unlikely         N/A           CT-8         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-5	0			Negligible	Unlikely	N/A
CT-7         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-6	0			Negligible	Unlikely	N/A
CT-8         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-7	0			Negligible	Unlikely	N/A
CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-8	0			Negligible	Unlikely	N/A
CT-10 0	CT-9	0			Negligible	Unlikely	N/A
CT-11 0 Negligible Unlikely N/A	CT-10	0			Negligible	Unlikely	N/A
	CT-11	0			Negligible	Unlikely	N/A
CT-13 Planning, Engineering, & Design Negligible Unlikely <b>0</b>	CT-12				Negligible	Unlikely	N/A
	CT-13	Planning, Engineering, & Design			Negligible	Unlikely	0

CT-14	Construction Management			Negligible	Unlikely	0
External P	roject Risks			Maximum Proje	ct Growth	20%
EX-1	Relocations	Fuel prices used for the estimate are near a two-year low, so the potential for increased fuel costs exiits. This would increase the cost of equipment operation and material/crew transport.	Increases in fuel prices are likely to impact costs. These impacts would be moderate due to the heavy reliance on fuel to operate equipment and transport material. Overall the impacts to cost would be moderate.	Marginal	Unlikely	0
EX-2	Dredging	Extreme weather events are a possibility in Coastal Louisiana, with the potential to delay the project significantly or damage construction equipment. Shoaling rates would also increase during such an event, potentially impacting dredging quantities. Fuel prices used for the estimate are near a two-year low, so the potential for increased fuel costs exiits.	Increases in fuel prices are likely and the cost impact would be moderate. Storm impacts could be significant, but the liklihood is small. The cost and schedule impacts would be marginal. Overall the impacts to cost would be moderate.	Moderate	Possible	2
EX-3	0			Marginal	Possible	N/A
EX-4	0			Negligible	Unlikely	N/A
EX-5	0			Negligible	Unlikely	N/A
EX-6	0			Negligible	Unlikely	N/A
EX-7	0			Negligible	Unlikely	N/A
EX-8	0			Negligible	Unlikely	N/A
EX-9	0			Negligible	Unlikely	N/A
EX-10	0			Negligible	Unlikely	N/A
EX-11	0			Negligible	Unlikely	N/A
EX-12				Negligible	Unlikely	N/A
EX-13	Planning, Engineering, & Design			Negligible	Unlikely	0
EX-14	Construction Management			Negligible	Unlikely	0

# Houma Navigation Canal Deepening Project 1A 18-Adjacent Feasibility (Alternatives)

Abbreviated Risk Analysis

<u>WBS</u>	Potential Risk Areas	Project Scope Growth	Acquisition Strategy	Construction Elements	Quantities for Current Scope	Specialty Fabrication or Equipment	Cost Estimate Assumptions	External Project Risks	Cost in Thousands
01 LANDS AND DAMAGES	Real Estate								\$0
02 RELOCATIONS	Relocations	0	0	0	0	0	0	0	\$0
12 NAVIGATION, PORTS AND HARBORS	Dredging	1	1	1	2	1	2	2	\$512,947
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
All Other	Remaining Construction Items	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	0	0	0	0	0	0	0	\$51,295
31 CONSTRUCTION MANAGEMENT	Construction Management	0	0	0	0	0	0	0	\$41,036
									\$605,278
Risk		\$ 10,727	\$ 10,127	\$ 51,186	\$ 17,001	\$ 11,217	\$ 18,589	\$ 17,001	\$135,849
ixed Dollar Risk Allocation		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$0
	Risk	\$ 10,727	\$ 10,127	\$ 51,186	\$ 17,001	\$ 11,217	\$ 18,589	\$ 17,001	\$135,849
								Total	\$741,12

Project (less than \$40M): Houma Navigation Canal Deepening Project

Project Development Stage/Alternative: Feasibility (Alternatives)

Risk Category: Low Risk: Typical Construction, Simple

Alternative: 1B 18-Earth

Meeting Date: 11/2/2015

Total Estimated Construction Contract Cost = \$ 116,374,300

	<u>CWWBS</u>	Feature of Work		ontract Cost	% Contingency	\$	Contingency	<u>Total</u>
	01 LANDS AND DAMAGES	Real Estate	\$	-	0.00%	\$	- \$	-
_1	02 RELOCATIONS	Relocations	\$	14,201,300	23.25%	\$	3,301,121 \$	17,502,421
_2	12 NAVIGATION, PORTS AND HARBORS	Dredging	\$	102,173,000	32.02%	\$	32,711,969 \$	134,884,969
3			\$	_	0.00%	\$	- \$	
4			\$		0.00%	\$	- \$	
5			\$		0.00%	\$	- \$	<u>-</u>
6			\$		0.00%	\$	- \$	<u>-</u>
7					0.00%	\$	- \$	-
8			\$		0.00%	\$	- \$	-
9			\$		0.00%	\$	- \$	-
10			\$		0.00%	\$	- \$	<u>-</u>
11			\$		0.00%	\$	- \$	-
12	All Other	Remaining Construction Items	\$	-	0.0% 0.00%	\$	- \$	
13	30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	\$	11,637,430	16.15%	\$	1,878,991 \$	13,516,421
14	31 CONSTRUCTION MANAGEMENT	Construction Management	\$	9,309,944	16.15%	\$	1,503,193 \$	10,813,137
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MU	JST INCLUDE JUSTIFICATION SEE BELOW)				\$		
		Totals F Total Constructio	Real Estate \$	- 116.374.300	0.00% 30.95%	\$ \$	- \$ 36.013.090 \$	152.387.390

		Bas	se .	50%	80%
Total	\$ 137,321,674	29%	\$	39,395,275	\$ 176,716,949
Total Construction Management	\$ 9,309,944	16.15%	\$	1,503,193	\$ 10,813,137
Total Planning, Engineering & Design	11,637,430	16.15%	\$	1,878,991	\$ 13,516,421
Total Construction Estimate	116,374,300	30.95%	\$	36,013,090	\$ 152,387,390
Real Estate	\$ -	0.00%	\$	-	\$ -
Totals					

	Duoc	0070	0070
Range Estimate (\$000's)	\$137,322k	\$160,959k	\$176,717k

Fixed Dollar Risk Add: (Allows for additional risk to be added to the risk analsyis. Must include justification. Does not allocate to Real Estate. \* 50% based on base is at 5% CL.

#### Houma Navigation Canal Deepening Project 1B 18-Earth

Feasibility (Alternatives)
Abbreviated Risk Analysis
Meeting Date: 2-Nov-1

			Risk Level		
Very Likely	2	3	4	5	5
Likely	1	2	3	4	5
Possible	0	1	2	3	4
Unlikely	0	0	1	2	3
	Negligible	Marginal	Moderate	Significant	Critical

Risk Element	Feature of Work		PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level
Project Sc	ope Growth			Maximum Proje	40%	
PS-1	Relocations	Some utility elevations could not be determined. Relocation costs are 6 years old. Unidentified utilities or oil/gas infrastructure could be located during construction.	The need for additional relocations are a possability, which would increase the scope of the project and mpact cost/schedule.	Marginal	Possible	1
PS-2	Dredging	A full Dredged Material Disposal Plan has not been developed. Some depths and elevations for proposed disposal areas were assumed, without survey data. Disposal quantities could also be increased based on low maintenance activities and old survey information. It could be determined that foreshore protection and rock retention could be required in additional areas other than those recommended. This could lead to the need for additional rock retention, foreshore protection, and floatation channel dredging.	The proposed disposal locations will be revisted during the design phase, but some changes to the costs associated with the current plan is likely. Additional quantites could require changes to the proposed disposal areas and lead to increases in scope. Any changes to the rock requirements could increase the project scope, but it would have a minimal impact on overall costs.	Moderate	Possible	2
PS-3	0			Moderate	Possible	N/A
PS-4	0			Negligible	Unlikely	N/A
PS-5	0			Negligible	Unlikely	N/A
PS-6	0			Negligible	Unlikely	N/A
PS-7	0			Negligible	Unlikely	N/A
PS-8	0			Negligible	Unlikely	N/A
PS-9	0			Negligible	Unlikely	N/A
PS-10	0			Negligible	Unlikely	N/A
PS-11	0			Negligible	Unlikely	N/A
PS-12				Marginal	Possible	N/A

PS-13	Planning, Engineering, & Design			Moderate	Likely	3
PS-14	Construction Management			Significant	Possible	3
<u>Acquisitio</u>	n Strategy			Maximum Proje	ct Growth	30%
AS-1	Relocations	Contract could require specialized work associated with environmental impacts of pipeline relocation and proper containment of material. The offshore nature of the work could limit the number of bids received to larger contracting companies.	A specialized pipeline relocation contractor could require a higher unit cost with a less competative bid. The overall cost ramifications of this would be minimal when compared to overall project costs.	Marginal	Possible	1
AS-2	Dredging	Dredging methodology for channel deepening would be widely available within south Louisiana, but offshore nature of the work could limit the number of bids.	A reduced number of bids could result in higher unit costs. However, based on the amount of ongoing dredging work within the channel over the past 20 years, it is believed the likihood of this occuring is minimal.	Marginal	Possible	1
AS-3	0			Moderate	Likely	N/A
AS-4	0			Negligible	Unlikely	N/A
AS-5	0			Negligible	Unlikely	N/A
AS-6	0			Negligible	Unlikely	N/A
AS-7	0			Negligible	Unlikely	N/A
AS-8	0			Negligible	Unlikely	N/A
AS-9	0			Negligible	Unlikely	N/A
AS-10	0			Negligible	Unlikely	N/A
AS-11	0			Negligible	Unlikely	N/A
AS-12				Negligible	Unlikely	N/A
AS-13	Planning, Engineering, & Design			Negligible	Unlikely	0
AS-14	Construction Management			Negligible	Unlikely	0
Construct	ion Elements		Maximum Project Growth		15%	
CE-1	Relocations	Boat access would be required for relocations. Mobilization/Demobilization could take longer than anticipated. The potential exists for low-frequency weather events to delay work. Marine work could result in lower than anticipated productivity.	Impacts due to extended weather delays would be the most significant impact to cost and schedule, but the likelihood is low. With the amount of oil infrastructure existing in south Louisana, it is assumed a contractor familiar with the challenges of offshore pipeline relocation would be chosen. Therefore productivity issues would be minimal.	Moderate	Possible	2

CE-2	Dredging	Boat access would be required for survey crews and dredging equipment/crews. The potential exists for low-frequency weather events to delay work. Remote location of project could impact schedule if repairs are necessary to dredging equipment. Dredging methods would be fairly straight forward.	Dredging work is commonplace within the channel, so the risk of schedule delays or reduced productivity would center around the remote location or extreme weather events, not the dredging methods. The impact of a significant storm could be significant but liklihood is small.	Moderate	Possible	2
CE-3	0			Marginal	Possible	N/A
CE-4	0			Negligible	Unlikely	N/A
CE-5	0			Negligible	Unlikely	N/A
CE-6	0			Negligible	Unlikely	N/A
CE-7	0			Negligible	Unlikely	N/A
CE-8	0			Negligible	Unlikely	N/A
CE-9	0			Negligible	Unlikely	N/A
CE-10	0			Negligible	Unlikely	N/A
CE-11	0			Negligible	Unlikely	N/A
CE-12				Negligible	Unlikely	N/A
CE-13	Planning, Engineering, & Design			Negligible	Unlikely	0
CE-14	Construction Management			Negligible	Unlikely	0
Quantities	for Current Scope			Maximum Proje	ct Growth	20%
Q-1	Relocations	The elevations of some pipelines are assumed or unkown. The potential exists for some unknown oil/gas infrastructure to be present. Shoaling rates utilized are based on past data, but the infrequency of maintenance dredging could result in pipelines found to be deeper than anticipated.	The potential exists for increased quantity requirements during the relocation phase of the project, but the cost impact would be small when compaed to the overall cost of the project.	Marginal	Possible	1
Q-2	Dredging	Disposal quantities could be underestimated based on the infrequent nature of maintenance dredging over the past 20 years. Pipeline distances may change is disposal areas are changed. Disposal area capacities are based on assumed depths without data from surveys.	Additional costs could be significant if additional dredging is required to achieve target depth. Dredging quantites required are based on dated survey information and assumed shoaling rates. Changes to the disposal plan during the design phase could increase costs.	Moderate	Possible	2
Q-3	0			Negligible	Likely	N/A
Q-4	0			Negligible	Unlikely	N/A

CS 0 0 Norgapha Unitary N/A  C7 0 Norgapha Unitary N/A  C8 0 Norgapha Unitary N/A  C8 0 Norgapha Unitary N/A  C9 10 Norgapha Unitary N/A  C9 10 Norgapha Unitary N/A  C9 11 Norgapha Unitary N/A  C9 12 Norgapha Unitary N/A  C9 13 Parving Eugreening & Despr  C9 14 Contribution or Equipment  C9 15 Norgapha Unitary N/A  C9 16 Norgapha Unitary N/A  C9 17 Norgapha Unitary N/A  C9 18 Norgapha Unitary N/A  C9 19 Norgapha Unitary N/A  C9 19 Norgapha Unitary N/A  C9 10 Norgapha Unitary N/A							
OFF Deciging Control of the Septiment Could be part of the Sep	Q-5	0			Negligible	Unlikely	N/A
O7 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Q-6	0			Negligible	Unlikely	N/A
Gall 0  Gall 0  Negligible Uniting N/A  C-10  C-11  C-12  Planning, Engineering, & Design  Planning, Engineering, & Design  C-12  Planning, Engineering, & Design  C-14  Construction Management  Transposition of pipe and other relocation materials/equipment could talk trapper from engineering and pipe and other relocation materials/equipment could talk trapper from engineering and engineering and pipe and other relocation materials/equipment could talk trapper from engineering and pipe and other relocation materials/equipment could talk trapper from engineering and pipe and other relocation materials/equipment could talk trapper from engineering and pipe and other relocation materials/equipment could talk trapper from engineering and pipe and other relocation materials/equipment could talk trapper from engineering and pipe and other relocation materials/equipment could talk trapper from engineering and pipe and other relocation materials/equipment could talk trapper from engineering and pipe and other relocation materials/equipment could talk trapper from engineering and pipe and other relocation materials/equipment could talk trapper from engineering and pipe and other relocation materials/equipment could talk trapper from engineering and eng	Q-7	0			Negligible	Unlikely	N/A
G-10 0 0 Negligible Unitkey N/A  G-11 0 Negligible Unitkey N/A  G-12 Negligible Unitkey N/A  G-13 Planning, Engineering, & Design  G-14 Constituction Management No.  Negligible Unitkey O  Negligible Unitkey O  Specialty Fabrication or Equipment  Relocations Tequipment	Q-8	0			Negligible	Unlikely	N/A
On 10 On 11 On 12 On 12 On 13 On 14 On 15	Q-9	0			Negligible	Unlikely	N/A
O-12 Negligible Unlikely N/A  O-13 Panning, Engineering, & Design  O-14 Construction Management  Negligible Unlikely 0  Specialty Fabrication or Equipment  Relocations  Relocations  Relocations  Relocations  PE-2 Dredging  Denote boation of project could improve could take longer as well. An increased life hood of equipment failure could east from working in a marken environment.  PE-2 Dredging  Denote boation of project could improve could take longer as well. An increased life hood of equipment failure could east from working in a marken environment.  PE-2 Dredging  Denote boation of project could improve could and activated in repairs are necessary to diredging equipment. The transport of review and equipment productivity resulting from longer than anticipated market language and equipment productivity resulting from longer than anticipated market language and equipment productivity.  PE-3 0  Negligible  Negligible  Unlikely  N/A  PE-6 0  Negligible  Unlikely  N/A  PE-6 0  Negligible  Unlikely  N/A  PE-7 0  Negligible  Unlikely  N/A	Q-10	0			Negligible	Unlikely	N/A
Planning, Engineering, & Design  Q-14 Construction Management  Negligible Unlikely 0  Specialty Fabrication or Equipment  Relocations  Relocations  Relocations  Relocations  Relocations  Remote location of year and equipment and eventorement  Relocation or project could impact cost and schedule if regains are necessary to drodging equipment. The transport of crown and equipment provided use to remote location of project could impact cost and schedule if regains are necessary to drodging equipment. The transport of crown and equipment resulting from longer than articipated could take longer than anticipated, resulting in reduced productivity.  FE-3  0  Remote location of project could impact cost and schedule if regains are necessary to drodging equipment. The transport of crows and equipment resulting from longer than articipated equipment could take longer than anticipated, resulting in reduced productivity.  FE-3  0  Remote location of project could impact cost and schedule if regains are necessary to drodging equipment. The transport of crows and equipment of equipment project could and exposure bring and exposure proper than articipated equipment could take longer than anticipated, resulting in reduced productivity.  FE-4  0  Regligible  Unlikely  N/A  FE-6  0  Regligible  Unlikely  N/A  FE-7  0  Regligible  Unlikely  N/A  Negligible  Unlikely  N/A	Q-11	0			Negligible	Unlikely	N/A
Construction Management    Construction Management   Negligible   Unlikely   O	Q-12				Negligible	Unlikely	N/A
Specialty Fabrication or Equipment  Relocations  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment could take longer than anticipated, resulting in reduced productivity.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment could take longer than anticipated, resulting in reduced productivity.  Resulting in reduced productivity.	Q-13	Planning, Engineering, & Design			Negligible	Unlikely	0
Relocations   Transportation of pipe and other relocation materials/equipment could take longer than articipated due to remote location of work. Equipment repairs could take longer set and included personal could take longer as well. An increased limit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.    FE-2	Q-14	Construction Management			Negligible	Unlikely	0
Relocations bonger than anticipated due to remote location of work. Equipment feature could exist from working in a marine environment.  FE-2 Dredging Remote location of project could impact cost and schedule flat project cost.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment could take longer than anticipated, resulting in reduced productivity.  FE-3 0  FE-4 0  Regligible Unlikely N/A  FE-6 0  Regligible Unlikely N/A  FE-7 0  Regligible Unlikely N/A  FE-8 0  Regligible Unlikely N/A	Specialty 1	Fabrication or Equipment			Maximum Proje	ct Growth	50%
Remote location of project could impact cost and schedule if repairs are necessary to design equipment, maintenance and equipment delivery could increase both costs and the schedule. However, it is believed that the impact double where it is believed that the impact due to these issues would be minimal when compared to the overall cost of the project.    FE-3		Relocations	longer than anticipated due to remote location of work. Equipment repairs	resulting in increased unit costs and schedule delays during	Marrinal	Possible	1
FE-4 0 Negligible Unlikely N/A  FE-5 0 Negligible Unlikely N/A  FE-6 0 Negligible Unlikely N/A  FE-7 0 Negligible Unlikely N/A  FE-8 0 Negligible Unlikely N/A  Negligible Unlikely N/A  Negligible Unlikely N/A  Negligible Unlikely N/A	FE-1				Marginal	1 OSSIDIO	'
FE-5         0         Negligible         Unlikely         N/A           FE-6         0         Negligible         Unlikely         N/A           FE-7         0         Negligible         Unlikely         N/A           Negligible         Unlikely         N/A           Negligible         Unlikely         N/A           Negligible         Unlikely         N/A		Dredging	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the			
FE-6 0 Negligible Unlikely N/A  FE-7 0 Negligible Unlikely N/A  FE-8 0 Negligible Unlikely N/A  Negligible Unlikely N/A  Negligible Unlikely N/A	FE-2		exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal	Possible	1
FE-7 0 Negligible Unlikely N/A FE-8 0 Negligible Unlikely N/A Negligible Unlikely N/A	FE-2	0	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal Negligible	Possible Unlikely	1 N/A
FE-7 0 Negligible Unlikely N/A  Negligible Unlikely N/A  Negligible Unlikely N/A	FE-2 FE-3 FE-4	0	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible	Possible Unlikely Unlikely	1 N/A N/A
FE-8 0 Negliqible Unlikely N/A	FE-2 FE-3 FE-4 FE-5	0 0	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible	Possible  Unlikely  Unlikely  Unlikely	1 N/A N/A N/A
FE-9 0 Negligible Unlikely N/A	FE-2 FE-3 FE-4 FE-5	0 0 0 0	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible  Negligible	Possible  Unlikely  Unlikely  Unlikely  Unlikely	N/A N/A N/A N/A
	FE-2 FE-3 FE-4 FE-5 FE-6 FE-7	0 0 0 0	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible  Negligible  Negligible	Possible  Unlikely  Unlikely  Unlikely  Unlikely  Unlikely	1 N/A N/A N/A N/A

FE-10	0			Negligible	Unlikely	N/A
FE-11	0			Negligible	Unlikely	N/A
FE-12				Negligible	Unlikely	N/A
FE-13	Planning, Engineering, & Design			Negligible	Unlikely	0
FE-14	Construction Management			Negligible	Unlikely	0
Cost Estim	nate Assumptions			Maximum Proje	ct Growth	25%
CT-1	Relocations	The unit prices for pipeline relocations are based on the 2009 estimate conducted by the Corps. Cost will be escilated to 2015 levels based on the Corps escalation indices. The elevation of some pipelines are unkown and need to be assumed for this phase of the project.	The potential exists for the unit costs of relaocations to be increased subsequent to the plannig phase of the project. This would result in marginally increased cost for the overall project.	Marginal	Possible	1
CT-2	Dredging	Shoaling rates are based on past data and the disposal plan used for development of dredging unit costs is based on assumptions associated with the existing disposal areas. Dredging quantities are also based on an assumed starting depth of the channel and could could be increased once a survey is conducted. Productivity rates were developed via CEDEP which is based on disposal plan assumptions as well.	It is possible that dredging quantities would increase during the design phase of the project, once more information in know about the existing depths of the channel. This would result in moderate increases to the project costs. It is also possible that the dredged material disposal plan would be modified based on new data, potentially increasing costs.	Moderate	Likely	3
CT-3	0			Moderate	Possible	N/A
CT-4	0			Negligible	Unlikely	N/A
CT-5	0			Negligible	Unlikely	N/A
CT-6	0			Negligible	Unlikely	N/A
CT-7	0			Negligible	Unlikely	N/A
CT-8	0			Negligible	Unlikely	N/A
CT-9	0			Negligible	Unlikely	N/A
CT-10	0			Negligible	Unlikely	N/A
CT-11	0			Negligible	Unlikely	N/A
CT-12				Negligible	Unlikely	N/A
CT-13	Planning, Engineering, & Design			Negligible	Unlikely	0

CT-14	Construction Management			Negligible	Unlikely	0
External P	Maximum Proje	ct Growth	20%			
EX-1	Relocations	Fuel prices used for the estimate are near a two-year low, so the potential for increased fuel costs exiits. This would increase the cost of equipment operation and material/crew transport.	Increases in fuel prices are likely to impact costs. These impacts would be moderate due to the heavy reliance on fuel to operate equipment and transport material. Overall the impacts to cost would be moderate.	Moderate	Possible	2
EX-2		Extreme weather events are a possibility in Coastal Louisiana, with the potential to delay the project significantly or damage construction equipment. Shoaling rates would also increase during such an event, potentially impacting dredging quantities. Fuel prices used for the estimate are near a two-year low, so the potential for increased fuel costs exitis.	Increases in fuel prices are likely and the cost impact would be moderate. Storm impacts could be significant, but the liklihood is small. The cost and schedule impacts would be marginal. Overall the impacts to cost would be moderate.	Moderate	Possible	2
EX-3	0			Marginal	Possible	N/A
EX-4	0			Negligible	Unlikely	N/A
EX-5	0			Negligible	Unlikely	N/A
EX-6	0			Negligible	Unlikely	N/A
EX-7	0			Negligible	Unlikely	N/A
EX-8	0			Negligible	Unlikely	N/A
EX-9	0			Negligible	Unlikely	N/A
EX-10	0			Negligible	Unlikely	N/A
EX-11	0			Negligible	Unlikely	N/A
EX-12				Negligible	Unlikely	N/A
EX-13	Planning, Engineering, & Design			Negligible	Unlikely	0
EX-14	Construction Management			Negligible	Unlikely	0

# Houma Navigation Canal Deepening Project 1B 18-Earth Feasibility (Alternatives)

Abbreviated Risk Analysis

<u>WBS</u>	Potential Risk Areas	Project Scope Growth	Acquisition Strategy	Construction Elements	Quantities for Current Scope	Specialty Fabrication or Equipment	Cost Estimate Assumptions	External Project Risks	Cost in Thousands
01 LANDS AND DAMAGES	Real Estate								\$0
02 RELOCATIONS	Relocations	1	1	2	1	1	1	2	\$14,201
12 NAVIGATION, PORTS AND HARBORS	Dredging	2	1	2	2	1	3	2	\$102,173
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
All Other	Remaining Construction Items	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	3	0	0	0	0	0	0	\$11,637
31 CONSTRUCTION MANAGEMENT	Construction Management	3	0	0	0	0	0	0	\$9,310
									\$137,322
Risk		\$ 6,681	\$ 2,298	\$ 13,050	\$ 3,645	\$ 2,545	\$ 7,319	\$ 3,857	\$39,395
Fixed Dollar Risk Allocation		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$0
	Risk	\$ 6,681	\$ 2,298	\$ 13,050	\$ 3,645	\$ 2,545	\$ 7,319	\$ 3,857	\$39,395
								Total	\$176,717

Project (less than \$40M): Houma Navigation Canal Deepening Project

Project Development Stage/Alternative: Feasibility (Alternatives)

Risk Category: Low Risk: Typical Construction, Simple

Alternative: 1B 18-Earth

Meeting Date: 11/2/2015

Total Estimated Construction Contract Cost = \$ 746,023,940

	CWWBS	Feature of Work	<u>Co</u>	ntract Cost	% Contingency	\$	Contingency	<u>Total</u>
	01 LANDS AND DAMAGES	Real Estate	\$	_	0.00%	\$	- \$	-
1_	02 RELOCATIONS	Relocations			0.00%	\$	- \$	
2	12 NAVIGATION, PORTS AND HARBORS	Dredging	\$	746,023,940	25.22%	\$	188,176,571 \$	934,200,511
3			\$	-	0.00%	\$	- \$	-
4			\$	_	0.00%	\$	- \$	-
5			\$	_	0.00%	\$	- \$	<u>-</u>
6			\$	_	0.00%	\$	- \$	
_ 7					0.00%	\$	- \$	
8			\$		0.00%	\$	- \$	<u>-</u>
9			\$		0.00%	\$	- \$	<u>-</u>
10			\$	-	0.00%	\$	- \$	
11			\$	_	0.00%	\$	- \$	
12	All Other	Remaining Construction Items	\$	_	0.0% 0.00%	\$	- \$	<u>-</u>
13	30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	\$	74,602,394	9.09%	\$	6,782,312 \$	81,384,706
14	31 CONSTRUCTION MANAGEMENT	Construction Management	\$	59,681,915	9.09%	\$	5,425,849 \$	65,107,765
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MUS	T INCLUDE JUSTIFICATION SEE BELOW)				\$	-	
		Totals						
		Real Estate Total Construction Estimate Total Planning, Engineering & Design Total Construction Management	\$	746,023,940 74,602,394 59,681,915	0.00% 25.22% 9.09% 9.09%	\$ \$ \$ \$ \$	- \$ 188,176,571 \$ 6,782,312 \$ 5,425,849 \$	934,200,511 81,384,706 65,107,765

Total \$

880,308,249

Range Estimate (\$000's)

Fixed Dollar Risk Add: (Allows for additional risk to be added to the risk analsyis. Must include justification. Does not allocate to Real Estate. \* 50% based on base is at 5% CL.

