

**Raritan Bay and Sandy Hook Bay
Highlands, New Jersey
Coastal Storm Risk Management
Feasibility Study**

**Appendix D Cost
Engineering
July 2015**

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Cost Introduction

This feasibility study has determined that periodic coastal storms, such as tropical storms, hurricanes, and nor'easters, pose a severe threat to life and property in the Borough of Highlands, Monmouth County, New Jersey (Highlands). There is an opportunity to manage coastal storm risks in Highlands. In response to these problems and opportunities, plan formulation activities considered a range of structural and nonstructural measures. Through an iterative plan formulation process, potential coastal storm risk management measures were identified, evaluated, and compared. Five final alternatives, 5a through 5e, were compared to determine the Tentatively Selected Plan (TSP) for Highlands.

Alternative 5e, the TSP, provides for an alignment of elevation +10 ft NAVD88 to +12.4 ft NAVD88, consisting of raised bulkheads, raised ground surfaces, floodwalls, and reinforced dunes, that ties into high ground at each end of the project. The exact dimensions and level of performance of the project will be determined as part of the optimization process to follow the release of this draft feasibility Report.

The cost information presented in this appendix is considered preliminary in nature and is based on current historical data of similar scope. The contingencies for the final array of alternatives were developed through an Abbreviated Risk Analysis (ARA). A Detailed Mill cost estimate and a Cost and Schedule Risk Analysis (CSRA) for the TSP will be developed after plan optimization.

The project will require temporary and permanent easements, as well as fee simple purchase for environmental mitigation.

The project will be cost-shared 65% Federal and 35% non-Federal.

This cost appendix contains:

- Total Cost Project Summary (TCPS) for the TSP
- Construction schedule for the TSP
- Preliminary costs for the final array of alternatives
- ARA sheets for the final array of alternatives

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

PROJECT: Raritan Bay and Sandy Hook Bay Highlands, New Jersey Coastal Storm Risk Management
PROJECT NO P2 403345
LOCATION: Highlands, New Jersey

DISTRICT: New York District
POC: CHIEF, COST ENGINEERING, Mukesh Kumar
PREPARED: 7/9/2015

This Estimate reflects the scope and schedule in report; Draft Feasibility Report - July 2015

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)					TOTAL PROJECT COST (FULLY FUNDED)					
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST (\$K)	CNTG (\$K)	CNTG (%)	TOTAL (\$K)	ESC (%)	COST (\$K)	CNTG (\$K)	TOTAL (\$K)	Program Year (Budget EC): Effective Price Level Date:		TOTAL FIRST COST (\$K)	INFLATED (%)	COST (\$K)	CNTG (\$K)	FULL (\$K)
										2017 1 OCT 16	Spent Thru: 10/1/2015					
A	B	C	D	E	F	G	H	I	J	(K)	K	L	M	N	O	
10	BREAKWATER & SEAWALLS	\$30,604	\$8,875	29.0%	\$39,479	3.3%	\$31,600	\$9,164	\$40,764	\$0	\$40,764	4.4%	\$32,984	\$9,565	\$42,550	
11	LEVEES & FLOODWALLS	\$13,368	\$3,877	29.0%	\$17,245	3.3%	\$13,803	\$4,003	\$17,806	\$0	\$17,806	4.4%	\$14,408	\$4,178	\$18,586	
14	RECREATION FACILITIES	\$558	\$162	29.0%	\$720	3.3%	\$576	\$167	\$743	\$0	\$743	4.4%	\$601	\$174	\$776	
CONSTRUCTION ESTIMATE TOTALS:		\$44,530	\$12,914		\$57,444	3.3%	\$45,979	\$13,334	\$59,313	\$0	\$59,313	4.4%	\$47,994	\$13,918	\$61,912	
01	LANDS AND DAMAGES	\$7,100	\$0	0.0%	\$7,100	3.3%	\$7,331	\$0	\$7,331	\$0	\$7,331	0.9%	\$7,397	\$0	\$7,397	
30	PLANNING, ENGINEERING & DESIGN	\$6,680	\$1,937	29.0%	\$8,617	6.0%	\$7,080	\$2,053	\$9,134	\$0	\$9,134	2.0%	\$7,220	\$2,094	\$9,314	
31	CONSTRUCTION MANAGEMENT	\$4,453	\$1,291	29.0%	\$5,744	6.0%	\$4,720	\$1,369	\$6,089	\$0	\$6,089	9.2%	\$5,155	\$1,495	\$6,649	
PROJECT COST TOTALS:		\$62,763	\$16,142	25.7%	\$78,905		\$65,110	\$16,756	\$81,866	\$0	\$81,866	4.2%	\$67,766	\$17,507	\$85,273	

CHIEF, COST ENGINEERING, Mukesh Kumar

PROJECT MANAGER, David t. Gentile

CHIEF, REAL ESTATE, Noreen Dresser

CHIEF, PLANNING,xxx

CHIEF, ENGINEERING, xxx

CHIEF, OPERATIONS, xxx

CHIEF, CONSTRUCTION, xxx

CHIEF, CONTRACTING,xxx

CHIEF, PM-PB, xxxx

CHIEF, DPM, xxx

ESTIMATED FEDERAL COST: 65% \$55,427
ESTIMATED NON-FEDERAL COST: 35% \$29,846
ESTIMATED TOTAL PROJECT COST: \$85,273

**** CONTRACT COST SUMMARY ****

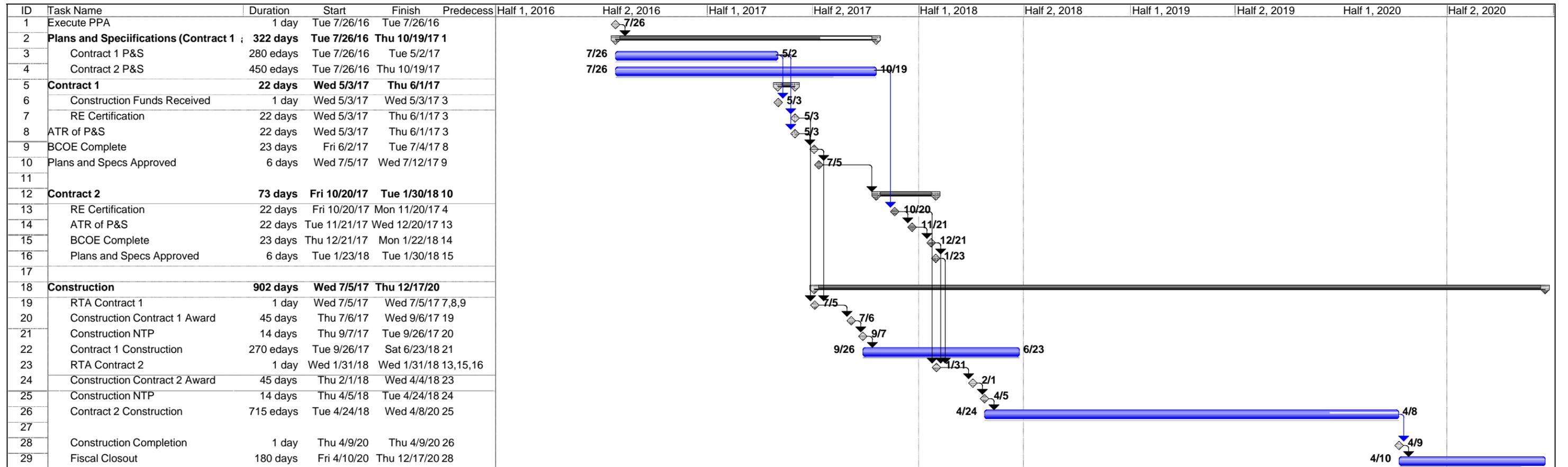
PROJECT: Raritan Bay and Sandy Hook Bay Highlands, New Jersey Coastal Storm Risk Management Feasibility
LOCATION: Highlands, New Jersey
This Estimate reflects the scope and schedule in report; Draft Feasibility Report - July 2015
File Name: Non-CAP Highlands TPCS July 2015

DISTRICT: New York District
POC: CHIEF, COST ENGINEERING, Mukesh Kumar

PREPARED: 7/9/2015

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

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 23-Oct-14				Program Year (Budget EC): 2017								
		Effective Price Level: 1-Oct-14				Effective Price Level Date: 1 OCT 16								
		RISK BASED												
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST (\$K)	CNTG (\$K)	CNTG (%)	TOTAL (\$K)	ESC (%)	COST (\$K)	CNTG (\$K)	TOTAL (\$K)	Mid-Point Date	INFLATED (%)	COST (\$K)	CNTG (\$K)	FULL (\$K)
<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>	<u>G</u>	<u>H</u>	<u>I</u>	<u>J</u>	<u>P</u>	<u>L</u>	<u>M</u>	<u>N</u>	<u>O</u>
PHASE 1 or CONTRACT 1														
10	BREAKWATER & SEAWALLS	\$30,604	\$8,875	29.0%	\$39,479	3.3%	\$31,600	\$9,164	\$40,764	2019Q2	4.4%	\$32,984	\$9,565	\$42,550
11	LEVEES & FLOODWALLS	\$13,368	\$3,877	29.0%	\$17,245	3.3%	\$13,803	\$4,003	\$17,806	2019Q2	4.4%	\$14,408	\$4,178	\$18,586
14	RECREATION FACILITIES	\$558	\$162	29.0%	\$720	3.3%	\$576	\$167	\$743	2019Q2	4.4%	\$601	\$174	\$776
CONSTRUCTION ESTIMATE TOTALS:		\$44,530	\$12,914	29.0%	\$57,444		\$45,979	\$13,334	\$59,313			\$47,994	\$13,918	\$61,912
01	LANDS AND DAMAGES	\$7,100	\$0	0.0%	\$7,100	3.3%	\$7,331	\$0	\$7,331	2017Q3	0.9%	\$7,397	\$0	\$7,397
30	PLANNING, ENGINEERING & DESIGN													
0.0%	Project Management	\$0	\$0	29.0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
0.0%	Planning & Environmental Compliance	\$0	\$0	29.0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
15.0%	Engineering & Design	\$6,680	\$1,937	29.0%	\$8,617	6.0%	\$7,080	\$2,053	\$9,134	2017Q3	2.0%	\$7,220	\$2,094	\$9,314
0.0%	Reviews, ATRs, IEPRs, VE	\$0	\$0	29.0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
0.0%	Life Cycle Updates (cost, schedule, risks)	\$0	\$0	29.0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
0.0%	Contracting & Reprographics	\$0	\$0	29.0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
0.0%	Engineering During Construction	\$0	\$0	29.0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
0.0%	Planning During Construction	\$0	\$0	29.0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
0.0%	Project Operations	\$0	\$0	29.0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
31	CONSTRUCTION MANAGEMENT													
10.0%	Construction Management	\$4,453	\$1,291	29.0%	\$5,744	6.0%	\$4,720	\$1,369	\$6,089	2019Q2	9.2%	\$5,155	\$1,495	\$6,649
0.0%	Project Operation:	\$0	\$0	29.0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
0.0%	Project Management	\$0	\$0	29.0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
CONTRACT COST TOTALS:		\$62,763	\$16,142		\$78,905		\$65,110	\$16,756	\$81,866			\$67,766	\$17,507	\$85,273



Project: Highlands Implementation Sch
Date: Mon 6/15/15

Task		Milestone		Rolled Up Task		Rolled Up Progress		External Tasks		Group By Summary	
Progress		Summary		Rolled Up Milestone		Split		Project Summary		Deadline	

Table B5
Alternative 5a
Preferred Alternative Plan with No Gate

Item Description	Quant.	Unit	Unit Cost (Oct 05 PL)	Unit Cost (Oct 10 PL)*	Unit Cost (Oct 14 PL)**	Item Cost (Oct 14 PL)
Mobilization and Demobilization	1	JOB	\$ 225,000	\$ 254,570	\$ 284,277	\$ 284,277
Raised Ground Surface at Park (Top elev = 11' NGVD) (Reach 4)	3,925	S.Y.	\$ 117	\$ 132	\$ 148	\$ 580,210
Steel Sheetpile Bulkhead (40' height), 328LF	13,120	S.F.	\$ 35	\$ 40	\$ 44	\$ 580,178
Splash Protection						
High Strength Concrete (2' thickness x10' width)	245	C.Y.	\$ 905	\$ 1,024	\$ 1,143	\$ 280,139
Splash Bedding Stone (1' thickness x 10' width)	195	TONS	\$ 80	\$ 91	\$ 101	\$ 19,710
Geotextile (10' width)	365	S.Y.	\$ 12	\$ 14	\$ 15	\$ 5,534
Toe Protection Berm (in front of raised bulkhead)						
Armor Stone	545	TONS	\$ 100	\$ 113	\$ 126	\$ 68,858
Bedding Layer	165	TONS	\$ 80	\$ 91	\$ 101	\$ 16,678
Geotextile	620	S.Y.	\$ 12	\$ 14	\$ 15	\$ 9,400
Epoxy Coated Steel Sheetpile Bulkhead (Reaches 1 & 3), 4514LF						
Top elev = 13.5' & 12.0' NGVD (40' height)	180,560	S.F.	\$ 35	\$ 40	\$ 44	\$ 7,984,525
Splash Protection						
High Strength Concrete (2' thickness x10' width)	3,345	C.Y.	\$ 905	\$ 1,024	\$ 1,143	\$ 3,824,760
Splash Bedding Stone (1' thickness x 10' width)	2,675	TONS	\$ 80	\$ 91	\$ 101	\$ 270,379
Geotextile (10' width)	5,015	S.Y.	\$ 12	\$ 14	\$ 15	\$ 76,035
Toe Protection Berm (in front of raised bulkhead)						
Armor Stone	7,490	TONS	\$ 100	\$ 113	\$ 126	\$ 946,327
Bedding Layer	2,210	TONS	\$ 80	\$ 91	\$ 101	\$ 223,379
Geotextile	8,530	S.Y.	\$ 12	\$ 14	\$ 15	\$ 129,327
Floodwall (concrete I-Type floodwalls) (Top elev = 11' NGVD) (Reach 4)	210	L.F.	\$ 1,220	\$ 1,380	\$ 1,541	\$ 323,697
Onshore Dune Barrier (Top elev = 13.5' & 12.0' NGVD) (Reaches 1 & 3)						
Sand Fill 12' wide, 1:5 slopes	8,850	C.Y.	\$ 22	\$ 25	\$ 28	\$ 245,995
Steel Sheetpile Bulkhead (40' height), 1194LF	47,760	S.F.	\$ 35	\$ 40	\$ 44	\$ 2,111,990
Splash Protection						
High Strength Concrete (2' thickness x10' width)	885	C.Y.	\$ 905	\$ 1,024	\$ 1,143	\$ 1,011,932
Splash Bedding Stone (1' thickness x 10' width)	710	TONS	\$ 80	\$ 91	\$ 101	\$ 71,764
Geotextile (10' width)	1,330	S.Y.	\$ 12	\$ 14	\$ 15	\$ 20,165
Toe Protection Berm (in front of raised bulkhead)						
Armor Stone	1,985	TONS	\$ 100	\$ 113	\$ 126	\$ 250,796
Bedding Layer	585	TONS	\$ 80	\$ 91	\$ 101	\$ 59,130
Geotextile	2,260	S.Y.	\$ 12	\$ 14	\$ 15	\$ 34,265
Dune Grass	9,075	S.Y.	\$ 3	\$ 3	\$ 4	\$ 34,398
Earthen Walkover Ramps	3	EA.	\$ 10,000	\$ 11,314	\$ 12,635	\$ 37,904
Soil Confinement Surfacing/Matting	9,075	S.Y.	\$ 22	\$ 25	\$ 28	\$ 252,249
Existing Surface Preparation	9,075	S.Y.	\$ 6	\$ 7	\$ 8	\$ 68,795
Capped Existing State Bulkhead (Reach 2)						
Permanent cap (Top elevation = 13' NGVD) and Wall	1,395	L.F.	\$ 985	\$ 1,114	\$ 1,245	\$ 1,736,081
Captain's Cove Perimeter Floodwall (Reach 2)						
Epoxy Coated Steel Sheetpile Bulkhead, 1567 LF				\$ -	\$ -	\$ -
Top elev = 13' NGVD (40' height)	62,680	S.F.	\$ 35	\$ 40	\$ 44	\$ 2,771,766
Splash Protection						
High Strength Concrete (2' thickness x10' width)	1,085	C.Y.	\$ 905	\$ 1,024	\$ 1,143	\$ 1,240,617
Splash Bedding Stone (1' thickness x 10' width)	870	TONS	\$ 80	\$ 91	\$ 101	\$ 87,936
Geotextile (10' width)	1,630	S.Y.	\$ 12	\$ 14	\$ 15	\$ 24,713
Gravel Surface Between Existing and Proposed Bulkheads (1' thickness x 5' width)	435	TONS			\$ 50	\$ 21,750
Geotextile (5' width)	815	S.Y.	\$ 12	\$ 14	\$ 15	\$ 12,357
Dock/Walkway Relocation along West Wall of Cove	110	L.F.	\$ 400	\$ 453	\$ 505	\$ 55,592
Dock/Walkway modification/replacement	18	EA.	\$ 5,000	\$ 5,657	\$ 6,317	\$ 113,711
Fabricated Floodwall (Top elevation = 11 ft NGVD) (Reach 4)						
H-Piles and Boards	1,046	L.F.	\$ 330	\$ 373	\$ 417	\$ 436,119
Concrete for H-Pile Foundations	1,940	C.Y.	\$ 905	\$ 1,024	\$ 1,143	\$ 2,218,247
Storage Building	1	EA.	\$ 300,000	\$ 339,427	\$ 379,036	\$ 379,036
Raise Sling Boat Launch Facilities in Reach 3 (2ea)	1	JOB	\$ -	\$ -	\$ 500,000	\$ 500,000
Raise Restaurant and Deck in Reach 3	1	JOB	\$ 150,000	\$ 169,713	\$ 189,518	\$ 189,518
Minimum Facility	1	JOB	\$ 297,100	\$ 331,770	\$ 371,770	\$ 371,770
Maintenance and Protection of Traffic	1	JOB	\$ 100,000	\$ 113,142	\$ 126,345	\$ 126,345
Environmental Mitigation	1	L.S.	\$ -	\$ -	\$ 2,000,000	\$ 2,000,000
Real Estate Lands and Damages	1	L.S.	\$ -	\$ -	\$ 6,600,000	\$ 6,600,000
Structural Revisions -						
Update Sheetpile to PZ40 - Closure Gate	304,120	SF			\$ 25	\$ 7,603,000
Add 1.5" Tie Rods	20,273	LF			\$ 10	\$ 202,730
Add HP14 x 73 Deadman Piles	50,618	LF			\$ 65	\$ 3,290,170
East End Tie-In Alternatives:						
Closure Gate Alternative						
Floodwall (concrete I-Type floodwalls) (Top elev = 11' NGVD) (Reach 4)	255	L.F.	\$ 1,220	\$ 1,380	\$ 1,541	\$ 393,061
Closure Gate (55' width)	1	EA.	\$ 607,400	\$ 687,226	\$ 767,422	\$ 767,422
Subtotal						\$ 50,924,736
Contingency (30%)						\$ 13,297,421
Subtotal						\$ 64,222,157
Eng. & Design (15%)						\$ 8,643,324
Construction Management (10%)						\$ 5,762,216
Total First Cost						\$ 78,628,000
IDC (n=2 vr.. i=4 and 1/8%)						\$ 2,596,360
Total Investment Cost						\$ 81,224,360
Annualized Investment Cost						\$ 3,385,209

