4.0 ENVIRONMENTAL CONSEQUENCES

Comments pertaining to the T-Head Groin Alternative can be found in Appendix M, as this alternative is not addressed in this section.

4.1 Tides, Winds, Currents and Waves

Tides, waves, currents, and storm events impact sediment transport in the coastal environment and are factors in determining sediment loss in an area. Since the fill volume is minimal and no structures will be constructed, large-scale changes in tides, waves, currents, and alterations in storm events are not expected with the proposed beach fill project design.

4.1.1 Alternative 1 - No Action

The No Action Alternative will not impact tides, waves, currents, or storm events. However, storm event driven erosional losses and background erosional losses to the coastline are to be expected as a result of No Action in the Project Area. If No Action is taken the area will become increasingly susceptible to storm damage as the beach and dune are continually eroded away. Onshore losses (above MHW), as described in Sections 3.1 to 3.3, and the background erosion rate are not expected to change as a result of "No Action."

4.1.2 Alternative 2 - Beach Fill with Structures

The Beach Fill with Structures Alternative will not significantly or quantifiably impact tides, winds, current, or waves in the Project Area. As described in 4.1.3, the background forces shaping the shoreline are not altered by the placement of sand or construction of rock groins. Added sediment will temporarily increase the beach profile and provide added storm protection and habitat. Installation of structures will increase sand retention slightly, but over the long-term, the fill performance is not significantly better than without the structures. The wave climate may be altered in the vicinity of the borrow area following dredging.

4.1.3 Alternative 3 - Applicant's Preferred Alternative - Beach Fill with Periodic Nourishment

The Applicant's Preferred Alternative will not impact tides, waves, currents, or storm events. This implies the forces directing the sediment will remain the same. Consequently, the background erosion rates will also remain the same and the storm event volume loss will not be altered. Nourishment of the beach will slow the progression of the background erosion and add storm protection for the landward structures. The added sediment will protect the loss of currently threatened beach and structures. The wave climate may be altered in the vicinity of the borrow area following dredging.

4.2 Beach and Inlet Geology and Geomorphology

4.2.1 Alternative 1 - No Action

Sediment will continue to erode from the shoreline in the Phipps Ocean Park Project Area. It is anticipated that without nourishment, landowners will erect seawalls to protect their property from the encroaching sea. Sediment transport patterns will be altered through the construction of such seawalls and other structures and erosion of the shorelines downdrift of the seawalls is to be expected.

4.2.2 Alternative 2 – Beach Fill with Structures

The Beach Fill with Structures Alternative is not expected to have any quantifiable impact on beach and Inlet geology or geomorphology over the long-term in the area between Lake Worth and South Lake Worth Inlet. The construction of rock groins would create new near shore rock habitat when exposed; however, the new habitat is relatively insignificant in the inlet-to-inlet region. Construction of groins in the Project Area would likely have a direct impact on some existing nearshore hardbottom resources.

4.2.3 Alternative 3 - Applicant's Preferred Alternative - Beach Fill with Periodic Nourishment

Littoral processes such as background erosion, sediment pathways, and influence of Lake Worth Inlet on the shorelines will remain the same; however, there will be increased volumes of sediment in the system causing the impacts of erosion to be diminished. The nourishment fill will directly impact 3.1 acres of hardbottom as determined by the FDEP. Due to the extensive hardbottom in the County, this minimal coverage is not expected to regionally alter the sedimentation patterns. Increased sediment in the system will reduce sediment deficiencies in and downdrift of the Project Area.

4.3 Sediment Characteristics of Borrow Area and Native Beach

4.3.1 No Action

The No Action Alternative will maintain the native sediment characteristics in the Project fill area and within the borrow area as described in Section 3.3.

4.3.2 Alternative 2 – Beach Fill with Structures

The Beach Fill with Structures Alternative will place approximately 1.5 million cubic yards of compatible material from an offshore borrow area onto the beach and result in the installation of six rock groins. The resulting beach will have slightly different sediment characteristics than the native beach (see Section 3.3); however, no adverse environmental consequences are expected with regard to the placement of borrow sediment. The sediment characteristics of the primary borrow area have been reviewed and conform to the provisions of Chapter 62B-41, Florida Administrative Code (specifically, 62B-41.007(2)(j)).

4.3.3 Alternative 3 -Applicant's Preferred Alternative - Beach Fill with Periodic Nourishment

The Applicant's Preferred Alternative will place approximately 1.5 million cubic yards of compatible material from an offshore borrow area onto the beach. The resulting beach will have slightly different sediment characteristics than the native beach (see Section 3.3); however, no adverse environmental consequences are expected with regard to the placement of borrow sediment. In response to a July 21, 2000 request from the Town of Palm Beach, the FDEP issued "Geotechnical Variance No. 0165332-002-EV" for the Project. This variance was specifically intended to address "relief from Rule 62B-41.007(2)(j) F.A.C. to provide a waiver from the requirement that fill material be 'free of coarse gravel and cobbles' and to provide a variance from the 'greater than 5 percent fines or gravel' standard." In October 2001, FDEP changed its policies and amended its rules to disallow "(a) Coarse gravel, cobbles or material retained on the ¾ inch sieve in a percentage or size greater than found on the native beach (emphasis added), and (b) Greater than 5 percent, by weight, silt, clay or colloids passing the #230 sieve". As identified in Appendix K, the Project borrow areas meet these existing rule provisions and the variance is no longer necessary under existing FDEP rules.

The sediment characteristics of the primary borrow area, after review and analysis by FDEP, have been found to conform to the provisions of Chapter 62B-41, Florida Administrative Code (specifically, 62B-41.007(2)(j))

4.4 Beach and Dune Vegetation and Wildlife

4.4.1 Alternative 1 - No Action

The No Action Alternative would have an impact on the vegetation resources within the Project Area. Continued erosion of the County's beaches would result in continued loss of habitat and eventual loss of vegetated dune areas. Also, the armoring measures that would be taken by residents along the beaches in these areas would result in impact to the plant and animal communities within these areas.

4.4.2 Alternative 2 – Beach Fill with Structures

The Beach Fill with Structures Alternative would have no impact to the vegetation resources of the County. Sand placement on the beach would not impact the nearby dune communities. The placement of the material on the beach along with the associated structures would act as a buffer to these communities from storm related surge.

4.4.3 Alternative 3 - Applicant's Preferred Alternative - Beach Fill with Periodic Nourishment

The Applicant's Preferred Alternative would have no negative impact to the vegetation resources within the Project Area. Sand placement on the beach would only help to protect the beach vegetation already present on the beaches. The existing dune in the Project Area is of adequate size and dimension and no dune enhancement is planned at this time. Restoration of that dune is not necessary at this time. Vegetation may be added to the existing dune at a later date to be determined by the Applicant.

Nelson (1989) reviewed the literature on the effects of beach renourishment projects on sand beach fauna and concluded that minimal biological effects resulted from beach nourishment. In addition, some mortality of organisms may occur where grain size is a poor match to existing sediments; however, recovery of the beach system appears to be rapid. Nelson reviewed several studies on the most common beach invertebrates of the southeastern U.S., including the mole crab, *Emerita talpoida,* the surf clam, *Donax sp.*, and the ghost crab *Ocypode quadrata*. None of the studies cited by Nelson showed significant or lasting impacts to any of the above species resulting from beach nourishment. Hackney et al. (1996) provide a more recent review of the effects of beach restoration projects on beach infauna in the southeastern U.S. They also reviewed studies on the above species and agree with the conclusions set forth by Nelson (1989), with the suggestion that construction should take place in winter months to minimize impacts, and that the sand used should be a close match to native beach sand. In review of past studies, there was a considerable short-term reduction in the abundances of mole crabs, surf clams, and ghost crabs attributable to direct burial. Recruitment and immigration were generally sufficient to re-establish populations within one year of construction. The proposed Projects will be constructed in the winter season, outside the recruitment window for these species, with a high quality sand source containing a small percentage of fine material. These features operate to minimize adverse effects on most beach infauna (Hackney et al., 1996). The proposed Project will not have any significant, long lasting impacts on sand beach infaunal communities.

