

# ST. LUCIE COUNTY, FLORIDA

COASTAL STORM RISK MANAGEMENT PROJECT  
FINAL INTEGRATED FEASIBILITY STUDY AND ENVIRONMENTAL  
ASSESSMENT

## **APPENDIX B**

### **Cost Engineering and Risk Analysis**



**US Army Corps  
of Engineers**  
Jacksonville District

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## **B. COST ESTIMATES**

### **B1. 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, 30 June 2016
- 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 (Amendment 3: Tables revised 30 September 2013), Civil Works Construction Cost Index System, 31 March 2012
- CECW-CP Memorandum For Distribution, Subject: Initiatives To Improve The Accuracy Of Total Project Costs In Civil Works Feasibility Studies Requiring Congressional Authorization, 19 Sep 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, October 2010

The goal of the cost estimates for the St. Lucie County CSRM Project Draft Feasibility Study and Integrated EA are to present a Total Project Cost (construction and non-construction costs) for the Recommended Plan at the current price level to be used for project justification/authorization and to escalate costs for budgeting purposes. 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 final set of plan formulation cost estimates used for plan selection rely on construction feature unit pricing and are prepared in Civil Works Work Breakdown Structure (CWWBS) format to the sub-feature level. The cost estimate supporting the National Economic Development (NED) plan (Recommended Plan) is prepared in the Micro-Computer Aided Cost Estimating System (MCACES/MII) format to the CWWBS sub-feature level. This estimate is supported by the preferred labor, equipment, materials and crew/production breakdown. A fully funded (escalated for inflation through project completion) cost estimate, the Baseline Cost Estimate or Total Project Cost Summary, has also been developed.

A full cost and schedule risk analysis was performed to establish the project contingency for the Recommended Plan's cost items.

#### **B.1.1. Plan Formulation Cost Estimates**

For the plan formulation cost estimates, unit prices for dredging related work were developed in 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 were provided in the Engineering Appendix. Plan formulation alternatives were run through Beach-fx for calculation of the Benefit-to-Cost Ratio (BCR). Cost Engineering provided estimates for the initial construction on all alternatives that were input into Beach-fx. Non-construction costs were included as percentages of the total construction contract cost for this level of comparison and screening.

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

### **B.1.2. Recommended Plan**

The Recommended Plan was chosen by the Project Delivery Team (PDT) according to the plan formulation described above. The Economics Appendix fully describes the plan selection. The scope of work for the Recommended Plan is found in the Engineering Appendix. The MCACES/MII cost estimate for the Recommended Plan 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 2017 price level (1 October 2016-30 September 2017). For project justification purposes, the estimate costs are categorized under the appropriate CWWBS code and include both construction and non-construction costs.

The construction costs fall under the following feature code:

- 17 Beach Replenishment

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

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

### **B.1.3. Construction Cost**

For the construction costs, unit prices for dredging related work were developed in the Cost Engineering Dredge Estimating Program (CEDEP) and then entered into MCACES/MII. These costs include all major project components categorized under the appropriate CWWBS to the sub-feature level. The Total Project Cost Summary (TPCS) on the Recommended Plan contains contingencies that were determined as a result of the cost and schedule risk analysis, which is covered under another paragraph.

### **B.1.4. 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). These costs were provided by the PDT either as a lump sum cost or as a percentage of the total Construction Contract Cost. Lands and Damages are provided by Real Estate and are best described in the Real Estate Appendix. PED costs are for the preparation of contract plans and specifications (P&S) and include itemized costs that were provided by the project manager, as well as costs for Post-Construction Monitoring, Life Cycle Updates, Planning During Construction (PDC), and Engineering During Construction (EDC). Construction Management costs are for the

supervision and administration of a contract. This cost was provided by the project manager and is included as a percentage of the total construction contract cost.

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).

#### **B.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 construction, but also the timing of construction contracts based on funding and construction windows. The construction schedule was combined with the project schedule to create an overall schedule that was used for the generation of the TPCS. The construction schedule will change as the project moves through the various project lifecycle phases.

#### **B.1.6. Total Project Cost Summary**

The cost estimate for the Recommended Plan is prepared with an identified price level date and inflation factors are used to adjust the pricing to the project schedule. This estimate is known as the Fully Funded Cost Estimate or Total Project Cost Summary. It includes all Federal and non-federal costs: Lands, Easements, Rights of Way and Relocations; construction features; Planning Engineering and Design; Construction Management; Contingency; and Inflation.

### **B2. PLAN FORMULATION COST ESTIMATES**

There were several alternatives the PDT evaluated during plan formulation in order to identify the Recommended Plan. All alternatives that were evaluated at various stages in the study can be found in the Economics Appendix and are also outlined in the Main Report.

The Final Array of Alternatives looked at the initial construction costs for one (1) reach, South Hutchison Island (R-99 to R-115/Martin County Line), as described in the Main Report and Engineering Appendix. The final array considered five (5) separate conditions (varying beach widths); altogether there were five beach replenishment alternatives estimated, evaluated, and compared in the final array to determine the Recommended Plan.

The alternatives in the final array considered varying dune or beach widths constructed via dredging and hydraulic pumpout and truck haul; costs for dune plantings were also included where applicable. All fill densities and volumes were provided in spreadsheet format by Engineering. The volumes were calculated by Beach-fx. Average distances to borrow sites were estimated using GoogleEarth (truck haul) or were provided by Engineering (dredging). Quantities for dune plantings were calculated based on acreages and FDEP planting requirement information.

The various alternatives were as follows:

- Dune10 (Truck Haul)
  - This alternative is a 10-foot extension of the existing dune with vegetation.
- ABerm10DuneEx (Truck Haul)

- This alternative is a 10-foot extension of the existing berm constructed with the existing dune.
- ABerm20DuneEx (Hopper Dredging)
  - This alternative is a 20-foot extension of the existing berm constructed with the existing dune.
- ABerm30DuneEx (Hopper Dredging)
  - This alternative is a 30-foot extension of the existing berm constructed with the existing dune.
- ABerm40DuneEx (Hopper Dredging)
  - This alternative is a 40-foot extension of the existing berm constructed with the existing dune.

All dredging unit costs were calculated in CEDEP and transferred to MII to determine the total initial construction costs for each alternative. All truck haul unit costs were based upon input from various, permitted sand mine vendors. A contingency was applied to each alternative based upon design level.

Once the total initial construction costs for each alternative were developed in MII, the costs were broken down into a spreadsheet provided by the PDT. The table listed, separately, costs for mobilization and demobilization, a cost/cubic yard, and associated general items related to the construction operation. For the dredging alternatives, the unit cost was for dredging work only. For the truck haul alternatives, the unit cost was for beach fill (purchase, delivery, placement, and spreading of sand) only. Associated General Items included (where applicable) tilling, all necessary during-construction monitoring (environmental and non), and maintenance of traffic.

See also the Economics Section in the Main Report.

### **B3. RECOMMENDED PLAN (NED) COST ESTIMATE**

The recommended design, ABerm20DuneEx covers approximately 3.4 miles of shoreline between FDEP monuments R-99 to R-115/Martin County line (R-001). The construction template consists of a 50-foot wide berm with a 1 on 100 slope and foreshore fill extending to approximately -3.5 ft-NAVD88 with a slope of 1 on 5. This template, dimensioned for constructability, will then equilibrate into the project (20-foot berm and profile extension) template. It should be noted that modification of this design may occur during the detailed design phase of the study.

The Recommended Plan estimate was prepared for the Total Project Cost, not just the initial construction costs.

See the MCACES/MI I Printout in Addendum A.

### **B4. SCHEDULE**

The project schedule covers the lifecycle phases of the recommended plan (Planning Phase, Preconstruction, Engineering and Design (PED) Phase and the Construction Phase). Refer to the Schedule on the next page.

## **B5. RISK AND UNCERTAINTY ANALYSIS**

A Cost and Schedule Risk Analysis was conducted according to the procedures outlined in the following documents and sources:

- Cost and Schedule Risk Analysis Process guidance prepared by the USACE Cost Engineering MCX.
- Engineer Regulation (ER) 1110-2-1302 CIVIL WORKS COST ENGINEERING, dated 30 June 2016.
- Engineer Technical Letter (ETL) CONSTRUCTION COST ESTIMATING GUIDE FOR CIVIL WORKS, dated 30 September 2008.

### **B.5.1 Risk Analysis Methods**

The risk analysis process for this study is intended to determine the probability of various cost outcomes and quantify the required contingency needed in the cost estimate to achieve the desired level of cost confidence.

The entire PDT participated in a risk analysis brainstorming session to identify risks associated with the Recommended Plan. The risks were listed in the risk register, which is a tool commonly used in project planning and risk analysis, and evaluated by the PDT. The actual risk register is provided in Attachment A. 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. A risk model was then developed in order to establish a contingency to apply to the project costs.

After the model was run, the results were reviewed and all parameters were re-evaluated by the PDT as a sanity check of assumptions and inputs. Adjustments were made to the analysis accordingly and the final contingency was established. The contingency was applied to the Recommended Plan estimate in the Total Project Cost Summary in order to obtain the Fully Funded Cost.

### **B.5.2 Risk Analysis Results**

Risk analysis results are intended to provide project leadership with contingency information for scheduling, budgeting, and project control purposes, as well as to provide tools to support decision making and risk management as projects progress through planning and implementation.

Based on the risks that were assessed for the project, the resultant contingency was 28%. The complete breakdown of results can be viewed in the Cost and Schedule Risk Analysis report provided in Addendum C.

## **B6. 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 CWWBS and uses Civil Works Construction Cost Indexing System (CWCCIS) 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 contingencies set by the risk analysis and the official project schedule.

B.6.1 Total Project Cost Summary Spreadsheet  
Refer to the Total Project Cost Summary Spreadsheet in Appendix D.

## **B7. DISTRICT QUALITY CONTROL CERTIFICATION**

The recommended plan estimate, formal cost and schedule risk analysis and total project cost summary spreadsheet underwent internal cost review and will be certified by the Walla Walla Mandatory Center of Expertise before final report approval.

**WALLA WALLA COST ENGINEERING  
MANDATORY CENTER OF EXPERTISE**

**COST AGENCY TECHNICAL REVIEW**

**CERTIFICATION STATEMENT**

**SAJ - PN 112339  
St Lucie County, FL  
Coastal Storm Risk Management Project**

The St Lucie County, FL Coastal Storm Risk Management Project, as presented by the Jacksonville District, has undergone a successful update for the Cost Agency Technical Review (Cost ATR) of remaining costs, 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 cost 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.

As of October 21, 2016, the Cost MCX certifies the estimated total project cost:

INITIAL

FY18 Project First Cost:	\$ 20,276,000
Fully Funded Costs:	\$ 22,894,000

PERIODIC

FY18 Project First Cost:	\$33,020,000
Fully Funded Costs:	\$ 91,900,000

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.



**CALLAN.KIM.C.1231558221**

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

**ADDENDUMS TO APPENDIX B**

**ADDENDUM A: Recommended Plan Cost Estimate – No Contingency**

RECOMMENDED NATIONAL ECONOMIC DEVELOPMENT (NED) PLAN ESTIMATE IS IN SUPPORT OF THE REVISED DRAFT FEASIBILITY REPORT  
AND INTEGRATED ENVIRONMENTAL ASSESSMENT (EA) FOR ST LUCIE COUNTY.

Estimated by CESAJ-EN-TC

Designed by CESAJ PDT

Prepared by CESAJ-EN-TC

Preparation Date 10/11/2016

Effective Date of Pricing 10/1/2016

Estimated Construction Time Days

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Designed by  
  
CESAJ PDT  
Estimated by  
CESAJ-EN-TC  
Prepared by  
CESAJ-EN-TC

Design Document St  
Lucie-EngApp-Draft-25May16-NED-PostATR\_A  
Berm20\_  
Document Date 5/25/2016  
District SAJ  
Contact Brian Blake, x1003  
Budget Year 2019  
UOM System Original

**Direct Costs**

LaborCost  
EQCost  
MatlCost  
SubBidCost  
ShipCost  
CEDEP-L  
CEDEP-M  
PDT  
Comparable

**Timeline/Currency**  
Preparation Date 10/11/2016  
Escalation Date 9/30/2016  
Eff. Pricing Date 10/1/2016  
Estimated Duration 0 Day(s)  
  
Currency US dollars  
Exchange Rate 1.000000

**Costbook CB15EngA: MII English Cost Book 2015 Rev A**

**Labor LFL2015: Labor\_Florida\_2015**

**Note: All labor rates now meet the new 2015 Federal Minimum Wage (\$10.10/hour)**

**Labor Rates**

LaborCost1  
LaborCost2  
LaborCost3  
LaborCost4

**Equipment EP14R03: MII Equipment 2014 Region 03**

**Note: Used 5-year average fuel prices as of price quotes in October 2016.**

**03 SOUTHEAST**

Sales Tax 8.60  
Working Hours per Year 1,530  
Labor Adjustment Factor 0.88  
Cost of Money 1.88  
Cost of Money Discount 25.00  
Tire Recap Cost Factor 1.50  
Tire Recap Wear Factor 1.80  
Tire Repair Factor 0.15  
Equipment Cost Factor 1.00  
Standby Depreciation Factor 0.50

**Fuel**

Electricity 0.095  
Gas 2.360  
Diesel Off-Road 2.780  
Diesel On-Road 2.980

**Shipping Rates**

Over 0 CWT 16.27  
Over 240 CWT 14.82  
Over 300 CWT 12.69  
Over 400 CWT 10.64  
Over 500 CWT 5.85  
Over 700 CWT 5.85  
Over 800 CWT 9.79

**Direct Cost Markups**

	<b>Category</b>			<b>Method</b>		
	Productivity	Overtime		Productivity	Overtime	
	<i>Days/Week</i>	<i>Hours/Shift</i>	<i>Shifts/Day</i>	<i>1st Shift</i>	<i>2nd Shift</i>	<i>3rd Shift</i>
<i>Standard</i>	5.00	8.00	1.00	8.00	0.00	0.00
<i>Actual</i>	5.00	8.00	1.00	8.00	0.00	0.00

<i>Day</i>	<i>OT Factor</i>	<i>Working</i>	<i>OT Percent</i>	<i>FCCM Percent</i>
<i>Monday</i>	1.50	Yes	0.00	0.00
<i>Tuesday</i>	1.50	Yes		
<i>Wednesday</i>	1.50	Yes		
<i>Thursday</i>	1.50	Yes		
<i>Friday</i>	1.50	Yes		
<i>Saturday</i>	1.50	No		
<i>Sunday</i>	2.00	No		

Sales Tax  
*MatlCost* TaxAdj Running % on Selected Costs

Marine Insurance  
*CEDEP-M*  
*EQCost* MiscDirect Running % on Selected Costs

**Contractor Markups**

	<b>Category</b>	<b>Method</b>
P_JOOH_%	JOOH	Running %
S_JOOH%	JOOH	Running %
P_JOOH (Small Tools)	Allowance	% of Labor
P_JOOH	JOOH	JOOH (Calculated)
P_HOOH	HOOH	Running %
S_HOOH	HOOH	Running %
P_Profit	Profit	Running %
S_Profit	Profit	Running %
Bond	Bond	Running %
Excise Tax	Excise	Running %

**Owner Markups**

	<b>Category</b>	<b>Method</b>
Escalation	Escalation	Running %
Contingency	Contingency	Running %
SIOH	SIOH	Running %

**Project Name:**

St. Lucie County Coastal Storm Risk Management (CSRМ) Draft Feasibility Study and Integrated Environmental Assessment (EA) Tentatively Selection Plan (TSP)/Locally Preferred Plan (LPP) and National Economic Development (NED) Plan

**Acquisition Plan:**

Unconfirmed, but intent is RFP

**Sub-contracting Plan:**

Currently assuming subcontracting for all monitoring efforts (turbidity, vibration, environmental), surveying, sea turtle trawling, site work, vegetation, and diving

**Scope of Work:**

Excerpts from St Lucie-EngApp-Draft-11Feb16.pdf and NED 20ft Berm Beach Design.pdf:

**Background**

St. Lucie County is located on the south-central east coast of Florida (Figure 1-1). The county is bounded to the north by Indian River County and to the south by Martin County. St. Lucie County has approximately 22 miles of sandy shoreline located on a coastal barrier island that varies in width from approximately 400 feet to 1.5 miles. The St. Lucie County shoreline is subject to erosion caused by both tropical and extra-tropical storms as well as other natural shoreline processes. The purpose of this study is to assess the feasibility of providing Federal Coastal Flood Risk Management (CFRM) measures to the southern portion of the St. Lucie County shoreline.

**Problem Identification**

In the past, beaches of St. Lucie County have generally experienced substantial erosion due to the combined effects of winds, waves, and tides. The objectives of this appendix include quantification of existing beach erosion problems in the southern portion of St. Lucie County and the design of corrective measures specific to that environment. Quantification efforts involve analysis of historical shoreline positions, estimation of longshore transport rates, and prediction of cross-shore losses of beach material due to storms. The results of those efforts serve as the basis for the design and analysis of various measures, which could be employed to reduce storm damage in the project area.

**Plans**

Based on Beach-fx model results and economic evaluation, project alternative ABerm20DuneEx (a 20 foot berm template designed to maintain the existing (2008) dune between renourishments) was identified as the National Economic Development (NED) Plan for nourishment of St. Lucie County. However, the local Sponsor has identified ABerm30DuneEx (a 30 foot berm template designed to maintain the existing dune) as the Locally Preferred Plan (LPP). The LPP is economically justified and is therefore considered to be the Tentatively Selected Plan (TSP). The model base year (start for estimate) is 2020. There is a 50-year project life.

**Project Length**

The selected alternative, ABerm30DuneEx, covers approximately 3.4 miles of the study area. The beach fill will be placed from R-98 to the Martin County line with tapers extending approximately 1,000 feet to the north of R-98 and approximately 1,000 feet to the south. As Martin County, south of St. Lucie is part of an authorized Federal project, future nourishment events may be timed to tie into the southern project, negating the need for a taper.

**Project Summary**

The project consists of beach nourishment/renourishment along approximately 3.4 miles of shoreline between FDEP monuments R-98 and the Martin County line.

*TSP/NED*: The design beach fill template is characterized by a 20 foot berm extension (+7 ft-NAVD88 to Depth of Closure) from the existing dune. Beach fill material required under the Base SLR case includes an average of 422,000 cubic yards for initial construction of the design beach profile and two to three renourishment events averaging 380,000 cubic yards each. Periodic nourishment, after initial construction, is expected at approximately 18 year intervals.

*Post-Construction Monitoring*: Physical monitoring of the project is necessary to assess project performance and to ensure that project functionality is maintained throughout the 50-year project life. Post construction monitoring activities include topographic and bathymetric surveys of the placement area on an annual basis for 3 years following construction and then biannually until the next construction event. The cost for this post construction monitoring is included in the cost shared total project cost.

Other monitoring efforts include bathymetric mapping of the borrow site, which will be done as part of the pre-construction engineering and design (PED) phase prior to each nourishment.

