f. Disorientation of hatchlings from adjacent beaches by artificial lights on dredge equipment or construction equipment on the beach.

Important physical characteristics of beaches include sand grain size, grain shape, silt-clay content, sand color, beach hardness, moisture content, mineral content, substrate water potential, and porosity/gas diffusion. By using proper management techniques such as nest relocation, tilling of compacted beaches, use of compatible sand, and smoothing of scarp formations, most of the negative effects can be avoided or corrected (Nelson and Dickerson, 1989).

Artificial lighting along the beach is known to affect the orientation of hatchlings (Dickerson and Nelson, 1989; Witherington, 1991) and to effect the emergence of nesting females onto the beach (Witherington, 1992). If beach nourishment occurs during the sea turtle nesting season, lighting associated with construction activities on the beach may effect hatchlings and nesting females. Research has shown that low pressure sodium (LPS) lights that emit only yellow wavelengths do not attract hatchlings (Dickerson and Nelson 1989). Witherington (1992) demonstrated that LPS lights on the beach did not significantly effect the nesting behavior of green or loggerhead sea turtles. The use of LPS lighting at the beach nourishment site and on the dredge can reduce the potential for lighting effects on sea turtles. However, the Corps is concerned about the appropriateness of using LPS lights in a marine environment for safety reasons.

4.3.2 PROPOSED BORROW AREAS SOUTH OF GOVERNMENT CUT

Hopper dredging in harbors and entrance channels is known to adversely effect sea turtles by entrainment. These incidents occur because sea turtles utilize and are concentrated in these channels during certain times of the year. Sea turtles utilize hardground and reef areas for foraging and resting and may be present on the hardground areas adjacent to the proposed borrow areas during dredging. It is not expected that sea turtles will concentrate in the sandy borrow area as they do in navigation channels; therefore it is unlikely that the dredge draghead will come into direct contact with a sea turtle. Since the boundary of the borrow area is designed to avoid hardgrounds, it is not expected that the hopper dredge will have a direct impact on any sea turtles utilizing the hardgrounds for resting or foraging. To further ensure that sea turtles are not entrained by the dredge, the use of a draghead designed to deflect sea turtles would be required on the dredge. The deflector draghead is designed to form a sand wedge in front of it that will push out of the way any sea turtle that it comes in contact with. The deflector draghead has been successfully used in the maintenance dredging of navigation channels along the Southeastern United States. During past beach nourishment projects there has been no evidence of sea turtles being entrained by a hopper dredge dredging sand material from an offshore borrow area. The material within the proposed borrow areas that will be dredged and placed on the beach is similar to the existing beach sand, is low in silt content and therefore, would be compatible with sea turtle nesting.

4.3.3 DISTANT DOMESTIC OR DEEP WATER SAND SOURCES

Depending upon the location and the type and quality of material, use of sand from these sources may have biological impacts similar to or greater than use of the proposed borrow areas.

4.3.4 UPLAND SAND SOURCE

The material obtained from an upland source would be predominantly quartz which would replace a predominantly calcium carbonate beach. It is not expected that the quartz sand itself would significantly effect nesting sea turtles or hatching success since the majority of the high density nesting beaches in Florida are comprised of predominantly quartz sand (i.e., Brevard County). However, some of the other negative impacts previously discussed (sand compaction, potential for scarp formation, artificial lighting effects, etc.) would still apply.

4.3.5 NO ACTION ALTERNATIVE (STATUS QUO)

If no action is taken, the beach would continue to erode. If left to erode, this could ultimately result in the loss of sea turtle nesting habitat and/or poor nest site selection. No adverse impacts are expected on other listed species.

4.4 FISH AND WILDLIFE RESOURCES

4.4.1 BEACH RENOURISHMENT ACTIVITIES

During the placement of sand on the beach there may be some interruption of foraging and resting activities for shorebirds that utilize the project area. This impact would be short-term and limited to the immediate area of disposal and time of construction. There would be sufficient beach area north and south of the renourishment sites that can be used by displaced birds while construction takes place. Increased foraging opportunities for some species, such as sea gulls, can also occur as a result of the discharge activity. Elevated turbidity levels within the immediate vicinity of the discharge site may interfere with foraging by sight feeders such as the brown pelican (*Pelecanus occidentalis*). However, increased turbidity levels would be limited to a small portion of the shoreline and should not result in significant impacts to foraging activities.