4.5 Threatened and Endangered Species

4.5.1 Alternative 1 - No Action

The No Action Alternative would negatively impact the threatened and endangered species utilizing these habitats. The continued erosion of the beaches in this critically eroded area may result in the armoring of additional shoreline over the next 30 years. This loss of beach habitat would have the greatest impact on sea turtles that utilize this habitat for nesting. Nesting success may be diminished as the total area of suitable nesting habitat is reduced by continuing erosion. In some areas, particularly in the vicinity of armoring structures, sea turtle nesting habitat may be lost completely. The hatching success of nests that are successfully laid will also be reduced, as nests on narrow, eroded beaches are more vulnerable to repeated inundation and washout. Loss of beach width would additionally reduce the habitat for the least tern and piping plover, which utilize these littoral and vegetated beach habitats.

4.5.2 Alternative 2 – Beach Fill with Structures

The placement of fill and structures on the beaches within the study area will have temporary and potentially long-term impacts. Nesting success on nourished beaches may be impacted directly following construction, but should normalize within one to two years following construction. The placement of structures along the beachfront may have long-term impacts on sea turtle nesting and migration throughout the area. The structures may alter the nearshore habitat areas important to sea turtle nesting and foraging.

4.5.3 Alternative 3 - Applicant's Preferred Alternative - Beach Fill with Periodic Nourishment

The placement of material on the Town's beaches would temporarily impact threatened and endangered species and efforts will be taken to greatly minimize these impacts. On the Atlantic shoreline of Florida, sea turtles typically nest between April and August, with late season nest deposits resulting in emergent hatchlings extending into late October. In similar projects on the Atlantic shoreline, nesting densities north and south of the fill area have been shown to increase, implying that nesting may be displaced from the fill area, but not necessarily reduced overall. It has also been found that following some beach nourishment projects, there is no reduction in nesting density even within the fill area itself. Bagley et al. (1994) and Ehrhart et al. (1994) both discuss the effects of beach nourishment on emergence success on nourished beaches. Specifically they address scarp formation and it's affect on turtle emergence. They found an increase in nesting on nearby beaches. They postulate that the turtles that tried to nest on the nourished beach and could not, then nested on the closest available suitable beach. Crain et al. (1995) also summarizes these two papers and draws this conclusion.

The Applicant has compiled all reasonably available sea turtle nesting data for Palm Beach County area and the Phipps Project Area, which is presented in detail in Appendix C, Cumulative Impact Assessment Report (CIAR). The relationship between nesting densities and beach width and general nesting trends between Lake Worth and South Lake Worth Inlet are presented. The CIAR discusses how beach nourishment can have both positive and negative effects on nesting behavior and success. In the first year following beach nourishment, there can be a reduction in nesting density in the fill area that can be accompanied by an increase in nesting density in adjacent beach areas. Palm Beach County Environmental Resources Management (ERM) also has valid data for at least one project that indicate that there is no reduction in nesting density in the first year following beach nourishment.

State and federal regulatory agencies require that construction be limited to a time period outside of the nesting season (1 November to 1 March) in order to minimize impacts to nesting and hatchling sea turtles. Construction activities are scheduled outside of the prime-nesting season of sea turtles; thus minimizing impacts to sea turtle nesting. Most Project impacts on sea turtle nesting success are expected to be limited to the first year, with some effect persisting into the second year.

The potential negative impacts of beach nourishment activities on marine sea turtle nesting are described In Appendix C, Cumulative Impact Assessment Report. In addition, the USACE has also identified the potential consequences of nourishment activities on sea turtle nesting in the environmental review of Federal beach restoration projects on the southeast Florida coast. In the Final Environmental Assessment, "Renourishment at Miami Beach in the Vicinity of 63rd Street, Beach Erosion Control and Hurricane Protection Project, Dade County," the USACE-Jacksonville District noted, "Beach nourishment and associated activities have the potential to impact sea turtles and may have the following effects:

a. Scarp development leading to hindrance or blockage of accessibility to nesting habitat;
b. Adverse alteration of moisture levels or temperature in beach due to modified nesting material;
c. Compaction and cementation of beach sediments that cause reduced nesting success and aberrant nest cavity construction resulting in reduced nesting and/or hatching success;
d. If carried out during the nesting season, there is a potential for the destruction of nests that are not identified during the daily nest survey and relocation program; and
e. Disruption of nesting activities that could lead to poor nest site selection and energetic cost diminishing egg production."

However, nests laid on renourished beaches generally hatch successfully (Nelson and Dickerson, 1988). Herren (1999) found no significant difference in hatching success in the renourished area in the first or second season after a sand transfer renourishment at Sebastian Inlet, Indian River County. Ecological Associates Inc. (EAI, 1999) found lower overall hatch success on nourished beaches following construction compared to controls, but the differences were not statistically

different. Indirect impacts that may be associated with placement of material on the beach may include unusual nest placement, scarping, temperature effects, and increased numbers of false crawls. The EAI study did show changes in incubation environment, but these changes did not affect the hatching success. The primary source of impact was erosional losses of low-lying nests on the newly constructed berms (EAI, 1999; Herren, 1999). A proper relocation program could significantly reduce this source of impact. Details of measures being taken to reduce these impacts are detailed in Appendix F, Part IV.

As set forth in the FDEP permit for the Phipps Project and included in Appendix F, Physical and Biological Monitoring Program, the Phipps Ocean Park Project design and post-construction monitoring/response program adequately addresses the potentially negative impacts of the project on nesting sea turtles. First, a sloped profile of the nourished beach has been designed to reduce the development of scarps that can hinder nesting success. Because scarps can form, post-construction monitoring is required as set forth in Appendix F, and the Applicant is required to remove them, in accordance with the FDEP permit. Second, the proposed borrow sand has been tested for compatibility with the native beach and approved for use by FDEP. As described in Section 3.3, the sand is similar in grain size, color, mineralogy, and composition to native beach sand, which is suitable for sea turtle nesting. (See also Section 3.6 and Appendix K, Supplemental Geotechnical Analysis). Third, following construction for a period of four years, compaction of the restored beach will be tested and, if compaction rates exceed the limits established in the FDEP permit, the beach will be tilled in accordance with permit provisions (See Appendix F, Physical and Biological Monitoring Program and Appendix L, FDEP Permit, Phipps Ocean Park Beach Restoration Project). Finally, as required in the FDEP permit, the Project will not be constructed during the turtle-nesting season.

Similar to the USACE's conclusions reached regarding the Federal projects planned for the Phipps Ocean Park area in 1987 and 1996, periodic beach nourishment can, considering other potential impacts on turtles, preserve and enhance marine turtle nesting areas on eroding shorelines. It can be expected that the Phipps Project will increase the dry beach area suitable for nesting and improve turtle access to the dry beach in areas that are currently inaccessible due to the exposed rock “cliffs” and rock “fields.” However, it is important to recognize that marine turtle nesting success is a complex natural dynamic and depends on multiple factors, including beach temperature, scarp formation, and sand grain size and compaction. The post-project monitoring program for the Phipps Ocean Park Project requires these parameters to be monitored and corrective actions to be taken if problems are identified (see Appendix F, Physical and Biological Monitoring Program).