**Documents Used as the Basis for this Estimate:**

- StLucieCoSPP Initial Alternatives Screening Estimates, dated 10 SEP 2015
- StLucieCoSPP Final Array Screening Estimates, dated 29 JAN 2016
- St Lucie-EngApp-Draft-11Feb16.pdf
- NED 20ft Berm Beach Design.pdf
- StLucie\_ReportSynopsis\_06\_15\_2015.docx
- St Lucie Feas NonConstruction Budget Info (002).xlsx
- Permit documents for St. Luce County - South Beach Restoration and South County
- Beach & Dune Restoration Project
- Google Earth images

**Narrative and Analytical Description on Rate/Price/Cost Development:**

**Dredging Costs were developed using Ho21-SAJ A 021816 and Pi021b\_012516\_SAJ\_Booster CEDEP (Cost Engineering Dredge Estimate Program). (See ETL 1110-2-573, Appendix D-4d.)**

**Historical Information - (See ETL 1110-2-573, Appendix D-5 (Historical Pricing Analysis, Past Contracts, etc.)**

There is no historical information. CEDEP inputs are based upon Dade Co SPP, which uses a hopper. While Ft. Pierce is a closer beach project, and uses a hopper, the process that will have to be followed for beach pumpout at St. Lucie is more similar to Dade County than Ft. Pierce. At Ft Pierce, beach work is a simple matter of dredging sand into the hopper, attaching to a moor set up near the jetty, and pumping from there. The South Hutchinson Island reach has no such offerings and will have to mimic Dade County instead. Dade County, unfortunately, has a lower production than Ft. Pierce, and yields a much higher unit cost.

**Selection of Equipment - (See ETL 1110-2-573, Appendix D-7)**

There is no dredging data for this project. The only Corps MII (2008) was for a truck haul from Stewart Mine. It does not appear to be an IGE. The estimate assumes a hopper due to use of Dade County SPP history as a reference, defining of the pipeline corridors, hardbottoms, and permit language. The Local Sponsor's permit for St. Lucie does not bar use of the hopper and Environmental team members didn't indicate that this would be a problematic assumption.

**Production - (See ETL 1110-2-573, Appendix D-8)**

CEDEP inputs are based upon Dade Co SPP. See above 'Historical Information' section.

**Mobilization and Demobilization - (See ETL 1110-2-573, Appendix D-11)**

Standard assumptions apply.

**Associated Work Items - (See ETL 1110-2-573, Appendix D-2)**

Due to hopper assumptions, considerations for non-capture sea turtle trawling will be considered in addition to the other associated work items such as turbidity monitoring and endangered species monitoring. Beach placement necessitates associated work such as turtle nest monitoring (not the same as endangered species monitoring), construction/vibration monitoring, and beach tilling.

**Quantity Calculations/Sources:** Based upon extensive modeling efforts and calculations from PDT. See St Lucie-EngApp-Draft-11Feb16.pdf.

**Effective Dates for Labor, Equipment and Material Pricing:**  
FY16

**Supporting Databases:**

MII Labor (2015), Equipment (2014), and Cost Book (2012)

**Major Project Features:**

Beach placement

**Federal and non-Federal Cost Sharing Requirements:**

See Project Partnership Agreement (PPA) or Total Project Cost Summary (TPCS) document

**Construction Schedule (including date of mid-point of construction):**

See schedule in Backup

**Known Construction Windows:**

*From Permit Number: 0154626-001-JC, Expiration Date: June 6, 2017*

Sand placement shall be started after October 31 and be completed before May 1. From May 1 through October 31, no construction equipment or pipes shall be stored on the beach.

During the early (March 1 through April 30) and late (November 1 through November 30) sea turtle nesting season, the Contractor shall not extend the beach fill more than 500 feet along the shoreline between dusk and sunrise of the following day until the daily nesting survey has been completed and the beach cleared for fill advancement. An exception to this may occur if there is permitted sea turtle surveyor present on-site to ensure no nesting and hatching sea turtles are present within the extended work area. If the 500 feet is not feasible for the project, an agreed upon distance will be decided on during the preconstruction meeting. Once the beach has been cleared and the necessary nest relocations have been completed, the Contractor will be allowed to proceed with the placement of fill during daylight hours until dusk at which time the 500-foot length limitation shall apply.

**Escalation:**

Applied in TPCS

**General Assumptions:**

1. Taxes: 6.5%
2. FOOH: 8%/4%
3. HOOH: 8%/4%
4. Profit 10%/8%
5. Bond: 1.5%
6. Price Level: FY16
7. Productivity/Overtime Usage: --
8. Contingency: Based upon CSRA, will be applied in Total Project Cost Summary (TPCS)
9. PED costs: Based upon PM/PDT input; see Backup
10. S&A costs: Based upon PM/PDT input; see Backup

**Site Access:**

Atlantic Ocean

**Borrow Areas:**

*From Permit Number: 0154626-001-JC, Expiration Date: June 6, 2017*

The offshore borrow area is located on the southern portion of St. Lucie Shoal, 3 to 4 miles offshore of R-98 through R-115, and the mitigation reef is approximately 400-550 feet offshore between R-90 and R-91, in the Atlantic Ocean off of St. Lucie County.

**Site Conditions:**

Estimator is not aware of any unusual or unique conditions at this time

**Unusual Conditions (Soil, Water, Weather):**

South Florida gets unpredictably high amounts of rainfall during certain seasons.

**Weather Days:**

Incorporated through CEDEP

**Unique Construction Techniques:**

See MII folder notes.

**Equipment and Labor Availability and Distance Traveled:**

Standard assumptions apply.

**Environmental Concerns During Construction:**

From StLucie\_ReportSynopsis\_06\_15\_2015.docx:

Existing

- Effects from storms including erosion, storm surge (flooding), and wave attack are threatening coastal infrastructure including residential and commercial property in St. Lucie County.
- Natural beach habitat of nesting sea turtles, benthic invertebrates, and shore birds is being lost to coastal erosion.
- Decreasing beach width due to shoreline erosion threatens recreation and tourism.

**Other Constraints**

The universal constraints are to avoid conflict with state and Federal regulations, as stated in Federal law, USACE regulations and Executive Orders, specifically the:

- Coastal Barrier Resource Act (CBRA)
- Clean Water Act
- Coastal Zone Management Act

The planning constraints for this study are to:

- Avoid conflict with state and Federal regulations, as stated in Federal law, USACE regulations and Executive Orders, specifically the Coastal Barrier Resource Act (CBRA), Clean Water Act and Coastal Zone Management Act.
- Avoid and / or minimize impacts to offshore hard bottom resources over a 50-year planning horizon (2020-2070).
- Avoid impacts to sea turtle nesting habitat including the placement of fill during construction and / or nourishment during nesting season over a 50-year planning horizon (2020-2070).
- Maintain the Hutchinson Island emergency evacuation routes over a 50-year planning horizon (2020 - 2070).
- Consider impacts of Federal participation in designated Coastal Barrier Resource Units within the study area (2020 - 2070).

**Volatile Cost Items:**

Fuel

**Risk Analysis:**

See CSRA, contingency will be applied in Total Project Cost Summary (TPCS)

**Cost/Schedule Impacts (Modifications):**

N/A

**Miscellaneous comments:**

Marine insurance has been applied to all marine equipment (7.32% total). CEDEP for hoppers already applies 3%. In order to avoid double-counting, a special mark-up has been applied to CEDEP equipment (dredge, equipment part of excavation cost) to make up the difference (4.32%). For marine equipment accounted for in MII directly (mooring rig efforts, hardbottom monitoring efforts, turbidity), the full 7.32% was applied to the equipment portion of those tasks only.

Description	Quantity	UOM	ContractCost	Escalation	Contingency	ProjectCost
<b>Project Cost Summary Report</b>			<b>40,708,906</b>	<b>0</b>	<b>0</b>	<b>40,708,906</b>
<b>FINAL RECOMMENDED PLAN (R99 - R115)</b>	<b>1.00</b>	<b>LS</b>	<b>40,708,906</b>	<b>0</b>	<b>0</b>	<b>40,708,906</b>
<b>2019 - P&amp;S, PED Mapping</b>	<b>1.00</b>	<b>LS</b>	<b>460,000</b>	<b>0</b>	<b>0</b>	<b>460,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>460,000</b>	<b>0</b>	<b>0</b>	<b>460,000</b>
USR Physical Monitoring	1.00	LS	30,000	0	0	30,000
<b>2020 - Initial Construction</b>	<b>1.00</b>	<b>LS</b>	<b>13,005,643</b>	<b>0</b>	<b>0</b>	<b>13,005,643</b>
<b>Construction</b>	<b>1.00</b>	<b>LS</b>	<b>10,558,221</b>	<b>0</b>	<b>0</b>	<b>10,558,221</b>
			<i>60.59</i>	<i>0.00%</i>	<i>0.00%</i>	<i>60.59</i>
USR Turtle Nest Monitor/Relocations	86.70	HR	5,253	0	0	5,253
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>2,447,421</b>	<b>0</b>	<b>0</b>	<b>2,447,421</b>
USR Construction Management	1.00	LS	1,517,421	0	0	1,517,421
<b>2021 - 1st Year Monitoring</b>	<b>1.00</b>	<b>LS</b>	<b>625,000</b>	<b>0</b>	<b>0</b>	<b>625,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>625,000</b>	<b>0</b>	<b>0</b>	<b>625,000</b>
USR Economic Update	1.00	LS	30,000	0	0	30,000
<b>2022 - 2nd Year Monitoring</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	50,000	0	0	50,000
<b>2023 - 3rd Year Monitoring</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	50,000	0	0	50,000
	<b>2024</b>	<b>1.00</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
USR Economic Update	1.00	LS	30,000	0	0	30,000
<b>2025 - 4th Year Monitoring</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	50,000	0	0	50,000
	<b>2026</b>	<b>1.00</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
USR Economic Update	1.00	LS	30,000	0	0	30,000
<b>2027 - 5th Year Monitoring</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	50,000	0	0	50,000
	<b>2028</b>	<b>1.00</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
USR Economic Update	1.00	LS	30,000	0	0	30,000
<b>2029 - 6th Year Monitoring</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	50,000	0	0	50,000
	<b>2030</b>	<b>1.00</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
USR Economic Update	1.00	LS	30,000	0	0	30,000
<b>2031 - 7th Year Monitoring</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>

Description	Quantity	UOM	ContractCost	Escalation	Contingency	ProjectCost
USR Biological Monitoring/Surveillance	1.00	LS	50,000	0	0	50,000
			<i>40,000.00</i>			<i>40,000.00</i>
<b>2032</b>	<b>1.00</b>	<b>EA</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
USR Economic Update	1.00	LS	30,000	0	0	30,000
<b>2033 - 8th Year Monitoring</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	50,000	0	0	50,000
<b>2034</b>	<b>1.00</b>	<b>LS</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
USR Economic Update	1.00	LS	30,000	0	0	30,000
			<i>140,000.00</i>			<i>140,000.00</i>
<b>2035 - 9th Year Monitoring</b>	<b>1.00</b>	<b>EA</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	50,000	0	0	50,000
			<i>40,000.00</i>			<i>40,000.00</i>
<b>2036</b>	<b>1.00</b>	<b>EA</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
USR Economic Update	1.00	LS	30,000	0	0	30,000
			<i>460,000.00</i>			<i>460,000.00</i>
<b>2037 - P&amp;S, PED Mapping</b>	<b>1.00</b>	<b>EA</b>	<b>460,000</b>	<b>0</b>	<b>0</b>	<b>460,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>460,000</b>	<b>0</b>	<b>0</b>	<b>460,000</b>
USR Physical Monitoring	1.00	LS	30,000	0	0	30,000
<b>2038 - 1st Renourishment</b>	<b>1.00</b>	<b>LS</b>	<b>10,699,132</b>	<b>0</b>	<b>0</b>	<b>10,699,132</b>
<b>Construction</b>	<b>1.00</b>	<b>LS</b>	<b>9,379,014</b>	<b>0</b>	<b>0</b>	<b>9,379,014</b>
			<i>60.59</i>	<i>0.00%</i>	<i>0.00%</i>	<i>60.59</i>
USR Turtle Nest Monitor/Relocations	79.40	HR	4,811	0	0	4,811
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>1,320,118</b>	<b>0</b>	<b>0</b>	<b>1,320,118</b>
USR Construction Management	1.00	LS	1,105,118	0	0	1,105,118
<b>2039 - 1st Year Monitoring</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	50,000	0	0	50,000
<b>2040 - 2nd Year Monitoring</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	50,000	0	0	50,000
<b>2041 - 3rd Year Monitoring</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	50,000	0	0	50,000
			<i>40,000.00</i>			<i>40,000.00</i>
<b>2042</b>	<b>1.00</b>	<b>EA</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
USR Economic Update	1.00	LS	30,000	0	0	30,000

Description	Quantity	UOM	ContractCost	Escalation	Contingency	ProjectCost
			<i>140,000.00</i>			<i>140,000.00</i>
<b>2043 - 4th Year Monitoring</b>	<b>1.00</b>	<b>EA</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	50,000	0	0	50,000
			<i>40,000.00</i>			<i>40,000.00</i>
<b>2044</b>	<b>1.00</b>	<b>EA</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
USR Economic Update	1.00	LS	30,000	0	0	30,000
			<i>140,000.00</i>			<i>140,000.00</i>
<b>2045 - 5th Year Monitoring</b>	<b>1.00</b>	<b>EA</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	50,000	0	0	50,000
			<i>40,000.00</i>			<i>40,000.00</i>
<b>2046</b>	<b>1.00</b>	<b>EA</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
USR Economic Update	1.00	LS	30,000	0	0	30,000
<b>2047 - 6th Year Monitoring</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	50,000	0	0	50,000
			<i>40,000.00</i>			<i>40,000.00</i>
<b>2048</b>	<b>1.00</b>	<b>EA</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
USR Economic Update	1.00	LS	30,000	0	0	30,000
			<i>140,000.00</i>			<i>140,000.00</i>
<b>2049 - 7th Year Monitoring</b>	<b>1.00</b>	<b>EA</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	50,000	0	0	50,000
			<i>40,000.00</i>			<i>40,000.00</i>
<b>2050</b>	<b>1.00</b>	<b>EA</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
USR Economic Update	1.00	LS	30,000	0	0	30,000
			<i>140,000.00</i>			<i>140,000.00</i>
<b>2051 - 8th Year Monitoring</b>	<b>1.00</b>	<b>EA</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	50,000	0	0	50,000
			<i>40,000.00</i>			<i>40,000.00</i>
<b>2052</b>	<b>1.00</b>	<b>EA</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
USR Economic Update	1.00	LS	30,000	0	0	30,000
			<i>140,000.00</i>			<i>140,000.00</i>
<b>2053 - 9th Year Monitoring</b>	<b>1.00</b>	<b>EA</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>

Description	Quantity	UOM	ContractCost	Escalation	Contingency	ProjectCost
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	50,000	0	0	50,000
	<b>2054</b>	<b>1.00</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
USR Economic Update	1.00	LS	30,000	0	0	30,000
<b>2055 - P&amp;S, PED Mapping</b>	<b>1.00</b>	<b>LS</b>	<b>460,000</b>	<b>0</b>	<b>0</b>	<b>460,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>460,000</b>	<b>0</b>	<b>0</b>	<b>460,000</b>
USR Physical Monitoring	1.00	LS	30,000	0	0	30,000
<b>2056 - 2nd Renourishment</b>	<b>1.00</b>	<b>LS</b>	<b>10,699,132</b>	<b>0</b>	<b>0</b>	<b>10,699,132</b>
<b>Construction</b>	<b>1.00</b>	<b>LS</b>	<b>9,379,014</b>	<b>0</b>	<b>0</b>	<b>9,379,014</b>
			<i>60.59</i>	<i>0.00%</i>	<i>0.00%</i>	<i>60.59</i>
USR Turtle Nest Monitor/Relocations	79.40	HR	4,811	0	0	4,811
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>1,320,118</b>	<b>0</b>	<b>0</b>	<b>1,320,118</b>
USR Construction Management	1.00	LS	1,105,118	0	0	1,105,118
<b>2057 - 1st Year Monitoring</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	50,000	0	0	50,000
<b>2058 - 2nd Year Monitoring</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	50,000	0	0	50,000
<b>2059 - 3rd Year Monitoring</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	50,000	0	0	50,000
	<b>2060</b>	<b>1.00</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
USR Economic Update	1.00	LS	30,000	0	0	30,000
<b>2061 - 4th Year Monitoring</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	50,000	0	0	50,000
			<i>40,000.00</i>			<i>40,000.00</i>
	<b>2062</b>	<b>1.00</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>EA</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
USR Economic Update	1.00	LS	30,000	0	0	30,000
			<i>140,000.00</i>			<i>140,000.00</i>
<b>2063 - 5th Year Monitoring</b>	<b>1.00</b>	<b>EA</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	50,000	0	0	50,000
			<i>40,000.00</i>			<i>40,000.00</i>
	<b>2064</b>	<b>1.00</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
USR Economic Update	1.00	LS	30,000	0	0	30,000
<b>2065 - 6th Year Monitoring</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>

Description	Quantity	UOM	ContractCost	Escalation	Contingency	ProjectCost
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	50,000	0	0	50,000
	<b>2066</b>	<b>1.00</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
USR Economic Update	1.00	LS	30,000	0	0	30,000
<b>2067 - 7th Year Monitoring</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	50,000	0	0	50,000
	<b>2068</b>	<b>1.00</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
USR Economic Update	1.00	LS	30,000	0	0	30,000
<b>2069 - 8th Year Monitoring</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>140,000</b>	<b>0</b>	<b>0</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	50,000	0	0	50,000
	<b>2070</b>	<b>1.00</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>40,000</b>	<b>0</b>	<b>0</b>	<b>40,000</b>
USR PM	1.00	LS	10,000	0	0	10,000
USR Economic Update	1.00	LS	30,000	0	0	30,000

