APPENDIX F

COST ESTIMATES AND COST AND SCHEDULE RISK ANALYSIS

FINAL
FEASIBILITY REPORT
AND ENVIRONMENTAL IMPACT STATEMENT
PORT EVERGLADES HARBOR NAVIGATION STUDY
BROWARD COUNTY, FLORIDA

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G. COST ESTIMATE AND RISK ANALYSIS

G1. GENERAL INFORMATION

Corps of Engineers cost estimates for planning purposes are prepared in accordance with the following guidance:

- Engineer Technical Letter (ETL) 1110-2-573, Construction Cost Estimating Guide for Civil Works, 30 September 2008
- Engineer Regulation (ER) 1110-1-1300, Cost Engineering Policy and General Requirements, 26 March 1993
- ER 1110-2-1302, Civil Works Cost Engineering, 15 September 2008
- ER 1110-2-1150, Engineering and Design for Civil Works Projects, 31 August 1999
- ER 1105-2-100, Planning Guidance Notebook, 22 April 2000, as amended
- Engineer Manual (EM) 1110-2-1304 (Tables Revised 31 March 2012), Civil Works Construction Cost Index System, 31 March 2000
- CECW-CP Memorandum for Distribution, Subject: Initiatives to Improve the Accuracy of Total Project Costs in Civil Works Feasibility Studies Requiring Congressional Authorization, 19 September 2007
- CECW-CE Memorandum for Distribution, Subject: Application of Cost Risk Analysis Methods to Develop Contingencies for Civil Works Total Project Costs, 3 July 2007
- Cost and Schedule Risk Analysis Process, March 2008

The goal of the cost estimates for the Port Everglades Harbor, Florida Feasibility Study is to present a Total Project Cost (Construction and Non-Construction costs) for the National Economic Development (NED) plan and the Locally Preferred Plan (LPP) at the current price level to be used for project justification/authorization. In addition, the costing efforts are intended to produce a final product (cost estimate) that is reliable and accurate, and that supports the definition of the Government's and the Non-Federal sponsor's obligations.

The cost estimating effort for the study also yielded a series of alternative plan formulation cost estimates for decision making. The cost estimates supporting the NED plan and the LPP are prepared in MCACES/MII format to the CWWBS sub-feature level. This estimate is supported by the preferred labor, equipment, materials and crew/production breakdown. A Cost and Schedule Risk Analysis (CSRA) is included that addresses project uncertainties and sets contingencies for each plan's cost items.

G.1.1 Recommended Alternative Plans

The final NED plan and LPP resulted directly from the plan formulation described above. The Economics Appendix fully describes the plan selection. The scopes of work for the NED plan LPP are found in the Engineering Appendix. The MCACES/MII cost estimate is based on that scope and is formatted in the CWWBS. The notes provided in the body of the estimate detail the estimate parameters and assumptions. These include pricing at the Fiscal Year 2015 price level (1 October 2014-30 September 2015).

The construction costs fall under the following feature codes:

- 02 Relocations
- 06 Fish and Wildlife Facilities
- 12 Navigation Ports and Harbors

The non-construction costs fall under the following feature codes:

- 01 Lands and Damages
- 30 Planning, Engineering and Design
- 31 Construction Management

G.1.2 Construction Cost

Construction costs were developed in MCACES/MII and include all major project components categorized under the appropriate CWWBS to the sub-feature level. The Total Project Costs on each plan contain contingencies that were determined as a result of the risk analysis. Additional information follows on the risk analysis.

In addition to the typical construction costs, this project also includes a Relocations cost for the relocation of aids to navigation, as well as non-construction Fish and Wildlife Facilities costs for the establishment of nutrient reduction measures, eco-restoration areas, and post construction monitoring.

G.1.3 Non-construction Cost

Non-construction costs typically include Lands and Damages (Real Estate), Planning Engineering & Design (PED) and Construction Management Costs (Supervision & Administration, S&A). PED costs for the preparation of contract plans and specifications (P&S) and Construction Management costs for the supervision and administration of the contract including Project Management and Contract Admin costs were provided by the PDT. Lands and Damages costs are provided by Real Estate and are described in the Real Estate Appendix

The main report details both cost allocation and cost apportionment for the Federal Government and the Non-Federal Sponsor. Also included in the main report are the Non-Federal Sponsor's obligations (items of local cooperation).

G.1.4 Plan Formulation Cost Estimates

For the plan formulation cost estimates, unit prices for dredging related work were developed in the Corps of Engineers Dredge Estimating Program (CEDEP) and then entered into MCACES/MII. Unit prices for the remaining major or variable construction elements were developed in MCACES/MII based on input from the PDT. Design details, information and assumptions are provided in the Engineering Appendix. Plan formulation alternatives and cost estimates did not include advanced maintenance or any associated advanced maintenance features.

Refer to Economics Section in the main report for final plan formulation cost tables.

G.1.5 Construction Schedule

A construction schedule was prepared utilizing input from the PDT and reflects all project construction components. The schedule considers not only durations of individual components of construction, but also the timing of construction contracts based on funding. The construction schedule was combined with the project schedule to create an overall schedule that was used for the generation of the Total Project Cost. The construction schedule will change as the project moves through the various project lifecycle phases. The overall project schedule is provided in this report.

G2. PLAN FORMULATION COST ESTIMATES

Refer to the Economics Section in the Main Report.

G3. NED & LPP COST ESTIMATE

The cost estimates were prepared for the Total Project costs, not just the initial construction.

G4. SCHEDULE

Refer to the Schedule in this report.

47' PROJECT

ID	Task Name	Duration	Start	Finish
1	**STUDY PHASE**	**714 days**	**Thu 4/25/13**	**Thu 4/9/15**
2	Complete econ modeling, NED determination, BCR analysis (DQC'd	27 days	Thu 4/25/13	Wed 5/22/13
3	TSP MS Read Ahead Materials at SAD/HQ & Legal Review	29 days	Thu 4/25/13	Fri 5/24/13
4	TSP MS Meeting and Approval	0 days	Fri 5/31/13	Fri 5/31/13
5	Complete Econ Appx, revised Feas Rpt, DQC and Legal Review	14 days	Fri 5/31/13	Fri 6/14/13
6	DEIS submittal to EPA	13 days	Fri 6/14/13	Thu 6/27/13
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8	Public Review (NEPA)	46 days	Fri 6/28/13	Tue 8/13/13
9	Public/Focus group meeting	2 days	Tue 7/23/13	Thu 7/25/13
10	ATR Review	28 days	Wed 6/19/13	Wed 7/17/13
11	IEPR Review (including final report backchecked)	89 days	Wed 6/19/13	Mon 9/16/13
12	VE Study	77 days	Fri 5/17/13	Fri 8/2/13
13	SAD/HQ Review	42 days	Fri 6/28/13	Fri 8/9/13
14	CZMA concurrency determination (MS)	350 days	Fri 6/28/13	Fri 6/13/14
15	Address public, ATR, IEPR, SAD/HQ, CZMA comments, Cost certification	67 days	Fri 7/5/13	Tue 9/10/13
16	Mitigation impact analysis and plan reformulation	95 days	Fri 8/30/13	Tue 12/3/13
17	NMFS prepares Biological Opinion	93 days	Wed 12/4/13	Fri 3/7/14
18	NMFS clarification letter re: BiOp, costs and econ updates	52 days	Mon 3/10/14	Thu 5/1/14
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21	REVISED Draft report DQC/Legal Reviews	10 days	Tue 9/2/14	Fri 9/12/14
22	REVISED Draft Feas and EIS, Cost Cert, ATR, IEPR, SAD QA, HQ policy compliance	21 days	Mon 9/15/14	Mon 10/6/14
23	***ATR certification/IEPR final report***	0 days	Mon 10/6/14	***Mon 10/6/14***
24	Final Draft Feas and EIS	5 days	Mon 10/6/14	Sat 10/11/14
25	Final Draft report DQC/Legal Reviews	5 days	Sun 10/12/14	Fri 10/17/14
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29	***HQ Final Review/Chief's Report Development/CWRB Prep***	36 days	Mon 11/10/14	***Tue 12/16/14***
30	CWRB/DCG-CEO decision to release final report (MS)	0 days	Wed 12/17/14	Wed 12/17/14
31	S&A Review, Interested Party, & EIS filing letters signed and sent to District	14 days	Thu 12/18/14	Thu 1/1/15
32	District sends letters/reports to State/agencies & files EIS	7 days	Fri 1/2/15	Fri 1/9/15
33	Notice of availability appears in Federal Register	0 days	Fri 1/16/15	Fri 1/16/15
34	Final NEPA, S&A Review Period (30 days)	30 days	Fri 1/16/15	Sun 2/15/15
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36	Final NEPA, S&A response letters mailed (SAD/HQ)	7 days	Tue 3/3/15	Tue 3/10/15
37	Documentation of Review Findings	82 days	Wed 12/17/14	Mon 3/9/15
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39	Review by Office of the Chief	14 days	Wed 3/25/15	Wed 4/8/15
40	Signature on Chief's Report (MS)	0 days	Thu 4/9/15	Thu 4/9/15
41				
42	**PED PHASE**	**905 days**	**Thu 4/9/15**	**Sat 9/30/17**
43	Design Agreement (DA) Initiated (Once Division Engineer's Transmittal Letter)	0 days	Thu 4/9/15	Thu 4/9/15
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45	DA Local Sponsor (LS) Concurrence Received	30 days	Fri 4/10/15	Sun 5/10/15
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47	DA Approved	30 days	Wed 5/13/15	Fri 6/12/15
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49	DA Executed USACE	30 days	Sun 7/12/15	Tue 8/11/15
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51	PED Complete P&S Investigations (After Sponsor Contributions)	210 days	Thu 10/1/15	Thu 4/28/16
52	PED Complete WQC	120 days	Mon 2/1/16	Tue 5/31/16
53	PED Complete P&S	487 days	Tue 5/31/16	Sat 9/30/17
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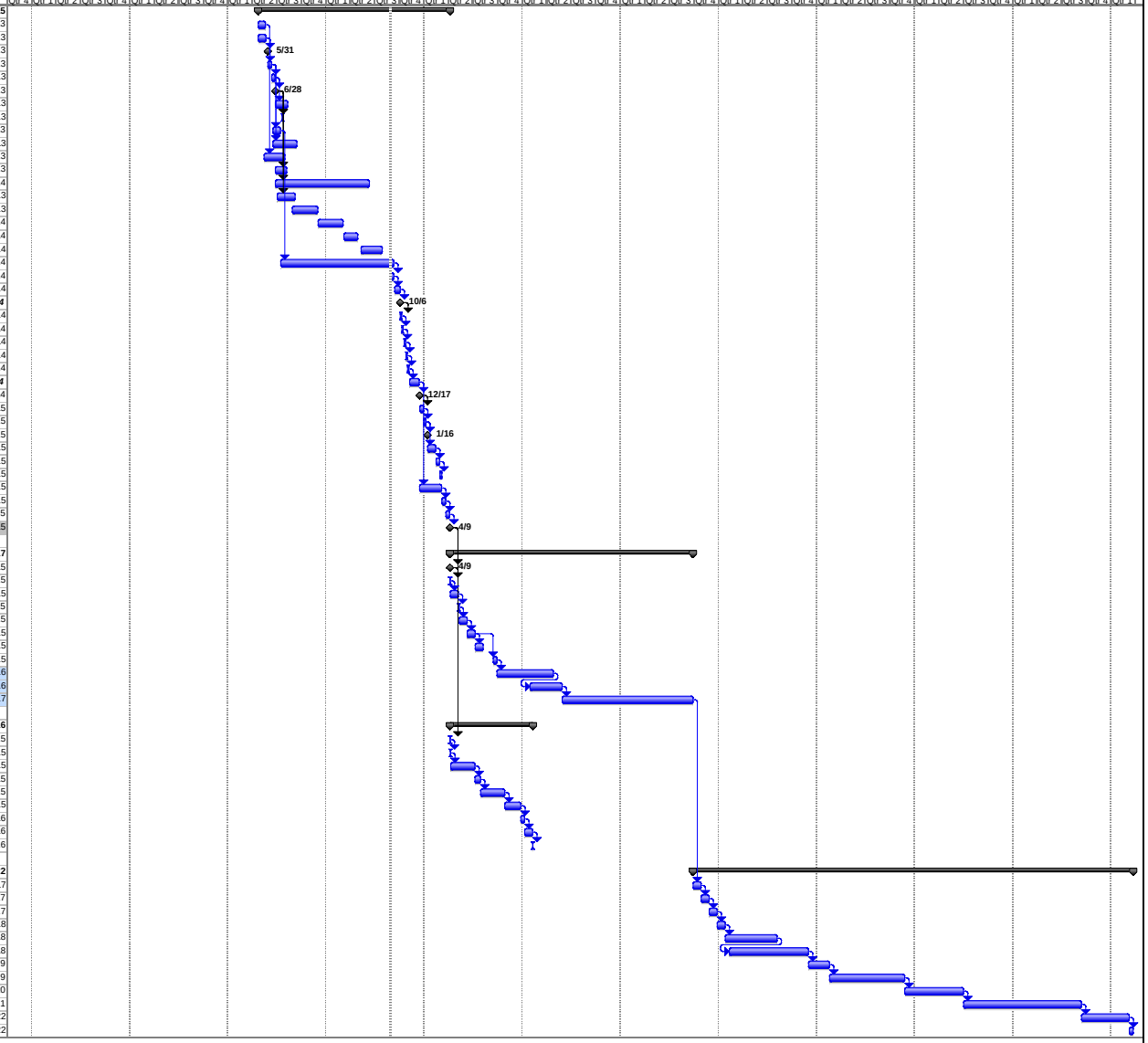
59	PCA submitted to HQ (once WQC received)	21 days	Sat 7/11/15	Sat 8/1/15
60	PCA Approved by ASA(CW)	90 days	Sat 8/1/15	Fri 10/30/15
61	PCA Executed by LS	60 days	Fri 10/30/15	Tue 12/29/15
62	PCA Executed by USACE	14 days	Tue 12/29/15	Tue 1/12/16
63	Receive Sponsor Contributions	30 days	Tue 1/12/16	Thu 2/11/16
64	Advertise (Contingent upon funding)	1 day	Thu 2/11/16	Fri 2/12/16
65				
66	**CONSTRUCTION PHASE - 47' PROJECT**	**1639 days**	**Sat 9/30/17**	**Sun 3/27/22**
67	Open Bids	30 days	Sat 9/30/17	Mon 10/30/17
68	Award	30 days	Mon 10/30/17	Wed 11/29/17
69	NTP	30 days	Wed 11/29/17	Fri 12/29/17
70	Mobilization	30 days	Fri 12/29/17	Sun 1/28/18
71	Rock Blasting	193 days	Sun 1/28/18	Thu 8/9/18
72	OEC Dredging	295 days	Mon 2/12/18	Tue 12/4/18
73	IEC Dredging	78 days	Tue 12/4/18	Wed 2/20/19
74	WIDE Dredging	280 days	Wed 2/20/19	Wed 11/27/19
75	MTB Dredging	219 days	Wed 11/27/19	Fri 7/3/20
76	SAC Dredging	439 days	Fri 7/3/20	Wed 9/15/21
77	TN Dredging	178 days	Wed 9/15/21	Sat 3/12/22
78	Demobilization	15 days	Sat 3/12/22	Sun 3/27/22



Project: Project Schedule REV 1
Date: Tue 8/26/14

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone

48' PROJECT

ID	Task Name	Duration	Start	Finish
1	**STUDY PHASE**	**714 days**	**Thu 4/25/13**	**Thu 4/9/15**
2	Complete econ modeling, NED determination, BCR analysis (DQC'd	27 days	Thu 4/25/13	Wed 5/22/13
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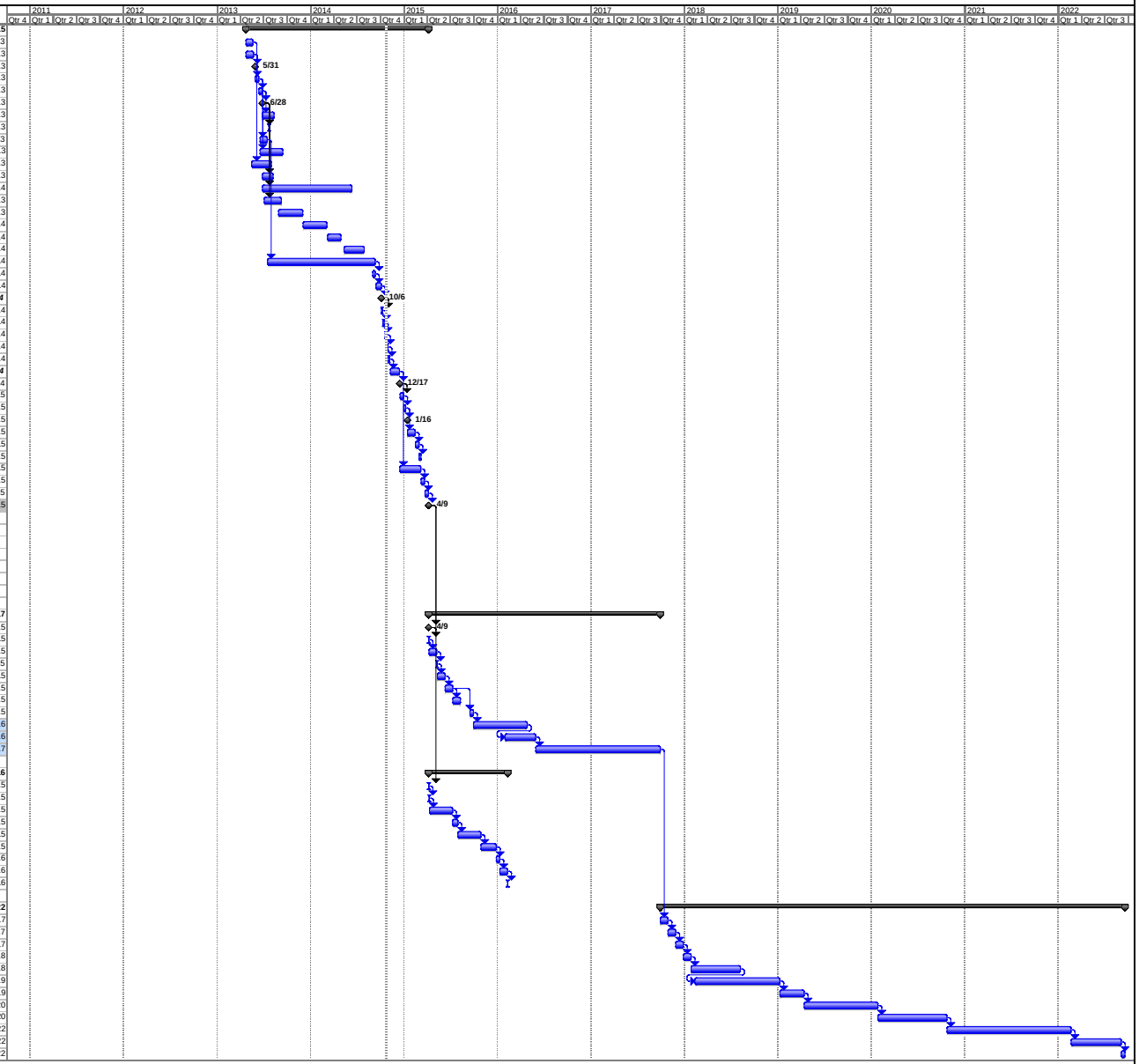
70	Receive Sponsor Contributions	30 days	Tue 1/12/16	Thu 2/11/16
71	Advertise (Contingent upon funding)	1 day	Thu 2/11/16	Fri 2/12/16
72				
73	**CONSTRUCTION PHASE - 48' PROJECT**	**1816 days**	**Sat 9/30/17**	**Tue 9/20/22**
74	Open Bids	30 days	Sat 9/30/17	Mon 10/30/17
75	Award	30 days	Mon 10/30/17	Wed 11/29/17
76	NTP	30 days	Wed 11/29/17	Fri 12/29/17
77	Mobilization	30 days	Fri 12/29/17	Sun 1/28/18
78	Rock Blasting	193 days	Sun 1/28/18	Thu 8/9/18
79	OEC Dredging	332 days	Mon 2/12/18	Thu 1/10/19
80	IEC Dredging	95 days	Thu 1/10/19	Mon 4/15/19
81	WIDE Dredging	288 days	Mon 4/15/19	Tue 1/28/20
82	MTB Dredging	270 days	Tue 1/28/20	Sat 10/24/20
83	SAC Dredging	485 days	Sat 10/24/20	Mon 2/21/22
84	TN Dredging	196 days	Mon 2/21/22	Mon 9/5/22
85	Demobilization	15 days	Mon 9/5/22	Tue 9/20/22



Project: Project Schedule REV 1
Date: Tue 10/21/14

Task | Split | Progress | Milestone | Summary | Project Summary | External Tasks | External Milestone | Deadline

G5. RISK AND UNCERTAINTY ANALYSIS

A Cost and Schedule Risk Analysis was conducted according to the procedures outlined in the manual entitled; “Cost and Schedule Risk Analysis Process” dated March 2008.