The disposal of sand on the beach would have temporary impacts to the macroinfaunal community.

Some organisms may be buried and lost, but many organisms inhabiting the intertidal zone are well adapted for burrowing and would be able to burrow up through the fill material and survive. Turbidity levels along the disposal site would temporarily increase, but would return to normal after beach equilibrium is achieved. Organisms inhabiting this zone would be impacted by the run off from the disposal area but are adapted for survival in such conditions and impacts should be minor. Dominant infaunal inhabitants of the intertidal zone, such as amphipods, isopods and polychaetes typically possess high fecundity and rapid turnover rates during their breeding season. Because of this, any losses due to construction activities would be replaced within a short time. No long-term adverse effects are anticipated to the intertidal macroinfaunal community due to nourishment activities (Deis, et al. 1992, Nelson 1985, Gorzelany & Nelson 1987, USFWS 1997).

Minimal impacts, if any, to nearshore hardbottom communities are expected by sand placement (i.e., disposal) on the beach due to the distance of the reefs to the shore. In conjunction with the Coast of Florida Erosion and Storm Effects Study, the hardground areas offshore of Dade County were mapped using side scan sonar. Subsequent aerial photography flown in July 1987 and April 2000 has also been used to map the nearshore hardground. The closest hardground community in the vicinity of the proposed beach fill at Miami Beach is in excess of 1,800 feet offshore.

4.4.2 PROPOSED BORROW AREAS SOUTH OF GOVERNMENT CUT

Organisms similar to the beach macroinfaunal community can be found in the borrow area. Dredging would result in the loss of these organisms; however, recolonization is expected to be fairly rapid. In a study of a borrow area located offshore of Delray Beach, Florida, Bowen and Marsh (1988) concluded that recovery of the infaunal community occurred within 1 year. Cutler and Mahadevan (1982) found no significant differences in biotic communities between borrow sites and surrounding areas off Panama City, Florida, some 3-4 years after a beach nourishment project. No long-term adverse impacts are expected to macroinfaunal communities that inhabit the proposed borrow site.

The proposed SGC borrow areas are located between the second and third reef hardbottom communities. Sessile organisms associated with the hardbottom community may be susceptible to some degree of negative impact due to dredging. Potential adverse impacts to the these communities may occur due to suspended sediments settling onto the reef, mechanical damage from contact by the dredge drag arm with the reef, or turbidity. As a group, scleractinian corals are the most sensitive to potential impacts. Gorgonian corals, sponges, and some other sessile organisms are more tolerant of increased turbidity and sedimentation. Past occurrences of mechanical and/or sedimentation damage to reef communities have been documented for the renourishments at Sunny Isles in 1988 and at Bal Harbour in 1990. Mechanical damages in 1988 and 1990 to reefs were from contact with the dredge drag-arm. In the 1988 incident, the dredge damaged hardbottom outside the designated dredging area. In the 1990 incident the dredge caused damage to previously undiscovered hardbottom within the designated dredging area. Sediment impacts to the reef during the 1990 incident was caused by the dredge spending a significant amount of time dredging a in one confined area between reefs located immediately north and south of the area dredged. Blair and Flynn (1988) and Blair et al. (1990) discuss factors believed to have contributed to the impacts documented, and recommended modifications to project specifications to reduce or eliminate the impacts. Special considerations have been incorporated into the proposed project to avoid or minimize the potential for impacts to the hardbottom community.

A buffer zone with a minimum distance of 400 ft from any hardground area has been established for the proposed borrow areas. Extensive turbidity monitoring will be performed at the beach fill and dredging sites, throughout the construction phase of the project to ensure levels of turbidity are maintained below the State water quality standard. Visual inspections of the hardbottoms adjacent to the borrow area would be performed. The regions of hardbottom in proximity to the dredging area would be surveyed routinely to look for any indicators of turbidity or sediment impacts. Marine biologists with experience in impact assessment would conduct the surveys and examine the benthic organisms for pre-defined indicators of stress or imminent impact. Findings of such indicators would cause actions ranging from consultation to halting of the dredge operations until a determination can be made as to the cause and rectification of the factors creating the stress or imminent impact. The established buffer zones, borrow area usage restrictions and visual inspections of the reef will minimize or eliminate turbidity and sedimentation impacts.