Description	Quantity	UOM	Contractor	DirectCost	SubCMU	CostToPrime	PrimeCMU	ContractCost
<b>Contract Cost Summary Report</b>				<b>34,009,384</b>	<b>329,600</b>	<b>33,598,282</b>	<b>6,369,922</b>	<b>40,708,906</b>
<b>FINAL RECOMMENDED PLAN (R99 - R115)</b>				<b>34,009,384</b>	<b>329,600</b>	<b>33,598,282</b>	<b>6,369,922</b>	<b>40,708,906</b>
2019 - P&S, PED Mapping	1.00	LS		460,000	0	460,000	0	460,000
Non-Construction	1.00	LS	Government	460,000	0	460,000	0	460,000
2020 - Initial Construction	1.00	LS		10,579,238	163,094	10,495,431	2,263,311	13,005,643
Construction	1.00	LS		8,131,816	163,094	8,048,009	2,263,311	10,558,221
Non-Construction	1.00	LS	Government	2,447,421	0	2,447,421	0	2,447,421
2021 - 1st Year Monitoring	1.00	LS		625,000	0	625,000	0	625,000
Non-Construction	1.00	LS	Government	625,000	0	625,000	0	625,000
2022 - 2nd Year Monitoring	1.00	LS		140,000	0	140,000	0	140,000
Non-Construction	1.00	LS	Government	140,000	0	140,000	0	140,000
2023 - 3rd Year Monitoring	1.00	LS		140,000	0	140,000	0	140,000
Non-Construction	1.00	LS	Government	140,000	0	140,000	0	140,000
	2024	1.00	LS	40,000	0	40,000	0	40,000
Non-Construction	1.00	LS	Government	40,000	0	40,000	0	40,000
2025 - 4th Year Monitoring	1.00	LS		140,000	0	140,000	0	140,000
Non-Construction	1.00	LS	Government	140,000	0	140,000	0	140,000
	2026	1.00	LS	40,000	0	40,000	0	40,000
Non-Construction	1.00	LS	Government	40,000	0	40,000	0	40,000
2027 - 5th Year Monitoring	1.00	LS		140,000	0	140,000	0	140,000
Non-Construction	1.00	LS	Government	140,000	0	140,000	0	140,000
	2028	1.00	LS	40,000	0	40,000	0	40,000
Non-Construction	1.00	LS	Government	40,000	0	40,000	0	40,000
2029 - 6th Year Monitoring	1.00	LS		140,000	0	140,000	0	140,000
Non-Construction	1.00	LS	Government	140,000	0	140,000	0	140,000
	2030	1.00	LS	40,000	0	40,000	0	40,000
Non-Construction	1.00	LS	Government	40,000	0	40,000	0	40,000
2031 - 7th Year Monitoring	1.00	LS		140,000	0	140,000	0	140,000
Non-Construction	1.00	LS	Government	140,000	0	140,000	0	140,000
	2032	1.00	EA	40,000	0	40,000	0	40,000
Non-Construction	1.00	LS	Government	40,000	0	40,000	0	40,000
2033 - 8th Year Monitoring	1.00	LS		140,000	0	140,000	0	140,000
Non-Construction	1.00	LS	Government	140,000	0	140,000	0	140,000
	2034	1.00	LS	40,000	0	40,000	0	40,000
Non-Construction	1.00	LS	Government	40,000	0	40,000	0	40,000
2035 - 9th Year Monitoring	1.00	EA		140,000	0	140,000	0	140,000
Non-Construction	1.00	LS	Government	140,000	0	140,000	0	140,000
	2036	1.00	EA	40,000	0	40,000	0	40,000

Description	Quantity	UOM	Contractor	DirectCost	SubCMU	CostToPrime	PrimeCMU	ContractCost
Non-Construction	1.00	LS	Government	40,000	0	40,000	0	40,000
2037 - P&S, PED Mapping	1.00	EA		460,000	0	460,000	0	460,000
Non-Construction	1.00	LS	Government	460,000	0	460,000	0	460,000
2038 - 1st Renourishment	1.00	LS		8,562,573	83,253	8,398,925	2,053,306	10,699,132
Construction	1.00	LS		7,242,455	83,253	7,078,807	2,053,306	9,379,014
Non-Construction	1.00	LS	Government	1,320,118	0	1,320,118	0	1,320,118
2039 - 1st Year Monitoring	1.00	LS		140,000	0	140,000	0	140,000
Non-Construction	1.00	LS	Government	140,000	0	140,000	0	140,000
2040 - 2nd Year Monitoring	1.00	LS		140,000	0	140,000	0	140,000
Non-Construction	1.00	LS	Government	140,000	0	140,000	0	140,000
2041 - 3rd Year Monitoring	1.00	LS		140,000	0	140,000	0	140,000
Non-Construction	1.00	LS	Government	140,000	0	140,000	0	140,000
	2042	1.00	EA	40,000	0	40,000	0	40,000
Non-Construction	1.00	LS	Government	40,000	0	40,000	0	40,000
2043 - 4th Year Monitoring	1.00	EA		140,000	0	140,000	0	140,000
Non-Construction	1.00	LS	Government	140,000	0	140,000	0	140,000
	2044	1.00	EA	40,000	0	40,000	0	40,000
Non-Construction	1.00	LS	Government	40,000	0	40,000	0	40,000
2045 - 5th Year Monitoring	1.00	EA		140,000	0	140,000	0	140,000
Non-Construction	1.00	LS	Government	140,000	0	140,000	0	140,000
	2046	1.00	EA	40,000	0	40,000	0	40,000
Non-Construction	1.00	LS	Government	40,000	0	40,000	0	40,000
2047 - 6th Year Monitoring	1.00	LS		140,000	0	140,000	0	140,000
Non-Construction	1.00	LS	Government	140,000	0	140,000	0	140,000
	2048	1.00	EA	40,000	0	40,000	0	40,000
Non-Construction	1.00	LS	Government	40,000	0	40,000	0	40,000
2049 - 7th Year Monitoring	1.00	EA		140,000	0	140,000	0	140,000
Non-Construction	1.00	LS	Government	140,000	0	140,000	0	140,000
	2050	1.00	EA	40,000	0	40,000	0	40,000
Non-Construction	1.00	LS	Government	40,000	0	40,000	0	40,000
2051 - 8th Year Monitoring	1.00	EA		140,000	0	140,000	0	140,000
Non-Construction	1.00	LS	Government	140,000	0	140,000	0	140,000
	2052	1.00	EA	40,000	0	40,000	0	40,000
Non-Construction	1.00	LS	Government	40,000	0	40,000	0	40,000
2053 - 9th Year Monitoring	1.00	EA		140,000	0	140,000	0	140,000
Non-Construction	1.00	LS	Government	140,000	0	140,000	0	140,000
	2054	1.00	LS	40,000	0	40,000	0	40,000
Non-Construction	1.00	LS	Government	40,000	0	40,000	0	40,000

Description	Quantity	UOM	Contractor	DirectCost	SubCMU	CostToPrime	PrimeCMU	ContractCost
2055 - P&S, PED Mapping	1.00	LS		460,000	0	460,000	0	460,000
Non-Construction	1.00	LS	Government	460,000	0	460,000	0	460,000
2056 - 2nd Renourishment	1.00	LS		8,562,573	83,253	8,398,925	2,053,306	10,699,132
Construction	1.00	LS		7,242,455	83,253	7,078,807	2,053,306	9,379,014
Non-Construction	1.00	LS	Government	1,320,118	0	1,320,118	0	1,320,118
2057 - 1st Year Monitoring	1.00	LS		140,000	0	140,000	0	140,000
Non-Construction	1.00	LS	Government	140,000	0	140,000	0	140,000
2058 - 2nd Year Monitoring	1.00	LS		140,000	0	140,000	0	140,000
Non-Construction	1.00	LS	Government	140,000	0	140,000	0	140,000
2059 - 3rd Year Monitoring	1.00	LS		140,000	0	140,000	0	140,000
Non-Construction	1.00	LS	Government	140,000	0	140,000	0	140,000
	2060	1.00	LS	40,000	0	40,000	0	40,000
Non-Construction	1.00	LS	Government	40,000	0	40,000	0	40,000
2061 - 4th Year Monitoring	1.00	LS		140,000	0	140,000	0	140,000
Non-Construction	1.00	LS	Government	140,000	0	140,000	0	140,000
	2062	1.00	EA	40,000	0	40,000	0	40,000
Non-Construction	1.00	LS	Government	40,000	0	40,000	0	40,000
2063 - 5th Year Monitoring	1.00	EA		140,000	0	140,000	0	140,000
Non-Construction	1.00	LS	Government	140,000	0	140,000	0	140,000
	2064	1.00	EA	40,000	0	40,000	0	40,000
Non-Construction	1.00	LS	Government	40,000	0	40,000	0	40,000
2065 - 6th Year Monitoring	1.00	LS		140,000	0	140,000	0	140,000
Non-Construction	1.00	LS	Government	140,000	0	140,000	0	140,000
	2066	1.00	LS	40,000	0	40,000	0	40,000
Non-Construction	1.00	LS	Government	40,000	0	40,000	0	40,000
2067 - 7th Year Monitoring	1.00	LS		140,000	0	140,000	0	140,000
Non-Construction	1.00	LS	Government	140,000	0	140,000	0	140,000
	2068	1.00	LS	40,000	0	40,000	0	40,000
Non-Construction	1.00	LS	Government	40,000	0	40,000	0	40,000
2069 - 8th Year Monitoring	1.00	LS		140,000	0	140,000	0	140,000
Non-Construction	1.00	LS	Government	140,000	0	140,000	0	140,000
	2070	1.00	LS	40,000	0	40,000	0	40,000
Non-Construction	1.00	LS	Government	40,000	0	40,000	0	40,000

Description	Quantity	UOM	Contractor	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost	DirectCost
<b>Project Direct Costs Report</b>				<b>1,281,615</b>	<b>4,364,153</b>	<b>410,271</b>	<b>362,856</b>	<b>27,590,488</b>	<b>34,009,384</b>
<b>FINAL RECOMMENDED PLAN (R99 - R115)</b>	<b>1.00</b>	<b>LS</b>		<b>1,281,615</b>	<b>4,364,153</b>	<b>410,271</b>	<b>362,856</b>	<b>27,590,488</b>	<b>34,009,384</b>
<b>2019 - P&amp;S, PED Mapping</b>	<b>1.00</b>	<b>LS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>460,000</b>	<b>460,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>460,000</b>	<b>460,000</b>
USR Physical Monitoring	1.00	LS	Government	0	0	0	0	30,000	30,000
<b>2020 - Initial Construction</b>	<b>1.00</b>	<b>LS</b>		<b>608,151</b>	<b>1,618,509</b>	<b>156,832</b>	<b>127,568</b>	<b>8,068,177</b>	<b>10,579,238</b>
<b>Construction</b>	<b>1.00</b>	<b>LS</b>		<b>608,151</b>	<b>1,618,509</b>	<b>156,832</b>	<b>127,568</b>	<b>5,620,756</b>	<b>8,131,816</b>
USR Turtle Nest Monitor/Relocations	86.70	HR	Environmental Sub - ABerm20DuneEx	45.00 3,901	0.00 0	0.00 0	0.00 0	0	45.00 3,901
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2,447,421</b>	<b>2,447,421</b>
USR Construction Management	1.00	LS	Government	0	0	0	0	1,517,421	1,517,421
<b>2021 - 1st Year Monitoring</b>	<b>1.00</b>	<b>LS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>625,000</b>	<b>625,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>625,000</b>	<b>625,000</b>
USR Economic Update	1.00	LS	Government	0	0	0	0	30,000	30,000
<b>2022 - 2nd Year Monitoring</b>	<b>1.00</b>	<b>LS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	Government	0	0	0	0	50,000	50,000
<b>2023 - 3rd Year Monitoring</b>	<b>1.00</b>	<b>LS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	Government	0	0	0	0	50,000	50,000
<b>2024</b>	<b>1.00</b>	<b>LS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
USR Economic Update	1.00	LS	Government	0	0	0	0	30,000	30,000
<b>2025 - 4th Year Monitoring</b>	<b>1.00</b>	<b>LS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	Government	0	0	0	0	50,000	50,000
<b>2026</b>	<b>1.00</b>	<b>LS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
USR Economic Update	1.00	LS	Government	0	0	0	0	30,000	30,000
<b>2027 - 5th Year Monitoring</b>	<b>1.00</b>	<b>LS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	Government	0	0	0	0	50,000	50,000
<b>2028</b>	<b>1.00</b>	<b>LS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
USR Economic Update	1.00	LS	Government	0	0	0	0	30,000	30,000
<b>2029 - 6th Year Monitoring</b>	<b>1.00</b>	<b>LS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	Government	0	0	0	0	50,000	50,000
<b>2030</b>	<b>1.00</b>	<b>LS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>

Description	Quantity	UOM	Contractor	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost	DirectCost
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
USR Economic Update	1.00	LS	Government	0	0	0	0	30,000	30,000
<b>2031 - 7th Year Monitoring</b>	<b>1.00</b>	<b>LS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	Government	0	0	0	0	50,000	50,000
				0.00	0.00	0.00	0.00		40,000.00
	<b>2032</b>	<b>1.00</b>	<b>EA</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
USR Economic Update	1.00	LS	Government	0	0	0	0	30,000	30,000
<b>2033 - 8th Year Monitoring</b>	<b>1.00</b>	<b>LS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	Government	0	0	0	0	50,000	50,000
	<b>2034</b>	<b>1.00</b>	<b>LS</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
USR Economic Update	1.00	LS	Government	0	0	0	0	30,000	30,000
				0.00	0.00	0.00	0.00		140,000.00
<b>2035 - 9th Year Monitoring</b>	<b>1.00</b>	<b>EA</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	Government	0	0	0	0	50,000	50,000
				0.00	0.00	0.00	0.00		40,000.00
	<b>2036</b>	<b>1.00</b>	<b>EA</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
USR Economic Update	1.00	LS	Government	0	0	0	0	30,000	30,000
				0.00	0.00	0.00	0.00		460,000.00
<b>2037 - P&amp;S, PED Mapping</b>	<b>1.00</b>	<b>EA</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>460,000</b>	<b>460,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>460,000</b>	<b>460,000</b>
USR Physical Monitoring	1.00	LS	Government	0	0	0	0	30,000	30,000
<b>2038 - 1st Renourishment</b>	<b>1.00</b>	<b>LS</b>		<b>336,732</b>	<b>1,372,822</b>	<b>126,719</b>	<b>117,644</b>	<b>6,608,655</b>	<b>8,562,573</b>
<b>Construction</b>	<b>1.00</b>	<b>LS</b>		<b>336,732</b>	<b>1,372,822</b>	<b>126,719</b>	<b>117,644</b>	<b>5,288,537</b>	<b>7,242,455</b>
USR Turtle Nest Monitor/Relocations	79.40	HR	Environmental Sub - ABerm20DuneEx	45.00 3,573	0.00 0	0.00 0	0.00 0	0	45.00 3,573
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1,320,118</b>	<b>1,320,118</b>
USR Construction Management	1.00	LS	Government	0	0	0	0	1,105,118	1,105,118
<b>2039 - 1st Year Monitoring</b>	<b>1.00</b>	<b>LS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	Government	0	0	0	0	50,000	50,000
<b>2040 - 2nd Year Monitoring</b>	<b>1.00</b>	<b>LS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	Government	0	0	0	0	50,000	50,000

Description	Quantity	UOM	Contractor	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost	DirectCost
<b>2041 - 3rd Year Monitoring</b>	<b>1.00</b>	<b>LS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	Government	0	0	0	0	50,000	50,000
				0.00	0.00	0.00	0.00		40,000.00
<b>2042</b>	<b>1.00</b>	<b>EA</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
USR Economic Update	1.00	LS	Government	0	0	0	0	30,000	30,000
				0.00	0.00	0.00	0.00		140,000.00
<b>2043 - 4th Year Monitoring</b>	<b>1.00</b>	<b>EA</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	Government	0	0	0	0	50,000	50,000
				0.00	0.00	0.00	0.00		40,000.00
<b>2044</b>	<b>1.00</b>	<b>EA</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
USR Economic Update	1.00	LS	Government	0	0	0	0	30,000	30,000
				0.00	0.00	0.00	0.00		140,000.00
<b>2045 - 5th Year Monitoring</b>	<b>1.00</b>	<b>EA</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	Government	0	0	0	0	50,000	50,000
				0.00	0.00	0.00	0.00		40,000.00
<b>2046</b>	<b>1.00</b>	<b>EA</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
USR Economic Update	1.00	LS	Government	0	0	0	0	30,000	30,000
				0.00	0.00	0.00	0.00		140,000.00
<b>2047 - 6th Year Monitoring</b>	<b>1.00</b>	<b>LS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	Government	0	0	0	0	50,000	50,000
				0.00	0.00	0.00	0.00		40,000.00
<b>2048</b>	<b>1.00</b>	<b>EA</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
USR Economic Update	1.00	LS	Government	0	0	0	0	30,000	30,000
				0.00	0.00	0.00	0.00		140,000.00
<b>2049 - 7th Year Monitoring</b>	<b>1.00</b>	<b>EA</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	Government	0	0	0	0	50,000	50,000
				0.00	0.00	0.00	0.00		40,000.00
<b>2050</b>	<b>1.00</b>	<b>EA</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
USR Economic Update	1.00	LS	Government	0	0	0	0	30,000	30,000
				0.00	0.00	0.00	0.00		140,000.00

Description	Quantity	UOM	Contractor	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost	DirectCost
<b>2051 - 8th Year Monitoring</b>	<b>1.00</b>	<b>EA</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	Government	0	0	0	0	50,000	50,000
				0.00	0.00	0.00	0.00		40,000.00
<b>2052</b>	<b>1.00</b>	<b>EA</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
USR Economic Update	1.00	LS	Government	0	0	0	0	30,000	30,000
				0.00	0.00	0.00	0.00		140,000.00
<b>2053 - 9th Year Monitoring</b>	<b>1.00</b>	<b>EA</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	Government	0	0	0	0	50,000	50,000
<b>2054</b>	<b>1.00</b>	<b>LS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
USR Economic Update	1.00	LS	Government	0	0	0	0	30,000	30,000
<b>2055 - P&amp;S, PED Mapping</b>	<b>1.00</b>	<b>LS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>460,000</b>	<b>460,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>460,000</b>	<b>460,000</b>
USR Physical Monitoring	1.00	LS	Government	0	0	0	0	30,000	30,000
<b>2056 - 2nd Renourishment</b>	<b>1.00</b>	<b>LS</b>		<b>336,732</b>	<b>1,372,822</b>	<b>126,719</b>	<b>117,644</b>	<b>6,608,655</b>	<b>8,562,573</b>
<b>Construction</b>	<b>1.00</b>	<b>LS</b>		<b>336,732</b>	<b>1,372,822</b>	<b>126,719</b>	<b>117,644</b>	<b>5,288,537</b>	<b>7,242,455</b>
USR Turtle Nest Monitor/Relocations	79.40	HR	Environmental Sub - ABerm20DuneEx	45.00 3,573	0.00 0	0.00 0	0.00 0	0	45.00 3,573
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1,320,118</b>	<b>1,320,118</b>
USR Construction Management	1.00	LS	Government	0	0	0	0	1,105,118	1,105,118
<b>2057 - 1st Year Monitoring</b>	<b>1.00</b>	<b>LS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	Government	0	0	0	0	50,000	50,000
<b>2058 - 2nd Year Monitoring</b>	<b>1.00</b>	<b>LS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	Government	0	0	0	0	50,000	50,000
<b>2059 - 3rd Year Monitoring</b>	<b>1.00</b>	<b>LS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	Government	0	0	0	0	50,000	50,000
<b>2060</b>	<b>1.00</b>	<b>LS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
USR Economic Update	1.00	LS	Government	0	0	0	0	30,000	30,000
<b>2061 - 4th Year Monitoring</b>	<b>1.00</b>	<b>LS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	Government	0	0	0	0	50,000	50,000
				0.00	0.00	0.00	0.00		40,000.00

