

APPENDIX C

Draft Economic Analysis

APPENDIX C ECONOMIC ANALYSIS

Project Authority:

The Atlantic Coast of New Jersey Sandy Hook to Barnegat Inlet Beach Erosion Control Project – Section I – Sea Bright to Ocean Township was authorized by River and Harbor Act of 3 July 1958, in accordance with reports printed in House Document 332, 85th Congress, 2nd Session. The reach of the authorized project extending from Sandy Hook to Ocean Township, Section I was modified by the Water Resources and Development Act of 17 November 1986 (PL 99-662) and subsequently amended by the Water Resources Development Act of 19 October 1988 (PL 100-676).

Project Scope has not changed since last approved report:

- No storm impacts have changed topography in the project area
- Hydraulics unchanged
- Modeling assumptions are still valid
- Renourishment schedule and volumes as recommended or less often.

Qualitative re-verification of key benefit assumptions:

- a. CSDR: Structure inventory graphic from time of plan completion compared to project area confirmed stability of structure inventory data base for the project area. **Structures damaged during Hurricane Sandy assumed to be a temporary condition, and majority will be rebuilt for the remainder of the project life.** Consultation with local planning officials confirms that building permit applications propose reconstruction of similar structures. Building codes have not been modified in the area in response to the storm event. Consistent with the future without project condition assumptions, few additional structures have been constructed within the project area, and any changes from teardowns/new construction have had minimal impact on composition of total structural data base. Storm damage reduction benefits from the authorizing document are still reasonable. Benefits for reduced damages from three potential storm damage categories: erosion, wave attack, and inundation.
- b. Recreation is a secondary purpose; the magnitude of benefits is still reasonable, if not conservative. Seasonal demographic demand for the recreational beach experience in the project area continues to increase over time.

Project benefits at price level of last approved report:

Project was justified on the basis of damage reduction, intensification, land erosion management, reduced maintenance, and recreation benefits.

Annual benefits were adjusted to \$30.1M to reflect two reaches constructed from 1998 through present. The benefits for the two completed reaches, Sea Bright to Monmouth Beach, and Long Branch, based upon the benefits summarized by reach within the Atlantic Coast of New Jersey, Section I, Sea Bright to Ocean Township, General Design Memorandum, dated January 1989. Total project benefits of \$36,900,000 accrue from 2016 through the remainder of fifty year

period of analysis once the final reach is constructed. As a result, average annual benefits are \$34.5M over fifty year period of economic analysis at a 3.5% interest rate.

Project costs:

The authorized, but unconstructed portion of the project will be the final increment of construction for the project originally recommended as Reach 3 of the 1989 General Design Memorandum recommended plan of fill only and 100’ width.

Total project cost is a composite of the actual construction costs and nourishment costs incurred for the reaches which were built in FY1998. These portions were also renourished in FY02, FY08, FY12 and FY13. Actual costs are presented in Table 6. The cost estimate for the Elberon to Loch Arbour Reach, which is described fully in Section 4.5, was added to the actual costs incurred to derive the total project cost for use in the economic analysis.

Once initial construction costs, interest during construction, design and construction and management costs are included in the total project cost estimate of this remaining portion, this reach is estimated to cost \$141,080,000 in FY 14 price level.

Renourishment, also in the FY 14 price level is estimated to cost \$54,675,700 per 6-year cycle for Sandy Hook to Barnegat Section I, and is combined with the actual renourishment expenditures to estimate the total project cost.

The economic analysis reflects that, for the first 18 years of the project, only operations, maintenance, repair and rehabilitation (OMR&R) costs which accrue from construction of the completed portions are applicable. The analysis reflects the OMR&R costs of all three reaches only from the time that this third reach is completed in FY 16. OMR&R costs include dune and groin maintenance, coastal monitoring and outfall maintenance.

Resulting project costs are presented at the current price level, and also deflated to the original authorizing document price level for generating a benefit cost ratio.

The total project cost for Sandy Hook to Barnegat Inlet Section I is \$425,943,800 in FY14 price level and for the economic analysis is deflated to the price level of the authorizing document with the CWCCIS quarterly index for beach replenishment, and amounts to \$197,299,000 in FY 88 price level.

Table C.2: Lifecycle Costs of Sandy Hook to Barnegat Inlet Section I

Year	IDC	Initial Construction	First Cost 2014 PL	O&M Costs FY14 PL	Total Project Cost FY14	Present Value Factor	Present Value FY88 PL (3.5%)	Present Value FY14 PL (3.5%)
1998	0	5,216,677	73,491,732	169,878,488	169,878,488	1	78,708,409	169,878,488
1999	1			498,086	498,086	0.966184	212,220	481,243
2000	2			498,086	498,086	0.933511	205,044	464,969
2001	3			498,086	498,086	0.901943	198,110	449,245
2002	4	15,435,833	22,530,164	498,086	23,028,250	0.871442	9,288,149	20,067,790
2003	5			498,086	498,086	0.841973	184,938	419,375
2004	6			498,086	498,086	0.813501	178,684	405,193
2005	7			498,086	498,086	0.785991	172,641	391,491
2006	8			498,086	498,086	0.759412	166,803	378,252
2007	9			498,086	498,086	0.733731	161,163	365,461
2008	10	13,427,693	15,668,765	498,086	16,166,851	0.708919	5,302,237	11,460,985
2009	11			498,086	498,086	0.684946	150,447	341,162

