

TABLE OF CONTENTS

	Page
EXECUTIVE SUMMARY	I
LIST OF FIGURES.....	VII
LIST OF TABLES	XV
1.0 PROJECT PURPOSE AND NEED	1
1.1 Project Purpose and Agency Goal.....	1
1.2 Project Need	1
1.3 Proposed Action	9
1.4 Project Authority	13
1.4.1 Initial Authorization.	13
1.4.2 Supplemental Information.....	13
1.5 Project Location	15
1.6 Project History.....	15
1.7 Related Environmental Documents.....	16
1.8 Decisions to be Made	17
1.9 Scoping and Issues	17
1.9.1 Issues Evaluated in Detail	18
1.9.2 Impact Measurement	18
1.9.3 Issues Eliminated From Detailed Analysis.....	20
1.10 Permits, Licenses, and Entitlements.....	21
2.0 PROJECT ALTERNATIVES	23
2.1. Description of Alternatives Evaluated in Detail.....	24
2.1.1 Alternative 1 - No Action Alternative	24
2.1.2 Alternative 2 – Beach Fill with Structures	37
2.1.3 Alternative 3 - Applicant's Preferred Alternative, Beach Fill with Periodic Renourishment.....	38
2.1.4 Sand Source Alternatives Analysis	46
2.2 Issues and Basis for Choice.....	54
2.2.1 Project Alternatives	54
2.2.2 Sand Source Alternatives	55

2.3	Alternatives Eliminated From Detailed Evaluation	55
2.3.1	Alternative 4 - Increased Fill Area Design (Placement of additional 343,200 cubic yards between DNR Monuments R-114 and R-116):.....	55
2.3.2	Alternative 5 - Reduced Fill Area Design (Placement of 750,000 to 1.5 million cubic yards between DNR Monuments R-116 and R-121).....	58
2.3.4	Alternative 7 - Seawalls.....	60
2.3.5	Alternative 8 - Nearshore Berm	60
2.3.6	Alternative 9 - PEP Reef	61
2.3.7	Alternative 10 - Groin Field without Beach Nourishment	61
2.3.8	Alternative 11 - Modification of the Lake Worth Inlet Sand Transfer Plant	62
2.3.9	Alternative 12 - Dune Restoration.....	63
2.3.10	Alternative 13 - Navigation Project Modification or Abandonment.....	63
2.3.11	Alternative 14 - Beach Fill with Periodic Nourishment Stabilized by an Offshore Breakwater.....	63
2.3.12	Alternative 15 - Beach Fill with Periodic Nourishment and Hurricane Surge Protection Berm.....	64
2.3.13	Alternative 16 - Feeder Beach.....	64
2.3.14	Alternative 17 - Removal of Groins	64
2.4	Alternatives Not Within Jurisdiction of the Lead Agency	65
2.4.1	Rezoning of Beach Area.....	65
2.4.2	Modification of Building Codes	65
2.4.3	Construction Setback Line	66
2.4.4	Construction Moratorium or No Growth Program.....	66
2.4.5	Evacuation Planning	66
2.4.6	Condemnation of Land and Structures	66
2.4.7	Relocation or Retrofit of Structures	Error! Bookmark not defined.
2.5	Comparison of Alternatives.....	67
2.6	Mitigation	67
3.0	AFFECTED ENVIRONMENT	72
3.1	Coastal Environment	72
3.1.1	Tides	74
3.1.2	Storm Surges	74
3.1.4	Waves	75
3.2	Beach and Inlet Geomorphology	75
3.2.1	Geomorphic Setting of Palm Beach Island	76
3.2.2	Lake Worth Inlet Sediment Budget	77
3.2.3	Palm Beach Island - Shoreline and Volumetric Changes.....	82