Annualized O & M \$ 319,300

Total Annual Cost \$ 3,705,000

	FY2015
Interest Rate	0.03375
Life	50
Capital Recovery Factor	0.04168
Construction Period in months	24
IDC factor	0.03302

* EM 1110-2-1304 (Revised 30 Sep 10) CWBS Code 11 (Levees & Floodwalls)

** EM 1110-2-1304 (Revised 31 March 2014) CWBS Code 11 (Levees & Floodwalls)

Table B5b
Alternative 5b
Preferred Alternative Plan with
Bulkhead Floodwall Crest El. 12.0' NGVD instead of Fabricated Floodwall

Item Description	Quant.	Unit	Unit Cost (Oct 05 PL)	Unit Cost (Oct 10 PL)*	Unit Cost (Oct 14 PL)**	Item Cost (Oct 14 PL)
Mobilization and Demobilization	1	JOB	\$ 225,000	\$ 254,570	\$ 284,277	\$ 284,277
Raised Ground Surface at Park (Top elev = 11' NGVD) (Reach 4)	3,775	S.Y.	\$ 117	\$ 132	\$ 148	\$ 558,036
Steel Sheetpile Bulkhead (40' height), 328LF	13,120	S.F.	\$ 35	\$ 40	\$ 44	\$ 580,178
Splash Protection						
High Strength Concrete (2' thickness x10' width)	245	C.Y.	\$ 905	\$ 1,024	\$ 1,143	\$ 280,139
Splash Bedding Stone (1' thickness x 10' width)	195	TONS	\$ 80	\$ 91	\$ 101	\$ 19,710
Geotextile (10' width)	365	S.Y.	\$ 12	\$ 14	\$ 15	\$ 5,534
Toe Protection Berm (in front of raised bulkhead)						
Armor Stone	545	TONS	\$ 100	\$ 113	\$ 126	\$ 68,858
Bedding Layer	165	TONS	\$ 80	\$ 91	\$ 101	\$ 16,678
Geotextile	620	S.Y.	\$ 12	\$ 14	\$ 15	\$ 9,400
Epoxy Coated Steel Sheetpile Bulkhead (Reaches 1,3 & 4), 5722LF						
Top elev = 13.5' & 12.0' NGVD (40' height)	228,880	S.F.	\$ 35	\$ 40	\$ 44	\$ 10,121,279
Splash Protection						
High Strength Concrete (2' thickness x10' width)	4,240	C.Y.	\$ 905	\$ 1,024	\$ 1,143	\$ 4,848,127
Splash Bedding Stone (1' thickness x 10' width)	3,395	TONS	\$ 80	\$ 91	\$ 101	\$ 343,154
Geotextile (10' width)	6,360	S.Y.	\$ 12	\$ 14	\$ 15	\$ 96,427
Toe Protection Berm (in front of raised bulkhead)						
Armor Stone	9,495	TONS	\$ 100	\$ 113	\$ 126	\$ 1,199,650
Bedding Layer	2,800	TONS	\$ 80	\$ 91	\$ 101	\$ 283,014
Geotextile	10,810	S.Y.	\$ 12	\$ 14	\$ 15	\$ 163,895
Floodwall (concrete I-Type floodwalls) (Top elev = 11' NGVD) (Reach 4)	120	L.F.	\$ 1,220	\$ 1,380	\$ 1,541	\$ 184,970
Onshore Dune Barrier (Top elev = 13.5' & 12.0' NGVD) (Reaches 1 & 3)						
Sand Fill 12' wide, 1:5 slopes	8,850	C.Y.	\$ 22	\$ 25	\$ 28	\$ 245,995
Steel Sheetpile Bulkhead (40' height), 1194LF	47,760	S.F.	\$ 35	\$ 40	\$ 44	\$ 2,111,990
Splash Protection						
High Strength Concrete (2' thickness x10' width)	885	C.Y.	\$ 905	\$ 1,024	\$ 1,143	\$ 1,011,932
Splash Bedding Stone (1' thickness x 10' width)	710	TONS	\$ 80	\$ 91	\$ 101	\$ 71,764
Geotextile (10' width)	1,330	S.Y.	\$ 12	\$ 14	\$ 15	\$ 20,165
Toe Protection Berm (in front of raised bulkhead)						
Armor Stone	1,985	TONS	\$ 100	\$ 113	\$ 126	\$ 250,796
Bedding Layer	585	TONS	\$ 80	\$ 91	\$ 101	\$ 59,130
Geotextile	2,260	S.Y.	\$ 12	\$ 14	\$ 15	\$ 34,265
Dune Grass	9,075	S.Y.	\$ 3	\$ 3	\$ 4	\$ 34,398
Earthen Walkover Ramps	3	EA.	\$ 10,000	\$ 11,314	\$ 12,635	\$ 37,904
Soil Confinement Surfacing/Matting	9,075	S.Y.	\$ 22	\$ 25	\$ 28	\$ 252,249
Existing Surface Preparation	9,075	S.Y.	\$ 6	\$ 7	\$ 8	\$ 68,795
Capped Existing State Bulkhead (Reach 2)						
Permanent cap (Top elevation = 13' NGVD) and Wall	1,395	L.F.	\$ 985	\$ 1,114	\$ 1,245	\$ 1,736,081
Buoyant Swing Gate (80' in length, 40' clear width) (Reach 2) (as detailed in the Leonardo, NJ Closure Gate Assess. & Des. - 4/02)	1	L.S.	\$ 3,500,000	\$ 3,959,977	\$ 4,422,090	\$ 4,422,090
Epoxy Coated Steel Sheetpile Bulkhead (40' height), 115LF	4,600	S.F.	\$ 35	\$ 40	\$ 44	\$ 203,416
Splash Protection						
High Strength Concrete (2' thickness x10' width)	35	C.Y.	\$ 905	\$ 1,024	\$ 1,143	\$ 40,020
Splash Bedding Stone (1' thickness x 10' width)	30	TONS	\$ 80	\$ 91	\$ 101	\$ 3,032
Geotextile (10' width)	55	S.Y.	\$ 12	\$ 14	\$ 15	\$ 834
Dock/Walkway modification/replacement	33	EA.	\$ 5,000	\$ 5,657	\$ 6,317	\$ 208,470
Raise Structures (avg. 1,500 s.f.) w/new reinf. concrete foundations due to high damaging overtopping rates - Reach 4**	15	EA.	\$ 98,000	\$ 110,879	\$ 123,819	\$ 1,857,278
Raise Structure (3,000 s.f.) w/new reinf. Concrete foundations due to high damaging overtopping rates - Reach 4**	1	EA.	\$ 196,000	\$ 221,759	\$ 247,637	\$ 247,637
Raise Sling Boat Launch Facilities in Reach 3 (2ea)	1	JOB			\$ 500,000	\$ 500,000
Raise Restaurant and Deck in Reach 3	1	JOB	\$ 150,000	\$ 169,713	\$ 189,518	\$ 189,518
Minimum Facility	1	JOB		\$ 297,100	\$ 331,770	\$ 331,770
Maintenance and Protection of Traffic	1	JOB	\$ 65,000	\$ 73,542	\$ 82,125	\$ 82,125
Environmental Mitigation	1	JOB		\$ 2,000,000	\$ 2,000,000	\$ 2,000,000
Real Estate Lands and Damages	1	JOB			\$ 6,800,000	\$ 6,800,000
Structural Revisions -						
Update Sheetpile to PZ40 - Closure Gate	294,360	SF			\$ 25	\$ 7,359,000
Add 1.5" Tie Rods	19,663	LF			\$ 10	\$ 196,630
Add HP14 x 73 Deadman Piles	49,156	LF			\$ 65	\$ 3,195,140
East End Tie-In Alternatives:						
Closure Gate Alternative						
Floodwall (concrete I-Type floodwalls) (Top elev = 11' NGVD) (Reach 4)	255	L.F.	\$ 1,220	\$ 1,380	\$ 1,541	\$ 393,061
Closure Gate (55' width)	1	JOB	\$ 607,400	\$ 687,226	\$ 767,422	\$ 767,422

Note: Raising structures directly behind bulkhead in Reach 4 is required due to the lower floodwall crest elevation (el. 12.0), allowing significant overtopping damage, if not raised with a reinforced foundation

Subtotal \$ 53,796,230

Contingency (32%) \$ 15,038,794

Subtotal \$ 68,835,024

Eng. & Design (15%) \$ 9,305,254

Construction Management (10%) \$ 6,683,502

Total First Cost \$ 84,824,000

IDC (n=2 yr., i=4 and 1/8%) \$ 2,800,956

Total Investment Cost \$ 87,624,956

Annualized Investment Cost \$ 3,651,968

Annualized O & M \$ 206,600

Total Annual Cost \$ 3,859,000

	FY2015
Interest Rate	0.03375
Life	50
Capital Recovery Factor	0.04168
Construction Period in months	24
IDC factor	0.03302

* EM 1110-2-1304 (Revised 30 Sep 10) CWBS Code 11 (Levees & Floodwalls)

** EM 1110-2-1304 (Revised 31 March 2014) CWBS Code 11 (Levees & Floodwalls)

Table B5c
Alternative 5c
Preferred Alternative Plan with
Bulkhead Floodwall Crest El. 13.2' NGVD instead of Fabricated Floodwall

Item Description	Quant.	Unit	Unit Cost (Oct 05 PL)	Unit Cost (Oct 10 PL)*	Unit Cost (Oct 14 PL)**	Item Cost (Oct 14 PL)
Mobilization and Demobilization	1	JOB	\$ 225,000	\$ 254,570	\$ 284,277	\$ 284,277
Raised Ground Surface at Park (Top elev = 11' NGVD) (Reach 4)	3,775	S.Y.	\$ 117	\$ 132	\$ 148	\$ 558,036
Steel Sheetpile Bulkhead (40' height), 328LF	13,120	S.F.	\$ 35	\$ 40	\$ 44	\$ 580,178
Splash Protection						
High Strength Concrete (2' thickness x10' width)	245	C.Y.	\$ 905	\$ 1,024	\$ 1,143	\$ 280,139
Splash Bedding Stone (1' thickness x 10' width)	195	TONS	\$ 80	\$ 91	\$ 101	\$ 19,710
Geotextile (10' width)	365	S.Y.	\$ 12	\$ 14	\$ 15	\$ 5,534
Toe Protection Berm (in front of raised bulkhead)						
Armor Stone	545	TONS	\$ 100	\$ 113	\$ 126	\$ 68,858
Bedding Layer	165	TONS	\$ 80	\$ 91	\$ 101	\$ 16,678
Geotextile	620	S.Y.	\$ 12	\$ 14	\$ 15	\$ 9,400
Epoxy Coated Steel Sheetpile Bulkhead (Reaches 1,3 & 4), 5722LF						
Top elev = 13.5' & 12.0' & 13.9' NGVD (40' height)	228,880	S.F.	\$ 35	\$ 40	\$ 44	\$ 10,121,279
Splash Protection						
High Strength Concrete (2' thickness x10' width)	4,240	C.Y.	\$ 905	\$ 1,024	\$ 1,143	\$ 4,848,127
Splash Bedding Stone (1' thickness x 10' width)	3,395	TONS	\$ 80	\$ 91	\$ 101	\$ 343,154
Geotextile (10' width)	6,360	S.Y.	\$ 12	\$ 14	\$ 15	\$ 96,427
Toe Protection Berm (in front of raised bulkhead)						
Armor Stone	9,495	TONS	\$ 100	\$ 113	\$ 126	\$ 1,199,650
Bedding Layer	2,800	TONS	\$ 80	\$ 91	\$ 101	\$ 283,014
Geotextile	10,810	S.Y.	\$ 12	\$ 14	\$ 15	\$ 163,895
Floodwall (concrete I-Type floodwalls) (Top elev = 11' NGVD) (Reach 4)	120	L.F.	\$ 1,220	\$ 1,380	\$ 1,541	\$ 184,970
Onshore Dune Barrier (Top elev = 13.5' & 12.0' NGVD) (Reaches 1 & 3)						
Sand Fill 12' wide, 1:5 slopes	8,850	C.Y.	\$ 22	\$ 25	\$ 28	\$ 245,995
Steel Sheetpile Bulkhead (40' height), 1194LF	47,760	S.F.	\$ 35	\$ 40	\$ 44	\$ 2,111,990
Splash Protection						
High Strength Concrete (2' thickness x10' width)	885	C.Y.	\$ 905	\$ 1,024	\$ 1,143	\$ 1,011,932
Splash Bedding Stone (1' thickness x 10' width)	710	TONS	\$ 80	\$ 91	\$ 101	\$ 71,764
Geotextile (10' width)	1,330	S.Y.	\$ 12	\$ 14	\$ 15	\$ 20,165
Toe Protection Berm (in front of raised bulkhead)						
Armor Stone	1,985	TONS	\$ 100	\$ 113	\$ 126	\$ 250,796
Bedding Layer	585	TONS	\$ 80	\$ 91	\$ 101	\$ 59,130
Geotextile	2,260	S.Y.	\$ 12	\$ 14	\$ 15	\$ 34,265
Dune Grass	9,075	S.Y.	\$ 3	\$ 3	\$ 4	\$ 34,398
Earthen Walkover Ramps	3	EA.	\$ 10,000	\$ 11,314	\$ 12,635	\$ 37,904
Soil Confinement Surfacing/Matting	9,075	S.Y.	\$ 22			
Existing Surface Preparation	9,075	S.Y.	\$ 6	\$ 7	\$ 8	\$ 68,795
Capped Existing State Bulkhead (Reach 2)						
Permanent cap (Top elevation = 13' NGVD) and Wall	1,395	L.F.	\$ 985	\$ 1,114	\$ 1,245	\$ 1,736,081
Buoyant Swing Gate (80' in length, 40' clear width) (Reach 2)	1	L.S.	\$ 3,500,000	\$ 3,959,977	\$ 4,422,090	\$ 4,422,090
(as detailed in the Leonardo, NJ Closure Gate Assess.& Des. - 4/02)						
Epoxy Coated Steel Sheetpile Bulkhead (40' height), 115LF	4,600	S.F.	\$ 35	\$ 40	\$ 44	\$ 203,416
Splash Protection						
High Strength Concrete (2' thickness x10' width)	35	C.Y.	\$ 905	\$ 1,024	\$ 1,143	\$ 40,020
Splash Bedding Stone (1' thickness x 10' width)	30	TONS	\$ 80	\$ 91	\$ 101	\$ 3,032
Geotextile (10' width)	55	S.Y.	\$ 12	\$ 14	\$ 15	\$ 834
Dock/Walkway modification/replacement	33	EA.	\$ 5,000	\$ 5,657	\$ 6,317	\$ 208,470
Raise Structures (avg. 1,500 s.f.) w/raised block foundation due to moderate to low damaging overtopping rates - Reach 4**	15	EA.	\$ 43,000	\$ 48,651	\$ 54,329	\$ 814,928
Raise Structure (3,000 s.f.) w/raised block foundation due to moderate to low damaging overtopping rates - Reach 4**	1	EA.	\$ 86,000	\$ 97,302	\$ 108,657	\$ 108,657
Raise Sling Boat Launch Facilities in Reach 3 (2ea)	1	JOB		\$ -	\$ 500,000	\$ 500,000
Raise Restaurant and Deck in Reach 3	1	JOB	\$ 150,000	\$ 169,713	\$ 189,518	\$ 189,518
Minimum Facility	1	JOB		\$ 297,100	\$ 331,770	\$ 331,770
Maintenance and Protection of Traffic	1	JOB	\$ 65,000	\$ 73,542	\$ 82,125	\$ 82,125
Environmental Mitigation	1	JOB		\$ -	\$ 2,000,000	\$ 2,000,000
Real Estate Lands and Damages	1	JOB		\$ -	\$ 6,800,000	\$ 6,800,000
Structural Revisions -						
Update Sheetpile to PZ40 - Closure Gate	294,360	SF			\$ 25	\$ 7,359,000
Add 1.5" Tie Rods	19,663	LF			\$ 10	\$ 196,630
Add HP14 x 73 Deadman Piles	49,156	LF			\$ 65	\$ 3,195,140
East End Tie-In Alternatives:						
Closure Gate Alternative						
Floodwall (concrete I-Type floodwalls) (Top elev = 11' NGVD) (Reach 4)	255	L.F.	\$ 1,220	\$ 1,380	\$ 1,541	\$ 393,061
Closure Gate (55' width)	1	JOB	\$ 607,400	\$ 687,226	\$ 767,422	\$ 767,422