200,384,733 \$

\$1,000,539k

50%

1,080,692,982

**80%** \$1,080,693k

23%

Base

\$880,308k

#### Houma Navigation Canal Deepening Project 1B 18-Earth

Feasibility (Alternatives)
Abbreviated Risk Analysis
Meeting Date: 2-Nov-15

			Risk Level		
Very Likely	2	3	4	5	5
Likely	1	2	3	4	5
Possible	0	1	2	3	4
Unlikely	0	0	1	2	3
	Negligible	Marginal	Moderate	Significant	Critical

Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level
Project Sc	Project Scope Growth					
PS-1	Relocations	Some utility elevations could not be determined. Relocation costs are 6 years old. Unidentified utilities or oil/gas infrastructure could be located during construction.	The need for additional relocations are a possability, which would increase the scope of the project and mpact cost/schedule.	Negligible	Unlikely	0
PS-2	Dredging	A full Dredged Material Disposal Plan has not been developed. Some depths and elevations for proposed disposal areas were assumed, without survey data. Disposal quantities could also be increased based on low maintenance activities and old survey information. It could be determined that foreshore protection and rock retention could be required in additional areas other than those recommended. This could lead to the need for additional rock retention, foreshore protection, and floatation channel dredging.	The proposed disposal locations will be revisted during the design phase, but some changes to the costs associated with the current plan is likely. Additional quantities could require changes to the proposed disposal areas and lead to increases in scope. Any changes to the rock requirements could increase the project scope, but it would have a minimal impact on overall costs.	Marginal	Possible	1
PS-3	0			Moderate	Possible	N/A
PS-4	0			Negligible	Unlikely	N/A
PS-5	0			Negligible	Unlikely	N/A
PS-6	0			Negligible	Unlikely	N/A
PS-7	0			Negligible	Unlikely	N/A
PS-8	0			Negligible	Unlikely	N/A
PS-9	0			Negligible	Unlikely	N/A
PS-10	0			Negligible	Unlikely	N/A
PS-11	0			Negligible	Unlikely	N/A
PS-12				Marginal	Possible	N/A

PS-13	Planning, Engineering, & Design			Marginal	Possible	1
PS-14	Construction Management			Marginal	Possible	1
Acquisitio	n Strategy			Maximum Proje	ct Growth	30%
AS-1	Relocations	Contract could require specialized work associated with environmental impacts of pipeline relocation and proper containment of material. The offshore nature of the work could limit the number of bids received to larger contracting companies.	A specialized pipeline relocation contractor could require a higher unit cost with a less competative bid. The overall cost ramifications of this would be minimal when compared to overall project costs.	Negligible	Unlikely	0
AS-2	Dredging	Dredging methodology for channel deepening would be widely available within south Louisiana, but offshore nature of the work could limit the number of bids.	A reduced number of bids could result in higher unit costs. However, based on the amount of ongoing dredging work within the channel over the past 20 years, it is believed the likihood of this occuring is minimal.	Marginal	Possible	1
AS-3	0			Moderate	Likely	N/A
AS-4	0			Negligible	Unlikely	N/A
AS-5	0			Negligible	Unlikely	N/A
AS-6	0			Negligible	Unlikely	N/A
AS-7	0			Negligible	Unlikely	N/A
AS-8	0			Negligible	Unlikely	N/A
AS-9	0			Negligible	Unlikely	N/A
AS-10	0			Negligible	Unlikely	N/A
AS-11	0			Negligible	Unlikely	N/A
AS-12				Negligible	Unlikely	N/A
AS-13	Planning, Engineering, & Design			Negligible	Unlikely	0
AS-14	Construction Management			Negligible	Unlikely	0
Constructi	Maximum Proje	ct Growth	15%			
CE-1	Relocations	Boat access would be required for relocations. Mobilization/Demobilization could take longer than anticipated. The potential exists for low-frequency weather events to delay work. Marine work could result in lower than anticipated productivity.	Impacts due to extended weather delays would be the most significant impact to cost and schedule, but the likelihood is low. With the amount of oil infrastructure existing in south Louisana, it is assumed a contractor familiar with the challenges of offshore pipeline relocation would be chosen. Therefore productivity issues would be minimal.	Negligible	Unlikely	0

CE-2	Dredging	Boat access would be required for survey crews and dredging equipment/crews. The potential exists for low-frequency weather events to delay work. Remote location of project could impact schedule if repairs are necessary to dredging equipment. Dredging methods would be fairly straight forward.	Dredging work is commonplace within the channel, so the risk of schedule delays or reduced productivity would center around the remote location or extreme weather events, not the dredging methods. The impact of a significant storm could be significant but liklihood is small.	Marginal	Possible	1
CE-3	0			Marginal	Possible	N/A
CE-4	0			Negligible	Unlikely	N/A
CE-5	0			Negligible	Unlikely	N/A
CE-6	0			Negligible	Unlikely	N/A
CE-7	0			Negligible	Unlikely	N/A
CE-8	0			Negligible	Unlikely	N/A
CE-9	0			Negligible	Unlikely	N/A
CE-10	0			Negligible	Unlikely	N/A
CE-11	0			Negligible	Unlikely	N/A
CE-12				Negligible	Unlikely	N/A
CE-13	Planning, Engineering, & Design			Negligible	Unlikely	0
CE-14	Construction Management			Negligible	Unlikely	0
Quantities	s for Current Scope			Maximum Proje	ct Growth	20%
Q-1	Relocations	The elevations of some pipelines are assumed or unkown. The potential exists for some unknown oil/gas infrastructure to be present. Shoaling rates utilized are based on past data, but the infrequency of maintenance dredging could result in pipelines found to be deeper than anticipated.	The potential exists for increased quantity requirements during the relocation phase of the project, but the cost impact would be small when compaed to the overall cost of the project.	Negligible	Unlikely	0
Q-2	Dredging	Disposal quantities could be underestimated based on the infrequent nature of maintenance dredging over the past 20 years. Pipeline distances may change is disposal areas are changed. Disposal area capacities are based on assumed depths without data from surveys.	Additional costs could be significant if additional dredging is required to achieve target depth. Dredging quantites required are based on dated survey information and assumed shoaling rates. Changes to the disposal plan during the design phase could increase costs.	Moderate	Possible	2
Q-3	0			Negligible	Likely	N/A
Q-4	0			Negligible	Unlikely	N/A

OS 0 0 Norgapia Unitary NA  OS 0 0 Norgapia Unitary NA  OS 0 Norgapia Unitary NA  OS 0 0 Norgapia Unitary NA  NA  Norgapia Unitary NA  NA  Norgapia Unitary NA  NA  Norgapia Unitary NA  NA  NA  Norgapia Unitary NA							
O Predigible Unitary N/A  O O O O O O O O O O O O O O O O O O O	Q-5	0			Negligible	Unlikely	N/A
0.7 0 0.9 0 0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	Q-6	0			Negligible	Unlikely	N/A
Ge 0  Qe 0  Qe 0  A Negligible Unillary N/A  Quit 0  Quit 1  Quit 1  Quit 1  Quit 2  A Negligible Unillary N/A  A Negligible Unillary N/A  A Negligible Unillary N/A  Quit 2  A Negligible Unillary N/A  Quit 2  A Negligible Unillary O  A Negligible	Q-7	0			Negligible	Unlikely	N/A
G-9 0 G-10 0 G-10 0 G-11 0 G-11 0 G-12	Q-8	0			Negligible	Unlikely	N/A
C-11 0 0 Negligible Unitkely N/A C-12 Negligible Unitkely N/A C-13 Planning, Engineering, & Design C-14 Corretruction Management Negligible Unitkely C-14 Negligible Unitkely N/A FE-3 O Negligible Unitkely N/A FE-6 O Negligible Unitkely N/A FE-7 O Negligible Unitkely N/A FE-8 O Negligible Unitkely N/A FE-9 O Negligible Unitkely N/A	Q-9	0			Negligible	Unlikely	N/A
Q-12   Negligible   Unlikely   N/A   Q-13   Planning Engineering, & Design   Negligible   Unlikely   N/A   Q-14   Construction Management   Negligible   Unlikely   Q    Specialty Fabrication or Equipment   Maximum Project Growth   Relocations   Transportation of pipe and other relocation materials/sequement could take longer as well. An increased lithicol of equipment failure could seast from velocing in material every provided in the country of the co	Q-10	0			Negligible	Unlikely	N/A
Planning, Engineering, & Design  Q-14 Construction Management  Regulation or Equipment  Relocations  Relocati	Q-11	0			Negligible	Unlikely	N/A
C-14 Construction Management  Specialty Fabrication or Equipment  Relocations  Relocations  Relocations  Relocations  Relocations  Remote focation of project could impact cost and schedule if repairs are necessary to dredging aquipment. The transport of crews and equipment and such schedule if repairs are necessary to dredging aquipment. The transport of crews and equipment and several delivery out in contrast and schedule in the coverage of the overall project cost.  FE-3  O  Remote focation of project could impact cost and schedule if repairs are necessary to dredging aquipment. The transport of crews and equipment and elevery out in longer than anticipated maintenance and equipment and elevery out in longer than anticipated maintenance and equipment and elevery out in maintenance and equipment elevery out in maintenance and equipment elevery out in maintenance and elevery out in maintenance and elevery elevery and elevery out in maintenance and elev	Q-12				Negligible	Unlikely	N/A
Specialty Fabrication or Equipment  Relocations  Remarks and Relocations  Remarks and Relocations or Equipment and the state to remote location of work. Equipment reports could take longer than anticipated due to remote location of work. Equipment reports could take longer than anticipated asked from working in a markine environment.  Remarks location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment could take longer than anticipated, resulting in reduced productivity.  FE-3  0  Remarks location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment could take longer than anticipated, resulting in reduced productivity.  FE-3  0  Register to the overall project cost.  The decreased productivity resulting from longer than anticipated to the transport of relivers would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated to the cost and schedule. However, it is believed that the impacts do to the series uses would be minimal when compared to the overall cost of the project.  The decreased productivity resulting from longer than anticipated to the cost and schedule and the impact cost and the cost and the schedule. However, it is believed that the impacts do to the series uses would be minimal when compared to the overall cost of the project.  The decreased productivity resulting from longer than anticipated.  The decreased productivity resulting from longer than anticipated with the cost and schedule. However, it is believed that the impact cost and schedule in the impact cost and schedule in the cost and schedule in the cost and schedule. However, it is believed that the impact cost and schedule in the cost and schedule in the cost and schedule in the cost a	Q-13	Planning, Engineering, & Design			Negligible	Unlikely	0
Relocations  FE-1  Relocations  Transportation of pipe and other relocation materials/equipment could take longer than anticipated us to remote location of work. Equipment repairs could take longer see will. An increased lithit code of equipment failure could easier to moverning in a marine environment.  FE-2  Dredging  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crevs and equipment delivery could increase both costs and the schedule. However, it is believed that the impacts which is the transport of the overall project cost.  The decreased productivity seating from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts when the impacts when the impacts when the impacts when the project.  FE-3  0  Regligible  Unlikely  N/A  FE-4  0  Regligible  Unlikely  N/A  FE-6  0  Regligible  Unlikely  N/A  FE-7  0  Regligible  Unlikely  N/A	Q-14	Construction Management			Negligible	Unlikely	0
Relocations bonder than anticipated due to remote location of work. Equipment feature could exist from working in a marine environment.  FE-1  Dredging Remote location of project could impact cost and schedule feature could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment could take longer than anticipated, resulting in reduced productivity.  FE-3  0  Reflect and the schedule delays during construction. However, it is believed that the impacts due to these issues would be minimal when compared to the overall cost of the project.  Negligible Unlikely N/A  FE-6  0  Regligible Unlikely N/A  FE-7  0  Regligible Unlikely N/A	Specialty 1	Fabrication or Equipment			Maximum Proje	ct Growth	50%
Remote location of project could impact cost and schedule if repairs are necessary to detailing equipment. The paragraph of crews and equipment could take longer than anticipated, resulting in reduced productivity.  FE-3 0		Relocations	longer than anticipated due to remote location of work. Equipment repairs	resulting in increased unit costs and schedule delays during	Negligible	Unlikely	0
FE-4 0 Negligible Unlikely N/A  FE-5 0 Negligible Unlikely N/A  FE-6 0 Negligible Unlikely N/A  FE-7 0 Negligible Unlikely N/A  FE-8 0 Negligible Unlikely N/A	FE-1				rvogrigibio		
FE-5         0         Negligible         Unlikely         N/A           FE-6         0         Negligible         Unlikely         N/A           FE-7         0         Negligible         Unlikely         N/A           Negligible         Unlikely         N/A           Negligible         Unlikely         N/A           Negligible         Unlikely         N/A		Dredging	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the			
FE-6 0 Negligible Unlikely N/A  FE-7 0 Negligible Unlikely N/A  FE-8 0 Negligible Unlikely N/A  Negligible Unlikely N/A  Negligible Unlikely N/A	FE-2		exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal	Possible	1
FE-7 0 Negligible Unlikely N/A FE-8 0 Negligible Unlikely N/A Negligible Unlikely N/A	FE-2	0	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal Negligible	Possible Unlikely	1 N/A
FE-7 0 Negligible Unlikely N/A  Negligible Unlikely N/A  Negligible Unlikely N/A	FE-2 FE-3 FE-4	0	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible	Possible Unlikely Unlikely	1 N/A N/A
FE-8 0 Negliqible Unlikely N/A	FE-2 FE-3 FE-4 FE-5	0 0	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible	Possible Unlikely Unlikely Unlikely	1 N/A N/A N/A
FE-9 0 Negligible Unlikely N/A	FE-2 FE-3 FE-4 FE-5 FE-6	0 0 0	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible  Negligible	Possible  Unlikely  Unlikely  Unlikely  Unlikely	N/A N/A N/A N/A
	FE-2 FE-3 FE-4 FE-5 FE-6 FE-7	0 0 0	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible  Negligible  Negligible	Possible  Unlikely  Unlikely  Unlikely  Unlikely  Unlikely	1  N/A  N/A  N/A  N/A  N/A

FE-10	0			Negligible	Unlikely	N/A
FE-11	0			Negligible	Unlikely	N/A
FE-12				Negligible	Unlikely	N/A
FE-13	Planning, Engineering, & Design			Negligible	Unlikely	0
FE-14	Construction Management			Negligible	Unlikely	0
Cost Estim	ate Assumptions			Maximum Proje	ct Growth	25%
CT-1	Relocations	The unit prices for pipeline relocations are based on the 2009 estimate conducted by the Corps. Cost will be escilated to 2015 levels based on the Corps escalation indices. The elevation of some pipelines are unkown and need to be assumed for this phase of the project.	The potential exists for the unit costs of relaocations to be increased subsequent to the plannig phase of the project. This would result in marginally increased cost for the overall project.	Negligible	Unlikely	0
CT-2	Dredging	Shoaling rates are based on past data and the disposal plan used for development of dredging unit costs is based on assumptions associated with the existing disposal areas. Dredging quantities are also based on an assumed starting depth of the channel and could could be increased once a survey is conducted. Productivity rates were developed via CEDEP which is based on disposal plan assumptions as well.	about the existing depths of the channel. This would result in moderate increases to the project costs. It is also possible that	Moderate	Possible	2
CT-3	0			Moderate	Possible	N/A
CT-4	0			Negligible	Unlikely	N/A
CT-5	0			Negligible	Unlikely	N/A
CT-6	0			Negligible	Unlikely	N/A
CT-7	0			Negligible	Unlikely	N/A
CT-8	0			Negligible	Unlikely	N/A
CT-9	0			Negligible	Unlikely	N/A
CT-10	0			Negligible	Unlikely	N/A
CT-11	0			Negligible	Unlikely	N/A
CT-12				Negligible	Unlikely	N/A
CT-13	Planning, Engineering, & Design			Negligible	Unlikely	0

CT-14	Construction Management			Negligible	Unlikely	0
External P	roject Risks			Maximum Proje	ct Growth	20%
EX-1	Relocations	Fuel prices used for the estimate are near a two-year low, so the potential for increased fuel costs exiits. This would increase the cost of equipment operation and material/crew transport.	Increases in fuel prices are likely to impact costs. These impacts would be moderate due to the heavy reliance on fuel to operate equipment and transport material. Overall the impacts to cost would be moderate.	Negligible	Unlikely	0
EX-2	Dredging	Extreme weather events are a possibility in Coastal Louisiana, with the potential to delay the project significantly or damage construction equipment. Shoaling rates would also increase during such an event, potentially impacting dredging quantities. Fuel prices used for the estimate are near a two-year low, so the potential for increased fuel costs exitis.	Increases in fuel prices are likely and the cost impact would be moderate. Storm impacts could be significant, but the liklihood is small. The cost and schedule impacts would be marginal. Overall the impacts to cost would be moderate.	Moderate	Possible	2
EX-3	0			Marginal	Possible	N/A
EX-4	0			Negligible	Unlikely	N/A
EX-5	0			Negligible	Unlikely	N/A
EX-6	0			Negligible	Unlikely	N/A
EX-7	0			Negligible	Unlikely	N/A
EX-8	0			Negligible	Unlikely	N/A
EX-9	0			Negligible	Unlikely	N/A
EX-10	0			Negligible	Unlikely	N/A
EX-11	0			Negligible	Unlikely	N/A
EX-12				Negligible	Unlikely	N/A
EX-13	Planning, Engineering, & Design			Negligible	Unlikely	0
EX-14	Construction Management			Negligible	Unlikely	0

# Houma Navigation Canal Deepening Project 1B 18-Earth Feasibility (Alternatives)

Abbreviated Risk Analysis

<u>WBS</u>	Potential Risk Areas	Project Scope Growth	Acquisition Strategy	Construction Elements	Quantities for Current Scope	Specialty Fabrication or Equipment	Cost Estimate Assumptions	External Project Risks	Cost in Thousands
01 LANDS AND DAMAGES	Real Estate								\$0
02 RELOCATIONS	Relocations	0	0	0	0	0	0	0	\$0
12 NAVIGATION, PORTS AND HARBORS	Dredging	1	1	1	2	1	2	2	\$746,024
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
All Other	Remaining Construction Items	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	1	0	0	0	0	0	0	\$74,602
31 CONSTRUCTION MANAGEMENT	Construction Management	1	0	0	0	0	0	0	\$59,682
		l .							\$880,308
Risk		\$ 18,410	\$ 14,729	\$ 74,444	\$ 24,727	\$ 16,313	\$ 27,035	\$ 24,727	\$200,385
ixed Dollar Risk Allocation		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$0
	Risk	\$ 18,410	\$ 14,729	\$ 74,444	\$ 24,727	\$ 16,313	\$ 27,035	\$ 24,727	\$200,385
								Total	\$1,080,693

Project (less than \$40M): Houma Navigation Canal Deepening Project

Project Development Stage/Alternative: Feasibility (Alternatives)

Risk Category: Low Risk: Typical Construction, Simple

Alternative: 1C 18-Rock

Meeting Date: 11/2/2015

Total Estimated Construction Contract Cost = \$ 141,456,800

	<u>CWWBS</u>	Feature of Work Contract Cost		% Contingency	% Contingency \$ Contingency			
	01 LANDS AND DAMAGES	Real Estate	\$	-	0.00%	\$	- \$	-
_1_	02 RELOCATIONS	Relocations	\$	14,201,300	23.25%	\$	3,301,121 \$	17,502,421
2	12 NAVIGATION, PORTS AND HARBORS	Dredging	\$	127,255,500	32.02%	\$	40,742,447 \$	167,997,947
3			\$	-	0.00%	\$	- \$	
4			\$	-	0.00%	\$	- \$	
_ 5			\$		0.00%	\$	- \$	
6			\$		0.00%	\$	- \$	
_ 7					0.00%	\$	- \$	
8			\$		0.00%	\$	- \$	
9			\$		0.00%	\$	- \$	
10			\$		0.00%	\$	- \$	
_11			\$		0.00%	\$	- \$	
12	All Other	Remaining Construction Items	\$		0.0% 0.00%	\$	- \$	
13	30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	\$	14,145,680	16.15%	\$	2,283,976 \$	16,429,656
14	31 CONSTRUCTION MANAGEMENT	Construction Management	\$	11,316,544	16.15%	\$	1,827,181 \$	13,143,725
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MU	JST INCLUDE JUSTIFICATION SEE BELOW)				\$	_	
		Totals						
			Real Estate \$	-	0.00%	\$	- \$	-

			Bas	se	50%	80%
Tota	al \$	166,919,024	29%	\$	48,154,724	\$ 215,073,748
Total Construction Managemer	nt \$	11,316,544	16.15%	\$	1,827,181	\$ 13,143,725
Total Planning, Engineering & Desig		14,145,680	16.15%	\$	2,283,976	\$ 16,429,656
Total Construction Estimat	e \$	141,456,800	31.14%	\$	44,043,568	\$ 185,500,368
Real Estat	e \$	-	0.00%	\$	-	\$ -
Totals						

	Duoc	0070	0070
Range Estimate (\$000's)	\$166,919k	\$195,812k	\$215,074k

Fixed Dollar Risk Add: (Allows for additional risk to be added to the risk analsyis. Must include justification. Does not allocate to Real Estate. \* 50% based on base is at 5% CL.

### Houma Navigation Canal Deepening Project 1C 18-Rock

Feasibility (Alternatives)
Abbreviated Risk Analysis
Meeting Date: 2-Nov-15

			Risk Level		
Very Likely	2	3	4	5	5
Likely	1	2	3	4	5
Possible	0	1	2	3	4
Unlikely	0	0	1	2	3
	Negligible	Marginal	Moderate	Significant	Critical

Risk Element	Feature of Work		PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level
Project Sc	ope Growth			Maximum Proje	ct Growth	40%
PS-1	Relocations	Some utility elevations could not be determined. Relocation costs are 6 years old. Unidentified utilities or oil/gas infrastructure could be located during construction.	The need for additional relocations are a possability, which would increase the scope of the project and mpact cost/schedule.	Marginal	Possible	1
PS-2	Dredging	A full Dredged Material Disposal Plan has not been developed. Some depths and elevations for proposed disposal areas were assumed, without survey data. Disposal quantities could also be increased based on low maintenance activities and old survey information. It could be determined that foreshore protection and rock retention could be required in additional areas other than those recommended. This could lead to the need for additional rock retention, foreshore protection, and floatation channel dredging.	The proposed disposal locations will be revisted during the design phase, but some changes to the costs associated with the current plan is likely. Additional quantites could require changes to the proposed disposal areas and lead to increases in scope. Any changes to the rock requirements could increase the project scope, but it would have a minimal impact on overall costs.	Moderate	Possible	2
PS-3	0			Moderate	Possible	N/A
PS-4	0			Negligible	Unlikely	N/A
PS-5	0			Negligible	Unlikely	N/A
PS-6	0			Negligible	Unlikely	N/A
PS-7	0			Negligible	Unlikely	N/A
PS-8	0			Negligible	Unlikely	N/A
PS-9	0			Negligible	Unlikely	N/A
PS-10	0			Negligible	Unlikely	N/A
PS-11	0			Negligible	Unlikely	N/A
PS-12				Marginal	Possible	N/A

PS-13	Planning, Engineering, & Design			Moderate	Likely	3
PS-14	Construction Management			Significant	Possible	3
<u>Acquisitio</u>	n Strategy			Maximum Proje	ct Growth	30%
AS-1	Relocations	Contract could require specialized work associated with environmental impacts of pipeline relocation and proper containment of material. The offshore nature of the work could limit the number of bids received to larger contracting companies.	A specialized pipeline relocation contractor could require a higher unit cost with a less competative bid. The overall cost ramifications of this would be minimal when compared to overall project costs.	Marginal	Possible	1
AS-2	Dredging	Dredging methodology for channel deepening would be widely available within south Louisiana, but offshore nature of the work could limit the number of bids.	A reduced number of bids could result in higher unit costs. However, based on the amount of ongoing dredging work within the channel over the past 20 years, it is believed the likihood of this occuring is minimal.	Marginal	Possible	1
AS-3	0			Moderate	Likely	N/A
AS-4	0			Negligible	Unlikely	N/A
AS-5	0			Negligible	Unlikely	N/A
AS-6	0			Negligible	Unlikely	N/A
AS-7	0			Negligible	Unlikely	N/A
AS-8	0			Negligible	Unlikely	N/A
AS-9	0			Negligible	Unlikely	N/A
AS-10	0			Negligible	Unlikely	N/A
AS-11	0			Negligible	Unlikely	N/A
AS-12				Negligible	Unlikely	N/A
AS-13	Planning, Engineering, & Design			Negligible	Unlikely	0
AS-14	Construction Management			Negligible	Unlikely	0
Construct	on Elements		Maximum Project Growth		15%	
CE-1	Relocations	Boat access would be required for relocations. Mobilization/Demobilization could take longer than anticipated. The potential exists for low-frequency weather events to delay work. Marine work could result in lower than anticipated productivity.	Impacts due to extended weather delays would be the most significant impact to cost and schedule, but the likelihood is low. With the amount of oil infrastructure existing in south Louisana, it is assumed a contractor familiar with the challenges of offshore pipeline relocation would be chosen. Therefore productivity issues would be minimal.	Moderate	Possible	2

CE-2	Dredging	Boat access would be required for survey crews and dredging equipment/crews. The potential exists for low-frequency weather events to delay work. Remote location of project could impact schedule if repairs are necessary to dredging equipment. Dredging methods would be fairly straight forward.	Dredging work is commonplace within the channel, so the risk of schedule delays or reduced productivity would center around the remote location or extreme weather events, not the dredging methods. The impact of a significant storm could be significant but liklihood is small.	Moderate	Possible	2
CE-3	0			Marginal	Possible	N/A
CE-4	0			Negligible	Unlikely	N/A
CE-5	0			Negligible	Unlikely	N/A
CE-6	0			Negligible	Unlikely	N/A
CE-7	0			Negligible	Unlikely	N/A
CE-8	0			Negligible	Unlikely	N/A
CE-9	0			Negligible	Unlikely	N/A
CE-10	0			Negligible	Unlikely	N/A
CE-11	0			Negligible	Unlikely	N/A
CE-12				Negligible	Unlikely	N/A
CE-13	Planning, Engineering, & Design			Negligible	Unlikely	0
CE-14	Construction Management			Negligible	Unlikely	0
Quantities	for Current Scope			Maximum Proje	ct Growth	20%
Q-1	Relocations	The elevations of some pipelines are assumed or unkown. The potential exists for some unknown oil/gas infrastructure to be present. Shoaling rates utilized are based on past data, but the infrequency of maintenance dredging could result in pipelines found to be deeper than anticipated.	The potential exists for increased quantity requirements during the relocation phase of the project, but the cost impact would be small when compaed to the overall cost of the project.	Marginal	Possible	1
Q-2	Dredging	Disposal quantities could be underestimated based on the infrequent nature of maintenance dredging over the past 20 years. Pipeline distances may change is disposal areas are changed. Disposal area capacities are based on assumed depths without data from surveys.	Additional costs could be significant if additional dredging is required to achieve target depth. Dredging quantites required are based on dated survey information and assumed shoaling rates. Changes to the disposal plan during the design phase could increase costs.	Moderate	Possible	2
Q-3	0			Negligible	Likely	N/A
Q-4	0			Negligible	Unlikely	N/A