Description	Quantity	UOM	Contractor	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost	DirectCost
<b>2062</b>	<b>1.00</b>	<b>EA</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
USR Economic Update	1.00	LS	Government	0	0	0	0	30,000	30,000
				0.00	0.00	0.00	0.00		140,000.00
<b>2063 - 5th Year Monitoring</b>	<b>1.00</b>	<b>EA</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	Government	0	0	0	0	50,000	50,000
				0.00	0.00	0.00	0.00		40,000.00
<b>2064</b>	<b>1.00</b>	<b>EA</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
USR Economic Update	1.00	LS	Government	0	0	0	0	30,000	30,000
<b>2065 - 6th Year Monitoring</b>	<b>1.00</b>	<b>LS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	Government	0	0	0	0	50,000	50,000
<b>2066</b>	<b>1.00</b>	<b>LS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
USR Economic Update	1.00	LS	Government	0	0	0	0	30,000	30,000
<b>2067 - 7th Year Monitoring</b>	<b>1.00</b>	<b>LS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	Government	0	0	0	0	50,000	50,000
<b>2068</b>	<b>1.00</b>	<b>LS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
USR Economic Update	1.00	LS	Government	0	0	0	0	30,000	30,000
<b>2069 - 8th Year Monitoring</b>	<b>1.00</b>	<b>LS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>140,000</b>	<b>140,000</b>
USR Biological Monitoring/Surveillance	1.00	LS	Government	0	0	0	0	50,000	50,000
<b>2070</b>	<b>1.00</b>	<b>LS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
<b>Non-Construction</b>	<b>1.00</b>	<b>LS</b>	<b>Government</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40,000</b>	<b>40,000</b>
USR PM	1.00	LS	Government	0	0	0	0	10,000	10,000
USR Economic Update	1.00	LS	Government	0	0	0	0	30,000	30,000

**ADDENDUM B: Schedule**

**St. Lucie Co. Feasibility**

ID	Task Name	Duration	Start	Finish	Predecessors	Half 2, 2016					Half 1, 2017					Half 2, 2017					Half 1, 2018				
						A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N
1	<b>St. Lucie Co SPP Feasibility - LPP (R99 to R115/MCL)</b>	12237 days	4/21/16	10/22/49		<b>St. Lucie Co SPP Feasibility - LPP (R99 to R115/MCL)</b>																			
2	<b>Report Milestones</b>	533 days	4/21/16	10/6/17																					
3	Tentatively Selected Plan (TSP) Milestone	0 days	4/21/16	4/21/16																					
4	Agency Decision Milestone (ADM)	0 days	8/11/16	8/11/16																					
5	Civil Works Review Board (CWRB) Milestone	0 days	4/18/17	4/18/17																					
6	Chief of Engineer's Report Milestone	0 days	7/25/17	7/25/17																					
7	Final Approval through ASA	0 days	10/6/17	10/6/17																					
8	<b>2019 - P&amp;S, PED Mapping, Update</b>	365 days	10/1/19	9/30/20																					
9	Lands & Damages	365 days	10/1/19	9/30/20																					
10	PED	365 days	10/1/19	9/30/20																					
11	Physical/Environmental Monitoring	365 days	10/1/19	9/30/20																					
12	<b>2020 - Initial Construction (R99 - R115)</b>	364 days	10/1/20	9/30/21	8FS+1 day																				
13	Beach Replenishment (422,000 CY)	100 days	10/1/20	1/9/21																					
14	Lands & Damages	364 days	10/1/20	9/30/21																					
15	PED	364 days	10/1/20	9/30/21																					
16	Construction Management	100 days	10/1/20	1/9/21																					
17	Physical/Environmental Monitoring	364 days	10/1/20	9/30/21																					
18	<b>2021 - Update, Monitoring</b>	364 days	10/1/21	9/30/22	12FS+1 day																				
19	Lands & Damages	364 days	10/1/21	9/30/22																					
20	PED	364 days	10/1/21	9/30/22																					
21	Physical/Environmental Monitoring	364 days	10/1/21	9/30/22																					
22	<b>2022 - Update, Monitoring</b>	364 days	10/1/22	9/30/23	18FS+1 day																				
23	PED	364 days	10/1/22	9/30/23																					
24	Physical/Environmental Monitoring	364 days	10/1/22	9/30/23																					

Project: Ft Pierce FY17 Econ Update Date: 9/29/16	Task		Rolled Up Milestone		Inactive Task		Manual Summary	
	Critical Task		Rolled Up Progress		Inactive Milestone		Start-only	
	Milestone		Split		Inactive Summary		Finish-only	
	Summary		External Tasks		Manual Task		Progress	
	Rolled Up Task		Project Summary		Duration-only		Deadline	
	Rolled Up Critical Task		Group By Summary		Manual Summary Rollup			











**St. Lucie Co. Feasibility**

ID	Task Name	Duration	Start	Finish	Predecessors	Half 2, 2016				Half 1, 2017				Half 2, 2017				Half 1, 2018							
						A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N
145	PED	0 days	10/18/49	10/18/49																					
146	<b>2067 - Update, Monitoring</b>	<b>0 days</b>	<b>10/19/49</b>	<b>10/19/49</b>	<b>144FS+1 day</b>																				
147	PED	0 days	10/19/49	10/19/49																					
148	Physical/Environmental Monitoring	0 days	10/19/49	10/19/49																					
149	<b>2068 - Update</b>	<b>0 days</b>	<b>10/20/49</b>	<b>10/20/49</b>	<b>146FS+1 day</b>																				
150	PED	0 days	10/20/49	10/20/49																					
151	<b>2069 - Update, Monitoring</b>	<b>0 days</b>	<b>10/21/49</b>	<b>10/21/49</b>	<b>149FS+1 day</b>																				
152	PED	0 days	10/21/49	10/21/49																					
153	Physical/Environmental Monitoring	0 days	10/21/49	10/21/49																					
154	<b>2070 - Update</b>	<b>0 days</b>	<b>10/22/49</b>	<b>10/22/49</b>	<b>151FS+1 day</b>																				
155	PED	0 days	10/22/49	10/22/49																					



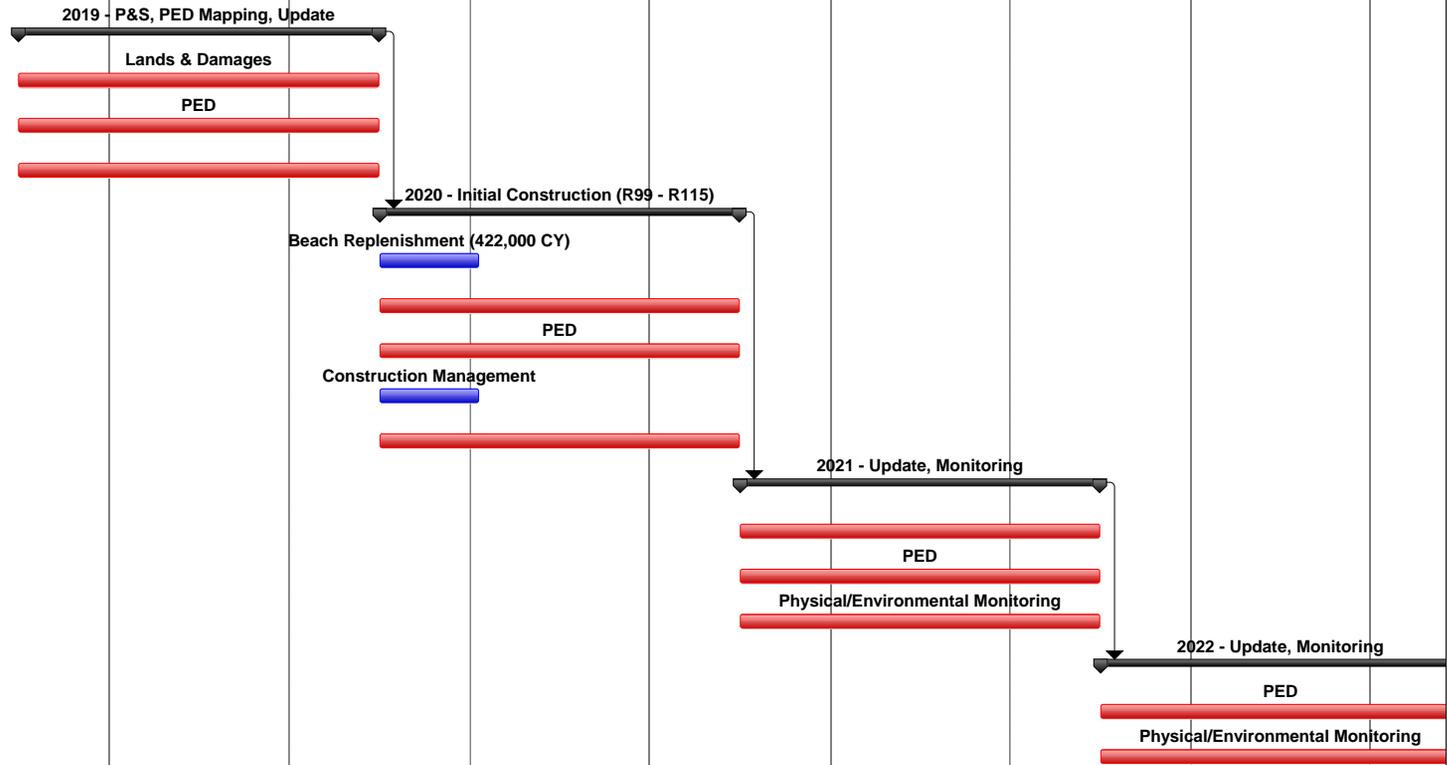
Project: Ft Pierce FY17 Econ Update  
Date: 9/29/16

Task		Rolled Up Milestone		Inactive Task		Manual Summary	
Critical Task		Rolled Up Progress		Inactive Milestone		Start-only	
Milestone		Split		Inactive Summary		Finish-only	
Summary		External Tasks		Manual Task		Progress	
Rolled Up Task		Project Summary		Duration-only		Deadline	
Rolled Up Critical Task		Group By Summary		Manual Summary Rollup			

### St. Lucie Co. Feasibility

Half 2, 2018				Half 1, 2019				Half 2, 2019				Half 1, 2020				Half 2, 2020				Half 1, 2021				Half 2, 2021				Half 1, 2022				Half 2, 2022				Half 1, 2023				Half 2, 2023																																						
J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D

**St. Lucie Co SPP Feasibility - LPP (R99 to R115/MCL)**

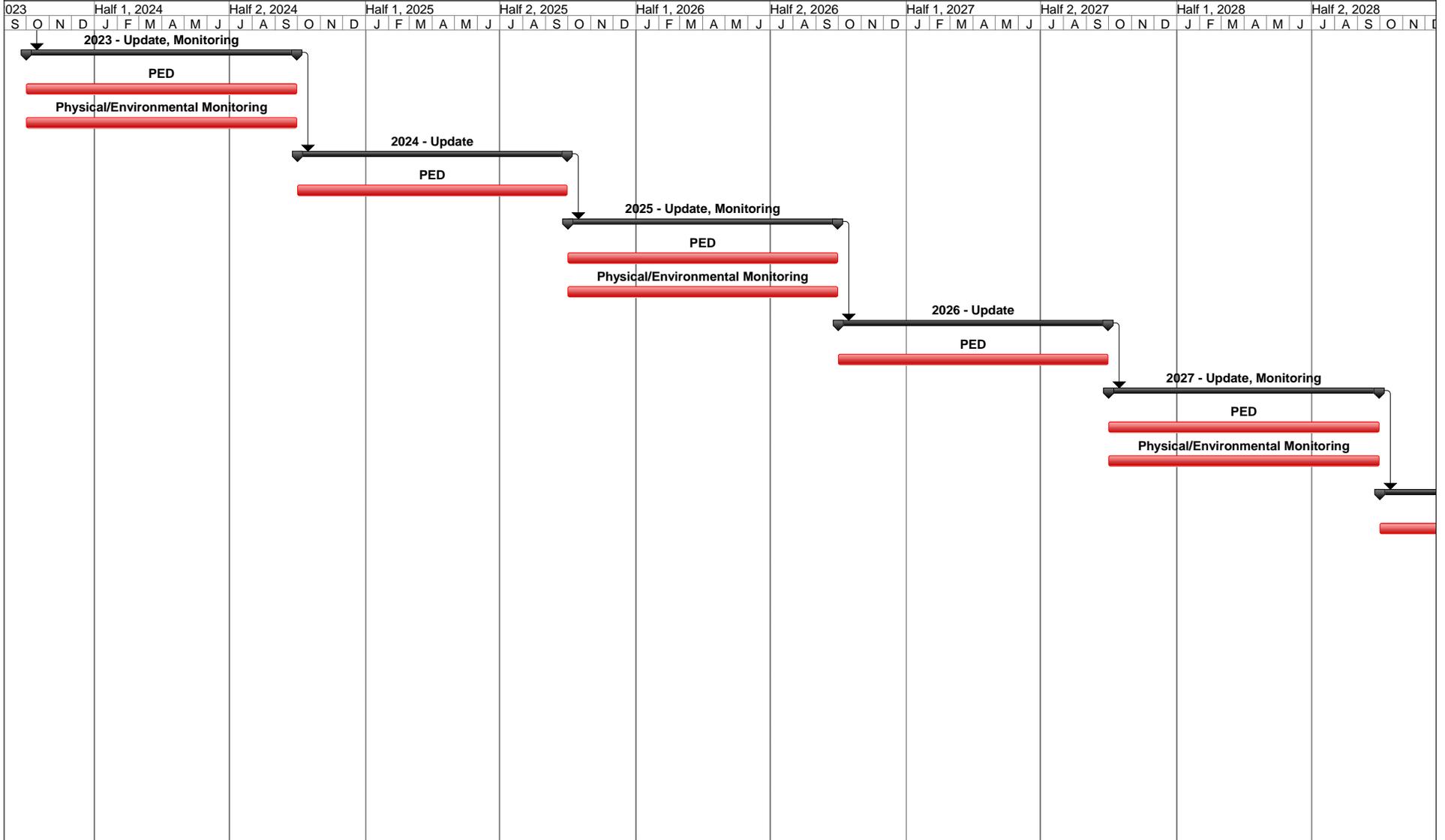


Project: Ft Pierce FY17 Econ Update  
Date: 9/29/16

Task		Rolled Up Milestone		Inactive Task		Manual Summary	
Critical Task		Rolled Up Progress		Inactive Milestone		Start-only	
Milestone		Split		Inactive Summary		Finish-only	
Summary		External Tasks		Manual Task		Progress	
Rolled Up Task		Project Summary		Duration-only		Deadline	
Rolled Up Critical Task		Group By Summary		Manual Summary Rollup			



### St. Lucie Co. Feasibility

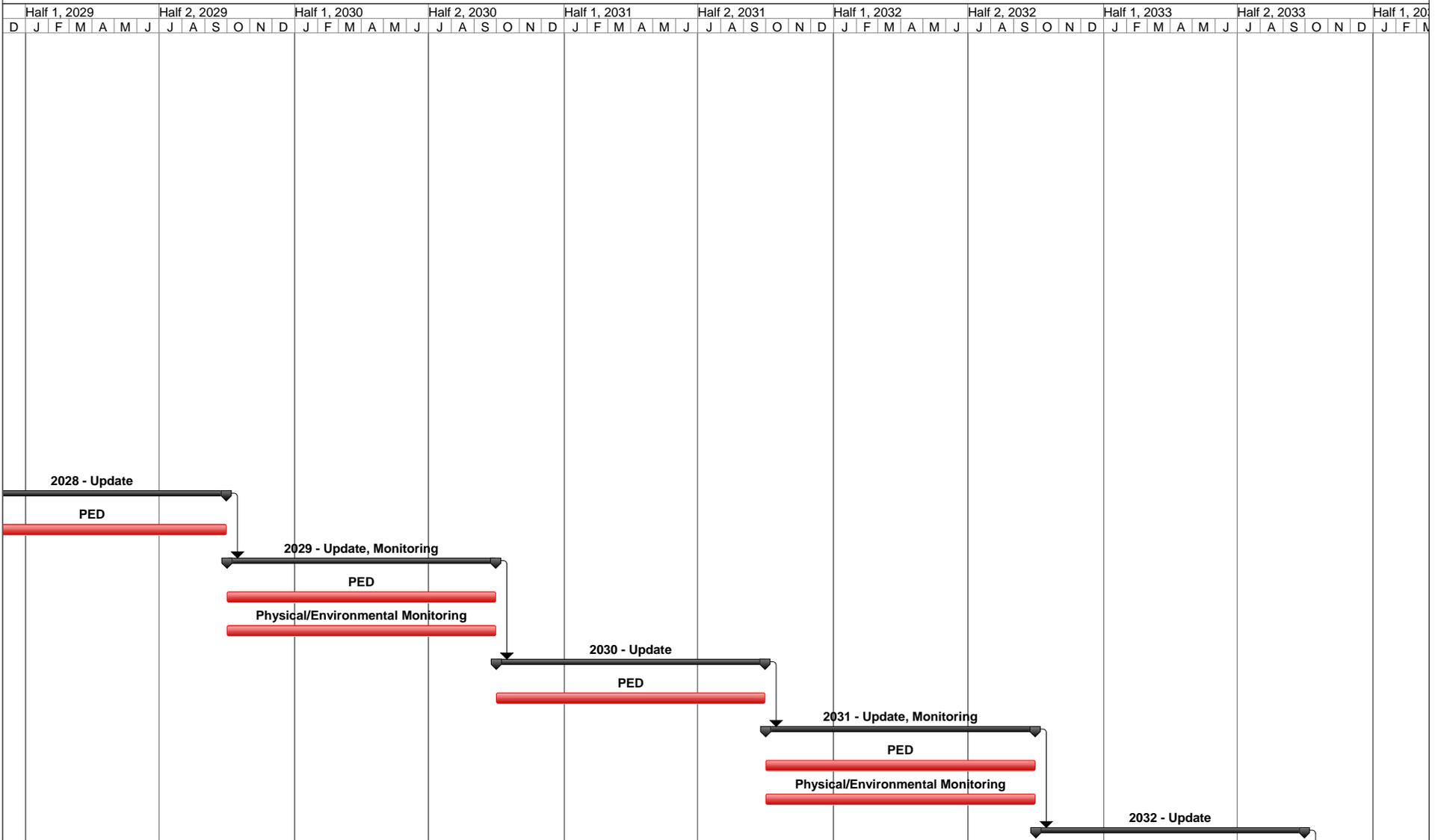


Project: Ft Pierce FY17 Econ Update  
Date: 9/29/16

Task		Rolled Up Milestone		Inactive Task		Manual Summary	
Critical Task		Rolled Up Progress		Inactive Milestone		Start-only	
Milestone		Split		Inactive Summary		Finish-only	
Summary		External Tasks		Manual Task		Progress	
Rolled Up Task		Project Summary		Duration-only		Deadline	
Rolled Up Critical Task		Group By Summary		Manual Summary Rollup			