Note: Raising structures directly behind bulkhead in Reach 4 are required due to lower floodwall crest elevation (el. 13.2) allowing damage to structure, if not raised out of damage zone

Subtotal						\$ 52,362,652
Contingency (32%)						\$ 14,580,049
Subtotal						\$ 66,942,700
Eng. & Design (15%)						\$ 9,021,405
Construction Management (10%)						\$ 6,014,270
Total First Cost						\$ 81,978,000

IDC (n=2 yr., i=4 and 1/8%)	\$ 2,706,979
Total Investment Cost	\$ 84,684,979

Annualized Investment Cost	\$ 3,529,438
Annualized O & M	\$ 210,500

Total Annual Cost	\$ 3,740,000
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	FY2015
Interest Rate	0.03375
Life	50
Capital Recovery Factor	0.04168
Construction Period in months	24
IDC factor	0.03302

* EM 1110-2-1304 (Revised 30 Sep 10) CWBS Code 11 (Levees & Floodwalls)
 ** EM 1110-2-1304 (Revised 31 March 2014) CWBS Code 11 (Levees & Floodwalls)

Table B5d
Alternative 5d
Preferred Alternative Plan with
Bulkhead Floodwall Crest El. 13.9' NGVD instead of Fabricated Floodwall

Item Description	Quant.	Unit	Unit Cost (Oct 05 PL)	Unit Cost (Oct 10 PL)*	Unit Cost (Oct 14 PL)**	Closure Gate Item Cost (Oct 14PL)
Mobilization and Demobilization	1	JOB	\$ 225,000	\$ 254,570	\$ 284,277	\$ 284,277
Raised Ground Surface at Park (Top elev = 11' NGVD) (Reach 4)	3,775	S.Y.	\$ 117	\$ 132	\$ 148	\$ 558,036
Steel Sheetpile Bulkhead (40' height), 328LF	13,120	S.F.	\$ 35	\$ 40	\$ 44	\$ 580,178
Splash Protection						
High Strength Concrete (2' thickness x10' width)	245	C.Y.	\$ 905	\$ 1,024	\$ 1,143	\$ 280,139
Splash Bedding Stone (1' thickness x 10' width)	195	TONS	\$ 80	\$ 91	\$ 101	\$ 19,710
Geotextile (10' width)	365	S.Y.	\$ 12	\$ 14	\$ 15	\$ 5,534
Toe Protection Berm (in front of raised bulkhead)						
Armor Stone	545	TONS	\$ 100	\$ 113	\$ 126	\$ 68,858
Bedding Layer	165	TONS	\$ 80	\$ 91	\$ 101	\$ 16,678
Geotextile	620	S.Y.	\$ 12	\$ 14	\$ 15	\$ 9,400
Epoxy Coated Steel Sheetpile Bulkhead (Reaches 1,3 & 4), 5722LF						
Top elev = 13.5' & 12.0' & 13.9' NGVD (40' height)	228,880	S.F.	\$ 35	\$ 40	\$ 44	\$ 10,121,279
Splash Protection						
High Strength Concrete (2' thickness x10' width)	4,240	C.Y.	\$ 905	\$ 1,024	\$ 1,143	\$ 4,848,127
Splash Bedding Stone (1' thickness x 10' width)	3,395	TONS	\$ 80	\$ 91	\$ 101	\$ 343,154
Geotextile (10' width)	6,360	S.Y.	\$ 12	\$ 14	\$ 15	\$ 96,427
Toe Protection Berm (in front of raised bulkhead)						
Armor Stone	9,495	TONS	\$ 100	\$ 113	\$ 126	\$ 1,199,650
Bedding Layer	2,800	TONS	\$ 80	\$ 91	\$ 101	\$ 283,014
Geotextile	10,810	S.Y.	\$ 12	\$ 14	\$ 15	\$ 163,895
Floodwall (concrete I-Type floodwalls) (Top elev = 11' NGVD) (Reach 4)	120	L.F.	\$ 1,220	\$ 1,380	\$ 1,541	\$ 184,970
Onshore Dune Barrier (Top elev = 13.5' & 12.0' NGVD) (Reaches 1 & 3)						
Sand Fill 12' wide, 1:5 slopes	8,850	C.Y.	\$ 22	\$ 25	\$ 28	\$ 245,995
Steel Sheetpile Bulkhead (40' height), 1194LF	47,760	S.F.	\$ 35	\$ 40	\$ 44	\$ 2,111,990
Splash Protection						
High Strength Concrete (2' thickness x10' width)	885	C.Y.	\$ 905	\$ 1,024	\$ 1,143	\$ 1,011,932
Splash Bedding Stone (1' thickness x 10' width)	710	TONS	\$ 80	\$ 91	\$ 101	\$ 71,764
Geotextile (10' width)	1,330	S.Y.	\$ 12	\$ 14	\$ 15	\$ 20,165
Toe Protection Berm (in front of raised bulkhead)						
Armor Stone	1,985	TONS	\$ 100	\$ 113	\$ 126	\$ 250,796
Bedding Layer	585	TONS	\$ 80	\$ 91	\$ 101	\$ 59,130
Geotextile	2,260	S.Y.	\$ 12	\$ 14	\$ 15	\$ 34,265
Dune Grass	9,075	S.Y.	\$ 3	\$ 3	\$ 4	\$ 34,398
Earthen Walkover Ramps	3	EA.	\$ 10,000	\$ 11,314	\$ 12,635	\$ 37,904
Soil Confinement Surfacing/Matting	9,075	S.Y.	\$ 22			
Existing Surface Preparation	9,075	S.Y.	\$ 6	\$ 7	\$ 8	\$ 68,795
Capped Existing State Bulkhead (Reach 2)						
Permanent cap (Top elevation = 13' NGVD) and Wall	1,395	L.F.	\$ 985	\$ 1,114	\$ 1,245	\$ 1,736,081
Buoyant Swing Gate (80' in length, 40' clear width) (Reach 2)	1	L.S.	\$ 3,500,000	\$ 3,959,977	\$ 4,422,090	\$ 4,422,090
(as detailed in the Leonardo, NJ Closure Gate Assess. & Des. - 4/02)						
Epoxy Coated Steel Sheetpile Bulkhead (40' height), 115LF	4,600	S.F.	\$ 35	\$ 40	\$ 44	\$ 203,416
Splash Protection						
High Strength Concrete (2' thickness x10' width)	35	C.Y.	\$ 905	\$ 1,024	\$ 1,143	\$ 40,020
Splash Bedding Stone (1' thickness x 10' width)	30	TONS	\$ 80	\$ 91	\$ 101	\$ 3,032
Geotextile (10' width)	55	S.Y.	\$ 12	\$ 14	\$ 15	\$ 834
Dock/Walkway modification/replacement	33	EA.	\$ 5,000	\$ 5,657	\$ 6,317	\$ 208,470
Raise Sling Boat Launch Facilities in Reach 3 (2ea)	1	JOB			\$ 500,000	\$ 500,000
Raise Restaurant and Deck in Reach 3	1	JOB	\$ 150,000	\$ 169,713	\$ 189,518	\$ 189,518
Minimum Facility	1	JOB	\$ 297,100	\$ 331,770	\$ 331,770	\$ 331,770
Maintenance and Protection of Traffic	1	JOB	\$ 65,000	\$ 73,542	\$ 82,125	\$ 82,125
Environmental Mitigation	1	JOB			\$ 2,000,000	\$ 2,000,000
Real Estate Lands and Damges	1	JOB			\$ 6,800,000	\$ 6,800,000
Structural Revisions -						
Update Sheetpile to PZ40 - Closure Gate	294,360	SF			\$ 25	\$ 7,359,000
Add 1.5" Tie Rods	19,663	LF			\$ 10	\$ 196,630
Add HP14 x 73 Deadman Piles	49,156	LF			\$ 65	\$ 3,195,140
East End Tie-In Alternatives:						
Closure Gate Alternative						
Floodwall (concrete I-Type floodwalls) (Top elev = 11' NGVD) (Reach 4)	255	L.F.	\$ 1,220	\$ 1,380	\$ 1,541	\$ 393,061
Closure Gate (55' width)	1	JOB	\$ 607,400	\$ 687,226	\$ 767,422	\$ 767,422

Note: No structure raising directly behind bulkhead is required in Reach 4 since floodwall crest elevation (el. 13.9) is high enough to prevent overtopping damage

Subtotal \$ 51,439,067

Contingency (32%) \$ 14,284,501

Subtotal \$ 65,723,568

Eng. & Design (15%) \$ 8,838,535

Construction Management (10%) \$ 5,892,357

Total First Cost \$ 80,454,000

IDC (n=2 yr., i=4 and 1/8%) \$ 2,656,656

Total Investment Cost \$ 83,110,656

Annualized Investment Cost \$ 3,463,824

Annualized O & M \$ 212,900

Total Annual Cost **\$ 3,677,000**

	FY2015
Interest Rate	0.03375
Life	50
Capital Recovery Factor	0.04168
Construction Period in months	24
IDC factor	0.03302

* EM 1110-2-1304 (Revised 30 Sep 10) CWBS Code 11 (Levees & Floodwalls)
** EM 1110-2-1304 (Revised 31 March 2014) CWBS Code 11 (Levees & Floodwalls)

Table B5e
Alternative 5e
Preferred Alternative Plan with
No Gate and Bulkhead Floodwall Crest El. 13.9' NGVD instead of Fabricated Floodwall

Item Description	Quant.	Unit	Unit Cost (Oct 05 PL)	Unit Cost (Oct 10 PL)*	Unit Cost (Oct 14 PL)**	Closure Gate Item Cost (Oct 14PL)
Mobilization and Demobilization	1	JOB	\$ 225,000	\$ 254,570	\$ 284,277	\$ 284,277
Raised Ground Surface at Park (Top elev = 11' NGVD) (Reach 4)	3,775	S.Y.	\$ 117	\$ 132	\$ 148	\$ 558,036
Steel Sheetpile Bulkhead (40' height), 328LF	13,120	S.F.	\$ 35	\$ 40	\$ 44	\$ 580,178
Splash Protection						
High Strength Concrete (2' thickness x10' width)	245	C.Y.	\$ 905	\$ 1,024	\$ 1,143	\$ 280,139
Splash Bedding Stone (1' thickness x 10' width)	195	TONS	\$ 80	\$ 91	\$ 101	\$ 19,710
Geotextile (10' width)	365	S.Y.	\$ 12	\$ 14	\$ 15	\$ 5,534
Toe Protection Berm (in front of raised bulkhead)						
Armor Stone	545	TONS	\$ 100	\$ 113	\$ 126	\$ 68,858
Bedding Layer	165	TONS	\$ 80	\$ 91	\$ 101	\$ 16,678
Geotextile	620	S.Y.	\$ 12	\$ 14	\$ 15	\$ 9,400
Epoxy Coated Steel Sheetpile Bulkhead (Reaches 1,3 & 4), 5722LF						
Top elev = 13.5' & 12.0' & 13.9' NGVD (40' height)	228,880	S.F.	\$ 35	\$ 40	\$ 44	\$ 10,121,279
Splash Protection						
High Strength Concrete (2' thickness x10' width)	4,240	C.Y.	\$ 905	\$ 1,024	\$ 1,143	\$ 4,848,127
Splash Bedding Stone (1' thickness x 10' width)	3,395	TONS	\$ 80	\$ 91	\$ 101	\$ 343,154
Geotextile (10' width)	6,360	S.Y.	\$ 12	\$ 14	\$ 15	\$ 96,427
Toe Protection Berm (in front of raised bulkhead)						
Armor Stone	9,495	TONS	\$ 100	\$ 113	\$ 126	\$ 1,199,650
Bedding Layer	2,800	TONS	\$ 80	\$ 91	\$ 101	\$ 283,014
Geotextile	10,810	S.Y.	\$ 12	\$ 14	\$ 15	\$ 163,895
Floodwall (concrete I-Type floodwalls) (Top elev = 11' NGVD) (Reach 4)	120	L.F.	\$ 1,220	\$ 1,380	\$ 1,541	\$ 184,970
Onshore Dune Barrier (Top elev = 13.5' & 12.0' NGVD) (Reaches 1 & 3)						
Sand Fill 12' wide, 1:5 slopes	8,850	C.Y.	\$ 22	\$ 25	\$ 28	\$ 245,995
Steel Sheetpile Bulkhead (40' height), 1194LF	47,760	S.F.	\$ 35	\$ 40	\$ 44	\$ 2,111,990
Splash Protection						
High Strength Concrete (2' thickness x10' width)	885	C.Y.	\$ 905	\$ 1,024	\$ 1,143	\$ 1,011,932
Splash Bedding Stone (1' thickness x 10' width)	710	TONS	\$ 80	\$ 91	\$ 101	\$ 71,764
Geotextile (10' width)	1,330	S.Y.	\$ 12	\$ 14	\$ 15	\$ 20,165
Toe Protection Berm (in front of raised bulkhead)						
Armor Stone	1,985	TONS	\$ 100	\$ 113	\$ 126	\$ 250,796
Bedding Layer	585	TONS	\$ 80	\$ 91	\$ 101	\$ 59,130
Geotextile	2,260	S.Y.	\$ 12	\$ 14	\$ 15	\$ 34,265
Dune Grass	9,075	S.Y.	\$ 3	\$ 3	\$ 4	\$ 34,398
Earthen Walkover Ramps	3	EA.	\$ 10,000	\$ 11,314	\$ 12,635	\$ 37,904
Soil Confinement Surfacing/Matting	9,075	S.Y.	\$ 22			
Existing Surface Preparation	9,075	S.Y.	\$ 6	\$ 7	\$ 8	\$ 68,795
Capped Existing State Bulkhead (Reach 2)						
Permanent cap (Top elevation = 13' NGVD) and Wall	1,395	L.F.	\$ 985	\$ 1,114	\$ 1,245	\$ 1,736,081
Captain's Cove Perimeter Floodwall (Reach 2)						
Epoxy Coated Steel Sheetpile Bulkhead, 1567 LF						
Top elev = 13' NGVD (40' height)	62,680	S.F.	\$ 35	\$ 40	\$ 44	\$ 2,771,766
Splash Protection						
High Strength Concrete (2' thickness x10' width)	1,085	C.Y.	\$ 905	\$ 1,024	\$ 1,143	\$ 1,240,617
Splash Bedding Stone (1' thickness x 10' width)	870	TONS	\$ 80	\$ 91	\$ 101	\$ 87,936
Geotextile (10' width)	1,630	S.Y.	\$ 12	\$ 14	\$ 15	\$ 24,713
Gravel Surface between Existing and Proposed Bulkheads (1' thickness x 5' width)	435	TONS			\$ 50	\$ 21,750
Geotextile (5' width)	815	S.Y.	\$ 12	\$ 14	\$ 15	\$ 12,357
Dock/Walkway Relocation along West Wall of Cove	110	L.F.	\$ 400	\$ 453	\$ 505	\$ 55,592
Dock/Walkway modification/replacement	33	EA.	\$ 5,000	\$ 5,657	\$ 6,317	\$ 208,470
Raise Sling Boat Launch Facilities in Reach 3 (2ea)	1	JOB			\$ 500,000	\$ 500,000
Raise Restaurant and Deck in Reach 3	1	JOB	\$ 150,000	\$ 169,713	\$ 189,518	\$ 189,518
Minimum Facility	1	JOB		\$ 297,100	\$ 331,770	\$ 331,770
Maintenance and Protection of Traffic	1	JOB	\$ 65,000	\$ 73,542	\$ 82,125	\$ 82,125
Environmental Mitigation	1	JOB			\$ 2,000,000	\$ 2,000,000
Real Estate Lands and Damages	1	JOB			\$ 7,100,000	\$ 7,100,000
Structural Revisions -						
Update Sheetpile to PZ40 - Closure Gate	304,120	SF			\$ 25	\$ 7,603,000
Add 1.5" Tie Rods	20,273	LF			\$ 10	\$ 202,730
Add HP14 x 73 Deadman Piles	50,618	LF			\$ 65	\$ 3,290,170
East End Tie-In Alternatives:						
Closure Gate Alternative						
Floodwall (concrete I-Type floodwalls) (Top elev = 11' NGVD) (Reach 4)	255	L.F.	\$ 1,220	\$ 1,380	\$ 1,541	\$ 393,061
Closure Gate (55' width)	1	JOB	\$ 607,400	\$ 687,226	\$ 767,422	\$ 767,422