3.3	Sediment Characteristics of Borrow Area and Native Beach	101
3.3.1	Sand Quality/Grain Size	101
3.3.2	Composition and Mineralogy	103
3.3.3	Color	103
3.4	Beach and Dune Vegetation and Wildlife	104
3.5	Threatened and Endangered Species	104
3.5.1	Sea Turtles	104
3.5.2	West Indian Manatee	108
3.5.3	Southeastern Beach Mouse.....	108
3.5.4	Least Tern.....	109
3.5.5	Northern Right Whale	Error! Bookmark not defined.
3.6	Offshore Borrow Area Resources	109
3.7	Hardbottom Resources	110
3.7.2	Intermediate Hardbottom.....	114
3.7.3	Offshore Hardbottom.....	114
3.9	Essential Fish Habitat.....	116
3.10	Coastal Barrier Resources	117
3.11	Water Quality	117
3.12	Hazardous, Toxic, and Radioactive Waste.....	118
3.13	Air Quality.....	118
3.14	Noise.....	118
3.15	Aesthetic Resources	118
3.16	Recreation Resources	119
3.17	Navigation	119
3.18	Cultural Resources	119
4.0	ENVIRONMENTAL CONSEQUENCES.....	120
4.1	Tides, Winds, Currents and Waves	120
4.1.1	Alternative 1 - No Action	120
4.1.2	Alternative 2 - Beach Fill with Structures	120
4.1.3	Alternative 3 - Applicant's Preferred Alternative - Beach Fill with Periodic Nourishment	120
4.2	Beach and Inlet Geology and Geomorphology	121
4.2.1	Alternative 1 - No Action	121
4.2.2	Alternative 2 – Beach Fill with Structures	121
4.2.3	Alternative 3 - Applicant's Preferred Alternative - Beach Fill with Periodic	121
4.3	Sediment Characteristics of Borrow Area and Native Beach	122

4.3.1	No Action	122
4.3.2	Alternative 2 – Beach Fill with Structures	122
4.3.3	Alternative 3 -Applicant’s Preferred Alternative - Beach Fill with Periodic Nourishment	122
4.4	Beach and Dune Vegetation and Wildlife.....	123
4.4.1	Alternative 1 - No Action	123
4.4.2	Alternative 2 – Beach Fill with Structures	123
4.4.3	Alternative 3 - Applicant’s Preferred Alternative - Beach Fill with Periodic Nourishment	123
4.5	Threatened and Endangered Species	124
4.5.1	Alternative 1 - No Action	124
4.5.2	Alternative 2 – Beach Fill with Structures	124
4.5.3	Alternative 3 - Applicant’s Preferred Alternative - Beach Fill with Periodic Nourishment	124
4.6	Offshore Borrow Area Resources	127
4.6.1	Alternative 1 - No Action	127
4.6.2	Alternative 2 – Beach Fill with Structures	127
4.6.3	Alternative 3 - Applicant’s Preferred Alternative - Beach Fill with Periodic Nourishment	128
4.7	Hardbottom Resources	128
4.7.1	Alternative 1 - No Action	128
4.7.2	Alternative 2 – Beach Fill with Structures	128
4.7.3	Alternative 3 - Applicant’s Preferred Alternative - Beach Fill with Periodic Nourishment	129
4.8	Essential Fish Habitat.....	130
4.8.1	Alternative 1 - No Action	130
4.8.2	Alternative 2 – Beach Fill with Structures	130
4.8.3	Alternative 3 - Applicant’s Preferred Alternative - Beach Fill with Periodic Nourishment	130
4.9	Coastal Barrier Resources	131
4.10	Water Quality	131
4.11	Hazardous, Toxic, and Radioactive Waste.....	132
4.12	Air Quality.....	132
4.13	Noise.....	133
4.14	Aesthetic Resources	133
4.15	Recreational Resources	134
4.16	Cultural Resources	134
4.17	Health and Safety	135

4.18	Energy Requirements and Conservation	135
4.19	Natural or Depletable Resources	135
4.20	Cumulative Impacts.....	136
4.20.1	Hardbottom Summary	136
4.20.2	Sand Habitat Summary	138
4.20.3	Significance of Cumulative Affects	138
4.21	Irreversible and Irretrievable Commitment of Resources	139
4.21.1	Irreversible.....	139
4.21.2	Irretrievable	140
4.22	Unavoidable Adverse Environmental Effects	140
4.23	Local Short-Term Uses and Maintenance/Enhancement of Long-Term Prod.....	140
4.24	Conflicts and Controversy	141
4.25	Uncertain, Unique, or Unknown Risks.....	141
4.26	Precedent and Principle for Future Actions	142
4.27	Environmental Commitments.....	142
4.28	Compliance with Environmental Requirements.....	143
4.28.1	National Environmental Policy Act of 1969	143
4.28.2	Endangered Species Act	143
4.28.3	Fish and Wildlife Coordination Act of 1958	144
4.28.4	National Historic Preservation Act of 1966 (<i>inter alia</i>)	144
4.28.5	Clean Water Act of 1972	144
4.28.6	Clean Air Act of 1972	144
4.28.7	Coastal Zone Management Act of 1972	145
4.28.8	Farmland Protection Policy Act of 1981	145
4.28.9	Wild and Scenic River Act of 1968.....	145
4.28.10	Marine Mammal Protection Act of 1972.....	145
4.28.11	Estuary Protection Act of 1968	145
4.28.12	Federal Water Project Recreation Act	145
4.28.13	Fishery Conservation and Management Act of 1976	145
4.28.14	Submerged Lands Act of 1953	146
4.28.15	Coastal Barrier Resources Act and Coastal Barrier Improvement Act of 1990	146
4.28.16	Rivers and Harbor Act of 1899.....	146
4.28.17	Anadromous Fish Conservation Act.....	146
4.28.18	Migratory Bird Treaty Act and Migratory Bird Conservation Act	146
4.28.19	Marine Protection, Research, and Sanctuaries Act.....	146
4.28.20	Magnuson-Stevens Fishery Conservation and Management Act.....	146