### St. Lucie Co. Feasibility



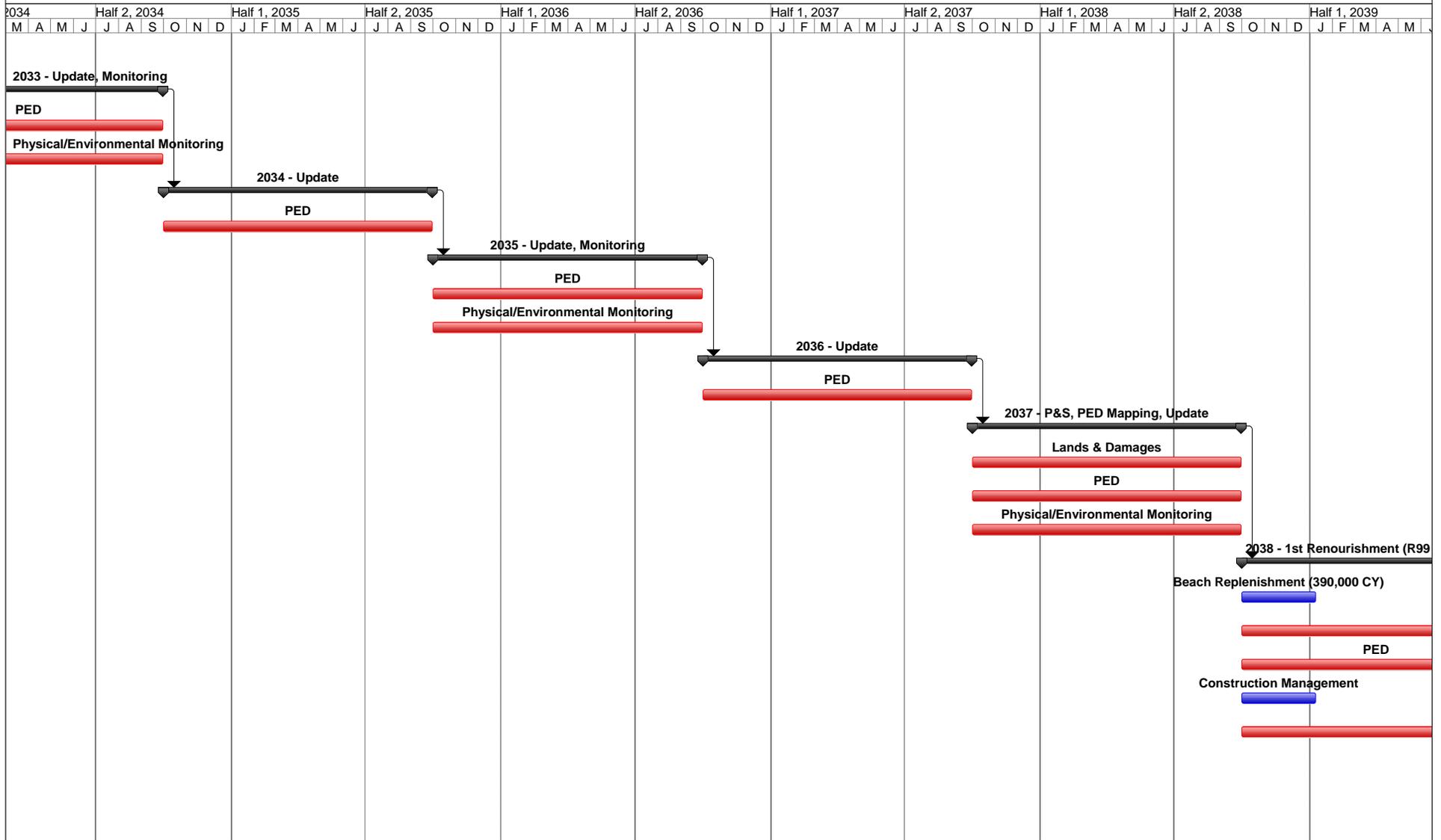
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Date: 9/29/16

Task		Rolled Up Milestone		Inactive Task		Manual Summary	
Critical Task		Rolled Up Progress		Inactive Milestone		Start-only	
Milestone		Split		Inactive Summary		Finish-only	
Summary		External Tasks		Manual Task		Progress	
Rolled Up Task		Project Summary		Duration-only		Deadline	
Rolled Up Critical Task		Group By Summary		Manual Summary Rollup			





### St. Lucie Co. Feasibility

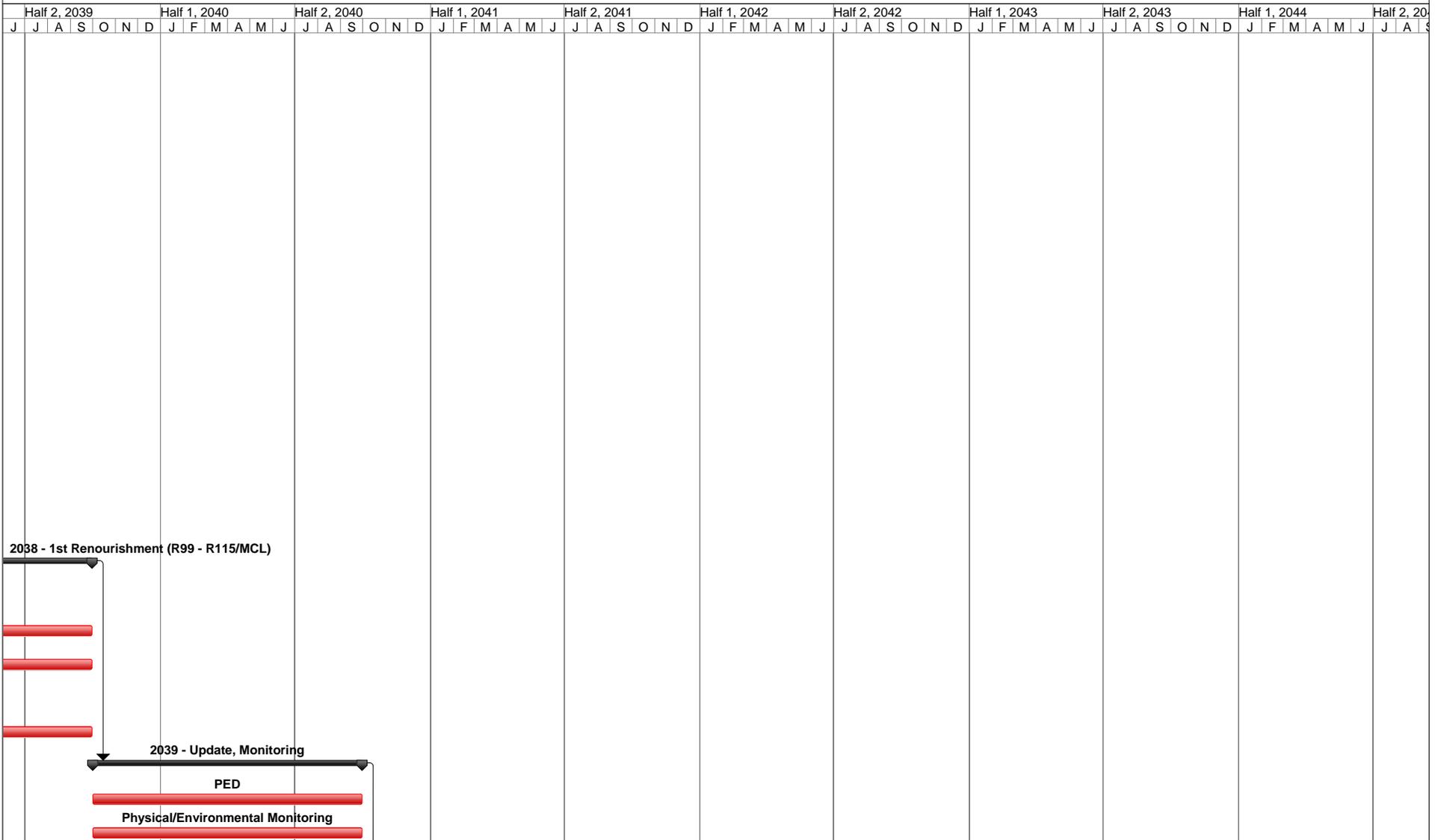


Project: Ft Pierce FY17 Econ Update  
Date: 9/29/16

Task		Rolled Up Milestone		Inactive Task		Manual Summary	
Critical Task		Rolled Up Progress		Inactive Milestone		Start-only	
Milestone		Split		Inactive Summary		Finish-only	
Summary		External Tasks		Manual Task		Progress	
Rolled Up Task		Project Summary		Duration-only		Deadline	
Rolled Up Critical Task		Group By Summary		Manual Summary Rollup			



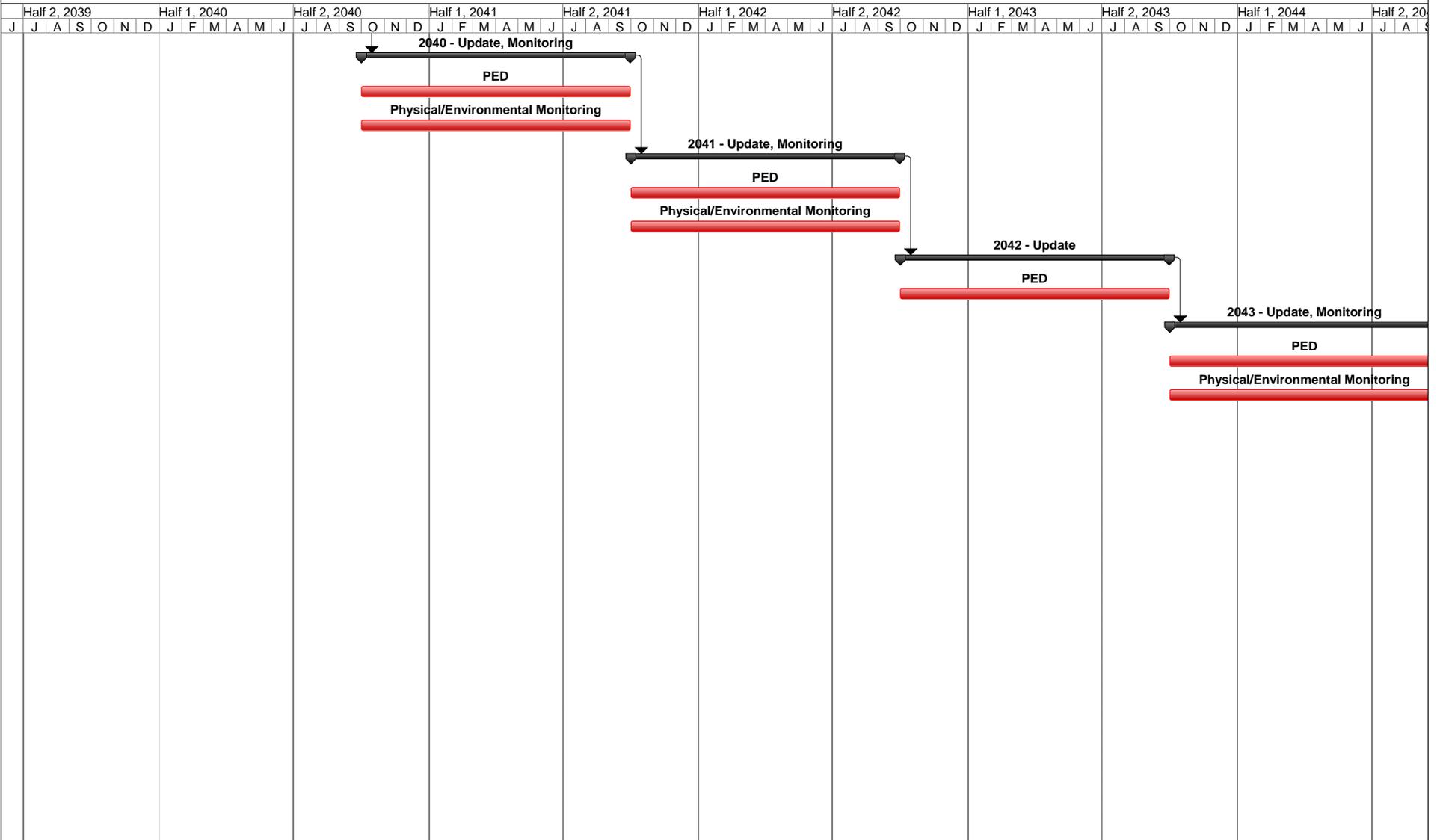
### St. Lucie Co. Feasibility



Project: Ft Pierce FY17 Econ Update  
Date: 9/29/16

Task		Rolled Up Milestone		Inactive Task		Manual Summary	
Critical Task		Rolled Up Progress		Inactive Milestone		Start-only	
Milestone		Split		Inactive Summary		Finish-only	
Summary		External Tasks		Manual Task		Progress	
Rolled Up Task		Project Summary		Duration-only		Deadline	
Rolled Up Critical Task		Group By Summary		Manual Summary Rollup			

### St. Lucie Co. Feasibility



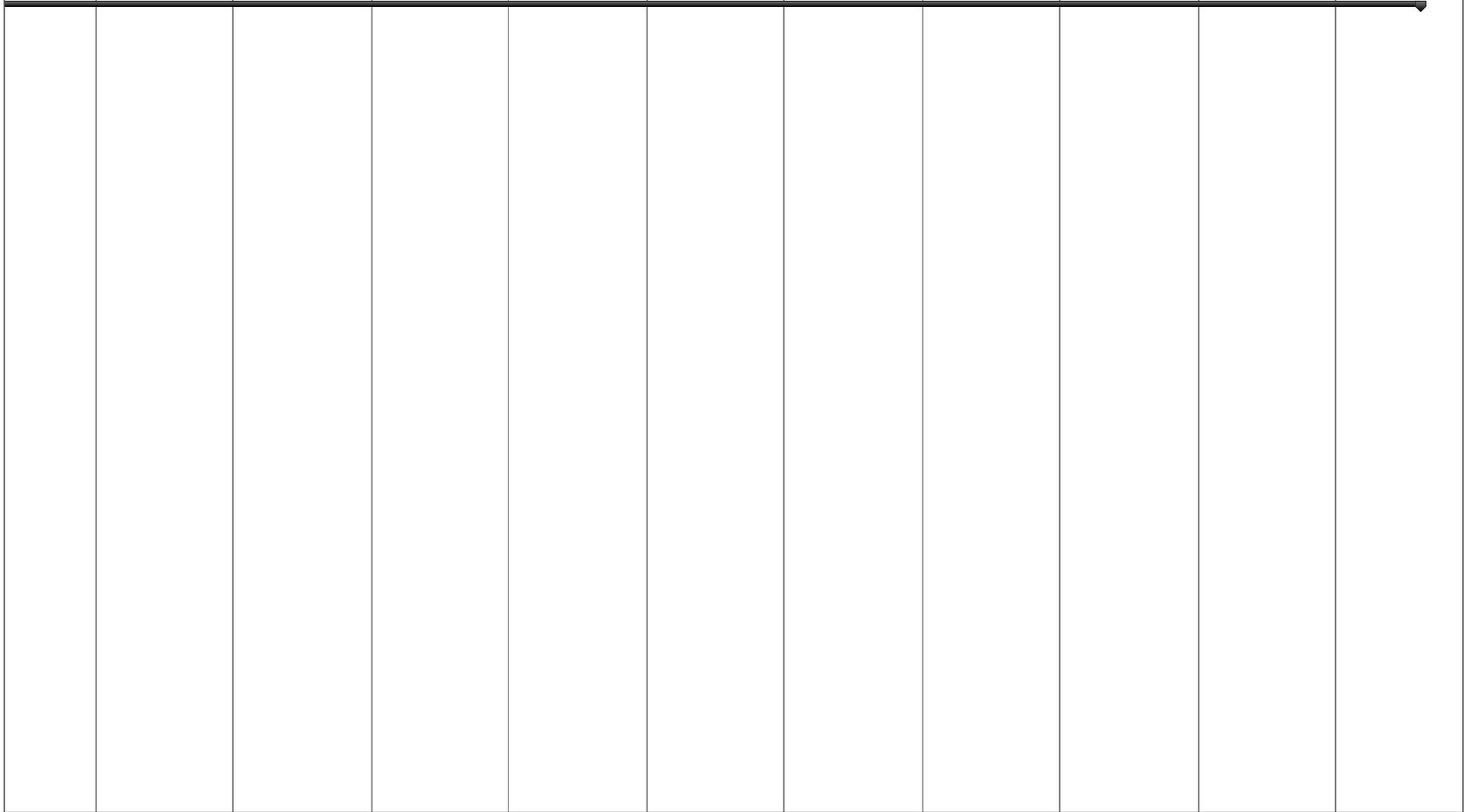
Project: Ft Pierce FY17 Econ Update  
Date: 9/29/16

Task		Rolled Up Milestone		Inactive Task		Manual Summary	
Critical Task		Rolled Up Progress		Inactive Milestone		Start-only	
Milestone		Split		Inactive Summary		Finish-only	
Summary		External Tasks		Manual Task		Progress	
Rolled Up Task		Project Summary		Duration-only		Deadline	
Rolled Up Critical Task		Group By Summary		Manual Summary Rollup			

### St. Lucie Co. Feasibility

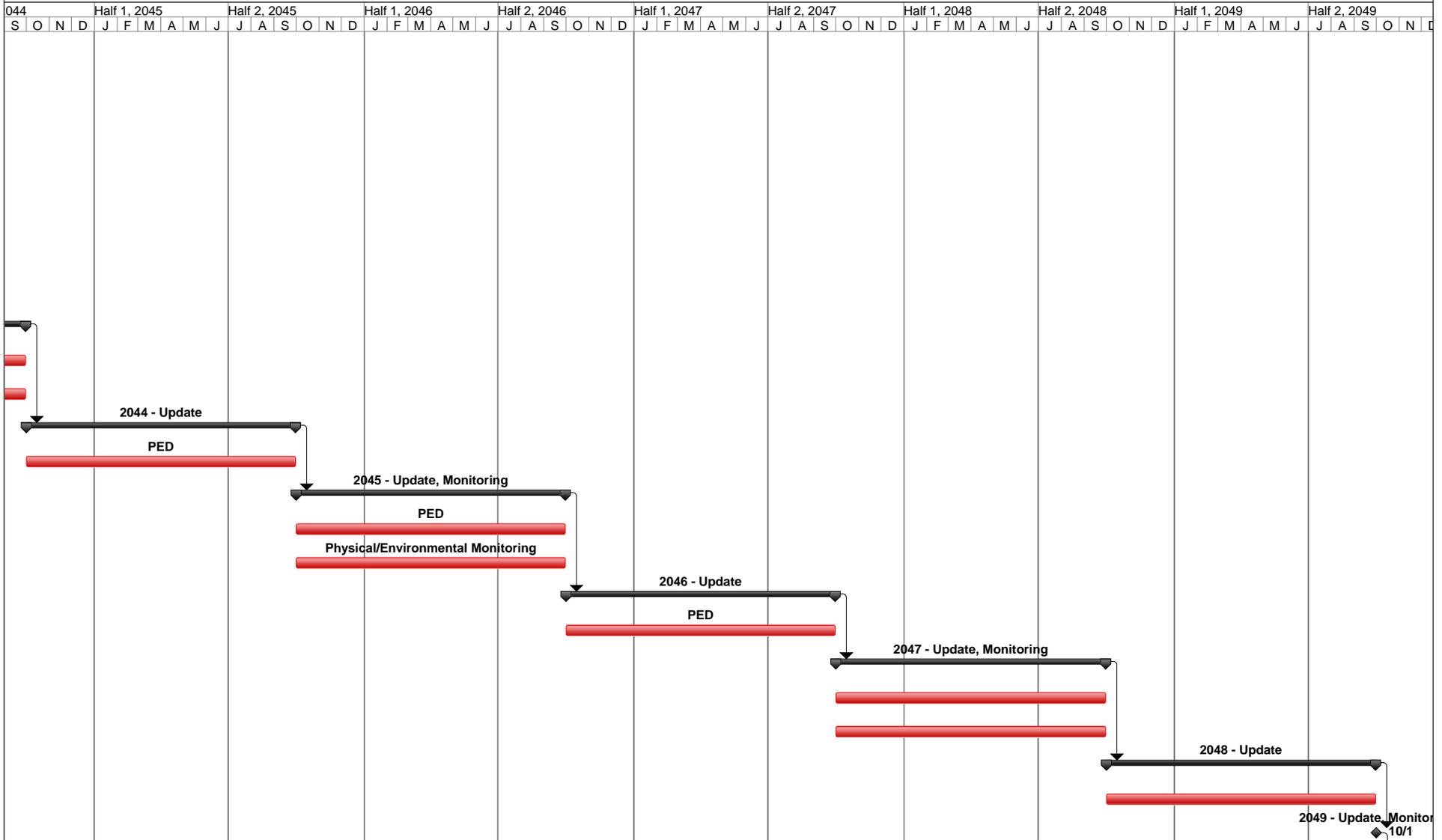
044	Half 1, 2045				Half 2, 2045				Half 1, 2046				Half 2, 2046				Half 1, 2047				Half 2, 2047				Half 1, 2048				Half 2, 2048				Half 1, 2049				Half 2, 2049																											
	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D