Negligible   United   NVA							
0.7 0 0 Nedgible Urbitaly N/A 0.8 0 Nedgible Urbitaly N/A 0.9 0 Nedgible Urbitaly N/A 0.10 0 Nedgible Urbitaly N/A 0.11 0 Nedgible Urbitaly N/A 0.12 Nedgible Urbitaly N/A 0.13 Planning Engreening & Design 0.14 Construction Management 0.15 Planning Engreening & Design 0.14 Construction Management 0.15 Planning Engreening & Design 0.16 Nedgible Urbitaly N/A 0.17 Nedgible Urbitaly N/A 0.18 Nedgible Urbitaly N/A 0.19 Nedgible Urbitaly N/A	Q-5	0			Negligible	Unlikely	N/A
0.7 0 0.8 0 0.8 Negligible 0.9 Negligible 0.10 Negligible 0.10 Negligible 0.10 Negligible 0.10 Negligible 0.10 Negligible 0.11 Negligible 0.12 Negligible 0.13 Negligible 0.14 Contendation Manugement 0.14 Contendation Manugement 0.15 Negligible 0.16 Negligible 0.17 Negligible 0.18 Negligible 0.18 Negligible 0.18 Negligible 0.19 Negligible 0.18 Negli	Q-6	0			Negligible	Unlikely	N/A
Ce United Constitution of Equipment    Part   Constitution Management   Constitution Management	Q-7	0			Negligible	Unlikely	N/A
O-19 0 0 Negligible Unitkey N/A  O-10 0 Negligible Unitkey N/A  O-12 Negligible Unitkey N/A  O-13 Parming, Engineering, & Design  O-14 Construction Management Negligible Unitkey O  Specialty Fabrication or Equipment  Relocations  FE-1 Diredging  Remote Equipment  Remote Equipment International United State Proper is well an international parameter excellent in pasts could take longer is well. An increased life ord of opporent failure could state from excellent in an international parameter excellent in an international parameter excellent in a manufacture international international parameter excellent international international parameter excellent international international parameter excellent international internatio	Q-8	0			Negligible	Unlikely	N/A
C-11 0 C-12   Negligible   Unikely   N/A C-12   Negligible   Unikely   N/A C-13   Planning, Engineering, & Design C-14   Construction Management   Negligible   Unikely   O C-14   Construction Management   Negligible   Unikely   O Specialty Fabrication or Equipment    Selectations   Transportation of pipe and other relocation materials/legipment could take bright and articipated due to remote becation of work. Equipment remote of failure would likely be more expensive, inspirely of an articipated due to remote becation of work. Equipment remote of failure would likely be more expensive, inspirely of an articipated due to remote out of equipment failure could calculate the piper as well. An increased unit could design an articipated and in the more of piper and other piper and articipated and in the more of piper and other piper and articipated and in the more of piper and other piper and other piper and articipated and in the more of piper and of the committee of the count bright piper an articipated and in the more of piper and other piper and articipated and in the more of piper and other piper and articipated and in the more of piper and articipated and in the country of	Q-9	0			Negligible	Unlikely	N/A
Q-12   Negligible   Unlikely   N/A   Q-13   Planning, Engineering, & Design   Negligible   Unlikely   N/A   Q-14   Construction Management   Negligible   Unlikely   Q    Specialty Fabrication or Equipment   Maximum Project Growth   Relocations   Transportation of pape and other relocation materials/equipment coult take longer as well. An increased life load of equipment failure could seast from vorking an anamier environment.   FE-1   Design   Planning is provided in the control of the control project could seast from vorking an anamier environment.   FE-2   Design   Planning is provided in the control of pape and other relocation of work Equipment ransport of failure would likely be more expension, resulting in increased unit costs and schedule sizes during contraction. However, these costs would represent a small potential project cost.   FE-2   Design   Planning is beauting in reduced productivity.   FE-3   Design   Planning is beauting in reduced productivity.   FE-4   Design   Planning is beauting in reduced productivity.   FE-5   Design   Planning is beauting in reduced productivity.   FE-6   Design   Planning is beauting in reduced productivity.   FE-6   Design   Planning is beauting in reduced productivity.   FE-7   Design   Planning is beauting in reduced productivity.   FE-8   Design   Planning is beauting in reduced productivity.   FE-9   Planning is beauting in reduced p	Q-10	0			Negligible	Unlikely	N/A
Planning, Engineering, & Design  Q-14 Construction Management  Regiculator Fabrication or Equipment  Relocations  Relocati	Q-11	0			Negligible	Unlikely	N/A
Q-14 Construction Management  Specialty Fabrication or Equipment  Relocations  Remote location of project could impact cost and schedule if repairs are necessary to dredging aquipment. The transport of crew and equipment and elevery outling in not case and schedule delayed using outlet from working in a marrine environment.  FE-2  Dredging  Remote location of project could impact cost and schedule if repairs are necessary to dredging aquipment. The transport of crew and equipment and elevery outlet increase both costs and the schedule. However, it is believed that the impacts due to this same would be immined when compared to the overall project cost.  FE-3  0  Regigible  In decreased productivity resulting from longer than anticipated maintenance and equipment and elevery outle increase both costs and the schedule. However, it is believed that the impacts also size would be a minned when compared to the overall cost of the project.  Regigible  Unlikely  N/A  FE-5  0  Regigible  Unlikely  N/A  FE-6  0  Regigible  Unlikely  N/A  Negligible  Unlikely  N/A  Negligible  Unlikely  N/A  Negligible  Unlikely  N/A  Negligible  Unlikely  N/A	Q-12				Negligible	Unlikely	N/A
Specialty Fabrication or Equipment  Relocations Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment could take longer than anticipated, resulting in reduced productivity.  FE-3  O  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment could take longer than anticipated, resulting in reduced productivity.  FE-3  O  Repossible Reference Service Repossible Repossib	Q-13	Planning, Engineering, & Design			Negligible	Unlikely	0
Relocations  FE-1  Fe-2  Dredging  Remote location of pipe and other relocation materials/equipment could take longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased illihood of equipment failure could exist from working in a mainte environment.  FE-2  Dredging  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment and equipment part delivery could increase both costs and the schedule. However, it is believed that the impacts which is the transport of the overall project cost.  The decreased productivity suiting from longer than anticipated maintenance and equipmentpart delivery could increase both costs and the schedule. However, it is believed that the impacts when the impacts when the impacts when the impacts when the project could take longer than anticipated, resulting in reduced productivity.  FE-3  0  Regligible  Unlikely  N/A  FE-6  0  Regligible  Unlikely  N/A  FE-7  0  Regligible  Unlikely  N/A  Regligible  Unlikely  N/A  Regligible  Unlikely  N/A  Negligible  Unlikely  N/A	Q-14	Construction Management			Negligible	Unlikely	0
Relocations bonger than anticipated due to remote location of work. Equipment repairs could take longer as well, an increased althood of equipment failure could exist from working in a marine environment.  FE-2 Dredging Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment could take longer than anticipated, resulting in reduced productivity.  FE-3 0	Specialty 1	Fabrication or Equipment			Maximum Proje	ct Growth	50%
Remote location of project could impact cost and schedule if repairs are necessary to deciding equipment. The project could take longer than anticipated, resulting in reduced productivity.  FE-3 0 Negligible Unlikely N/A  FE-6 0 Negligible Unlikely N/A  FE-7 0 Negligible Unlikely N/A  FE-8 0 Negligible Unlikely N/A  FE-8 0 Negligible Unlikely N/A		Relocations	longer than anticipated due to remote location of work. Equipment repairs	resulting in increased unit costs and schedule delays during	Marginal	Possible	1
FE-4 0 Negligible Unlikely N/A  FE-5 0 Negligible Unlikely N/A  FE-6 0 Negligible Unlikely N/A  FE-7 0 Negligible Unlikely N/A  FE-8 0 Negligible Unlikely N/A  Negligible Unlikely N/A  Negligible Unlikely N/A  Negligible Unlikely N/A	FE-1				Warginai	1 0001510	•
FE-5         0         Negligible         Unlikely         N/A           FE-6         0         Negligible         Unlikely         N/A		Dredging	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the			
FE-6 0 Negligible Unlikely N/A  FE-7 0 Negligible Unlikely N/A  FE-8 0 Negligible Unlikely N/A  Negligible Unlikely N/A  Negligible Unlikely N/A	FE-2		exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal	Possible	1
FE-7 0 Negligible Unlikely N/A FE-8 0 Negligible Unlikely N/A Negligible Unlikely N/A	FE-2	0	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal Negligible	Possible Unlikely	1 N/A
FE-7 0 Negligible Unlikely N/A  Negligible Unlikely N/A  Negligible Unlikely N/A	FE-2 FE-3 FE-4	0	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible	Possible Unlikely Unlikely	1 N/A N/A
FE-8 V Negliqible Unlikely N/A	FE-2 FE-3 FE-4 FE-5	0 0	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible	Possible Unlikely Unlikely Unlikely	1 N/A N/A N/A
FE-9 0 Negligible Unlikely N/A	FE-2 FE-3 FE-4 FE-5 FE-6	0 0 0 0	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible  Negligible	Possible  Unlikely  Unlikely  Unlikely  Unlikely	N/A N/A N/A N/A
	FE-2 FE-3 FE-4 FE-5 FE-6 FE-7	0 0 0 0	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible  Negligible  Negligible	Possible  Unlikely  Unlikely  Unlikely  Unlikely  Unlikely	N/A N/A N/A N/A N/A

FE-10	0			Negligible	Unlikely	N/A
FE-11	0			Negligible	Unlikely	N/A
FE-12				Negligible	Unlikely	N/A
FE-13	Planning, Engineering, & Design			Negligible	Unlikely	0
FE-14	Construction Management			Negligible	Unlikely	0
Cost Estim	nate Assumptions			Maximum Proje	ct Growth	25%
CT-1	Relocations	The unit prices for pipeline relocations are based on the 2009 estimate conducted by the Corps. Cost will be escilated to 2015 levels based on the Corps escalation indices. The elevation of some pipelines are unkown and need to be assumed for this phase of the project.	The potential exists for the unit costs of relaocations to be increased subsequent to the plannig phase of the project. This would result in marginally increased cost for the overall project.	Marginal	Possible	1
CT-2	Dredging	Shoaling rates are based on past data and the disposal plan used for development of dredging unit costs is based on assumptions associated with the existing disposal areas. Dredging quantities are also based on an assumed starting depth of the channel and could could be increased once a survey is conducted. Productivity rates were developed via CEDEP which is based on disposal plan assumptions as well.	It is possible that dredging quantities would increase during the design phase of the project, once more information in know about the existing depths of the channel. This would result in moderate increases to the project costs. It is also possible that the dredged material disposal plan would be modified based on new data, potentially increasing costs.	Moderate	Likely	3
CT-3	0			Moderate	Possible	N/A
CT-4	0			Negligible	Unlikely	N/A
CT-5	0			Negligible	Unlikely	N/A
CT-6	0			Negligible	Unlikely	N/A
CT-7	0			Negligible	Unlikely	N/A
CT-8	0			Negligible	Unlikely	N/A
CT-9	0			Negligible	Unlikely	N/A
CT-10	0			Negligible	Unlikely	N/A
CT-11	0			Negligible	Unlikely	N/A
CT-12				Negligible	Unlikely	N/A
CT-13	Planning, Engineering, & Design			Negligible	Unlikely	0

CT-14	Construction Management			Negligible	Unlikely	0
External P	Project Risks			Maximum Proje	ct Growth	20%
EX-1	Relocations	Fuel prices used for the estimate are near a two-year low, so the potential for increased fuel costs exiits. This would increase the cost of equipment operation and material/crew transport.	Increases in fuel prices are likely to impact costs. These impacts would be moderate due to the heavy reliance on fuel to operate equipment and transport material. Overall the impacts to cost would be moderate.	Moderate	Possible	2
EX-2	Dredging	Extreme weather events are a possibility in Coastal Louisiana, with the potential to delay the project significantly or damage construction equipment. Shoaling rates would also increase during such an event, potentially impacting dredging quantities. Fuel prices used for the estimate are near a two-year low, so the potential for increased fuel costs exiits.	Increases in fuel prices are likely and the cost impact would be moderate. Storm impacts could be significant, but the liklihood is small. The cost and schedule impacts would be marginal. Overall the impacts to cost would be moderate.	Moderate	Possible	2
EX-3	0			Marginal	Possible	N/A
EX-4	0			Negligible	Unlikely	N/A
EX-5	0			Negligible	Unlikely	N/A
EX-6	0			Negligible	Unlikely	N/A
EX-7	0			Negligible	Unlikely	N/A
EX-8	0			Negligible	Unlikely	N/A
EX-9	0			Negligible	Unlikely	N/A
EX-10	0			Negligible	Unlikely	N/A
EX-11	0			Negligible	Unlikely	N/A
EX-12				Negligible	Unlikely	N/A
EX-13	Planning, Engineering, & Design			Negligible	Unlikely	0
EX-14	Construction Management			Negligible	Unlikely	0

# Houma Navigation Canal Deepening Project 1C 18-Rock Feasibility (Alternatives)

Abbreviated Risk Analysis

<u>WBS</u>	Potential Risk Areas	Project Scope Growth	Acquisition Strategy	Construction Elements	Quantities for Current Scope	Specialty Fabrication or Equipment	Cost Estimate Assumptions	External Project Risks	Cost in Thousands
01 LANDS AND DAMAGES	Real Estate								\$0
02 RELOCATIONS	Relocations	1	1	2	1	1	1	2	\$14,201
12 NAVIGATION, PORTS AND HARBORS	Dredging	2	1	2	2	1	3	2	\$127,256
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
All Other	Remaining Construction Items	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	3	0	0	0	0	0	0	\$14,146
31 CONSTRUCTION MANAGEMENT	Construction Management	3	0	0	0	0	0	0	\$11,317
		l .							\$166,919
Risk		\$ 8,191	\$ 2,793	\$ 15,863	\$ 4,476	\$ 3,093	\$ 9,049	\$ 4,689	\$48,155
ixed Dollar Risk Allocation		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$0
	Risk	\$ 8,191	\$ 2,793	\$ 15,863	\$ 4,476	\$ 3,093	\$ 9,049	\$ 4,689	\$48,155
								Total	\$215,074

Project (less than \$40M): Houma Navigation Canal Deepening Project

Project Development Stage/Alternative: Feasibility (Alternatives)

Risk Category: Low Risk: Typical Construction, Simple

Alternative: 1C 18-Rock

Meeting Date: 11/2/2015

Total Estimated Construction Contract Cost = \$ 843,880,480

	<u>CWWBS</u>	Feature of Work	Co	ntract Cost	<u>%</u>	Contingency	\$ (	Contingency	<u>Total</u>
	01 LANDS AND DAMAGES	Real Estate	\$	-		0.00%	\$	- \$	-
1	02 RELOCATIONS	Relocations				0.00%	\$	- \$	-
2	12 NAVIGATION, PORTS AND HARBORS	Dredging	\$	843,880,480		25.22%	\$	212,859,839 \$	1,056,740,319
3			\$	-		0.00%	\$	- \$	-
4			\$	-		0.00%	\$	- \$	-
5			\$	_		0.00%	\$	- \$	
6			\$	_		0.00%	\$	- \$	
7						0.00%	\$	- \$	
8			\$	_		0.00%	\$	- \$	
9			\$	_		0.00%	\$	- \$	
10			\$			0.00%	\$	- \$	
11			\$	_		0.00%	\$	- \$	
12	All Other	Remaining Construction Items	\$	-	0.0%	0.00%	\$	- \$	-
13	30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	\$	84,388,048		7.00%	\$	5,907,163 \$	90,295,211
14	31 CONSTRUCTION MANAGEMENT	Construction Management	\$	67,510,438		7.00%	\$	4,725,731 \$	72,236,169
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MU	JST INCLUDE JUSTIFICATION SEE BELOW)					\$		
		Totals Real Estate	\$			0.00%	\$	- \$	
		Total Construction Estimate	\$	843,880,480		25.22%	\$	212,859,839 \$	1,056,740,319

	_				0.1.100.0==1		01.010.000
		_	Bas	ie .	50%		80%
Total	\$	995,778,966	22%	\$	223,492,733	\$	1,219,271,699
Total Construction Management	\$	67,510,438	7.00%	\$	4,725,731	<b>Þ</b>	72,236,169
Total Construction Management	r.	C7 F40 400	7 000/	•	4 705 704	d.	70 000 400
Total Planning, Engineering & Design	\$	84,388,048	7.00%	\$	5,907,163	\$	90,295,211
Total Construction Estimate	\$	843,880,480	25.22%	\$	212,859,839	\$	1,056,740,319
Real Estate	*	-	0.00%	\$	-	\$	-
Totals							

Range Estimate (\$000's) \$995,779k \$1,129,875k \$1,219,272k

Fixed Dollar Risk Add: (Allows for additional risk to be added to the risk analsyis. Must include justification. Does not allocate to Real Estate. \* 50% based on base is at 5% CL.

### Houma Navigation Canal Deepening Project 1C 18-Rock

Feasibility (Alternatives)
Abbreviated Risk Analysis
Meeting Date: 2-Nov-15

			Risk Level			
Very Likely	2	3	4	5	5	
Likely	1	2	3	4	5	
Possible	0	1	2	3	4	
Unlikely	0	0	1	2	3	
	Negligible	Marginal	Moderate	Significant	Critical	

Risk Element	Feature of Work		PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level
Project Sco	ope Growth			Maximum Proje	ct Growth	40%
PS-1	Relocations	Some utility elevations could not be determined. Relocation costs are 6 years old. Unidentified utilities or oil/gas infrastructure could be located during construction.	The need for additional relocations are a possability, which would increase the scope of the project and mpact cost/schedule.	Marginal	Unlikely	0
PS-2	Dredging	A full Dredged Material Disposal Plan has not been developed. Some depths and elevations for proposed disposal areas were assumed, without survey data. Disposal quantities could also be increased based on low maintenance activities and old survey information. It could be determined that foreshore protection and rock retention could be required in additional areas other than those recommended. This could lead to the need for additional rock retention, foreshore protection, and floatation channel dredging.	The proposed disposal locations will be revisted during the design phase, but some changes to the costs associated with the current plan is likely. Additional quantites could require changes to the proposed disposal areas and lead to increases in scope. Any changes to the rock requirements could increase the project scope, but it would have a minimal impact on overall costs.	Marginal	Possible	1
PS-3	0			Moderate	Possible	N/A
PS-4	0			Negligible	Unlikely	N/A
PS-5	0			Negligible	Unlikely	N/A
PS-6	0			Negligible	Unlikely	N/A
PS-7	0			Negligible	Unlikely	N/A
PS-8	0			Negligible	Unlikely	N/A
PS-9	0			Negligible	Unlikely	N/A
PS-10	0			Negligible	Unlikely	N/A
PS-11	0			Negligible	Unlikely	N/A
PS-12				Marginal	Possible	N/A

PS-13	Planning, Engineering, & Design			Marginal	Unlikely	0
PS-14	Construction Management			Marginal	Unlikely	0
Acquisitio	n Strategy			Maximum Proje	ct Growth	30%
AS-1	Relocations	Contract could require specialized work associated with environmental impacts of pipeline relocation and proper containment of material. The offshore nature of the work could limit the number of bids received to larger contracting companies.	A specialized pipeline relocation contractor could require a higher unit cost with a less competative bid. The overall cost ramifications of this would be minimal when compared to overall project costs.	Marginal	Unlikely	0
AS-2	Dredging	Dredging methodology for channel deepening would be widely available within south Louisiana, but offshore nature of the work could limit the number of bids.	A reduced number of bids could result in higher unit costs. However, based on the amount of ongoing dredging work within the channel over the past 20 years, it is believed the likihood of this occuring is minimal.	Marginal	Possible	1
AS-3	0			Moderate	Likely	N/A
AS-4	0			Negligible	Unlikely	N/A
AS-5	0			Negligible	Unlikely	N/A
AS-6	0			Negligible	Unlikely	N/A
AS-7	0			Negligible	Unlikely	N/A
AS-8	0			Negligible	Unlikely	N/A
AS-9	0			Negligible	Unlikely	N/A
AS-10	0			Negligible	Unlikely	N/A
AS-11	0			Negligible	Unlikely	N/A
AS-12				Negligible	Unlikely	N/A
AS-13	Planning, Engineering, & Design			Negligible	Unlikely	0
AS-14	Construction Management			Negligible	Unlikely	0
Constructi	on Elements	Maximum Project Growth		15%		
CE-1	Relocations	Boat access would be required for relocations. Mobilization/Demobilization could take longer than anticipated. The potential exists for low-frequency weather events to delay work. Marine work could result in lower than anticipated productivity.	Impacts due to extended weather delays would be the most significant impact to cost and schedule, but the likelihood is low. With the amount of oil infrastructure existing in south Louisana, it is assumed a contractor familiar with the challenges of offshore pipeline relocation would be chosen. Therefore productivity issues would be minimal.	Marginal	Unlikely	0

CE-2	Dredging	Boat access would be required for survey crews and dredging equipment/crews. The potential exists for low-frequency weather events to delay work. Remote location of project could impact schedule if repairs are necessary to dredging equipment. Dredging methods would be fairly straight forward.	Dredging work is commonplace within the channel, so the risk of schedule delays or reduced productivity would center around the remote location or extreme weather events, not the dredging methods. The impact of a significant storm could be significant but liklihood is small.	Marginal	Possible	1
CE-3	0			Marginal	Possible	N/A
CE-4	0			Negligible	Unlikely	N/A
CE-5	0			Negligible	Unlikely	N/A
CE-6	0			Negligible	Unlikely	N/A
CE-7	0			Negligible	Unlikely	N/A
CE-8	0			Negligible	Unlikely	N/A
CE-9	0			Negligible	Unlikely	N/A
CE-10	0			Negligible	Unlikely	N/A
CE-11	0			Negligible	Unlikely	N/A
CE-12				Negligible	Unlikely	N/A
CE-13	Planning, Engineering, & Design			Negligible	Unlikely	0
CE-14	Construction Management			Negligible	Unlikely	0
Quantities	for Current Scope			Maximum Proje	ct Growth	20%
Q-1	Relocations	The elevations of some pipelines are assumed or unkown. The potential exists for some unknown oil/gas infrastructure to be present. Shoaling rates utilized are based on past data, but the infrequency of maintenance dredging could result in pipelines found to be deeper than anticipated.	The potential exists for increased quantity requirements during the relocation phase of the project, but the cost impact would be small when compaed to the overall cost of the project.	Marginal	Unlikely	0
Q-2	Dredging	Disposal quantities could be underestimated based on the infrequent nature of maintenance dredging over the past 20 years. Pipeline distances may change is disposal areas are changed. Disposal area capacities are based on assumed depths without data from surveys.	Additional costs could be significant if additional dredging is required to achieve target depth. Dredging quantites required are based on dated survey information and assumed shoaling rates. Changes to the disposal plan during the design phase could increase costs.	Moderate	Possible	2
Q-3	0			Negligible	Likely	N/A
Q-4	0			Negligible	Unlikely	N/A

Q-5	0			Negligible	Unlikely	N/A
Q-6	0			Negligible	Unlikely	N/A
Q-7	0			Negligible	Unlikely	N/A
Q-8	0			Negligible	Unlikely	N/A
Q-9	0			Negligible	Unlikely	N/A
Q-10	0			Negligible	Unlikely	N/A
Q-11	0			Negligible	Unlikely	N/A
Q-12				Negligible	Unlikely	N/A
Q-13	Planning, Engineering, & Design			Negligible	Unlikely	0
Q-14	Construction Management			Negligible	Unlikely	0
<b>Specialty</b>	Fabrication or Equipment			Maximum Proje	ct Growth	50%
		Transportation of pipe and other relocation materials/equipment could take	Equipment transport of failure would likely be more expensive,			
FE-1	Relocations	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.	Marginal	Unlikely	0
FE-1	Relocations  Dredging	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small	Marginal Marginal	Unlikely	1
		longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the		·	
FE-2	Dredging	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal	Possible	1
FE-2	Dredging 0	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal Negligible	Possible Unlikely	1 N/A
FE-2 FE-3 FE-4	Dredging 0	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible	Possible Unlikely Unlikely	1 N/A N/A
FE-2 FE-3 FE-4 FE-5	Dredging 0 0 0	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible	Possible  Unlikely  Unlikely  Unlikely	1 N/A N/A N/A
FE-2 FE-3 FE-4 FE-5 FE-6	Dredging 0 0 0	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible  Negligible	Possible  Unlikely  Unlikely  Unlikely  Unlikely	N/A N/A N/A N/A
FE-2 FE-3 FE-4 FE-5 FE-6 FE-7	Dredging 0 0 0	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible  Negligible  Negligible	Possible Unlikely Unlikely Unlikely Unlikely Unlikely	N/A N/A N/A N/A N/A