* Note: No structure raising directly behind bulkhead is required in Reach 4 since floodwall crest elevation (el. 13.9) is high enough to prevent overtopping damage

Subtotal \$ 51,629,536

Contingency (29%) \$ 12,913,565

Subtotal \$ 64,543,101

Eng. & Design (15%) \$ 8,616,465

Construction Management (10%) \$ 5,744,310

Total First Cost \$ 78,904,000

IDC (n=2 yr., i=4 and 1/8%) \$ 2,605,473

Total Investment Cost \$ 81,509,473

Annualized Investment Cost		\$ 3,397,091
Annualized O & M		\$ 92,100
Total Annual Cost		\$ 3,489,000
	FY2015	
Interest Rate	0.03375	
Life	50	
Capital Recovery Factor	0.04168	
Construction Period in months	24	
IDC factor	0.03302	

* EM 1110-2-1304 (Revised 30 Sep 10) CWBS Code 11 (Levees & Floodwalls)
** EM 1110-2-1304 (Revised 31 March 2014) CWBS Code 11 (Levees & Floodwalls)

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Abbreviated Risk Analysis

Project Name & Location: **Highlands Feasibility Study, Highlands New Jersey**
 Project Development Stage/Alternative: **Feasibility (Alternatives)**
 Risk Category: **Moderate Risk: Typical Project Construction Type**

District: **NAN**
 Alternative: **Alt 5a**
 Meeting Date: **10/23/2014**

Total Estimated Construction Contract Cost = \$ **44,325,000**

	<u>CWWS</u>	<u>Feature of Work</u>	<u>Contract Cost</u>	<u>% Contingency</u>	<u>\$ Contingency</u>	<u>Total</u>	
	01 LANDS AND DAMAGES	Real Estate	\$ 6,600,000	0.00%	\$ -	\$ 6,600,000	
1	14 RECREATION FACILITIES	Raised Ground Service at Park	\$ 580,000	19.59%	\$ 113,595	\$ 693,595	
2	10 BREAKWATERS AND SEAWALLS	Sheetpile Bulkheads & Floodwalls	\$ 22,097,000	32.71%	\$ 7,228,442	\$ 29,325,442	
3	10 BREAKWATERS AND SEAWALLS	Cap Existing State Bulkhead	\$ 1,736,000	22.16%	\$ 384,648	\$ 2,120,648	
4	10 BREAKWATERS AND SEAWALLS	Captains Cove Construction	\$ 4,442,000	32.25%	\$ 1,432,497	\$ 5,874,497	
5	11 02 FLOODWALLS	Fabricated Floodwall	\$ 3,033,000	40.57%	\$ 1,230,386	\$ 4,263,386	
6	10 BREAKWATERS AND SEAWALLS	Boat Launch Facilities		0.00%	\$ -	\$ -	
7	10 BREAKWATERS AND SEAWALLS	Minimum Facilities	\$ 332,000	55.21%	\$ 183,291	\$ 515,290.60	
8				0.00%	\$ -	\$ -	
9				0.00%	\$ -	\$ -	
10				0.00%	\$ -	\$ -	
11				0.00%	\$ -	\$ -	
12	All Other (less than 10% of construction costs)	Remaining Construction Items	\$ 12,105,000	37.6%	\$ 2,517,113	\$ 14,622,113	
13	30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	\$ 6,648,750	22.81%	\$ 1,516,848	\$ 8,165,598	
14	31 CONSTRUCTION MANAGEMENT	Construction Management	\$ 4,432,500	19.56%	\$ 867,074	\$ 5,299,574	
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MUST INCLUDE JUSTIFICATION SEE BELOW)					\$ -	

Totals						
	Real Estate	\$ 6,600,000	0.00%	\$ -	\$ 6,600,000.00	
	Total Construction Estimate	\$ 44,325,000	29.53%	\$ 13,089,972	\$ 57,414,972	
	Total Planning, Engineering & Design	\$ 6,648,750	22.81%	\$ 1,516,848	\$ 8,165,598	
	Total Construction Management	\$ 4,432,500	19.56%	\$ 867,074	\$ 5,299,574	
	Total	\$ 62,006,250	25%	\$ 15,473,894	\$ 77,480,144	
	Range Estimate (\$000's)	Base	50%	80%		
		\$62,006k	\$71,290k	\$77,480k		

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

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

Highlands Feasibility Study, Highlands New Jersey Alt 5a

Feasibility (Alternatives)

Abbreviated Risk Analysis

Meeting Date: 23-Oct-14

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

Risk Register

Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level	
Project Scope Growth						Maximum Project Growth	60%
PS-1	Raised ground Surface at Park	Potential for scope growth, added features and quantities?	Raising the ground surface in the park effects multiple misc features. Including but not limited to walkways, benches, sidewalks, landscape etc.	Marginal	Likely	2	
PS-2	Sheetpile Bulkheads & Concrete Floodwalls	Potential for scope growth, added features and quantities?	Interference of existing infrastructure, Utilities, etc. Multiple utility relocations would impact the schedule as well as the cost.	Significant	Possible	3	
PS-3	Cap Existing State Bulkhead	Design confidence?	Due to required design criteria there is the potential for bulkhead replacement	Significant	Unlikely	2	
PS-4	Captains Cove Construction	Potential for scope growth, added features and quantities? Investigations sufficient to support design assumptions?	Road may need to be reconstructed due to construction activities. Close to residential property. Stakeholder concern.	Moderate	Possible	2	
PS-5	Fabricated Floodwall	Water care and diversion fully understood, planned?	Storage of components. Time required to erect and remove. Potential for increased usage and rapid deployment. Non-static design	Significant	Possible	3	
PS-6	Boat Launch Facilities	Design confidence?	Current design unknown?	Significant	Very LIKELY	5	
PS-7	Minimum Facilities	Potential for scope growth, added features and quantities?	Work is currently undefined. Assumed design for interior drainage may not capture additional facilities required.	Significant	Possible	3	
PS-8	0			Negligible	Unlikely	0	
PS-9	0			Negligible	Unlikely	0	
PS-10	0			Negligible	Unlikely	0	
PS-11	0			Negligible	Unlikely	0	
PS-12	Remaining Construction Items	Potential for scope growth, added features and quantities?	Potential design changes/revisions	Marginal	Possible	1	
PS-13	Planning, Engineering, & Design	Potential for scope growth, added features and quantities?	Potential for additional contracts	Marginal	Possible	1	
PS-14	Construction Management	Potential for scope growth, added features and quantities?	Potential for additional contracts	Marginal	Possible	1	

Acquisition Strategy				Maximum Project Growth		40%
AS-1	Raised ground Surface at Park	Contracting plan firmly established? Accelerated schedule or harsh weather schedule?	Current acquisition strategy is unknown. Potential for accelerated schedule due to hurricane season or winter weather.	Negligible	Possible	0
AS-2	Sheetpile Bulkheads & Concrete Floodwalls	Contracting plan firmly established? Accelerated schedule or harsh weather schedule?	Current acquisition strategy is unknown. Potential for accelerated schedule due to hurricane season or winter weather.	Marginal	Possible	1
AS-3	Cap Existing State Bulkhead	Contracting plan firmly established? Accelerated schedule or harsh weather schedule?	Current acquisition strategy is unknown. Potential for accelerated schedule due to hurricane season or winter weather.	Marginal	Possible	1
AS-4	Captains Cove Construction	Contracting plan firmly established? Accelerated schedule or harsh weather schedule?	Current acquisition strategy is unknown. Potential for accelerated schedule due to hurricane season or winter weather.	Moderate	Possible	2
AS-5	Fabricated Floodwall	Contracting plan firmly established?	Current acquisition strategy is unknown.	Negligible	Possible	0
AS-6	Boat Launch Facilities	Contracting plan firmly established? Accelerated schedule or harsh weather schedule?	Current acquisition strategy is unknown. Potential for accelerated schedule due to hurricane season or winter weather.	Moderate	Possible	2
AS-7	Minimum Facilities	Contracting plan firmly established? Accelerated schedule or harsh weather schedule?	Current acquisition strategy is unknown. Potential for accelerated schedule due to hurricane season or winter weather.	Moderate	Possible	2
AS-8	0			Negligible	Unlikely	0
AS-9	0			Negligible	Unlikely	0
AS-10	0			Negligible	Unlikely	0
AS-11	0			Negligible	Unlikely	0
AS-12	Remaining Construction Items	Contracting plan firmly established? Accelerated schedule or harsh weather schedule?	Potential for additional contracts	Marginal	Possible	1
AS-13	Planning, Engineering, & Design	Contracting plan firmly established?	Potential for additional contracts	Marginal	Possible	1
AS-14	Construction Management	Contracting plan firmly established?	Potential for additional contracts	Marginal	Possible	1
Construction Elements				Maximum Project Growth		30%

CON-1	Raised ground Surface at Park	Accelerated schedule or harsh winter weather?	Potential for accelerated schedule due to hurricane season or winter weather.	Negligible	Possible	0
CON-2	Sheetpile Bulkheads & Concrete Floodwalls	Accelerated schedule or harsh winter weather? High risk or complex construction elements, site access, in water? Potential for contract modification and claims?	Potential for accelerated schedule due to hurricane season or winter weather. Limited site access could effect construction coordination/logistics. Potential for contract mods due to the possibility of utility relocations.	Moderate	Possible	2
CON-3	Cap Existing State Bulkhead	Accelerated schedule or harsh winter weather?	Potential for accelerated schedule due to hurricane season or winter weather.	Marginal	Possible	1
CON-4	Captains Cove Construction	Accelerated schedule or harsh winter weather? High risk or complex construction elements, site access, in water?	Potential for accelerated schedule due to hurricane season or winter weather. Limited site access could effect construction coordination/logistics. Potential for contract mods due to the possibility of utility relocations.	Significant	Unlikely	2
CON-5	Fabricated Floodwall	Potential for construction modification and claims?	Assumed to be shop fabricated. Initial installation for erection and test validation could require modification of wall fabrication.	Moderate	Likely	3
CON-6	Boat Launch Facilities	Accelerated schedule or harsh winter weather? High risk or complex construction elements, site access, in water?	Potential for accelerated schedule due to hurricane season or winter weather. Some of the work would need to be accomplished from the water.	Marginal	Likely	2
CON-7	Minimum Facilities	Potential for construction modification and claims?	Work is currently undefined. Assumed design for interior drainage may not capture additional facilities required.	Significant	Possible	3
CON-8	0			Negligible	Unlikely	0
CON-9	0			Negligible	Unlikely	0
CON-10	0			Negligible	Unlikely	0
CON-11	0			Negligible	Unlikely	0
CON-12	Remaining Construction Items	Accelerated schedule or harsh winter weather?	Potential for accelerated schedule due to hurricane season or winter weather.	Marginal	Possible	1
CON-13	Planning, Engineering, & Design	Potential for construction modification and claims?	Contract modifications would require additional engineering and design	Negligible	Likely	1
CON-14	Construction Management	Potential for construction modification and claims?	Contract modification would require additional construction oversight.	Negligible	Likely	1

Quantities for Current Scope

Maximum Project Growth 20%

Q-1	Raised ground Surface at Park	Sufficient Investigations to develop quantities?	Raising the ground surface in the park effects multiple misc features. Including but not limited to walkways, benches, sidewalks, landscape etc.	Marginal	Likely	2
Q-2	Sheetpile Bulkheads & Concrete Floodwalls	Level of confidence based on design and assumptions? Sufficient investigations to develop quantities?	Interference of existing infrastructure, Utilities, etc. Multiple utility relocations would impact the schedule as well as the cost.	Marginal	Possible	1
Q-3	Cap Existing State Bulkhead	Level of confidence based on design and assumptions? Sufficient investigations to develop quantities?	Due to required design criteria there is the potential for bulkhead replacement	Moderate	Unlikely	1
Q-4	Captains Cove Construction	Level of confidence based on design and assumptions? Sufficient investigations to develop quantities?	Road may need to be reconstructed due to construction activities. Close to residential property. Stakeholder concern.	Moderate	Possible	2

Q-5	Fabricated Floodwall	Level of confidence based on design and assumptions? Sufficient investigations to develop quantities?	Storage of components. Time required to erect and remove. Potential for increased usage and rapid deployment. Non-static design	Moderate	Possible	2
Q-6	Boat Launch Facilities	Level of confidence based on design and assumptions? Sufficient investigations to develop quantities?	Current design unknown?	Significant	Very LIKELY	5
Q-7	Minimum Facilities	Level of confidence based on design and assumptions? Sufficient investigations to develop quantities?	Work is currently undefined. Assumed design for interior drainage may not capture additional facilities required.	Significant	Possible	3
Q-8	0			Negligible	Unlikely	0
Q-9	0			Negligible	Unlikely	0
Q-10	0			Negligible	Unlikely	0
Q-11	0			Negligible	Unlikely	0
Q-12	Remaining Construction Items	Sufficient Investigations to develop quantities?	Potential design changes/revisions	Marginal	Likely	2
Q-13	Planning, Engineering, & Design	Sufficient Investigations to develop quantities?	Potential for additional contracts	Marginal	Possible	1
Q-14	Construction Management	Sufficient Investigations to develop quantities?	Potential for additional contracts	Marginal	Possible	1

Specialty Fabrication or Equipment

Maximum Project Growth 75%

FE-1				Negligible	Unlikely	0
FE-2				Negligible	Unlikely	0
FE-3				Negligible	Unlikely	0
FE-4				Negligible	Unlikely	0
FE-5	Fabricated Floodwall	Risk of specialty equipment functioning first time? Test?	Contractor may need to make some adjustment to removable components. Would require reinstallation for testing purposes.	Marginal	Possible	1
FE-6	Boat Launch Facilities	Risk of specialty equipment functioning first time? Test?	Facility owner may need to purchase new equipment to function as designed.	Moderate	Possible	2
FE-7	Minimum Facilities	Risk of specialty equipment functioning first time? Test?	Work is currently undefined. Assumed design for interior drainage may not capture additional facilities required.	Moderate	Possible	2
FE-8	0			Negligible	Unlikely	0

FE-9	0			Negligible	Unlikely	0
FE-10	0			Negligible	Unlikely	0
FE-11	0			Negligible	Unlikely	0
FE-12	Remaining Construction Items			Negligible	Unlikely	0
FE-13	Planning, Engineering, & Design	Risk of specialty equipment functioning first time? Test?	Potential for design of additional facilities	Moderate	Possible	2
FE-14	Construction Management	Risk of specialty equipment functioning first time? Test?	Additional contracts to manage	Marginal	Possible	1