G.5.1 Risk Analysis Methods

The entire PDT participated in cost and schedule risk analysis brainstorming sessions to identify risks associated with the recommended plan. The risks were listed in the risk register and evaluated by the PDT. Assumptions were made as to the likelihood and impact of each risk item, as well as the probability of occurrence and magnitude of the impact if it were to occur. Adjustments were made to the analysis accordingly and the final contingency was established. The contingency was applied to each plan estimate in order to obtain the Total Project Cost.

G.5.2 Risk Analysis Results

Refer to the CSRA Report provided in this report.

US Army Corps of Engineers®

COST AND SCHEDULE RISK ANALYSIS
PORT EVERGLADES HARBOR
NATIONAL ECONOMIC DEVELOPMENT PLAN
BROWARD COUNTY, FLORIDA

Prepared for:

U.S. Army Corps of Engineers,
Jacksonville District

Prepared by:

U.S. Army Corps of Engineers,
Jacksonville District and

Civil Works Cost Engineering and ATR Mandatory Center of Expertise with Technical Expertise, Walla Walla

October 8, 2014

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Executive Summary

The purpose of this report is to document the results of the cost and schedule risk analysis (CSRA) performed for the Port Everglades Harbor feasibility study project. This report presents a recommendation for the total project cost and schedule contingencies based on CSRA results.

The scope of this CSRA report is to identify cost and schedule risks with a resulting recommendation for contingencies at the 80 percent confidence level using risk analysis processes as mandated by U.S. Army Corps of Engineers (USACE) Engineer Regulation (ER) 1110-2-1150, Engineering and Design for Civil Works, ER 1110-2-1302, Civil Works Cost Engineering, and Engineer Technical Letter 1110-2-573, Construction Cost Estimating Guide for Civil Works. This report presents the contingency results for both cost and schedule risks for both construction features and non-construction features. The CSRA does not include consideration for lifecycle costs.

Port Everglades Harbor is a major seaport located on the southeast coast of Florida. It is located within the cities of Hollywood, Dania Beach, and Fort Lauderdale, with immediate access to the Atlantic Ocean. The entrance of the Port is approximately 27 nautical miles north of Miami Harbor, Florida and 301 nautical miles south of Jacksonville Harbor, Florida.

To the east of the Port is a barrier island that contains a U.S. Navy facility, the Nova Southeastern University Oceanographic Center, a U.S. Coast Guard (USCG) facility, and John U. Lloyd Beach State Park and its adjacent beaches. South of the Dania Cutoff Canal is the West Lake Park area. West of the Port is Federal Highway (US Highway 1) which is flanked by the Fort Lauderdale/Hollywood International Airport. North of the Port is a mixture of small craft waterways and commercial and residential development.

The Port Everglades Harbor Feasibility Study was initiated in 2001 with the non- federal sponsor, Broward County. The primary purpose of conducting the feasibility study is to investigate improvements to the Federal navigation project at Port Everglades. The existing Federal Channel project depth of 42-feet does not provide adequate, safe depth for large tankers and container ships currently visiting the harbor. The next generation of container ships and oil tankers requires significantly more channel depth to operate efficiently. The National Economic Development (NED) plan, depth where the net benefits are the highest, has been identified to be 47 feet. The non-federal sponsor requested a Locally Preferred Plan (LPP) of 48 feet. There are positive net benefits at this depth. The Tentatively Selected Plan (TSP) is the LPP of 48 feet.

Summary of Findings

Table ES-1 provides the cost contingencies for NED plan calculated at selected confidence level intervals. Contingency was quantified as approximately $74.1 million at the 80 percent confidence level, which is about 26.3% of the base cost estimate of approximately $281.9 million. These results reflect contingencies based on both the cost and schedule risk analyses.

Table ES- 1 - NED Plan CSRA

Confidence Level (%)	Base Cost Estimate[1] + Contingency	Contingency ($)	Contingency (%)
5	$285,566,000	$3,655,000	1.3%
50	$328,883,000	$46,972,000	16.7%
80	**$356,009,000**	**$74,098,000**	**26.3%**
90	$371,323,000	$89,412,000	31.7%

Notes:

1. The NED Plan base cost estimate is $281,910,803.

The primary threats to the NED Plan cost estimate identified by the CSRA process are listed below. These threats include both direct cost impacts and the cost impacts of schedule delays.

Industry Availability/Bidding Climate: The relatively large contract size may limit field of interested bidders and increase the uncertainty of future costs. Joint ventures may be necessary due to the size of the contract. Schedule for this project could overlap with competing dredging projects which are preparing for New Panamax class ships.

Bonding Capacity: Competition may be limited due to bonding capacity issues. Joint ventures (JV's) will likely be necessary due to the size of the anticipated contract. Several market participants have existing JV agreements. Bonding capacity is also impacted by the number of dredging projects being performed in the same time frame.

Results of PED Studies Impact Costs: Further studies will be performed during the Planning Engineering and Design (PED) phase. The results of these studies could impact the cost estimate. Future geotechnical and environmental surveys have the greatest potential for impacts. New sea grass and coral surveys will be completed.

Feasibility Level Designs: Current design level is appropriate for feasibility level; however, designs will be refined during the PED phase. Refinement is likely to impact costs.

Table ES-2 provides the cost contingencies for LPP plan calculated at selected confidence level intervals. Contingency was quantified as approximately $78.0 million at the 80 percent confidence level, which is about 26.3% of the base cost estimate of approximately

$296.2 million. These results reflect contingencies based on both the cost and schedule risk analyses.

Table ES- 2 - LPP Plan CSRA

Confidence Level (%)	Base Cost Estimate[1] + Contingency	Contingency ($)	Contingency (%)
5	$302,214,000	$6,050,000	2.0%
50	$346,794,000	$50,630,000	17.1%
80	**$374,180,000**	**$78,016,000**	**26.3%**
90	$389,689,000	$93,525,000	31.6%

Notes:

1. The LPP Plan base cost estimate is $296,164,431.

The primary threats to the LPP Plan cost estimate identified by the CSRA process are listed below. These threats include both direct cost impacts and the cost impacts of schedule delays.

Industry Availability/Bidding Climate: The relatively large contract size may limit field of interested bidders and increase the uncertainty of future costs. Joint ventures may be necessary due to the size of the contract. Schedule for this project could overlap with competing dredging projects which are preparing for New Panamax class ships.

Bonding Capacity: Competition may be limited due to bonding capacity issues. Joint ventures (JV's) will likely be necessary due to the size of the anticipated contract. Several market participants have existing JV agreements. Bonding capacity is also impacted by the number of dredging projects being performed in the same time frame.

Results of PED Studies Impact Costs: Further studies will be performed during the Planning Engineering and Design (PED) phase. The results of these studies could impact the cost estimate. Future geotechnical and environmental surveys have the greatest potential for impacts. New sea grass and coral surveys will be completed.

Feasibility Level Designs: Current design level is appropriate for feasibility level; however, designs will be refined during the PED phase. Refinement is likely to impact costs.

Table ES-3, on the following page, provides a comparison of recommended contingency values for the major elements of the cost estimates for each plan. The contingency values presented in Table ES-3 are calculated at the 80 percent confidence level. The contingency values are not rounded and were calculated based on statistical analysis of the CSRA Monte Carlo simulation.

Recommendations

The project delivery team (PDT) should include the recommended contingency levels in the total project cost estimate for the Port Everglades Harbor project.

Project leadership should use of the outputs created during the CSRA effort as tools in future risk management processes. The risk register should be updated at each major project milestone. The results of the sensitivity analysis may also be used for response planning strategy and development. These tools should be used in conjunction with regular risk review meetings.

Project leadership should review risk items identified in the NED plan and LPP risk registers and add others, as required, throughout the project life-cycle. Risks should be reviewed for status and reevaluation (using qualitative measure, at a minimum) and placed on risk management watch lists if any risk's likelihood or impact significantly increases. Project leadership should also be mindful of the potential for secondary (new risks created specifically by the response to an original risk) and residual risks (risks that remain and have unintended impact following response).

Table ES- 3 - Recommended Contingency for WBS Features

Feature	Base Cost Estimate, Excluding Contingency ($)	Recommended Contingency ($)	Base Cost Estimate + Contingency ($)
NED Plan - 47'			
Wildlife Facilities & Sanctuary (Mitigation & Monitoring)	$40,316,657	$10,603,281	$50,919,938
Navigation Ports & Harbors (Dredging)	$230,318,620	$60,573,797	$290,892,417
Relocations (Aids to Navigation)	$147,703	$38,846	$186,549
Planning Engineering and Design	$4,453,000	$1,171,139	$5,624,139
Construction Management	$6,674,823	$1,755,478	$8,430,301
LPP - 48'			
Wildlife Facilities & Sanctuary (Mitigation & Monitoring)	$40,316,657	$10,603,281	$50,919,938
Navigation Ports & Harbors (Dredging)	$230,318,620	$60,573,797	$290,892,417
Relocations (Aids to Navigation)	$147,703	$38,846	$186,549
Planning Engineering and Design	$4,453,000	$1,171,139	$5,624,139
Construction Management	$6,674,823	$1,755,478	$8,430,301

1. Recommended contingency is based on the 80-percent confidence level CSRA.

1. Introduction

a) In July of 2013, Legis Consultancy, Inc. ("Legis") entered into an agreement with the United States Army Corps of Engineers (USACE) Jacksonville District to provide support for preparation of the Final Report Cost Appendix for the Port Everglades Harbor feasibility study project. This report documented the Cost and Schedule Risk Analysis (CSRA) prepared as an element of the Cost Appendix.

   The Legis CSRA support team included the following individuals:
   Gordon L. Ballentine, CFA; David R. Smart, JD, CCA, PMP; and Michael C. Ray, PE, CCE, PSP, PMP

b) In 2014 the project scope changed to include 'Coral Propagation'. This was done to satisfy the environmental requirements of the National Marine Fisheries Service (NMFS) necessary for issuance of a favorable Biological Opinion to support permit issuance.

2. Purpose

This purpose of this report is to document the results of the CSRA performed for the Port Everglades Harbor feasibility study project. This report presents a recommendation for the total project cost and schedule contingencies based on CSRA results.

3. Background

Port Everglades Harbor is a major seaport located on the southeast coast of Florida. It is located within the cities of Hollywood, Dania Beach, and Fort Lauderdale, with immediate access to the Atlantic Ocean. The entrance of the Port is approximately 27 nautical miles north of Miami Harbor, Florida and 301 nautical miles south of Jacksonville Harbor, Florida.

To the east of the Port is a barrier island that contains a U.S. Navy facility, the Nova Southeastern University Oceanographic Center, a U.S. Coast Guard (USCG) facility, and John U. Lloyd Beach State Park and its adjacent beaches. South of the Dania Cutoff Canal is the West Lake Park area. West of the Port is Federal Highway (US Highway 1) which is flanked by the Fort Lauderdale/Hollywood International Airport. North of the Port is a mixture of small craft waterways and commercial and residential development.

The Port Everglades Harbor Feasibility Study was initiated in 2001 with the non- federal sponsor, Broward County. The primary purpose of conducting the feasibility study is to investigate improvements to the Federal navigation project at Port Everglades. The existing Federal Channel project depth of 42-feet does not provide adequate, safe depth for large tankers and container ships currently visiting the harbor. The next generation of container

ships and oil tankers requires significantly more channel depth to operate efficiently. The National Economic Development (NED) plan, depth where the net benefits are the highest, has been identified to be 47 feet. The non-federal sponsor requested a Locally Preferred Plan (LPP) of 48 feet. There are positive net benefits at this depth. The Tentatively Selected Plan (TSP) is the LPP of 48 feet.

4. Report Scope

The scope of this CSRA report is to identify cost and schedule risks with a resulting recommendation for contingencies at the 80 percent confidence level using risk analysis processes as mandated by U.S. Army Corps of Engineers (USACE) Engineer Regulation (ER) 1110-2-1150, Engineering and Design for Civil Works, ER 1110-2-1302, Civil Works Cost Engineering, and Engineer Technical Letter 1110-2-573, Construction Cost Estimating Guide for Civil Works. This report presents the contingency results for both cost and schedule risks for both construction features and non-construction features. The CSRA does not include consideration for lifecycle costs.

4.1 Project Scope

The Port Everglades Harbor project technical scope, cost estimates and schedules were developed and presented by the Jacksonville District. Consequently, these documents serve as the basis for the CSRA. The cost estimate and schedule for the NED and LPP plans are provided in summary format as Appendix A.

CSRA development included extensive involvement of the Project Delivery Team (PDT) for risk identification and the development of the risk register for the NED plan. The analysis process evaluated the Micro Computer Aided Cost Estimating System (MCACES) cost estimate, project schedule, and funding profiles using Oracle Crystal Ball software to conduct a *Monte Carlo* simulation and statistical sensitivity analysis, per the guidance in Engineer Technical Letter (ETL) Construction Cost Estimating Guide for Civil Works, dated September 30, 2008.

4.2 USACE Risk Analysis Process

The risk analysis process for this study follows USACE Headquarters guidance as well as guidance provided by the USACE Cost Engineering MCX/TCX. The risk analysis process reflected within this report uses probabilistic cost and schedule risk analysis methods within the framework of the Oracle Crystal Ball software application. The risk analysis results are intended to serve several functions, one being the establishment of reasonable contingency reflective of various levels of confidence to successfully accomplish the project work within that established contingency amount. Furthermore, the process includes the identification and communication of important steps, logic, key assumptions, limitations, and decisions to help ensure that risk analysis results can be appropriately interpreted.

Risk analysis results are also intended to support decision making and risk management as the project progresses to completion. To fully recognize its benefits, CSRA should be considered as an ongoing process conducted concurrent to, and iteratively with, other important project processes such as scope and execution plan development, resource planning, procurement planning, cost estimating, budgeting and scheduling.

In addition to broadly defined risk analysis standards and recommended practices, this risk analysis was performed to substantially meet the guidance and recommendations of the following documents and sources:

- Cost and Schedule Risk Analysis Process guidance prepared by the Cost Engineering MCX/TCX.
- Memorandum from Major General Don T. Riley (US Army Director of Civil Works), dated July 3, 2007.
- Engineering and Construction Bulletin issued by James C. Dalton, P.E. (Chief, Engineering and Construction, Directorate of Civil Works), dated September 10, 2007.
- Engineering Regulation ER 1110-2-1150 dated August 31, 1999.
- Engineering Regulation ER 1110-2-1302 dated September 15, 2008.
- Engineering Technical Letter ETL 1110-2-573 dated September 30, 2008.

5. Methodology/Process

The risk analysis process used for the CSRA determined the probability of various cost outcomes and quantified the required contingency needed in the project cost estimate to achieve any desired level of cost confidence. A parallel process was also used to determine the probability of various project schedule duration outcomes and quantify the required schedule contingency (float) needed in the schedule to achieve any desired level of schedule confidence.

In simple terms, contingency is an amount added to an estimate (cost or schedule) to allow for items, conditions, or events for which the occurrence or impact is uncertain and that experience suggests may result in additional costs being incurred or additional time being required. The amount of contingency included in project control plans depends, at least in part, on the project leadership's willingness to accept risk of project overruns. The less risk that project leadership is willing to accept, the more contingency should be applied. The risk of overrun is expressed, in a probabilistic context, using confidence levels.

The Cost Engineering MCX/TCX guidance for CSRAs generally recommends budgeting based on the 80-percent confidence level for contingency calculation. An 80-percent confidence level results in greater contingency as compared to a 50-percent confidence level. The use of the 50-percent confidence level is a risk neutral approach, so use of the 80-percent

confidence level as a decision criteria is a risk averse approach (levels less than 50 percent would be risk seeking).

The risk analysis process uses *Monte Carlo* simulation to determine confidence levels and contingency. *Monte Carlo* simulation is a technique that computes or iterates the project cost or project schedule many times using input values selected at random from probability distributions of possible costs or durations, to calculate a distribution of possible project costs or durations. Consistent with Cost Engineering MCX/TCX guidance, the *Monte Carlo* simulation is facilitated computationally using the Oracle Crystal Ball software application which is an add-in to Microsoft Excel.

The primary steps, in functional terms, of the risk analysis process are described in the following subsections. Risk analysis results are provided in Section 7.

5.1 Identify and Qualitatively Analyze Project Risks

A project risk is an uncertain event or condition that, if it occurs, has an uncertain positive or negative effect on a project's objectives. This definition includes two key dimensions of risk: uncertainty and effect on a project's objectives (*i.e.*, cost and schedule objectives in the case of CSRA). When assessing the importance of a project risk, these two dimensions are both considered. The uncertainty dimension is described using the terms "likelihood" or "probability" and the effect is called "impact".

Members of the Port Everglades Harbor PDT identified and qualitatively analyzed risks during a facilitated risk identification and qualitative analysis meeting. The original risk identification and qualitative analysis effort was conducted 22 August 2013 in Jacksonville, Florida. Legis support team members participated in the risk meeting. A follow-up meeting was held on 3 September 2014 in which the PDT reconsidered all elements of the previous risk register, considered the conditions that had changed in the last year, and assessed the risk associated with the added project component of 'Coral Propagation'.

Both meetings focused on refinement of risks previously identified, as well as the identification and qualitative analysis of risks not previously identified. The risk meeting included capable and qualified representatives from multiple project disciplines and functions, including:

- Project Management
- Contracting
- Real Estate
- Engineering and Design
- Cost Engineering
- Construction
- Environmental
- Sponsor
- Risk Analysis

Risks identified by the PDT were categorized as to the likelihood of occurrence and the impact to the project if realized using the categories identified in Table 1.

Table 1- Risk Categories Used by the PDT

Likelihood of Occurrence Category
Very Unlikely
Unlikely
Likely
Very Likely
Impact Category
Negligible
Marginal
Significant
Critical
Crisis

After categorizing project risks in regard to likelihood of occurrence and impact, a risk matrix was used to prioritize individual risks for inclusion in quantitative analysis. The risk matrix is presented as Figure 1. Consistent with Cost Engineering MCX/TCX guidance for CSRA, only the moderate and high level risks are included in quantitative analysis. Low-level risks are not included, but remain within the risk register to document PDT discussions as well as support follow-on risk studies.

Figure 1- Risk Matrix Used by the PDT

Risk Matrix

Likelihood of Occurrence	**Impact or Consequence of Occurrence**				
	Negligible	**Marginal**	**Significant**	**Critical**	**Crisis**
Certain	**Moderate**	**Moderate**	**High**	**High**	**High**
Very Likely	**Low**	**Moderate**	**High**	**High**	**High**
Likely	**Low**	**Moderate**	**High**	**High**	**High**
Unlikely	**Low**	**Low**	**Moderate**	**Moderate**	**High**
Very Unlikely	**Low**	**Low**	**Low**	**Low**	**Moderate**

5.2 Quantitative Analysis of Project Risks

The quantitative impacts of project risks on cost and schedule objectives were analyzed using a combination of professional judgment, empirical data and analytical techniques. Similar to the identification and qualitative analysis process, quantitative analysis involved multiple project team disciplines and functions. However, the quantification process relied more extensively on collaboration between cost engineering and risk analysis team members with lesser inputs from other functions and disciplines.

5.3 Analysis of Contingency

Contingency was analyzed using the Oracle Crystal Ball software application. *Monte Carlo* analysis was performed by applying the project risks (quantified as probability density functions) to the appropriate Work Breakdown Structure (WBS) elements identified in the risk register. Contingency was calculated by applying only the moderate and high level risks identified through qualitative risk analysis. Low-level risks were not considered, but remain within the risk register to document PDT discussions as well as support follow-on risk studies.