4.28.21 E.O. 11990, Protection of Wetlands	147
4.28.22 E.O. 11988, Flood Plain Management	147
4.28.23 E.O. 12898, Environmental Justice	147
4.28.24 E.O. 13089, Coral Reef Protection.....	147
4.28.25 E.O. 13112, Invasive Species	147
5.0 LIST OF PREPARERS	148
6.0 PUBLIC INVOLVEMENT, PUBLIC COMMENTS AND RESPONSES	151
6.1 Summary of Public Comments on the Draft SEIS	151
6.1.1 Overview	152
6.1.2 Demographics.....	153
6.1.3 Comment Analysis Process	153
6.1.4 Summary.....	154
6.2 Index of Public Comments Received	154
6.3 Comments and Responses	156
7.0 REFERENCES.....	194

LIST OF APPENDICES

Appendix A	Coastal Zone Management Consistency
Appendix B	Pertinent Correspondence
Appendix C	Cumulative Impact Assessment Report
Appendix D	EFH Assessment Report
Appendix E	Mitigation Reef Plan and Monitoring Program
Appendix F	Physical and Biological Monitoring Program
Appendix G	Vessel Operations Plan
Appendix H	Borrow Area Hardbottom Survey Report
Appendix I	Lake Worth Inlet Management Study and Implementation Plan
Appendix J	Project Preliminary Design
Appendix K	Supplementary Geotechnical Analysis
Appendix L	FDEP Permit, Phipps Ocean Park Beach Restoration Project
Appendix M	Supplemental Alternatives Analysis: T-Head Groin Field and Reduced Fill Alternative
Appendix N	Storm Impact Risk Assessment, Phipps Ocean Park Beach Restoration Project, Palm Beach County, Florida, (Taylor Engineering, Inc., December 2003).
Appendix O	Phipps Ocean Park Beach Restoration Project, Subsurface Rock Outcrops, Jet Probe Investigation (Morgan & Ekland, November 2003)
Appendix P	USFWS, Biological Opinion

LIST OF FIGURES

Figure 1.1 Applicant's Preferred Alternative	11
Figure 1.2 Select Fill Template Profiles.....	12
Figure 1.3 Project Area Location Map	14
Figure 2.1 Maximum Elevation of Rock Within Project Area – As Surveyed	25
Figure 2.2a "No Action" Alternative After 4 Years.....	26
Figure 2.2b "No Action" Alternative After 8 Years.....	26
Figure 2.3 Historical Shoreline & Limits of Expected Shoreline Fluctuations With "No Action"	28
Figure 2.3a Comparison of 1997 Coastal Construction Control Line and Predicted Storm Recession – Method 2 Sheet 1 of 4	32
Figure 2.3b Comparison of 1997 Coastal Construction Control Line and Predicted Storm Recession – Method 2 Sheet 2 of 4	32
Figure 2.3c Comparison of 1997 Coastal Construction Control Line and Predicted Storm Recession – Method 2 Sheet 3 of 4	32
Figure 2.3d Comparison of 1997 Coastal Construction Control Line and Predicted Storm Recession – Method 2 Sheet 4 of 4	32
Figure 2.4a Design with Structures, Results after 2 Years	39
Figure 2.4b Design with Structures, Results after 4 Years	39
Figure 2.4c Design with Structures, Results after 6 Years.....	40
Figure 2.4d Design with Structures, Results after 8 Years.....	40
Figure 2.5a Applicant's Preferred Alternative, After 2 Years.....	42
Figure 2.5b Applicant's Preferred Alternative, After 4 Years	42
Figure 2.5c Applicant's Preferred Alternative, After 6 Years.....	43
Figure 2.5d Applicant's Preferred Alternative, After 8 Years	43