Very little data exist on the seasonality of use and dietary habits of juvenile turtles within this area. However, it is believed foraging juvenile green turtles may utilize nearshore habitats similar to those on the Phipps Project Area. Green turtles typically develop in habitats that are shallow, protected waters where seagrasses are prevalent (Carr et al. 1978), but small green turtles are also commonly found in reef environments where attached algae is present (Ehrhart et

al. 1996) (Coyne 1994). It has been suggested that green turtles in foraging habitats may tend to specialize in either algae or seagrass forage, as individual turtles with intestinal microbial flora adapted to aid in seagrass digestion would digest algae less efficiently, and vice versa (Bjorndal 1985). University of Central Florida researchers along the Indian River County coast have done some preliminary work on this subject, but published data is not yet available. Placement of material along the nearshore areas of Palm Beach County may have an impact on foraging juvenile turtles within the project toe of fill. Considering the large amount of similar habitat available outside of the Project Area and the requirement that the Applicant construct a 3.1 acre mitigation reef six months before the beach fill, impacts to foraging habitat should be temporary and minimal.

Consistent with established Federal practices governing beach restoration projects, impacts to other species such as the least tern, and piping plover will be minimized by timing the construction activities outside of the main breeding season, which peaks in late summer.

4.6 Offshore Borrow Area Resources

4.6.1 Alternative 1 - No Action

The No Action Alternative will have no impact on the native characteristics of the offshore borrow area or any of its associated resources.

4.6.2 Alternative 2 – Beach Fill with Structures

Dredging has spatially and temporally limited impacts to benthic infaunal communities and sessile epifauna. In some cases, the bottom topography of borrow areas outside the depth of closure may be altered for extensive periods of time. However, most studies on the infauna of sand borrow areas have shown little lasting impact in terms of species diversity and total abundance or density. Previous studies have shown dredging to have little long-term adverse effects on benthic habitats (Culter and Mahadevan, 1982; Saloman et al., 1982; Hammer, et al., 2000). Johnson and Nelson (1985) found that abundance and species richness returned to near normal 9-12 months after dredging off Fort Pierce Inlet in the same general location as the proposed Project. Similar results were reported by Saloman et. al. (1982) off Panama City Beach, Florida and by Tuberville and Marsh (1982) in Broward County. Benthic infauna should be expected to start re-colonizing these areas within days after dredging is completed. The walls of the dredge cut will adjust to a slope determined by the grain size of the material.

As identified in Appendix G, Vessel Operations Plan, the side slopes of the borrow areas, consistent with accepted industry standards, will be approximately 1V:3H. The calculation of borrow area material volume takes into account the 1V:3H slope required in the Vessel Operations Plan. The cross-sections of the borrow areas are included in Appendix L, FDEP Permit.

Silt content in the borrow area can also impact benthic community re-colonization. Barry A. Vittor and Associates, Inc. (1999) found that the amount of silt/clay present within sediments and the location of the offshore borrow area can, in some conditions, delay the recovery time of benthic infauna following dredging. Since very little fine material (silt/clay) is present within the borrow areas identified by the Applicant, the presence of fine material is unlikely to impact benthic re-colonization rates and recovery should occur rapidly within the borrow areas identified by the Applicant. Based on a review of current published data, it is estimated that infaunal assemblages within the Phipps borrow areas will become re-established within 12 to 24 months of dredging. The Vessel Operations Plan requirements governing dredging practices will help aid in the re-colonization of benthic organisms.

4.6.3 Alternative 3 - Applicant's Preferred Alternative - Beach Fill with Periodic Nourishment

Since fill placement for Alternative 2 (described above) is identical to the fill placement for the Applicant's Preferred Alternative, the direct impacts to offshore borrow area resources will be similar for the initial construction. Since Alternative 3 will require periodic renourishment of the beach in years following the Project, other impacts can be expected to offshore borrow area resources. Assuming sufficient time for re-colonization between nourishment events, there should be no long-term cumulative effects to the communities within the borrow areas.

4.7 Hardbottom Resources

4.7.1 Alternative 1 - No Action

The No Action Alternative will allow sand to continue to be eroded from the study area. This continued erosion would persist in exposing more hardbottom along the beach as the sand is washed away.

4.7.2 Alternative 2 – Beach Fill with Structures

Implementation of Alternative 2 would impact 3.1 acres of nearshore hardbottom habitat. Exposed rock, sand-veneered rock, and rock on sand comprised the nearshore survey area. Sabellariid worm rock, sponges, and algae dominate these habitats. Although direct impact to 3.1 acres of hardbottom would occur, placement of structures along the beach would allow for colonization along these structures. However, sand retention on the up drift side of these structures could also cause further coverage of existing natural rock areas.

4.7.3 Alternative 3 - Applicant's Preferred Alternative - Beach Fill with Periodic Nourishment

The Applicant's Preferred Alternative would impact 3.1 acres of nearshore hardbottom habitat. This habitat is primarily exposed rock or sand-veneered rock dominated by sabellariid worm rock, sponges, and algal species. The nearshore outcrops are subject to periodic increased turbidity by storms and wave activity. As a result, the biological communities that inhabit this nearshore zone are made up of stress-tolerant, opportunistic species. Lindeman and Snyder (1999) suggested that the nearshore hardbottom plays an important role due to its cross shelf positioning, lying between estuarine developmental habitats and adult marine habitats. As a result, the Applicant is required to complete construction of the 3.1 acre mitigation reef six months before placement of fill material on the beach. Once buried, nearshore hardbottom habitat will remain in place but it will not be re-exposed unless renourishment activities are suspended or interrupted.

Consistent with the USACE's determination and analysis in the 1987 Palm Beach Island GDM/EIS and the 1996 COFS, the nearshore hardbottom impacts from the Applicant's Preferred Alternative are treated as "temporary and reversible", rather than a "permanent loss." (See 1987 Palm Beach Island GDM/EIS, Table 4, page 48, regarding "reversibility" of nearshore hardbottom impacts, concluding, "Fill material could be removed at any time by allowing the nourished beach to erode by discontinuing periodic nourishment.")

While no nearshore rock will be permanently lost, the temporal loss of this habitat is expected as the Applicant intends to maintain the Project once constructed. The mitigation reef will replace all 3.1 acres of nearshore hardbottom impacted by the beach fill, so no net loss of hardground resources will occur. Appendix E, Mitigation Reef Plan and Monitoring Program, outlines an extensive post-construction program to scrutinize the condition and quality of the mitigation reef and the Applicant can be required to undertake remedial action if the habitat created is deficient or inadequate.

Impacts to the offshore area adjacent to the beach fill site are expected to be inconsequential, as the sand bottom is devoid of exposed rock or reef for a distance of approximately 8,000 feet offshore. Since no hardbottom exists between the borrow areas and the fill area, additional hardbottom impacts are not expected and any can be avoided by the proper designation of pipeline access corridors between the borrow areas and the fill area. These measures, along with the careful monitoring of turbidity within the borrow areas and nearshore areas, will avoid and minimize other hardbottom impacts.

4.8 Essential Fish Habitat

4.8.1 Alternative 1 - No Action

The No Action Alternative would have no impact to EFH within the study area.