Cost Estimate Assumptions				Maximum Project Growth		35%
EST-1	Raised ground Surface at Park	Reliability and number of key quotes? Lack of confidence on critical cost item?	Original NAN feasibility costs escalated for inflation. Potential for future cost increases upon validation of selected alternative.	Marginal	Possible	1
EST-2	Sheetpile Bulkheads & Concrete Floodwalls	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Original NAN feasibility costs escalated for inflation. Potential for future cost increases upon validation of selected alternative. Site access issues and congestion could influence construction methodology and production rates.	Moderate	Possible	2
EST-3	Cap Existing State Bulkhead	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Original NAN feasibility costs escalated for inflation. Potential for future cost increases upon validation of selected alternative. Site access issues and congestion could influence construction methodology and production rates.	Marginal	Possible	1
EST-4	Captains Cove Construction	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Original NAN feasibility costs escalated for inflation. Potential for future cost increases upon validation of selected alternative. Site access issues and congestion could influence construction methodology and production rates.	Moderate	Possible	2
EST-5	Fabricated Floodwall	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Original NAN feasibility costs escalated for inflation. Potential for future cost increases upon validation of selected alternative. Site access issues and congestion could influence construction methodology and production rates.	Moderate	Possible	2
EST-6	Boat Launch Facilities	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Original NAN feasibility costs escalated for inflation. Potential for future cost increases upon validation of selected alternative. Site access issues and congestion could influence construction methodology and production rates.	Moderate	Possible	2
EST-7	Minimum Facilities	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Work is currently undefined. Assumed design for interior drainage may not capture additional facilities required.	Significant	Possible	3
EST-8	0			Negligible	Unlikely	0
EST-9	0			Negligible	Unlikely	0
EST-10	0			Negligible	Unlikely	0
EST-11	0			Negligible	Unlikely	0
EST-12	Remaining Construction Items	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Original NAN feasibility costs escalated for inflation. Potential for future cost increases upon validation of selected alternative. Site access issues and congestion could influence construction methodology and production rates.	Moderate	Possible	2
EST-13	Planning, Engineering, & Design	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Increase in costs would directly effect PED	Marginal	Possible	1

EST-14	Construction Management	Reliability and number of key routes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Increase in costs would directly effect CM	Marginal	Possible	1
External Project Risks				Maximum Project Growth		40%
EX-1	Raised ground Surface at Park	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Marginal	Possible	1
EX-2	Sheetpile Bulkheads & Concrete Floodwalls	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Marginal	Possible	1
EX-3	Cap Existing State Bulkhead	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Marginal	Possible	1
EX-4	Captains Cove Construction	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Moderate	Possible	2
EX-5	Fabricated Floodwall	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Moderate	Possible	2
EX-6	Boat Launch Facilities	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Moderate	Possible	2
EX-7	Minimum Facilities	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Moderate	Possible	2
EX-8	0			Negligible	Unlikely	0
EX-9	0			Negligible	Unlikely	0
EX-10	0			Negligible	Unlikely	0
EX-11	0			Negligible	Unlikely	0
EX-12	Remaining Construction Items	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Negligible	Unlikely	0
EX-13	Planning, Engineering, & Design	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Increase in costs would directly effect PED	Negligible	Unlikely	0
EX-14	Construction Management	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Increase in costs would directly effect CM	Negligible	Unlikely	0

Abbreviated Risk Analysis

Project Name & Location: **Highlands Feasibility Study, Highlands New Jersey**
 Project Development Stage/Alternative: **Feasibility (Alternatives)**
 Risk Category: **Moderate Risk: Typical Project Construction Type**

District: **NAN**
 Alternative: **Alt 5b**
 Meeting Date: **10/23/2014**

Total Estimated Construction Contract Cost = \$ **46,996,000**

	<u>CWWBS</u>	<u>Feature of Work</u>	<u>Contract Cost</u>	<u>% Contingency</u>	<u>\$ Contingency</u>	<u>Total</u>	
	01 LANDS AND DAMAGES	Real Estate	\$ 6,800,000	0.00%	\$ -	\$ 6,800,000	
1	14 RECREATION FACILITIES	Raised Ground Service at Park	\$ 558,000	19.59%	\$ 109,287	\$ 667,287	
2	10 BREAKWATERS AND SEAWALLS	Sheetpile Bulkheads & Floodwalls	\$ 23,952,000	32.71%	\$ 7,835,256	\$ 31,787,256	
3	10 BREAKWATERS AND SEAWALLS	Cap Existing State Bulkhead	\$ 1,736,000	22.16%	\$ 384,648	\$ 2,120,648	
4	10 BREAKWATERS AND SEAWALLS	Buoyant Swing Gate	\$ 4,422,000	67.70%	\$ 2,993,678	\$ 7,415,678	
5				0.00%	\$ -	\$ -	
6	10 BREAKWATERS AND SEAWALLS	Boat Launch Facilities		0.00%	\$ -	\$ -	
7	10 BREAKWATERS AND SEAWALLS	Minimum Facilities	\$ 332,000	55.21%	\$ 183,291	\$ 515,290.60	
8				0.00%	\$ -	\$ -	
9				0.00%	\$ -	\$ -	
10				0.00%	\$ -	\$ -	
11				0.00%	\$ -	\$ -	
12	All Other (less than 10% of construction costs)	Remaining Construction Items	\$ 15,996,000	51.6%	\$ 3,326,208	\$ 19,322,208	
13	30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	\$ 7,049,400	22.81%	\$ 1,608,252	\$ 8,657,652	
14	31 CONSTRUCTION MANAGEMENT	Construction Management	\$ 4,699,600	19.56%	\$ 919,323	\$ 5,618,923	
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MUST INCLUDE JUSTIFICATION SEE BELOW)					\$ -	

Totals						
	Real Estate	\$	6,800,000	0.00%	\$	- \$ 6,800,000.00
	Total Construction Estimate	\$	46,996,000	31.56%	\$	14,832,367 \$ 61,828,367
	Total Planning, Engineering & Design	\$	7,049,400	22.81%	\$	1,608,252 \$ 8,657,652
	Total Construction Management	\$	4,699,600	19.56%	\$	919,323 \$ 5,618,923
	Total	\$	65,545,000	26%	\$	17,359,942 \$ 82,904,942
				Base	50%	80%
	Range Estimate (\$000's)			\$65,545k	\$75,961k	\$82,905k

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

<p>Fixed Dollar Risk Add: (Allows for additional risk to be added to the risk analysis. Must include justification. Does not allocate to Real Estate.)</p>	
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Highlands Feasibility Study, Highlands New Jersey Alt 5b

Feasibility (Alternatives)

Abbreviated Risk Analysis

Meeting Date: 23-Oct-14

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

Risk Register

Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level	
Project Scope Growth						Maximum Project Growth	60%
PS-1	Raised ground Surface at Park	Potential for scope growth, added features and quantities?	Raising the ground surface in the park effects multiple misc features. Including but not limited to walkways, benches, sidewalks, landscape etc.	Marginal	Likely	2	
PS-2	Sheetpile Bulkheads & Concrete Floodwalls	Potential for scope growth, added features and quantities?	Interference of existing infrastructure, Utilities, etc. Multiple utility relocations would impact the schedule as well as the cost.	Significant	Possible	3	
PS-3	Cap Existing State Bulkhead	Design confidence?	Due to required design criteria there is the potential for bulkhead replacement	Significant	Unlikely	2	
PS-4	Buoyant Swing Gate	Potential for scope growth, added features and quantities? Investigations sufficient to support design assumptions? Design Confidence?	No current design. Potential for gate to silt-in requiring dredging on a regular basis. Failure of gate, not operational when needed.	Significant	Possible	3	
PS-5	Fabricated Floodwall	Water care and diversion fully understood, planned?	Storage of components. Time required to erect and remove. Potential for increased usage and rapid deployment. Non-static design	Moderate	Possible	N/A	
PS-6	Boat Launch Facilities	Design confidence?	Current design unknown?	Significant	Very LIKELY	5	
PS-7	Minimum Facilities	Potential for scope growth, added features and quantities?	Work is currently undefined. Assumed design for interior drainage may not capture additional facilities required.	Significant	Possible	3	
PS-8	0			Negligible	Unlikely	0	
PS-9	0			Negligible	Unlikely	0	
PS-10	0			Negligible	Unlikely	0	
PS-11	0			Negligible	Unlikely	0	
PS-12	Remaining Construction Items	Potential for scope growth, added features and quantities?	Potential design changes/revisions	Marginal	Possible	1	
PS-13	Planning, Engineering, & Design	Potential for scope growth, added features and quantities?	Potential for additional contracts	Marginal	Possible	1	
PS-14	Construction Management	Potential for scope growth, added features and quantities?	Potential for additional contracts	Marginal	Possible	1	

Acquisition Strategy				Maximum Project Growth		40%
AS-1	Raised ground Surface at Park	Contracting plan firmly established? Accelerated schedule or harsh weather schedule?	Current acquisition strategy is unknown. Potential for accelerated schedule due to hurricane season or winter weather.	Negligible	Possible	0
AS-2	Sheetpile Bulkheads & Concrete Floodwalls	Contracting plan firmly established? Accelerated schedule or harsh weather schedule?	Current acquisition strategy is unknown. Potential for accelerated schedule due to hurricane season or winter weather.	Marginal	Possible	1
AS-3	Cap Existing State Bulkhead	Contracting plan firmly established? Accelerated schedule or harsh weather schedule?	Current acquisition strategy is unknown. Potential for accelerated schedule due to hurricane season or winter weather.	Marginal	Possible	1
AS-4	Buoyant Swing Gate	Contracting plan firmly established? Accelerated schedule or harsh weather schedule?	Current acquisition strategy is unknown. Potential for accelerated schedule due to hurricane season or winter weather.	Moderate	Possible	2
AS-5	Fabricated Floodwall	Contracting plan firmly established?	Current acquisition strategy is unknown.	Negligible	Possible	N/A
AS-6	Boat Launch Facilities	Contracting plan firmly established? Accelerated schedule or harsh weather schedule?	Current acquisition strategy is unknown. Potential for accelerated schedule due to hurricane season or winter weather.	Moderate	Possible	2
AS-7	Minimum Facilities	Contracting plan firmly established? Accelerated schedule or harsh weather schedule?	Current acquisition strategy is unknown. Potential for accelerated schedule due to hurricane season or winter weather.	Moderate	Possible	2
AS-8	0			Negligible	Unlikely	0
AS-9	0			Negligible	Unlikely	0
AS-10	0			Negligible	Unlikely	0
AS-11	0			Negligible	Unlikely	0
AS-12	Remaining Construction Items	Contracting plan firmly established? Accelerated schedule or harsh weather schedule?	Potential for additional contracts	Marginal	Possible	1
AS-13	Planning, Engineering, & Design	Contracting plan firmly established?	Potential for additional contracts	Marginal	Possible	1
AS-14	Construction Management	Contracting plan firmly established?	Potential for additional contracts	Marginal	Possible	1
Construction Elements				Maximum Project Growth		30%

CON-1	Raised ground Surface at Park	Accelerated schedule or harsh winter weather?	Potential for accelerated schedule due to hurricane season or winter weather.	Negligible	Possible	0
CON-2	Sheetpile Bulkheads & Concrete Floodwalls	Accelerated schedule or harsh winter weather? High risk or complex construction elements, site access, in water? Potential for contract modification and claims?	Potential for accelerated schedule due to hurricane season or winter weather. Limited site access could effect construction coordination/logistics. Potential for contract mods due to the possibility of utility relocations.	Moderate	Possible	2
CON-3	Cap Existing State Bulkhead	Accelerated schedule or harsh winter weather?	Potential for accelerated schedule due to hurricane season or winter weather.	Marginal	Possible	1
CON-4	Buoyant Swing Gate	Accelerated schedule or harsh winter weather? High risk or complex construction elements, site access, in water? Water care and diversion plan?	Potential for accelerated schedule due to hurricane season or winter weather. Limited site access could effect construction coordination/logistics. Cofferdam required for construction.	Significant	Likely	4
CON-5	Fabricated Floodwall	Potential for construction modification and claims?	Assumed to be shop fabricated. Initial installation for erection and test validation could require modification of wall fabrication.	Moderate	Likely	N/A
CON-6	Boat Launch Facilities	Accelerated schedule or harsh winter weather? High risk or complex construction elements, site access, in water?	Potential for accelerated schedule due to hurricane season or winter weather. Some of the work would need to be accomplished from the water.	Marginal	Likely	2
CON-7	Minimum Facilities	Potential for construction modification and claims?	Work is currently undefined. Assumed design for interior drainage may not capture additional facilities required.	Significant	Possible	3
CON-8	0			Negligible	Unlikely	0
CON-9	0			Negligible	Unlikely	0
CON-10	0			Negligible	Unlikely	0
CON-11	0			Negligible	Unlikely	0
CON-12	Remaining Construction Items	Accelerated schedule or harsh winter weather?	Potential for accelerated schedule due to hurricane season or winter weather.	Marginal	Possible	1
CON-13	Planning, Engineering, & Design	Potential for construction modification and claims?	Contract modifications would require additional engineering and design	Negligible	Likely	1
CON-14	Construction Management	Potential for construction modification and claims?	Contract modification would require additional construction oversight.	Negligible	Likely	1

Quantities for Current Scope

Maximum Project Growth 20%

Q-1	Raised ground Surface at Park	Sufficient Investigations to develop quantities?	Raising the ground surface in the park effects multiple misc features. Including but not limited to walkways, benches, sidewalks, landscape etc.	Marginal	Likely	2
Q-2	Sheetpile Bulkheads & Concrete Floodwalls	Level of confidence based on design and assumptions? Sufficient investigations to develop quantities?	Interference of existing infrastructure, Utilities, etc. Multiple utility relocations would impact the schedule as well as the cost.	Marginal	Possible	1
Q-3	Cap Existing State Bulkhead	Level of confidence based on design and assumptions? Sufficient investigations to develop quantities?	Due to required design criteria there is the potential for bulkhead replacement	Moderate	Unlikely	1
Q-4	Buoyant Swing Gate	Level of confidence based on design and assumptions? Sufficient investigations to develop quantities?	No current design. Exploration of existing site may be required. (borings etc.) Cofferdam required for construction	Moderate	Possible	2

Q-5	Fabricated Floodwall	Level of confidence based on design and assumptions? Sufficient investigations to develop quantities?	Storage of components. Time required to erect and remove. Potential for increased usage and rapid deployment. Non-static design	Moderate	Possible	N/A
Q-6	Boat Launch Facilities	Level of confidence based on design and assumptions? Sufficient investigations to develop quantities?	Current design unknown?	Significant	Very LIKELY	5
Q-7	Minimum Facilities	Level of confidence based on design and assumptions? Sufficient investigations to develop quantities?	Work is currently undefined. Assumed design for interior drainage may not capture additional facilities required.	Significant	Possible	3
Q-8	0			Negligible	Unlikely	0
Q-9	0			Negligible	Unlikely	0
Q-10	0			Negligible	Unlikely	0
Q-11	0			Negligible	Unlikely	0
Q-12	Remaining Construction Items	Sufficient Investigations to develop quantities?	Potential design changes/revisions	Marginal	Likely	2
Q-13	Planning, Engineering, & Design	Sufficient Investigations to develop quantities?	Potential for additional contracts	Marginal	Possible	1
Q-14	Construction Management	Sufficient Investigations to develop quantities?	Potential for additional contracts	Marginal	Possible	1
Specialty Fabrication or Equipment				Maximum Project Growth		75%
FE-1				Negligible	Unlikely	0
FE-2				Negligible	Unlikely	0
FE-3				Negligible	Unlikely	0
FE-4	Buoyant Swing Gate	Confidence in contractors ability to install? Risk of specialty equipment functioning first time? Test?	Potential for difficult installation. Alignment, etc. Need for fabricators rep to be on sight for installation. May require on-sight adjustments after installation for permanent operation.	Moderate	Likely	3
FE-5	Fabricated Floodwall	Risk of specialty equipment functioning first time? Test?	Contractor may need to make some adjustment to removable components. Would require reinstallation for testing purposes.	Marginal	Possible	N/A
FE-6	Boat Launch Facilities	Risk of specialty equipment functioning first time? Test?	Facility owner may need to purchase new equipment to function as designed.	Moderate	Possible	2
FE-7	Minimum Facilities	Risk of specialty equipment functioning first time? Test?	Work is currently undefined. Assumed design for interior drainage may not capture additional facilities required.	Moderate	Possible	2
FE-8	0			Negligible	Unlikely	0

FE-9	0			Negligible	Unlikely	0
FE-10	0			Negligible	Unlikely	0
FE-11	0			Negligible	Unlikely	0
FE-12	Remaining Construction Items			Negligible	Unlikely	0
FE-13	Planning, Engineering, & Design	Risk of specialty equipment functioning first time? Test?	Potential for design of additional facilities	Moderate	Possible	2
FE-14	Construction Management	Risk of specialty equipment functioning first time? Test?	Additional contracts to manage	Marginal	Possible	1