Figure 2.6 Seven Potential Offshore Borrow Areas	48
Figure 2.7 Borrow Area III.....	50
Figure 2.8 Borrow Area IV	51
Figure 2.9 Increased Fill Area Design.....	57
Figure 2.10 Reduced Fill Area Design Alternatives	59
Figure 3.1 Phipps Ocean Park Beach Restoration Project Plan View.....	73
Figure 3.2 Shallow Water Wave Data for Station 158 Adjacent to Palm Beach, FL.....	75
Figure 3.3 The Floridian Plateau	76
Figure 3.4 Lake Worth Inlet Sediment Budget Cells and Domain.....	77
Figure 3.5a Mean High Water Line Change Rates (ft/yr)	85
Figure 3.5b Historical Shoreline Positions.....	86
Figure 3.6 Volume Change Rates (cy/yr).....	88
Figure 3.7 Reach 1, South of Lake Worth Inlet Extending South (March 2001).....	91
Figure 3.8 Aerial Photograph of Reach 2 at Palm Beach Country Club (March 2001).....	92
Figure 3.9 The Narrow Beach Front Along Reach 2 at Palm Beach Country Club (February 2002)	92
Figure 3.10 Reach 3, Breakers Hotel (March 2001)	92
Figure 3.11 Reach 4, Mid-Town Region, (February 2002).....	93
Figure 3.12 Aerial Photograph of Reach 5 at Widener's Curve (March 2001)	93
Figure 3.13 Rock and Groin in Reach 6 (February 2001).....	94
Figure 3.14 Exposed Anastasia Formation in Reach 7.....	94
Figure 3.15 Oblique Aerial Photograph of The Concave Shoreline in Reach 7 (1999).....	95
Figure 3.16 Lake Worth Public Beach, Immediately South of Lake Worth Pier (Reach 8)	96
Figure 3.17 Exposed Seawall Near R-135 (Reach 8).....	96

Figure 3.18 Typical Beach and Seawall Conditions Near R-143 Along Reaches 9 & 10	96
Figure 3.19 South Lake Worth	97
Figure 3.20 Highest Surveyed Elevation of Rock Within Project Area.....	100
Figure 3.21a Typical Nearshore Hardbottom Habitat, Towed Video Survey, DNR Monument R-91	113
Figure 3.21b Typical Nearshore Algal Fouling Community, Still Photo, DNR Monument R- 91	113
Figure 3.22 Typical Intermediate Hardbottom Habitat, Video Capture Image, DNR Monument R-103	114
Figure 3.23 Typical Offshore Hardbottom Habitat Breaker's Coral Reef, DNR Monument R-94	115

LIST OF TABLES

Table 1.1 Properties with Seawalls in Project Vicinity Expected to Benefit by Project.....	3
Table 1.2 Recreational Use of Phipps Ocean Park (1993 to 1999)	5
Table 2.1 Structures Impacted with No Action Alternative	31
Table 2.2a Number of Structures Impacted with “No Action” Alternative	44
Table 2.2b Number of Structures Impacted with the Applicant’s Preferred Alternative	45
Table 2.3 Alternative 4 – Increased Fill Design Characteristics	56
Table 2.4 Comparison of Direct & Indirect Impacts for Alternatives Evaluated in Detail.....	68
Table 3.1 Predicted Peak Storm Surge (ft MSL).....	74
Table 3.2 Lake Worth Inlet Sediment Budget, 1977 to 1994 and 1994 to 2000.....	79
Table 3.3 Inlet Sediment Sinks and Mechanical Transfer – 1974 to 1994.....	81
Table 3.4 Inlet Sediment Sinks and Mechanical Transfer – 1994 to 2000.....	81
Table 3.5 Palm Beach Island Reaches.....	83
Table 3.6 Shoreline (MHWL) Change Rates From 1928-1974, 1974-1990 and 1990-2000.....	87
Table 3.7 Volume Change Rates from 1974-1990 and 1990-1997	89
Table 3.8 Volume Change Rates 1929-1957 and 1957-1979.....	90
Table 3.9 Summary of Net Volume Change Rates	98
Table 3.10 Summary of Historic Nourishment Volumes, Reaches 2 – 11.....	98
Table 3.11 Summary of Historic Erosion Volumes	99
Table 3.12 Native Beach & Borrow Area Grain Size Characteristics	102
Table 3.13 Mitigation Potential as Related to Provisional Classification of Nearshore Hardbottom Habitat on the Inner Shelf of Palm Beach County	112

Table 3.14 Essential Fish Habitat Areas.....116

Table 4.1 Summary of Past, Present, and Proposed Future Projects and Direct Hardbottom
Impacts Within Lake Worth Inlet to South Lake Worth Inlet Region137