**St. Lucie Co SPP Feasibility - LPP (R99 to R115/MCL)**



<p>Project: Ft Pierce FY17 Econ Update Date: 9/29/16</p>	<p>Task </p> <p>Critical Task </p> <p>Milestone </p> <p>Summary </p> <p>Rolled Up Task </p> <p>Rolled Up Critical Task </p>	<p>Rolled Up Milestone </p> <p>Rolled Up Progress </p> <p>Split </p> <p>External Tasks </p> <p>Project Summary </p> <p>Group By Summary </p>	<p>Inactive Task </p> <p>Inactive Milestone </p> <p>Inactive Summary </p> <p>Manual Task </p> <p>Duration-only </p> <p>Manual Summary Rollup </p>	<p>Manual Summary </p> <p>Start-only </p> <p>Finish-only </p> <p>Progress </p> <p>Deadline </p>	<p></p> <p></p> <p></p> <p></p> <p></p>
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### St. Lucie Co. Feasibility



Project: Ft Pierce FY17 Econ Update  
Date: 9/29/16

Task		Rolled Up Milestone		Inactive Task		Manual Summary	
Critical Task		Rolled Up Progress		Inactive Milestone		Start-only	
Milestone		Split		Inactive Summary		Finish-only	
Summary		External Tasks		Manual Task		Progress	
Rolled Up Task		Project Summary		Duration-only		Deadline	
Rolled Up Critical Task		Group By Summary		Manual Summary Rollup			







**ADDENDUM C: Risk Report**



**US Army Corps  
of Engineers®**

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**St. Lucie County Coastal Storm Risk Management (CSRM)  
St. Lucie County, Florida  
Draft Feasibility Study and Integrated Environmental  
Assessment (EA)  
Project Cost and Schedule Risk Analysis (CSRA) Report**

*Prepared by:*

U.S. Army Corps of Engineers  
Jacksonville District  
Cost Engineering Section

October 2016

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## EXECUTIVE SUMMARY

The CSRA was developed with support by the Cost Engineering Mandatory Center of Expertise (MCX) for Civil Works. The CSRA will be reviewed by the MCX during Agency Technical Review (ATR) and during subsequent coordination between the MCX and Jacksonville District Cost Engineering. This report presents a recommendation for the total project cost and schedule contingencies for the St. Lucie County CSRMs Draft Feasibility Study and Integrated Environmental Assessment. In compliance with Engineer Regulation (ER) 1110-2-1302 CIVIL WORKS COST ENGINEERING, dated 15 September 2008, a formal risk analysis study was conducted for the development of contingency on the total project cost. The purpose of this risk analysis study was to establish project contingencies by identifying and measuring the cost and schedule impact of project uncertainties with respect to the estimated total project cost.

Specific to the St. Lucie County CSRMs project, the project base cost for the remaining work is approximately \$39.1 Million. Based on the results of the analysis, the Jacksonville District recommends a contingency value of \$10.9 Million, or 28%. This contingency includes \$10.4 Million (27.5%) for risks related to cost and \$0.5 Million (0.5%) for the effect of schedule delay on overall project costs.

The Jacksonville District performed the risk analysis using the *Monte Carlo* technique, producing the aforementioned contingencies and identifying key risk drivers. This has been reviewed, as required, by the MCX, Walla Walla District.

The following table portrays the development of contingencies (28% overall). The contingency is based on an 80% confidence level, as per USACE Civil Works guidance.

**Table ES-1. Contingency Analysis Table**

Base Cost Estimate	\$39,119,000	
Confidence Level	Value (\$\$)	Contingency (%)
5%	\$41,857,330	7%
50%	\$46,942,800	20%
<b>80%</b>	<b>\$50,072,320</b>	<b>28%</b>
95%	\$53,593,030	37%

## KEY FINDINGS/OBSERVATIONS RECOMMENDATIONS

The key cost risk drivers identified through sensitivity analysis are PR-1 (Fuel Prices), TL1 (Volume Variations), ET3 (Quantity Estimates), and REG2 (Environmental Monitoring & Mitigation) which together contribute over 86 percent of the statistical cost variance.

- Fuel Prices refers to the potential impacts to the cost due to fluctuations in fuel costs during various phases of the project, both in and out of construction.
- Volume Variations captures the risk to the cost caused by fluctuations in erosion rates between modeling and, later, dredging surveys.
- Quantity Estimates captures the risk that projected bid volumes increase or decrease between design and pre-construction surveys.
- Environmental Monitoring & Mitigation addresses the risk of triggering mitigation of some kind, or new and/or more stringent environmental requirements being developed.

An additional moderate cost risk that should be closely monitored is TL2 (Periodic Nourishment Interval).

- Periodic nourishment intervals captures the risk to the cost due to the events not occurring at the projected intervals.

The key schedule risk drivers identified through sensitivity analysis are REG5 (Permit Delays), PR1 (Bidding Climate and Competition), and LD3 (Easements), which together contribute over 81 percent of the statistical schedule variance.

- Permit Delays captures the risk to the schedule due to complications that may arise during permit coordination.
- Bidding Climate and Competition captures the risk that the bidding pool is impacted by such things as economic swings and scheduling.
- Easements captures the risk to schedule that unexpected problems/delays occur during the process of obtaining easements/land certifications.

An additional moderate schedule risk that should be closely monitored is PM4 (Review & Authorization Delays).

- Review and Authorization Delays captures the impacts to the schedule due to delayed authorization and/or reviews.

Recommendations, as detailed within the main report, include the implementation of cost and schedule contingencies, further iterative study of risks throughout the project life-cycle, potential mitigation throughout the PED phase, and proactive monitoring and control of risk identified in this study.

## MAIN REPORT

### 1.0 PURPOSE

This report presents a recommendation for the total project cost and schedule contingencies for the St. Lucie County CSRMs Draft Feasibility Study and Integrated Environmental Assessment.

### 2.0 BACKGROUND

St. Lucie County is located on the south-central east coast of Florida (Figure 1-1). The county is bounded to the north by Indian River County and to the south by Martin County. St. Lucie County has approximately 22 miles of sandy shoreline located on a coastal barrier island that varies in width from approximately 400 feet to 1.5 miles. The St. Lucie County shoreline is subject to erosion caused by both tropical and extra-tropical storms as well as other natural shoreline processes. The purpose of this study is to assess the feasibility of providing Federal Coastal Flood Risk Management (CFRM) measures to the southern portion of the St. Lucie County shoreline.

Based on Beach-fx model results and economic evaluation, project alternative ABerm20DuneEx (a 20-foot berm template designed to maintain the existing (2008) dune between periodic nourishments) was identified as the National Economic Development (NED) Plan for nourishment of St. Lucie County. However, the local Sponsor has identified ABerm30DuneEx (a 30-foot berm template designed to maintain the existing dune) as the Locally Preferred Plan (LPP). The LPP is not economically justified. Therefore, the NED is considered to be the Tentatively Selected Plan (TSP).

The full study area (7.4 miles), extending from FDEP monument R-99 to R-115/Martin County line, was initially considered during project evaluation using Beach-fx. The TSP, ABerm20DuneEx, covers approximately 3.4 miles of the study area. The beach fill will be placed from R-99 to the Martin County line with tapers extending approximately 1,000 feet to the north of R-99 and approximately 1,000 feet to the south. As Martin County, south of St. Lucie is part of an authorized Federal project, future nourishment events may be timed to tie into the southern project, negating the need for a taper.

The design beach fill template is characterized by a 20-foot berm extension (+7 ft-NAVD88 to Depth of Closure) from the existing dune. Beach fill material required under the Base SLR case includes an average of 422,000 cubic yards for initial construction of the design beach profile and two to three periodic nourishment events averaging 390,000 cubic yards each. Dune planting is expected for initial construction only, with responsibility falling to the Local Sponsor during periodic nourishments. Periodic nourishment, after initial construction, is expected at approximately 18 year intervals.

It is likely that the contracts will be acquired using a Request for Proposal (RFP). The expected construction schedule is about 4 months for initial construction in 2020, and approximately 3 months for the subsequent periodic nourishments in 2038 and 2056.

As a part of this effort, Jacksonville District will request that the USACE Cost Engineering MCX provide an ATR of the CSRA.

### **3.0 REPORT SCOPE**

The scope of the risk analysis report is to calculate and present the cost and schedule contingencies at the 80 percent confidence level using the 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. The report presents the contingency results for cost risks for all project features. The study and presentation does not include consideration for life cycle costs.

#### **3.1 Project Scope**

The formal process included extensive involvement of the PDT for risk identification and the development of the risk register. The analysis process evaluated the baseline Micro Computer Aided Cost Estimating System (MCACES) cost estimate, schedule, and funding profiles using 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.

The project technical scope, estimates and schedules were developed and presented by the Jacksonville District. Consequently, these documents serve as the basis for the risk analysis.

The scope of this study addresses the identification of problems, needs, opportunities and potential solutions that are viable from an economic, environmental, and engineering viewpoint.

#### **3.2 USACE Risk Analysis Process**

The risk analysis process for this study follows the USACE Headquarters requirements as well as the guidance provided by the Cost Engineering MCX. The risk analysis process reflected within this report uses probabilistic cost and schedule risk analysis methods within the framework of the Crystal Ball software. Furthermore, the scope of the report 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 provide project leadership with contingency information for scheduling, budgeting, and project control purposes, as well as to provide tools to support decision making and risk management as the project progresses through planning and implementation. To fully recognize its benefits, cost and schedule risk analysis 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 meet the requirements and recommendations of the following documents and sources:

- Cost and Schedule Risk Analysis Process guidance prepared by the USACE Cost Engineering MCX.
- Engineer Regulation (ER) 1110-2-1302 CIVIL WORKS COST ENGINEERING, dated 30 June 2016.
- Engineer Technical Letter (ETL) CONSTRUCTION COST ESTIMATING GUIDE FOR CIVIL WORKS, dated 30 September 2008.

#### **4.0 METHODOLOGY / PROCESS**

As part of the Draft Feasibility Study and Integrated EA, the Jacksonville District performed the Cost and Schedule Risk Analysis, conducting a risk identification meeting on 19 November 2015 with the Project Delivery Team (PDT) to produce a risk register that served as the framework for the risk analysis. The cost engineer solicited updates from the PDT on 24 February 2016, as part of the previous CSRA. An updated CSRA was developed as a result of the ATR requirement to reformulate the final plan economic analysis, which included an updated cost estimate. The updated cost estimate included new additional dredge production information including a past contract on the same project administered by NFS (St. Lucie County). Another PDT risk register review was held on 14 September to reevaluate the previous risk ratings with special attention given to risk that could have increased impacts due to the use of the updated dredge production data, specifically the NFS contract information. Participants in the risk identification process included the following:

## Initial Risk Register Development Meeting - Initial TSP

Date: Thursday, 19 November 2015

Attendance	Name	Office	Representing
In-Person	Shelley Trulock	PM-WN	Project Manager
In-Person	Stacey Roth	PD-PN	Planning Technical Lead
In-Person	Erik Adamiec	PD-D	Economics
In-Person	Emmanuel Freeman	RE-A	Real Estate
In-Person	Lori Hadley	EN-WC	Water Resources
In-Person	Troy Mayhew	EN-GG	Geotech
Call-In	Meredith Moreno	PD-ES	Archaeology/Cultural Resources
In-Person	Brittany Berger	OC	Legal
In-Person	Sophia Bryant	EN-TC	Cost Estimating

## Follow-Up Discussions - Individual or group discussions - Initial TSP

Date: Friday, 20 November 2015

through

Tuesday, 22 March 2016

Attendance	Name	Office	Representing
In-Person, E-mail	Jim LaGrone	EN-DW	Engineering Technical Lead (Former)
In-Person	Shelley Trulock	PM-WN	Project Manager
In-Person	Stacey Roth	PD-PN	Planning Technical Lead
In-Person	Erik Adamiec	PD-D	Economics
In-Person	Emmanuel Freeman	RE-A	Real Estate
In-Person	Lori Hadley	EN-WC	Water Resources
In-Person	Troy Mayhew	EN-GG	Geotech
In-Person	Meredith Moreno	PD-ES	Archaeology/Cultural Resources
Call-In	Brittany Berger	OC	Legal
In-Person	Sophia Bryant	EN-TC	Cost Estimating
In-Person	Mike Neves	EN-DW	Engineering Technical Lead (Current)
E-mail	Katrina Denson	CT	Contracting

**Follow-Up Meeting Notes**

Updates/corrections from team members as work on the feasibility report continues. Follow-ups also include input from team members who weren't able to attend the initial meeting. An update session was held 2/24/2016.

**Follow-Up Discussions - Individual or group discussions - NED/LPP (ADM)**

**Date:**  **through**

Attendance	Name	Office	Representing
E-mail	Jim LaGrone	EN-DW	Engineering Technical Lead (Former)
In-Person	Shelley Trulock	PM-WN	Project Manager
In-Person	Stacey Roth	PD-PN	Planning Technical Lead
In-Person	Erik Adamiec/Colin Rawls	PD-D	Economics
In-Person	Emmanuel Freeman	RE-A	Real Estate
In-Person	Lori Hadley	EN-WC	Water Resources
In-Person	Troy Mayhew	EN-GG	Geotech
Call-In	Robin Moore	PD-ES	Archaeology/Cultural Resources
Call-In	Brittany Berger	OC	Legal
In-Person	Brian Blake	EN-TC	Cost Estimating
In-Person	Mike Neves	EN-DW	Engineering Technical Lead (Current)
E-mail	Griselle Gonzalez	CT	Contracting

**Follow-Up Meeting Notes**

Updates/corrections from team members as work on the feasibility report continues. Follow-ups also include input from team members who weren't able to attend the initial meeting. An update session was held 9/14/2016.

The risk analysis process for this study is intended to determine the probability of various cost outcomes and quantify the required contingency needed in the cost estimate to achieve the desired level of cost confidence. Per regulation and guidance, the P80 confidence level (80% confidence level) is the normal and accepted cost confidence level. District Management has the prerogative to select different confidence levels, pending approval from Headquarters, USACE.

In simple terms, contingency is an amount added to an estimate to allow for items, conditions or events for which the occurrence or impact is uncertain and that experience suggests will likely 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 in the project control plans. The risk of overrun is expressed, in a probabilistic context, using confidence levels.

The Cost MCX guidance for cost and schedule risk analysis generally focuses on the 80-percent level of confidence (P80) for cost contingency calculation. It should be

noted that use of P80 as a decision criteria is a risk averse approach (whereas the use of P50 would be a risk neutral approach, and use of levels less than 50 percent would be risk seeking). Thus, a P80 confidence level results in greater contingency as compared to a P50 confidence level. The selection of contingency at a particular confidence level is ultimately the decision and responsibility of the project's District and/or Division management.

The risk analysis process uses *Monte Carlo* techniques to determine probabilities and contingency. The *Monte Carlo* techniques are facilitated computationally by a commercially available risk analysis software package (Crystal Ball) that is an add-in to Microsoft Excel. Cost estimates are packaged into an Excel format and used directly for cost risk analysis purposes. The level of detail recreated in the Excel-format schedule is sufficient for risk analysis purposes that reflect the established risk register, but generally less than that of the native format.

The primary steps, in functional terms, of the risk analysis process are described in the following subsections. Risk analysis results are provided in Section 6.

#### **4.1 Identify and Assess Risk Factors**

Identifying the risk factors via the PDT is considered a qualitative process that results in establishing a risk register that serves as the document for the quantitative study using the Crystal Ball risk software. Risk factors are events and conditions that may influence or drive uncertainty in project performance. They may be inherent characteristics or conditions of the project or external influences, events, or conditions such as weather or economic conditions. Risk factors may have either favorable or unfavorable impacts on project cost and schedule.

A formal PDT meeting and follow up discussions were held for the purposes of identifying and assessing risk factors. The meeting included capable and qualified representatives from multiple project team disciplines and functions, including project management, cost engineering, design, geology, and coastal engineering.

The initial formal meetings focused primarily on risk factor identification using brainstorming techniques, but also included some facilitated discussions based on risk factors common to projects of similar scope and geographic location. Subsequent meetings focused primarily on risk factor assessment and quantification and appropriate updates to the risk register.

#### **4.2 Quantify Risk Factor Impacts**

The quantitative impacts of risk factors on project plans were analyzed using a combination of professional judgment, empirical data and analytical techniques. Risk factor impacts were quantified using probability distributions (density functions) because risk factors are entered into the Crystal Ball software in the form of probability density functions.

Similar to the identification and assessment process, risk factor quantification 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. This process used an iterative approach to estimate the following elements of each risk factor:

- Maximum possible value for the risk factor
- Minimum possible value for the risk factor
- Most likely value (the statistical mode), if applicable
- Nature of the probability density function used to approximate risk factor uncertainty
- Mathematical correlations between risk factors
- Affected cost estimate and schedule elements

The resulting product from the PDT discussions is captured within a risk register as presented in Section 6 for both cost and schedule risk concerns. Note that the risk register records the PDT's risk concerns, discussions related to those concerns, and potential impacts to the current cost and schedule estimates. The concerns and discussions support the team's decisions related to event likelihood, impact, and the resulting risk levels for each risk event.

#### **4.3 Analyze Cost Estimate and Schedule Contingency**

Contingency is analyzed using the Crystal Ball software, an add-in to the Microsoft Excel format of the cost estimate and schedule. *Monte Carlo* simulations are performed by applying the risk factors (quantified as probability density functions) to the appropriate estimated cost and schedule elements identified by the PDT.