Cost Estimate Assumptions				Maximum Project Growth		35%
EST-1	Raised ground Surface at Park	Reliability and number of key quotes? Lack of confidence on critical cost item?	Original NAN feasibility costs escalated for inflation. Potential for future cost increases upon validation of selected alternative.	Marginal	Possible	1
EST-2	Sheetpile Bulkheads & Concrete Floodwalls	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Original NAN feasibility costs escalated for inflation. Potential for future cost increases upon validation of selected alternative. Site access issues and congestion could influence construction methodology and production rates.	Moderate	Possible	2
EST-3	Cap Existing State Bulkhead	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Original NAN feasibility costs escalated for inflation. Potential for future cost increases upon validation of selected alternative. Site access issues and congestion could influence construction methodology and production rates.	Marginal	Possible	1
EST-4	Buoyant Swing Gate	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Original NAN feasibility costs escalated for inflation. Potential for future cost increases upon validation of selected alternative. Site access issues and congestion could influence construction methodology and production rates.	Significant	Possible	3
EST-5	Fabricated Floodwall	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Original NAN feasibility costs escalated for inflation. Potential for future cost increases upon validation of selected alternative. Site access issues and congestion could influence construction methodology and production rates.	Moderate	Possible	N/A
EST-6	Boat Launch Facilities	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Original NAN feasibility costs escalated for inflation. Potential for future cost increases upon validation of selected alternative. Site access issues and congestion could influence construction methodology and production rates.	Moderate	Possible	2
EST-7	Minimum Facilities	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Work is currently undefined. Assumed design for interior drainage may not capture additional facilities required.	Significant	Possible	3
EST-8	0			Negligible	Unlikely	0
EST-9	0			Negligible	Unlikely	0
EST-10	0			Negligible	Unlikely	0
EST-11	0			Negligible	Unlikely	0
EST-12	Remaining Construction Items	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Original NAN feasibility costs escalated for inflation. Potential for future cost increases upon validation of selected alternative. Site access issues and congestion could influence construction methodology and production rates.	Moderate	Possible	2
EST-13	Planning, Engineering, & Design	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Increase in costs would directly effect PED	Marginal	Possible	1

EST-14	Construction Management	Reliability and number of key routes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Increase in costs would directly effect CM	Marginal	Possible	1
External Project Risks				Maximum Project Growth		40%
EX-1	Raised ground Surface at Park	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Marginal	Possible	1
EX-2	Sheetpile Bulkheads & Concrete Floodwalls	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Marginal	Possible	1
EX-3	Cap Existing State Bulkhead	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Marginal	Possible	1
EX-4	Buoyant Swing Gate	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Overtopping of cofferdam, etc. Lack of local support could alter the design features.	Moderate	Possible	2
EX-5	Fabricated Floodwall	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Moderate	Possible	N/A
EX-6	Boat Launch Facilities	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Moderate	Possible	2
EX-7	Minimum Facilities	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Moderate	Possible	2
EX-8	0			Negligible	Unlikely	0
EX-9	0			Negligible	Unlikely	0
EX-10	0			Negligible	Unlikely	0
EX-11	0			Negligible	Unlikely	0
EX-12	Remaining Construction Items	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Negligible	Unlikely	0
EX-13	Planning, Engineering, & Design	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Increase in costs would directly effect PED	Negligible	Unlikely	0
EX-14	Construction Management	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Increase in costs would directly effect CM	Negligible	Unlikely	0

Abbreviated Risk Analysis

Project Name & Location: **Highlands Feasibility Study, Highlands New Jersey**
 Project Development Stage/Alternative: **Feasibility (Alternatives)**
 Risk Category: **Moderate Risk: Typical Project Construction Type**

District: **NAN**
 Alternative: **Alt 5c**
 Meeting Date: **10/23/2014**

Total Estimated Construction Contract Cost = \$ **45,563,000**

	<u>CWWBS</u>	<u>Feature of Work</u>	<u>Contract Cost</u>	<u>% Contingency</u>	<u>\$ Contingency</u>	<u>Total</u>	
	01 LANDS AND DAMAGES	Real Estate	\$ 6,800,000	0.00%	\$ -	\$ 6,800,000	
1	14 RECREATION FACILITIES	Raised Ground Service at Park	\$ 558,000	19.59%	\$ 109,287	\$ 667,287	
2	10 BREAKWATERS AND SEAWALLS	Sheetpile Bulkheads & Floodwalls	\$ 23,952,000	32.71%	\$ 7,835,256	\$ 31,787,256	
3	10 BREAKWATERS AND SEAWALLS	Cap Existing State Bulkhead	\$ 1,736,000	22.16%	\$ 384,648	\$ 2,120,648	
4	10 BREAKWATERS AND SEAWALLS	Buoyant Swing Gate	\$ 4,422,000	67.70%	\$ 2,993,678	\$ 7,415,678	
5				0.00%	\$ -	\$ -	
6	10 BREAKWATERS AND SEAWALLS	Boat Launch Facilities		0.00%	\$ -	\$ -	
7	10 BREAKWATERS AND SEAWALLS	Minimum Facilities	\$ 332,000	55.21%	\$ 183,291	\$ 515,290.60	
8				0.00%	\$ -	\$ -	
9				0.00%	\$ -	\$ -	
10				0.00%	\$ -	\$ -	
11				0.00%	\$ -	\$ -	
12	All Other (less than 10% of construction costs)	Remaining Construction Items	\$ 14,563,000	47.0%	\$ 3,028,230	\$ 17,591,230	
13	30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	\$ 6,834,450	22.81%	\$ 1,559,213	\$ 8,393,663	
14	31 CONSTRUCTION MANAGEMENT	Construction Management	\$ 4,556,300	19.56%	\$ 891,291	\$ 5,447,591	
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MUST INCLUDE JUSTIFICATION SEE BELOW)					\$ -	

Totals						
	Real Estate	\$	6,800,000	0.00%	\$	- \$ 6,800,000.00
	Total Construction Estimate	\$	45,563,000	31.90%	\$	14,534,389 \$ 60,097,389
	Total Planning, Engineering & Design	\$	6,834,450	22.81%	\$	1,559,213 \$ 8,393,663
	Total Construction Management	\$	4,556,300	19.56%	\$	891,291 \$ 5,447,591
	Total	\$	63,753,750	27%	\$	16,984,894 \$ 80,738,644
				Base	50%	80%
	Range Estimate (\$000's)			\$63,754k	\$73,945k	\$80,739k

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

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

Highlands Feasibility Study, Highlands New Jersey Alt 5c

Feasibility (Alternatives)

Abbreviated Risk Analysis

Meeting Date: 23-Oct-14

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

Risk Register

Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level	
Project Scope Growth						Maximum Project Growth	60%
PS-1	Raised ground Surface at Park	Potential for scope growth, added features and quantities?	Raising the ground surface in the park effects multiple misc features. Including but not limited to walkways, benches, sidewalks, landscape etc.	Marginal	Likely	2	
PS-2	Sheetpile Bulkheads & Concrete Floodwalls	Potential for scope growth, added features and quantities?	Interference of existing infrastructure, Utilities, etc. Multiple utility relocations would impact the schedule as well as the cost.	Significant	Possible	3	
PS-3	Cap Existing State Bulkhead	Design confidence?	Due to required design criteria there is the potential for bulkhead replacement	Significant	Unlikely	2	
PS-4	Buoyant Swing Gate	Potential for scope growth, added features and quantities? Investigations sufficient to support design assumptions? Design Confidence?	No current design. Potential for gate to silt-in requiring dredging on a regular basis. Failure of gate, not operational when needed.	Significant	Possible	3	
PS-5	Fabricated Floodwall	Water care and diversion fully understood, planned?	Storage of components. Time required to erect and remove. Potential for increased usage and rapid deployment. Non-static design	Moderate	Possible	N/A	
PS-6	Boat Launch Facilities	Design confidence?	Current design unknown?	Significant	Very LIKELY	5	
PS-7	Minimum Facilities	Potential for scope growth, added features and quantities?	Work is currently undefined. Assumed design for interior drainage may not capture additional facilities required.	Significant	Possible	3	
PS-8	0			Negligible	Unlikely	0	
PS-9	0			Negligible	Unlikely	0	
PS-10	0			Negligible	Unlikely	0	
PS-11	0			Negligible	Unlikely	0	
PS-12	Remaining Construction Items	Potential for scope growth, added features and quantities?	Potential design changes/revisions	Marginal	Possible	1	
PS-13	Planning, Engineering, & Design	Potential for scope growth, added features and quantities?	Potential for additional contracts	Marginal	Possible	1	
PS-14	Construction Management	Potential for scope growth, added features and quantities?	Potential for additional contracts	Marginal	Possible	1	

Acquisition Strategy				Maximum Project Growth		40%
AS-1	Raised ground Surface at Park	Contracting plan firmly established? Accelerated schedule or harsh weather schedule?	Current acquisition strategy is unknown. Potential for accelerated schedule due to hurricane season or winter weather.	Negligible	Possible	0
AS-2	Sheetpile Bulkheads & Concrete Floodwalls	Contracting plan firmly established? Accelerated schedule or harsh weather schedule?	Current acquisition strategy is unknown. Potential for accelerated schedule due to hurricane season or winter weather.	Marginal	Possible	1
AS-3	Cap Existing State Bulkhead	Contracting plan firmly established? Accelerated schedule or harsh weather schedule?	Current acquisition strategy is unknown. Potential for accelerated schedule due to hurricane season or winter weather.	Marginal	Possible	1
AS-4	Buoyant Swing Gate	Contracting plan firmly established? Accelerated schedule or harsh weather schedule?	Current acquisition strategy is unknown. Potential for accelerated schedule due to hurricane season or winter weather.	Moderate	Possible	2
AS-5	Fabricated Floodwall	Contracting plan firmly established?	Current acquisition strategy is unknown.	Negligible	Possible	N/A
AS-6	Boat Launch Facilities	Contracting plan firmly established? Accelerated schedule or harsh weather schedule?	Current acquisition strategy is unknown. Potential for accelerated schedule due to hurricane season or winter weather.	Moderate	Possible	2
AS-7	Minimum Facilities	Contracting plan firmly established? Accelerated schedule or harsh weather schedule?	Current acquisition strategy is unknown. Potential for accelerated schedule due to hurricane season or winter weather.	Moderate	Possible	2
AS-8	0			Negligible	Unlikely	0
AS-9	0			Negligible	Unlikely	0
AS-10	0			Negligible	Unlikely	0
AS-11	0			Negligible	Unlikely	0
AS-12	Remaining Construction Items	Contracting plan firmly established? Accelerated schedule or harsh weather schedule?	Potential for additional contracts	Marginal	Possible	1
AS-13	Planning, Engineering, & Design	Contracting plan firmly established?	Potential for additional contracts	Marginal	Possible	1
AS-14	Construction Management	Contracting plan firmly established?	Potential for additional contracts	Marginal	Possible	1
Construction Elements				Maximum Project Growth		30%

CON-1	Raised ground Surface at Park	Accelerated schedule or harsh winter weather?	Potential for accelerated schedule due to hurricane season or winter weather.	Negligible	Possible	0
CON-2	Sheetpile Bulkheads & Concrete Floodwalls	Accelerated schedule or harsh winter weather? High risk or complex construction elements, site access, in water? Potential for contract modification and claims?	Potential for accelerated schedule due to hurricane season or winter weather. Limited site access could effect construction coordination/logistics. Potential for contract mods due to the possibility of utility relocations.	Moderate	Possible	2
CON-3	Cap Existing State Bulkhead	Accelerated schedule or harsh winter weather?	Potential for accelerated schedule due to hurricane season or winter weather.	Marginal	Possible	1
CON-4	Buoyant Swing Gate	Accelerated schedule or harsh winter weather? High risk or complex construction elements, site access, in water? Water care and diversion plan?	Potential for accelerated schedule due to hurricane season or winter weather. Limited site access could effect construction coordination/logistics. Cofferdam required for construction.	Significant	Likely	4
CON-5	Fabricated Floodwall	Potential for construction modification and claims?	Assumed to be shop fabricated. Initial installation for erection and test validation could require modification of wall fabrication.	Moderate	Likely	N/A
CON-6	Boat Launch Facilities	Accelerated schedule or harsh winter weather? High risk or complex construction elements, site access, in water?	Potential for accelerated schedule due to hurricane season or winter weather. Some of the work would need to be accomplished from the water.	Marginal	Likely	2
CON-7	Minimum Facilities	Potential for construction modification and claims?	Work is currently undefined. Assumed design for interior drainage may not capture additional facilities required.	Significant	Possible	3
CON-8	0			Negligible	Unlikely	0
CON-9	0			Negligible	Unlikely	0
CON-10	0			Negligible	Unlikely	0
CON-11	0			Negligible	Unlikely	0
CON-12	Remaining Construction Items	Accelerated schedule or harsh winter weather?	Potential for accelerated schedule due to hurricane season or winter weather.	Marginal	Possible	1
CON-13	Planning, Engineering, & Design	Potential for construction modification and claims?	Contract modifications would require additional engineering and design	Negligible	Likely	1
CON-14	Construction Management	Potential for construction modification and claims?	Contract modification would require additional construction oversight.	Negligible	Likely	1

Quantities for Current Scope

Maximum Project Growth 20%

Q-1	Raised ground Surface at Park	Sufficient Investigations to develop quantities?	Raising the ground surface in the park effects multiple misc features. Including but not limited to walkways, benches, sidewalks, landscape etc.	Marginal	Likely	2
Q-2	Sheetpile Bulkheads & Concrete Floodwalls	Level of confidence based on design and assumptions? Sufficient investigations to develop quantities?	Interference of existing infrastructure, Utilities, etc. Multiple utility relocations would impact the schedule as well as the cost.	Marginal	Possible	1
Q-3	Cap Existing State Bulkhead	Level of confidence based on design and assumptions? Sufficient investigations to develop quantities?	Due to required design criteria there is the potential for bulkhead replacement	Moderate	Unlikely	1
Q-4	Buoyant Swing Gate	Level of confidence based on design and assumptions? Sufficient investigations to develop quantities?	No current design. Exploration of existing site may be required. (borings etc.) Cofferdam required for construction	Moderate	Possible	2

Q-5	Fabricated Floodwall	Level of confidence based on design and assumptions? Sufficient investigations to develop quantities?	Storage of components. Time required to erect and remove. Potential for increased usage and rapid deployment. Non-static design	Moderate	Possible	N/A
Q-6	Boat Launch Facilities	Level of confidence based on design and assumptions? Sufficient investigations to develop quantities?	Current design unknown?	Significant	Very LIKELY	5
Q-7	Minimum Facilities	Level of confidence based on design and assumptions? Sufficient investigations to develop quantities?	Work is currently undefined. Assumed design for interior drainage may not capture additional facilities required.	Significant	Possible	3
Q-8	0			Negligible	Unlikely	0
Q-9	0			Negligible	Unlikely	0
Q-10	0			Negligible	Unlikely	0
Q-11	0			Negligible	Unlikely	0
Q-12	Remaining Construction Items	Sufficient Investigations to develop quantities?	Potential design changes/revisions	Marginal	Likely	2
Q-13	Planning, Engineering, & Design	Sufficient Investigations to develop quantities?	Potential for additional contracts	Marginal	Possible	1
Q-14	Construction Management	Sufficient Investigations to develop quantities?	Potential for additional contracts	Marginal	Possible	1
Specialty Fabrication or Equipment				Maximum Project Growth		75%
FE-1				Negligible	Unlikely	0
FE-2				Negligible	Unlikely	0
FE-3				Negligible	Unlikely	0
FE-4	Buoyant Swing Gate	Confidence in contractors ability to install? Risk of specialty equipment functioning first time? Test?	Potential for difficult installation. Alignment, etc. Need for fabricators rep to be on sight for installation. May require on-sight adjustments after installation for permanent operation.	Moderate	Likely	3
FE-5	Fabricated Floodwall	Risk of specialty equipment functioning first time? Test?	Contractor may need to make some adjustment to removable components. Would require reinstallation for testing purposes.	Marginal	Possible	N/A
FE-6	Boat Launch Facilities	Risk of specialty equipment functioning first time? Test?	Facility owner may need to purchase new equipment to function as designed.	Moderate	Possible	2
FE-7	Minimum Facilities	Risk of specialty equipment functioning first time? Test?	Work is currently undefined. Assumed design for interior drainage may not capture additional facilities required.	Moderate	Possible	2
FE-8	0			Negligible	Unlikely	0

FE-9	0			Negligible	Unlikely	0
FE-10	0			Negligible	Unlikely	0
FE-11	0			Negligible	Unlikely	0
FE-12	Remaining Construction Items			Negligible	Unlikely	0
FE-13	Planning, Engineering, & Design	Risk of specialty equipment functioning first time? Test?	Potential for design of additional facilities	Moderate	Possible	2
FE-14	Construction Management	Risk of specialty equipment functioning first time? Test?	Additional contracts to manage	Marginal	Possible	1