FE-10 0 0 Negliging United States   Negligin							
FE-11 0 FE-12 Randog Eightering, A Design FE-14 Construction Management  Cost Estimate Assumptions  The unit prices for pipeline reboliture are based on the 2009 external control of the prices for pipeline reboliture are based on the 2009 external control of the prices for pipeline reboliture are based on the 2009 external control of the prices for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for the unit protes of t	FE-10	0			Negligible	Unlikely	N/A
FE-13 Permit Engineering & Design  FE-14 Construction Management  Cost Estimate Assumptions  The surt prices for pipeline relocation are based on the 2009 estimate conducted by the Cusp. Cost at bit be received by 2015 review by 2015 received prices for the prices of the prices.  The surt prices for pipeline relocation are based on the 2009 estimate conducted by the Cusp. Cost at bit be received by 2015 review by 2015 received	FE-11	0			Negligible	Unlikely	N/A
FE 14 Construction Management  Cost Estimate Assumptions  The unit prices for peptine relocations are board on the 2000 estimate costs for the unit costs of relocations and prices for peptine relocations are board on the 2000 estimate costs for the unit costs of relocations to the construction to the construction of the pertine prices of the provided to the construction to the construction of the pertine prices of the provided to the construction to the construction of the pertine prices of the provided to the construction of the construction of the pertine prices of the provided to the construction of the construction	FE-12				Negligible	Unlikely	N/A
Cost Estimate Assumptions  Characteristic Processing Cost In the Company of Section 1 to Proceed the Cost In th	FE-13	Planning, Engineering, & Design			Negligible	Unlikely	0
The potential exists for the unit codes of relaborations to the consistency of the code of	FE-14	Construction Management			Negligible	Unlikely	0
The potential exists for the unit codes of relaborations to the consistency of the code of	Cost Estim	nate Assumptions			Maximum Proje	ct Growth	25%
development of dredging unit costs is based on assumptions associated with the existing disposal results are also based in assumed starting depth of the channel nation could could be increased one assumed starting depth of the channel and could could be increased one assumed starting depth of the channel nation could could be increased one assumptions as well.  CT-3 0			conducted by the Corps. Cost will be escilated to 2015 levels based on the Corps escalation indices. The elevation of some pipelines are unkown and	increased subsequent to the plannig phase of the project. This	Marginal	Unlikely	0
CT-4         0         Negligible         Unlikely         N/A           CT-5         0         Negligible         Unlikely         N/A           CT-6         0         Negligible         Unlikely         N/A           CT-7         0         Negligible         Unlikely         N/A           CT-8         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-2	Dredging	development of dredging unit costs is based on assumptions associated with the existing disposal areas. Dredging quantities are also based on an assumed starting depth of the channel and could could be increased once a survey is conducted. Productivity rates were developed via CEDEP which is	design phase of the project, once more information in know about the existing depths of the channel. This would result in moderate increases to the project costs. It is also possible that the dredged material disposal plan would be modified based on	Moderate	Possible	2
CT-5         0         Negligible         Unlikely         N/A           CT-6         0         Negligible         Unlikely         N/A           CT-7         0         Negligible         Unlikely         N/A           CT-8         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           Negligible         Unlikely         N/A         N/A	CT-3	0			Moderate	Possible	N/A
CT-6         0         Negligible         Unlikely         N/A           CT-7         0         Negligible         Unlikely         N/A           CT-8         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-4	0			Negligible	Unlikely	N/A
CT-7         0         Negligible         Unlikely         N/A           CT-8         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-5	0			Negligible	Unlikely	N/A
CT-7         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-6	0			Negligible	Unlikely	N/A
CT-8         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-7	0			Negligible	Unlikely	N/A
CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-8	0			Negligible	Unlikely	N/A
CT-10 0	CT-9	0			Negligible	Unlikely	N/A
CT-11 0 Negligible Unlikely N/A	CT-10	0			Negligible	Unlikely	N/A
	CT-11	0			Negligible	Unlikely	N/A
CT-13 Planning, Engineering, & Design Negligible Unlikely <b>0</b>	CT-12				Negligible	Unlikely	N/A
	CT-13	Planning, Engineering, & Design			Negligible	Unlikely	0

CT-14	Construction Management			Negligible	Unlikely	0
External P	Project Risks			Maximum Proje	ct Growth	20%
EX-1	Relocations	Fuel prices used for the estimate are near a two-year low, so the potential for increased fuel costs exiits. This would increase the cost of equipment operation and material/crew transport.	Increases in fuel prices are likely to impact costs. These impacts would be moderate due to the heavy reliance on fuel to operate equipment and transport material. Overall the impacts to cost would be moderate.	Marginal	Unlikely	0
EX-2	Dredging	Extreme weather events are a possibility in Coastal Louisiana, with the potential to delay the project significantly or damage construction equipment. Shoaling rates would also increase during such an event, potentially impacting dredging quantities. Fuel prices used for the estimate are near a two-year low, so the potential for increased fuel costs exiits.	Increases in fuel prices are likely and the cost impact would be moderate. Storm impacts could be significant, but the liklihood is small. The cost and schedule impacts would be marginal. Overall the impacts to cost would be moderate.	Moderate	Possible	2
EX-3	0			Marginal	Possible	N/A
EX-4	0			Negligible	Unlikely	N/A
EX-5	0			Negligible	Unlikely	N/A
EX-6	0			Negligible	Unlikely	N/A
EX-7	0			Negligible	Unlikely	N/A
EX-8	0			Negligible	Unlikely	N/A
EX-9	0			Negligible	Unlikely	N/A
EX-10	0			Negligible	Unlikely	N/A
EX-11	0			Negligible	Unlikely	N/A
EX-12				Negligible	Unlikely	N/A
EX-13	Planning, Engineering, & Design			Negligible	Unlikely	0
EX-14	Construction Management			Negligible	Unlikely	0

# Houma Navigation Canal Deepening Project 1C 18-Rock Feasibility (Alternatives)

Abbreviated Risk Analysis

<u>WBS</u>	Potential Risk Areas	Project Scope Growth	Acquisition Strategy	Construction Elements	Quantities for Current Scope	Specialty Fabrication or Equipment	Cost Estimate Assumptions	External Project Risks	Cost in Thousands
01 LANDS AND DAMAGES	Real Estate								\$0
02 RELOCATIONS	Relocations	0	0	0	0	0	0	0	\$0
12 NAVIGATION, PORTS AND HARBORS	Dredging	1	1	1	2	1	2	2	\$843,880
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
All Other	Remaining Construction Items	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	0	0	0	0	0	0	0	\$84,388
31 CONSTRUCTION MANAGEMENT	Construction Management	0	0	0	0	0	0	0	\$67,510
									\$995,779
Risk		\$ 17,648	\$ 16,661	\$ 84,209	\$ 27,970	\$ 18,453	\$ 30,581	\$ 27,970	\$223,493
ixed Dollar Risk Allocation		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$0
	Risk	\$ 17,648	\$ 16,661	\$ 84,209	\$ 27,970	\$ 18,453	\$ 30,581	\$ 27,970	\$223,493
								Total	\$1,219,272

Project (less than \$40M): Houma Navigation Canal Deepening Project

Project Development Stage/Alternative: Feasibility (Alternatives)

Risk Category: Low Risk: Typical Construction, Simple

Alternative: 2A 20-Adjacent

Meeting Date: 11/2/2015

Total Estimated Construction Contract Cost = \$ 107,948,500

	<u>CWWBS</u>	Feature of Work	<u>Co</u>	ntract Cost	% Contingency	\$ Contingency	<u>Total</u>
	01 LANDS AND DAMAGES	Real Estate	\$	-	0.00%	\$ - \$	-
_1	02 RELOCATIONS	Relocations	\$	16,965,700	23.25%	\$ 3,943,711 \$	20,909,411
2	12 NAVIGATION, PORTS AND HARBORS	Dredging	\$	90,982,800	32.02%	\$ 29,129,286 \$	120,112,086
3			\$	-	0.00%	\$ - \$	-
4			\$	_	0.00%	\$ - \$	<u>-</u>
5			\$	_	0.00%	\$ - \$	
6			\$	_	0.00%	\$ - \$	
7					0.00%	\$ - \$	-
8			\$	_	0.00%	\$ - \$	
9			\$	_	0.00%	\$ - \$	-
10			\$	_	0.00%	\$ - \$	-
11			\$		0.00%	\$ - \$	-
12	All Other	Remaining Construction Items	\$	-	0.0% 0.00%	\$ - \$	-
13	30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	\$	10,794,850	16.15%	\$ 1,742,947 \$	12,537,797
14	31 CONSTRUCTION MANAGEMENT	Construction Management	\$	8,794	16.15%	\$ 1,420 \$	10,214
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, M	UST INCLUDE JUSTIFICATION SEE BELOW)				\$ -	

	R	ange Estimate (\$000's)	\$118.75		\$139.643k		\$153,570k
			Bas	Δ.	50%		80%
Total	\$	118,752,144	29%	\$	34,817,365	\$	153,569,509
rotal Construction Management	Ф	8,794	16.15%	Þ	1,420	Ф	10,214
Total Construction Management		8.794	16.15%	ď.	1.420	Ġ.	10,214
Total Planning, Engineering & Design	\$	10,794,850	16.15%	\$	1,742,947	\$	12,537,797
Total Construction Estimate	\$	107,948,500	30.64%	\$	33,072,998	\$	141,021,498
Real Estate		-	0.00%	\$	-	\$	-
Totals	_			_		_	

\* 50% based on base is at 5% CL.

Fixed Dollar Risk Add: (Allows for additional risk to be added to the risk analsyis. Must include justification. Does not allocate to Real Estate.

### Houma Navigation Canal Deepening Project 2A 20-Adjacent

Feasibility (Alternatives)
Abbreviated Risk Analysis
Meeting Date: 2-Nov-15

Risk Element	Feature of Work		PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level
Project Sc	ope Growth			Maximum Proje	ct Growth	40%
PS-1	Relocations	Some utility elevations could not be determined. Relocation costs are 6 years old. Unidentified utilities or oil/gas infrastructure could be located during construction.	The need for additional relocations are a possability, which would increase the scope of the project and mpact cost/schedule.	Marginal	Possible	1
PS-2	Dredging	A full Dredged Material Disposal Plan has not been developed. Some depths and elevations for proposed disposal areas were assumed, without survey data. Disposal quantities could also be increased based on low maintenance activities and old survey information. It could be determined that foreshore protection and rock retention could be required in additional areas other than those recommended. This could lead to the need for additional rock retention, foreshore protection, and floatation channel dredging.	The proposed disposal locations will be revisted during the design phase, but some changes to the costs associated with the current plan is likely. Additional quantites could require changes to the proposed disposal areas and lead to increases in scope. Any changes to the rock requirements could increase the project scope, but it would have a minimal impact on overall costs.	Moderate	Possible	2
PS-3	0			Moderate	Possible	N/A
PS-4	0			Negligible	Unlikely	N/A
PS-5	0			Negligible	Unlikely	N/A
PS-6	0			Negligible	Unlikely	N/A
PS-7	0			Negligible	Unlikely	N/A
PS-8	0			Negligible	Unlikely	N/A
PS-9	0			Negligible	Unlikely	N/A
PS-10	0			Negligible	Unlikely	N/A
PS-11	0			Negligible	Unlikely	N/A
PS-12				Marginal	Possible	N/A

PS-13	Planning, Engineering, & Design			Moderate	Likely	3
PS-14	Construction Management			Significant	Possible	3
<u>Acquisitio</u>	n Strategy			Maximum Proje	ct Growth	30%
AS-1	Relocations	Contract could require specialized work associated with environmental impacts of pipeline relocation and proper containment of material. The offshore nature of the work could limit the number of bids received to larger contracting companies.	A specialized pipeline relocation contractor could require a higher unit cost with a less competative bid. The overall cost ramifications of this would be minimal when compared to overall project costs.	Marginal	Possible	1
AS-2	Dredging	Dredging methodology for channel deepening would be widely available within south Louisiana, but offshore nature of the work could limit the number of bids.	A reduced number of bids could result in higher unit costs. However, based on the amount of ongoing dredging work within the channel over the past 20 years, it is believed the likihood of this occuring is minimal.	Marginal	Possible	1
AS-3	0			Moderate	Likely	N/A
AS-4	0			Negligible	Unlikely	N/A
AS-5	0			Negligible	Unlikely	N/A
AS-6	0			Negligible	Unlikely	N/A
AS-7	0			Negligible	Unlikely	N/A
AS-8	0			Negligible	Unlikely	N/A
AS-9	0			Negligible	Unlikely	N/A
AS-10	0			Negligible	Unlikely	N/A
AS-11	0			Negligible	Unlikely	N/A
AS-12				Negligible	Unlikely	N/A
AS-13	Planning, Engineering, & Design			Negligible	Unlikely	0
AS-14	Construction Management			Negligible	Unlikely	0
Construct	ion Elements			Maximum Proje	ct Growth	15%
CE-1	Relocations	Boat access would be required for relocations. Mobilization/Demobilization could take longer than anticipated. The potential exists for low-frequency weather events to delay work. Marine work could result in lower than anticipated productivity.	Impacts due to extended weather delays would be the most significant impact to cost and schedule, but the likelihood is low. With the amount of oil infrastructure existing in south Louisana, it is assumed a contractor familiar with the challenges of offshore pipeline relocation would be chosen. Therefore productivity issues would be minimal.	Moderate	Possible	2

CE-2	Dredging	Boat access would be required for survey crews and dredging equipment/crews. The potential exists for low-frequency weather events to delay work. Remote location of project could impact schedule if repairs are necessary to dredging equipment. Dredging methods would be fairly straight forward.	Dredging work is commonplace within the channel, so the risk of schedule delays or reduced productivity would center around the remote location or extreme weather events, not the dredging methods. The impact of a significant storm could be significant but liklihood is small.	Moderate	Possible	2
CE-3	0			Marginal	Possible	N/A
CE-4	0			Negligible	Unlikely	N/A
CE-5	0			Negligible	Unlikely	N/A
CE-6	0			Negligible	Unlikely	N/A
CE-7	0			Negligible	Unlikely	N/A
CE-8	0			Negligible	Unlikely	N/A
CE-9	0			Negligible	Unlikely	N/A
CE-10	0			Negligible	Unlikely	N/A
CE-11	0			Negligible	Unlikely	N/A
CE-12				Negligible	Unlikely	N/A
CE-13	Planning, Engineering, & Design			Negligible	Unlikely	0
CE-14	Construction Management			Negligible	Unlikely	0
Quantities	for Current Scope			Maximum Proje	ct Growth	20%
Q-1	Relocations	The elevations of some pipelines are assumed or unkown. The potential exists for some unknown oil/gas infrastructure to be present. Shoaling rates utilized are based on past data, but the infrequency of maintenance dredging could result in pipelines found to be deeper than anticipated.	The potential exists for increased quantity requirements during the relocation phase of the project, but the cost impact would be small when compaed to the overall cost of the project.	Marginal	Possible	1
Q-2	Dredging	Disposal quantities could be underestimated based on the infrequent nature of maintenance dredging over the past 20 years. Pipeline distances may change is disposal areas are changed. Disposal area capacities are based on assumed depths without data from surveys.	Additional costs could be significant if additional dredging is required to achieve target depth. Dredging quantites required are based on dated survey information and assumed shoaling rates. Changes to the disposal plan during the design phase could increase costs.	Moderate	Possible	2
Q-3	0			Negligible	Likely	N/A
Q-4	0			Negligible	Unlikely	N/A

Negligible   United   NVA							
0.7 0 0 Nedgible Urbitaly N/A 0.8 0 Nedgible Urbitaly N/A 0.9 0 Nedgible Urbitaly N/A 0.10 0 Nedgible Urbitaly N/A 0.11 0 Nedgible Urbitaly N/A 0.12 Nedgible Urbitaly N/A 0.13 Planning Engreening & Design 0.14 Construction Management 0.15 Planning Engreening & Design 0.14 Construction Management 0.15 Planning Engreening & Design 0.16 Nedgible Urbitaly N/A 0.17 Nedgible Urbitaly N/A 0.18 Nedgible Urbitaly N/A 0.19 Nedgible Urbitaly N/A	Q-5	0			Negligible	Unlikely	N/A
0.7 0 0.8 0 0.8 Negligible 0.9 Negligible 0.10 Negligible 0.10 Negligible 0.10 Negligible 0.10 Negligible 0.10 Negligible 0.11 Negligible 0.12 Negligible 0.13 Negligible 0.14 Contendation Manugement 0.14 Contendation Manugement 0.15 Negligible 0.16 Negligible 0.17 Negligible 0.18 Negligible 0.18 Negligible 0.18 Negligible 0.19 Negligible 0.18 Negli	Q-6	0			Negligible	Unlikely	N/A
Ce United Constitution of Equipment    Part   Constitution Management   Constitution Management	Q-7	0			Negligible	Unlikely	N/A
O-19 0 0 Negligible Unitkey N/A  O-10 0 Negligible Unitkey N/A  O-12 Negligible Unitkey N/A  O-13 Parming, Engineering, & Design  O-14 Construction Management Negligible Unitkey O  Specialty Fabrication or Equipment  Relocations  FE-1 Diredging  Remote Equipment  Remote Equipment International United State Proper is well an international parameter excellent in pasts could take longer is well. An increased life ord of opporent failure could state from excellent in an international parameter excellent in an international parameter excellent in a manufacture international international parameter excellent international international parameter excellent international international parameter excellent international internatio	Q-8	0			Negligible	Unlikely	N/A
C-11 0 C-12   Negligible   Unikely   N/A C-12   Negligible   Unikely   N/A C-13   Planning, Engineering, & Design C-14   Construction Management   Negligible   Unikely   O C-14   Construction Management   Negligible   Unikely   O Specialty Fabrication or Equipment    Selectations   Transportation of pipe and other relocation materials/legipment could take bright and articipated due to remote becation of work. Equipment remote of failure would likely be more expensive, inspirely of an articipated due to remote becation of work. Equipment remote of failure would likely be more expensive, inspirely of an articipated due to remote out of equipment failure could calculate the piper as well. An increased unit could design an articipated and in the more of piper and other piper and articipated and in the more of piper and other piper and articipated and in the more of piper and other piper and other piper and articipated and in the more of piper and of the committee of the count bright piper an articipated and in the more of piper and other piper and articipated and in the more of piper and other piper and articipated and in the more of piper and articipated and in the country of	Q-9	0			Negligible	Unlikely	N/A
Q-12   Negligible   Unlikely   N/A   Q-13   Planning, Engineering, & Design   Negligible   Unlikely   N/A   Q-14   Construction Management   Negligible   Unlikely   Q    Specialty Fabrication or Equipment   Maximum Project Growth   Relocations   Transportation of pape and other relocation materials/equipment coult take longer as well. An increased life load of equipment failure could seast from vorking an anamier environment.   FE-1   Design   Planning is provided in the control of the control project could seast from vorking an anamier environment.   FE-2   Design   Planning is provided in the control of pape and other relocation of work Equipment ransport of failure would likely be more expension, resulting in increased unit costs and schedule sizes during contraction. However, these costs would represent a small potential project cost.   FE-2   Design   Planning is beauting in reduced productivity.   FE-3   Design   Planning is beauting in reduced productivity.   FE-4   Design   Planning is beauting in reduced productivity.   FE-5   Design   Planning is beauting in reduced productivity.   FE-6   Design   Planning is beauting in reduced productivity.   FE-6   Design   Planning is beauting in reduced productivity.   FE-7   Design   Planning is beauting in reduced productivity.   FE-8   Design   Planning is beauting in reduced productivity.   FE-9   Planning is beauting in reduced p	Q-10	0			Negligible	Unlikely	N/A
Planning, Engineering, & Design  Q-14 Construction Management  Regiculator Fabrication or Equipment  Relocations  Relocati	Q-11	0			Negligible	Unlikely	N/A
Q-14 Construction Management  Specialty Fabrication or Equipment  Relocations  Remote location of project could impact cost and schedule if repairs are necessary to dredging aquipment. The transport of crew and equipment and elevery outling in not case and schedule delayed using outlet from working in a marrine environment.  FE-2  Dredging  Remote location of project could impact cost and schedule if repairs are necessary to dredging aquipment. The transport of crew and equipment and elevery outlet increase both costs and the schedule. However, it is believed that the impacts due to this same would be immined when compared to the overall project cost.  FE-3  0  Regigible  In decreased productivity resulting from longer than anticipated maintenance and equipment and elevery outle increase both costs and the schedule. However, it is believed that the impacts also size would be a minned when compared to the overall cost of the project.  Regigible  Unlikely  N/A  FE-5  0  Regigible  Unlikely  N/A  FE-6  0  Regigible  Unlikely  N/A  Negligible  Unlikely  N/A  Negligible  Unlikely  N/A  Negligible  Unlikely  N/A  Negligible  Unlikely  N/A	Q-12				Negligible	Unlikely	N/A
Specialty Fabrication or Equipment  Relocations Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment could take longer than anticipated, resulting in reduced productivity.  FE-3  O  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment could take longer than anticipated, resulting in reduced productivity.  FE-3  O  Repossible Reference Service Repossible Repossib	Q-13	Planning, Engineering, & Design			Negligible	Unlikely	0
Relocations  FE-1  Fe-2  Dredging  Remote location of pipe and other relocation materials/equipment could take longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased illihood of equipment failure could exist from working in a mainte environment.  FE-2  Dredging  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment and equipment part delivery could increase both costs and the schedule. However, it is believed that the impacts which is the transport of the overall project cost.  The decreased productivity suiting from longer than anticipated maintenance and equipmentpart delivery could increase both costs and the schedule. However, it is believed that the impacts when the impacts when the impacts when the impacts when the project could take longer than anticipated, resulting in reduced productivity.  FE-3  0  Regligible  Unlikely  N/A  FE-6  0  Regligible  Unlikely  N/A  FE-7  0  Regligible  Unlikely  N/A  Regligible  Unlikely  N/A  Regligible  Unlikely  N/A  Negligible  Unlikely  N/A	Q-14	Construction Management			Negligible	Unlikely	0
Relocations bonger than anticipated due to remote location of work. Equipment repairs could take longer as well, an increased althood of equipment failure could exist from working in a marine environment.  FE-2 Dredging Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment could take longer than anticipated, resulting in reduced productivity.  FE-3 0	Specialty 1	Fabrication or Equipment			Maximum Proje	ct Growth	50%
Remote location of project could impact cost and schedule if repairs are necessary to deciding equipment. The project could take longer than anticipated, resulting in reduced productivity.  FE-3 0 Negligible Unlikely N/A  FE-6 0 Negligible Unlikely N/A  FE-7 0 Negligible Unlikely N/A  FE-8 0 Negligible Unlikely N/A  FE-8 0 Negligible Unlikely N/A		Relocations	longer than anticipated due to remote location of work. Equipment repairs	resulting in increased unit costs and schedule delays during	Marginal	Possible	1
FE-4 0 Negligible Unlikely N/A  FE-5 0 Negligible Unlikely N/A  FE-6 0 Negligible Unlikely N/A  FE-7 0 Negligible Unlikely N/A  FE-8 0 Negligible Unlikely N/A  Negligible Unlikely N/A  Negligible Unlikely N/A  Negligible Unlikely N/A	FE-1				Warginai	1 0001510	•
FE-5         0         Negligible         Unlikely         N/A           FE-6         0         Negligible         Unlikely         N/A		Dredging	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the			
FE-6 0 Negligible Unlikely N/A  FE-7 0 Negligible Unlikely N/A  FE-8 0 Negligible Unlikely N/A  Negligible Unlikely N/A  Negligible Unlikely N/A	FE-2		exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal	Possible	1
FE-7 0 Negligible Unlikely N/A FE-8 0 Negligible Unlikely N/A Negligible Unlikely N/A	FE-2	0	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal Negligible	Possible Unlikely	1 N/A
FE-7 0 Negligible Unlikely N/A  Negligible Unlikely N/A  Negligible Unlikely N/A	FE-2 FE-3 FE-4	0	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible	Possible Unlikely Unlikely	1 N/A N/A
FE-8 V Negliqible Unlikely N/A	FE-2 FE-3 FE-4 FE-5	0 0	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible	Possible Unlikely Unlikely Unlikely	1 N/A N/A N/A
FE-9 0 Negligible Unlikely N/A	FE-2 FE-3 FE-4 FE-5 FE-6	0 0 0 0	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible  Negligible	Possible  Unlikely  Unlikely  Unlikely  Unlikely	N/A N/A N/A N/A
	FE-2 FE-3 FE-4 FE-5 FE-6 FE-7	0 0 0 0	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible  Negligible  Negligible	Possible  Unlikely  Unlikely  Unlikely  Unlikely  Unlikely	N/A N/A N/A N/A N/A

FE-10	0			Negligible	Unlikely	N/A
FE-11	0			Negligible	Unlikely	N/A
FE-12				Negligible	Unlikely	N/A
FE-13	Planning, Engineering, & Design			Negligible	Unlikely	0
FE-14	Construction Management			Negligible	Unlikely	0
Cost Estim	nate Assumptions			Maximum Proje	ct Growth	25%
CT-1	Relocations	The unit prices for pipeline relocations are based on the 2009 estimate conducted by the Corps. Cost will be escilated to 2015 levels based on the Corps escalation indices. The elevation of some pipelines are unkown and need to be assumed for this phase of the project.	The potential exists for the unit costs of relaocations to be increased subsequent to the plannig phase of the project. This would result in marginally increased cost for the overall project.	Marginal	Possible	1
CT-2	Dredging	Shoaling rates are based on past data and the disposal plan used for development of dredging unit costs is based on assumptions associated with the existing disposal areas. Dredging quantities are also based on an assumed starting depth of the channel and could could be increased once a survey is conducted. Productivity rates were developed via CEDEP which is based on disposal plan assumptions as well.	It is possible that dredging quantities would increase during the design phase of the project, once more information in know about the existing depths of the channel. This would result in moderate increases to the project costs. It is also possible that the dredged material disposal plan would be modified based on new data, potentially increasing costs.	Moderate	Likely	3
CT-3	0			Moderate	Possible	N/A
CT-4	0			Negligible	Unlikely	N/A
CT-5	0			Negligible	Unlikely	N/A
CT-6	0			Negligible	Unlikely	N/A
CT-7	0			Negligible	Unlikely	N/A
CT-8	0			Negligible	Unlikely	N/A
CT-9	0			Negligible	Unlikely	N/A
CT-10	0			Negligible	Unlikely	N/A
CT-11	0			Negligible	Unlikely	N/A
CT-12				Negligible	Unlikely	N/A
CT-13	Planning, Engineering, & Design			Negligible	Unlikely	0

CT-14	Construction Management			Negligible	Unlikely	0
External P	Project Risks			Maximum Proje	ct Growth	20%
EX-1	Relocations	Fuel prices used for the estimate are near a two-year low, so the potential for increased fuel costs exiits. This would increase the cost of equipment operation and material/crew transport.	Increases in fuel prices are likely to impact costs. These impacts would be moderate due to the heavy reliance on fuel to operate equipment and transport material. Overall the impacts to cost would be moderate.	Moderate	Possible	2
EX-2		Extreme weather events are a possibility in Coastal Louisiana, with the potential to delay the project significantly or damage construction equipment. Shoaling rates would also increase during such an event, potentially impacting dredging quantities. Fuel prices used for the estimate are near a two-year low, so the potential for increased fuel costs exitis.	Increases in fuel prices are likely and the cost impact would be moderate. Storm impacts could be significant, but the liklihood is small. The cost and schedule impacts would be marginal. Overall the impacts to cost would be moderate.	Moderate	Possible	2
EX-3	0			Marginal	Possible	N/A
EX-4	0			Negligible	Unlikely	N/A
EX-5	0			Negligible	Unlikely	N/A
EX-6	0			Negligible	Unlikely	N/A
EX-7	0			Negligible	Unlikely	N/A
EX-8	0			Negligible	Unlikely	N/A
EX-9	0			Negligible	Unlikely	N/A
EX-10	0			Negligible	Unlikely	N/A
EX-11	0			Negligible	Unlikely	N/A
EX-12				Negligible	Unlikely	N/A
EX-13	Planning, Engineering, & Design			Negligible	Unlikely	0
EX-14	Construction Management			Negligible	Unlikely	0

# Houma Navigation Canal Deepening Project 2A 20-Adjacent Feasibility (Alternatives)

Abbreviated Risk Analysis

<u>WBS</u>	Potential Risk Areas	Project Scope Growth	Acquisition Strategy	Construction Elements	Quantities for Current Scope	Specialty Fabrication or Equipment	Cost Estimate Assumptions	External Project Risks	Cost in Thousands
01 LANDS AND DAMAGES	Real Estate								\$0
02 RELOCATIONS	Relocations	1	1	2	1	1	1	2	\$16,966
12 NAVIGATION, PORTS AND HARBORS	Dredging	2	1	2	2	1	3	2	\$90,983
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
All Other	Remaining Construction Items	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	3	0	0	0	0	0	0	\$10,795
31 CONSTRUCTION MANAGEMENT	Construction Management	3	0	0	0	0	0	0	\$9
									\$118,752
Risk		\$ 5,322	\$ 2,131	\$ 11,502	\$ 3,324	\$ 2,361	\$ 6,600	\$ 3,578	\$34,817
xed Dollar Risk Allocation		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$0
	Risk	\$ 5,322	\$ 2,131	\$ 11,502	\$ 3,324	\$ 2,361	\$ 6,600	\$ 3,578	\$34,817
								Total	\$153,57

Project (less than \$40M): Houma Navigation Canal Deepening Project

Project Development Stage/Alternative: Feasibility (Alternatives)

Risk Category: Low Risk: Typical Construction, Simple

Alternative: 2A 20-Adjacent

Meeting Date: 11/2/2015

Total Estimated Construction Contract Cost = \$ 530,504,456

	<u>CWWBS</u>	Feature of Work	<u>Co</u>	ntract Cost	% Contingency	\$ <u>Contingency</u>	<u>Total</u>
	01 LANDS AND DAMAGES	Real Estate	\$	-	0.00%	\$ - \$	-
1	02 RELOCATIONS	Relocations			0.00%	\$ - \$	
2	12 NAVIGATION, PORTS AND HARBORS	Dredging	\$	530,504,456	25.22%	\$ 133,814,083 \$	664,318,539
3			\$	-	0.00%	\$ - \$	
4			\$	-	0.00%	\$ - \$	
5			\$	-	0.00%	\$ - \$	
6			\$	-	0.00%	\$ - \$	-
7					0.00%	\$ - \$	-
8			\$	-	0.00%	\$ - \$	-
9			\$	-	0.00%	\$ - \$	-
10			\$	-	0.00%	\$ - \$	-
11			\$	_	0.00%	\$ - \$	-
12	All Other	Remaining Construction Items	\$		0.0% 0.00%	\$ - \$	-
13	30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	\$	53,050,446	7.00%	\$ 3,713,531 \$	56,763,977
14	31 CONSTRUCTION MANAGEMENT	Construction Management	\$	8,794	7.00%	\$ 616 \$	9,410
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, M	JST INCLUDE JUSTIFICATION SEE BELOW)				\$ -	
		Totals					

		Bas	Base		80%
Total	\$ 583,563,696	24%	\$	137,528,230	\$ 721,091,926
Total Construction Management	\$ 8,794	7.00%	7.00% \$ 616		\$ 9,410
Total Planning, Engineering & Design	53,050,446	7.00%			\$ 56,763,977
Total Construction Estimate	530,504,456	25.22%	25.22% \$ 133		\$ 664,318,539
Real Estate	\$ -	0.00%	0.00% \$		\$ -
Totals					

Range Estimate (\$000's) \$583,564k \$666,081k \$721,092k

Fixed Dollar Risk Add: (Allows for additional risk to be added to the risk analsyis. Must include justification. Does not allocate to Real Estate. \* 50% based on base is at 5% CL.