Proper controls and procedures would be utilized to avoid the mechanical damage that could result from the dredge or associated equipment coming in contact with the hardbottom. Project and construction specifications that would prevent such damage are: (a) Recording and displaying, real-time precision electronic location equipment must be in use during dredging operations. This equipment would provide the precision equivalent to that of a

differential GPS system, provide records of the exact position of the dredge to the operator and allow continuous monitoring of the dredge location during operations. Daily reports would include a plot indicating the dredge location while operating in or within a quarter of a mile of the borrow area, keyed to a printout listing coordinates at specified time intervals. (b) Pipelines would be placed only in approved locations and anchoring would be permitted in sandy areas only. (c) The borrow area perimeter will be marked by placement of Coast Guard approved lighted buoys. The buoys will be placed at an interval no greater than 400 ft apart, at every change of direction of the borrow area, and no closer than 400 feet from any hardground area. The distance of all borrow area buoys from the hardgrounds will be verified by divers and their positions recorded. (d) The edge of the hardbottoms adjacent to the borrow area will be marked by buoys at a sufficient frequency to visually discern the line of hardground edge. All buoys (borrow area and hardground) will be checked regularly, and replaced or repositioned as necessary, throughout the period of construction. (e) The Corps and Dade County DERM have developed a procedure that would allow suspension or alteration of the dredging operation if monitoring by DERM indicates a problem.

Additional measures to protect the reefs in the vicinity of the borrow areas would include an intensive reef monitoring program. The program would monitor and evaluate numerous biological and physical characteristics and indicators for signs of stress or impact related to construction activities. This comprehensive program is designed to identify factors that may contribute to or cause stress and minor impacts, before they cause non-reversible impacts. Among the parameters assessed in the monitoring program are: benthic community structure, including hard coral, sponge and algal populations; fish populations of the hardbottom areas; infaunal assemblages of the beach area and borrow area; water quality, including nutrients, light penetration, turbidity and physical characteristics. These factors will be surveyed prior to and after project construction, and will be monitored regularly during project construction. Refer to Appendix E, Physical and Biological Monitoring Program for the Sunny Isles Renourishment - Design Modification. The monitoring described in this document would be conducted for this project.

Rock, shell and coral rubble material that is dredged up with the sand, but unsuitable for placement on the beach (i.e., >1 in. diam.), would be placed in a permitted artificial reef site. The habitat in the area where the rock is deposited, would change from what is now a predominantly sand benthic macroinfaunal community to a hardbottom benthic community. The rock would provide a concentrated hard substrate suitable for colonization by sessile benthic organisms. This would allow for the development of coral, plant, invertebrate and vertebrate communities and would provide a viable habitat with refuge, food resources, and a potential breeding ground for a wide variety of marine organisms. This would be the best use of this material, as the rock separated from the sand would be, and have been, devoid of external epibiotic growth (algae, sponges, coral, encrusting organisms) at the time of removal. The rock material that would be disposed in the artificial reef site is clean natural material.

The use of any of the SGC borrow areas would most likely require the use of a hopper dredge. Because of the water depth required for a hopper dredge, it must remain seaward of the first reef tract to pump material to the beach. It is therefore necessary to place a discharge pipeline across the reef from an offshore pump-out platform to the beach fill site. The placement of the pipeline across the reef would have an impact on the benthic community. Potential impacts included: physical crushing, abrasion and shading of benthos (algae, sponges, soft coral and hard coral). It was expected that the major impact would occur to sponges, algae and soft corals, with some loss to hard corals. The actual extent of impact would be determined through post-construction surveys.