For the NED plan cost estimate, cost risk contingency was calculated as the difference between the cost forecast at various confidence level intervals and the base cost estimate (excluding escalation). For the NED plan schedule, schedule contingency was calculated as the difference between the duration forecast at various confidence level intervals and the base schedule duration. The duration contingency was then used to calculate the cost impact of schedule delays (*i.e.*, escalation risk) that are included in the presentation of total cost contingency in Section 7.4.

6. Key Assumptions and Limitations

Key assumptions and limitations are those that are most likely to significantly affect the determinations of contingency presented in the CSRA. The key assumptions and limitations are important to help ensure that project leadership and other decision makers understand the steps, logic, and decisions made in the risk analysis, as well as any resultant implications on the use of outcomes and results.

Section 6.1 identifies key assumptions and limitations for the CSRA development process. Section 6.2 identifies key assumptions and limitations of the project cost estimate and schedule within the context of CSRA development.

6.1 CSRA Process

The following list identifies the key risk analysis assumptions and limitations within the context of the Port Everglades Harbor CSRA. For each item, the context is first provided and then followed by the key assumption or limitation.

1. Unknown Decisions or Decision Makers: The CSRA was prepared using a framework to identify cost and schedule risks with a resulting recommendation for contingencies at the 80 percent confidence level. The framework may generate results that are appropriate for use by a wide variety of decision makers or stakeholders; however, the assumed use CSRA result is to provide a contingency recommendation. Other uses by unknown decision makers may not be appropriate.

2. Dynamic Risks: Project risks are dynamic, not static, and should be evaluated regularly through all phases of the project. The CSRA is based on the identification and assessment of risks as of the date of this report. Reduced utility of current CSRA results should be assumed if the likelihood and impact of risks change over time.

3. Causal Relationships: With the exception of risks identified as correlated in the risk register, it is assumed that the impacts of risks are independent and that the realization of one risk does not cause the realization of another. Significant variance of the risk model results from actual project costs and schedules may be experienced if significant causal relationships exist between risks assumed to be independent.

4. Conservation of Market Pricing Risk: The CSRA assumes that market pricing risks are not created or destroyed but can only be transferred or shared at a price as a result of various contract acquisition strategies. As an example, it is assumed that a contractor will add a level of contingency to a fixed price bid, relative to a cost reimbursable bid, that is reflective of the risk transferred contractually from the Government to the contractor. Other aspects of contract acquisition strategies not related to market pricing, such as the management cost of modifications or claims, are not included in this assumption. Any contract acquisition strategy that actually transfers market pricing risk to a contractor at no cost to the Government is not reflected in the CSRA.

5. Unknown Unknown and Unknowable Risks: The CSRA process focuses on Known Known and Known Unknown risks and is not intended to quantify the impacts of Unknown Unknown or Unknowable risks. Significant variance of the risk analysis results from actual project costs may be experienced if Unknown Unknown or Unknowable risks are experienced. The following definitions of these project risk categories may be useful for understanding this limitation:

- A risk is a Known Known if it can be identified and there is no uncertainty in regard to its likelihood and impact.
- A risk is a Known Unknown if it can be identified but there is uncertainty in regard to its likelihood, impact or both.
- A risk is an Unknown Unknown if it can be identified; there is uncertainty in regard to its likelihood, impact or both; but the project team did not conceive of the risk during the risk identification process.
- A risk is Unknowable if the existence of the risk is not predictable.

6. Variance-Based Sensitivity Analysis: The Oracle Crystal Ball software uses a statistical measure (contribution to variance) that approximates the importance of each risk contributing to variability of cost outcomes during *Monte Carlo* simulation. In variance-based sensitivity analysis, expectation values have to be evaluated to generate a global sensitivity measure. Because expectation values are means (probability-weighted averages), using the importance measures to calculate the contingency associated with a risk at any given confidence level would generally not be meaningful. Variance-based sensitivity analysis may provide misleading results for correlated risks.

6.2 Cost Estimate and Schedule

The following list identifies key assumptions and limitations of the project cost estimate and schedule within the context of CSRA development.

1. Acquisition Strategy: The cost estimate is based on a single, five-year prime contract with a large business dredging contractor. It is anticipated that the prime contractor will subcontract non-dredging work including bulkhead construction, mitigation construction work and environmental monitoring. The single, five-year contract assumption may be impacted by funding stream limitations. Unanticipated funding stream impacts may result in contractor claims, multiple contracts or multiple mobilizations.

2. Funding: Future Federal funding levels are uncertain. Incremental funding is anticipated. Funding levels less than required to support the project schedule may result in additional years of work.

3. Level of Design Development: Current design level is appropriate for feasibility level; however, designs will be refined during the PED phase. Refinement is likely to impact costs and may impact schedule assumptions.

4. Escalation: No escalation is applied in the MII cost estimate. Contractors are likely to include contingency in their bids to cover potential cost escalation and escalation risk over the five year contract period.

5. Environmental Concerns and Permitting: Specific environmental impacts and appropriate mitigation will be more precisely identified during the PED phase. Turbidity monitoring and Endangered Species Observer costs are currently included in the estimate. Permits may be untimely. Legal challenges may occur during National Environmental Policy Act (NEPA) coordination and permit authorizations. Administrative challenge to Water Quality Certification (WQC) certification/permit is likely.

6. Real Estate: No real estate acquisition planned.

7. Equipment and Labor Availability/Bidding Climate: Cost estimate assumptions for equipment and labor availability are typical for construction dredging projects. The relatively large contract size/duration may limit the field of capable bidders and increase the uncertainty of future costs. Joint ventures may be necessary due to the size of the contract. Schedule for this project could overlap with competing dredging projects which are preparing for New Panamax class ships.

7. Results

The results of the CSRA for the Port Everglades Harbor deepening are provided in the following sections. The CSRA process involves developing a risk register and then performing independent cost estimate and schedule risk analyses which are combined to capture the cost impact of schedule delays. The risk register is described in Section 7.1; cost estimate risk analysis is described in Section 7.2; schedule risk analysis are described in Section 7.3; and combined cost and schedule risk analysis is described in Section 7.4. In addition to cost estimate and schedule risk analysis results, sensitivity analyses are presented to provide decision makers with an understanding of variability and the key contributors to the cause of this variability.

7.1 Risk Registers

A risk register is a tool commonly used in project risk management. The risk register developed for the NED plan and LPP are included as Appendix B. The risk registers presented in Appendix B are the result of a two-step development process. The initial step was development of the initial risk registers by the PDT during the Identify and Qualitatively Analyze Project Risks process described in Section 5.1. The second step of risk register development was the refinement of the initial risk registers based on the results of the Quantitative Analysis of Project Risks process described in Section 5.2. The refined risk registers presented in Appendix B are considered final for the CSRA and should serve as the basis of future project risk management activities. Table 2 provides a summary of the risk register for the NED plan.

Table 2- Risk Register Summary

Risk Register Summary	NED	LPP
Total Number of Individual Risks	48	48
Number of Moderate and High Level Cost Risks	20	20
Number of Moderate and High Level Schedule Risks	8	8

7.2 Cost Risk Analysis

The results of the cost risk analysis for the NED plan and LPP are provided in the following subsections. Note that the combined cost and schedule risk analyses are provided in Section 7.4. The cost risk analyses provided in this section do not include the cost impact of schedule delays.

In addition to risk analysis results, a sensitivity analysis is provided for each plan's cost and schedule risk analysis. Sensitivity analysis is important because it serves to rank the relative importance of each risk in regard to its contribution to project contingency. Key cost and schedule risk drivers identified in the sensitivity analysis can be used to support development of a risk management plan that will facilitate control of project risks and their potential impacts throughout the project lifecycle.

The risks considered as key or primary cost drivers are ranked in order of importance in sensitivity analysis bar charts. A longer bar in the sensitivity analysis chart represents a greater potential impact to total project cost.

7.2.1 NED Cost Risk Analysis

Table 3 provides the cost contingencies for the NED plan calculated at various confidence level intervals. Cost contingency was quantified as approximately $67.1 million at the 80 percent confidence level, which is about 23.8% of the base cost estimate of approximately $281.9 million.

Table 3- NED Cost Risk Analysis

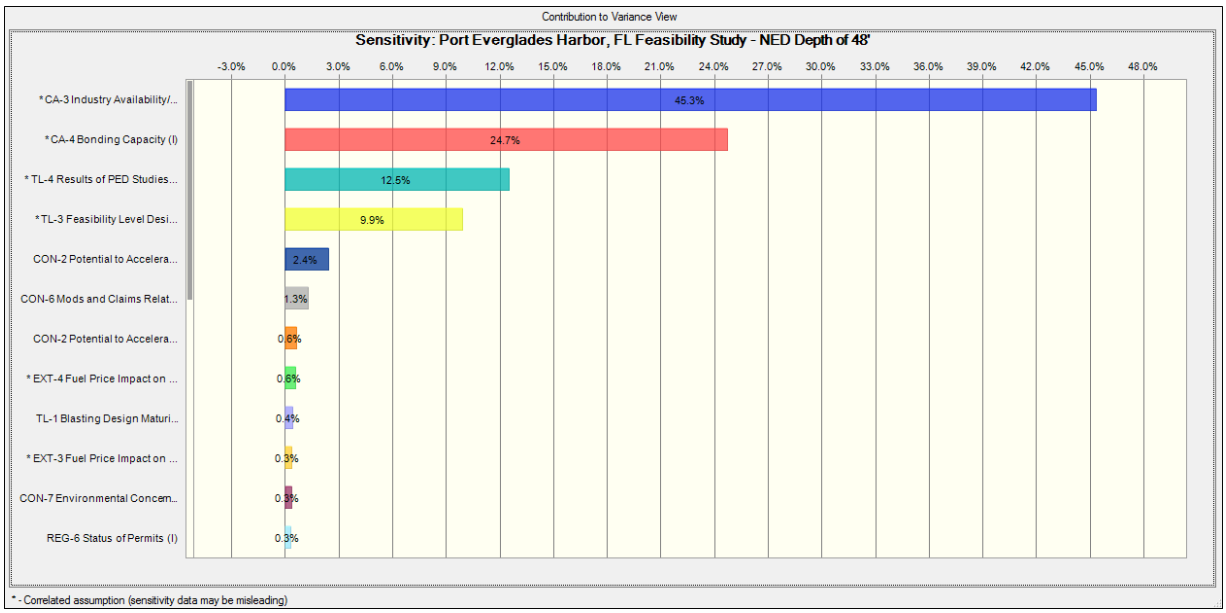
Confidence Level (%)	Base Cost Estimate[1] + Contingency	Contingency[2] ($)	Contingency (%)
0	$258,223,810	($23,686,993)	-8.4%
5	$281,201,871	($708,932)	-0.3%
10	$289,894,490	$7,983,687	2.8%
15	$295,699,046	$13,788,243	4.9%
20	$301,171,431	$19,260,628	6.8%
25	$305,498,960	$23,588,157	8.4%
30	$308,591,829	$26,681,026	9.5%
35	$313,329,588	$31,418,784	11.1%
40	$316,529,970	$34,619,166	12.3%
45	$319,444,396	$37,533,593	13.3%
50	$322,886,207	$40,975,404	14.5%
55	$326,439,274	$44,528,471	15.8%
60	$330,184,377	$48,273,574	17.1%
65	$333,292,919	$51,382,116	18.2%
70	$337,948,831	$56,038,027	19.9%
75	$342,018,118	$60,107,315	21.3%
80	**$349,056,473**	**$67,145,670**	**23.8%**
85	$355,633,664	$73,722,861	26.2%
90	$363,815,524	$81,904,720	29.1%
95	$379,486,715	$97,575,911	34.6%
100	$443,237,613	$161,326,810	57.2%

Notes: 1. The NED Plan base cost estimate is $ $281,910,803.

2. Negative contingencies indicate cost or schedule outcomes that are less than the base (deterministic) cost estimate or schedule.

Figure 2 presents a sensitivity analysis that includes the moderate and high level cost risks identified in the risk register for the NED Plan.

Figure 2- NED Plan Cost Risk Sensitivity Analysis



Note: Variance-based sensitivity analysis provides quantitative information about the importance of individual project risks; however, extrapolations or ancillary uses of the information are not recommended. Risks followed by an asterisk are correlated with one or more other project risks.
All risks contributing at least 0.1% of variance are included in the figure.

The primary threats to the NED Plan cost estimate identified through sensitivity analysis are as follows:

Industry Availability/Bidding Climate: The relatively large contract size may limit field of interested bidders and increase the uncertainty of future costs. Joint ventures may be necessary due to the size of the contract. Schedule for this project could overlap with competing dredging projects which are preparing for New Panamax class ships.

Bonding Capacity: Competition may be limited due to bonding capacity issues. Joint ventures (JV's) will likely be necessary due to the size of the anticipated contract. Several market participants have existing JV agreements. Bonding capacity is also impacted by the number of dredging projects being performed in the same time frame.

Results of PED Studies Impact Costs: Further studies will be performed during the Planning Engineering and Design (PED) phase. The results of these studies could impact the cost estimate. Future geotechnical and environmental surveys have the greatest potential for impacts. New sea grass and coral surveys will be completed.

7.2.2 LPP Cost Risk Analysis

Table 4 provides the cost contingencies for the LPP calculated at various confidence level intervals. Cost contingency was quantified as approximately $70.7 million at the 80 percent confidence level, which is about 23.9% of the base cost estimate of approximately $296.1 million.

Table 4- LPP Cost Risk Analysis

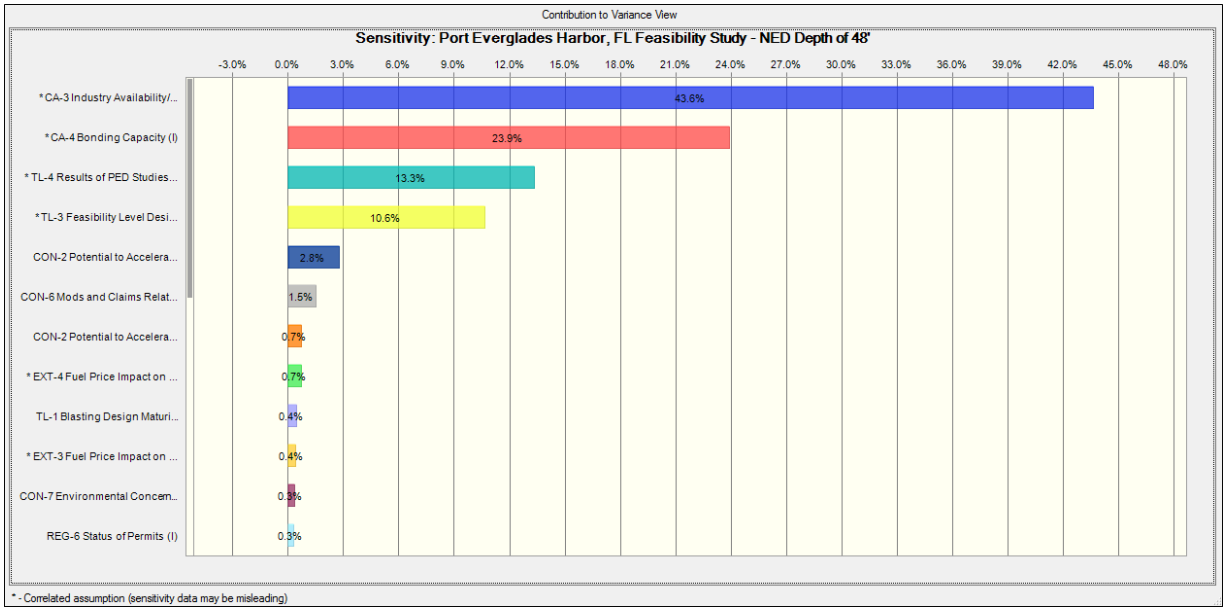
Confidence Level (%)	Base Cost Estimate[1] + Contingency	Contingency[2] ($)	Contingency (%)
0	$273,550,682	($22,613,749)	-7.6%
5	$297,628,747	$1,464,315	0.5%
10	$306,105,232	$9,940,801	3.4%
15	$312,594,777	$16,430,345	5.5%
20	$317,813,582	$21,649,151	7.3%
25	$322,163,457	$25,999,025	8.8%
30	$326,019,433	$29,855,002	10.1%
35	$330,310,024	$34,145,593	11.5%
40	$334,060,536	$37,896,105	12.8%
45	$336,869,530	$40,705,098	13.7%
50	$340,493,258	$44,328,827	15.0%
55	$344,434,379	$48,269,948	16.3%
60	$347,981,795	$51,817,364	17.5%
65	$351,048,457	$54,884,026	18.5%
70	$355,391,418	$59,226,986	20.0%
75	$359,709,690	$63,545,258	21.5%
80	**$366,876,027**	**$70,711,596**	**23.9%**
85	$373,112,050	$76,947,619	26.0%
90	$381,802,399	$85,637,968	28.9%
95	$397,207,784	$101,043,353	34.1%
100	$462,528,162	$166,363,730	56.2%

Notes: 1. The NED Plan base cost estimate is $296,164,431.

2. Negative contingencies indicate cost or schedule outcomes that are less than the base (deterministic) cost estimate or schedule.

Figure 3 presents a sensitivity analysis that includes the moderate and high level cost risks identified in the risk register for the LPP.

Figure 3- LPP Cost Risk Sensitivity Analysis



Note: Variance-based sensitivity analysis provides quantitative information about the importance of individual project risks; however, extrapolations or ancillary uses of the information are not recommended. Risks followed by an asterisk are correlated with one or more other project risks. All risks contributing at least 0.1% of variance are included in the figure.

The primary threats to the LPP cost estimate identified through sensitivity analysis are as follows:

Industry Availability/Bidding Climate: The relatively large contract size may limit field of interested bidders and increase the uncertainty of future costs. Joint ventures may be necessary due to the size of the contract. Schedule for this project could overlap with competing dredging projects which are preparing for New Panamax class ships.

Bonding Capacity: Competition may be limited due to bonding capacity issues. Joint ventures (JV's) will likely be necessary due to the size of the anticipated contract. Several market participants have existing JV agreements. Bonding capacity is also impacted by the number of dredging projects being performed in the same time frame.

Results of PED Studies Impact Costs: Further studies will be performed during the Planning Engineering and Design (PED) phase. The results of these studies could impact the cost estimate. Future geotechnical and environmental surveys have the greatest potential for impacts. New sea grass and coral surveys will be completed.

7.3 Schedule Risk Analysis

The results of the schedule risk analysis for the NED plan and LPP are provided in the following subsections. In addition to risk analysis results, a sensitivity analysis is provided for each plan.

7.3.1 NED Plan Schedule Risk Analysis

Table 5 provides the schedule duration contingencies for the NED plan calculated at various confidence level intervals. Schedule duration contingency was quantified as about 32.1 months at the 80 percent confidence level (about 38.2% of the baseline schedule duration of approximately 84 months).