### Houma Navigation Canal Deepening Project 2A 20-Adjacent

Feasibility (Alternatives)
Abbreviated Risk Analysis
Meeting Date: 2-Nov-15

| Negligible | Marginal | Moderate | Significant | Critical | | Negligible | Neglig

Risk Element	Feature of Work		PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level
Project Sco	ope Growth			Maximum Proje	ct Growth	40%
PS-1	Relocations	Some utility elevations could not be determined. Relocation costs are 6 years old. Unidentified utilities or oil/gas infrastructure could be located during construction.	The need for additional relocations are a possability, which would increase the scope of the project and mpact cost/schedule.	Marginal	Unlikely	0
PS-2	Dredging	A full Dredged Material Disposal Plan has not been developed. Some depths and elevations for proposed disposal areas were assumed, without survey data. Disposal quantities could also be increased based on low maintenance activities and old survey information. It could be determined that foreshore protection and rock retention could be required in additional areas other than those recommended. This could lead to the need for additional rock retention, foreshore protection, and floatation channel dredging.	The proposed disposal locations will be revisted during the design phase, but some changes to the costs associated with the current plan is likely. Additional quantites could require changes to the proposed disposal areas and lead to increases in scope. Any changes to the rock requirements could increase the project scope, but it would have a minimal impact on overall costs.	Marginal	Possible	1
PS-3	0			Moderate	Possible	N/A
PS-4	0			Negligible	Unlikely	N/A
PS-5	0			Negligible	Unlikely	N/A
PS-6	0			Negligible	Unlikely	N/A
PS-7	0			Negligible	Unlikely	N/A
PS-8	0			Negligible	Unlikely	N/A
PS-9	0			Negligible	Unlikely	N/A
PS-10	0			Negligible	Unlikely	N/A
PS-11	0			Negligible	Unlikely	N/A
PS-12				Marginal	Possible	N/A

PS-13	Planning, Engineering, & Design			Marginal	Unlikely	0
PS-14	Construction Management			Marginal	Unlikely	0
Acquisitio	n Strategy			Maximum Proje	ct Growth	30%
AS-1	Relocations	Contract could require specialized work associated with environmental impacts of pipeline relocation and proper containment of material. The offshore nature of the work could limit the number of bids received to larger contracting companies.	A specialized pipeline relocation contractor could require a higher unit cost with a less competative bid. The overall cost ramifications of this would be minimal when compared to overall project costs.	Marginal	Unlikely	0
AS-2	Dredging	Dredging methodology for channel deepening would be widely available within south Louisiana, but offshore nature of the work could limit the number of bids.	A reduced number of bids could result in higher unit costs. However, based on the amount of ongoing dredging work within the channel over the past 20 years, it is believed the likihood of this occuring is minimal.	Marginal	Possible	1
AS-3	0			Moderate	Likely	N/A
AS-4	0			Negligible	Unlikely	N/A
AS-5	0			Negligible	Unlikely	N/A
AS-6	0			Negligible	Unlikely	N/A
AS-7	0			Negligible	Unlikely	N/A
AS-8	0			Negligible	Unlikely	N/A
AS-9	0			Negligible	Unlikely	N/A
AS-10	0			Negligible	Unlikely	N/A
AS-11	0			Negligible	Unlikely	N/A
AS-12				Negligible	Unlikely	N/A
AS-13	Planning, Engineering, & Design			Negligible	Unlikely	0
AS-14	Construction Management			Negligible	Unlikely	0
Constructi	action Elements Maximum Project Gro		ct Growth	15%		
CE-1	Relocations	Boat access would be required for relocations. Mobilization/Demobilization could take longer than anticipated. The potential exists for low-frequency weather events to delay work. Marine work could result in lower than anticipated productivity.	Impacts due to extended weather delays would be the most significant impact to cost and schedule, but the likelihood is low. With the amount of oil infrastructure existing in south Louisana, it is assumed a contractor familiar with the challenges of offshore pipeline relocation would be chosen. Therefore productivity issues would be minimal.	Marginal	Unlikely	0

CE-2	Dredging	Boat access would be required for survey crews and dredging equipment/crews. The potential exists for low-frequency weather events to delay work. Remote location of project could impact schedule if repairs are necessary to dredging equipment. Dredging methods would be fairly straight forward.	Dredging work is commonplace within the channel, so the risk of schedule delays or reduced productivity would center around the remote location or extreme weather events, not the dredging methods. The impact of a significant storm could be significant but liklihood is small.	Marginal	Possible	1
CE-3	0			Marginal	Possible	N/A
CE-4	0			Negligible	Unlikely	N/A
CE-5	0			Negligible	Unlikely	N/A
CE-6	0			Negligible	Unlikely	N/A
CE-7	0			Negligible	Unlikely	N/A
CE-8	0			Negligible	Unlikely	N/A
CE-9	0			Negligible	Unlikely	N/A
CE-10	0			Negligible	Unlikely	N/A
CE-11	0			Negligible	Unlikely	N/A
CE-12				Negligible	Unlikely	N/A
CE-13	Planning, Engineering, & Design			Negligible	Unlikely	0
CE-14	Construction Management			Negligible	Unlikely	0
Quantities	for Current Scope			Maximum Proje	ct Growth	20%
Q-1	Relocations	The elevations of some pipelines are assumed or unkown. The potential exists for some unknown oil/gas infrastructure to be present. Shoaling rates utilized are based on past data, but the infrequency of maintenance dredging could result in pipelines found to be deeper than anticipated.	The potential exists for increased quantity requirements during the relocation phase of the project, but the cost impact would be small when compaed to the overall cost of the project.	Marginal	Unlikely	0
Q-2	Dredging	Disposal quantities could be underestimated based on the infrequent nature of maintenance dredging over the past 20 years. Pipeline distances may change is disposal areas are changed. Disposal area capacities are based on assumed depths without data from surveys.	Additional costs could be significant if additional dredging is required to achieve target depth. Dredging quantites required are based on dated survey information and assumed shoaling rates. Changes to the disposal plan during the design phase could increase costs.	Moderate	Possible	2
Q-3	0			Negligible	Likely	N/A
Q-4	0			Negligible	Unlikely	N/A

Relocations Transportation of pipe and other relocation materials/equipment could take longer than anticipated due to remote location of work. Equipment fransport of failure would likely be more expensive, resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  FE-1  Dredging Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment anticipated an internance and equipment part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the overall cost of the project.  FE-3  0  Regligible Unlikely N/A  FE-4  0  Regligible Unlikely N/A  FE-5  0  Regligible Unlikely N/A  Negligible Unlikely N/A							
O-7 0  Negligible Urillary N/A  Negligible Urillary N/A  Negligible Urillary N/A  Negligible Urillary N/A  O-10 0  Negligible Urillary N/A  O-10 0  Negligible Urillary N/A  O-11 0  Negligible Urillary N/A  O-12 Negligible Urillary N/A  O-13 Planning Engineering & Design Urillary N/A  O-13 Planning Engineering & Design Urillary N/A  D-13 Planning Engineering & Design Urillary N/A  Negligible Urillary N/A  Specialty Fabrication or Equipment  Negligible Urillary O  Specialty Fabrication or Equipment  Relocations  Relocations  Remain anticipated date for remains boston of work. Expansed regains and other relocation materials record and schedule's regains are anticipated and soft remains boston of work. Expansed regains could take hoper as well An encreased lithout of apphrent failure could seated from work of apphrent failure and the policy to more expensive, to seat the more design part of a seated failure and the policy to more expensive, to seating in increased unit could seate from work of apphrent failure could seated for the remaining of apphrent failure could seated for the remaining of apphrent failure could seated from the country of apphrent failure could seated from the country of a believed that the improve of an expensive failure and the country of a believed that the improve of apphrent failure could seated from the country of a believed that the improve of a believed that the improve of a believed that the improve of a believed that the country of a believed that the improve of a believed that the country of the provide of the provide.  PE-2 Osogling Transported from the improve of a believed that th	Q-5	0			Negligible	Unlikely	N/A
O-7   0 O-8   0 O-9   0 O-9   0 O-10   0 O-10   0 O-10   0 O-11   0 O-12   0 O-12   0 O-14   0 O-15   0 O-15   0 O-15   0 O-16   0 O-16   0 O-17   0 O-18   0 O-18   0 O-19	Q-6	0			Negligible	Unlikely	N/A
O-3 0 O-3 0 O-4 0 O-4 0 O-10 0 O-11 0 O-11 0 O-12 0 O-13 Planning, Engineering, & Design O-14 Construction Management O-14 Construction Management  Specialty Fabrication or Equipment  Transportation of pipe and other robustion materials liquipment could take longer than anticipated due to remote location of white. Equipment repairs could take longer as with a minimated due to remote location of white Equipment transport of failure would likely be more expensive, resulting in remove of pipe and other robustion of pipe and other robustion of pipe and other robustion materials liquipment could take longer than anticipated due to remote location of white. Equipment repairs could take longer as with a minimated due to remote location of white Equipment repairs could take longer as with a minimated due to remote location of white Equipment remote could be remoted by the remove of the pipe and anticipated could be remoted increased production of the section of the pipe and other robustion of pipe and o	Q-7	0			Negligible	Unlikely	N/A
O-9 0 0 Negligible Unitiety N/A O-10 0 Negligible Unitiety N/A O-11 0 Negligible Unitiety N/A O-12 Negligible Unitiety N/A O-13 Planning Engineering, & Design O-14 Construction Management Negligible Unitiety O O-14 Construction Management Negligible Unitiety O O-14 Construction Management Negligible Unitiety O O-15 Specialty Fabrication or Equipment  Transportation of pipe and other relocation materials requipment could take longer than antiquated due to remote location of a voice Equipment requipment transport of failure would likely be more expensive, resulting in relocation of the overall propert as a resulting in relocation of the overall propert could mental requirement requipment could take throw working in a manife environment.  FE-1 Dredging Remote location of project could impact coal and schedule of pagina are increased any to disagging equipment. The transport of covers and equipment page to the impact coal and schedule for pagina are increased any to disagging equipment. The transport of covers and equipment page to the impact coal and schedule for page to the impact coal and the schedule coal throw an increase and equipment page to the impact coal and schedule for page to the coal and schedule for page to the impact coal and schedule for page to the impact coal and schedule for page to the impact coal and schedule for page to the coal and schedule for pag	Q-8	0			Negligible	Unlikely	N/A
O-10 0 O-11 0 O-12 Negligible Unlikely N/A O-12 Negligible Unlikely N/A O-13 Planning, Engineering, & Design O-14 Construction Management Negligible Unlikely O O-15 Specialty Fabrication or Equipment  Transportation of pee and other relocation materials lequipment quairs could take longer than anticipated due to remote location of vort. Equipment requires could take longer and the relocation of equipment failure could take longer and the relocation of equipment failure could take longer and the relocation of equipment failure could take longer and take longer and take longer and the relocation of equipment failure could take longer and take longer longer and take longer longer and take longer longer and take longer and take longer longer and take longer and take longer longer longer longer longer longer longer longe		0			Negligible	Unlikely	N/A
Q-11 0 Q-12 Negligible Unlikely N/A Q-13 Planning, Engineering, & Design Negligible Unlikely Q-1 Q-14 Construction Management Negligible Unlikely Q-1  Specialty Fabrication or Equipment Relocations		0			Negligible	Unlikely	N/A
Q-12   Negligible Unikely N/A Q-13   Planning, Engineering, & Design Q-14   Construction Management   Negligible Unikely 0  Specialty Fabrication or Equipment  Transportation of pipe and other relocation materials/equipment could take longer than anticipated due to remote bocation of work. Equipment fabric could take longer than anticipated due to remote bocation of work. Equipment fabric could replace to remote bocation of work. Equipment fabric could replace to remote bocation of work. Equipment fabric could replace to remote bocation of work. Equipment fabric could replace to remote bocation of work. Equipment fabric could replace to remote bocation of work. Equipment fabric could replace to remote bocation of work. Equipment fabric could replace to remote bocation of work. Equipment fabric could replace to remote bocation of work. Equipment fabric could replace to remote bocation of work. Equipment fabric could replace to remote bocation of work. Equipment fabric could replace to remote bocation of work. Equipment fabric could replace to remote bocation of work. Equipment fabric could replace to remote bocation of work. Equipment fabric resulting in reduced productivity.  Equipment transport of failure would likely be more expensive, resulting in more expensive, resulting in reduced productivity. Page costs would repeat a small politic of the overall project could repeat a small politic of the overall project of the remote both remote some and equipment politic delivery could increase both remote some and equipment politic delivery could increase both remote and equipment politic reduced productivity.  FE-3 0  Remote location of pipe and other relocation materials/equipment could take foreigns and equipment politic relocation of project could inspect transport of remote and expensive a small politic remote and expensive a sma		0			Negligible	Unlikely	N/A
Specialty Fabrication or Equipment  Relocations  Transportation of pipe and other relocation materials/equipment could take longer than anticipated due to remote location of dequipment failure could exist from working in a marine environment.  FE-1  Dredging  PE-2  Dredging  Remote location of project could lake longer than anticipated, resulting in reduced productivity.  FE-3  O  Remote location of project could lake longer than anticipated, resulting in reduced productivity.  FE-6  O  Negligible  Unlikely  O  Marginal  Unlikely  O  Negligible  Unlikely  N/A  FE-6  O  Negligible  Unlikely  N/A  Negligible  Unlikely  N/A					Negligible	Unlikely	N/A
Specialty Fabrication or Equipment   Transportation of pipe and other relocation materials/equipment could take longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lithood of equipment failure could exist from working in a marine environment.   FE-1   Predging   Pre	Q-13	Planning, Engineering, & Design			Negligible	Unlikely	0
Relocations  Transportation of pipe and other relocation materials/equipment could take longer than anticipated due to remote location of work. Equipment frailure could exist from working in a marine environment.  Equipment transport of failure would likely be more expensive, resulting in increased unit costs and schedule delays during construction. However, the costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment fosts and schedule if repairs are necessary to dreedging equipment. The transport of crews and equipment cost and schedule if repairs are necessary to dreedging equipment. The transport of crews and equipment cost and schedule if repairs are necessary to dreedging equipment. The transport of crews and equipment cost and schedule if repairs are necessary to dreedging equipment. The transport of crews and equipment cost and schedule if repairs are necessary to dreedging equipment. The transport of crews and equipment cost and schedule if repairs are necessary to dreedging equipment. The transport of crews and equipment cost and schedule if repairs are necessary to dreedging equipment. The transport of crews and equipment cost and schedule if repairs are necessary to dreedging equipment. The transport of crews and equipment cost and schedule if repairs are necessary to dreedging equipment. The transport of crews and equipment cost and schedule if repairs are necessary to dreedging equipment. The transport of crews and equipment that schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the overall cost of the project.  Negligible Unlikely N/A  FE-4 0  Negligible Unlikely N/A  Negligible Unlikely N/A	Q-14	Construction Management			Negligible	Unlikely	0
Relocations  longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased illihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment could take longer than anticipated, resulting in reduced productivity.  FE-3 0  Response location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment could take longer than anticipated, resulting in reduced productivity.  FE-3 0  Response location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment could take longer than anticipated, resulting in reduced productivity.  FE-3 0  Regligible Unlikely N/A  FE-4 0  Regligible Unlikely N/A  FE-5 0  Regligible Unlikely N/A  Negligible Unlikely N/A	<b>Specialty</b>	Fabrication or Equipment			Maximum Proje	ct Growth	50%
Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment could take longer than anticipated, resulting in reduced productivity.  FE-3 0 Negligible Unlikely N/A  FE-6 0 Negligible Unlikely N/A  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the overall cost of the project.  Negligible Unlikely N/A  FE-6 0 Negligible Unlikely N/A  Negligible Unlikely N/A	FE-1	Relocations	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small	Marginal	Unlikely	0
FE-4         0         Negligible         Unlikely         N/A           FE-5         0         Negligible         Unlikely         N/A           FE-6         0         Negligible         Unlikely         N/A	FE-2	Dredging	necessary to dredging equipment. The transport of crews and equipment	maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal	Possible	1
FE-5 0 Negligible Unlikely N/A  FE-6 0 Negligible Unlikely N/A	FE-3	0			Negligible	Unlikely	N/A
FE-6 0 Negligible Unlikely N/A	FE-4	0			Negligible	Unlikely	N/A
	FE-5	0			Negligible	Unlikely	N/A
Negligible Unlikely N/A	FE-6	0			Negligible	Unlikely	N/A
FE-7 0	FE-7	0			Negligible	Unlikely	N/A
FE-8 0 Negligible Unlikely N/A	55.0				Negligible	Unlikely	N/A
FE-9 0 Negligible Unlikely N/A	FE-8	0					

FE-10 0 0 Negliging United States   Negligin							
FE-11 0 FE-12 Randog Eightering, A Design FE-14 Construction Management  Cost Estimate Assumptions  The unit prices for pipeline reboliture are based on the 2009 external control of the prices for pipeline reboliture are based on the 2009 external control of the prices for pipeline reboliture are based on the 2009 external control of the prices for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for the unit protes of t	FE-10	0			Negligible	Unlikely	N/A
FE-13 Permit Engineering & Design  FE-14 Construction Management  Cost Estimate Assumptions  The surt prices for pipeline relocation are based on the 2009 estimate conducted by the Cusp. Cost at bit be received by 2015 review by 2015 received prices for the prices of the prices.  The surt prices for pipeline relocation are based on the 2009 estimate conducted by the Cusp. Cost at bit be received by 2015 review by 2015 received	FE-11	0			Negligible	Unlikely	N/A
FE 14 Construction Management  Cost Estimate Assumptions  The unit prices for peptine relocations are board on the 2000 estimate costs for the unit costs of relocations and prices for peptine relocations are board on the 2000 estimate costs for the unit costs of relocations to the construction to the construction of the pertine prices of the provided to the construction to the construction of the pertine prices of the provided to the construction to the construction of the pertine prices of the provided to the construction of the construction of the pertine prices of the provided to the construction of the construction	FE-12				Negligible	Unlikely	N/A
Cost Estimate Assumptions  Characteristic Processing Cost In the Company of Section 1 to Proceed the Cost In th	FE-13	Planning, Engineering, & Design			Negligible	Unlikely	0
The potential exists for the unit codes of relaborations to the consistency of the code of	FE-14	Construction Management			Negligible	Unlikely	0
The potential exists for the unit codes of relaborations to the consistency of the code of	Cost Estim	nate Assumptions			Maximum Proje	ct Growth	25%
development of dredging unit costs is based on assumptions associated with the existing disposal results are also based in assumptions associated with the existing depth of the channel nation could could be increased one assumptions as well.  CT-3 0			conducted by the Corps. Cost will be escilated to 2015 levels based on the Corps escalation indices. The elevation of some pipelines are unkown and	increased subsequent to the plannig phase of the project. This	Marginal	Unlikely	0
CT-4         0         Negligible         Unlikely         N/A           CT-5         0         Negligible         Unlikely         N/A           CT-6         0         Negligible         Unlikely         N/A           CT-7         0         Negligible         Unlikely         N/A           CT-8         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-2	Dredging	development of dredging unit costs is based on assumptions associated with the existing disposal areas. Dredging quantities are also based on an assumed starting depth of the channel and could could be increased once a survey is conducted. Productivity rates were developed via CEDEP which is	design phase of the project, once more information in know about the existing depths of the channel. This would result in moderate increases to the project costs. It is also possible that the dredged material disposal plan would be modified based on	Moderate	Possible	2
CT-5         0         Negligible         Unlikely         N/A           CT-6         0         Negligible         Unlikely         N/A           CT-7         0         Negligible         Unlikely         N/A           CT-8         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           Negligible         Unlikely         N/A         N/A	CT-3	0			Moderate	Possible	N/A
CT-6         0         Negligible         Unlikely         N/A           CT-7         0         Negligible         Unlikely         N/A           CT-8         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-4	0			Negligible	Unlikely	N/A
CT-7         0         Negligible         Unlikely         N/A           CT-8         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-5	0			Negligible	Unlikely	N/A
CT-7         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-6	0			Negligible	Unlikely	N/A
CT-8         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-7	0			Negligible	Unlikely	N/A
CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-8	0			Negligible	Unlikely	N/A
CT-10 0	CT-9	0			Negligible	Unlikely	N/A
CT-11 0 Negligible Unlikely N/A	CT-10	0			Negligible	Unlikely	N/A
	CT-11	0			Negligible	Unlikely	N/A
CT-13 Planning, Engineering, & Design Negligible Unlikely <b>0</b>	CT-12				Negligible	Unlikely	N/A
	CT-13	Planning, Engineering, & Design			Negligible	Unlikely	0

CT-14	Construction Management			Negligible	Unlikely	0
External P	Project Risks			Maximum Proje	ct Growth	20%
EX-1	Relocations	Fuel prices used for the estimate are near a two-year low, so the potential for increased fuel costs exiits. This would increase the cost of equipment operation and material/crew transport.	Increases in fuel prices are likely to impact costs. These impacts would be moderate due to the heavy reliance on fuel to operate equipment and transport material. Overall the impacts to cost would be moderate.	Marginal	Unlikely	0
EX-2	Dredging	Extreme weather events are a possibility in Coastal Louisiana, with the potential to delay the project significantly or damage construction equipment. Shoaling rates would also increase during such an event, potentially impacting dredging quantities. Fuel prices used for the estimate are near a two-year low, so the potential for increased fuel costs exiits.	Increases in fuel prices are likely and the cost impact would be moderate. Storm impacts could be significant, but the liklihood is small. The cost and schedule impacts would be marginal. Overall the impacts to cost would be moderate.	Moderate	Possible	2
EX-3	0			Marginal	Possible	N/A
EX-4	0			Negligible	Unlikely	N/A
EX-5	0			Negligible	Unlikely	N/A
EX-6	0			Negligible	Unlikely	N/A
EX-7	0			Negligible	Unlikely	N/A
EX-8	0			Negligible	Unlikely	N/A
EX-9	0			Negligible	Unlikely	N/A
EX-10	0			Negligible	Unlikely	N/A
EX-11	0			Negligible	Unlikely	N/A
EX-12				Negligible	Unlikely	N/A
EX-13	Planning, Engineering, & Design			Negligible	Unlikely	0
EX-14	Construction Management			Negligible	Unlikely	0

# Houma Navigation Canal Deepening Project 2A 20-Adjacent Feasibility (Alternatives) Abbreviated Risk Analysis

<u>WBS</u>	Potential Risk Areas	Project Scope Growth	Acquisition Strategy	Construction Elements	Quantities for Current Scope	Specialty Fabrication or Equipment	Cost Estimate Assumptions	External Project Risks	Cost in Thousands
01 LANDS AND DAMAGES	Real Estate								\$0
02 RELOCATIONS	Relocations	0	0	0	0	0	0	0	\$0
12 NAVIGATION, PORTS AND HARBORS	Dredging	1	1	1	2	1	2	2	\$530,504
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
All Other	Remaining Construction Items	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	0	0	0	0	0	0	0	\$53,050
31 CONSTRUCTION MANAGEMENT	Construction Management	0	0	0	0	0	0	0	\$9
									\$583,564
Risk		\$ 11,094	\$ 10,474	\$ 49,968	\$ 17,583	\$ 11,601	\$ 19,225	\$ 17,583	\$137,528
ixed Dollar Risk Allocation		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$0
	Risk	\$ 11,094	\$ 10,474	\$ 49,968	\$ 17,583	\$ 11,601	\$ 19,225	\$ 17,583	\$137,528
			·					Total	\$721,09

Project (less than \$40M): Houma Navigation Canal Deepening Project

Project Development Stage/Alternative: Feasibility (Alternatives)

Risk Category: Low Risk: Typical Construction, Simple

Alternative: 2B 20-Earth

11/2/2015 **Meeting Date:** 

Total Estimated Construction Contract Cost = \$ 129,198,500

	<u>CWWBS</u>	Feature of Work	<u>Cc</u>	ntract Cost	% Contingency	\$ (	Contingency	<u>Total</u>
	01 LANDS AND DAMAGES	Real Estate	\$	-	0.00%	\$	- \$	-
1	02 RELOCATIONS	Relocations	\$	16,965,700	23.25%	\$	3,943,711 \$	20,909,411
2	12 NAVIGATION, PORTS AND HARBORS	Dredging	\$	112,232,800	32.02%	\$	35,932,741 \$	148,165,541
3			\$	-	0.00%	\$	- \$	
4			\$	-	0.00%	\$	- \$	-
5			\$	-	0.00%	\$	- \$	-
6			\$	-	0.00%	\$	- \$	
7					0.00%	\$	- \$	
8			\$	-	0.00%	\$	- \$	
9			\$	-	0.00%	\$	- \$	-
10			\$	_	0.00%	\$	- \$	
11			\$	-	0.00%	\$	- \$	-
12	All Other	Remaining Construction Items	\$	-	0.0% 0.00%	\$	- \$	<u>-</u>
13	30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	\$	12,919,850	16.15%	\$	2,086,052 \$	15,005,902
14	31 CONSTRUCTION MANAGEMENT	Construction Management	\$	10,335,880	16.15%	\$	1,668,842 \$	12,004,722
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL,	MUST INCLUDE JUSTIFICATION SEE BELOW)				\$	-	
		Tarah						

	R	ange Estimate (\$000's)	<b>Bas</b> \$152.45		<b>50%</b> \$178.633k		<b>80</b> % \$196.086
Total	\$	152,454,230	29%	\$	43,631,346	\$	196,085,576
Total Construction Management	\$	10,335,880	16.15%	\$	1,668,842	\$	12,004,722
Total Planning, Engineering & Design		12,919,850	16.15%	\$	2,086,052		15,005,902
Total Construction Estimate	\$	129,198,500	30.86%	\$	39,876,452	\$	169,074,952
Real Estate	\$	-	0.00%	\$	-	\$	-
Fotals	•		0.000/	ф		•	

Range Estimate (\$000's) \* 50% based on base is at 5% CL.