The substrate located within the footprint of the pipeline will be temporarily impacted by the placement of the pipeline. However when the pipeline is removed the area will be re-exposed and new benthic populations will begin to quickly establish. Past observations during previous renourishments (Miami Beach 1994; Sunny Isles and Miami Beach 1997; and Surfside and South Miami Beach 1999) have shown the pipeline made only occasional contact with the bottom, minimizing the impact by reducing the amount of substrate and number of benthic organisms contacting the pipeline. Post-placement inspection of the pipe found it to be in contact with the reef only sporadically. Irregularities of the reef and the connector collars (or rings) used to connect the pipe segments, held the pipeline off the reef surface for considerable distances. In general, impacts to the bottom were much less than expected. The most severe impacts noted were to large hard coral heads having a colony diameter up to 2.0 m. The most common impact was to erect, dendroid soft corals that bordered the pipeline. These corals were abraded by the constant wave surge moving their branches against the pipeline. The actual impact was considerably less than the pre-project estimated impact. This was the result of several factors. The pre-project evaluation of the reef area over which the pipeline was to be placed provided a 'minimal impact" path for the corridor. In addition, the connector rings for the pipeline segments raised substantial lengths

of the pipe off the bottom (between 50 and 100 feet, dependent on localized relief). Finally, the irregularities of the reef itself served as point supports for the pipe, allowing substantial lengths of the pipeline (up to 150 to 200 feet) to remain off the bottom. Although organisms in contact with the pipe (soft corals, sponges and hard corals) were impacted, many of these were saved by the "suspended" pipeline. For the 1999 Surfside and South Miami Beach renourishment, the Corps included a requirement in the contract plans and specifications for "collars" to be placed along the pipeline at 100-foot intervals. The contractor elected to use large tractor tires which where slid over the pipeline and secured in place by pieces of chain that were passed through the side-wall of the tire and attached to "eyes" welded to the exterior of the pipe. Underwater surveys of the pipeline indicated that the tires were successful in holding the pipe off the bottom to a much greater extent than seen in previous projects. The same requirement for collars will be included in the contract plans and specifications for this project. For reference, a copy of the Submerged Dredge Slurry Pipeline Impact Assessment for the Surfside and South Miami Beach renourishment is included as Appendix F of this EA.

The proposed pipeline corridor would be permanently marked underwater with concrete blocks cemented to the substrate. The location of the cement markers would be recorded using differential GPS. It is proposed that this pipeline corridor would be used for future renourishments of Miami Beach. Surface and subsurface buoys can be attached to the blocks that would allow a contractor to place a pipeline along or very near the previous impact path. This would greatly reduce future impacts to the reef because many hard corals in the impact path would have previously relocated and repaired.

Dade County DERM will implement protection measures prior to and during placement of the pipeline to reduce hard coral and benthic impact associated with placing the pipeline. Refer to Section IV of Appendix E. Any impacts to the first reef from placing the pipeline will be appropriately mitigated. Prefabricated modules composed of pre-cast concrete culvert, with limerock grouted to the exterior surface would be placed with a corresponding artificial reef habitat creation-to-impact ratio of 1:1. The area of credit for the artificial reef modules will be the footprint of the module. Similar prefabricated modules were used to mitigate pipeline impacts for the Sunny Isles and Miami Beach and the Surfside renourishments. The actual level of impact to be mitigated will be determined through the evaluation conducted during the post construction pipeline survey. A mitigation plan specific to this project has been prepared and is included as Appendix H.

Fish are a highly motile group of organisms. During dredging most fish species will avoid the dredge area and quickly return upon dredging completion. No long-term impacts are expected to fish communities inhabiting the borrow area. The rock disposal area should provide a substrate that will act as an artificial reef and be beneficial to fish. Many gamefish species, both juveniles and adults, are associated with these areas. Hardgrounds generally display increased productivity compared to sand bottoms.

4.4.3 DEEP WATER, DISTANT DOMESTIC, AND UPLAND SAND SOURCES

The use of any of these sand sources would not have any of the adverse affects on the local hardground communities that would be associated with the dredging of an offshore borrow area. However, using other offshore sources would involve dredging at the location of the source of sand. The impacts of dredging at alternate sites cannot be predicted, not knowing location of the area(s) that would be dredged or the types of habitats present. It is expected that any hardground that might be present would be avoided to the extent practicable and that unavoidable impacts would be mitigated. Using an alternate offshore source would require pumping the material to the beach from the transport vessel. This would also be required if upland sand were barged to the project area and trucks were not used to haul the material to the beach. Both these options would have the same impacts to the nearshore reef community as the preferred borrow areas SGC-2 & SGC-EXT-1.

4.4.4 NO ACTION ALTERNATIVE (STATUS QUO)

With the no action alternative, none of the impacts associated with dredging an offshore borrow area would occur.