Contingencies are calculated by applying only the moderate and high level risks identified for each option (i.e., low-level risks are typically not considered, but remain within the risk register to serve historical purposes as well as support follow-on risk studies as the project and risks evolve).

For the cost estimate, the contingency is calculated as the difference between the P80 cost forecast and the baseline cost estimate. Each option-specific contingency is then allocated on a civil works feature level based on the dollar-weighted relative risk of each feature as quantified by *Monte Carlo* simulation. Standard deviation is used as the feature-specific measure of risk for contingency allocation purposes. This approach results in a relatively larger portion of all the project feature cost contingency being allocated to features with relatively higher estimated cost uncertainty.

#### **5.0 PROJECT ASSUMPTIONS**

The following data sources and assumptions were used in quantifying the costs associated with the St. Lucie County CSR.

- a. The Jacksonville District completed the MII MCACES (Micro-Computer Aided Cost Estimating Software), serving as the basis for the cost and schedule risk analyses, on 31 March 2016.
- b. The cost comparisons and risk analyses performed and reflected within this report are based on design scope and estimates that are at the feasibility level for the remaining work.
- c. Schedules are analyzed for impact to the project cost in terms of both uncaptured escalation (variance from OMB factors and the local market) and unavoidable fixed contract costs and/or languishing Federal administration costs incurred throughout delay. Specific to the St. Lucie County CSRМ, the schedule was analyzed only for impacts due to residual fixed costs.
- d. Per the CWCCIS Historical State Adjustment Factors in EM 1110-2-1304, State Adjustment Factor for the State of Florida is 0.92, meaning that the average inflation for the project area is assumed to be 8% lower than the national average for inflation. Therefore, it is assumed that the project inflations experienced are similar to OMB inflation factors for future construction. Based on this information, the risk analysis accounted for a slight escalation adjustment over and above the national average.
- e. The assumed residual fixed cost rate for this project is 7.6%. This rate has been used to calculate impacts to the P80 schedule and cost contingencies within the risk model. This is based upon the standard Planning, Engineering, and Design (PED) and Supervision & Administration (S&A) percentage for the Jacksonville District CSRМ projects. The majority of schedule risk is assumed to occur during the early stages of PED.
- f. The Cost MCX guidance generally focuses on the eighty-percent level of confidence (P80) for cost contingency calculation. For this risk analysis, the eighty-percent level of confidence (P80) was used. It should be noted that the use of P80 as a decision criteria is a moderately risk averse approach, generally resulting in higher cost contingencies. However, the P80 level of confidence also assumes a small degree of risk that the recommended contingencies may be inadequate to capture actual project costs.
- g. Only high and moderate risk level impacts, as identified in the risk register, were considered for the purposes of calculating cost contingency. Low level risk impacts should be maintained in project management documentation, and reviewed at each project milestone to determine if they should be placed on the risk “watch list”.

## **6.0 RESULTS**

The cost and schedule risk analysis results are provided in the following sections. In addition to contingency calculation results, sensitivity analyses are presented to provide decision makers with an understanding of variability and the key contributors to the cause of this variability.

## 6.1 Risk Register

A risk register is a tool commonly used in project planning and risk analysis. The actual risk register is provided in Appendix A. The complete risk register includes low level risks, as well as additional information regarding the nature and impacts of each risk.

It is important to note that a risk register can be an effective tool for managing identified risks throughout the project life cycle. As such, it is generally recommended that risk registers be updated as the designs, cost estimates, and schedule are further refined, especially on large projects with extended schedules. Recommended uses of the risk register going forward include:

- Documenting risk mitigation strategies being pursued in response to the identified risks and their assessment in terms of probability and impact.
- Providing project sponsors, stakeholders, and leadership/management with a documented framework from which risk status can be reported in the context of project controls.
- Communicating risk management issues.
- Providing a mechanism for eliciting feedback and project control input.
- Identifying risk transfer, elimination, or mitigation actions required for implementation of risk management plans.

## 6.2 Cost Contingency and Sensitivity Analysis

The result of risk or uncertainty analysis is quantification of the cumulative impact of all analyzed risks or uncertainties as compared to probability of occurrence. These results, as applied to the analysis herein, depict the overall project cost at intervals of confidence (probability).

Table 1 provides the construction cost contingencies calculated for the P80 confidence level and rounded to the nearest thousand. The construction cost contingencies for the P50 and P100 confidence levels are also provided for illustrative purposes only.

Contingency was quantified as approximately \$10.9 Million at the P80 confidence level (28% of the baseline cost estimate). For comparison, the cost contingencies at the P50 and P100 confidence levels were quantified as 20% and 68% of the baseline cost estimate, respectively.

**Table 1. Project Cost Contingency Summary**

Risk Analysis Forecast	Baseline Estimate	Total Contingency <sup>1,2</sup> (\$)	Total Contingency (%)
<b>50% Confidence Level</b>			
Project Cost	\$39,119,000	\$7,823,800	20%
<b>80% Confidence Level</b>			
Project Cost	\$39,119,000	\$10,953,320	28%
<b>100% Confidence Level</b>			
Project Cost	\$39,119,000	\$26,600,920	68%

Notes:

1) These figures combine uncertainty in the baseline cost estimates and schedule.

2) A P100 confidence level is an abstract concept for illustration only, as the nature of risk and uncertainty (specifically the presence of “unknown unknowns”) makes 100% confidence a theoretical impossibility.

### 6.2.1 Sensitivity Analysis

Sensitivity analysis generally ranks the relative impact of each risk/opportunity as a percentage of total cost uncertainty. The Crystal Ball software uses a statistical measure (contribution to variance) that approximates the impact of each risk/opportunity contributing to variability of cost outcomes during *Monte Carlo* simulation.

Key cost drivers identified in the sensitivity analysis can be used to support development of a risk management plan that will facilitate control of risk factors and their potential impacts throughout the project lifecycle. Together with the risk register, sensitivity analysis results can also be used to support development of strategies to eliminate, mitigate, accept or transfer key risks.

### 6.2.2 Sensitivity Analysis Results

The risks/opportunities considered as key or primary cost drivers are ranked in order of importance in contribution to variance bar charts. Opportunities that have a potential to reduce project cost are shown with a negative sign; risks are shown with a positive sign to reflect the potential to increase project cost. A longer bar in the sensitivity analysis chart represents a greater potential impact to project cost.

Figure 1 presents a sensitivity analysis for cost growth risk from the high level cost risks identified in the risk register. Likewise, Figure 2 presents a sensitivity analysis for schedule growth risk from the high level schedule risks identified in the risk register.

### 6.3 Schedule and Contingency Risk Analysis

Table 2 provides the schedule duration contingencies calculated for the P80 confidence level. The schedule duration contingencies for the P50 and P100 confidence levels are also provided for illustrative purposes.

Schedule duration contingency was quantified as 31.0 months based on the P80 level of confidence. These contingencies were used to calculate the projected residual fixed cost impact of project delays that are included in the Table 1 presentation of total cost contingency. The schedule contingencies were calculated by applying the high level schedule risks identified in the risk register for each option to the durations of critical path and near critical path tasks.

The schedule was not resource loaded and contained open-ended tasks and non-zero lags (gaps in the logic between tasks) that limit the overall utility of the schedule risk analysis. These issues should be considered as limitations in the utility of the schedule contingency data presented. Schedule contingency impacts presented in this analysis are based solely on projected residual fixed costs.

**Table 2. Schedule Duration Contingency Summary**

<b>Risk Analysis Forecast</b>	<b>Baseline Schedule Duration (months)</b>	<b>Contingency<sup>1</sup> (months)</b>
<b>50% Confidence Level</b>		
Project Duration	620.0	24.8
<b>80% Confidence Level</b>		
Project Duration	620.0	31.0
<b>100% Confidence Level</b>		
Project Duration	620.0	49.6

Notes:

1) The schedule was not resource loaded and contained open-ended tasks and non-zero lags (gaps in the logic between tasks) that limit the overall utility of the schedule risk analysis. These issues should be considered as limitations in the utility of the schedule contingency data presented in Table 2.

2) A P100 confidence level is an abstract concept for illustration only, as the nature of risk and uncertainty (specifically the presence of “unknown unknowns”) makes 100% confidence a theoretical impossibility.

Figure 1. Cost Sensitivity Analysis

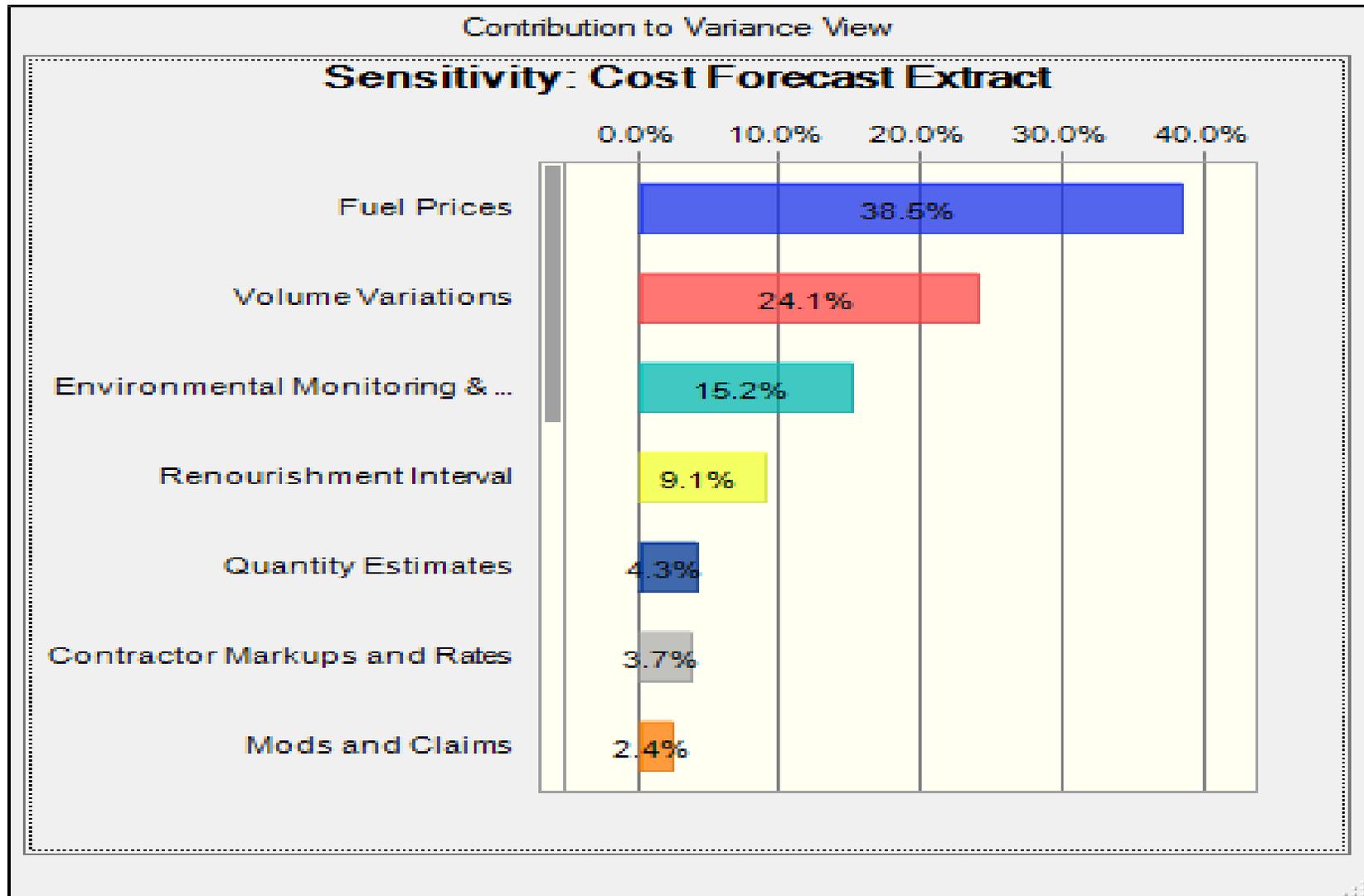
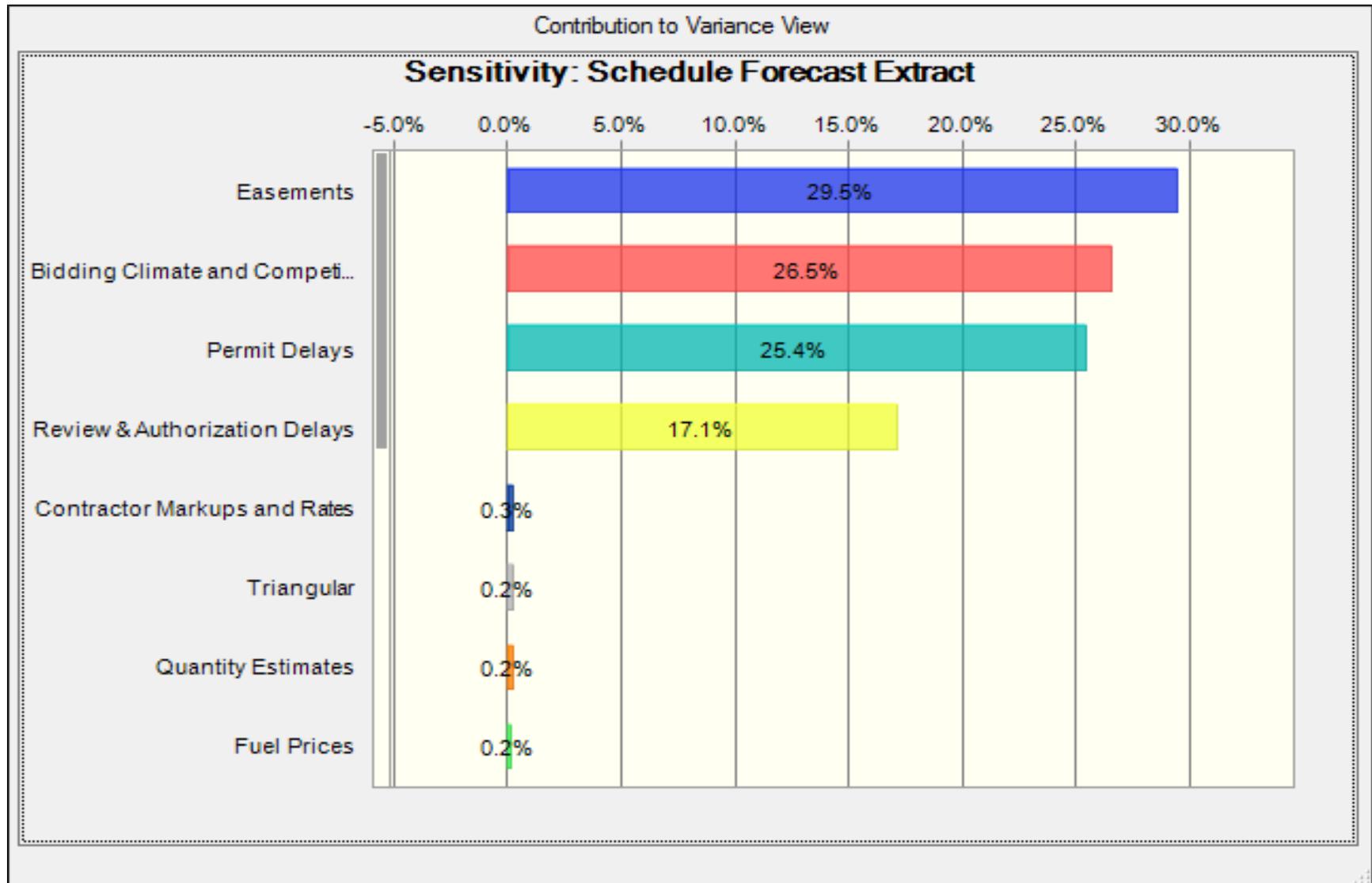


Figure 2. Schedule Sensitivity Analysis



## **7.0 MAJOR FINDINGS/OBSERVATIONS/RECOMMENDATIONS**

This section provides a summary of significant risk analysis results that are identified in the preceding sections of the report. Risk analysis results are intended to provide project leadership with contingency information for scheduling, budgeting, and project control purposes, as well as to provide tools to support decision making and risk management as projects progress through planning and implementation. Because of the potential for use of risk analysis results for such diverse purposes, this section also reiterates and highlights important steps, logic, key assumptions, limitations, and decisions to help ensure that the risk analysis results are appropriately interpreted.

### **7.1 Major Findings/Observations**

Project cost comparison summaries are provided in Table 3 and Figure 3. Additional major findings and observations of the risk analysis are listed below.

1. The key cost risk drivers identified through sensitivity analysis are PR-1 (Fuel Prices), TL1 (Volume Variations), and REG2 (Environmental Monitoring & Mitigation) which together contribute over 86 percent of the statistical cost variance.
2. An additional moderate cost risk that should be closely monitored is TL2 (Periodic Nourishment Interval).
3. The key schedule risk drivers identified through sensitivity analysis are LD3 (Easements) PR1 (Bidding Climate and Competition) and REG5 (Permit Delays), which together contribute over 81 percent of the statistical schedule variance.
4. An additional moderate schedule risk that should be closely monitored is PM4 (Review & Authorization Delays).