Fixed Dollar Risk Add: (Allows for additional risk to be added to the risk analsyis. Must include justification. Does not allocate to Real Estate.

### Houma Navigation Canal Deepening Project 2B 20-Earth

Feasibility (Alternatives)
Abbreviated Risk Analysis **Meeting Date:** 2-Nov-15

			Risk Level		
Very Likely	2	3	4	5	5
Likely	1	2	3	4	5
Possible	0	1	2	3	4
Unlikely	0	0	1	2	3
	Negligible	Marginal	Moderate	Significant	Critical

Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level
Project Sc	ope Growth			Maximum Proje	ct Growth	40%
PS-1	Relocations	Some utility elevations could not be determined. Relocation costs are 6 years old. Unidentified utilities or oil/gas infrastructure could be located during construction.	The need for additional relocations are a possability, which would increase the scope of the project and mpact cost/schedule.	Marginal	Possible	1
PS-2	Dredging	A full Dredged Material Disposal Plan has not been developed. Some depths and elevations for proposed disposal areas were assumed, without survey data. Disposal quantities could also be increased based on low maintenance activities and old survey information. It could be determined that foreshore protection and rock retention could be required in additional areas other than those recommended. This could lead to the need for additional rock retention, foreshore protection, and floatation channel dredging.	The proposed disposal locations will be revisted during the design phase, but some changes to the costs associated with the current plan is likely. Additional quantites could require changes to the proposed disposal areas and lead to increases in scope. Any changes to the rock requirements could increase the project scope, but it would have a minimal impact on overall costs.	Moderate	Possible	2
PS-3	0			Moderate	Possible	N/A
PS-4	0			Negligible	Unlikely	N/A
PS-5	0			Negligible	Unlikely	N/A
PS-6	0			Negligible	Unlikely	N/A
PS-7	0			Negligible	Unlikely	N/A
PS-8	0			Negligible	Unlikely	N/A
PS-9	0			Negligible	Unlikely	N/A
PS-10	0			Negligible	Unlikely	N/A
PS-11	0			Negligible	Unlikely	N/A
PS-12				Marginal	Possible	N/A

PS-13	Planning, Engineering, & Design			Moderate	Likely	3
PS-14	Construction Management			Significant	Possible	3
<u>Acquisitio</u>	n Strategy			Maximum Proje	ct Growth	30%
AS-1	Relocations	Contract could require specialized work associated with environmental impacts of pipeline relocation and proper containment of material. The offshore nature of the work could limit the number of bids received to larger contracting companies.	A specialized pipeline relocation contractor could require a higher unit cost with a less competative bid. The overall cost ramifications of this would be minimal when compared to overall project costs.	Marginal	Possible	1
AS-2	Dredging	Dredging methodology for channel deepening would be widely available within south Louisiana, but offshore nature of the work could limit the number of bids.	A reduced number of bids could result in higher unit costs. However, based on the amount of ongoing dredging work within the channel over the past 20 years, it is believed the likihood of this occuring is minimal.	Marginal	Possible	1
AS-3	0			Moderate	Likely	N/A
AS-4	0			Negligible	Unlikely	N/A
AS-5	0			Negligible	Unlikely	N/A
AS-6	0			Negligible	Unlikely	N/A
AS-7	0			Negligible	Unlikely	N/A
AS-8	0			Negligible	Unlikely	N/A
AS-9	0			Negligible	Unlikely	N/A
AS-10	0			Negligible	Unlikely	N/A
AS-11	0			Negligible	Unlikely	N/A
AS-12				Negligible	Unlikely	N/A
AS-13	Planning, Engineering, & Design			Negligible	Unlikely	0
AS-14	Construction Management			Negligible	Unlikely	0
Construct	on Elements			Maximum Proje	ct Growth	15%
CE-1	Relocations	Boat access would be required for relocations. Mobilization/Demobilization could take longer than anticipated. The potential exists for low-frequency weather events to delay work. Marine work could result in lower than anticipated productivity.	Impacts due to extended weather delays would be the most significant impact to cost and schedule, but the likelihood is low. With the amount of oil infrastructure existing in south Louisana, it is assumed a contractor familiar with the challenges of offshore pipeline relocation would be chosen. Therefore productivity issues would be minimal.	Moderate	Possible	2

CE-2	Dredging	Boat access would be required for survey crews and dredging equipment/crews. The potential exists for low-frequency weather events to delay work. Remote location of project could impact schedule if repairs are necessary to dredging equipment. Dredging methods would be fairly straight forward.	Dredging work is commonplace within the channel, so the risk of schedule delays or reduced productivity would center around the remote location or extreme weather events, not the dredging methods. The impact of a significant storm could be significant but liklihood is small.	Moderate	Possible	2
CE-3	0			Marginal	Possible	N/A
CE-4	0			Negligible	Unlikely	N/A
CE-5	0			Negligible	Unlikely	N/A
CE-6	0			Negligible	Unlikely	N/A
CE-7	0			Negligible	Unlikely	N/A
CE-8	0			Negligible	Unlikely	N/A
CE-9	0			Negligible	Unlikely	N/A
CE-10	0			Negligible	Unlikely	N/A
CE-11	0			Negligible	Unlikely	N/A
CE-12				Negligible	Unlikely	N/A
CE-13	Planning, Engineering, & Design			Negligible	Unlikely	0
CE-14	Construction Management			Negligible	Unlikely	0
Quantities	for Current Scope			Maximum Proje	ct Growth	20%
Q-1	Relocations	The elevations of some pipelines are assumed or unkown. The potential exists for some unknown oil/gas infrastructure to be present. Shoaling rates utilized are based on past data, but the infrequency of maintenance dredging could result in pipelines found to be deeper than anticipated.	The potential exists for increased quantity requirements during the relocation phase of the project, but the cost impact would be small when compaed to the overall cost of the project.	Marginal	Possible	1
Q-2	Dredging	Disposal quantities could be underestimated based on the infrequent nature of maintenance dredging over the past 20 years. Pipeline distances may change is disposal areas are changed. Disposal area capacities are based on assumed depths without data from surveys.	Additional costs could be significant if additional dredging is required to achieve target depth. Dredging quantites required are based on dated survey information and assumed shoaling rates. Changes to the disposal plan during the design phase could increase costs.	Moderate	Possible	2
Q-3	0			Negligible	Likely	N/A
Q-4	0			Negligible	Unlikely	N/A

Negligible   United   NVA							
0.7 0 0 Nedgible Urbitaly N/A 0.8 0 Nedgible Urbitaly N/A 0.9 0 Nedgible Urbitaly N/A 0.10 0 Nedgible Urbitaly N/A 0.11 0 Nedgible Urbitaly N/A 0.12 Nedgible Urbitaly N/A 0.13 Planning Engreening & Design 0.14 Construction Management 0.15 Planning Engreening & Design 0.14 Construction Management 0.15 Planning Engreening & Design 0.16 Nedgible Urbitaly N/A 0.17 Nedgible Urbitaly N/A 0.18 Nedgible Urbitaly N/A 0.19 Nedgible Urbitaly N/A	Q-5	0			Negligible	Unlikely	N/A
0.7 0 0.8 0 0.8 Negligible 0.9 Negligible 0.10 Negligible 0.10 Negligible 0.10 Negligible 0.10 Negligible 0.10 Negligible 0.11 Negligible 0.12 Negligible 0.13 Negligible 0.14 Contendation Manugement 0.14 Contendation Manugement 0.15 Negligible 0.16 Negligible 0.17 Negligible 0.18 Negligible 0.18 Negligible 0.18 Negligible 0.19 Negligible 0.18 Negli	Q-6	0			Negligible	Unlikely	N/A
Ce United Constitution of Equipment    Part   Constitution Management   Constitution Management	Q-7	0			Negligible	Unlikely	N/A
O-19 0 0 Negligible Unitkey N/A  O-10 0 Negligible Unitkey N/A  O-12 Negligible Unitkey N/A  O-13 Parming, Engineering, & Design  O-14 Construction Management Negligible Unitkey O  Specialty Fabrication or Equipment  Relocations  FE-1 Diredging  Remote Equipment  Remote Equipment International United State Proper is well an international parameter excellent in pasts could take longer is well. An increased life ord of opporent failure could state from excellent in an international parameter excellent in an international parameter excellent in a manufacture international international parameter excellent international international parameter excellent international international parameter excellent international internatio	Q-8	0			Negligible	Unlikely	N/A
C-11 0 C-12   Negligible   Unikely   N/A C-12   Negligible   Unikely   N/A C-13   Planning, Engineering, & Design C-14   Construction Management   Negligible   Unikely   O C-14   Construction Management   Negligible   Unikely   O Specialty Fabrication or Equipment    Selectations   Transportation of pipe and other relocation materials/legipment could take bright and articipated due to remote becation of work. Equipment remote of failure would likely be more expensive, inspirely of an articipated due to remote becation of work. Equipment remote of failure would likely be more expensive, inspirely of an articipated due to remote out of equipment failure could calculate the piper as well. An increased unit could design an articipated and in the more of piper and other piper and articipated and in the more of piper and other piper and articipated and in the more of piper and other piper and other piper and articipated and in the more of piper and of the committee of the count bright piper an articipated and in the more of piper and other piper and articipated and in the more of piper and other piper and articipated and in the more of piper and articipated and in the country of	Q-9	0			Negligible	Unlikely	N/A
Q-12   Negligible   Unlikely   N/A   Q-13   Planning, Engineering, & Design   Negligible   Unlikely   N/A   Q-14   Construction Management   Negligible   Unlikely   Q    Specialty Fabrication or Equipment   Maximum Project Growth   Relocations   Transportation of pape and other relocation materials/equipment coult take longer as well. An increased life load of equipment failure could seast from vorking an anamier environment.   FE-1   Design   Planning is provided in the control of the control project could seast from vorking an anamier environment.   FE-2   Design   Planning is provided in the control of pape and other relocation of work Equipment ransport of failure would likely be more expension, resulting in increased unit costs and schedule sizes during contraction. However, these costs would represent a small potential project cost.   FE-2   Design   Planning is beauting in reduced productivity.   FE-3   Design   Planning is beauting in reduced productivity.   FE-4   Design   Planning is beauting in reduced productivity.   FE-5   Design   Planning is beauting in reduced productivity.   FE-6   Design   Planning is beauting in reduced productivity.   FE-6   Design   Planning is beauting in reduced productivity.   FE-7   Design   Planning is beauting in reduced productivity.   FE-8   Design   Planning is beauting in reduced productivity.   FE-9   Planning is beauting in reduced p	Q-10	0			Negligible	Unlikely	N/A
Planning, Engineering, & Design  Q-14 Construction Management  Regiculator Fabrication or Equipment  Relocations  Relocati	Q-11	0			Negligible	Unlikely	N/A
Q-14 Construction Management  Specialty Fabrication or Equipment  Relocations  Remote location of project could impact cost and schedule if repairs are necessary to dredging aquipment. The transport of crew and equipment and elevery outling in not case and schedule delayed using outlet from working in a marrine environment.  FE-2  Dredging  Remote location of project could impact cost and schedule if repairs are necessary to dredging aquipment. The transport of crew and equipment and elevery outlet increase both costs and the schedule. However, it is believed that the impacts due to this same would be immined when compared to the overall project cost.  FE-3  0  Regigible  In decreased productivity resulting from longer than anticipated maintenance and equipment and elevery outle increase both costs and the schedule. However, it is believed that the impacts also size would be a minned when compared to the overall cost of the project.  Regigible  Unlikely  N/A  FE-5  0  Regigible  Unlikely  N/A  FE-6  0  Regigible  Unlikely  N/A  Negligible  Unlikely  N/A  Negligible  Unlikely  N/A  Negligible  Unlikely  N/A  Negligible  Unlikely  N/A	Q-12				Negligible	Unlikely	N/A
Specialty Fabrication or Equipment  Relocations  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment could take longer than anticipated, resulting in reduced productivity.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment could take longer than anticipated, resulting in reduced productivity.  Resulting in increased on observative from every could increase both costs and the schedule. However, it is believed that the impacts do to these issues would be minimal when compared to the overall project.  The decreased productivity resulting from longer than anticipated costs and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment and relevance and equipment plant relevance to the overall project cost.  The decreased productivity resulting from longer than anticipated with relationship of the overall project cost.  The decreased productivity resulting from longer than anticipated with relationship of the overall project cost.  The decreased productivity resulting from longer than anticipated with relationship of the overall project cost.  The decreased productivity resulting from longer than anticipated with relationship of the overall project cost.  The decreased productivity resulting from longer than anticipated with relationship of the overall project cost.  The decreased productivity resulting from longer than anticipated with relationship of the overall project cost.  The decreased productivity resulting from longer than anticipated with relationship of the overall project cost.  The decreased productivity results are the	Q-13	Planning, Engineering, & Design			Negligible	Unlikely	0
Relocations  FE-1  Fe-2  Dredging  Remote location of pipe and other relocation materials/equipment could take longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased illihood of equipment failure could exist from working in a mainte environment.  FE-2  Dredging  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment and equipment part delivery could increase both costs and the schedule. However, it is believed that the impacts when the vioral cost of the project.  FE-3  0  Regligible  Unlikely  N/A  FE-6  0  Regligible  Unlikely  N/A  FE-7  0  Regligible  Unlikely  N/A	Q-14	Construction Management			Negligible	Unlikely	0
Relocations bonger than anticipated due to remote location of work. Equipment repairs could take longer as well, an increased althood of equipment failure could exist from working in a marine environment.  FE-2 Dredging Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment could take longer than anticipated, resulting in reduced productivity.  FE-3 0	Specialty 1	Fabrication or Equipment			Maximum Proje	ct Growth	50%
Remote location of project could impact cost and schedule if repairs are necessary to deciding equipment. The project could take longer than anticipated, resulting in reduced productivity.  FE-3 0 Negligible Unlikely N/A  FE-6 0 Negligible Unlikely N/A  FE-7 0 Negligible Unlikely N/A  FE-8 0 Negligible Unlikely N/A  FE-8 0 Negligible Unlikely N/A		Relocations	longer than anticipated due to remote location of work. Equipment repairs	resulting in increased unit costs and schedule delays during	Marginal	Possible	1
FE-4 0 Negligible Unlikely N/A  FE-5 0 Negligible Unlikely N/A  FE-6 0 Negligible Unlikely N/A  FE-7 0 Negligible Unlikely N/A  FE-8 0 Negligible Unlikely N/A  Negligible Unlikely N/A  Negligible Unlikely N/A  Negligible Unlikely N/A	FE-1				Warginai	1 0001510	•
FE-5         0         Negligible         Unlikely         N/A           FE-6         0         Negligible         Unlikely         N/A		Dredging	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the			
FE-6 0 Negligible Unlikely N/A  FE-7 0 Negligible Unlikely N/A  FE-8 0 Negligible Unlikely N/A  Negligible Unlikely N/A  Negligible Unlikely N/A	FE-2		exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal	Possible	1
FE-7 0 Negligible Unlikely N/A FE-8 0 Negligible Unlikely N/A Negligible Unlikely N/A	FE-2	0	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal Negligible	Possible Unlikely	1 N/A
FE-7 0 Negligible Unlikely N/A  Negligible Unlikely N/A  Negligible Unlikely N/A	FE-2 FE-3 FE-4	0	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible	Possible Unlikely Unlikely	1 N/A N/A
FE-8 V Negliqible Unlikely N/A	FE-2 FE-3 FE-4 FE-5	0 0	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible	Possible Unlikely Unlikely Unlikely	1 N/A N/A N/A
FE-9 0 Negligible Unlikely N/A	FE-2 FE-3 FE-4 FE-5	0 0 0 0	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible  Negligible	Possible  Unlikely  Unlikely  Unlikely  Unlikely	N/A N/A N/A N/A
	FE-2 FE-3 FE-4 FE-5 FE-6 FE-7	0 0 0 0	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible  Negligible  Negligible	Possible  Unlikely  Unlikely  Unlikely  Unlikely  Unlikely	N/A N/A N/A N/A N/A

FE-10	0			Negligible	Unlikely	N/A
FE-11	0			Negligible	Unlikely	N/A
FE-12				Negligible	Unlikely	N/A
FE-13	Planning, Engineering, & Design			Negligible	Unlikely	0
FE-14	Construction Management			Negligible	Unlikely	0
Cost Estim	nate Assumptions			Maximum Proje	ct Growth	25%
CT-1	Relocations	The unit prices for pipeline relocations are based on the 2009 estimate conducted by the Corps. Cost will be escilated to 2015 levels based on the Corps escalation indices. The elevation of some pipelines are unkown and need to be assumed for this phase of the project.	The potential exists for the unit costs of relaocations to be increased subsequent to the plannig phase of the project. This would result in marginally increased cost for the overall project.	Marginal	Possible	1
CT-2	Dredging	Shoaling rates are based on past data and the disposal plan used for development of dredging unit costs is based on assumptions associated with the existing disposal areas. Dredging quantities are also based on an assumed starting depth of the channel and could could be increased once a survey is conducted. Productivity rates were developed via CEDEP which is based on disposal plan assumptions as well.	It is possible that dredging quantities would increase during the design phase of the project, once more information in know about the existing depths of the channel. This would result in moderate increases to the project costs. It is also possible that the dredged material disposal plan would be modified based on new data, potentially increasing costs.	Moderate	Likely	3
CT-3	0			Moderate	Possible	N/A
CT-4	0			Negligible	Unlikely	N/A
CT-5	0			Negligible	Unlikely	N/A
CT-6	0			Negligible	Unlikely	N/A
CT-7	0			Negligible	Unlikely	N/A
CT-8	0			Negligible	Unlikely	N/A
CT-9	0			Negligible	Unlikely	N/A
CT-10	0			Negligible	Unlikely	N/A
CT-11	0			Negligible	Unlikely	N/A
CT-12				Negligible	Unlikely	N/A
CT-13	Planning, Engineering, & Design			Negligible	Unlikely	0

CT-14	Construction Management			Negligible	Unlikely	0
External P	Project Risks			Maximum Proje	ct Growth	20%
EX-1	Relocations	Fuel prices used for the estimate are near a two-year low, so the potential for increased fuel costs exiits. This would increase the cost of equipment operation and material/crew transport.	Increases in fuel prices are likely to impact costs. These impacts would be moderate due to the heavy reliance on fuel to operate equipment and transport material. Overall the impacts to cost would be moderate.	Moderate	Possible	2
EX-2	Dredging	Extreme weather events are a possibility in Coastal Louisiana, with the potential to delay the project significantly or damage construction equipment. Shoaling rates would also increase during such an event, potentially impacting dredging quantities. Fuel prices used for the estimate are near a two-year low, so the potential for increased fuel costs exiits.	Increases in fuel prices are likely and the cost impact would be moderate. Storm impacts could be significant, but the liklihood is small. The cost and schedule impacts would be marginal. Overall the impacts to cost would be moderate.	Moderate	Possible	2
EX-3	0			Marginal	Possible	N/A
EX-4	0			Negligible	Unlikely	N/A
EX-5	0			Negligible	Unlikely	N/A
EX-6	0			Negligible	Unlikely	N/A
EX-7	0			Negligible	Unlikely	N/A
EX-8	0			Negligible	Unlikely	N/A
EX-9	0			Negligible	Unlikely	N/A
EX-10	0			Negligible	Unlikely	N/A
EX-11	0			Negligible	Unlikely	N/A
EX-12				Negligible	Unlikely	N/A
EX-13	Planning, Engineering, & Design			Negligible	Unlikely	0
EX-14	Construction Management			Negligible	Unlikely	0

## Houma Navigation Canal Deepening Project 2B 20-Earth Feasibility (Alternatives)

Abbreviated Risk Analysis

<u>WBS</u>	Potential Risk Areas	Project Scope Growth	Acquisition Strategy	Construction Elements	Quantities for Current Scope	Specialty Fabrication or Equipment	Cost Estimate Assumptions	External Project Risks	Cost in Thousands
01 LANDS AND DAMAGES	Real Estate								\$0
02 RELOCATIONS	Relocations	1	1	2	1	1	1	2	\$16,966
12 NAVIGATION, PORTS AND HARBORS	Dredging	2	1	2	2	1	3	2	\$112,233
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
All Other	Remaining Construction Items	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	3	0	0	0	0	0	0	\$12,920
31 CONSTRUCTION MANAGEMENT	Construction Management	3	0	0	0	0	0	0	\$10,336
									\$152,454
Risk		\$ 7,390	\$ 2,551	\$ 14,489	\$ 4,029	\$ 2,825	\$ 8,066	\$ 4,282	\$43,631
ixed Dollar Risk Allocation		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$0
	Risk	\$ 7,390	\$ 2,551	\$ 14,489	\$ 4,029	\$ 2,825	\$ 8,066	\$ 4,282	\$43,631
								Total	\$196,086

Project (less than \$40M): Houma Navigation Canal Deepening Project

Project Development Stage/Alternative: Feasibility (Alternatives)

Risk Category: Low Risk: Typical Construction, Simple

Alternative: 2B 20-Earth

Meeting Date: 11/2/2015

Total Estimated Construction Contract Cost = \$ 769,046,148

	<u>CWWBS</u>	Feature of Work	C	ontract Cost	% Contingend	<u>cy</u> <u>\$</u>	Contingency	Total
	01 LANDS AND DAMAGES	Real Estate	\$	-	0.00%	\$	- \$	-
_1	02 RELOCATIONS	Relocations			0.00%	\$	- \$	-
2	12 NAVIGATION, PORTS AND HARBORS	Dredging	\$	769,046,148	25.22%	\$	193,983,678 \$	963,029,826
3			\$	-	0.00%	\$	- \$	-
4			\$	_	0.00%	\$	- \$	
5			\$		0.00%	\$	- \$	
6			\$	-	0.00%	\$	- \$	-
7					0.00%	\$	- \$	-
8			\$		0.00%	\$	- \$	-
9			\$		0.00%	\$	- \$	
10			\$	-	0.00%	\$	- \$	<u>-</u>
11			\$		0.00%	\$	- \$	<u> </u>
12	All Other	Remaining Construction Items	\$	-	0.0% 0.00%	\$	- \$	<u> </u>
13	30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	\$	76,904,615	7.00%	\$	5,383,323 \$	82,287,938
14	31 CONSTRUCTION MANAGEMENT	Construction Management	\$	61,523,692	7.00%	\$	4,306,658 \$	65,830,350
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL,	MUST INCLUDE JUSTIFICATION SEE BELOW)				\$	_	
		Totals						
		Real Esta Total Construction Estima		- 769,046,148	0.00% 25.22%	\$ \$	- \$ 193,983,678 \$	- 963,029,826

_		Bas	e	50%	80%
Total	\$ 907,474,455	22%	\$	203,673,659	\$ 1,111,148,114
Total Construction Management	\$ 61,523,692	7.00%	\$	4,306,658	\$ 65,830,350
Total Planning, Engineering & Design	76,904,615	7.00%	\$	5,383,323	\$ 82,287,938
Total Construction Estimate	\$ 769,046,148	25.22%	\$	193,983,678	\$ 963,029,826
Real Estate	\$ -	0.00%	\$	-	\$ -
otals					

Range Estimate (\$000's) \$907,474k \$1,029,678k \$1,111,148k

Fixed Dollar Risk Add: (Allows for additional risk to be added to the risk analsyis. Must include justification. Does not allocate to Real Estate.