4.8.2 Alternative 2 – Beach Fill with Structures

Alternative 2 would impact open sand, hardbottom, and open water habitats. The hardbottom communities within the study area are designated as EFH-HAPC by the SAFMC (1998). A total of 3.1 acres of hardbottom habitat would be impacted by implementation of this alternative. The addition of structures would create additional hardbottom habitat within the area impacted. While this would not totally replace the natural habitats lost, it would over time help to mitigate any losses attributed to this alternative. The proposed toe of fill would also temporarily impact approximately 114.8 acres of open water habitat along the Project Area occurring from the MHWL and extending approximately 350 to 650 feet offshore. These temporary impacts would include displacement of fishes and some invertebrates from nearshore areas during dredging and fill placement. Other impacts include temporary loss of water quality due to turbidity and decreased primary productivity until the completion of nourishment.

4.8.3 Alternative 3 - Applicant's Preferred Alternative - Beach Fill with Periodic Nourishment

Implementation of the beach nourishment associated with the Applicant's Preferred Alternative will impact hardbottom areas and open water habitat designated as EFH. The hardbottom communities offshore of Palm Beach County have been designated as EFH-HAPC by the SAFMC (1998). There would be a total of 3.1 acres of hardbottom habitat directly impacted by the proposed nourishment. Temporary impacts similar to those described above would also occur. These temporary impacts would include displacement of fishes and some invertebrates from nearshore areas during dredging and fill placement. Other impacts include temporary loss of water quality due to turbidity and decreased primary productivity until the completion of nourishment.

Nearshore ephemeral hardbottom is predominantly characterized by opportunistic fouling organisms which can be compensated for by construction of artificial reefs. A 3.1 acre mitigation reef is planned. Observations and preliminary data suggest that artificial reefs can be very successful in replicating natural nearshore hardbottom habitat.

4.9 Coastal Barrier Resources

The purpose of the Coastal Barrier Resources Act is to minimize the loss of human life, wasteful expenditure of federal funds, and damage to fishes, wildlife, and other resources associated with the coastal barriers along the Atlantic coast. This is implemented by restricting future federal expenditures and financial assistance, which have the effect of encouraging development of these coastal barriers. There are no designated Coastal Barrier Resource Act Units located within or adjacent to the Project Area.

4.10 Water Quality

Direct impacts to water quality resulting from the dredging of material from the borrow area and subsequent beach disposal should be minimal. The beach disposal could cause elevated turbidity at the edge of a 150-meter mixing zone originating from the point of discharge of fill material onto the beach. Accordingly, the Applicant has requested a variance from Rule 62-4.244(5)(c), F.A.C. to establish a temporary mixing zone measured at two points: 1) 300 meters offshore; and 2) 1,000 meters alongshore from the point of sand discharge onto the beach, in an area within Class III Waters of the State.

It is typical for beach fill projects on the open coast to be granted a variance to the mixing zone criteria of 62-4.244 (FAC); the proposed Phipps project is not unique in such a request. The concept of a mixing zone was developed principally for discharges into receiving waters that either had unidirectional flow (riverine) or simple tidal forcing (estuarine), and also typically for a static point of discharge. Special challenges exist when the discharge of a conservative constituent, especially sediment, takes place into a water body that exhibits both tidal forcing and wave action (ocean), and for a discharge point that moves daily. Wave action produces onshore-offshore water movement as a result of induced water column orbital velocities, as well as alongshore water movement as a result of the incident angle of the waves with respect to the shoreline. The magnitude of the orbital velocities may vary greatly depending on the wave heights at the time and incident wave angles may vary over the entire range of possible offshore directions of approach. As a result, and with the concurrent variability of tidal stage and tidal current direction, all the forces and water movement components may reinforce each other causing much greater potential suspended sediment transport than any single element might by itself. In addition, because of the directional variability of each factor, the entire regime is in effect oscillatory and therefore requires not only an expanded mixing zone size, but also one applied in both directions from the moving point of discharge.

There may be no practical means known to further minimize the potential for elevated turbidity using the borrow material selected and considering hydrodynamic processes in the nearshore area at the beach nourishment site. The beach nourishment work will be accomplished in a manner that minimizes the potential for elevated turbidity, including the use of construction dikes and a minimum setback for the discharge pipe from open water at the beach. A turbidity-mixing zone of 300 meters offshore and 1,000 meters alongshore from the point of discharge has been approved by the FDEP staff. Turbidity will be monitored during the beach disposal work to ensure compliance at these limits. The areas of nearshore hardbottom habitat adjacent to the Project Area are not anticipated to be impacted from the recommended temporary increase in turbidity resulting from the beach disposal of material. The nearshore outcrops are subject to periodic increased turbidity by storms and wave activity. As a result, the biological communities that inhabit this nearshore zone are made up of stress-tolerant, opportunistic species. The offshore area adjacent to the beach fill site is characterized by sand bottom devoid of exposed rock or reef out to approximately 8,000 feet offshore. Therefore, extending the mixing zone from 150 meters to 300 meters offshore is not expected to have any adverse affect on the conservation of fishes, endangered or threatened species, or their habitat. The proposed action would cause temporary increases in turbidity at borrow area and beach disposal sites.

The rock material to be placed at the artificial reef site will be clean and free of any significant amount of fine or silty material. However, there may be some slight elevation of turbidity in the immediate disposal area. There may also be some disturbance of the bottom sediments as the rock hits the ocean bottom, causing some minimal turbidity. The State of Florida water quality regulations require that water quality standards not be violated during dredging operations. The standards state that turbidity outside the mixing zone shall not exceed 29 NTU's above background. Results from turbidity monitoring at previous beach nourishment projects have shown that the turbidity did not exceed the standard. Various protective measures and monitoring programs would be conducted during construction to ensure compliance with State water quality criteria. Specific Condition 11 of the FDEP permit requires maintenance of a shore-parallel dike at the beach disposal area at all times during dredging operations. In addition, Specific Condition 14 of the FDEP permit requires water quality monitoring during dredging operation. Compliance samples within the mixing zone must be within the 29 NTU above background limit or all dredging operations stop until the standard is met. These FDEP permit provisions will be fulfilled during construction. Appendix L includes a complete copy of the FDEP permit.

Should turbidity exceed State water quality standards as determined by monitoring, the contractor would be required to cease work until conditions returned to normal. The use of other submerged borrow sites would have similar turbidity impacts on water quality to using the proposed borrow areas. Use of upland sources would not have the impacts associated with dredging an offshore borrow area, but would have the same impact along the beach fill area.

4.11 Hazardous, Toxic, and Radioactive Waste

Implementation of all alternatives evaluated in detail will have no impact on HTRW within the study area.

4.12 Air Quality

Direct emissions from the proposed action would be confined to exhaust emissions of labor transport equipment (land and water vehicles), and construction equipment (dredge barges). These emissions would likely be well under the *de minimus* levels for ozone non-attainment areas as cited in 40 CFR 91.853; that is, projects implemented cannot produce total emissions greater or equal to 100 tons/yr of Volatile Organic Compounds (VOCs). Any indirect increase in emissions (indirect emissions), as a result of the proposed action is beyond the control of the Town and USACE. Consequently, a conformity determination with the Florida State Implementation Plan is inappropriate for increases of indirect emissions from the proposed action. Continued development in the area is likely under regardless of the action taken, which may cause marginal adverse impacts to air quality. The extent of these impacts, however, is difficult to predict.