4.5 ESSENTIAL FISH HABITAT

Impacts to Essential Fish Habitat from the proposed project are discussed in detail in Sections 4.4 and 4.7 of this EA. Impacts include physical damage to the nearshore live/hardbottom and coral habitat within the footprint of the discharge pipeline. An estimate of the magnitude of impact from placement of the pipeline is provided in Appendix G, Pre-Construction Assessment of Proposed Pipeline Corridor, prepared by Miami-Dade Department of Environmental Resources Management. Any impact to the nearshore reef associated with the placement of the pipeline will be mitigated as previously described in the EA and in the mitigation plan, Appendix H.

As discussed in Section 4.4.2 in the EA, proper controls and procedures (buffer zones, real-time positioning, GPS, etc.) will be implemented to avoid mechanical damage to the hardbottom communities adjacent to the borrow areas. In addition, a comprehensive monitoring program (refer to Appendix E) will be conducted to look for signs of

stress or impact related to construction activities before non-reversible impacts occur. With these precautions in place, no significant impact to the hardbottom communities adjacent to the borrow areas are expected.

There will also be temporary turbidity impacts to the water column from dredging and beach fill activities in the vicinity of the borrow areas, adjacent to the beach fill area and within the rock disposal area. Turbidity is not expected to exceed the State standard of 29 NTU's above background.

4.6 COASTAL BARRIER RESOURCES

The purpose of the Coastal Barrier Resources Act is to minimize the loss of human life, wasteful expenditure of Federal moneys; and the damage to fish, wildlife, and other resources associated with the coastal barriers along the Atlantic coast 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.

4.7 WATER QUALITY

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 fines or silty material. However, there may be some slight elevation of turbidity in the immediate area of disposal. 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. 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 proposed action has been evaluated in accordance with Section 404 of the Clean Water Act and a 404(b) evaluation report has been included as Appendix A to this EA. The use of other submerged borrow sites would have similar turbidity impacts on water quality as using the proposed borrow areas. Use of upland sources would not have the impacts associated with dredging an offshore borrow area, but would the same impact along the beach fill area.

4.8 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE

There are no hazardous, toxic, or radioactive waste sites or producers in the project area that would be affected as a result of the preferred alternative. No impacts associated with the disturbance of such sites are anticipated from either the recommended or no-action alternatives. However, use of previously uninvestigated borrow sources would require examination for potential problems with harmful substances. This would involve examination of recorded spills and a "Preliminary Assessment Screen". If these indicate a potential for contamination, we would either try to avoid the potential contamination, look for another site, or consider remediation.

With the use of dredging and construction equipment in the in the areas around the borrow and beach fill sites, there is the potential for hydrocarbon spills or other effluent releases. However, the likelihood of significant accidents and releases of this sort is very remote. The contract specifications will require the contractor to develop accident and spill prevention plans. The no-action alternative should not allow conditions to develop that would increase accidents or releases of this sort.

4.9 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 per year of Volatile Organic Compounds (VOCs). Any indirect increase in emissions (indirect emissions), as a result of the proposed action is beyond the control and maintenance of the USACE. Consequently, a conformity determination with the Florida State Implementation Plan is inappropriate for increases of indirect emissions from the proposed action. As with the proposed action and alternatives, the no-action alternative will see continued development, which may cause marginal adverse impacts to air quality. The extent of these impacts, however, is difficult to predict.

4.10 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 breakwater 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.

4.11 AESTHETICS

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 and the dredge. Construction equipment would be properly maintained to minimize the effects of noise. Increases to the current levels of noise as a result of this project would be localized and minor, and limited to the time of construction. Engine exhaust fumes would be rapidly carried away by breezes. Any temporary decrease in air quality caused by this work would be corrected once work is completed. Hundreds of feet of dredge pipe lying on the beach or just offshore would have a negative visual impact on the aesthetics of the area. This impact would only be temporary and would be removed along with the pipe at the completion of the work. The negative visual impacts of the equipment and pipe would be offset to an extent by the natural curiosity of some individuals to see what is going on and 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 project would result in an overall improved aesthetic quality. 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, which would reduce the visual aesthetics of the area.