### Houma Navigation Canal Deepening Project 2B 20-Earth

Feasibility (Alternatives)
Abbreviated Risk Analysis
Meeting Date: 2-Nov-15

			Risk Level		
Very Likely	2	3	4	5	5
Likely	1	2	3	4	5
Possible	0	1	2	3	4
Unlikely	0	0	1	2	3
	Negligible	Marginal	Moderate	Significant	Critical

Risk Element	Feature of Work		PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level
Project Sco	ope Growth			Maximum Proje	ct Growth	40%
PS-1	Relocations	Some utility elevations could not be determined. Relocation costs are 6 years old. Unidentified utilities or oil/gas infrastructure could be located during construction.	The need for additional relocations are a possability, which would increase the scope of the project and mpact cost/schedule.	Marginal	Unlikely	0
PS-2	Dredging	A full Dredged Material Disposal Plan has not been developed. Some depths and elevations for proposed disposal areas were assumed, without survey data. Disposal quantities could also be increased based on low maintenance activities and old survey information. It could be determined that foreshore protection and rock retention could be required in additional areas other than those recommended. This could lead to the need for additional rock retention, foreshore protection, and floatation channel dredging.	The proposed disposal locations will be revisted during the design phase, but some changes to the costs associated with the current plan is likely. Additional quantites could require changes to the proposed disposal areas and lead to increases in scope. Any changes to the rock requirements could increase the project scope, but it would have a minimal impact on overall costs.	Marginal	Possible	1
PS-3	0			Moderate	Possible	N/A
PS-4	0			Negligible	Unlikely	N/A
PS-5	0			Negligible	Unlikely	N/A
PS-6	0			Negligible	Unlikely	N/A
PS-7	0			Negligible	Unlikely	N/A
PS-8	0			Negligible	Unlikely	N/A
PS-9	0			Negligible	Unlikely	N/A
PS-10	0			Negligible	Unlikely	N/A
PS-11	0			Negligible	Unlikely	N/A
PS-12				Marginal	Possible	N/A

PS-13	Planning, Engineering, & Design			Marginal	Unlikely	0
PS-14	Construction Management			Marginal	Unlikely	0
Acquisitio	n Strategy			Maximum Proje	ct Growth	30%
AS-1	Relocations	Contract could require specialized work associated with environmental impacts of pipeline relocation and proper containment of material. The offshore nature of the work could limit the number of bids received to larger contracting companies.	A specialized pipeline relocation contractor could require a higher unit cost with a less competative bid. The overall cost ramifications of this would be minimal when compared to overall project costs.	Marginal	Unlikely	0
AS-2	Dredging	Dredging methodology for channel deepening would be widely available within south Louisiana, but offshore nature of the work could limit the number of bids.	A reduced number of bids could result in higher unit costs. However, based on the amount of ongoing dredging work within the channel over the past 20 years, it is believed the likihood of this occuring is minimal.	Marginal	Possible	1
AS-3	0			Moderate	Likely	N/A
AS-4	0			Negligible	Unlikely	N/A
AS-5	0			Negligible	Unlikely	N/A
AS-6	0			Negligible	Unlikely	N/A
AS-7	0			Negligible	Unlikely	N/A
AS-8	0			Negligible	Unlikely	N/A
AS-9	0			Negligible	Unlikely	N/A
AS-10	0			Negligible	Unlikely	N/A
AS-11	0			Negligible	Unlikely	N/A
AS-12				Negligible	Unlikely	N/A
AS-13	Planning, Engineering, & Design			Negligible	Unlikely	0
AS-14	Construction Management			Negligible	Unlikely	0
Constructi	on Elements			Maximum Proje	ct Growth	15%
CE-1	Relocations	Boat access would be required for relocations. Mobilization/Demobilization could take longer than anticipated. The potential exists for low-frequency weather events to delay work. Marine work could result in lower than anticipated productivity.	Impacts due to extended weather delays would be the most significant impact to cost and schedule, but the likelihood is low. With the amount of oil infrastructure existing in south Louisana, it is assumed a contractor familiar with the challenges of offshore pipeline relocation would be chosen. Therefore productivity issues would be minimal.	Marginal	Unlikely	0

CE-2	Dredging	Boat access would be required for survey crews and dredging equipment/crews. The potential exists for low-frequency weather events to delay work. Remote location of project could impact schedule if repairs are necessary to dredging equipment. Dredging methods would be fairly straight forward.	Dredging work is commonplace within the channel, so the risk of schedule delays or reduced productivity would center around the remote location or extreme weather events, not the dredging methods. The impact of a significant storm could be significant but liklihood is small.	Marginal	Possible	1
CE-3	0			Marginal	Possible	N/A
CE-4	0			Negligible	Unlikely	N/A
CE-5	0			Negligible	Unlikely	N/A
CE-6	0			Negligible	Unlikely	N/A
CE-7	0			Negligible	Unlikely	N/A
CE-8	0			Negligible	Unlikely	N/A
CE-9	0			Negligible	Unlikely	N/A
CE-10	0			Negligible	Unlikely	N/A
CE-11	0			Negligible	Unlikely	N/A
CE-12				Negligible	Unlikely	N/A
CE-13	Planning, Engineering, & Design			Negligible	Unlikely	0
CE-14	Construction Management			Negligible	Unlikely	0
Quantities	for Current Scope			Maximum Proje	ct Growth	20%
Q-1	Relocations	The elevations of some pipelines are assumed or unkown. The potential exists for some unknown oil/gas infrastructure to be present. Shoaling rates utilized are based on past data, but the infrequency of maintenance dredging could result in pipelines found to be deeper than anticipated.	The potential exists for increased quantity requirements during the relocation phase of the project, but the cost impact would be small when compaed to the overall cost of the project.	Marginal	Unlikely	0
Q-2	Dredging	Disposal quantities could be underestimated based on the infrequent nature of maintenance dredging over the past 20 years. Pipeline distances may change is disposal areas are changed. Disposal area capacities are based on assumed depths without data from surveys.	Additional costs could be significant if additional dredging is required to achieve target depth. Dredging quantites required are based on dated survey information and assumed shoaling rates. Changes to the disposal plan during the design phase could increase costs.	Moderate	Possible	2
Q-3	0			Negligible	Likely	N/A
Q-4	0			Negligible	Unlikely	N/A

Q-5	0			Negligible	Unlikely	N/A
Q-6	0			Negligible	Unlikely	N/A
Q-7	0			Negligible	Unlikely	N/A
Q-8	0			Negligible	Unlikely	N/A
Q-9	0			Negligible	Unlikely	N/A
Q-10	0			Negligible	Unlikely	N/A
Q-11	0			Negligible	Unlikely	N/A
Q-12				Negligible	Unlikely	N/A
Q-13	Planning, Engineering, & Design			Negligible	Unlikely	0
Q-14	Construction Management			Negligible	Unlikely	0
<b>Specialty</b>	Fabrication or Equipment		Maximum Project Growth			
		Transportation of pipe and other relocation materials/equipment could take	Equipment transport of failure would likely be more expensive,			
FE-1	Relocations	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.	Marginal	Unlikely	0
FE-1	Relocations  Dredging	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small	Marginal Marginal	Unlikely	1
		longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the		·	
FE-2	Dredging	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal	Possible	1
FE-2	Dredging 0	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal Negligible	Possible Unlikely	1 N/A
FE-3 FE-4	Dredging 0	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible	Possible Unlikely Unlikely	1 N/A N/A
FE-2 FE-3 FE-4 FE-5	Dredging 0 0 0	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible	Possible  Unlikely  Unlikely  Unlikely	1 N/A N/A N/A
FE-2 FE-3 FE-4 FE-5 FE-6	Dredging 0 0 0	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible  Negligible	Possible  Unlikely  Unlikely  Unlikely  Unlikely	N/A N/A N/A N/A
FE-2 FE-3 FE-4 FE-5 FE-6 FE-7	Dredging 0 0 0	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible  Negligible  Negligible	Possible Unlikely Unlikely Unlikely Unlikely Unlikely	N/A N/A N/A N/A N/A

FE-10 0 0 Negliging United States   Negligin							
FE-11 0 FE-12 Randog Eightering, A Design FE-14 Construction Management  Cost Estimate Assumptions  The unit prices for pipeline reboliture are based on the 2009 external control of the prices for pipeline reboliture are based on the 2009 external control of the prices for pipeline reboliture are based on the 2009 external control of the prices for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for the unit protes of t	FE-10	0			Negligible	Unlikely	N/A
FE-13 Permit Engineering & Design  FE-14 Construction Management  Cost Estimate Assumptions  The surt prices for pipeline relocation are based on the 2009 estimate conducted by the Cusp. Cost at bit be received by 2015 review by 2015 received prices for the prices of the prices.  The surt prices for pipeline relocation are based on the 2009 estimate conducted by the Cusp. Cost at bit be received by 2015 review by 2015 received	FE-11	0			Negligible	Unlikely	N/A
FE 14 Construction Management  Cost Estimate Assumptions  The unit prices for peptine relocations are board on the 2000 estimate costs for the unit costs of relocations and prices for peptine relocations are board on the 2000 estimate costs for the unit costs of relocations to the construction to the construction of the pertine prices of the provided to the construction to the construction of the pertine prices of the provided to the construction to the construction of the pertine prices of the provided to the construction of the construction of the pertine prices of the provided to the construction of the construction	FE-12				Negligible	Unlikely	N/A
Cost Estimate Assumptions  Characteristic Processing Cost In the Company of Section 1 to Proceed the Cost In th	FE-13	Planning, Engineering, & Design			Negligible	Unlikely	0
The potential exists for the unit codes of relaborations to the consistency of the code of	FE-14	Construction Management			Negligible	Unlikely	0
The potential exists for the unit codes of relaborations to the consistency of the code of	Cost Estim	nate Assumptions			Maximum Proje	ct Growth	25%
development of dredging unit costs is based on assumptions associated with the existing disposal results are also based in assumed starting depth of the channel nation could could be increased one assumed starting depth of the channel and could could be increased one assumed starting depth of the channel nation could could be increased one assumptions as well.  CT-3 0			conducted by the Corps. Cost will be escilated to 2015 levels based on the Corps escalation indices. The elevation of some pipelines are unknwn and	increased subsequent to the plannig phase of the project. This	Marginal	Unlikely	0
CT-4         0         Negligible         Unlikely         N/A           CT-5         0         Negligible         Unlikely         N/A           CT-6         0         Negligible         Unlikely         N/A           CT-7         0         Negligible         Unlikely         N/A           CT-8         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-2	Dredging	development of dredging unit costs is based on assumptions associated with the existing disposal areas. Dredging quantities are also based on an assumed starting depth of the channel and could could be increased once a survey is conducted. Productivity rates were developed via CEDEP which is	design phase of the project, once more information in know about the existing depths of the channel. This would result in moderate increases to the project costs. It is also possible that the dredged material disposal plan would be modified based on	Moderate	Possible	2
CT-5         0         Negligible         Unlikely         N/A           CT-6         0         Negligible         Unlikely         N/A           CT-7         0         Negligible         Unlikely         N/A           CT-8         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           Negligible         Unlikely         N/A         N/A	CT-3	0			Moderate	Possible	N/A
CT-6         0         Negligible         Unlikely         N/A           CT-7         0         Negligible         Unlikely         N/A           CT-8         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-4	0			Negligible	Unlikely	N/A
CT-7         0         Negligible         Unlikely         N/A           CT-8         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-5	0			Negligible	Unlikely	N/A
CT-7         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-6	0			Negligible	Unlikely	N/A
CT-8         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-7	0			Negligible	Unlikely	N/A
CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-8	0			Negligible	Unlikely	N/A
CT-10 0	CT-9	0			Negligible	Unlikely	N/A
CT-11 0 Negligible Unlikely N/A	CT-10	0			Negligible	Unlikely	N/A
	CT-11	0			Negligible	Unlikely	N/A
CT-13 Planning, Engineering, & Design Negligible Unlikely <b>0</b>	CT-12				Negligible	Unlikely	N/A
	CT-13	Planning, Engineering, & Design			Negligible	Unlikely	0

CT-14	Construction Management			Negligible	Unlikely	0
External P	Project Risks			Maximum Proje	ct Growth	20%
EX-1	Relocations	Fuel prices used for the estimate are near a two-year low, so the potential for increased fuel costs exiits. This would increase the cost of equipment operation and material/crew transport.	Increases in fuel prices are likely to impact costs. These impacts would be moderate due to the heavy reliance on fuel to operate equipment and transport material. Overall the impacts to cost would be moderate.	Marginal	Unlikely	0
EX-2	Dredging	Extreme weather events are a possibility in Coastal Louisiana, with the potential to delay the project significantly or damage construction equipment. Shoaling rates would also increase during such an event, potentially impacting dredging quantities. Fuel prices used for the estimate are near a two-year low, so the potential for increased fuel costs exiits.	Increases in fuel prices are likely and the cost impact would be moderate. Storm impacts could be significant, but the liklihood is small. The cost and schedule impacts would be marginal. Overall the impacts to cost would be moderate.	Moderate	Possible	2
EX-3	0			Marginal	Possible	N/A
EX-4	0			Negligible	Unlikely	N/A
EX-5	0			Negligible	Unlikely	N/A
EX-6	0			Negligible	Unlikely	N/A
EX-7	0			Negligible	Unlikely	N/A
EX-8	0			Negligible	Unlikely	N/A
EX-9	0			Negligible	Unlikely	N/A
EX-10	0			Negligible	Unlikely	N/A
EX-11	0			Negligible	Unlikely	N/A
EX-12				Negligible	Unlikely	N/A
EX-13	Planning, Engineering, & Design			Negligible	Unlikely	0
EX-14	Construction Management			Negligible	Unlikely	0

## Houma Navigation Canal Deepening Project 2B 20-Earth Feasibility (Alternatives)

Abbreviated Risk Analysis

<u>WBS</u>	Potential Risk Areas	Project Scope Growth	Acquisition Strategy	Construction Elements	Quantities for Current Scope	Specialty Fabrication or Equipment	Cost Estimate Assumptions	External Project Risks	Cost in Thousands
01 LANDS AND DAMAGES	Real Estate								\$0
02 RELOCATIONS	Relocations	0	0	0	0	0	0	0	\$0
12 NAVIGATION, PORTS AND HARBORS	Dredging	1	1	1	2	1	2	2	\$769,046
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
All Other	Remaining Construction Items	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	0	0	0	0	0	0	0	\$76,905
31 CONSTRUCTION MANAGEMENT	Construction Management	0	0	0	0	0	0	0	\$61,524
									\$907,474
Risk		\$ 16,083	\$ 15,184	\$ 76,741	\$ 25,490	\$ 16,817	\$ 27,869	\$ 25,490	\$203,674
xed Dollar Risk Allocation		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$0
	Risk	\$ 16,083	\$ 15,184	\$ 76,741	\$ 25,490	\$ 16,817	\$ 27,869	\$ 25,490	\$203,674
								Total	\$1,111,14

Project (less than \$40M): Houma Navigation Canal Deepening Project

Project Development Stage/Alternative: Feasibility (Alternatives)

Risk Category: Low Risk: Typical Construction, Simple

Alternative: 2C 20-Rock

Meeting Date: 11/2/2015

Total Estimated Construction Contract Cost = \$ 156,295,500

**CWWBS** Feature of Work **Contract Cost** \$ Contingency % Contingency Total Real Estate 0.00% 01 LANDS AND DAMAGES - \$ Relocations 16,965,700 23.25% 3,943,711 \$ 1 02 RELOCATIONS 20,909,411 12 NAVIGATION, PORTS AND HARBORS Dredging 139,329,800 32.02% 44,608,186 \$ 183.937.986 0.00% - \$ 0.00% - \$ 0.00% - \$ 0.00% 0.00% - \$ 0.00% 0.00% 0.00% 0.00% **Remaining Construction Items** 0.0% 0.00% 15,629,550 13 30 PLANNING, ENGINEERING, AND DESIGN Planning, Engineering, & Design 16.15% 2,523,563 \$ 18,153,113 14 31 CONSTRUCTION MANAGEMENT **Construction Management** 12,503,640 16.15% 2,018,850 \$ 14,522,490

		Base		50%	80%
Total	\$ 184,428,690	29%	\$	53,094,310	\$ 237,523,000
Total Construction Management	\$ 12,503,640	16.15%	\$	2,018,850	\$ 14,522,490
Total Planning, Engineering & Design	15,629,550	16.15%	\$	2,523,563	\$ 18,153,113
Total Construction Estimate	\$ 156,295,500	31.06%	\$	48,551,897	\$ 204,847,397
Real Estate	\$ -	0.00%	\$	-	\$ -
Totals					

Range Estimate (\$000's)

\* 50% based on base is at 5% CL

\$216,285k

\$237,523k

\$184,429k

Fixed Dollar Risk Add: (Allows for additional risk to be added to the risk analsyis. Must include justification. Does not allocate to Real Estate.

XX FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MUST INCLUDE JUSTIFICATION SEE BELOW)

3

5

6

8

10

11

12 All Other

### Houma Navigation Canal Deepening Project 2C 20-Rock

Feasibility (Alternatives)
Abbreviated Risk Analysis
Meeting Date: 2-Nov-15

			Risk Level			
Very Likely	2	3	4	5	5	ł
Likely	1	2	3	4	5	
Possible	0	1	2	3	4	
Unlikely	0	0	1	2	3	
	Negligible	Marginal	Moderate	Significant	Critical	

Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level
Project Sc	ope Growth			Maximum Proje	ct Growth	40%
PS-1	Relocations	Some utility elevations could not be determined. Relocation costs are 6 years old. Unidentified utilities or oil/gas infrastructure could be located during construction.	The need for additional relocations are a possability, which would increase the scope of the project and mpact cost/schedule.	Marginal	Possible	1
PS-2	Dredging	A full Dredged Material Disposal Plan has not been developed. Some depths and elevations for proposed disposal areas were assumed, without survey data. Disposal quantities could also be increased based on low maintenance activities and old survey information. It could be determined that foreshore protection and rock retention could be required in additional areas other than those recommended. This could lead to the need for additional rock retention, foreshore protection, and floatation channel dredging.	The proposed disposal locations will be revisted during the design phase, but some changes to the costs associated with the current plan is likely. Additional quantites could require changes to the proposed disposal areas and lead to increases in scope. Any changes to the rock requirements could increase the project scope, but it would have a minimal impact on overall costs.	Moderate	Possible	2
PS-3	0			Moderate	Possible	N/A
PS-4	0			Negligible	Unlikely	N/A
PS-5	0			Negligible	Unlikely	N/A
PS-6	0			Negligible	Unlikely	N/A
PS-7	0			Negligible	Unlikely	N/A
PS-8	0			Negligible	Unlikely	N/A
PS-9	0			Negligible	Unlikely	N/A
PS-10	0			Negligible	Unlikely	N/A
PS-11	0			Negligible	Unlikely	N/A
PS-12				Marginal	Possible	N/A

PS-13	Planning, Engineering, & Design			Moderate	Likely	3
PS-14	Construction Management			Significant	Possible	3
<u>Acquisitio</u>	n Strategy			Maximum Project Growth		
AS-1	Relocations	Contract could require specialized work associated with environmental impacts of pipeline relocation and proper containment of material. The offshore nature of the work could limit the number of bids received to larger contracting companies.	A specialized pipeline relocation contractor could require a higher unit cost with a less competative bid. The overall cost ramifications of this would be minimal when compared to overall project costs.	Marginal	Possible	1
AS-2	Dredging	Dredging methodology for channel deepening would be widely available within south Louisiana, but offshore nature of the work could limit the number of bids.	A reduced number of bids could result in higher unit costs. However, based on the amount of ongoing dredging work within the channel over the past 20 years, it is believed the likihood of this occuring is minimal.	Marginal	Possible	1
AS-3	0			Moderate	Likely	N/A
AS-4	0			Negligible	Unlikely	N/A
AS-5	0			Negligible	Unlikely	N/A
AS-6	0			Negligible	Unlikely	N/A
AS-7	0			Negligible	Unlikely	N/A
AS-8	0			Negligible	Unlikely	N/A
AS-9	0			Negligible	Unlikely	N/A
AS-10	0			Negligible	Unlikely	N/A
AS-11	0			Negligible	Unlikely	N/A
AS-12				Negligible	Unlikely	N/A
AS-13	Planning, Engineering, & Design			Negligible	Unlikely	0
AS-14	Construction Management			Negligible	Unlikely	0
Construct	ion Elements			Maximum Proje	ct Growth	15%
CE-1	Relocations	Boat access would be required for relocations. Mobilization/Demobilization could take longer than anticipated. The potential exists for low-frequency weather events to delay work. Marine work could result in lower than anticipated productivity.	Impacts due to extended weather delays would be the most significant impact to cost and schedule, but the likelihood is low. With the amount of oil infrastructure existing in south Louisana, it is assumed a contractor familiar with the challenges of offshore pipeline relocation would be chosen. Therefore productivity issues would be minimal.	Moderate	Possible	2

CE-2	Dredging	Boat access would be required for survey crews and dredging equipment/crews. The potential exists for low-frequency weather events to delay work. Remote location of project could impact schedule if repairs are necessary to dredging equipment. Dredging methods would be fairly straight forward.	Dredging work is commonplace within the channel, so the risk of schedule delays or reduced productivity would center around the remote location or extreme weather events, not the dredging methods. The impact of a significant storm could be significant but liklihood is small.	Moderate	Possible	2
CE-3	0			Marginal	Possible	N/A
CE-4	0			Negligible	Unlikely	N/A
CE-5	0			Negligible	Unlikely	N/A
CE-6	0			Negligible	Unlikely	N/A
CE-7	0			Negligible	Unlikely	N/A
CE-8	0			Negligible	Unlikely	N/A
CE-9	0			Negligible	Unlikely	N/A
CE-10	0			Negligible	Unlikely	N/A
CE-11	0			Negligible	Unlikely	N/A
CE-12				Negligible	Unlikely	N/A
CE-13	Planning, Engineering, & Design			Negligible	Unlikely	0
CE-14	Construction Management			Negligible	Unlikely	0
Quantities	for Current Scope			Maximum Proje	ct Growth	20%
Q-1	Relocations	The elevations of some pipelines are assumed or unkown. The potential exists for some unknown oil/gas infrastructure to be present. Shoaling rates utilized are based on past data, but the infrequency of maintenance dredging could result in pipelines found to be deeper than anticipated.	The potential exists for increased quantity requirements during the relocation phase of the project, but the cost impact would be small when compaed to the overall cost of the project.	Marginal	Possible	1
Q-2	Dredging	Disposal quantities could be underestimated based on the infrequent nature of maintenance dredging over the past 20 years. Pipeline distances may change is disposal areas are changed. Disposal area capacities are based on assumed depths without data from surveys.	Additional costs could be significant if additional dredging is required to achieve target depth. Dredging quantites required are based on dated survey information and assumed shoaling rates. Changes to the disposal plan during the design phase could increase costs.	Moderate	Possible	2
Q-3	0			Negligible	Likely	N/A
Q-4	0			Negligible	Unlikely	N/A

Negligible   United   NVA							
0.7 0 0 Nedgible Urbitaly N/A 0.8 0 Nedgible Urbitaly N/A 0.9 0 Nedgible Urbitaly N/A 0.10 0 Nedgible Urbitaly N/A 0.11 0 Nedgible Urbitaly N/A 0.12 Nedgible Urbitaly N/A 0.13 Planning Engreening & Design 0.14 Construction Management 0.15 Planning Engreening & Design 0.14 Construction Management 0.15 Planning Engreening & Design 0.16 Nedgible Urbitaly N/A 0.17 Nedgible Urbitaly N/A 0.18 Nedgible Urbitaly N/A 0.19 Nedgible Urbitaly N/A	Q-5	0			Negligible	Unlikely	N/A
0.7 0 0.8 0 0.8 Negligible 0.9 Negligible 0.10 Negligible 0.10 Negligible 0.10 Negligible 0.10 Negligible 0.10 Negligible 0.11 Negligible 0.12 Negligible 0.13 Negligible 0.14 Contendation Manugement 0.14 Contendation Manugement 0.15 Negligible 0.16 Negligible 0.17 Negligible 0.18 Negligible 0.18 Negligible 0.18 Negligible 0.19 Negligible 0.18 Negli	Q-6	0			Negligible	Unlikely	N/A
Ce United Constitution of Equipment    Part   Constitution Management   Constitution Management	Q-7	0			Negligible	Unlikely	N/A
O-19 0 0 Negligible Unitkey N/A  O-10 0 Negligible Unitkey N/A  O-12 Negligible Unitkey N/A  O-13 Parming, Engineering, & Design  O-14 Construction Management Negligible Unitkey O  Specialty Fabrication or Equipment  Relocations  FE-1 Diredging  Remote Equipment  Remote Equipment International United State Proper is well an international parameter excellent in pasts could take longer is well. An increased life ord of opporent failure could state from excellent in an international parameter excellent in an international parameter excellent in a manufacture international international parameter excellent international international parameter excellent international international parameter excellent international internatio	Q-8	0			Negligible	Unlikely	N/A
C-11 0 C-12   Negligible   Unikely   N/A C-12   Negligible   Unikely   N/A C-13   Planning, Engineering, & Design C-14   Construction Management   Negligible   Unikely   O C-14   Construction Management   Negligible   Unikely   O Specialty Fabrication or Equipment    Selectations   Transportation of pipe and other relocation materials/legipment could take bright and articipated due to remote becation of work. Equipment remote of failure would likely be more expensive, inspirely of an articipated due to remote becation of work. Equipment remote of failure would likely be more expensive, inspirely of an articipated due to remote out of equipment failure could calculate the piper as well. An increased unit could design an articipated and in the more of piper and other piper and articipated and in the more of piper and other piper and articipated and in the more of piper and other piper and other piper and articipated and in the more of piper and of the committee of the count bright piper an articipated and in the more of piper and other piper and articipated and in the more of piper and other piper and articipated and in the more of piper and articipated and in the country of	Q-9	0			Negligible	Unlikely	N/A
Q-12   Negligible   Unlikely   N/A   Q-13   Planning, Engineering, & Design   Negligible   Unlikely   N/A   Q-14   Construction Management   Negligible   Unlikely   Q    Specialty Fabrication or Equipment   Maximum Project Growth   Relocations   Transportation of pape and other relocation materials/equipment coult take longer as well. An increased life load of equipment failure could seast from vorking an anamier environment.   FE-1   Design   Planning is provided in the control of the control project could seast from vorking an anamier environment.   FE-2   Design   Planning is provided in the control of pape and other relocation of work Equipment ransport of failure would likely be more expension, resulting in increased unit costs and schedule sizes during contraction. However, these costs would represent a small potential project cost.   FE-2   Design   Planning is beauting in reduced productivity.   FE-3   Design   Planning is beauting in reduced productivity.   FE-4   Design   Planning is beauting in reduced productivity.   FE-5   Design   Planning is beauting in reduced productivity.   FE-6   Design   Planning is beauting in reduced productivity.   FE-6   Design   Planning is beauting in reduced productivity.   FE-7   Design   Planning is beauting in reduced productivity.   FE-8   Design   Planning is beauting in reduced productivity.   FE-9   Planning is beauting in reduced p	Q-10	0			Negligible	Unlikely	N/A
Planning, Engineering, & Design  Q-14 Construction Management  Regiculator Fabrication or Equipment  Relocations  Relocati	Q-11	0			Negligible	Unlikely	N/A
Q-14 Construction Management  Specialty Fabrication or Equipment  Relocations  Remote location of project could impact cost and schedule if repairs are necessary to dredging aquipment. The transport of crew and equipment and elevery outling in not case and schedule delayed using outlet from working in a marrine environment.  FE-2  Dredging  Remote location of project could impact cost and schedule if repairs are necessary to dredging aquipment. The transport of crew and equipment and elevery outlet increase both costs and the schedule. However, it is believed that the impacts due to this same would be immined when compared to the overall project cost.  FE-3  0  Regigible  In decreased productivity resulting from longer than anticipated maintenance and equipment and elevery outle increase both costs and the schedule. However, it is believed that the impacts also size would be a minned when compared to the overall cost of the project.  Regigible  Unlikely  N/A  FE-5  0  Regigible  Unlikely  N/A  FE-6  0  Regigible  Unlikely  N/A  Negligible  Unlikely  N/A  Negligible  Unlikely  N/A  Negligible  Unlikely  N/A  Negligible  Unlikely  N/A	Q-12				Negligible	Unlikely	N/A
Specialty Fabrication or Equipment  Relocations  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment could take longer than anticipated, resulting in reduced productivity.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment could take longer than anticipated, resulting in reduced productivity.  Resulting in increased on observative from every could increase both costs and the schedule. However, it is believed that the impacts do to these issues would be minimal when compared to the overall project.  The decreased productivity resulting from longer than anticipated costs and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment and relevance and equipment plant relevance to the overall project cost.  The decreased productivity resulting from longer than anticipated with relationship of the overall project cost.  The decreased productivity resulting from longer than anticipated with relationship of the overall project cost.  The decreased productivity resulting from longer than anticipated with relationship of the overall project cost.  The decreased productivity resulting from longer than anticipated with relationship of the overall project cost.  The decreased productivity resulting from longer than anticipated with relationship of the overall project cost.  The decreased productivity resulting from longer than anticipated with relationship of the overall project cost.  The decreased productivity resulting from longer than anticipated with relationship of the overall project cost.  The decreased productivity results are the	Q-13	Planning, Engineering, & Design			Negligible	Unlikely	0
Relocations  FE-1  Fe-2  Dredging  Remote location of pipe and other relocation materials/equipment could take longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased illihood of equipment failure could exist from working in a mainte environment.  FE-2  Dredging  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment and equipment part delivery could increase both costs and the schedule. However, it is believed that the impacts when the vioral cost of the project.  FE-3  0  Regligible  Unlikely  N/A  FE-6  0  Regligible  Unlikely  N/A  FE-7  0  Regligible  Unlikely  N/A	Q-14	Construction Management			Negligible	Unlikely	0
Relocations bonger than anticipated due to remote location of work. Equipment repairs could take longer as well, an increased althood of equipment failure could exist from working in a marine environment.  FE-2 Dredging Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment could take longer than anticipated, resulting in reduced productivity.  FE-3 0	Specialty 1	Fabrication or Equipment			Maximum Proje	ct Growth	50%
Remote location of project could impact cost and schedule if repairs are necessary to deciding equipment. The project could take longer than anticipated, resulting in reduced productivity.  FE-3 0 Negligible Unlikely N/A  FE-6 0 Negligible Unlikely N/A  FE-7 0 Negligible Unlikely N/A  FE-8 0 Negligible Unlikely N/A  FE-8 0 Negligible Unlikely N/A		Relocations	longer than anticipated due to remote location of work. Equipment repairs	resulting in increased unit costs and schedule delays during	Marginal	Possible	1
FE-4 0 Negligible Unlikely N/A  FE-5 0 Negligible Unlikely N/A  FE-6 0 Negligible Unlikely N/A  FE-7 0 Negligible Unlikely N/A  FE-8 0 Negligible Unlikely N/A  Negligible Unlikely N/A  Negligible Unlikely N/A  Negligible Unlikely N/A	FE-1				Warginai	1 0001510	•
FE-5         0         Negligible         Unlikely         N/A           FE-6         0         Negligible         Unlikely         N/A		Dredging	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the			
FE-6 0 Negligible Unlikely N/A  FE-7 0 Negligible Unlikely N/A  FE-8 0 Negligible Unlikely N/A  Negligible Unlikely N/A  Negligible Unlikely N/A	FE-2		exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal	Possible	1
FE-7 0 Negligible Unlikely N/A FE-8 0 Negligible Unlikely N/A Negligible Unlikely N/A	FE-2	0	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal Negligible	Possible Unlikely	1 N/A
FE-7 0 Negligible Unlikely N/A  Negligible Unlikely N/A  Negligible Unlikely N/A	FE-2 FE-3 FE-4	0	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible	Possible Unlikely Unlikely	1 N/A N/A
FE-8 V Negliqible Unlikely N/A	FE-2 FE-3 FE-4 FE-5	0 0	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible	Possible Unlikely Unlikely Unlikely	1 N/A N/A N/A
FE-9 0 Negligible Unlikely N/A	FE-2 FE-3 FE-4 FE-5	0 0 0 0	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible  Negligible	Possible  Unlikely  Unlikely  Unlikely  Unlikely	N/A N/A N/A N/A
	FE-2 FE-3 FE-4 FE-5 FE-6 FE-7	0 0 0 0	exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible  Negligible  Negligible	Possible  Unlikely  Unlikely  Unlikely  Unlikely  Unlikely	N/A N/A N/A N/A N/A