Table 5- NED Plan Schedule Risk Analysis

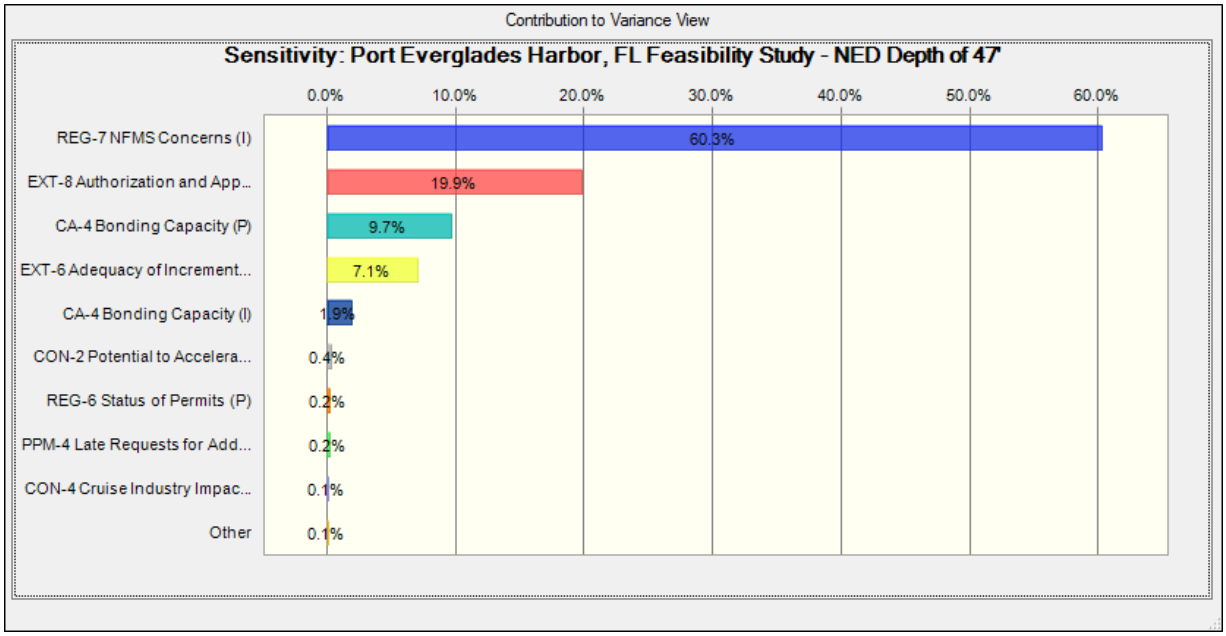
Confidence Level (%)	Duration[1] + Contingency (months)	Contingency (months)	Contingency (%
0	100.3	16.3	19.4%
5	104.2	20.2	24.1%
10	105.7	21.7	25.8%
15	106.8	22.8	27.1%
20	107.5	23.5	28.0%
25	108.3	24.3	28.9%
30	109.0	25.0	29.8%
35	109.7	25.7	30.7%
40	110.4	26.4	31.5%
45	111.1	27.1	32.2%
50	111.7	27.7	33.0%
55	112.3	28.3	33.7%
60	112.9	28.9	34.4%
65	113.6	29.6	35.2%
70	114.3	30.3	36.0%
75	115.1	31.1	37.0%
80	**116.1**	**32.1**	**38.2%**
85	117.1	33.1	39.5%
90	118.6	34.6	41.2%
95	120.1	36.1	43.0%
100	124.6	40.6	48.3%

Note:

1. The base NED Plan schedule duration is approximately 84 months.

Figure 4 presents a sensitivity analysis that includes the moderate and high level schedule risks identified in the risk register for the NED plan.

Figure 4- NED Plan Schedule Risk Sensitivity Analysis



Note: Variance-based sensitivity analysis provides quantitative information about the importance of individual project risks; however, extrapolations or ancillary uses of the information are not recommended.

The primary threats to the NED Plan schedule identified through sensitivity analysis are as follows:

NFMS Concerns: The state and federal regulatory agencies have given the EIS favorable reviews with the exception of NMFS. Possibility exists that NMFS will elevate their concerns.

Authorization and Appropriation: Future Federal funding levels are uncertain. Incremental funding is anticipated. Funding levels less than required to support the project schedule may result in additional years of work.

Bonding Capacity: Competition may be limited due to bonding capacity issues.

Adequacy of Incremental Funding: Actual project funding may not be sufficient to achieve schedule.

7.3.2 LPP Plan Schedule Risk Analysis

Table 6 provides the schedule duration contingencies for the NED plan calculated at various confidence level intervals. Schedule duration contingency was quantified as about 32.1 months at the 80 percent confidence level (about 38.2% of the baseline schedule duration of approximately 84 months).

Table 6- LPP Plan Schedule Risk Analysis

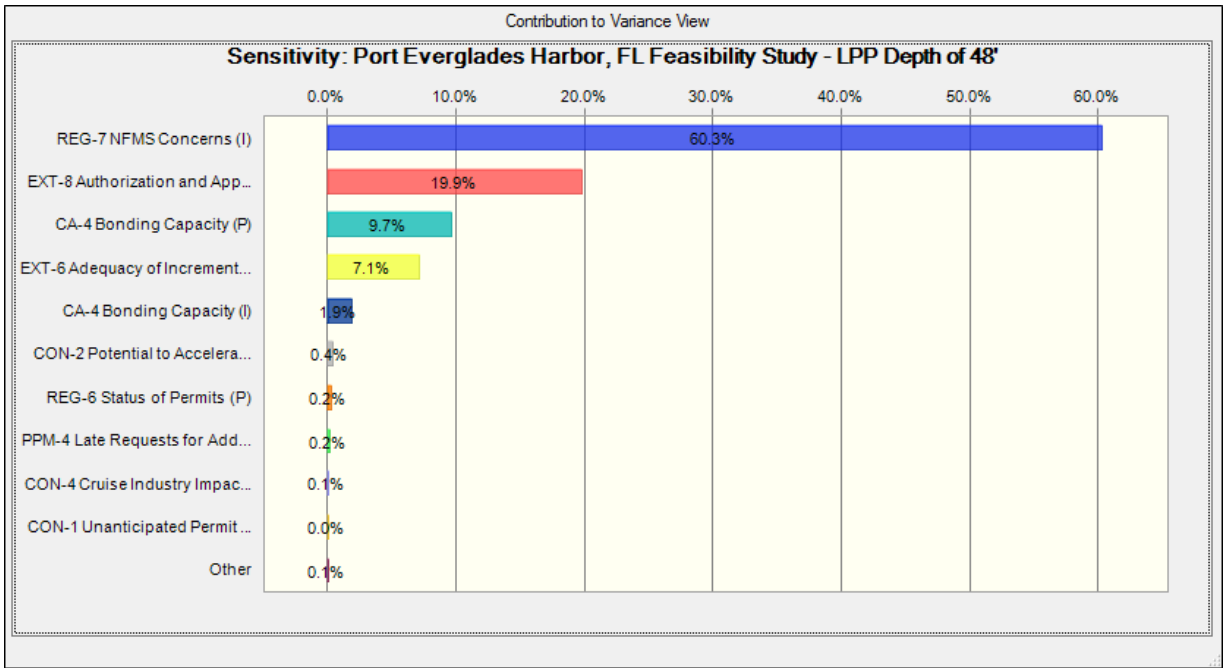
Confidence Level (%)	Duration[1] + Contingency (months)	Contingency (months)	Contingency (%)
0	100.3	16.3	19.4%
5	104.2	20.2	24.1%
10	105.7	21.7	25.8%
15	106.8	22.8	27.1%
20	107.5	23.5	28.0%
25	108.3	24.3	28.9%
30	109.0	25.0	29.8%
35	109.7	25.7	30.7%
40	110.4	26.4	31.5%
45	111.1	27.1	32.2%
50	111.7	27.7	33.0%
55	112.3	28.3	33.7%
60	112.9	28.9	34.4%
65	113.6	29.6	35.2%
70	114.3	30.3	36.0%
75	115.1	31.1	37.0%
80	**116.1**	**32.1**	**38.2%**
85	117.1	33.1	39.5%
90	118.6	34.6	41.2%
95	120.1	36.1	43.0%
100	124.6	40.6	48.3%

Note:

1. The base LPP Plan schedule duration is approximately 84 months.

Figure 5 presents a sensitivity analysis that includes the moderate and high level schedule risks identified in the risk register for the LPP plan.

Figure 5- LPP Plan Schedule Risk Sensitivity Analysis



Note: Variance-based sensitivity analysis provides quantitative information about the importance of individual project risks; however, extrapolations or ancillary uses of the information are not recommended.

The primary threats to the NED Plan schedule identified through sensitivity analysis are as follows:

NFMS Concerns: The state and federal regulatory agencies have given the EIS favorable reviews with the exception of NMFS. Possibility exists that NMFS will elevate their concerns.

Authorization and Appropriation: Future Federal funding levels are uncertain. Incremental funding is anticipated. Funding levels less than required to support the project schedule may result in additional years of work.

Bonding Capacity: Competition may be limited due to bonding capacity issues.

Adequacy of Incremental Funding: Actual project funding may not be sufficient to achieve schedule.

7.4 Combined Cost and Schedule Risk Analysis

The results of the combined cost and schedule risk analysis for the NED plan and LPP are provided in the following subsections. The results provided in this section include the cost impact of schedule delays (*i.e.*, escalation risk).

7.4.1 NED Plan CSRA

Table 7 provides the cost contingencies for the NED plan calculated at various confidence level intervals. Contingency was quantified as approximately $74.1 million at the 80 percent confidence level, which is about 26.3% of the base cost estimate of approximately $281.9 million. The values presented in Table 7 are presented in graphic format in Figure 6.

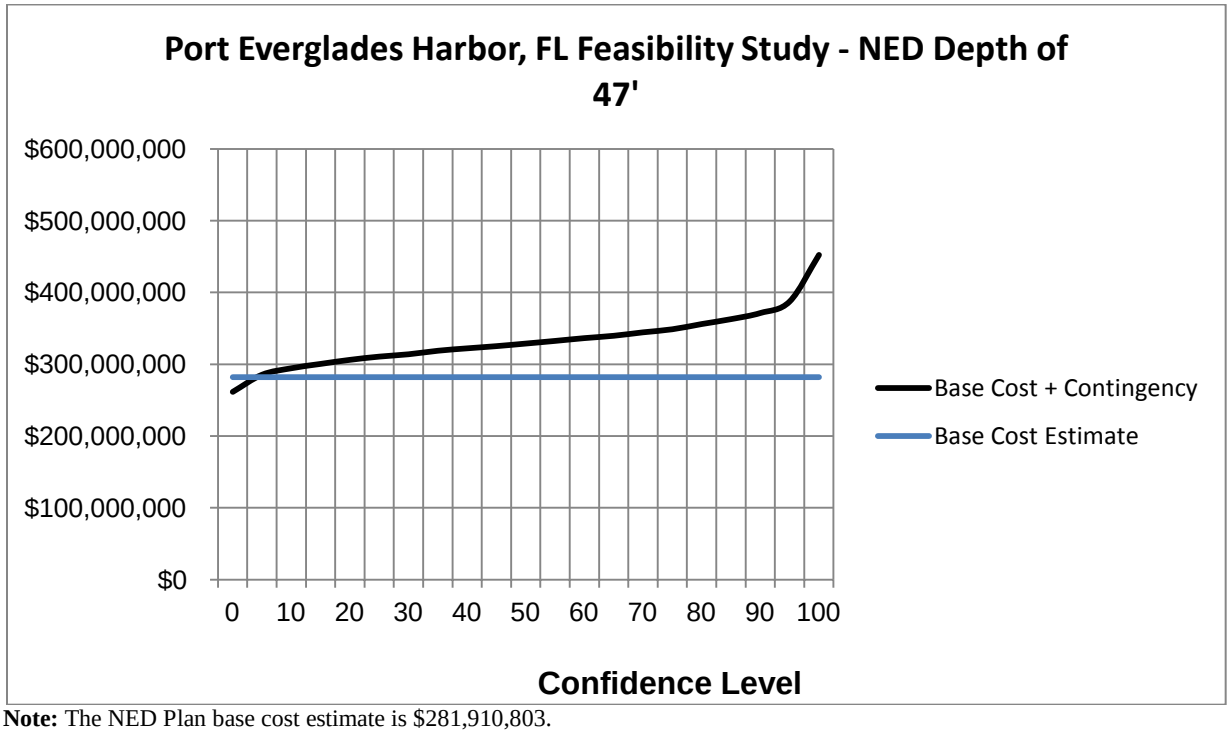
Table 7- NED Plan CSRA

Confidence Level (%)	Base Cost Estimate[1] + Contingency	Contingency[2] ($)	Contingency (%)
0	$261,740,000	($20,171,000)	-7.2%
5	$285,566,000	$3,655,000	1.3%
10	$294,569,000	$12,658,000	4.5%
15	$300,613,000	$18,702,000	6.6%
20	$306,256,000	$24,345,000	8.6%
25	$310,744,000	$28,833,000	10.2%
30	$313,997,000	$32,086,000	11.4%
35	$318,895,000	$36,984,000	13.1%
40	$322,246,000	$40,335,000	14.3%
45	$325,301,000	$43,390,000	15.4%
50	$328,883,000	$46,972,000	16.7%
55	$332,567,000	$50,656,000	18.0%
60	$336,443,000	$54,532,000	19.3%
65	$339,702,000	$57,791,000	20.5%
70	$344,499,000	$62,588,000	22.2%
75	$348,749,000	$66,838,000	23.7%
80	**$356,009,000**	**$74,098,000**	**26.3%**
85	$362,818,000	$80,907,000	28.7%
90	$371,323,000	$89,412,000	31.7%
95	$387,327,000	$105,416,000	37.4%
100	$452,059,000	$170,148,000	60.4%

Notes:

1. The NED Plan base cost estimate is $281,910,803.
2. Negative contingencies indicate cost or schedule outcomes that are less than the base (deterministic) cost estimate or schedule.

Figure 6- NED Plan CSRA



Note: The NED Plan base cost estimate is $281,910,803.

7.4.2 LPP CSRA

Table 8 provides the cost contingencies for the LPP calculated at various confidence level intervals. Contingency was quantified as approximately $78.0 million at the 80 percent confidence level, which is about 26.3% of the base cost estimate of approximately $296.3 million. The values presented in Table 8 are presented in graphic format in Figure 7.

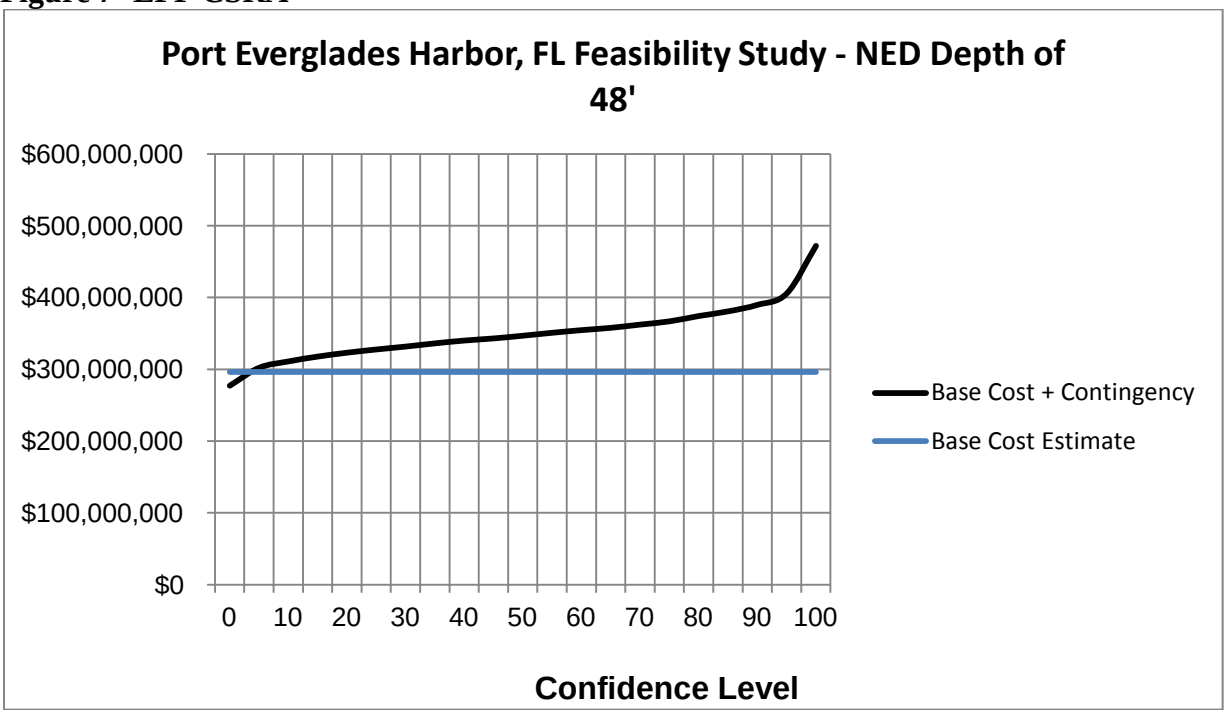
Table 8- LPP CSRA

Confidence Level (%)	Base Cost Estimate[1] + Contingency	Contingency[2] ($)	Contingency (%)
0	$277,245,000	($18,919,000)	-6.4%
5	$302,214,000	$6,050,000	2.0%
10	$311,016,000	$14,852,000	5.0%
15	$317,758,000	$21,594,000	7.3%
20	$323,155,000	$26,991,000	9.1%
25	$327,673,000	$31,509,000	10.6%
30	$331,698,000	$35,534,000	12.0%
35	$336,157,000	$39,993,000	13.5%
40	$340,066,000	$43,902,000	14.8%
45	$343,022,000	$46,858,000	15.8%
50	$346,794,000	$50,630,000	17.1%
55	$350,872,000	$54,708,000	18.5%
60	$354,557,000	$58,393,000	19.7%
65	$357,782,000	$61,618,000	20.8%
70	$362,273,000	$66,109,000	22.3%
75	$366,781,000	$70,617,000	23.8%
80	**$374,180,000**	**$78,016,000**	**26.3%**
85	$380,660,000	$84,496,000	28.5%
90	$389,689,000	$93,525,000	31.6%
95	$405,445,000	$109,281,000	36.9%
100	$471,796,000	$175,632,000	59.3%

Notes:

1. The LPP base cost estimate is $296,264,431.
2. Negative contingencies indicate cost or schedule outcomes that are less than the base (deterministic) cost estimate or schedule.

Figure 7- LPP CSRA



Note: The LPP base cost estimate is $296,264,431.