4.12 RECREATION

During nourishment activities, the use of the beach in the vicinity of construction would drop or be restricted temporarily. Use of the beach in the immediate area of the discharge pipe and equipment would be restricted for public safety. 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 come available, use by the general public would increase once more. After nourishment of the beach, use by the general public and those who stay at the condominiums and hotels would return to pre-erosion activity levels. The general public would be more inclined to use these beaches rather than by-passing them for others with more sand above the high tide line. There would 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. Nearshore snorkeling, and SCUBA diving activities may also be impacted by increased turbidity during construction activities and shortly thereafter. Long-term adverse impacts to these water activities are not anticipated. 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 plan.

4.13 HISTORIC PROPERTIES

As stated previously, archival research and field investigations were conducted for the SGC borrow areas proposed for this project. Four potentially significant magnetic anomalies were identified in the vicinity of the borrow areas. Reports describing these investigations and the identified resources were coordinated with the SHPO. In consultation with the SHPO it was determined that 200 to 250 foot radius buffer zones would protect the anomalies located in the vicinity of the borrow areas. In letters dated June 17, 1993 and May 29, 1996, the SHPO concurred with the Jacksonville District's no effect determination for the anomalies in the vicinity of the borrow areas.

4.14 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 other distant sources would require the use of more energy to transport the sand for beach fill. 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 develop that may endanger coastal property from storm surges 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.

4.15 NATURAL OR DEPLETABLE RESOURCES

In this case, the beach quality sand used to construct the project is the 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 where 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.

4.16 CUMULATIVE IMPACTS

Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions (40 CFR 1508.7). The use of sand from the proposed borrow area will deplete the area of sand and species of relatively non-motile infaunal invertebrates (mollusks). However, many of those species that are not able to escape the construction area are expected to recolonize after project completion. Some may never recolonize to the pre-project condition. Repeated placement of pipeline for periodic nourishment would have a cumulative impact on nearshore hardground habitat. However, using the same corridors for each renourishment to the extent practicable would minimize such cumulative impact. The proposed action would result in long-term benefits, which should outweigh any short-term environmental losses. The cumulative impact of shore protection projects along the Florida coast has been to restore and maintain many beaches which otherwise would have experienced severe erosion or would have totally disappeared. In addition, these activities have reduced property damage and helped maintain property value.

4.17 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

4.17.1 IRREVERSIBLE

An irreversible commitment of resources is one in which the ability to use and/or enjoy the resource is lost forever. One example of an irreversible commitment might be the mining of a mineral resource. The use of sand from the proposed borrow area would (for all practical purposes) irreversibly deplete the suitable sand reserves. The sands would not replenish fast enough to be of much value to future nourishment and renourishment projects. There will however, be sufficient sand remaining in the dredged area for recolonization of benthic organisms. Any impacts to larger hard coral could be irreversible for practical purposes given the long amount of time needed to regrow older and larger specimens. Measures would be taken to try to avoid such impacts and the mitigation plan calls for efforts to move, reattach, or otherwise salvage as much hard coral that might be damaged as possible. The energy and fuel used during construction would also be an irreversible commitment of resources.

4.17.2 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. Impacts from the placement of the pipeline which are temporary (soft corals, sponges, small hard corals, benthic invertebrates, etc.), would be an irretrievable loss of that resource for the period of time it takes to recover.

4.18 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 an unavoidable reduction in water clarity and increased turbidity and sedimentation. This would be limited to the immediate areas of dredging and beach fill operations. This impact will be temporary and should disappear shortly after construction activities cease. There would also be unavoidable impacts to hardground benthic organisms due to placement of pipelines across the nearshore reef. Measures will be implemented to minimize these impacts and any impacts that do occur will be mitigated.

4.19 LOCAL SHORT-TERM USES AND MAINTENANCE/ENHANCEMENT OF LONG-TERM PRODUCTIVITY

We recognize that protection of the shoreline is a continual effort. No acceptable and permanent one-time fix has been identified. Using periodic renourishment is an ongoing effort. Renourishment efforts have a temporary and short-term impact on the biological resources on and near the shore. Removal of material from offshore borrow sites has a long-term impact on the nature of the borrow site. However, these impacts are not substantial since there are no special resources within the borrow site and some resources remain after dredging.