FE-10	0			Negligible	Unlikely	N/A
FE-11	0			Negligible	Unlikely	N/A
FE-12				Negligible	Unlikely	N/A
FE-13	Planning, Engineering, & Design			Negligible	Unlikely	0
FE-14	Construction Management			Negligible	Unlikely	0
Cost Estim	nate Assumptions			Maximum Proje	ct Growth	25%
CT-1	Relocations	The unit prices for pipeline relocations are based on the 2009 estimate conducted by the Corps. Cost will be escilated to 2015 levels based on the Corps escalation indices. The elevation of some pipelines are unkown and need to be assumed for this phase of the project.	The potential exists for the unit costs of relaocations to be increased subsequent to the plannig phase of the project. This would result in marginally increased cost for the overall project.	Marginal	Possible	1
CT-2	Dredging	Shoaling rates are based on past data and the disposal plan used for development of dredging unit costs is based on assumptions associated with the existing disposal areas. Dredging quantities are also based on an assumed starting depth of the channel and could could be increased once a survey is conducted. Productivity rates were developed via CEDEP which is based on disposal plan assumptions as well.	It is possible that dredging quantities would increase during the design phase of the project, once more information in know about the existing depths of the channel. This would result in moderate increases to the project costs. It is also possible that the dredged material disposal plan would be modified based on new data, potentially increasing costs.	Moderate	Likely	3
CT-3	0			Moderate	Possible	N/A
CT-4	0			Negligible	Unlikely	N/A
CT-5	0			Negligible	Unlikely	N/A
CT-6	0			Negligible	Unlikely	N/A
CT-7	0			Negligible	Unlikely	N/A
CT-8	0			Negligible	Unlikely	N/A
CT-9	0			Negligible	Unlikely	N/A
CT-10	0			Negligible	Unlikely	N/A
CT-11	0			Negligible	Unlikely	N/A
CT-12				Negligible	Unlikely	N/A
CT-13	Planning, Engineering, & Design			Negligible	Unlikely	0

CT-14	Construction Management			Negligible	Unlikely	0
External P	Project Risks			Maximum Proje	ct Growth	20%
EX-1	Relocations	Fuel prices used for the estimate are near a two-year low, so the potential for increased fuel costs exiits. This would increase the cost of equipment operation and material/crew transport.	Increases in fuel prices are likely to impact costs. These impacts would be moderate due to the heavy reliance on fuel to operate equipment and transport material. Overall the impacts to cost would be moderate.	Moderate	Possible	2
EX-2		Extreme weather events are a possibility in Coastal Louisiana, with the potential to delay the project significantly or damage construction equipment. Shoaling rates would also increase during such an event, potentially impacting dredging quantities. Fuel prices used for the estimate are near a two-year low, so the potential for increased fuel costs exitis.	Increases in fuel prices are likely and the cost impact would be moderate. Storm impacts could be significant, but the liklihood is small. The cost and schedule impacts would be marginal. Overall the impacts to cost would be moderate.	Moderate	Possible	2
EX-3	0			Marginal	Possible	N/A
EX-4	0			Negligible	Unlikely	N/A
EX-5	0			Negligible	Unlikely	N/A
EX-6	0			Negligible	Unlikely	N/A
EX-7	0			Negligible	Unlikely	N/A
EX-8	0			Negligible	Unlikely	N/A
EX-9	0			Negligible	Unlikely	N/A
EX-10	0			Negligible	Unlikely	N/A
EX-11	0			Negligible	Unlikely	N/A
EX-12				Negligible	Unlikely	N/A
EX-13	Planning, Engineering, & Design			Negligible	Unlikely	0
EX-14	Construction Management			Negligible	Unlikely	0

## Houma Navigation Canal Deepening Project 2C 20-Rock Feasibility (Alternatives)

Abbreviated Risk Analysis

02 RELOCATIONS Re 12 NAVIGATION, PORTS AND	Real Estate Relocations  Dredging	1							
12 NAVIGATION, PORTS AND		1							\$0
	)redging	-	1	2	1	1	1	2	\$16,966
HARBORS	or edging	2	1	2	2	1	3	2	\$139,330
0 0	)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0 0	)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0 0	)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0 0	)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0 0	)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0 0	)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0 0	)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0 0	)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0 0	)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
All Other Re	Remaining Construction Items	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	3	0	0	0	0	0	0	\$15,630
31 CONSTRUCTION MANAGEMENT Co	Construction Management	3	0	0	0	0	0	0	\$12,504
•									\$184,429
Risk		\$ 9,021	\$ 3,086	\$ 17,527	\$ 4,927	\$ 3,418	\$ 9,935	\$ 5,180	\$53,094
xed Dollar Risk Allocation		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$0
	Risk	\$ 9,021	\$ 3,086	\$ 17,527	\$ 4,927	\$ 3,418	\$ 9,935	\$ 5,180	\$53,094 \$237,523

Project (less than \$40M): Houma Navigation Canal Deepening Project

Project Development Stage/Alternative: Feasibility (Alternatives)

Risk Category: Low Risk: Typical Construction, Simple

Alternative: 2C 20-Rock

Meeting Date: 11/2/2015

Total Estimated Construction Contract Cost = \$881,596,248

	<u>CWWBS</u>	Feature of Work	<u>Cc</u>	ontract Cost	% Contingency	\$	Contingency	<u>Total</u>
	01 LANDS AND DAMAGES	Real Estate	\$	-	0.00%	\$	- \$	-
_1_	02 RELOCATIONS	Relocations			0.00%	\$	- \$	-
2	12 NAVIGATION, PORTS AND HARBORS	Dredging	\$	881,596,248	25.22%	\$	222,373,238 \$	1,103,969,486
3			\$	-	0.00%	\$	- \$	-
4			\$	-	0.00%	\$	- \$	-
5			\$	_	0.00%	\$	- \$	-
6			\$	_	0.00%	\$	- \$	-
7					0.00%	\$	- \$	
8			\$	_	0.00%	\$	- \$	
9			\$	_	0.00%	\$	- \$	
10			\$	-	0.00%	\$	- \$	-
11			\$		0.00%	\$	- \$	
12	All Other	Remaining Construction Items	\$	_	0.0% 0.00%	\$	- \$	
13	30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	\$	88,159,625	7.00%	\$	6,171,174 \$	94,330,799
14	31 CONSTRUCTION MANAGEMENT	Construction Management	\$	70,527,700	7.00%	\$	4,936,939 \$	75,464,639
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MU	JST INCLUDE JUSTIFICATION SEE BELOW)				\$		
		Totals  Re Total Construction	al Estate \$	- 881.596.248	0.00% 25.22%	\$ \$	- \$ 222.373.238 \$	1,103,969,486

		Bas	е	50%	80%
Total	\$ 1,040,283,573	22%	\$	233,481,351	\$ 1,273,764,924
Total Construction Management	\$ 70,527,700	7.00%	\$	4,936,939	\$ 75,464,639
Total Planning, Engineering & Design	88,159,625	7.00%	\$	6,171,174	\$ 94,330,799
Total Construction Estimate	\$ 881,596,248	25.22%	\$	222,373,238	\$ 1,103,969,486
Real Estate	\$ -	0.00%	\$	-	\$ -
Totals					

Range Estimate (\$000's) \$1,040,284k \$1,180,373k \$1,273,765k \*50% based on base is at 5% CL.

Fixed Dollar Risk Add: (Allows for additional risk to be added to the risk analsyis. Must include justification. Does not allocate to Real Estate.

### Houma Navigation Canal Deepening Project 2C 20-Rock

Feasibility (Alternatives)
Abbreviated Risk Analysis
Meeting Date: 2-Nov-15

			Risk Level			
Very Likely	2	3	4	5	5	
Likely	1	2	3	4	5	
Possible	0	1	2	3	4	
Unlikely	0	0	1	2	3	
	Negligible	Marginal	Moderate	Significant	Critical	

Risk Element	Feature of Work		PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level
Project Sco	ope Growth			Maximum Proje	ct Growth	40%
PS-1	Relocations	Some utility elevations could not be determined. Relocation costs are 6 years old. Unidentified utilities or oil/gas infrastructure could be located during construction.	The need for additional relocations are a possability, which would increase the scope of the project and mpact cost/schedule.	Marginal	Unlikely	0
PS-2	Dredging	A full Dredged Material Disposal Plan has not been developed. Some depths and elevations for proposed disposal areas were assumed, without survey data. Disposal quantities could also be increased based on low maintenance activities and old survey information. It could be determined that foreshore protection and rock retention could be required in additional areas other than those recommended. This could lead to the need for additional rock retention, foreshore protection, and floatation channel dredging.	The proposed disposal locations will be revisted during the design phase, but some changes to the costs associated with the current plan is likely. Additional quantites could require changes to the proposed disposal areas and lead to increases in scope. Any changes to the rock requirements could increase the project scope, but it would have a minimal impact on overall costs.	Marginal	Possible	1
PS-3	0			Moderate	Possible	N/A
PS-4	0			Negligible	Unlikely	N/A
PS-5	0			Negligible	Unlikely	N/A
PS-6	0			Negligible	Unlikely	N/A
PS-7	0			Negligible	Unlikely	N/A
PS-8	0			Negligible	Unlikely	N/A
PS-9	0			Negligible	Unlikely	N/A
PS-10	0			Negligible	Unlikely	N/A
PS-11	0			Negligible	Unlikely	N/A
PS-12				Marginal	Possible	N/A

PS-13	Planning, Engineering, & Design			Marginal	Unlikely	0
PS-14	Construction Management			Marginal	Unlikely	0
Acquisitio	n Strategy			Maximum Proje	ct Growth	30%
AS-1	Relocations	Contract could require specialized work associated with environmental impacts of pipeline relocation and proper containment of material. The offshore nature of the work could limit the number of bids received to larger contracting companies.	A specialized pipeline relocation contractor could require a higher unit cost with a less competative bid. The overall cost ramifications of this would be minimal when compared to overall project costs.	Marginal	Unlikely	0
AS-2	Dredging	Dredging methodology for channel deepening would be widely available within south Louisiana, but offshore nature of the work could limit the number of bids.	A reduced number of bids could result in higher unit costs. However, based on the amount of ongoing dredging work within the channel over the past 20 years, it is believed the likihood of this occuring is minimal.	Marginal	Possible	1
AS-3	0			Moderate	Likely	N/A
AS-4	0			Negligible	Unlikely	N/A
AS-5	0			Negligible	Unlikely	N/A
AS-6	0			Negligible	Unlikely	N/A
AS-7	0			Negligible	Unlikely	N/A
AS-8	0			Negligible	Unlikely	N/A
AS-9	0			Negligible	Unlikely	N/A
AS-10	0			Negligible	Unlikely	N/A
AS-11	0			Negligible	Unlikely	N/A
AS-12				Negligible	Unlikely	N/A
AS-13	Planning, Engineering, & Design			Negligible	Unlikely	0
AS-14	Construction Management			Negligible	Unlikely	0
Constructi	ruction Elements					15%
CE-1	Relocations	Boat access would be required for relocations. Mobilization/Demobilization could take longer than anticipated. The potential exists for low-frequency weather events to delay work. Marine work could result in lower than anticipated productivity.	Impacts due to extended weather delays would be the most significant impact to cost and schedule, but the likelihood is low. With the amount of oil infrastructure existing in south Louisana, it is assumed a contractor familiar with the challenges of offshore pipeline relocation would be chosen. Therefore productivity issues would be minimal.	Marginal	Unlikely	0

CE-2	Dredging	Boat access would be required for survey crews and dredging equipment/crews. The potential exists for low-frequency weather events to delay work. Remote location of project could impact schedule if repairs are necessary to dredging equipment. Dredging methods would be fairly straight forward.	Dredging work is commonplace within the channel, so the risk of schedule delays or reduced productivity would center around the remote location or extreme weather events, not the dredging methods. The impact of a significant storm could be significant but liklihood is small.	Marginal	Possible	1
CE-3	0			Marginal	Possible	N/A
CE-4	0			Negligible	Unlikely	N/A
CE-5	0			Negligible	Unlikely	N/A
CE-6	0			Negligible	Unlikely	N/A
CE-7	0			Negligible	Unlikely	N/A
CE-8	0			Negligible	Unlikely	N/A
CE-9	0			Negligible	Unlikely	N/A
CE-10	0			Negligible	Unlikely	N/A
CE-11	0			Negligible	Unlikely	N/A
CE-12				Negligible	Unlikely	N/A
CE-13	Planning, Engineering, & Design			Negligible	Unlikely	0
CE-14	Construction Management			Negligible	Unlikely	0
Quantities	for Current Scope			Maximum Proje	ct Growth	20%
Q-1	Relocations	The elevations of some pipelines are assumed or unkown. The potential exists for some unknown oil/gas infrastructure to be present. Shoaling rates utilized are based on past data, but the infrequency of maintenance dredging could result in pipelines found to be deeper than anticipated.	The potential exists for increased quantity requirements during the relocation phase of the project, but the cost impact would be small when compaed to the overall cost of the project.	Marginal	Unlikely	0
Q-2	Dredging	Disposal quantities could be underestimated based on the infrequent nature of maintenance dredging over the past 20 years. Pipeline distances may change is disposal areas are changed. Disposal area capacities are based on assumed depths without data from surveys.	Additional costs could be significant if additional dredging is required to achieve target depth. Dredging quantites required are based on dated survey information and assumed shoaling rates. Changes to the disposal plan during the design phase could increase costs.	Moderate	Possible	2
Q-3	0			Negligible	Likely	N/A
Q-4	0			Negligible	Unlikely	N/A

Q-5	0			Negligible	Unlikely	N/A
Q-6	0			Negligible	Unlikely	N/A
Q-7	0			Negligible	Unlikely	N/A
Q-8	0			Negligible	Unlikely	N/A
Q-9	0			Negligible	Unlikely	N/A
Q-10	0			Negligible	Unlikely	N/A
Q-11	0			Negligible	Unlikely	N/A
Q-12				Negligible	Unlikely	N/A
Q-13	Planning, Engineering, & Design			Negligible	Unlikely	0
Q-14	Construction Management			Negligible	Unlikely	0
<b>Specialty</b>	alty Fabrication or Equipment				ct Growth	50%
		Transportation of pipe and other relocation materials/equipment could take	Equipment transport of failure would likely be more expensive,			
FE-1	Relocations	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.	Marginal	Unlikely	0
FE-1	Relocations  Dredging	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small	Marginal Marginal	Unlikely	1
		longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the		·	
FE-2	Dredging	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal	Possible	1
FE-2	Dredging 0	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal Negligible	Possible Unlikely	1 N/A
FE-3 FE-4	Dredging 0	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible	Possible Unlikely Unlikely	1 N/A N/A
FE-2 FE-3 FE-4 FE-5	Dredging  0  0	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible	Possible  Unlikely  Unlikely  Unlikely	1 N/A N/A N/A
FE-2 FE-3 FE-4 FE-5 FE-6	Dredging  0  0	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible  Negligible	Possible  Unlikely  Unlikely  Unlikely  Unlikely	N/A N/A N/A N/A
FE-2 FE-3 FE-4 FE-5 FE-6 FE-7	Dredging  0  0	longer than anticipated due to remote location of work. Equipment repairs could take longer as well. An increased lilihood of equipment failure could exist from working in a marine environment.  Remote location of project could impact cost and schedule if repairs are necessary to dredging equipment. The transport of crews and equipment	resulting in increased unit costs and schedule delays during construction. However, these costs would represent a small portion of the overall project cost.  The decreased productivity resulting from longer than anticipated maintenance and equipment/part delivery could increase both costs and the schedule. However, it is believed that the impacts due to these issues would be minimal when compared to the	Marginal  Negligible  Negligible  Negligible  Negligible  Negligible	Possible Unlikely Unlikely Unlikely Unlikely Unlikely	N/A N/A N/A N/A N/A

FE-10 0 0 Negliging United States   Negligin							
FE-11 0 FE-12 Randog Eightering, A Design FE-14 Construction Management  Cost Estimate Assumptions  The unit prices for pipeline reboliture are based on the 2009 external control of the prices for pipeline reboliture are based on the 2009 external control of the prices for pipeline reboliture are based on the 2009 external control of the prices for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for pipeline reboliture are based on the 2009 external control of the unit protes for the unit protes of t	FE-10	0			Negligible	Unlikely	N/A
FE-13 Permit Engineering & Design  FE-14 Construction Management  Cost Estimate Assumptions  The surt prices for pipeline relocation are based on the 2009 estimate conducted by the Cusp. Cost at bit be received by 2015 review by 2015 received prices for the prices of the prices.  The surt prices for pipeline relocation are based on the 2009 estimate conducted by the Cusp. Cost at bit be received by 2015 review by 2015 received	FE-11	0			Negligible	Unlikely	N/A
FE 14 Construction Management  Cost Estimate Assumptions  The unit prices for peptine relocations are board on the 2000 estimate costs for the unit costs of relocations and prices for peptine relocations are board on the 2000 estimate costs for the unit costs of relocations to the construction to the construction of the pertine prices of the provided to the construction to the construction of the pertine prices of the provided to the construction to the construction of the pertine prices of the provided to the construction of the construction of the pertine prices of the provided to the construction of the construction	FE-12				Negligible	Unlikely	N/A
Cost Estimate Assumptions  Characteristic Processing Cost In the Company of Section 1 to Proceed the Cost In th	FE-13	Planning, Engineering, & Design			Negligible	Unlikely	0
The potential exists for the unit codes of relaborations to the consistency of the code of	FE-14	Construction Management			Negligible	Unlikely	0
The potential exists for the unit codes of relaborations to the consistency of the code of	Cost Estim	nate Assumptions			Maximum Project Growth		25%
development of dredging unit costs is based on assumptions associated with the existing disposal results are also based in assumed starting depth of the channel nation could could be increased one assumed starting depth of the channel and could could be increased one assumed starting depth of the channel nation could could be increased one assumptions as well.  CT-3 0			conducted by the Corps. Cost will be escilated to 2015 levels based on the Corps escalation indices. The elevation of some pipelines are unknwn and	increased subsequent to the plannig phase of the project. This	Marginal	Unlikely	0
CT-4         0         Negligible         Unlikely         N/A           CT-5         0         Negligible         Unlikely         N/A           CT-6         0         Negligible         Unlikely         N/A           CT-7         0         Negligible         Unlikely         N/A           CT-8         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-2	Dredging	development of dredging unit costs is based on assumptions associated with the existing disposal areas. Dredging quantities are also based on an assumed starting depth of the channel and could could be increased once a survey is conducted. Productivity rates were developed via CEDEP which is	design phase of the project, once more information in know about the existing depths of the channel. This would result in moderate increases to the project costs. It is also possible that the dredged material disposal plan would be modified based on	Moderate	Possible	2
CT-5         0         Negligible         Unlikely         N/A           CT-6         0         Negligible         Unlikely         N/A           CT-7         0         Negligible         Unlikely         N/A           CT-8         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           Negligible         Unlikely         N/A         N/A	CT-3	0			Moderate	Possible	N/A
CT-6         0         Negligible         Unlikely         N/A           CT-7         0         Negligible         Unlikely         N/A           CT-8         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-4	0			Negligible	Unlikely	N/A
CT-7         0         Negligible         Unlikely         N/A           CT-8         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-5	0			Negligible	Unlikely	N/A
CT-7         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-6	0			Negligible	Unlikely	N/A
CT-8         0         Negligible         Unlikely         N/A           CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-11         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-7	0			Negligible	Unlikely	N/A
CT-9         0         Negligible         Unlikely         N/A           CT-10         0         Negligible         Unlikely         N/A           CT-12         Negligible         Unlikely         N/A	CT-8	0			Negligible	Unlikely	N/A
CT-10 0	CT-9	0			Negligible	Unlikely	N/A
CT-11 0 Negligible Unlikely N/A	CT-10	0			Negligible	Unlikely	N/A
	CT-11	0			Negligible	Unlikely	N/A
CT-13 Planning, Engineering, & Design Negligible Unlikely <b>0</b>	CT-12				Negligible	Unlikely	N/A
	CT-13	Planning, Engineering, & Design			Negligible	Unlikely	0

CT-14	Construction Management			Negligible	Unlikely	0	
External Project Risks					Maximum Project Growth		
EX-1	Relocations	Fuel prices used for the estimate are near a two-year low, so the potential for increased fuel costs exiits. This would increase the cost of equipment operation and material/crew transport.	Increases in fuel prices are likely to impact costs. These impacts would be moderate due to the heavy reliance on fuel to operate equipment and transport material. Overall the impacts to cost would be moderate.	Marginal	Unlikely	0	
EX-2	Dredging	Extreme weather events are a possibility in Coastal Louisiana, with the potential to delay the project significantly or damage construction equipment. Shoaling rates would also increase during such an event, potentially impacting dredging quantities. Fuel prices used for the estimate are near a two-year low, so the potential for increased fuel costs exiits.	Increases in fuel prices are likely and the cost impact would be moderate. Storm impacts could be significant, but the liklihood is small. The cost and schedule impacts would be marginal. Overall the impacts to cost would be moderate.	Moderate	Possible	2	
EX-3	0			Marginal	Possible	N/A	
EX-4	0			Negligible	Unlikely	N/A	
EX-5	0			Negligible	Unlikely	N/A	
EX-6	0			Negligible	Unlikely	N/A	
EX-7	0			Negligible	Unlikely	N/A	
EX-8	0			Negligible	Unlikely	N/A	
EX-9	0			Negligible	Unlikely	N/A	
EX-10	0			Negligible	Unlikely	N/A	
EX-11	0			Negligible	Unlikely	N/A	
EX-12				Negligible	Unlikely	N/A	
EX-13	Planning, Engineering, & Design			Negligible	Unlikely	0	
EX-14	Construction Management			Negligible	Unlikely	0	

## Houma Navigation Canal Deepening Project 2C 20-Rock Feasibility (Alternatives)

Abbreviated Risk Analysis

<u>WBS</u>	Potential Risk Areas	Project Scope Growth	Acquisition Strategy	Construction Elements	Quantities for Current Scope	Specialty Fabrication or Equipment	Cost Estimate Assumptions	External Project Risks	Cost in Thousands
01 LANDS AND DAMAGES	Real Estate								\$0
02 RELOCATIONS	Relocations	0	0	0	0	0	0	0	\$0
12 NAVIGATION, PORTS AND HARBORS	Dredging	1	1	1	2	1	2	2	\$881,596
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
All Other	Remaining Construction Items	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$0
30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	0	0	0	0	0	0	0	\$88,160
31 CONSTRUCTION MANAGEMENT	Construction Management	0	0	0	0	0	0	0	\$70,528
		•							\$1,040,284
Risk		\$ 18,437	\$ 17,406	\$ 87,972	\$ 29,220	\$ 19,278	\$ 31,948	\$ 29,220	\$233,481
ixed Dollar Risk Allocation		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$0
	Risk	\$ 18,437	\$ 17,406	\$ 87,972	\$ 29,220	\$ 19,278	\$ 31,948	\$ 29,220	\$233,48 <sup>2</sup>
								Total	\$1,273,7