APPENDIX A
Cost Estimates and Schedules

Port Everglades Harbor, FL Feasibility Study - NED Depth of 47'	**$281,910,803.37**
Construction Costs	**$257,885,126.17**
Navigation Ports & Harbors	**$257,885,126.17**
Outter Entrance Channel - 54'	$43,866,934.94
Inner Entrance Channel - 47'	$6,109,512.10
Main Turning Basins - 47'	$43,303,265.89
Widener - 47'	$21,758,568.52
Southport Access Channel - 47'	$109,590,511.64
Turning Notch - 47'	$33,256,333.09
Non-Construction Costs	**$24,025,677.20**
Relocations	**$0.00**
Cemetery, Utilities, & Structure	**$0.00**
Utilities	**$0.00**
FPL Utility Relocation Cost (Southport Access Channel)	$0.00
Fish and Wildlife Facilities	**$12,897,854.20**
Wildlife Facilities & Sanctuary	**$12,897,854.20**
Habitat and Feeding Facilities	**$12,897,854.20**
Post Construction Mitigation Monitoring and Coral Propagation	$12,897,854.20
Planning, Engineering and Design	**$4,453,000.00**
PED	**$4,453,000.00**
Cost Estimates	**$4,453,000.00**
Planning, Engineering & Design Cost Estimate	$4,453,000.00
Construction Management	**$6,674,823.00**
Construction Contracts	**$6,674,823.00**
Construction Contracts	**$6,674,823.00**
Construction Management	$6,674,823.00

47' PROJECT

ID	Task Name	Duration	Start	Finish
1	**STUDY PHASE**	**714 days**	**Thu 4/25/13**	**Thu 4/9/15**
2	Complete econ modeling, NED determination, BCR analysis (DQC'd	27 days	Thu 4/25/13	Wed 5/22/13
3	TSP MS Read Ahead Materials at SAD/HQ & Legal Review	29 days	Thu 4/25/13	Fri 5/24/13
4	TSP MS Meeting and Approval	0 days	Fri 5/31/13	Fri 5/31/13
5	Complete Econ Appx, revised Feas Rpt, DQC and Legal Review	14 days	Fri 5/31/13	Fri 6/14/13
6	DEIS submittal to EPA	13 days	Fri 6/14/13	Thu 6/27/13
7	EPA Publishes Notice of Availability in Fed Register	0 days	Fri 6/28/13	Fri 6/28/13
8	Public Review (NEPA)	46 days	Fri 6/28/13	Tue 8/13/13
9	Public/Focus group meeting	2 days	Tue 7/23/13	Thu 7/25/13
10	ATR Review	28 days	Wed 6/19/13	Wed 7/17/13
11	IEPR Review (including final report backchecked)	89 days	Wed 6/19/13	Mon 9/16/13
12	VE Study	77 days	Fri 5/17/13	Fri 8/2/13
13	SAD/HQ Review	42 days	Fri 6/28/13	Fri 8/9/13
14	CZMA concurrency determination (MS)	350 days	Fri 6/28/13	Fri 6/13/14
15	Address public, ATR, IEPR, SAD/HQ, CZMA comments, Cost certification	67 days	Fri 7/5/13	Tue 9/10/13
16	Mitigation impact analysis and plan reformulation	95 days	Fri 8/30/13	Tue 12/3/13
17	NMFS prepares Biological Opinion	93 days	Wed 12/4/13	Fri 3/7/14
18	NMFS clarification letter re: BiOp, costs and econ updates	52 days	Mon 3/10/14	Thu 5/1/14
19	NED plan policy determination	79 days	Tue 5/13/14	Thu 7/31/14
20	Prepare REVISED Draft Feas and EIS	421 days	Thu 7/18/13	Fri 9/12/14
21	REVISED Draft report DQC/Legal Reviews	10 days	Tue 9/2/14	Fri 9/12/14
22	REVISED Draft Feas and EIS, Cost Cert, ATR, IEPR, SAD QA, HQ policy compliance	21 days	Mon 9/15/14	Mon 10/6/14
23	***ATR certification/IEPR final report***	0 days	Mon 10/6/14	***Mon 10/6/14***
24	Final Draft Feas and EIS	5 days	Mon 10/6/14	Sat 10/11/14
25	Final Draft report DQC/Legal Reviews	5 days	Sun 10/12/14	Fri 10/17/14
26	Report Reproduction & Assembly	5 days	Tue 10/21/14	Sun 10/26/14
27	District transmits signed report to SAD	5 days	Mon 10/27/14	Sat 11/1/14
28	Division Engineer transmittal memo (MS)	5 days	Sun 11/2/14	Fri 11/7/14
29	***HQ Final Review/Chief's Report Development/CWRB Prep***	36 days	Mon 11/10/14	***Tue 12/16/14***
30	CWRB/DCG-CEO decision to release final report (MS)	0 days	Wed 12/17/14	Wed 12/17/14
31	S&A Review, Interested Party, & EIS filing letters signed and sent to District	14 days	Thu 12/18/14	Thu 1/1/15
32	District sends letters/reports to State/agencies & files EIS	7 days	Fri 1/2/15	Fri 1/9/15
33	Notice of availability appears in Federal Register	0 days	Fri 1/16/15	Fri 1/16/15
34	Final NEPA, S&A Review Period (30 days)	30 days	Fri 1/16/15	Sun 2/15/15
35	District provides draft responses to significant NEPA, S&A review comments	14 days	Mon 2/16/15	Mon 3/2/15
36	Final NEPA, S&A response letters mailed (SAD/HQ)	7 days	Tue 3/3/15	Tue 3/10/15
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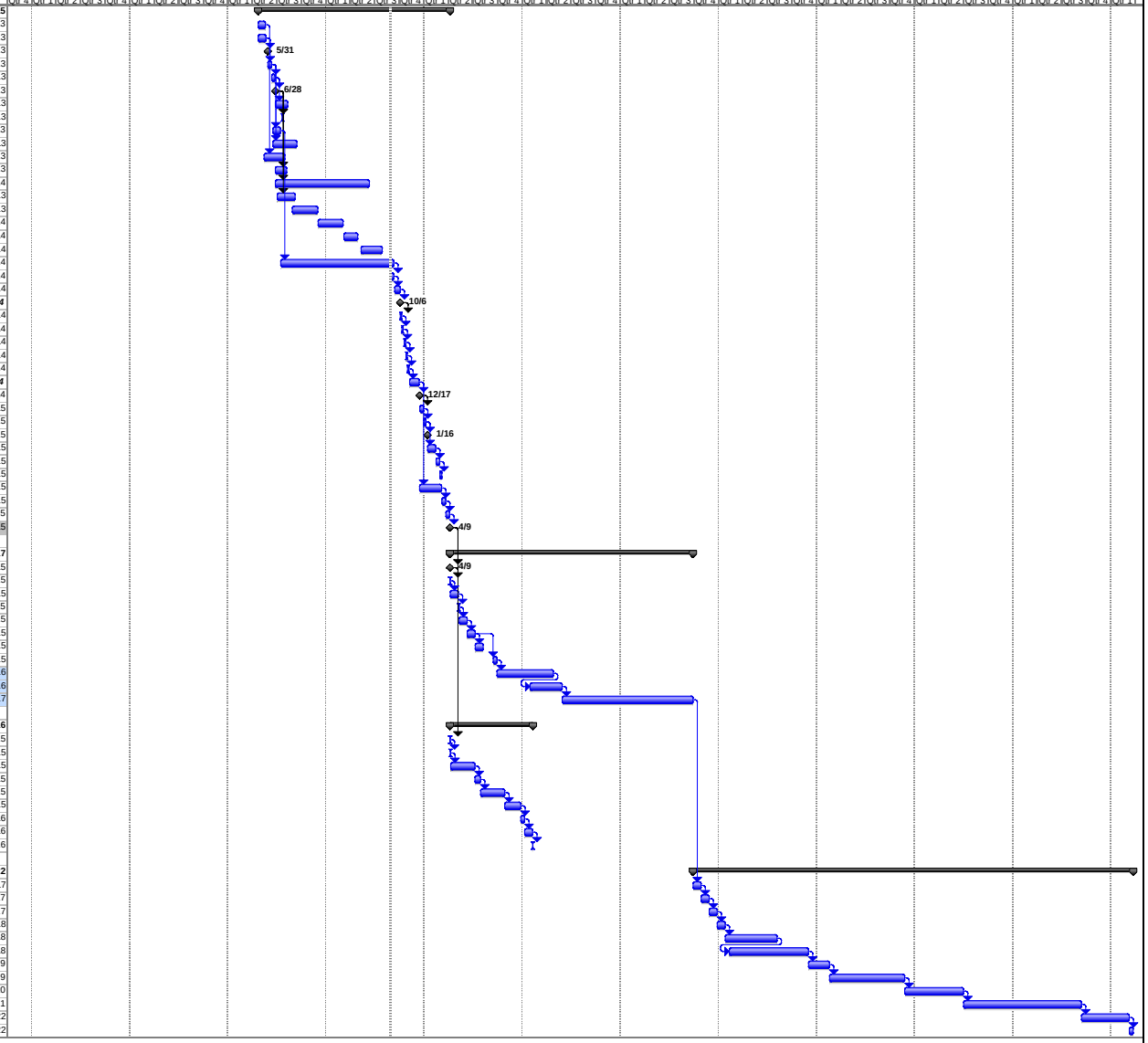
40	Signature on Chief's Report (MS)	0 days	Thu 4/9/15	Thu 4/9/15
41				
42	**PED PHASE**	**905 days**	**Thu 4/9/15**	**Sat 9/30/17**
43	Design Agreement (DA) Initiated (Once Division Engineer's Transmittal Letter)	0 days	Thu 4/9/15	Thu 4/9/15
44	DA to Local Sponsor (LS)	1 day	Thu 4/9/15	Fri 4/10/15
45	DA Local Sponsor (LS) Concurrence Received	30 days	Fri 4/10/15	Sun 5/10/15
46	DA submitted to SAD	3 days	Sun 5/10/15	Wed 5/13/15
47	DA Approved	30 days	Wed 5/13/15	Fri 6/12/15
48	DA Executed by LS	30 days	Fri 6/12/15	Sun 7/12/15
49	DA Executed USACE	30 days	Sun 7/12/15	Tue 8/11/15
50	Receive Sponsor Funding & FEDERAL FUNDING	14 days	Thu 9/17/15	Thu 10/1/15
51	PED Complete P&S Investigations (After Sponsor Contributions)	210 days	Thu 10/1/15	Thu 4/28/16
52	PED Complete WQC	120 days	Mon 2/1/16	Tue 5/31/16
53	PED Complete P&S	487 days	Tue 5/31/16	Sat 9/30/17
54				
55	**CONSTRUCTION PHASE START**	**309 days**	**Thu 4/9/15**	**Fri 2/12/16**
56	Project Cooperation Agreement (PCA) Initiated (Once Authorized& WQC)	1 day	Thu 4/9/15	Fri 4/10/15
57	PCA transmitted to Local Sponsor (LS)	2 days	Fri 4/10/15	Sun 4/12/15
58	PCA LS Concurrence Received	90 days	Sun 4/12/15	Sat 7/11/15
59	PCA submitted to HQ (once WQC received)	21 days	Sat 7/11/15	Sat 8/1/15
60	PCA Approved by ASA(CW)	90 days	Sat 8/1/15	Fri 10/30/15
61	PCA Executed by LS	60 days	Fri 10/30/15	Tue 12/29/15
62	PCA Executed by USACE	14 days	Tue 12/29/15	Tue 1/12/16
63	Receive Sponsor Contributions	30 days	Tue 1/12/16	Thu 2/11/16
64	Advertise (Contingent upon funding)	1 day	Thu 2/11/16	Fri 2/12/16
65				
66	**CONSTRUCTION PHASE - 47' PROJECT**	**1639 days**	**Sat 9/30/17**	**Sun 3/27/22**
67	Open Bids	30 days	Sat 9/30/17	Mon 10/30/17
68	Award	30 days	Mon 10/30/17	Wed 11/29/17
69	NTP	30 days	Wed 11/29/17	Fri 12/29/17
70	Mobilization	30 days	Fri 12/29/17	Sun 1/28/18
71	Rock Blasting	193 days	Sun 1/28/18	Thu 8/9/18
72	OEC Dredging	295 days	Mon 2/12/18	Tue 12/4/18
73	IEC Dredging	78 days	Tue 12/4/18	Wed 2/20/19
74	WIDE Dredging	280 days	Wed 2/20/19	Wed 11/27/19
75	MTB Dredging	219 days	Wed 11/27/19	Fri 7/3/20
76	SAC Dredging	439 days	Fri 7/3/20	Wed 9/15/21
77	TN Dredging	178 days	Wed 9/15/21	Sat 3/12/22
78	Demobilization	15 days	Sat 3/12/22	Sun 3/27/22



Project: Project Schedule REV 1
Date: Tue 8/26/14

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone

Port Everglades Harbor, FL Feasibility Study - LPP Depth of 48'	**$296,164,431.35**
Construction Costs	**$271,389,067.51**
Navigation Ports & Harbors	**$271,389,067.51**
Outter Entrance Channel - 55'	$46,826,488.48
Inner Entrance Channel - 48'	$7,335,809.23
Main Turning Basins - 48'	$48,167,077.61
Widener - 48'	$22,292,655.21
Southport Access Channel - 48'	$112,442,676.52
Turning Notch - 48'	$34,324,360.46
Non-Construction Costs	**$24,775,363.84**
Relocations	**$0.00**
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Utilities	**$0.00**
FPL Utility Relocation Cost (Southport Access Channel)	$0.00
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Wildlife Facilities & Sanctuary	**$13,647,540.84**
Habitat and Feeding Facilities	**$13,647,540.84**
Post Construction Mitigation Monitoring and Coral Propagation	$13,647,540.84
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PED	**$4,453,000.00**
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Planning, Engineering & Design Cost Estimate	$4,453,000.00
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Construction Contracts	**$6,674,823.00**
Construction Contracts	**$6,674,823.00**
Construction Management	$6,674,823.00

48' PROJECT

ID	Task Name	Duration	Start	Finish
1	**STUDY PHASE**	**714 days**	**Thu 4/25/13**	**Thu 4/9/15**
2	Complete econ modeling, NED determination, BCR analysis (DQC'd	27 days	Thu 4/25/13	Wed 5/22/13
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23	***ATR certification/IEPR final report***	0 days	Mon 10/6/14	***Mon 10/6/14***
24	Final Draft Feas and EIS	5 days	Mon 10/6/14	Sat 10/11/14
25	Final Draft report DQC/Legal Reviews	5 days	Sun 10/12/14	Fri 10/17/14
26	Report Reproduction & Assembly	5 days	Tue 10/21/14	Sun 10/26/14
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30	CWRB/DCG-CEO decision to release final report (MS)	0 days	Wed 12/17/14	Wed 12/17/14
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42	**PED PHASE**	**905 days**	**Thu 4/9/15**	**Sat 9/30/17**
43	Design Agreement (DA) Initiated (Once Division Engineer's Transmittal Letter)	0 days	Thu 4/9/15	Thu 4/9/15
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45	DA Local Sponsor (LS) Concurrence Received	30 days	Fri 4/10/15	Sun 5/10/15
46	DA submitted to SAD	3 days	Sun 5/10/15	Wed 5/13/15
47	DA Approved	30 days	Wed 5/13/15	Fri 6/12/15
48	DA Executed by LS	30 days	Fri 6/12/15	Sun 7/12/15
49	DA Executed USACE	30 days	Sun 7/12/15	Tue 8/11/15
50	Receive Sponsor Funding & FEDERAL FUNDING	14 days	Thu 9/17/15	Thu 10/1/15
51	PED Complete P&S Investigations (After Sponsor Contributions)	210 days	Thu 10/1/15	Thu 4/28/16
52	PED Complete WQC	120 days	Mon 2/1/16	Tue 5/31/16
53	PED Complete P&S	487 days	Tue 5/31/16	Sat 9/30/17
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55	**CONSTRUCTION PHASE START**	**309 days**	**Thu 4/9/15**	**Fri 2/12/16**
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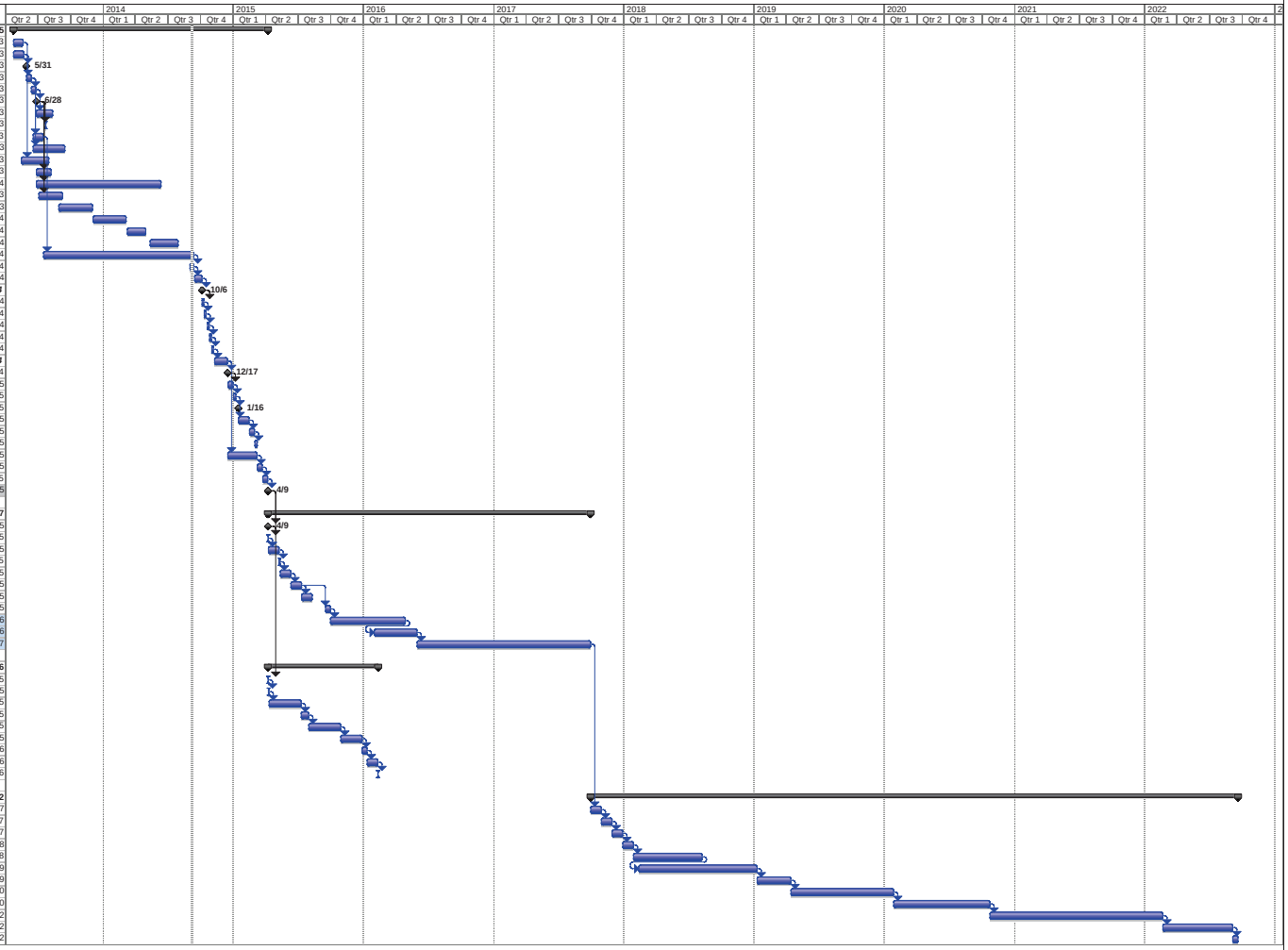
57	PCA transmitted to Local Sponsor (LS)	2 days	Fri 4/10/15	Sun 4/12/15
58	PCA LS Concurrence Received	90 days	Sun 4/12/15	Sat 7/11/15
59	PCA submitted to HQ (once WQC received)	21 days	Sat 7/11/15	Sat 8/1/15
60	PCA Approved by ASA(CW)	90 days	Sat 8/1/15	Fri 10/30/15
61	PCA Executed by LS	60 days	Fri 10/30/15	Tue 12/29/15
62	PCA Executed by USACE	14 days	Tue 12/29/15	Tue 1/12/16
63	Receive Sponsor Contributions	30 days	Tue 1/12/16	Thu 2/11/16
64	Advertise (Contingent upon funding)	1 day	Thu 2/11/16	Fri 2/12/16
65				
66	**CONSTRUCTION PHASE - 48' PROJECT**	**1816 days**	**Sat 9/30/17**	**Tue 9/20/22**
67	Open Bids	30 days	Sat 9/30/17	Mon 10/30/17
68	Award	30 days	Mon 10/30/17	Wed 11/29/17
69	NTP	30 days	Wed 11/29/17	Fri 12/29/17
70	Mobilization	30 days	Fri 12/29/17	Sun 1/28/18
71	Rock Blasting	193 days	Sun 1/28/18	Thu 8/9/18
72	OEC Dredging	332 days	Mon 2/12/18	Thu 1/10/19
73	IEC Dredging	95 days	Thu 1/10/19	Mon 4/15/19
74	WIDE Dredging	288 days	Mon 4/15/19	Tue 1/28/20
75	MTB Dredging	270 days	Tue 1/28/20	Sat 10/24/20
76	SAC Dredging	485 days	Sat 10/24/20	Mon 2/21/22
77	TN Dredging	196 days	Mon 2/21/22	Mon 9/5/22
78	Demobilization	15 days	Mon 9/5/22	Tue 9/20/22



Project: Project Schedule REV 1
Date: Fri 9/5/14

Task | Split | Progress | Milestone | Summary | Project Summary | External Tasks | External Milestone | Deadline

Port Everglades Harbor, FL Feasibility Study -NED Depth of 47'

Brief Scope Presentation:	The project consists of construction dredging, bulkhead improvements and mitigation costs for the 48' LPP depth which is the Locally Preferred Plan. Dredging will occur in the Outer Entrance Channel, Inner Entrance Channel, Main Turning Basin (MTB), Widener, South Port Access Channel, Turning Notch, and Berths located south of the MTB along the Intercoastal Waterway, Broward County, Florida. The project depth costs include a one foot required and one foot allowable overdepth.