4.13 Noise

With the implementation of the proposed action, there would be a temporary increase in the noise level during construction. The principle noise would stem from the vicinity of the discharge point on the beach, the mitigation reef construction site and the dredge. Construction equipment would be properly maintained to minimize the effects of noise. Increases from the current noise levels as a result of the proposed action would be localized and minor, and limited to the time of construction. There would be no noise related impacts associated with the No Action Alternative.

4.14 Aesthetic Resources

The Applicant's Preferred Alternative will adversely impact the aesthetics of the Project Area during construction but improve the Project Area aesthetics over the long term. Hundreds of feet of dredge pipe lying on the beach or just offshore would have a temporary negative visual impact on the aesthetics of the area. This impact would be eliminated with removal of the pipe at the completion of the work. The negative visual impacts of the equipment and pipe would be offset in part by the natural curiosity of some individuals observing how work is progressing. There would also be a temporary increase in turbidity during construction adjacent to the point of discharge. Turbidity would return to normal levels once construction activities cease. Once completed, the proposed Applicant's Preferred Alternative would result in an overall improvement to the aesthetic quality of the Project Area because the placement of sand on the beach would restore the natural appearance of the shore. With the No Action Alternative, the shoreline would continue to erode. This would result in the loss of existing shoreline and sandy beach areas, which would reduce the visual aesthetics of the area.

Initially, the beach fill material will be grayer in color than the native beach sands. However, over time, the placed sand will lighten in color after drying, exposure to air, and “bleaching” by sunlight. As is typical of similar beach nourishment projects, escarpments will likely for as the beach reaches its equilibrium profile. Appendix F, Physical and Biological Monitoring Program, and Appendix L, FDEP Permit, Phipps Ocean Park Beach Restoration Project, describe the means and methods that will be employed to monitor for and remove escarpments or gravel pockets that form as the beach fill adjusts. During construction of the beach, and to the extent necessary to remove escarpments and course gravels, some heavy equipment will be present on the beach, affecting the visual and auditory aesthetics of the Project Area.

4.15 Recreational Resources

During nourishment activities, the use of the beach in the vicinity of construction can be expected to drop or be restricted temporarily for public safety in the immediate area of the discharge pipe and equipment. Noise from the heavy equipment needed to spread and smooth the sand would disturb some users as well. Many visitors would seek quieter areas for sunbathing or swimming. As portions of the renourished beaches become available, use by the

general public is expected to increase once more. The expanded dry beach will create more space for visitors interested in beach recreational activities, such as sun bathing, volleyball, kite flying, and similar activities.

Upon completion, use of the Project Area by the general public and those who stay at the nearby condominiums and hotels can be expected to rapidly return to pre-project activity levels and increase over time. The general public is expected to use the restored beach in the Project Area, rather than bypassing it for wider beaches with more sand above the high tide line. The burial of nearshore hardbottom will eliminate these areas for use by snorkelers, so long as the Applicant maintains the project. However, according to lifeguards at this public beach facility, the area is has not been heavily utilized for snorkeling in the past and any impact would be minimal. Regardless of how small, the impact on nearshore snorkeling activities is expected to be offset by the construction of the 3.1-acre mitigation reef. This reef, which will be located at a depth of 5 to10 feet - outside the breaking surf zone under typical summer wave conditions - is likely to be equally or more attractive to snorkelers than the pre-project conditions, as the area is likely to be less turbid and many snorkelers are less skilled in breaking wave and surf conditions. It is also expected that the mitigation reef will attract some SCUBA divers.

Finally, there could be a temporary adverse effect on recreational fishing in the immediate area of beach fill operations and at the borrow area due to construction activities and turbidity. Fishing would not be affected outside the area of immediate construction. Boat operations may be detoured during construction activities; however, the extent of these detours and time frame of operations render these impacts insignificant. With the No Action Alternative, the shoreline would continue to erode. This would eventually reduce the amount of beach available for recreation and would result in the degradation or loss of shorefront property thus, adversely impacting beach recreational opportunities within the area. There would be no construction related impacts to fishing, snorkeling and SCUBA diving with the No Action Alternative.

4.16 Cultural Resources

Archival research and field investigations of the borrow areas were conducted by CP&E in March 2000 (See Section 1.6, Report j). In Borrow Area IV, three magnetic anomalies were identified that generally exhibit characteristics consistent with those of historic submerged cultural resource. However, the magnetometer signatures within the borrow areas have not been identified as cultural resources. As a precaution, in case these anomalies are a cultural resource, a 200-foot buffer has been imposed on the dredge operation, eliminating potential impact to these areas. The estimated slope of the final borrow area cut is approximately 1 vertical to 3 horizontal. With a maximum cut thickness within the borrow area of 20 feet, the bottom of the cut will be about 60 feet away from the 200-foot buffer around the Borrow Area IV anomalies. The objects -- whether of cultural significance or not -- will not be exposed during dredging operations and therefore no impact to the objects can be reasonably expected.

In Borrow Area III, one magnetic anomaly cluster was detected at the approximate location of a charted and inactive outfall pipeline. A 100-foot buffer area was established to avoid impacts to

this cluster. Consultation with the State Historic Preservation Officer was completed on June 22, 2000 in accordance with 36 CFR, Part 800 ("Protection of Historic Properties") and Chapter 267.061, Florida Statutes, as implemented through 1A-46 Florida Administrative Code. The cultural resource buffers were coordinated with the SHPO and determined to be protective of these features.

4.17 Health and Safety

No unique health or safety concerns have been identified with respect to the Applicant's Preferred Alternative or any other alternative evaluated in detail. During construction, appropriate signage warning of temporary conditions unsuitable for visitors will be placed as required or applicable.

4.18 Energy Requirements and Conservation

The energy requirements for this construction activity would be confined to fuel for the dredge, labor transportation, and other construction equipment. The expenditure of energy would be much less using the proposed borrow areas than obtaining material from other sources described in the alternatives section. For example, the use of sand from the Bahamas or other distant sources would require the use of more energy to transport the sand. The use of upland sand would most likely require the expenditure of additional energy to perform repairs to local roads and highways damaged by trucks hauling material to the beach. The No Action Alternative would allow conditions to further develop that may endanger coastal property from storm surge and wave erosion during future storm events. On-site preventive measures and post clean up under the No Action Alternative would likely demand greater energy than that required of the proposed action.

4.19 Natural or Depletable Resources

In this case, the beach quality sand used to construct the Project is a depletable resource. Using sand from the proposed borrow area will deplete the sand source from the areas dredged at that site. Eventually the sand will be redistributed over nearshore areas. It is unlikely that the redistributed sand will return to the same location from which it was removed, resulting in a depletion of resources in the borrow areas. The gasoline and diesel fuel used by the dredge and other construction equipment is also a depletable resource.

4.20 Cumulative Impacts

The direct impacts from past, present and proposed beach restoration activities on the nearshore hardbottom resources within the Project Impact Zone, Proposed Project Zone, and Regional Institutional Zone are summarized in Table 4.1. Information within the Project Impact Zone (Applicant's Preferred Alternative) and the Proposed Project Zone are accurate and assumes all

projects have a high probability of being funded and permitted with appropriate mitigation. Indirect impacts are more difficult to ascertain inside and outside the County unless readily provided. A thorough Cumulative Impact Assessment Report is located in Appendix C.