**Table 3. Project Cost Comparison Summary (Uncertainty Analysis)**

<b>Confidence Level</b>	<b>Project Cost (\$)</b>	<b>Contingency (\$)</b>	<b>Contingency (%)</b>
0%	\$36,380,670	-\$2,738,330	-7%
5%	\$41,857,330	\$2,738,330	7%
10%	\$43,030,900	\$3,911,900	10%
15%	\$43,422,090	\$4,303,090	11%
20%	\$44,204,470	\$5,085,470	13%
25%	\$44,595,660	\$5,476,660	14%
30%	\$44,986,850	\$5,867,850	15%
35%	\$45,378,040	\$6,259,040	16%
40%	\$46,160,420	\$7,041,420	18%
45%	\$46,551,610	\$7,432,610	19%
50%	\$46,942,800	\$7,823,800	20%
55%	\$47,333,990	\$8,214,990	21%
60%	\$47,725,180	\$8,606,180	22%
65%	\$48,116,370	\$8,997,370	23%
70%	\$48,898,750	\$9,779,750	25%
75%	\$49,289,940	\$10,170,940	26%
<b>80%</b>	<b>\$50,072,320</b>	<b>\$10,953,320</b>	<b>28%</b>
85%	\$51,245,890	\$12,126,890	31%
90%	\$52,419,460	\$13,300,460	34%
95%	\$53,593,030	\$14,474,030	37%
100%	\$65,719,920	\$26,600,920	68%

Figure 3. Project Cost Summary (Uncertainty Analysis)

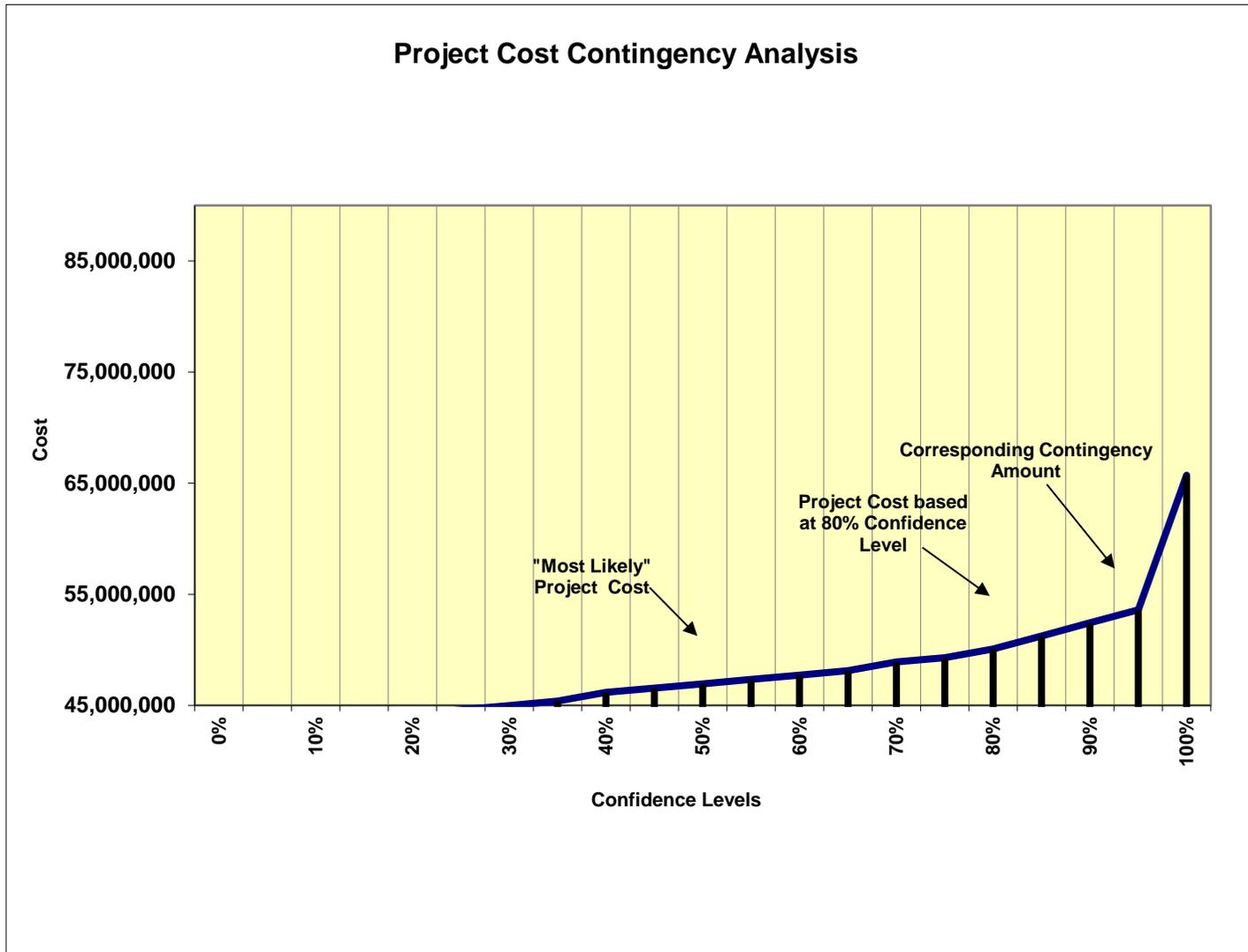
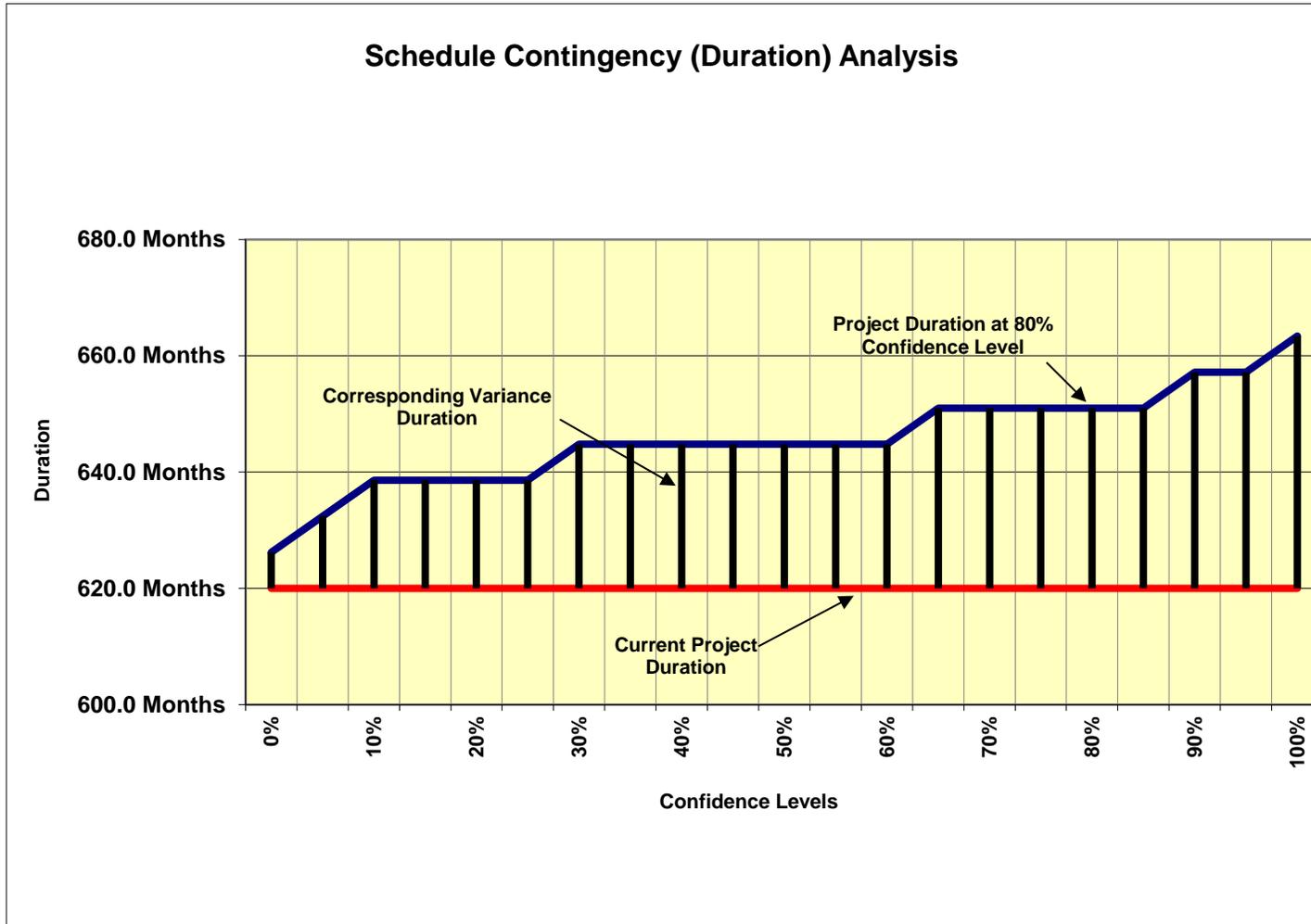


Figure 4. Project Duration Summary (Uncertainty Analysis)



## 7.2 Recommendations

Risk Management is an all-encompassing, iterative, and life-cycle process of project management. The Project Management Institute's (PMI) *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)*, 4<sup>th</sup> edition, states that "project risk management includes the processes concerned with conducting risk management planning, identification, analysis, responses, and monitoring and control on a project." Risk identification and analysis are processes within the knowledge area of risk management. Its outputs pertinent to this effort include the risk register, risk quantification (risk analysis model), contingency report, and the sensitivity analysis.

The intended use of these outputs is implementation by the project leadership with respect to risk responses (such as mitigation) and risk monitoring and control. In short, the effectiveness of the project risk management effort requires that the proactive management of risks not conclude with the study completed in this report.

The CSRA produced by the PDT identifies issues that require the development of subsequent risk response and mitigation plans. This section provides a list of recommendations for continued management of the risks identified and analyzed in this study. Note that this list is not all inclusive and should not substitute a formal risk management and response plan.

1. Key Cost Risk Drivers: The key cost risk drivers identified through sensitivity analysis are PR-1 (Fuel Prices), TL1 (Volume Variations), ET3 (Quantity Estimates), and REG2 (Environmental Monitoring & Mitigation) which together contribute over 86 percent of the statistical cost variance.

- a) Fuel Prices: Naturally, fuel is an ever-fluctuating cost, and a big factor in dredging projects. While contract estimates for each nourishment would use the most-recent rates, the budget submission estimate attempts to mitigate risks by considering a 5-year average. Recently, fuel costs have been quite low, so the average does well to counter the risk of fuel rising beyond current rates between now and the end of the project life. There is not much that the team can do about fuel costs, other than keep an eye on the trends.
- b) Volume Variations: Erosion rates vary. The team accounts for this through historical data, averages, storm data, and modeling software like Beach-fx. Factors like heavy storms could cause variations beyond team control. The PDT will keep variation potential in mind as the project, post-authorization, progresses in order to maintain accurate volume calculations. This would be accomplished most readily via up-to-date surveys. The estimate uses the average volumes as presented in the draft Engineering Appendix.
- c) Environmental Monitoring & Mitigation: Monitoring and mitigation requirements as a result of hardbottom impacts could impact cost and schedule. The PDT is not expecting to trigger mitigation for this project; however, costs for mitigation

have already been explored in the alternative screenings for this project (mimicking Local Sponsor mitigation project). For monitoring, such requirements already well-known and would be incorporated into the contract. No surprises are either front are expected. Regardless, the impacts would be notable, if they occurred. The team can counter this by ensuring that mitigation is not triggered or, at least, ensure that the team is prepared to take appropriate measures are taken if mitigation is triggered.

- d) Periodic Nourishment Intervals: The Beach-fx predicted intervals could change based on future storm events which may reset the remaining project periodic nourishment requirements. Although major storm events may qualify the project for emergency FCCE funding, which would mitigate the financial impact of this risk. This is based on previous experience on other Federal Shore Protection projects along the East Coast of Florida. Weather impacts are covered under PR8 Weather in the risk register.

2. Key Schedule Risk Drivers: The key schedule risk drivers identified through sensitivity analysis are LD3 (Easements), PR1 (Bidding Climate and Competition), and REG5 (Permit Delays) which together contribute over 63 percent of the statistical schedule variance.

- a) Easements: The project does require easements/land certifications. Eminent domain, condemnation, unwillingness of property owners, etc. could cause delays for easements west of the erosion control line. However, the county has already paved a path for this project by completing their own in the recent past (2012/2013), so problems following in the established trail are not expected.
- b) Bidding Climate and Competition: Bidder interest is fairly consistent for these types of projects, especially in this area (vicinity of Ft. Pierce and Martin Co, which are well-established SAJ projects). Bidder availability is always considered in advance. The PDT will try to time construction as favorably as possible. Historically, there hasn't been a problem with projects in this area. The small size of the project may impact bidder interest, but that is something the team can better predict with pre-proposal meetings. Poor turnout could cause bidders to artificially drive up costs. Receiving no bids, though extremely unlikely, would delay the project. Competition requirements only call for two (2) bidders in order to make award and the PDT is confident that this is something that can be accomplished. Bidder availability as impacted by weather is captured under PR8 Weather.
- c) Permit Delays: Predictably, delays in permitting actions can lead to delays in the advertisement process. It is possible that a lengthy delay on future permit mods/extensions could push the construction into the following environmental window. Permitting conditions have been fairly consistent, as this is a routine project, and the team usually has advance notice of new requirements that may impact the project. As long as the team keeps abreast of requirements and

3. Risk Management: Project leadership should use the outputs created during the risk analysis 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.

4. Risk Analysis Updates: Project leadership should review risk items identified in the original risk register 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).

**ADDENDUM D: Total Project Cost Summary with Cost Risk Analysis, Contingency and Schedule Analysis Escalation**

PROJECT: St. Lucie County CSRМ  
PROJECT NO: P2 112339  
LOCATION: St. Lucie County, FL

DISTRICT: SAJ District  
POC: CHIEF, COST ENGINEERING, MATTHEW CUNNINGHAM  
PREPARED: 10/18/2016

This Estimate reflects the scope and schedule in the report. St Lucie County CSRМ Draft Feasibility Study and Integrated EA Report

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)					
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	Program Year (Budget EC): Effective Price Level Date:		INFLATED (%) L	COST (\$K) M	CNTG (\$K) N	FULL (\$K) O
										2018 1 OCT 17	TOTAL FIRST COST (\$K) K				
17	Initial BEACH REPLENISHMENT	\$10,558	\$2,956	28.0%	\$13,515	1.8%	\$10,753	\$3,011	\$13,764	\$0	\$13,764	6.0%	\$11,403	\$3,193	\$14,596
<b>CONSTRUCTION ESTIMATE TOTALS:</b>		\$10,558	\$2,956		\$13,515	1.8%	\$10,753	\$3,011	\$13,764	\$0	\$13,764	6.0%	\$11,403	\$3,193	\$14,596
01	Initial LANDS AND DAMAGES	\$1,330	\$372	28.0%	\$1,702	1.8%	\$1,355	\$379	\$1,734	\$0	\$1,734	6.6%	\$1,444	\$404	\$1,848
30	Initial PLANNING, ENGINEERING & DESIGN	\$2,085	\$584	28.0%	\$2,669	3.6%	\$2,160	\$605	\$2,765	\$0	\$2,765	51.7%	\$3,276	\$917	\$4,193
31	Initial CONSTRUCTION MANAGEMENT	\$1,517	\$425	28.0%	\$1,942	3.6%	\$1,572	\$440	\$2,012	\$0	\$2,012	12.2%	\$1,763	\$494	\$2,257
<b>PROJECT COST TOTALS:</b>		\$15,491	\$4,337	28.0%	\$19,828		\$15,840	\$4,435	\$20,276	\$0	\$20,276	12.9%	\$17,886	\$5,008	\$22,894

LED FORD.TONY.W.JR.  
1277500619  
Digitally signed by LED FORD.TONY.W.JR. 1277500619  
DN: cn=LED FORD.TONY.W.JR., ou=St. Lucie County, ou=FL, ou=USA, email=ledford@stluciecounty.com, c=US, o=St. Lucie County, ou=FL, ou=USA, email=ledford@stluciecounty.com, date=2017.07.05 11:03:24 -0400

TRULOCK.SHELLEY.FAYE.1230  
638663  
Digitally signed by TRULOCK.SHELLEY.FAYE.1230638663  
DN: cn=TRULOCK.SHELLEY.FAYE.1230638663, ou=St. Lucie County, ou=FL, ou=USA, email=shelley@stluciecounty.com, c=US, o=St. Lucie County, ou=FL, ou=USA, email=shelley@stluciecounty.com, date=2017.07.07 14:00:25 -0400

WHITE.TORI.KINSEY.12  
29881546  
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SUMMA.ERIC.PRESTON.12  
29601969  
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DN: cn=SUMMA.ERIC.PRESTON.1229601969, ou=St. Lucie County, ou=FL, ou=USA, email=eric@stluciecounty.com, c=US, o=St. Lucie County, ou=FL, ou=USA, email=eric@stluciecounty.com, date=2017.07.10 09:46:46 -0400

FOR: CHIEF, COST ENGINEERING, MATTHEW CUNNINGHAM

PROJECT MANAGER, SHELLEY TRULOCK

ACTING CHIEF, REAL ESTATE, TORI WHITE

CHIEF, PLANNING, ERIC SUMMA

CHIEF, ENGINEERING, LAUREEN BOROCHANER

CHIEF, OPERATIONS, CAROL BERNSTEIN

CHIEF, CONSTRUCTION, STEPHEN DUBA

CHIEF, CONTRACTING, TIMOTHY BLACK

CHIEF, PM-PB, GERALD GRUBB

CHIEF, DPM, TIM MURPHY

TOTAL PROJECT COST INITIAL: \$22,894  
ESTIMATED TOTAL PROJECT COST: \$22,894

PROJECT: St. Lucie County CSR  
PROJECT NO: P2 112339  
LOCATION: St. Lucie County, FL

DISTRICT: SAJ District  
POC: CHIEF, COST ENGINEERING, MATTHEW CUNNINGHAM  
PREPARED: 10/18/2016

This Estimate reflects the scope and schedule in the report. St Lucie County CSR Draft Feasibility Study and Integrated EA Report

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)							
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	Program Year (Budget EC): Effective Price Level Date:		Spent Thru: (\$K) K	TOTAL FIRST COST (\$K) K	INFLATED (%) L	COST (\$K) M	CNTG (\$K) N	FULL (\$K) O
										2018 1 OCT 17	10/1/2016						
17	Renourishments BEACH REPLENISHMENT	\$18,758	\$5,252	28.0%	\$24,010	1.8%	\$19,105	\$5,349	\$24,454		\$0	\$24,454	83.9%	\$35,130	\$9,836	\$44,966	
<b>CONSTRUCTION ESTIMATE TOTALS:</b>		\$18,758	\$5,252		\$24,010	1.8%	\$19,105	\$5,349	\$24,454		\$0	\$24,454	83.9%	\$35,130	\$9,836	\$44,966	
01	Renourishments LANDS AND DAMAGES	\$60	\$17	28.0%	\$77	1.8%	\$61	\$17	\$78		\$0	\$78	81.6%	\$111	\$31	\$142	
30	Renourishments PLANNING, ENGINEERING & DESIGN	\$4,190	\$1,173	28.0%	\$5,363	3.6%	\$4,341	\$1,216	\$5,557		\$0	\$5,557	510.2%	\$26,487	\$7,416	\$33,904	
31	Renourishments CONSTRUCTION MANAGEMENT	\$2,210	\$619	28.0%	\$2,829	3.6%	\$2,290	\$641	\$2,931		\$0	\$2,931	339.7%	\$10,069	\$2,819	\$12,888	
<b>PROJECT COST TOTALS:</b>		\$25,218	\$7,061	28.0%	\$32,279		\$25,797	\$7,223	\$33,020		\$0	\$33,020	178.3%	\$71,797	\$20,103	\$91,900	

LEDFOORD.TONY.W.JR.  
1277500619  
FOR: CHIEF, COST ENGINEERING, MATTHEW CUNNINGHAM

TRULOCK.SHELLEY.FAYE.12306386  
63  
PROJECT MANAGER, SHELLEY TRULOCK

WHITE.TORI.KINSEY.1229881546  
9881546  
ACTING CHIEF, REAL ESTATE, TORI WHITE

SUMMA.ERIC.PRESTON.  
1229601969  
CHIEF, PLANNING, ERIC SUMMA

CHIEF, ENGINEERING, LAUREEN BOROCHANER

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CHIEF, CONSTRUCTION, STEPHEN DUBA

CHIEF, CONTRACTING, TIMOTHY BLACK

CHIEF, PM-PB, GERALD GRUBB

CHIEF, DPM, TIM MURPHY

TOTAL PROJECT COST RENOURISHMENTS: \$91,900  
ESTIMATED TOTAL PROJECT COST: \$91,900