2010	12				498,086	498,086	0.661783	145,359	329,625
2011	13				498,086	498,086	0.639404	140,444	318,478
2012	14		15,145,644	15,636,809	498,086	16,134,895	0.617782	4,611,446	9,967,845
2013	15		17,280,000	17,436,727	498,086	17,934,813	0.596891	4,953,275	10,705,122
2014	16				498,086	498,086	0.576706	126,672	287,249
2015	17			0	498,086	498,086	0.557204	122,389	277,536
2016	18	2,010,863	134,637,511	141,079,808	1,997,000	143,076,808	0.538361	35,692,804	77,026,993
2017	19			0	1,997,000	1,997,000	0.520156	485,641	1,038,751
2018	20			0	1,997,000	1,997,000	0.502566	469,218	1,003,624
2019	21		54,675,700	54,675,700	1,997,000	56,672,700	0.485571	12,754,049	27,518,614
2020	22			0	1,997,000	1,997,000	0.469151	438,020	936,894
2021	23			0	1,997,000	1,997,000	0.453286	423,208	905,211
2022	24			0	1,997,000	1,997,000	0.437957	408,897	874,600
2023	25			0	1,997,000	1,997,000	0.423147	395,069	845,025
2024	26			0	1,997,000	1,997,000	0.408838	381,709	816,449
2025	27		54,675,700	54,675,700	1,997,000	56,672,700	0.395012	10,375,427	22,386,410
2026	28			0	1,997,000	1,997,000	0.381654	356,330	762,164
2027	29			0	1,997,000	1,997,000	0.368748	344,280	736,390
2028	30			0	1,997,000	1,997,000	0.356278	332,638	711,488
2029	31			0	1,997,000	1,997,000	0.34423	321,389	687,428
2030	32			0	1,997,000	1,997,000	0.33259	310,521	664,182
2031	33		54,675,700	54,675,700	1,997,000	56,672,700	0.321343	8,440,417	18,211,359
2032	34			0	1,997,000	1,997,000	0.310476	289,875	620,021
2033	35			0	1,997,000	1,997,000	0.299977	280,072	599,054
2034	36			0	1,997,000	1,997,000	0.289833	270,601	578,796
2035	37			0	1,997,000	1,997,000	0.280032	261,450	559,223
2036	38			0	1,997,000	1,997,000	0.270562	252,609	540,312
2037	39		54,675,700	54,675,700	1,997,000	56,672,700	0.261413	6,866,284	14,814,952
2038	40			0	1,997,000	1,997,000	0.252572	235,813	504,387
2039	41			0	1,997,000	1,997,000	0.244031	227,839	487,331
2040	42			0	1,997,000	1,997,000	0.235779	220,134	470,851
2041	43			0	1,997,000	1,997,000	0.227806	212,690	454,928
2042	44			0	1,997,000	1,997,000	0.220102	205,498	439,544
2043	45		54,675,700	54,675,700	1,997,000	56,672,700	0.212659	5,585,727	12,051,973
2044	46			0	1,997,000	1,997,000	0.205468	191,834	410,319
2045	47			0	1,997,000	1,997,000	0.19852	185,347	396,444
2046	48			0	1,997,000	1,997,000	0.191806	179,079	383,037
2047	49			0	1,997,000	1,997,000	0.18532	173,023	370,085
2048	50		54,675,700	54,675,700	1,997,000	56,672,700	0.179053	4,703,032	10,147,438
								197,298,957	425,943,788
							ANNUAL	8,411,586	18,159,564

*CWCCIS, Beach Replenishment Index used to deflate current estimates to authorizing document price levels.

BCR Results:

BCR: 4.1 3.5% Discount rate; FY 1988 P.L.

As described previously, this HSLRR addresses the Elberon to Loch Arbour Reach; however it's Sandy Hook to Barnegat Section I that must be economically justified. Since some initial construction and renourishment has been completed for Sandy Hook to Barnegat Inlet Section I, and future expenditures are scheduled, the entire project cost is presented in the price level of the 1989 GDM and the benefit cost ratio is calculated for Sandy Hook to Barnegat Inlet Section I. This facilitates comparison of benefits and costs and is consistent with the Level I budget update approach.

The average annual benefits for the 50-year period of analysis are \$34,450,000. The average annual cost of the project is \$8,411,600. The benefit cost ratio of the entire project, inclusive of the expended costs and the estimated costs of the Elberon to Loch Arbour Reach, is 4.1, representing an economically justified project.

Table C.2 Economic Analysis Parameters- Entire Project

	GDM FY88 PL	FY88 PL*	FY14 PL
Discount Rate	8 7/8%	3.5%	3.5%
Initial Construction Cost	\$87,106,000	\$144,073,800	\$310,958,300
Total Annual Equivalent Cost	\$20,806,000	\$8,411,600	\$18,159,600
Renourishment Cost per Cycle	N/A	25,332,400	\$54,675,700
Renourishment Annual Cost	\$ 679,000* 50 years	\$3,730,200 32 years	\$8,051,000 32 years
Annual Benefit	\$36,900,000	\$34,450,000	NA
BCR	1.78	4.1	NA

*CWCCIS, Beach Replenishment Index used to deflate current estimates to authorizing document price levels.