4.20.1 Hardbottom Summary

The hardbottom in the Project Area is composed in part of sessile organisms including macro algae, sponges, sabellariid worm rock, and, to a lesser extent, soft and hard corals. The Beach Fill with Nourishment Alternative was selected as the Applicant's Preferred Alternative because it accomplished the Project's goals and objectives between DNR Monuments R-116 and R-126 while minimizing the environmental impacts. According to this Applicant's Preferred Alternative, the toe of the fill will extend approximately 430 to 570 feet offshore and is expected to impact approximately 3.1 acres of nearshore hardbottom. Because this hardbottom is immediately adjacent to the shoreline, dredging-associated impacts to this habitat are deposition, resulting in the burial of the algal, sponge, and coral community. As discussed in Appendix J, the GENESIS model indicated a secondary impact involving material spreading to the north of the Project site. It is estimated that this material will temporarily impact 0.13 acres north of the Project site. This impact is included in the 3.1 acres of hardbottom addressed in the mitigation plan. Any spreading from the fill section will be minor in volume, confined to the nearshore zone, be essentially complete after the first year of adjustment, and will not result in long-term burial or damage to nearshore hardbottom north of the Project site. Additional secondary impacts could include downdrift movement of sediments; elevated suspended solids that would reduce algal production (due to reduced light levels) and could interfere with the ability of corals to feed heterotrophically; and diminished biological integrity and diversity.

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

Project Name	Project Type	Permitted	Funding Approved	Project Length (ft)	Hardbottom Impact (acres)
Past (FY80-01)					
Lake Worth Inlet Sand Transfer Plant	Sand Bypassing	N/A	Yes	100	N/A
Lake Worth Inlet Maintenance Dredging	Nourishment	Yes	Yes	3,130	N/A
Midtown	Nourishment	Yes	Yes	5,400	0.32
Sloan's Curve	Dune Restoration	Yes	Yes	N/A	N/A
Present (FY02-04)					
Lake Worth Inlet Sand Transfer Plant	Sand Bypassing	N/A	Pending	100	N/A
Lake Worth Inlet Maintenance Dredging	Nourishment	Pending	Pending	3,130	N/A
Midtown	Renourishment	Pending	Pending	12,352	0
Phipps Ocean Park	Nourishment & Renourishment	Pending	Pending	10,032	3.1
Proposed Future (FY05-12)					
Lake Worth Inlet Sand Transfer Plant	Sand Bypassing	N/A	No	100	N/A
Lake Worth Inlet Maintenance Dredging	Nourishment	N/A	No	3,130	N/A
Midtown	Renourishment	N/A	No	12,672	0
Phipps Ocean Park	Renourishment	Pending	No	10,032	3.1
Reach 2	Nourishment	Conceptual	No	5,300	6.9
Reach 5	Nourishment	Conceptual	No	8,704	2.9
Reach 8	Nourishment	Conceptual	No	8,142	4.3

4.20.2 Sand Habitat Summary

Removal of sediment from the proposed borrow area will directly impact the sand habitat including both the infaunal and epifaunal community. Initially this will result in a significant, but localized, reduction in the abundance, diversity, and biomass of the immediate fauna. Species affected most are those that have limited capabilities or are incapable in avoiding the dredging activities. The fauna most affected will include predominately invertebrates such as crustaceans, echinoderms, mollusks, and annelids, as well as finfish larvae. However, due to the relatively small area that will be impacted as viewed on a spatial scale, impacts to the benthic community will be minimal due to the relatively short period of recovery documented for infaunal communities following dredging activities (Culter and Mahadevan, 1982; Saloman et al., 1982). Adjacent areas not impacted will most likely be the primary source of recruitment to the impacted area. Implementing the practices developed for the Project will minimize any impacts (Appendices E, F, and G). To minimize any adverse effects to beach fauna, the proposed Project will be conducted during the winter months, outside the recruitment window for many impacted species, and a high quality source of sand containing a small percentage of fine material will be used. The proposed Project will not have any significant, long lasting impacts on the beach sand infaunal communities.

4.20.3 Significance of Cumulative Affects

Due to the paucity of actual research and long-term monitoring on nearshore hardbottom communities, determining what amount of cumulative impact is significant is difficult. Past impacts within the Regional Institutional Zone do not appear to have had any adverse or significant cumulative impact on the resource. Proposed future actions within the County do add cumulatively and are adverse. Due to the significant amount of adjacent habitat remaining, however, it is safe to assume that the hardbottom habitat has not reached carrying capacity for the indigenous marine algae, fishes, or macroinvertebrate fauna and that a small reduction in the amount of habitat will not adversely affect populations of these species. With this in mind, the impacts of the proposed Project, which could be scheduled for construction as early as 2004, are likely to be considered adverse, but not significant, since the adjacent habitat is clearly not limited for commonly occurring fishes and invertebrate species. Monitoring the Project Area could provide substantial information on the actual extent of spatial and temporal indirect affects. Information focusing on the response of the hardbottom community to disturbances could be highly beneficial in determining whether additional projects implemented in the County or region would have a significant cumulative affect. A reassessment of cumulative affects should be performed based on scientific monitoring prior to implementation of each proposed project.

4.21 Irreversible and Irretrievable Commitment of Resources

4.21.1 Irreversible

An irreversible commitment of resources is one in which the ability to use and/or enjoy the resource is lost forever. Federal NEPA guidance issued by the Council on Environmental Quality offers several illustrations of irretrievable resource commitments, such as mining of mineral resources or the combustion of petroleum products. The relocation of sand resources from the borrow areas to the placement areas may irreversibly deplete offshore sand reserves to some unknown extent. Depending on longshore transport rates, storm condition and other factors, the offshore sand resources may not replenish fast enough for future nourishment projects. The energy and fuel used during construction would also be an irreversible commitment of resources.

While the Applicant intends to construct and maintain the beach fill indefinitely, coverage of nearshore hardbottom resources cannot be fairly characterized as an "irreversible" commitment of resources. The underlying nearshore rock, which is naturally buried and unburied at various times of the year, will not be irretrievably lost by construction of the Applicant's Preferred Alternative. If maintenance of the project were cancelled or suspended for any reason -- be it financial, regulatory, or simply a shift in local priorities -- the hardground resources impacted by the project would eventually be re-exposed without the human intervention, as the erosive forces begin again to operate unchecked. Renourishment activities, subject to permitting and funding availability, cannot be guaranteed. The waves and tides on the shoreline would, as in the past, erode the shoreline landward and the rock coverage would be “reversed.” In 1987, the USACE recognized the reversibility of hardbottom burial in reference to the Palm Beach Island Beach nourishment project. The Corps concluded, "(Fill material) could be removed at any time by allowing the nourished beach to erode by discontinuing periodic nourishment." (See 1987 Palm Beach Island GDM/EIS, Table 4, page 48, regarding "reversibility" of nearshore hardbottom impacts).

But because of the importance of the nearshore hardground resources and because the Applicant intends to maintain the project, re-exposure of the resource is considered unlikely. The Applicant will be required to construct a mitigation reef even if the impact is reversible. The FDEP permit for the Applicant’s Preferred Alternative requires that the Applicant mitigate for the associated impacts by constructing a 3.1 acre mitigation reef six months before the beach fill project is constructed. The USACE will be authorizing the construction of these reefs through the issuance of a Department of the Army permit for artificial reefs, not necessarily to mitigate impacts at Phipps Beach. The Town of Palm Beach may use these reefs as compensatory mitigation, in the future, to offset impacts resulting from Town projects including Phipps Beach, if a permit is issued for the proposed Phipps Beach Nourishment.