Risk No.	RBS Level III	Feature of Work	Risk/Opportunity Event	PDT Event Concerns	PDT Discussions	Responsibility/POC	Project Cost			Project Schedule		
							Likelihood	Impact	Risk Level	Likelihood	Impact	Risk Level
PPM-1	Project & Program Management	Total Project	Inadequate PDT Staffing Levels	There is a dedicated USACE staff in place for completing the Chief's Report by *May 2015*. No concerns at this time regarding staffing for PED activities.	Not a concern for FY15. Some concern in out years, subject to future funding levels.	PM	Unlikely	Negligible	LOW	Unlikely	Marginal	LOW
PPM-2	Project & Program Management	Total Project	Delayed Project Decisions	Compressed schedule for Chief's Report requires timely decisions.	Risk is partially mitigated by conducting in-progress reviews. More of a potential schedule impact than cost. Examples of potential delayed decisions include the PPA. Impact is somewhat dependent on the specific decision that is delayed.	PM/Sponsor	Unlikely	Negligible	LOW	Unlikely	Marginal	LOW
PPM-3	Project & Program Management	Total Project	Contractor Delays	Some concern regarding environmental sub-contractors ability to perform within this time frame.	EIS is primarily done by a contractor.	PM	Unlikely	Negligible	LOW	Unlikely	Marginal	LOW
PPM-4	Project & Program Management	Total Project	Late Requests for Additional Analysis	Unanticipated requests for additional analysis could delay the Chief's Report.	Chief's Report on expedited schedule is fully funded as of now. Additional requests create risk to schedule. IEPR reviewer doesn't agree with the methodology used to predict O&M quantities. May be required to do further analysis (not likely (low risk), but would require 6 month-1yr modeling).	PM	Unlikely	Marginal	LOW	Unlikely	Critical	MODERATE
PPM-5	Project & Program Management	Total Project	Competition for Resources within the District	Higher priority projects could divert resources away from this project.	***Project is one of District and Division priorities.*** Schedule is accelerated already due to priority. There is always a risk of losing key staff to other projects (hurricane response, etc.). Risk applies to both PED and construction phases.	PM	Very Unlikely	Marginal	LOW	Very Unlikely	Critical	LOW
CA-1	Contract Acquisition	All Construction	Funding Stream Impacts to Contract Acquisition	Funding stream may require base bid and options or separate contracts.	Acquisition plan under development during feasibility phase. Construction schedule reflects current acquisition assumptions. Schedule is based on realistic funding stream assumptions. Phasing or continuing contract clause would be potential issues if used. ASA approval required for continuing contract clause use. Acquisition plan will go to Deputy Secretary for Acquisition for approval. Unanticipated funding stream impacts may result in contractor claims, multiple contracts or multiple mobilizations.	Contracting	Unlikely	Significant	MODERATE	Unlikely	Significant	MODERATE
CA-2	Contract Acquisition	Drilling & Blasting	Mods and Claims Related to Rock Quantities	There is uncertainty in the estimated quantity of rock material.	Additional geotechnical investigation will be performed in PED to further define rock quantities and characteristics. Complexity of project suggest moderate level of mods and claims (less than a typical civil works project). For a claim, the contractor would need to show that core logs were not representative in terms of volume. Mods could arise from hardness of rock issues.	Engineering	Unlikely	Significant	MODERATE	Unlikely	Negligible	LOW
CA-3	Contract Acquisition	Dredging	Industry Availability/Bidding Climate	Limited competition due to large contract value.	There is only one dredging company that likely could handle the work alone. 3-4 companies could JV and bid. Number of proposals will likely be 3-4. Industry day will be held to provide maximum exposure to potential bidders to encourage competition. Anticipating one prime contractor for construction (however, USCG station ***reconfiguration*** may be under separate contract). Could be base + options, continuing contracting clause, etc. Acquisition strategy not completely defined. Impact based on future market conditions. Future market conditions are difficult to forecast.	Contracting	Likely	Critical	HIGH	Likely	Negligible	LOW
CA-4	Contract Acquisition	Dredging	Bonding Capacity	Competition may be limited due to bonding capacity issues.	Joint ventures (JV's) will likely be necessary due to the size of the anticipated contract. Several market participants have existing JV agreements. Bonding capacity is also impacted by the number of dredging projects being performed in the same time frame.	Contracting	Likely	Marginal	MODERATE	Likely	Critical	HIGH
CA-5	Contract Acquisition	Environmental Mitigation	Separate Contract for Mitigation	A separate environmental mitigation contractor may result in coordination issues with the dredging contractor. Performance of two separate contractors may not be aligned.	A separate mitigation subcontractor under the dredging prime is preferred at this time to facilitate construction scheduling. Coral relocation will be performed before construction. Risk is placed on prime contractor (not the independent mitigation contractor). ***Coral propagation to be separate contract.***	Contracting	Very Unlikely	Negligible	LOW	Very Unlikely	Marginal	LOW
CA-6	Contract Acquisition	Associated General Items	Prime Contractor Markups for AGI's	Risk is that a single prime contractor adds significant markups to subcontractors resulting in unfavorable pricing.	By keeping all work under a single prime contractor there would be a sole source of responsibility for coordinating the different work elements and avoid scheduling and resource issues. However, use a separate contractor in certain instances may reduce costs. Impact is potential cost savings, but there is a potential for schedule risk due to smaller contractor performance and additional recovery cost. USCG station ***reconfiguration*** could be a separate design build contract.	Contracting	Likely	Marginal	MODERATE	Likely	Negligible	LOW
CA-7	Contract Acquisition	Mechanical Dredging	Mods and Claims Related to Dredge Material Quantities	There is uncertainty in the estimated quantity of material to be dredged.	Additional physical surveys will be performed during the PED phase to increase confidence in the dredge material quantities. Another source of mods is typically upland disposal for dredge materials. This project is ocean disposal only.	Engineering	Very Unlikely	Significant	LOW	Very Unlikely	Negligible	LOW
TL-1	Technical	Drilling & Blasting	Blasting Design Maturity	Uncertainty related to physical surveys and rock properties.	Next set of surveys will include bathometric surveys, resistivity surveys, and coring to greater depths. Historical cores do not go as deep as necessary. Some change is likely. Impact can be positive or negative based on refined understanding of physical conditions. May have opportunities to dredge instead of blast.	Engineering	Likely	Significant	HIGH	Likely	Negligible	LOW
TL-2	Technical	Aids to Navigation	USCG Coordination	Uncertainty regarding USCG ability to deliver ATON's on schedule and budget.	Past experience with the USCG demonstrate a high degree of reliability. Long term coordination with USCG for this project. No range markers anticipated.	Engineering	Likely	Negligible	LOW	Likely	Negligible	LOW

Risk No.	RBS Level III	Feature of Work	Risk/Opportunity Event	PDT Event Concerns	PDT Discussions	Responsibility/POC	Project Cost			Project Schedule		
							Likelihood	Impact	Risk Level	Likelihood	Impact	Risk Level
TL-3	Technical	All Construction	Feasibility Level Designs	Current design level is appropriate for feasibility level; however, designs will be refined during the PED phase. Refinement is likely to impact costs.	Current conceptual design and cost estimates are considered conservative and will be refined during the PED phase. ***PED may result in cost savings.***	Engineering	Likely	Marginal	MODERATE	Likely	Negligible	LOW
TL-4	Technical	All Construction	Results of PED Studies Impact Costs	Further studies will be performed during the PED phase. The results of these studies could impact the cost estimate.	The level of study completion is appropriate for feasibility phase. Future geotechnical and environmental surveys have the greatest potential for impacts. New seagrass and coral surveys will be completed ***during PED***.	Engineering	Likely	Marginal	MODERATE	Likely	Negligible	LOW
TL-5	Technical	Associated General Items	Environmentally Friendly Bulkheads (EFB's)	EFB design is new application for USACE projects.	While EFB design/use is new for USACE, EFB's are used by industry and is not a new application in general. Environmental groups are providing inputs to engineering.	Engineering	Unlikely	Marginal	LOW	Unlikely	Negligible	LOW
LD-1	Lands and Damages	Associated General Items	Real Estate Plan	Inaccurate real estate plan assumptions could impact project cost or schedule.	No real estate acquisition planned. USCG will give **a permit to *reconfigure***. An estate is not required. USCG is not giving up land.	Real Estate	Very Unlikely	Significant	LOW	Very Unlikely	Significant	LOW
LD-2	Lands and Damages	Associated General Items	Westlake Park Mitigation Area	Westlake Park will include construction as part of mitigation. Real estate is already been acquired by state for a conservation area. State has leased land to County. County will provide a right of entry to USACE. State cannot sell property to USACE by state law.	Not an easement. Only a permission is required. Intent is for the Port to perform mitigation before Federal construction project begins. Mitigation work will be contracted by Broward County. Counts as part of the Port's cost share. ***VT may question innovative approach.***	Real Estate	Very Unlikely	Significant	LOW	Very Unlikely	Significant	LOW
REG-1	Regulatory and Environmental	Environmental Mitigation	Mitigation Design Maturity	Scope is well defined; however, new baseline surveys for sea-grass, corals, and mangrove will be required in PED. Conservative values based on historical records have been used for planning purposes.	Resource surveys will be updated and refinements will be made in PED. Potential for larger areas than estimated. Stakeholders may ask for increased seagrass mitigation. This risk is separate from engineering issues such as rock quantities. Likelihood is unlikely because of conservatism of estimate and high degree of confidence in environmental design.	Environmental	Unlikely	Marginal	LOW	Unlikely	Negligible	LOW
REG-2	Regulatory and Environmental	Mechanical Dredging	Disposal Area Uncertainty	EPA could reject ODMDS as a disposal area.	EPA has never denied a USACE request for disposal area approval. There are no known issue that would result in denial. EPA process includes rule making for the disposal site so there is some uncertainty. Majority of material will be rock rather than sediments that have a greater potential for issues.	Engineering	Very Unlikely	Marginal	LOW	Very Unlikely	Significant	LOW
REG-3	Regulatory and Environmental	Mechanical Dredging	Hazardous Waste Concerns	No hazardous waste concerns identified during feasibility phase; however, if Section 103 testing identifies that a portion of dredge material unsuitable for ODMDS disposal, the Port has expressed ability to provide upland disposal capacity.	Disposal material will primarily be rock. Federal channels rarely have contamination issues. Berthing areas may have issues from operations. Risk is meeting Federal standards and standards for placing material in ocean disposal site. EIS indicates that no alternatives have hazardous waste issues. If an issue arises, sponsor would be responsible for cost. Impact to Federal project would be schedule. Berths are historically responsibility of Port.	Environmental	Very Unlikely	Negligible	LOW	Very Unlikely	Significant	LOW
REG-4	Regulatory and Environmental	Environmental Mitigation	Adaptive Management Features	Adaptive management is very likely to be used.	Cost estimate and schedule include adaptive management. Adaptive management could be augmented based on on-going negotiations. Additional costs may be moved to adaptive management in current plan. Cost impact could be zero or increase (no opportunity for cost savings).	Environmental	Likely	Significant	HIGH	Likely	Negligible	LOW
REG-5	Regulatory and Environmental	Total Project	Cultural Resources, Endangered Species and Wetlands Identification	Unknown cultural resources, endangered species or wetlands could be identified in the PED phase.	No cultural resources have been identified. Wetlands are well known. All species have been identified, including proposed listing species. Construction schedule reflects restriction on blasting during winter and use of clam shell dredging.	Environmental	Very Unlikely	Marginal	LOW	Very Unlikely	Critical	LOW
REG-6	Regulatory and Environmental	Total Project	Status of Permits	Permits will be obtained during PED phase.	Permits may be untimely. There could be administrative appeal on a Florida EDP permit. Impact viewed as a percentage of mitigation cost. Current estimate is about $42 million for mitigation. PDT believes a 20% potential cost impact is possible. Recent changes in Florida law limit schedule impacts.	Environmental	Likely	Significant	HIGH	Likely	Marginal	MODERATE
REG-7	Regulatory and Environmental	NFMS Concerns	NFMS Concerns	The state and federal regulatory agencies have given the EIS favorable reviews with the exception of NMFS. Possibility exists that NMFS will elevate their concerns.	Project has a 17-year history and some regulatory opinions may be entrenched. NMFS agenda may not be aligned with USACE mission. NMFS delays related to staffing issues are historically common. USACE may need to modify plan based on NMFS review concerns. Potential issues may be elevated within predefined timeframes. Resolution is uncertain and may delay Chief's Report. Extensive consultation with NMFS in the 2nd quarter of FY14 resulted in a scope and quantity sufficient to allow issuance of a favorable Biological Opinion. Costs were solicited by NFMS from several vendors (and provided to USACE) to assure adequate funding.	Environmental	Likely	Significant	HIGH	Likely	Significant	HIGH
CON-1	Construction	All Construction	Unanticipated Permit or Environmental Work Windows	Unanticipated permit or environmental work windows.	No blasting during winter. Certain dredging equipment use is seasonal. Cost estimate and schedule reflect restrictions already. Unanticipated restrictions are very unlikely, but the impact could be crisis level if the risk occurs.	Construction	Unlikely	Marginal	LOW	Unlikely	Negligible	LOW

Risk No.	RBS Level III	Feature of Work	Risk/Opportunity Event	PDT Event Concerns	PDT Discussions	Responsibility/POC	Project Cost			Project Schedule		
							Likelihood	Impact	Risk Level	Likelihood	Impact	Risk Level
CON-2	Construction	All Construction	Potential to Accelerate Construction Schedule	Sponsor prefers a faster schedule.	If a faster schedule is adopted, more than one contract may be needed. There are only 2-3 contractors that are anticipated to be proficient in the project work. Estimate is based on excavator. A few individual contractors have up to three rock-capable dredges and could complete the work. Some schedule acceleration is possible using a single contractor. S ignificant acceleration would require a second contractor. Two contractors each have two cutter suction dredges that could be used with little blasting. Two dredges is probably the maximum possible due to level of port activity (would require 3 years). Accelerating the project may also impact level of competition. 3 years is the minimum (one contractor with two dredges); 4 years is possible with one contractor; 5 years will be least expensive and create the best bidding environment. Cost, risk/schedule opportunity. Cost impact is second mob and lower efficiency operations.	Construction	Unlikely	Significant	MODERATE	Unlikely	Crisis	HIGH
CON-3	Construction	Mechanical Dredging	Cross Current Impact on Productivity	Dredge will need to be removed from the channel when ships enter due to the cross current.	Schedule assumes that dredge will be removed from the channel.	Construction	Unlikely	Negligible	LOW	Unlikely	Negligible	LOW
CON-4	Construction	Drilling & Blasting	Cruise Industry Impacts to Blasting	Cruise ships not likely to enter port if explosives are set.	Could be a delay after explosives are loaded due to manatee presence. Technical issues can add delays while holes are loaded. Potential loss of cruise ship revenue for sponsor may result in requirements to change construction techniques or scheduling.	Construction	Unlikely	Marginal	LOW	Unlikely	Significant	MODERATE
CON-5	Construction	Associated General Items	Relocation Issues	Relocations issues that result in higher costs or schedule delays.	USCG station ***reconfiguration*** is a navigation feature (not a relocation) and ***could*** be completed before construction begins. One FPL electrical cable (in south channel) will be removed prior to next O&M dredging. No relocation issues anticipated. Cost for ***FPL*** cable is external to Federal project.	Construction	Unlikely	Marginal	LOW	Unlikely	Marginal	LOW
CON-6	Construction	All Construction	Mods and Claims Related to Other Unknown Conditions	The risk register identifies project risks related to mods and claims for hurricanes, rock and dredge material quantities, and unanticipated work restrictions. Other unknown risks not identified by the PDT may result in mods and claims.	Because this risk relates to unknown conditions not specifically identified by the PDT, it was not qualitatively assessed in regard to probability and impact. Rather, the sum of identified mods and claims risks was subtracted from historical Jacksonville District dredging project mods and claims rates to identify potential residual mods and claims risk that exceeds that identified by the PDT.	Construction	Likely	Significant	HIGH	Likely	Negligible	LOW
CON-7	Construction	Drilling & Blasting	Environmental Concerns for Blasting	There may be added costs associated with penalty fees or procedure changes related to blasting.	Environmental monitors for blasting may need to be specialized subcontractors. There is no incidental take for Manatees.	Environmental/Construction	Likely	Marginal	MODERATE	Likely	Negligible	LOW
EST-1	Estimate and Schedule	Construction Management	Construction Management Duration	Additional construction management costs may be incurred if the construction duration is longer than assumed.	Differing or unforeseen site conditions may add to construction duration and increase construction management costs.	Engineering	Likely	Marginal	MODERATE	Likely	Negligible	LOW
EST-2	Estimate and Schedule	Mechanical Dredging	Production Rates	Blasting and dredging production rates assumed for cost estimate and schedule may be inaccurate.	Blasting and dredging records, including Miami, were used to develop production rates. Unlikely that dredge size plan is incorrect due to past experience. Estimate conservatism reduced the probability and impact of this risk. Plan is for 100% excavator (no clamshell).	Engineering	Very Unlikely	Significant	LOW	Very Unlikely	Marginal	LOW
EST-3	Estimate and Schedule	Planning, Engineering and Design	PED Cost Estimate	PED cost estimate may be too low.	PED cost estimate is approximately 1.8% of construction cost and may not be sufficient for actual expenditures.	Engineering	Unlikely	Marginal	LOW	Unlikely	Negligible	LOW
EST-4	Estimate and Schedule	Construction Management	CM Cost Estimate	CM cost estimate may be too low.	CM cost estimate is approximately 3.5% of construction cost and may not be sufficient for actual expenditures.	Engineering	Unlikely	Marginal	LOW	Unlikely	Negligible	LOW
EST-5	Estimate and Schedule	All Construction	Escalation for Long Term Contract	Contractors are likely to include contingency in their bids to cover potential cost escalation and escalation risk over the contract period.	Contract duration is five years. Future contractor expectations about future escalation rates are uncertain.	Engineering	Likely	Marginal	MODERATE	Likely	Negligible	LOW
EXT-1	External Risks	All Construction	Local Community Objections to Construction	Local high rise residents and NGO's may have objections related to air quality (diesel), equipment and staging area/equipment lighting, construction noise and blasting (perceived physical impacts).	Near certain risk that will be realized. Impact is managing PR. Public objections may cause impacts resulting in litigation or the need for further studies.	PM	Unlikely	Critical	MODERATE	Unlikely	Marginal	LOW
EXT-2	External Risks	Total Project	Legal Challenges	Legal challenges may occur during NEPA coordination and permit authorizations.	Project has good political support, but there is always a threat of lawsuit. EIS is designed to limit potential lawsuits. Administrative challenge to WQC certification/permit is likely. It is relatively easy to challenge NEPA. ***THIS ITEM IS CONSIDERED IN EXT-1 SO RISK IS SET TO LOW-LOW TO AVOID DOUBLE COUNTING.***	PM	Unlikely	Negligible	LOW	Unlikely	Negligible	LOW
EXT-3	External Risks	Mobilization	Fuel Price Impact on Mobilization	Future fuel prices are uncertain and may not match cost estimate assumptions.	Fuel price increases and market volatility directly affect bid prices.	Engineering	Likely	Marginal	MODERATE	Likely	Negligible	LOW
EXT-4	External Risks	Mechanical Dredging	Fuel Price Impact on Dredging	Future fuel prices are uncertain and may not match cost estimate assumptions.	Fuel price increases and market volatility directly affect bid prices. Weather delays are considered in historical production analysis. Fuel cost is an important component of dredging cost.	Engineering	Likely	Marginal	MODERATE	Likely	Negligible	LOW
EXT-5	External Risks	Mechanical Dredging	Mods and Claims Related to Adverse Weather	Adverse weather, such as a hurricane or tropical storm, during dredging operations may result in contractor mods and claims.	Delays to current operations and a temporary suspension for re-survey would be potential impacts.	Construction	Unlikely	Significant	MODERATE	Unlikely	Marginal	LOW
EXT-6	External Risks	Total Project	Adequacy of Incremental Project Funding	Actual project funding may not be sufficient to achieve schedule.	Estimate and schedule assume incremental funding. 5-year construction schedule is based on realistic funding stream. Risk of WRDA passing without PEH project authority is not included in this risk.	PM	Very Unlikely	Critical	LOW	Very Unlikely	Critical	LOW
EXT-7	External Risks	Total Project	Influential Stakeholders Request Scope Changes	Influential stakeholders may request late changes that impact project cost and schedule.	Project has a long history and the scope has evolved to address stakeholder issues. New requests by influential stakeholders are very unlikely due to project maturity. Impacts could be critical if risk were to occur. ***Descoping is possibility.***	PM	Very Unlikely	Critical	LOW	Very Unlikely	Critical	LOW
EXT-8	External Risks	Total Project	Authorization and Appropriation	Project funding delay.	***WRDA recently passed, next one expected in 2-5 years, possibly longer. State of Florida is very supportive of project and may provide funding similar to Miami.***	PM/Congress	Unlikely	Marginal	LOW	Unlikely	Crisis	HIGH
EXT-9	External Risks	Mechanical Dredging	Mods and Claims Related to Unanticipated Work Restrictions	Claims and mods related to unanticipated work restrictions may occur.	Public complaints may result in unanticipated work restrictions.	Construction	Unlikely	Marginal	LOW	Unlikely	Marginal	LOW

Port Everglades Harbor, FL Feasibility Study - LPP Depth of 48'

Brief Scope Presentation:	The project consists of construction dredging, bulkhead improvements and mitigation costs for the 48' LPP depth which is the Locally Preferred Plan. Dredging will occur in the Outer Entrance Channel, Inner Entrance Channel, Main Turning Basin (MTB), Widener, South Port Access Channel, Turning Notch, and Berths located south of the MTB along the Intercoastal Waterway, Broward County, Florida. The project depth costs include a one foot required and one foot allowable overdepth.