Cost Estimate Assumptions				Maximum Project Growth		35%
EST-1	Raised ground Surface at Park	Reliability and number of key quotes? Lack of confidence on critical cost item?	Original NAN feasibility costs escalated for inflation. Potential for future cost increases upon validation of selected alternative.	Marginal	Possible	1
EST-2	Sheetpile Bulkheads & Concrete Floodwalls	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Original NAN feasibility costs escalated for inflation. Potential for future cost increases upon validation of selected alternative. Site access issues and congestion could influence construction methodology and production rates.	Moderate	Possible	2
EST-3	Cap Existing State Bulkhead	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Original NAN feasibility costs escalated for inflation. Potential for future cost increases upon validation of selected alternative. Site access issues and congestion could influence construction methodology and production rates.	Marginal	Possible	1
EST-4	Buoyant Swing Gate	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Original NAN feasibility costs escalated for inflation. Potential for future cost increases upon validation of selected alternative. Site access issues and congestion could influence construction methodology and production rates.	Significant	Possible	3
EST-5	Fabricated Floodwall	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Original NAN feasibility costs escalated for inflation. Potential for future cost increases upon validation of selected alternative. Site access issues and congestion could influence construction methodology and production rates.	Moderate	Possible	N/A
EST-6	Boat Launch Facilities	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Original NAN feasibility costs escalated for inflation. Potential for future cost increases upon validation of selected alternative. Site access issues and congestion could influence construction methodology and production rates.	Moderate	Possible	2
EST-7	Minimum Facilities	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Work is currently undefined. Assumed design for interior drainage may not capture additional facilities required.	Significant	Possible	3
EST-8	0			Negligible	Unlikely	0
EST-9	0			Negligible	Unlikely	0
EST-10	0			Negligible	Unlikely	0
EST-11	0			Negligible	Unlikely	0
EST-12	Remaining Construction Items	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Original NAN feasibility costs escalated for inflation. Potential for future cost increases upon validation of selected alternative. Site access issues and congestion could influence construction methodology and production rates.	Moderate	Possible	2
EST-13	Planning, Engineering, & Design	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Increase in costs would directly effect PED	Marginal	Possible	1

EST-14	Construction Management	Reliability and number of key routes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Increase in costs would directly effect CM	Marginal	Possible	1
External Project Risks				Maximum Project Growth		40%
EX-1	Raised ground Surface at Park	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Marginal	Possible	1
EX-2	Sheetpile Bulkheads & Concrete Floodwalls	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Marginal	Possible	1
EX-3	Cap Existing State Bulkhead	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Marginal	Possible	1
EX-4	Buoyant Swing Gate	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Overtopping of cofferdam, etc. Lack of local support could alter the design features.	Moderate	Possible	2
EX-5	Fabricated Floodwall	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Moderate	Possible	N/A
EX-6	Boat Launch Facilities	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Moderate	Possible	2
EX-7	Minimum Facilities	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Moderate	Possible	2
EX-8	0			Negligible	Unlikely	0
EX-9	0			Negligible	Unlikely	0
EX-10	0			Negligible	Unlikely	0
EX-11	0			Negligible	Unlikely	0
EX-12	Remaining Construction Items	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Negligible	Unlikely	0
EX-13	Planning, Engineering, & Design	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Increase in costs would directly effect PED	Negligible	Unlikely	0
EX-14	Construction Management	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Increase in costs would directly effect CM	Negligible	Unlikely	0

Abbreviated Risk Analysis

Project Name & Location: **Highlands Feasibility Study, Highlands New Jersey**
 Project Development Stage/Alternative: **Feasibility (Alternatives)**
 Risk Category: **Moderate Risk: Typical Project Construction Type**

District: **NAN**
 Alternative: **Alt 5d**
 Meeting Date: **10/23/2014**

Total Estimated Construction Contract Cost = \$ **44,639,000**

	<u>CWWS</u>	<u>Feature of Work</u>	<u>Contract Cost</u>	<u>% Contingency</u>	<u>\$ Contingency</u>	<u>Total</u>	
	01 LANDS AND DAMAGES	Real Estate	\$ 6,800,000	0.00%	\$ -	\$ 6,800,000	
1	14 RECREATION FACILITIES	Raised Ground Service at Park	\$ 558,000	19.59%	\$ 109,287	\$ 667,287	
2	10 BREAKWATERS AND SEAWALLS	Sheetpile Bulkheads & Floodwalls	\$ 23,952,000	32.71%	\$ 7,835,256	\$ 31,787,256	
3	10 BREAKWATERS AND SEAWALLS	Cap Existing State Bulkhead	\$ 1,736,000	22.16%	\$ 384,648	\$ 2,120,648	
4	10 BREAKWATERS AND SEAWALLS	Buoyant Swing Gate	\$ 4,422,000	67.70%	\$ 2,993,678	\$ 7,415,678	
5				0.00%	\$ -	\$ -	
6	10 BREAKWATERS AND SEAWALLS	Boat Launch Facilities		0.00%	\$ -	\$ -	
7	10 BREAKWATERS AND SEAWALLS	Minimum Facilities	\$ 332,000	55.21%	\$ 183,291	\$ 515,290.60	
8				0.00%	\$ -	\$ -	
9				0.00%	\$ -	\$ -	
10				0.00%	\$ -	\$ -	
11				0.00%	\$ -	\$ -	
12	All Other (less than 10% of construction costs)	Remaining Construction Items	\$ 13,639,000	44.0%	\$ 2,836,093	\$ 16,475,093	
13	30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	\$ 6,695,850	22.81%	\$ 1,527,593	\$ 8,223,443	
14	31 CONSTRUCTION MANAGEMENT	Construction Management	\$ 4,463,900	19.56%	\$ 873,216	\$ 5,337,116	
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MUST INCLUDE JUSTIFICATION SEE BELOW)					\$ -	

Totals						
	Real Estate	\$	6,800,000	0.00%	\$	- \$ 6,800,000.00
	Total Construction Estimate	\$	44,639,000	32.13%	\$	14,342,253 \$ 58,981,253
	Total Planning, Engineering & Design	\$	6,695,850	22.81%	\$	1,527,593 \$ 8,223,443
	Total Construction Management	\$	4,463,900	19.56%	\$	873,216 \$ 5,337,116
	Total	\$	62,598,750	27%	\$	16,743,062 \$ 79,341,812
				Base	50%	80%
	Range Estimate (\$000's)			\$62,599k	\$72,645k	\$79,342k

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

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

Highlands Feasibility Study, Highlands New Jersey Alt 5d

Feasibility (Alternatives)

Abbreviated Risk Analysis

Meeting Date: 23-Oct-14

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

Risk Register

Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level	
Project Scope Growth						Maximum Project Growth	60%
PS-1	Raised ground Surface at Park	Potential for scope growth, added features and quantities?	Raising the ground surface in the park effects multiple misc features. Including but not limited to walkways, benches, sidewalks, landscape etc.	Marginal	Likely	2	
PS-2	Sheetpile Bulkheads & Concrete Floodwalls	Potential for scope growth, added features and quantities?	Interference of existing infrastructure, Utilities, etc. Multiple utility relocations would impact the schedule as well as the cost.	Significant	Possible	3	
PS-3	Cap Existing State Bulkhead	Design confidence?	Due to required design criteria there is the potential for bulkhead replacement	Significant	Unlikely	2	
PS-4	Buoyant Swing Gate	Potential for scope growth, added features and quantities? Investigations sufficient to support design assumptions? Design Confidence?	No current design. Potential for gate to silt-in requiring dredging on a regular basis. Failure of gate, not operational when needed.	Significant	Possible	3	
PS-5	Fabricated Floodwall	Water care and diversion fully understood, planned?	Storage of components. Time required to erect and remove. Potential for increased usage and rapid deployment. Non-static design	Moderate	Possible	N/A	
PS-6	Boat Launch Facilities	Design confidence?	Current design unknown?	Significant	Very LIKELY	5	
PS-7	Minimum Facilities	Potential for scope growth, added features and quantities?	Work is currently undefined. Assumed design for interior drainage may not capture additional facilities required.	Significant	Possible	3	
PS-8	0			Negligible	Unlikely	0	
PS-9	0			Negligible	Unlikely	0	
PS-10	0			Negligible	Unlikely	0	
PS-11	0			Negligible	Unlikely	0	
PS-12	Remaining Construction Items	Potential for scope growth, added features and quantities?	Potential design changes/revisions	Marginal	Possible	1	
PS-13	Planning, Engineering, & Design	Potential for scope growth, added features and quantities?	Potential for additional contracts	Marginal	Possible	1	
PS-14	Construction Management	Potential for scope growth, added features and quantities?	Potential for additional contracts	Marginal	Possible	1	

Acquisition Strategy				Maximum Project Growth		40%
AS-1	Raised ground Surface at Park	Contracting plan firmly established? Accelerated schedule or harsh weather schedule?	Current acquisition strategy is unknown. Potential for accelerated schedule due to hurricane season or winter weather.	Negligible	Possible	0
AS-2	Sheetpile Bulkheads & Concrete Floodwalls	Contracting plan firmly established? Accelerated schedule or harsh weather schedule?	Current acquisition strategy is unknown. Potential for accelerated schedule due to hurricane season or winter weather.	Marginal	Possible	1
AS-3	Cap Existing State Bulkhead	Contracting plan firmly established? Accelerated schedule or harsh weather schedule?	Current acquisition strategy is unknown. Potential for accelerated schedule due to hurricane season or winter weather.	Marginal	Possible	1
AS-4	Buoyant Swing Gate	Contracting plan firmly established? Accelerated schedule or harsh weather schedule?	Current acquisition strategy is unknown. Potential for accelerated schedule due to hurricane season or winter weather.	Moderate	Possible	2
AS-5	Fabricated Floodwall	Contracting plan firmly established?	Current acquisition strategy is unknown.	Negligible	Possible	N/A
AS-6	Boat Launch Facilities	Contracting plan firmly established? Accelerated schedule or harsh weather schedule?	Current acquisition strategy is unknown. Potential for accelerated schedule due to hurricane season or winter weather.	Moderate	Possible	2
AS-7	Minimum Facilities	Contracting plan firmly established? Accelerated schedule or harsh weather schedule?	Current acquisition strategy is unknown. Potential for accelerated schedule due to hurricane season or winter weather.	Moderate	Possible	2
AS-8	0			Negligible	Unlikely	0
AS-9	0			Negligible	Unlikely	0
AS-10	0			Negligible	Unlikely	0
AS-11	0			Negligible	Unlikely	0
AS-12	Remaining Construction Items	Contracting plan firmly established? Accelerated schedule or harsh weather schedule?	Potential for additional contracts	Marginal	Possible	1
AS-13	Planning, Engineering, & Design	Contracting plan firmly established?	Potential for additional contracts	Marginal	Possible	1
AS-14	Construction Management	Contracting plan firmly established?	Potential for additional contracts	Marginal	Possible	1
Construction Elements				Maximum Project Growth		30%

CON-1	Raised ground Surface at Park	Accelerated schedule or harsh winter weather?	Potential for accelerated schedule due to hurricane season or winter weather.	Negligible	Possible	0
CON-2	Sheetpile Bulkheads & Concrete Floodwalls	Accelerated schedule or harsh winter weather? High risk or complex construction elements, site access, in water? Potential for contract modification and claims?	Potential for accelerated schedule due to hurricane season or winter weather. Limited site access could effect construction coordination/logistics. Potential for contract mods due to the possibility of utility relocations.	Moderate	Possible	2
CON-3	Cap Existing State Bulkhead	Accelerated schedule or harsh winter weather?	Potential for accelerated schedule due to hurricane season or winter weather.	Marginal	Possible	1
CON-4	Buoyant Swing Gate	Accelerated schedule or harsh winter weather? High risk or complex construction elements, site access, in water? Water care and diversion plan?	Potential for accelerated schedule due to hurricane season or winter weather. Limited site access could effect construction coordination/logistics. Cofferdam required for construction.	Significant	Likely	4
CON-5	Fabricated Floodwall	Potential for construction modification and claims?	Assumed to be shop fabricated. Initial installation for erection and test validation could require modification of wall fabrication.	Moderate	Likely	N/A
CON-6	Boat Launch Facilities	Accelerated schedule or harsh winter weather? High risk or complex construction elements, site access, in water?	Potential for accelerated schedule due to hurricane season or winter weather. Some of the work would need to be accomplished from the water.	Marginal	Likely	2
CON-7	Minimum Facilities	Potential for construction modification and claims?	Work is currently undefined. Assumed design for interior drainage may not capture additional facilities required.	Significant	Possible	3
CON-8	0			Negligible	Unlikely	0
CON-9	0			Negligible	Unlikely	0
CON-10	0			Negligible	Unlikely	0
CON-11	0			Negligible	Unlikely	0
CON-12	Remaining Construction Items	Accelerated schedule or harsh winter weather?	Potential for accelerated schedule due to hurricane season or winter weather.	Marginal	Possible	1
CON-13	Planning, Engineering, & Design	Potential for construction modification and claims?	Contract modifications would require additional engineering and design	Negligible	Likely	1
CON-14	Construction Management	Potential for construction modification and claims?	Contract modification would require additional construction oversight.	Negligible	Likely	1

Quantities for Current Scope

Maximum Project Growth 20%

Q-1	Raised ground Surface at Park	Sufficient Investigations to develop quantities?	Raising the ground surface in the park effects multiple misc features. Including but not limited to walkways, benches, sidewalks, landscape etc.	Marginal	Likely	2
Q-2	Sheetpile Bulkheads & Concrete Floodwalls	Level of confidence based on design and assumptions? Sufficient investigations to develop quantities?	Interference of existing infrastructure, Utilities, etc. Multiple utility relocations would impact the schedule as well as the cost.	Marginal	Possible	1
Q-3	Cap Existing State Bulkhead	Level of confidence based on design and assumptions? Sufficient investigations to develop quantities?	Due to required design criteria there is the potential for bulkhead replacement	Moderate	Unlikely	1
Q-4	Buoyant Swing Gate	Level of confidence based on design and assumptions? Sufficient investigations to develop quantities?	No current design. Exploration of existing site may be required. (borings etc.) Cofferdam required for construction	Moderate	Possible	2

Q-5	Fabricated Floodwall	Level of confidence based on design and assumptions? Sufficient investigations to develop quantities?	Storage of components. Time required to erect and remove. Potential for increased usage and rapid deployment. Non-static design	Moderate	Possible	N/A
Q-6	Boat Launch Facilities	Level of confidence based on design and assumptions? Sufficient investigations to develop quantities?	Current design unknown?	Significant	Very LIKELY	5
Q-7	Minimum Facilities	Level of confidence based on design and assumptions? Sufficient investigations to develop quantities?	Work is currently undefined. Assumed design for interior drainage may not capture additional facilities required.	Significant	Possible	3
Q-8	0			Negligible	Unlikely	0
Q-9	0			Negligible	Unlikely	0
Q-10	0			Negligible	Unlikely	0
Q-11	0			Negligible	Unlikely	0
Q-12	Remaining Construction Items	Sufficient Investigations to develop quantities?	Potential design changes/revisions	Marginal	Likely	2
Q-13	Planning, Engineering, & Design	Sufficient Investigations to develop quantities?	Potential for additional contracts	Marginal	Possible	1
Q-14	Construction Management	Sufficient Investigations to develop quantities?	Potential for additional contracts	Marginal	Possible	1
Specialty Fabrication or Equipment				Maximum Project Growth		75%
FE-1				Negligible	Unlikely	0
FE-2				Negligible	Unlikely	0
FE-3				Negligible	Unlikely	0
FE-4	Buoyant Swing Gate	Confidence in contractors ability to install? Risk of specialty equipment functioning first time? Test?	Potential for difficult installation. Alignment, etc. Need for fabricators rep to be on sight for installation. May require on-sight adjustments after installation for permanent operation.	Moderate	Likely	3
FE-5	Fabricated Floodwall	Risk of specialty equipment functioning first time? Test?	Contractor may need to make some adjustment to removable components. Would require reinstallation for testing purposes.	Marginal	Possible	N/A
FE-6	Boat Launch Facilities	Risk of specialty equipment functioning first time? Test?	Facility owner may need to purchase new equipment to function as designed.	Moderate	Possible	2
FE-7	Minimum Facilities	Risk of specialty equipment functioning first time? Test?	Work is currently undefined. Assumed design for interior drainage may not capture additional facilities required.	Moderate	Possible	2
FE-8	0			Negligible	Unlikely	0

FE-9	0			Negligible	Unlikely	0
FE-10	0			Negligible	Unlikely	0
FE-11	0			Negligible	Unlikely	0
FE-12	Remaining Construction Items			Negligible	Unlikely	0
FE-13	Planning, Engineering, & Design	Risk of specialty equipment functioning first time? Test?	Potential for design of additional facilities	Moderate	Possible	2
FE-14	Construction Management	Risk of specialty equipment functioning first time? Test?	Additional contracts to manage	Marginal	Possible	1