4.21.2 Irretrievable

An irretrievable commitment of resources is one in which, due to decisions to manage the resource for another purpose, opportunities to use or enjoy the resource as they presently exist are lost for a period of time. An example of an irretrievable loss might be where a type of vegetation is lost due to road construction. Benthic organisms within the borrow area and beach fill area that would be eliminated during construction would be irretrievably lost for a period of time. However, the high rate of repopulation expected from these organisms reduces the significance of the loss.

Unavoidably, the Applicant's Preferred Alternative will result in a commitment of 3.1-acres of nearshore hardground resources. This resource commitment can be considered "irretrievable" to the extent that the Applicant is successful in maintaining the beach over time, as is the Applicant's stated intent. As discussed in Section 4.21.1, the FDEP permit for the Applicant's Preferred Alternative requires the Applicant to mitigate for this impact by constructing a 3.1 acre mitigation reef six months before the beach fill project is constructed.

4.22 Unavoidable Adverse Environmental Effects

Species of relatively non-motile infaunal invertebrates that inhabit the borrow area will unavoidably be lost during dredging. Those species that are not able to escape the construction area are expected to recolonize after Project completion. There would be a temporary but unavoidable reduction in water clarity and increased turbidity and sedimentation during construction. This would be limited to the immediate areas of dredging, beach fill operations, and mitigation reef construction. This impact will be temporary and should disappear shortly after construction activities cease. There could also be unavoidable impacts to hardbottom benthic organisms due to placement of pipelines across the sand and nearshore rock outcrops and due to the direct burial of nearshore hardground resources within Project Area. Measures such as construction of the 3.1-acre mitigation reef will be implemented to minimize and compensate for these impacts.

4.23 Local Short-Term Uses and Maintenance/Enhancement of Long-Term Productivity

The Applicant and USACE recognize that protection of the shoreline is a continual effort. The Applicant's Preferred Alternative is designed to be renourished every 8 years, not four years as proposed by the USACE in the 1996 COFS. Reducing the frequency of such events can reasonably be expected to reduce overall net environmental consequences associated with dredging over the project life. No acceptable and permanent one-time fix has been identified to meet the project purposes outlined by the Applicant or identified for this area in the 1996 COFS. Renourishment of the project will be an ongoing effort, expected to approach a mean eight-year beach renourishment cycle, and continuing until no longer necessary or desired by the Applicant. Renourishment efforts can have a temporary impact on the biological resources in the vicinity of the borrow area and shoreline. The construction of the 3.1-acre mitigation reef can reasonably

be expected to maintain or possibly enhance long-term productivity of the area to some degree, but the benefit cannot be estimated or calculated. Post-construction monitoring required for the reef and nearshore hard resources impacted by the project (see Appendices E and F) is required and will provide valuable data and information on this issue.

4.24 Conflicts and Controversy

In recent years, resource agencies, scientists and some environmental organizations have expressed concern about the impact of beach restoration and maintenance activities on nearshore hardbottom resources. The controversy tends to surround three broad issues areas: (1) the extent to which beach nourishment activities impact reefs and hardbottom features and biotic communities in the borrow and placement areas, (2) the duration or permanency of the impact and the capacity of the resource to recover from perturbations caused by beach restoration activities; and (3) the cumulative effect of multiple but unrelated projects in a region of the coast.

In response to this controversy, the USACE has required that the regulatory compliance determination for the Phipps Ocean Park Project for be fully evaluated review under the National Environmental Policy Act (NEPA). While public concern for impacts to nearshore hardbottom cannot be fully alleviated simply by analysis in an Environmental Impact Statement, the issues of concern have been more closely examined and the sufficiency of measures to avoid, minimize, and mitigate for impacts to hardbottom resources better scrutinized. In addition, as described in Appendix E, the Applicant has proposed and the USACE will require that a mitigation reef be constructed to offset the impacts to the nearshore hardbottom resources. Substantial monitoring will be undertaken to document the productivity of the mitigation reef, as described in Appendix F.

4.25 Uncertain, Unique, or Unknown Risks

Restoration of eroding sandy shorelines through periodic placement of sand from offshore borrow areas is a long established practice in Florida and in the region of the Phipps Ocean Park Project. Consequently, with respect to the means and methods for constructing the project, general performance of the beach nourishment, and expected range of impacts, there are few if any risks that are uncertain, unique, or unknown. The presence of hardbottom features in the proposed fill area, while not unique to this project, are important and noteworthy. Burial of these features along the shoreline within the fill template is clearly an unavoidable impact if the beach is to be restored. What is not fully certain is the extent to which burial of these features – which have only been exposed by shoreline retreat in the last 50 years – will have long-term impact on the environment. Additional data and experience would also be helpful to better assess the long-term effectiveness of mitigation reefs such as the one proposed for this project.

While a final design and construction schedule is not available, interest has been expressed by updrift landowners in the construction of two new groins at Sloan's Curve. The new groins, as proposed by the property owners, would be constructed without the addition of any fill material in this area. This potential project creates some degree of uncertainty in the Project Area, since

it would (a) reduce the updrift sandy beach by placement of rock on the beach, (b) potentially trap sand on the updrift (north) side of the groins resulting in the temporary burial of some nearshore hardbottom, and (c) further impede net longshore sediment transport to the Project Area and correspondingly increase erosion in the area immediately south of the groins. The impact of the T-Head Groin and Reduced Fill alternative is specifically evaluated in detail in Appendix M.

4.26 Precedent and Principle for Future Actions

Neither the decision evaluated in this FSEIS nor the Applicant's Preferred Alternative is likely to create or establish new precedents or principles for future action. The USACE has an established record of decisions and actions with respect to all of the essential elements of the project, including the environmental considerations, evaluation of alternatives, and the means and methods for mitigation of hardbottom resources. The level of analysis in the Cumulative Impacts Assessment and Essential Fish Habitat Assessment reports is greater than for similar projects in the past.

4.27 Environmental Commitments

As outlined in Section 2.0, Project Alternatives, several project design alternatives were evaluated to determine the extent to which the alternative satisfied the project purpose and need, while minimizing the potential adverse impacts to the environment. The Applicant's Preferred Alternative, Beach Fill with Periodic Renourishment, along with the additional requirement to construct a 3.1 acre mitigation reef in advance of the fill placement, best met the project purpose and need with the least overall adverse impacts.

Under the Joint Coastal Permit issued by FDEP for the Project, the Town and contractors are obligated to undertake specific actions and employ specified practices to avoid, minimize, or mitigate for potential adverse effects during construction activities. These actions and practices to be undertaken are identified in detail in the following Appendices:

Appendix E – Mitigation Reef Plan and Monitoring Program
- Reef Plan
- Reef Material
- Placement Location
- Placement Technique
- Timing
- Monitoring

Appendix F – Physical and Biological Monitoring

Part 1 – Required Monitoring
Part 2 – Required Monitoring Plans
Part 3 – Pre-Construction Conference
Part 4 – (Protection of) Marine Sea Turtles
Part 5 – (Protection of) Manatees

Appendix G – Vessel Operations Plan
General Requirements
Coordination of Vessel Operations and Construction Activities
Vessel Position & Control
No-Dredge Buffer Zone
No-Anchor Buffer Zone
Sewer Outfall Buffer Zone

4.28 Compliance with Environmental Requirements

4.28.1 National Environmental Policy Act of 1969

Environmental information on the Project has been compiled and a Draft Supplemental Environmental Impact Statement, dated May 2002, was prepared and circulated for public review and comment. Following the responses to public comments received, a revised Draft SEIS, dated January 28, 2003, was prepared. Subsequent revisions and additional analysis were undertaken and completed during calendar year 2003, resulting in preparation of this Final SEIS. The Project is in compliance with the National Environmental Policy Act.