							Project Cost			Project Schedule		
Risk No.	**RBS Level III**	**Feature of Work**	**Risk/Opportunity Event**	**PDT Event Concerns**	**PDT Discussions**	**Responsibility/POC**	**Likelihood**	**Impact**	**Risk Level**	**Likelihood**	**Impact**	**Risk Level**
PPM-1	Project & Program Management	Total Project	Inadequate PDT Staffing Levels	There is a dedicated USACE staff in place for completing the Chief's Report by *May 2015*. No concerns at this time regarding staffing for PED activities.	Not a concern for FY15. Some concern in out years, subject to future funding levels.	PM	Unlikely	Negligible	LOW	Unlikely	Marginal	LOW
PPM-2	Project & Program Management	Total Project	Delayed Project Decisions	Compressed schedule for Chief's Report requires timely decisions.	Risk is partially mitigated by conducting in-progress reviews. More of a potential schedule impact than cost. Examples of potential delayed decisions include the PPA. Impact is somewhat dependent on the specific decision that is delayed.	PM/Sponsor	Unlikely	Negligible	LOW	Unlikely	Marginal	LOW
PPM-3	Project & Program Management	Total Project	Contractor Delays	Some concern regarding environmental sub-contractors ability to perform within this time frame.	EIS is primarily done by a contractor.	PM	Unlikely	Negligible	LOW	Unlikely	Marginal	LOW
PPM-4	Project & Program Management	Total Project	Late Requests for Additional Analysis	Unanticipated requests for additional analysis could delay the Chief's Report.	Chief's Report on expedited schedule is fully funded as of now. Additional requests create risk to schedule. IEPR reviewer doesn't agree with the methodology used to predict O&M quantities. May be required to do further analysis (not likely (low risk), but would require 6 month-1yr modeling).	PM	Unlikely	Marginal	LOW	Unlikely	Critical	MODERATE
PPM-5	Project & Program Management	Total Project	Competition for Resources within the District	Higher priority projects could divert resources away from this project.	***Project is one of District and Division priorities.*** Schedule is accelerated already due to priority. There is always a risk of losing key staff to other projects (hurricane response, etc.). Risk applies to both PED and construction phases.	PM	Very Unlikely	Marginal	LOW	Very Unlikely	Critical	LOW
CA-1	Contract Acquisition	All Construction	Funding Stream Impacts to Contract Acquisition	Funding stream may require base bid and options or separate contracts.	Acquisition plan under development during feasibility phase. Construction schedule reflects current acquisition assumptions. Schedule is based on realistic funding stream assumptions. Phasing or continuing contract clause would be potential issues if used. ASA approval required for continuing contract clause use. Acquisition plan will go to Deputy Secretary for Acquisition for approval. Unanticipated funding stream impacts may result in contractor claims, multiple contracts or multiple mobilizations.	Contracting	Unlikely	Significant	MODERATE	Unlikely	Significant	MODERATE
CA-2	Contract Acquisition	Drilling & Blasting	Mods and Claims Related to Rock Quantities	There is uncertainty in the estimated quantity of rock material.	Additional geotechnical investigation will be performed in PED to further define rock quantities and characteristics. Complexity of project suggest moderate level of mods and claims (less than a typical civil works project). For a claim, the contractor would need to show that core logs were not representative in terms of volume. Mods could arise from hardness of rock issues.	Engineering	Unlikely	Significant	MODERATE	Unlikely	Negligible	LOW
CA-3	Contract Acquisition	Dredging	Industry Availability/Bidding Climate	Limited competition due to large contract value.	There is only one dredging company that likely could handle the work alone. 3-4 companies could JV and bid. Number of proposals will likely be 3-4. Industry day will be held to provide maximum exposure to potential bidders to encourage competition. Anticipating one prime contractor for construction (however, USCG station ***reconfiguration*** may be under separate contract). Could be base + options, continuing contracting clause, etc. Acquisition strategy not completely defined. Impact based on future market conditions. Future market conditions are difficult to forecast.	Contracting	Likely	Critical	HIGH	Likely	Negligible	LOW
CA-4	Contract Acquisition	Dredging	Bonding Capacity	Competition may be limited due to bonding capacity issues.	Joint ventures (JV's) will likely be necessary due to the size of the anticipated contract. Several market participants have existing JV agreements. Bonding capacity is also impacted by the number of dredging projects being performed in the same time frame.	Contracting	Likely	Marginal	MODERATE	Likely	Critical	HIGH
CA-5	Contract Acquisition	Environmental Mitigation	Separate Contract for Mitigation	A separate environmental mitigation contractor may result in coordination issues with the dredging contractor. Performance of two separate contractors may not be aligned.	A separate mitigation subcontractor under the dredging prime is preferred at this time to facilitate construction scheduling. Coral relocation will be performed before construction. Risk is placed on prime contractor (not the independent mitigation contractor). ***Coral propagation to be separate contract.***	Contracting	Very Unlikely	Negligible	LOW	Very Unlikely	Marginal	LOW
CA-6	Contract Acquisition	Associated General Items	Prime Contractor Markups for AGI's	Risk is that a single prime contractor adds significant markups to subcontractors resulting in unfavorable pricing.	By keeping all work under a single prime contractor there would be a sole source of responsibility for coordinating the different work elements and avoid scheduling and resource issues. However, use a separate contractor in certain instances may reduce costs. Impact is potential cost savings, but there is a potential for schedule risk due to smaller contractor performance and additional recovery cost. USCG station ***reconfiguration*** could be a separate design build contract.	Contracting	Likely	Marginal	MODERATE	Likely	Negligible	LOW
CA-7	Contract Acquisition	Mechanical Dredging	Mods and Claims Related to Dredge Material Quantities	There is uncertainty in the estimated quantity of material to be dredged.	Additional physical surveys will be performed during the PED phase to increase confidence in the dredge material quantities. Another source of mods is typically upland disposal for dredge materials. This project is ocean disposal only.	Engineering	Very Unlikely	Significant	LOW	Very Unlikely	Negligible	LOW
TL-1	Technical	Drilling & Blasting	Blasting Design Maturity	Uncertainty related to physical surveys and rock properties.	Next set of surveys will include bathometric surveys, resistivity surveys, and coring to greater depths. Historical cores do not go as deep as necessary. Some change is likely. Impact can be positive or negative based on refined understanding of physical conditions. May have opportunities to dredge instead of blast.	Engineering	Likely	Significant	HIGH	Likely	Negligible	LOW
TL-2	Technical	Aids to Navigation	USCG Coordination	Uncertainty regarding USCG ability to deliver ATON's on schedule and budget.	Past experience with the USCG demonstrate a high degree of reliability. Long term coordination with USCG for this project. No range markers anticipated.	Engineering	Likely	Negligible	LOW	Likely	Negligible	LOW

Risk No.	RBS Level III	Feature of Work	Risk/Opportunity Event	PDT Event Concerns	PDT Discussions	Responsibility/POC	Project Cost			Project Schedule		
							Likelihood	Impact	Risk Level	Likelihood	Impact	Risk Level
TL-3	Technical	All Construction	Feasibility Level Designs	Current design level is appropriate for feasibility level; however, designs will be refined during the PED phase. Refinement is likely to impact costs.	Current conceptual design and cost estimates are considered conservative and will be refined during the PED phase. ***PED may result in cost savings.***	Engineering	Likely	Marginal	MODERATE	Likely	Negligible	LOW
TL-4	Technical	All Construction	Results of PED Studies Impact Costs	Further studies will be performed during the PED phase. The results of these studies could impact the cost estimate.	The level of study completion is appropriate for feasibility phase. Future geotechnical and environmental surveys have the greatest potential for impacts. New seagrass and coral surveys will be completed ***during PED***.	Engineering	Likely	Marginal	MODERATE	Likely	Negligible	LOW
TL-5	Technical	Associated General Items	Environmentally Friendly Bulkheads (EFB's)	EFB design is new application for USACE projects.	While EFB design/use is new for USACE, EFB's are used by industry and is not a new application in general. Environmental groups are providing inputs to engineering.	Engineering	Unlikely	Marginal	LOW	Unlikely	Negligible	LOW
LD-1	Lands and Damages	Associated General Items	Real Estate Plan	Inaccurate real estate plan assumptions could impact project cost or schedule.	No real estate acquisition planned. USCG will give **a permit to *reconfigure***. An estate is not required. USCG is not giving up land.	Real Estate	Very Unlikely	Significant	LOW	Very Unlikely	Significant	LOW
LD-2	Lands and Damages	Associated General Items	Westlake Park Mitigation Area	Westlake Park will include construction as part of mitigation. Real estate is already been acquired by state for a conservation area. State has leased land to County. County will provide a right of entry to USACE. State cannot sell property to USACE by state law.	Not an easement. Only a permission is required. Intent is for the Port to perform mitigation before Federal construction project begins. Mitigation work will be contracted by Broward County. Counts as part of the Port's cost share. ***VT may question innovative approach.***	Real Estate	Very Unlikely	Significant	LOW	Very Unlikely	Significant	LOW
REG-1	Regulatory and Environmental	Environmental Mitigation	Mitigation Design Maturity	Scope is well defined; however, new baseline surveys for sea-grass, corals, and mangrove will be required in PED. Conservative values based on historical records have been used for planning purposes.	Resource surveys will be updated and refinements will be made in PED. Potential for larger areas than estimated. Stakeholders may ask for increased seagrass mitigation. This risk is separate from engineering issues such as rock quantities. Likelihood is unlikely because of conservatism of estimate and high degree of confidence in environmental design.	Environmental	Unlikely	Marginal	LOW	Unlikely	Negligible	LOW
REG-2	Regulatory and Environmental	Mechanical Dredging	Disposal Area Uncertainty	EPA could reject ODMDS as a disposal area.	EPA has never denied a USACE request for disposal area approval. There are no known issue that would result in denial. EPA process includes rule making for the disposal site so there is some uncertainty. Majority of material will be rock rather than sediments that have a greater potential for issues.	Engineering	Very Unlikely	Marginal	LOW	Very Unlikely	Significant	LOW
REG-3	Regulatory and Environmental	Mechanical Dredging	Hazardous Waste Concerns	No hazardous waste concerns identified during feasibility phase; however, if Section 103 testing identifies that a portion of dredge material unsuitable for ODMDS disposal, the Port has expressed ability to provide upland disposal capacity.	Disposal material will primarily be rock. Federal channels rarely have contamination issues. Berthing areas may have issues from operations. Risk is meeting Federal standards and standards for placing material in ocean disposal site. EIS indicates that no alternatives have hazardous waste issues. If an issue arises, sponsor would be responsible for cost. Impact to Federal project would be schedule. Berths are historically responsibility of Port.	Environmental	Very Unlikely	Negligible	LOW	Very Unlikely	Significant	LOW
REG-4	Regulatory and Environmental	Environmental Mitigation	Adaptive Management Features	Adaptive management is very likely to be used.	Cost estimate and schedule include adaptive management. Adaptive management could be augmented based on on-going negotiations. Additional costs may be moved to adaptive management in current plan. Cost impact could be zero or increase (no opportunity for cost savings).	Environmental	Likely	Significant	HIGH	Likely	Negligible	LOW
REG-5	Regulatory and Environmental	Total Project	Cultural Resources, Endangered Species and Wetlands Identification	Unknown cultural resources, endangered species or wetlands could be identified in the PED phase.	No cultural resources have been identified. Wetlands are well known. All species have been identified, including proposed listing species. Construction schedule reflects restriction on blasting during winter and use of clam shell dredging.	Environmental	Very Unlikely	Marginal	LOW	Very Unlikely	Critical	LOW
REG-6	Regulatory and Environmental	Total Project	Status of Permits	Permits will be obtained during PED phase.	Permits may be untimely. There could be administrative appeal on a Florida EDP permit. Impact viewed as a percentage of mitigation cost. Current estimate is about $42 million for mitigation. PDT believes a 20% potential cost impact is possible. Recent changes in Florida law limit schedule impacts.	Environmental	Likely	Significant	HIGH	Likely	Marginal	MODERATE
REG-7	Regulatory and Environmental	Environmental Mitigation	NFMS Concerns	The state and federal regulatory agencies have given the EIS favorable reviews with the exception of NMFS. Possibility exists that NMFS will elevate their concerns.	Project has a 17-year history and some regulatory opinions may be entrenched. NMFS agenda may not be aligned with USACE mission. NMFS delays related to staffing issues are historically common. USACE may need to modify plan based on NMFS review concerns. Potential issues may be elevated within predefined timeframes. Resolution is uncertain and may delay Chief's Report. Extensive consultation with NMFS in the 2nd quarter of FY14 resulted in a scope and quantity sufficient to allow issuance of a favorable Biological Opinion. Costs were solicited by NFMS from several vendors (and provided to USACE) to assure adequate funding.	Environmental	Likely	Significant	HIGH	Likely	Significant	HIGH
CON-1	Construction	All Construction	Unanticipated Permit or Environmental Work Windows	Unanticipated permit or environmental work windows.	No blasting during winter. Certain dredging equipment use is seasonal. Cost estimate and schedule reflect restrictions already. Unanticipated restrictions are very unlikely, but the impact could be crisis level if the risk occurs.	Construction	Unlikely	Marginal	LOW	Unlikely	Negligible	LOW

Risk No.	RBS Level III	Feature of Work	Risk/Opportunity Event	PDT Event Concerns	PDT Discussions	Responsibility/POC	Project Cost			Project Schedule		
							Likelihood	Impact	Risk Level	Likelihood	Impact	Risk Level
CON-2	Construction	All Construction	Potential to Accelerate Construction Schedule	Sponsor prefers a faster schedule.	If a faster schedule is adopted, more than one contract may be needed. There are only 2-3 contractors that are anticipated to be proficient in the project work. Estimate is based on excavator. A few individual contractors have up to three rock-capable dredges and could complete the work. Some schedule acceleration is possible using a single contractor. S ignificant acceleration would require a second contractor. Two contractors each have two cutter suction dredges that could be used with little blasting. Two dredges is probably the maximum possible due to level of port activity (would require 3 years). Accelerating the project may also impact level of competition. 3 years is the minimum (one contractor with two dredges); 4 years is possible with one contractor; 5 years will be least expensive and create the best bidding environment. Cost, risk/schedule opportunity. Cost impact is second mob and lower efficiency operations.	Construction	Unlikely	Significant	MODERATE	Unlikely	Crisis	HIGH
CON-3	Construction	Mechanical Dredging	Cross Current Impact on Productivity	Dredge will need to be removed from the channel when ships enter due to the cross current.	Schedule assumes that dredge will be removed from the channel.	Construction	Unlikely	Negligible	LOW	Unlikely	Negligible	LOW
CON-4	Construction	Drilling & Blasting	Cruise Industry Impacts to Blasting	Cruise ships not likely to enter port if explosives are set.	Could be a delay after explosives are loaded due to manatee presence. Technical issues can add delays while holes are loaded. Potential loss of cruise ship revenue for sponsor may result in requirements to change construction techniques or scheduling.	Construction	Unlikely	Marginal	LOW	Unlikely	Significant	MODERATE
CON-5	Construction	Associated General Items	Relocation Issues	Relocations issues that result in higher costs or schedule delays.	USCG station ***reconfiguration*** is a navigation feature (not a relocation) and ***could*** be completed before construction begins. One FPL electrical cable (in south channel) will be removed prior to next O&M dredging. No relocation issues anticipated. Cost for ***FPL*** cable is external to Federal project.	Construction	Unlikely	Marginal	LOW	Unlikely	Marginal	LOW
CON-6	Construction	All Construction	Mods and Claims Related to Other Unknown Conditions	The risk register identifies project risks related to mods and claims for hurricanes, rock and dredge material quantities, and unanticipated work restrictions. Other unknown risks not identified by the PDT may result in mods and claims.	Because this risk relates to unknown conditions not specifically identified by the PDT, it was not qualitatively assessed in regard to probability and impact. Rather, the sum of identified mods and claims risks was subtracted from historical Jacksonville District dredging project mods and claims rates to identify potential residual mods and claims risk that exceeds that identified by the PDT.	Construction	Likely	Significant	HIGH	Likely	Negligible	LOW
CON-7	Construction	Drilling & Blasting	Environmental Concerns for Blasting	There may be added costs associated with penalty fees or procedure changes related to blasting.	Environmental monitors for blasting may need to be specialized subcontractors. There is no incidental take for Manatees.	Environmental/Construction	Likely	Marginal	MODERATE	Likely	Negligible	LOW
EST-1	Estimate and Schedule	Construction Management	Construction Management Duration	Additional construction management costs may be incurred if the construction duration is longer than assumed.	Differing or unforeseen site conditions may add to construction duration and increase construction management costs.	Engineering	Likely	Marginal	MODERATE	Likely	Negligible	LOW
EST-2	Estimate and Schedule	Mechanical Dredging	Production Rates	Blasting and dredging production rates assumed for cost estimate and schedule may be inaccurate.	Blasting and dredging records, including Miami, were used to develop production rates. Unlikely that dredge size plan is incorrect due to past experience. Estimate conservatism reduced the probability and impact of this risk. Plan is for 100% excavator (no clamshell).	Engineering	Very Unlikely	Significant	LOW	Very Unlikely	Marginal	LOW
EST-3	Estimate and Schedule	Planning, Engineering and Design	PED Cost Estimate	PED cost estimate may be too low.	PED cost estimate is approximately 1.8% of construction cost and may not be sufficient for actual expenditures.	Engineering	Unlikely	Marginal	LOW	Unlikely	Negligible	LOW
EST-4	Estimate and Schedule	Construction Management	CM Cost Estimate	CM cost estimate may be too low.	CM cost estimate is approximately 3.5% of construction cost and may not be sufficient for actual expenditures.	Engineering	Unlikely	Marginal	LOW	Unlikely	Negligible	LOW
EST-5	Estimate and Schedule	All Construction	Escalation for Long Term Contract	Contractors are likely to include contingency in their bids to cover potential cost escalation and escalation risk over the contract period.	Contract duration is five years. Future contractor expectations about future escalation rates are uncertain.	Engineering	Likely	Marginal	MODERATE	Likely	Negligible	LOW
EXT-1	External Risks	All Construction	Local Community Objections to Construction	Local high rise residents and NGO's may have objections related to air quality (diesel), equipment and staging area/equipment lighting, construction noise and blasting (perceived physical impacts).	Near certain risk that will be realized. Impact is managing PR. Public objections may cause impacts resulting in litigation or the need for further studies.	PM	Unlikely	Critical	MODERATE	Unlikely	Marginal	LOW
EXT-2	External Risks	Total Project	Legal Challenges	Legal challenges may occur during NEPA coordination and permit authorizations.	Project has good political support, but there is always a threat of lawsuit. EIS is designed to limit potential lawsuits. Administrative challenge to WQC certification/permit is likely. It is relatively easy to challenge NEPA. ***THIS ITEM IS CONSIDERED IN EXT-1 SO RISK IS SET TO LOW-LOW TO AVOID DOUBLE COUNTING.***	PM	Unlikely	Negligible	LOW	Unlikely	Negligible	LOW
EXT-3	External Risks	Mobilization	Fuel Price Impact on Mobilization	Future fuel prices are uncertain and may not match cost estimate assumptions.	Fuel price increases and market volatility directly affect bid prices.	Engineering	Likely	Marginal	MODERATE	Likely	Negligible	LOW
EXT-4	External Risks	Mechanical Dredging	Fuel Price Impact on Dredging	Future fuel prices are uncertain and may not match cost estimate assumptions.	Fuel price increases and market volatility directly affect bid prices. Weather delays are considered in historical production analysis. Fuel cost is an important component of dredging cost.	Engineering	Likely	Marginal	MODERATE	Likely	Negligible	LOW
EXT-5	External Risks	Mechanical Dredging	Mods and Claims Related to Adverse Weather	Adverse weather, such as a hurricane or tropical storm, during dredging operations may result in contractor mods and claims.	Delays to current operations and a temporary suspension for re-survey would be potential impacts.	Construction	Unlikely	Significant	MODERATE	Unlikely	Marginal	LOW
EXT-6	External Risks	Total Project	Adequacy of Incremental Project Funding	Actual project funding may not be sufficient to achieve schedule.	Estimate and schedule assume incremental funding. 5-year construction schedule is based on realistic funding stream. Risk of WRDA passing without PEH project authority is not included in this risk.	PM	Very Unlikely	Critical	LOW	Very Unlikely	Critical	LOW
EXT-7	External Risks	Total Project	Influential Stakeholders Request Scope Changes	Influential stakeholders may request late changes that impact project cost and schedule.	Project has a long history and the scope has evolved to address stakeholder issues. New requests by influential stakeholders are very unlikely due to project maturity. Impacts could be critical if risk were to occur. ***Descoping is possibility.***	PM	Very Unlikely	Critical	LOW	Very Unlikely	Critical	LOW
EXT-8	External Risks	Total Project	Authorization and Appropriation	Project funding delay.	***WRDA recently passed, next one expected in 2-5 years, possibly longer. State of Florida is very supportive of project and may provide funding similar to Miami.***	PM/Congress	Unlikely	Marginal	LOW	Unlikely	Crisis	HIGH
EXT-9	External Risks	Mechanical Dredging	Mods and Claims Related to Unanticipated Work Restrictions	Claims and mods related to unanticipated work restrictions may occur.	Public complaints may result in unanticipated work restrictions.	Construction	Unlikely	Marginal	LOW	Unlikely	Marginal	LOW

G6. TOTAL PROJECT COST SUMMARY

The Total Project Cost Summary (TPCS) addresses inflation through project completion (accomplished by escalation to mid-point of construction per ER 1110-2-1302, Appendix C, Page C-2). It is based on the scope of the Recommended Plan and the official project schedule. The TPCS includes Federal and Non-Federal costs for Lands and Damages, all construction features, PED, S&A, along with the appropriate contingencies and escalation associated with each of these activities. The TPCS is formatted according to the WBS and uses Civil Works Construction Cost Indexing System factors for escalation (EM 1110-2-1304) of construction costs and Office of Management and Budget (EC 11-2-18X, 20 Feb 2008) factors for escalation of PED and S&A costs. The Total Project Cost Summary was prepared using the MCACES/MII cost estimate on the Recommended Plan, as well as the contingency set by the risk analysis and the official project schedule.