Cost Estimate Assumptions				Maximum Project Growth		35%
EST-1	Raised ground Surface at Park	Reliability and number of key quotes? Lack of confidence on critical cost item?	Original NAN feasibility costs escalated for inflation. Potential for future cost increases upon validation of selected alternative.	Marginal	Possible	1
EST-2	Sheetpile Bulkheads & Concrete Floodwalls	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Original NAN feasibility costs escalated for inflation. Potential for future cost increases upon validation of selected alternative. Site access issues and congestion could influence construction methodology and production rates.	Moderate	Possible	2
EST-3	Cap Existing State Bulkhead	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Original NAN feasibility costs escalated for inflation. Potential for future cost increases upon validation of selected alternative. Site access issues and congestion could influence construction methodology and production rates.	Marginal	Possible	1
EST-4	Buoyant Swing Gate	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Original NAN feasibility costs escalated for inflation. Potential for future cost increases upon validation of selected alternative. Site access issues and congestion could influence construction methodology and production rates.	Significant	Possible	3
EST-5	Fabricated Floodwall	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Original NAN feasibility costs escalated for inflation. Potential for future cost increases upon validation of selected alternative. Site access issues and congestion could influence construction methodology and production rates.	Moderate	Possible	N/A
EST-6	Boat Launch Facilities	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Original NAN feasibility costs escalated for inflation. Potential for future cost increases upon validation of selected alternative. Site access issues and congestion could influence construction methodology and production rates.	Moderate	Possible	2
EST-7	Minimum Facilities	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Work is currently undefined. Assumed design for interior drainage may not capture additional facilities required.	Significant	Possible	3
EST-8	0			Negligible	Unlikely	0
EST-9	0			Negligible	Unlikely	0
EST-10	0			Negligible	Unlikely	0
EST-11	0			Negligible	Unlikely	0
EST-12	Remaining Construction Items	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Original NAN feasibility costs escalated for inflation. Potential for future cost increases upon validation of selected alternative. Site access issues and congestion could influence construction methodology and production rates.	Moderate	Possible	2
EST-13	Planning, Engineering, & Design	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Increase in costs would directly effect PED	Marginal	Possible	1

EST-14	Construction Management	Reliability and number of key routes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Increase in costs would directly effect CM	Marginal	Possible	1
External Project Risks				Maximum Project Growth		40%
EX-1	Raised ground Surface at Park	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Marginal	Possible	1
EX-2	Sheetpile Bulkheads & Concrete Floodwalls	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Marginal	Possible	1
EX-3	Cap Existing State Bulkhead	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Marginal	Possible	1
EX-4	Buoyant Swing Gate	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Overtopping of cofferdam, etc. Lack of local support could alter the design features.	Moderate	Possible	2
EX-5	Fabricated Floodwall	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Moderate	Possible	N/A
EX-6	Boat Launch Facilities	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Moderate	Possible	2
EX-7	Minimum Facilities	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Moderate	Possible	2
EX-8	0			Negligible	Unlikely	0
EX-9	0			Negligible	Unlikely	0
EX-10	0			Negligible	Unlikely	0
EX-11	0			Negligible	Unlikely	0
EX-12	Remaining Construction Items	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Negligible	Unlikely	0
EX-13	Planning, Engineering, & Design	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Increase in costs would directly effect PED	Negligible	Unlikely	0
EX-14	Construction Management	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Increase in costs would directly effect CM	Negligible	Unlikely	0

Abbreviated Risk Analysis

Project Name & Location: **Highlands Feasibility Study, Highlands New Jersey**
 Project Development Stage/Alternative: **Feasibility (Alternatives)**
 Risk Category: **Moderate Risk: Typical Project Construction Type**

District: **NAN**
 Alternative: **Alt 5e**
 Meeting Date: **10/23/2014**

Total Estimated Construction Contract Cost = \$ **44,530,000**

	<u>CWWBS</u>	<u>Feature of Work</u>	<u>Contract Cost</u>	<u>% Contingency</u>	<u>\$ Contingency</u>	<u>Total</u>	
	01 LANDS AND DAMAGES	Real Estate	\$ 7,100,000	0.00%	\$ -	\$ 7,100,000	
1	14 RECREATION FACILITIES	Raised Ground Service at Park	\$ 558,000	19.59%	\$ 109,287	\$ 667,287	
2	10 BREAKWATERS AND SEAWALLS	Sheetpile Bulkheads & Floodwalls	\$ 24,094,000	32.71%	\$ 7,881,707	\$ 31,975,707	
3	10 BREAKWATERS AND SEAWALLS	Cap Existing State Bulkhead	\$ 1,736,000	22.16%	\$ 384,648	\$ 2,120,648	
4	10 BREAKWATERS AND SEAWALLS	Captains Cove Construction	\$ 4,442,000	32.25%	\$ 1,432,497	\$ 5,874,497	
5				0.00%	\$ -	\$ -	
6	10 BREAKWATERS AND SEAWALLS	Boat Launch Facilities		0.00%	\$ -	\$ -	
7	10 BREAKWATERS AND SEAWALLS	Minimum Facilities	\$ 332,000	55.21%	\$ 183,291	\$ 515,290.60	
8				0.00%	\$ -	\$ -	
9				0.00%	\$ -	\$ -	
10				0.00%	\$ -	\$ -	
11				0.00%	\$ -	\$ -	
12	All Other (less than 10% of construction costs)	Remaining Construction Items	\$ 13,368,000	42.9%	\$ 2,779,742	\$ 16,147,742	
13	30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	\$ 6,679,500	22.81%	\$ 1,523,863	\$ 8,203,363	
14	31 CONSTRUCTION MANAGEMENT	Construction Management	\$ 4,453,000	19.56%	\$ 871,084	\$ 5,324,084	
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MUST INCLUDE JUSTIFICATION SEE BELOW)					\$ -	

Totals						
	Real Estate	\$	7,100,000	0.00%	\$	- \$ 7,100,000.00
	Total Construction Estimate	\$	44,530,000	28.68%	\$	12,771,171 \$ 57,301,171
	Total Planning, Engineering & Design	\$	6,679,500	22.81%	\$	1,523,863 \$ 8,203,363
	Total Construction Management	\$	4,453,000	19.56%	\$	871,084 \$ 5,324,084
	Total	\$	62,762,500	24%	\$	15,166,118 \$ 77,928,618
				Base	50%	80%
	Range Estimate (\$000's)			\$62,763k	\$71,863k	\$77,929k

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

<p>Fixed Dollar Risk Add: (Allows for additional risk to be added to the risk analysis. Must include justification. Does not allocate to Real Estate.)</p>	
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Highlands Feasibility Study, Highlands New Jersey Alt 5e

Feasibility (Alternatives)

Abbreviated Risk Analysis

Meeting Date: 23-Oct-14

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

Risk Register

Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level	
Project Scope Growth						Maximum Project Growth	60%
PS-1	Raised ground Surface at Park	Potential for scope growth, added features and quantities?	Raising the ground surface in the park effects multiple misc features. Including but not limited to walkways, benches, sidewalks, landscape etc.	Marginal	Likely	2	
PS-2	Sheetpile Bulkheads & Concrete Floodwalls	Potential for scope growth, added features and quantities?	Interference of existing infrastructure, Utilities, etc. Multiple utility relocations would impact the schedule as well as the cost.	Significant	Possible	3	
PS-3	Cap Existing State Bulkhead	Design confidence?	Due to required design criteria there is the potential for bulkhead replacement	Significant	Unlikely	2	
PS-4	Captains Cove Construction	Potential for scope growth, added features and quantities? Investigations sufficient to support design assumptions?	Road may need to be reconstructed due to construction activities. Close to residential property. Stakeholder concern.	Moderate	Possible	2	
PS-5	Fabricated Floodwall	Water care and diversion fully understood, planned?	Storage of components. Time required to erect and remove. Potential for increased usage and rapid deployment. Non-static design	Moderate	Possible	N/A	
PS-6	Boat Launch Facilities	Design confidence?	Current design unknown?	Significant	Very LIKELY	5	
PS-7	Minimum Facilities	Potential for scope growth, added features and quantities?	Work is currently undefined. Assumed design for interior drainage may not capture additional facilities required.	Significant	Possible	3	
PS-8	0			Negligible	Unlikely	0	
PS-9	0			Negligible	Unlikely	0	
PS-10	0			Negligible	Unlikely	0	
PS-11	0			Negligible	Unlikely	0	
PS-12	Remaining Construction Items	Potential for scope growth, added features and quantities?	Potential design changes/revisions	Marginal	Possible	1	
PS-13	Planning, Engineering, & Design	Potential for scope growth, added features and quantities?	Potential for additional contracts	Marginal	Possible	1	
PS-14	Construction Management	Potential for scope growth, added features and quantities?	Potential for additional contracts	Marginal	Possible	1	

Acquisition Strategy				Maximum Project Growth		40%
AS-1	Raised ground Surface at Park	Contracting plan firmly established? Accelerated schedule or harsh weather schedule?	Current acquisition strategy is unknown. Potential for accelerated schedule due to hurricane season or winter weather.	Negligible	Possible	0
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AS-3	Cap Existing State Bulkhead	Contracting plan firmly established? Accelerated schedule or harsh weather schedule?	Current acquisition strategy is unknown. Potential for accelerated schedule due to hurricane season or winter weather.	Marginal	Possible	1
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AS-9	0			Negligible	Unlikely	0
AS-10	0			Negligible	Unlikely	0
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AS-13	Planning, Engineering, & Design	Contracting plan firmly established?	Potential for additional contracts	Marginal	Possible	1
AS-14	Construction Management	Contracting plan firmly established?	Potential for additional contracts	Marginal	Possible	1
Construction Elements				Maximum Project Growth		30%

CON-1	Raised ground Surface at Park	Accelerated schedule or harsh winter weather?	Potential for accelerated schedule due to hurricane season or winter weather.	Negligible	Possible	0
CON-2	Sheetpile Bulkheads & Concrete Floodwalls	Accelerated schedule or harsh winter weather? High risk or complex construction elements, site access, in water? Potential for contract modification and claims?	Potential for accelerated schedule due to hurricane season or winter weather. Limited site access could effect construction coordination/logistics. Potential for contract mods due to the possibility of utility relocations.	Moderate	Possible	2
CON-3	Cap Existing State Bulkhead	Accelerated schedule or harsh winter weather?	Potential for accelerated schedule due to hurricane season or winter weather.	Marginal	Possible	1
CON-4	Captains Cove Construction	Accelerated schedule or harsh winter weather? High risk or complex construction elements, site access, in water?	Potential for accelerated schedule due to hurricane season or winter weather. Limited site access could effect construction coordination/logistics. Potential for contract mods due to the possibility of utility relocations.	Significant	Unlikely	2
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CON-6	Boat Launch Facilities	Accelerated schedule or harsh winter weather? High risk or complex construction elements, site access, in water?	Potential for accelerated schedule due to hurricane season or winter weather. Some of the work would need to be accomplished from the water.	Marginal	Likely	2
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CON-11	0			Negligible	Unlikely	0
CON-12	Remaining Construction Items	Accelerated schedule or harsh winter weather?	Potential for accelerated schedule due to hurricane season or winter weather.	Marginal	Possible	1
CON-13	Planning, Engineering, & Design	Potential for construction modification and claims?	Contract modifications would require additional engineering and design	Negligible	Likely	1
CON-14	Construction Management	Potential for construction modification and claims?	Contract modification would require additional construction oversight.	Negligible	Likely	1

Quantities for Current Scope

Maximum Project Growth 20%

Q-1	Raised ground Surface at Park	Sufficient Investigations to develop quantities?	Raising the ground surface in the park effects multiple misc features. Including but not limited to walkways, benches, sidewalks, landscape etc.	Marginal	Likely	2
Q-2	Sheetpile Bulkheads & Concrete Floodwalls	Level of confidence based on design and assumptions? Sufficient investigations to develop quantities?	Interference of existing infrastructure, Utilities, etc. Multiple utility relocations would impact the schedule as well as the cost.	Marginal	Possible	1
Q-3	Cap Existing State Bulkhead	Level of confidence based on design and assumptions? Sufficient investigations to develop quantities?	Due to required design criteria there is the potential for bulkhead replacement	Moderate	Unlikely	1
Q-4	Captains Cove Construction	Level of confidence based on design and assumptions? Sufficient investigations to develop quantities?	Road may need to be reconstructed due to construction activities. Close to residential property. Stakeholder concern.	Moderate	Possible	2

Q-5	Fabricated Floodwall	Level of confidence based on design and assumptions? Sufficient investigations to develop quantities?	Storage of components. Time required to erect and remove. Potential for increased usage and rapid deployment. Non-static design	Moderate	Possible	N/A
Q-6	Boat Launch Facilities	Level of confidence based on design and assumptions? Sufficient investigations to develop quantities?	Current design unknown?	Significant	Very LIKELY	5
Q-7	Minimum Facilities	Level of confidence based on design and assumptions? Sufficient investigations to develop quantities?	Work is currently undefined. Assumed design for interior drainage may not capture additional facilities required.	Significant	Possible	3
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Q-14	Construction Management	Sufficient Investigations to develop quantities?	Potential for additional contracts	Marginal	Possible	1
Specialty Fabrication or Equipment				Maximum Project Growth		75%
FE-1				Negligible	Unlikely	0
FE-2				Negligible	Unlikely	0
FE-3				Negligible	Unlikely	0
FE-4				Negligible	Unlikely	0
FE-5	Fabricated Floodwall	Risk of specialty equipment functioning first time? Test?	Contractor may need to make some adjustment to removable components. Would require reinstallation for testing purposes.	Marginal	Possible	N/A
FE-6	Boat Launch Facilities	Risk of specialty equipment functioning first time? Test?	Facility owner may need to purchase new equipment to function as designed.	Moderate	Possible	2
FE-7	Minimum Facilities	Risk of specialty equipment functioning first time? Test?	Work is currently undefined. Assumed design for interior drainage may not capture additional facilities required.	Moderate	Possible	2
FE-8	0			Negligible	Unlikely	0

FE-9	0			Negligible	Unlikely	0
FE-10	0			Negligible	Unlikely	0
FE-11	0			Negligible	Unlikely	0
FE-12	Remaining Construction Items			Negligible	Unlikely	0
FE-13	Planning, Engineering, & Design	Risk of specialty equipment functioning first time? Test?	Potential for design of additional facilities	Moderate	Possible	2
FE-14	Construction Management	Risk of specialty equipment functioning first time? Test?	Additional contracts to manage	Marginal	Possible	1

Cost Estimate Assumptions				Maximum Project Growth		35%
EST-1	Raised ground Surface at Park	Reliability and number of key quotes? Lack of confidence on critical cost item?	Original NAN feasibility costs escalated for inflation. Potential for future cost increases upon validation of selected alternative.	Marginal	Possible	1
EST-2	Sheetpile Bulkheads & Concrete Floodwalls	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Original NAN feasibility costs escalated for inflation. Potential for future cost increases upon validation of selected alternative. Site access issues and congestion could influence construction methodology and production rates.	Moderate	Possible	2
EST-3	Cap Existing State Bulkhead	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Original NAN feasibility costs escalated for inflation. Potential for future cost increases upon validation of selected alternative. Site access issues and congestion could influence construction methodology and production rates.	Marginal	Possible	1
EST-4	Captains Cove Construction	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Original NAN feasibility costs escalated for inflation. Potential for future cost increases upon validation of selected alternative. Site access issues and congestion could influence construction methodology and production rates.	Moderate	Possible	2
EST-5	Fabricated Floodwall	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Original NAN feasibility costs escalated for inflation. Potential for future cost increases upon validation of selected alternative. Site access issues and congestion could influence construction methodology and production rates.	Moderate	Possible	N/A
EST-6	Boat Launch Facilities	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Original NAN feasibility costs escalated for inflation. Potential for future cost increases upon validation of selected alternative. Site access issues and congestion could influence construction methodology and production rates.	Moderate	Possible	2
EST-7	Minimum Facilities	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Work is currently undefined. Assumed design for interior drainage may not capture additional facilities required.	Significant	Possible	3
EST-8	0			Negligible	Unlikely	0
EST-9	0			Negligible	Unlikely	0
EST-10	0			Negligible	Unlikely	0
EST-11	0			Negligible	Unlikely	0
EST-12	Remaining Construction Items	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Original NAN feasibility costs escalated for inflation. Potential for future cost increases upon validation of selected alternative. Site access issues and congestion could influence construction methodology and production rates.	Moderate	Possible	2
EST-13	Planning, Engineering, & Design	Reliability and number of key quotes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Increase in costs would directly effect PED	Marginal	Possible	1

EST-14	Construction Management	Reliability and number of key routes? Site accessibility, transport delays, congestion? Lack of confidence on critical cost items?	Increase in costs would directly effect CM	Marginal	Possible	1
External Project Risks				Maximum Project Growth		40%
EX-1	Raised ground Surface at Park	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Marginal	Possible	1
EX-2	Sheetpile Bulkheads & Concrete Floodwalls	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Marginal	Possible	1
EX-3	Cap Existing State Bulkhead	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Marginal	Possible	1
EX-4	Captains Cove Construction	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Moderate	Possible	2
EX-5	Fabricated Floodwall	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Moderate	Possible	N/A
EX-6	Boat Launch Facilities	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Moderate	Possible	2
EX-7	Minimum Facilities	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Moderate	Possible	2
EX-8	0			Negligible	Unlikely	0
EX-9	0			Negligible	Unlikely	0
EX-10	0			Negligible	Unlikely	0
EX-11	0			Negligible	Unlikely	0
EX-12	Remaining Construction Items	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Severe adverse weather during the hurricane season or winter could impact the construction schedule and potentially damage the construction features. Lack of local support could alter the design features.	Negligible	Unlikely	0
EX-13	Planning, Engineering, & Design	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Increase in costs would directly effect PED	Negligible	Unlikely	0
EX-14	Construction Management	Potential for severe adverse weather? Political influences, lack of support, obstacles?	Increase in costs would directly effect CM	Negligible	Unlikely	0