4.28.2 Endangered Species Act

Actions to comply with requirements of the Endangered Species Act were undertaken by the USACE in association with the *Coast of Florida, Erosion and Storm Effects Study – Region III, Feasibility Study and Environmental Impact Statement (October, 1996).* On 3 June 1994 the USACE submitted a Biological Assessment (BA) to the NMFS pursuant to Section 7 of the Endangered Species Act for the COF Region III Study/EIS. In the BA, the USACE had determined that erosion response alternatives such as beach nourishment would not adversely affect any listed species (whales and pelagic sea turtles) under their jurisdiction. On 4 January 1995, the NMFS concurred with the USACE's no effect determination under certain specified conditions. Following the 4 January 1995 concurrence, the NMFS issued a Regional Biological Opinion (RBO), dated 25 September 1997, concerning hopper dredging along the South Atlantic Coast of Florida. On 3 June 1994 the USACE submitted a BA to the USFWS pursuant to Section 7 of the Endangered Species Act to address potential impacts to nesting sea turtles for certain erosion response activities in Region III. On 24 October 1996 the USFWS issued a Biological Opinion (BO) for COF Region III Study/EIS, including the Phipps Ocean Park Beach Nourishment Project Area and addressing potential impacts to nesting sea turtles. As a regulatory action, the issuance of USACE Section 404/Section 10 permits for the Phipps Project

will require project specific ESA coordination, which is expected to be completed in association with final permitting decision for the Phipps Project.

4.28.3 Fish and Wildlife Coordination Act of 1958

With respect to the COF Region III Study/EIS, the USACE and USFWS completed actions necessary to comply with the Fish and Wildlife Coordination Act with issuance of the Coordination Act Report dated 30 September 1994. As a regulatory action, the issuance of USCAE Section 404/Section 10 permits for the Phipps Project will not require completion of a Coordination Act Report. However, additional project specific FWCA coordination with USFWS is expected to be completed in association with the final permitting decision for the Phipps Project.

4.28.4 National Historic Preservation Act of 1966 (*inter alia*)

PL 89-665, the Archeology and Historic Preservation Act (PL 93-291), and Executive Order 11593, archival research, field investigations, and consultation with the Florida SHPO, have been conducted in accordance with the National Historic Preservation Act, as amended; the Archeological and Historic Preservation Act, as amended and Executive Order 11593. Refer to Section 4.16 for results of SHPO consultation. The Project will not affect historic properties included in or eligible for inclusion in the National Register of Historic places. The Project is in compliance with each of these federal laws.

4.28.5 Clean Water Act of 1972

The Project is in compliance with this Act. The FDEP has issued the Section 401 water quality certification for the Project, as identified in Section 1.9 of this document. All State water quality standards would be met under the Applicant's Preferred Alternative.

4.28.6 Clean Air Act of 1972

Refer to Section 4.12 in the FSEIS for a discussion on the compliance with the Clean Air Act General Conformity Rules. No air quality permits would be required for this Project and the Project has been coordinated with U.S. Environmental Protection Agency (EPA) and is in compliance with Section 309 of the Act.

4.28.7 Coastal Zone Management Act of 1972

A federal consistency determination has been issued in accordance with 15 CFR 930 Subpart C and is included in this report as Appendix A. State consistency review was conducted during the coordination of the FDEP permit for the Project.

4.28.8 Farmland Protection Policy Act of 1981

No prime or unique farmland would be impacted by implementation of this Project. This Act is not applicable.

4.28.9 Wild and Scenic River Act of 1968

No designated Wild and Scenic river reaches would be affected by Project related activities. This Act is not applicable.

4.28.10 Marine Mammal Protection Act of 1972

Incorporation of the safe guards used to protect threatened or endangered species, including marine mammals, during dredging and disposal operations have been included in the Joint Coastal Permit for the Phipps Project as identified in Section 1.9 of this document. Specific conditions and requirements relative to protection of Manatees are set forth in Appendix F, Physical and Biological Monitoring. This Project is in compliance with the Act.

4.28.11 Estuary Protection Act of 1968

No designated estuary would be affected by Project activities. This Act is not applicable.

4.28.12 Federal Water Project Recreation Act

The principles of the Federal Water Project Recreation Act, (Public Law 89-72) as amended, have been fulfilled by complying with the recreation cost sharing criteria as outlined in Section 2 (a), paragraph (2) of the Act. Another area of compliance includes the public beach access requirement, on which the Project hinges (Section 1(b)).

4.28.13 Fishery Conservation and Management Act of 1976

The Project has been coordinated with the NMFS and is in compliance with the Act (refer to correspondence in Appendix B from NMFS).

4.28.14 Submerged Lands Act of 1953

The Project would occur on submerged lands of the State of Florida. The Project has been coordinated with the State and is in compliance with the Act.

4.28.15 Coastal Barrier Resources Act and Coastal Barrier Improvement Act of 1990

There are no designated coastal barrier resources in the Project Area that would be affected by this Project. These Acts are not applicable.

4.28.16 Rivers and Harbor Act of 1899

The proposed Project would not obstruct navigable waters of the United States and is in full compliance.

4.28.17 Anadromous Fish Conservation Act

Anadromous fish species would not be affected. The Project has been coordinated with the NMFS and is in compliance with the Act.

4.28.18 Migratory Bird Treaty Act and Migratory Bird Conservation Act

No migratory birds would be affected by Project activities. The Project is in compliance with these Acts.

4.28.19 Marine Protection, Research, and Sanctuaries Act

The term “dumping” as defined in the Act (33 U.S.C. 1402) (f)) does not apply to the disposal of material for beach nourishment or to the placement of material for a purpose other than disposal (i.e. placement of rock material as an artificial reef or the construction of artificial reefs as mitigation). Therefore, the Marine Protection, Research and Sanctuaries Act does not apply to this Project. The disposal activities addressed in this EIS have been evaluated under Section 404 of the Clean Water Act.

4.28.20 Magnuson-Stevens Fishery Conservation and Management Act

The proposed action may affect essential fishery habitat as defined by SAFMC (1998). Precautions would be implemented during beach renourishment operations to minimize any potential impacts. In addition, artificial reefs would be constructed to mitigate any reef-related

impacts associated with the beach nourishment project. Refer to Appendix E of the FSEIS for additional information. The Project is in compliance with this Act.

4.28.21 E.O. 11990, Protection of Wetlands

No wetlands would be affected by Project activities. This Project is in compliance with the goals of this Executive Order.

4.28.22 E.O. 11988, Flood Plain Management

The Project is in the base flood plain (100-year flood) and has been evaluated in accordance with this Executive Order. The Project is in compliance with this Order.

4.28.23 E.O. 12898, Environmental Justice

The proposed action would not result in adverse human health or environmental effects, nor would the activity impact subsistence consumption of fish or wildlife. The Project is in compliance with this Order.

4.28.24 E.O. 13089, Coral Reef Protection

The proposed action may affect U.S. coral reef ecosystems as defined in the Executive Order. Precautions would be implemented during construction to minimize impacts. Artificial reefs would be constructed to mitigate for any nearshore or offshore hardbottom areas associated with the placement of discharge pipelines, as provided in Appendix E. The Project is in compliance with this Order.

4.28.25 E.O. 13112, Invasive Species

The proposed action would not result in the introduction or facilitation of any known invasive species. The Project is in compliance with this Order.