G.6.1 Total Project Cost Summary Spreadsheet

Refer to the Total Project Cost Summary Spreadsheet in this report.

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

PROJECT: Port Everglades Harbor Deepening [47' NED]
PROJECT NO: 113180
LOCATION: Port Everglades, FL

DISTRICT: SAJ Jacksonville
POC: CHIEF, COST ENGINEERING,

PREPARED: 10/6/2014

This Estimate reflects the scope and schedule in report; Port Everglades Harbor Engineering Appendix

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
						Program Year (Budget EC): 2016								
						Effective Price Level Date: 1 OCT 15								
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Spent Thru: 1-Oct-14 ($K)		COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*	*L*	*M*	*N*	*O*
02	RELOCATIONS	$148	$39	26%	$187	1.9%	$150	$40	$190	$0		$163	$43	$206
06	FISH & WILDLIFE FACILITIES	$40,317	$10,603	26%	$50,920	1.9%	$41,072	$10,802	$51,874	$0		$44,440	$11,688	$56,128
12	NAVIGATION PORTS & HARBORS	$230,319	$60,574	26%	$290,892	1.9%	$234,630	$61,708	$296,337	$0		$253,876	$66,769	$320,645
	CONSTRUCTION ESTIMATE TOTALS:	$270,783	$71,216		$341,999	1.9%	$275,852	$72,549	$348,401	$0		$298,479	$78,500	$376,979
01	LANDS AND DAMAGES	$0	$0	-	$0	-	$0	$0	$0	$0		$0	$0	$0
30	PLANNING, ENGINEERING & DESIGN	$4,453	$1,171	26%	$5,624	3.4%	$4,606	$1,211	$5,817	$0		$4,771	$1,255	$6,026
31	CONSTRUCTION MANAGEMENT	$6,675	$1,755	26%	$8,430	3.4%	$6,904	$1,816	$8,720	$0		$8,051	$2,118	$10,169
	PROJECT COST TOTALS:	$281,911	$74,143	26%	$356,053		$287,362	$75,576	**$362,938**	$0		$311,301	$81,872	$393,173

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PEREZ.CYNTHIA.BERRIOS.1232161309 — PROJECT MANAGER, Cynthia Perez

ORMEROD.AUDREY.C.1230602634 — CHIEF, REAL ESTATE, Audrey Ormerod

_____ CHIEF, PLANNING, Eric Bush

_____ CHIEF, ENGINEERING, Laureen Borochaner

_____ CHIEF, OPERATIONS, Jim Jeffords

_____ CHIEF, CONSTRUCTION, Steve Duba

_____ CHIEF, CONTRACTING, Carlos Clarke

_____ CHIEF, PM-PB, Dan Haubner

_____ CHIEF, DPM, Dave Hobbie

ESTIMATED FEDERAL COST:	**75%**	**$294,880**
ESTIMATED NON-FEDERAL COST:	**25%**	**$98,293**
ESTIMATED TOTAL PROJECT COST:		**$393,173**

NOTE: CONTINGENCIES IN ACCORDANCE WITH CSRA.

Filename: TPCS_PEHHBR_47'_Sep2014_R4.xlsx
TPCS

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

****** CONTRACT COST SUMMARY ******

PROJECT: Port Everglades Harbor Deepening [47' NED]
LOCATION: Port Everglades, FL
This Estimate reflects the scope and schedule in report; Port Everglades Harbor Engineering Appendix

DISTRICT: SAJ Jacksonville
POC: CHIEF, COST ENGINEERING,
PREPARED: 10/6/2014

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 9/2/2014 Effective Price Level: 1-Oct-2014				Program Year (Budget EC): 2016 Effective Price Level Date: 1 OCT 15								
				RISK BASED										
WBS NUMBER *A*	Civil Works Feature & Sub-Feature Description *B*	COST ($K) *C*	CNTG ($K) *D*	CNTG (%) *E*	TOTAL ($K) *F*	ESC (%) *G*	COST ($K) *H*	CNTG ($K) *I*	TOTAL ($K) *J*	Mid-Point Date *P*	INFLATED (%) *L*	COST ($K) *M*	CNTG ($K) *N*	FULL ($K) *O*
	PHASE 1 or CONTRACT 1													
02	RELOCATIONS	$148	$39	26%	$187	1.9%	$150	$40	$190	2020Q1	8.2%	$163	$43	$206
06	FISH & WILDLIFE FACILITIES	$40,317	$10,603	26%	$50,920	1.9%	$41,072	$10,802	$51,874	2020Q1	8.2%	$44,440	$11,688	$56,128
12	NAVIGATION PORTS & HARBORS	$2,421	$637	26%	$3,057	1.9%	$2,466	$649	$3,115	2020Q1	8.2%	$2,668	$702	$3,370
12	NAVIGATION PORTS & HARBORS	$26,922	$7,080	26%	$34,002	1.9%	$27,426	$7,213	$34,638	2020Q1	8.2%	$29,675	$7,805	$37,480
12	NAVIGATION PORTS & HARBORS	$78,322	$20,599	26%	$98,921	1.9%	$79,788	$20,984	$100,772	2020Q1	8.2%	$86,333	$22,706	$109,038
12	NAVIGATION PORTS & HARBORS	$3,569	$939	26%	$4,508	1.9%	$3,636	$956	$4,593	2020Q1	8.2%	$3,934	$1,035	$4,969
12	NAVIGATION PORTS & HARBORS	$119,085	$31,319	26%	$150,404	1.9%	$121,314	$31,906	$153,219	2020Q1	8.2%	$131,265	$34,523	$165,788
							$0							
	CONSTRUCTION ESTIMATE TOTALS:	$270,783	$71,216	26%	**$341,999**		$275,852	$72,549	$348,401			$298,479	$78,500	$376,979
01	LANDS AND DAMAGES	$0	$0	26%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
30	PLANNING, ENGINEERING & DESIGN													
0.06%	Project Management	$173	$45	26%	$218	3.4%	$179	$47	$226	2016Q1	0.0%	$179	$47	$226
0.41%	Planning & Environmental Compliance	$1,100	$289	26%	$1,389	3.4%	$1,138	$299	$1,437	2016Q1	0.0%	$1,138	$299	$1,437
0.59%	Engineering & Design	$1,600	$421	26%	$2,021	3.4%	$1,655	$435	$2,090	2016Q1	0.0%	$1,655	$435	$2,090
0.06%	Reviews, ATRs, IEPRs, VE	$150	$39	26%	$189	3.4%	$155	$41	$196	2016Q1	0.0%	$155	$41	$196
0.04%	**Life Cycle Updates (cost, schedule, risks**	$100	$26	26%	$126	3.4%	$103	$27	$131	2016Q1	0.0%	$103	$27	$131
0.04%	Contracting & Reprographics	$120	$32	26%	$152	3.4%	$124	$33	$157	2016Q1	0.0%	$124	$33	$157
0.01%	Engineering During Construction	$35	$9	26%	$44	3.4%	$36	$10	$46	2020Q1	16.6%	$42	$11	$53
0.34%	Planning During Construction	$925	$243	26%	$1,168	3.4%	$957	$252	$1,208	2020Q1	16.6%	$1,116	$293	$1,409
0.09%	Project Operations	$250	$66	26%	$316	3.4%	$259	$68	$327	2016Q1	0.0%	$259	$68	$327
31	CONSTRUCTION MANAGEMENT													
2.47%	Construction Management (S&A + S&I)	$6,675	$1,755	26%	$8,430	3.4%	$6,904	$1,816	$8,720	2020Q1	16.6%	$8,051	$2,118	$10,169
0.00%	Project Operation:				$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
0.00%	Project Management				$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
	CONTRACT COST TOTALS:	$281,911	$74,143		**$356,053**		$287,362	$75,576	$362,938			$311,301	$81,872	**$393,173**

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

PROJECT: Port Everglades Harbor Deepening [48' LPP]
PROJECT NO: 113180
LOCATION: Port Everglades, FL

DISTRICT: SAJ Jacksonville
POC: CHIEF, COST ENGINEERING,

PREPARED: 10/6/2014

This Estimate reflects the scope and schedule in report; Port Everglades Harbor Engineering Appendix

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
						Program Year (Budget EC): 2016								
						Effective Price Level Date: 1 OCT 15								
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Spent Thru: 1-Oct-14 ($K)		COST ($K)	CNTG ($K)	FULL ($K)
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
02	RELOCATIONS	$148	$39	26%	$187	1.9%	$150	$40	$190	$0		$164	$43	$208
06	FISH & WILDLIFE FACILITIES	$41,812	$10,996	26%	$52,808	1.9%	$42,595	$11,202	$53,797	$0		$46,552	$12,243	$58,796
12	NAVIGATION PORTS & HARBORS	$243,077	$63,929	26%	$307,007	1.9%	$247,627	$65,126	$312,753	$0		$270,638	$71,178	$341,816
	CONSTRUCTION ESTIMATE TOTALS:	$285,037	$74,965		$360,001	1.9%	$290,372	$76,368	$366,740	$0		$317,355	$83,464	$400,820
01	LANDS AND DAMAGES	$0	$0	-	$0	-	$0	$0	$0	$0		$0	$0	$0
30	PLANNING, ENGINEERING & DESIGN	$4,453	$1,171	26%	$5,624	3.4%	$4,606	$1,211	$5,817	$0		$4,794	$1,261	$6,054
31	CONSTRUCTION MANAGEMENT	$6,675	$1,755	26%	$8,430	3.4%	$6,904	$1,816	$8,720	$0		$8,210	$2,159	$10,369
	PROJECT COST TOTALS:	$296,164	$77,891	26%	$374,056		$301,882	$79,395	**$381,277**	$0		$330,359	$86,884	$417,243

GNEITING-JAMES.THERESA.ANNE.1395797847 — Digitally signed by GNEITING-JAMES.THERESA.ANNE.1395797847 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=GNEITING-JAMES.THERESA.ANNE.1395797847 Date: 2014.10.24 12:36:51 -07'00' — CHIEF, COST ENGINEERING,

PEREZ.CYNTHIA.BERRIOS.1232161309 — Digitally signed by PEREZ.CYNTHIA.BERRIOS.1232161309 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=PEREZ.CYNTHIA.BERRIOS.1232161309 Date: 2014.10.24 16:16:49 -04'00' — PROJECT MANAGER, Cynthia Perez

NIXON.KARL.JAMES.1229751057 — Digitally signed by NIXON.KARL.JAMES.1229751057 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=NIXON.KARL.JAMES.1229751057 Date: 2014.11.04 11:27:55 -05'00' — CHIEF, REAL ESTATE, Audrey Ormerod

CHIEF, PLANNING, Eric Bush

CHIEF, ENGINEERING, Laureen Borochaner

CHIEF, OPERATIONS, Jim Jeffords

CHIEF, CONSTRUCTION, Steve Duba

CHIEF, CONTRACTING, Carlos Clarke

CHIEF, PM-PB, Dan Haubner

CHIEF, DPM, Dave Hobbie

ESTIMATED FEDERAL COST:	**75%**	**$312,932**
ESTIMATED NON-FEDERAL COST:	**25%**	**$104,311**
ESTIMATED TOTAL PROJECT COST:		**$417,243**

NOTE: CONTINGENCIES IN ACCORDANCE WITH CSRA.

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

****** CONTRACT COST SUMMARY ******

PROJECT: Port Everglades Harbor Deepening [48' LPP]
LOCATION: Port Everglades, FL
This Estimate reflects the scope and schedule in report; Port Everglades Harbor Engineering Appendix

DISTRICT: SAJ Jacksonville
POC: CHIEF, COST ENGINEERING,
PREPARED: 10/6/2014

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 9/2/2014 Effective Price Level: 1-Oct-2014				Program Year (Budget EC): 2016 Effective Price Level Date: 1 OCT 15								
				RISK BASED										
WBS NUMBER *A*	Civil Works Feature & Sub-Feature Description *B*	COST ($K) *C*	CNTG ($K) *D*	CNTG (%) *E*	TOTAL ($K) *F*	ESC (%) *G*	COST ($K) *H*	CNTG ($K) *I*	TOTAL ($K) *J*	Mid-Point Date *P*	INFLATED (%) *L*	COST ($K) *M*	CNTG ($K) *N*	FULL ($K) *O*
	PHASE 1 or CONTRACT 1													
02	RELOCATIONS	$148	$39	26%	$187	1.9%	$150	$40	$190	2020Q3	9.3%	$164	$43	$208
06	FISH & WILDLIFE FACILITIES	$41,812	$10,996	26%	$52,808	1.9%	$42,595	$11,202	$53,797	2020Q3	9.3%	$46,552	$12,243	$58,796
12	NAVIGATION PORTS & HARBORS	$2,421	$637	26%	$3,057	1.9%	$2,466	$649	$3,115	2020Q3	9.3%	$2,695	$709	$3,404
12	NAVIGATION PORTS & HARBORS	$28,709	$7,550	26%	$36,259	1.9%	$29,246	$7,692	$36,938	2020Q3	9.3%	$31,964	$8,406	$40,370
12	NAVIGATION PORTS & HARBORS	$88,310	$23,226	26%	$111,536	1.9%	$89,963	$23,660	$113,624	2020Q3	9.3%	$98,323	$25,859	$124,182
12	NAVIGATION PORTS & HARBORS	$4,039	$1,062	26%	$5,101	1.9%	$4,114	$1,082	$5,196	2020Q3	9.3%	$4,497	$1,183	$5,679
12	NAVIGATION PORTS & HARBORS	$119,599	$31,454	26%	$151,053	1.9%	$121,837	$32,043	$153,881	2020Q3	9.3%	$133,159	$35,021	$168,180
							$0							
	CONSTRUCTION ESTIMATE TOTALS:	$285,037	$74,965	26%	**$360,001**		$290,372	$76,368	$366,740			$317,355	$83,464	$400,820
01	LANDS AND DAMAGES	$0	$0	26%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
30	PLANNING, ENGINEERING & DESIGN													
0.06%	Project Management	$173	$45	26%	$218	3.4%	$179	$47	$226	2016Q1	0.0%	$179	$47	$226
0.39%	Planning & Environmental Compliance	$1,100	$289	26%	$1,389	3.4%	$1,138	$299	$1,437	2016Q1	0.0%	$1,138	$299	$1,437
0.56%	Engineering & Design	$1,600	$421	26%	$2,021	3.4%	$1,655	$435	$2,090	2016Q1	0.0%	$1,655	$435	$2,090
0.05%	Reviews, ATRs, IEPRs, VE	$150	$39	26%	$189	3.4%	$155	$41	$196	2016Q1	0.0%	$155	$41	$196
0.04%	**Life Cycle Updates (cost, schedule, risks**	$100	$26	26%	$126	3.4%	$103	$27	$131	2016Q1	0.0%	$103	$27	$131
0.04%	Contracting & Reprographics	$120	$32	26%	$152	3.4%	$124	$33	$157	2016Q1	0.0%	$124	$33	$157
0.01%	Engineering During Construction	$35	$9	26%	$44	3.4%	$36	$10	$46	2020Q3	18.9%	$43	$11	$54
0.32%	Planning During Construction	$925	$243	26%	$1,168	3.4%	$957	$252	$1,208	2020Q3	18.9%	$1,138	$299	$1,437
0.09%	Project Operations	$250	$66	26%	$316	3.4%	$259	$68	$327	2016Q1	0.0%	$259	$68	$327
31	CONSTRUCTION MANAGEMENT													
2.34%	Construction Management (S&A + S&I)	$6,675	$1,755	26%	$8,430	3.4%	$6,904	$1,816	$8,720	2020Q3	18.9%	$8,210	$2,159	$10,369
0.0%	Project Operation:				$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
0.0%	Project Management				$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
	CONTRACT COST TOTALS:	$296,164	$77,891		**$374,056**		$301,882	$79,395	$381,277			$330,359	$86,884	**$417,243**

G7. COST MCX TPCS CERTIFICATION

WALLA WALLA COST ENGINEERING MANDATORY CENTER OF EXPERTISE

COST AGENCY TECHNICAL REVIEW

CERTIFICATION STATEMENT

For Project No. 113180

SAJ – Port Everglades Harbor Deepening (48' NED/LPP)

The Port Everglades Harbor Deepening – 48' project, as presented by Jacksonville District, has undergone a successful Cost Agency Technical Review (Cost ATR), performed by the Walla Walla District Cost Engineering Mandatory Center of Expertise (Cost MCX) team. The Cost ATR included study of the project scope, report, cost estimates, schedules, escalation, and risk-based contingencies. This certification signifies the products meet the quality standards as prescribed in ER 1110-2-1150 Engineering and Design for Civil Works Projects and ER 1110-2-1302 Civil Works Cost Engineering. The Cost MCX certifies the estimated total project cost:

NED Plan (47' Depth)
FY 2016 Price Level: $362,938,000
Fully Funded Amount: $393,173,000

LPP (48' Depth)
FY 2016 Price Level: $381,277,000
Fully Funded Amount: $417,243,000

It remains the responsibility of the District to correctly reflect these cost values within the Final Report and to implement effective project management controls and implementation procedures including risk management throughout the life of the project.

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DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=CALLAN.KIM.C.1231558221

Kim C. Callan, PE, CCE, PM
Chief, Cost Engineering MCX
Walla Walla District

US Army Corps of Engineers®