4.20 RISK AND UNCERTAINTY (INCOMPLETE OR UNAVAILABLE INFORMATION)

This issue has been addressed in the earlier EIS for the modification of the Sunny Isles segment (U.S. Army Corps of Engineers, 1998) and other NEPA documents on Dade County. There is some uncertainty concerning the extent and nature of impacts and resources to be impacted. There also are some operational risks associated with dredging, hauling, and pumping due to the nature of the operation and difficulty working in an ocean environment. A number of measures are taken to minimize risk (see Environmental Commitments in Section 5). Resources have been investigated with both remote sensing and ground truthing. The reasonably foreseeable range of impacts would

indicate no major, significant, or catastrophic consequences.

5 ENVIRONMENTAL COMMITMENTS

The U.S. Army Corps of Engineers and contractors commit to avoiding, minimizing or mitigating for adverse effects during construction activities by including the following commitments in the contract specifications:

(1) Inform contractor personnel of the potential presence of sea turtles and manatees in the project area, their endangered status, the need for precautionary measures, and the Endangered Species Act prohibition on taking sea turtles, manatees and other threatened or endangered species.

(2) Take precautions during construction activities to insure the safety of the manatee. To insure the contractor and his personnel are aware of the potential presence of the manatee in the project area, their endangered status, and the need for precautionary measures, the contract specifications would include the standard protection clauses concerning manatees. The contractor would instruct all personnel associated with the construction of the project about the presence of manatees in the area and the need to avoid collisions with manatees. All vessels associated with the project shall operate at 'no wake' speeds at all times while in shallow waters, or channels, where the draft of the boat provides less than three feet clearance of the bottom. Boats used to transport personnel shall be shallow draft vessels, preferably of the light-displacement category, where navigational safety permits. Vessels transporting personnel between the landing and any workboat shall follow routes of deep water to the extent possible. Shore crews or personnel assigned to the disposal site for the workshift shall use upland road access if available. All personnel would be advised that there are civil and criminal penalties for harming, harassing, or killing manatees, which are protected under the Endangered Species Act and the Marine Mammal Protection Act. The contractor shall be held responsible for any manatee harmed, harassed, or killed as a result of the construction of the project. If a manatee is sighted within 100 yards of the dredging area, appropriate safeguards would be taken, including suspension of dredging, if necessary, to avoid injury to manatees. The contractor shall keep a log of all sightings, collision, injuries, or killings of manatees during the contract period. Any manatee deaths or injuries will be immediately reported to the Corps of Engineers and the USFWS (Vero Beach Office).

(3) To minimize adverse impacts to sea turtles the Corps will implement the terms and conditions as stated in the NMFS Regional Biological Opinion for hopper dredging on the South Atlantic Coast as amended on September 25, 1997. The Corps will also implement all the terms and conditions applicable to Dade County as outlined in the USFWS Biological Opinion for Region III of the Coast of Florida Erosion and Storm Effects Study issued on October 24, 1996 and amended on October 4, 2000 (refer to the USFWS Coordination Act Report in Appendix D of this EA). Measures to minimize adverse effects to sea turtles are summarized below:

a. Nourished beaches would be plowed to a depth of at least 36 inches within one week following the completion of the entire beach nourishment (or sooner on completed sections) if sand compaction is greater than 500 cone penetrometer units.

b. Nourished beaches would be checked for compaction every 500 feet along the project area. One station shall be at the seaward edge of the dune/bulkhead line (when material is placed in this area); one station shall be located between the dune line and the high water line; and one station shall be located just landward of the mean high water line. At each station three readings would be made at 6, 12, and 18 inch depths three times (three replicates). If any two or more adjacent stations have compaction at the same depth greater than 500 cone penetrometer units, the area would be plowed to a depth of at least 36 inches immediately prior to April 1. This process would be completed for three consecutive years following project completion.

c. Nest relocation activities must begin 65 days prior to nourishment activities which occur within the nesting and hatching season (April 1 - November 30) or by April 1, whichever is later. Nest surveys and relocations shall continue through the end of the project or September 30, whichever is earlier.

d. Nest surveys and relocations would be conducted by personnel with prior experience and training in nest survey and relocation procedures, and with a valid permit from the Florida Fish and Wildlife Conservation Commission (FWC).

e. Nests would be relocated between sunrise and 9 a.m. each day, and the relocation would be to a nearby hatchery in a secure setting where artificial lighting would not conflict with hatchling orientation.

f. In the event a turtle nest is dug up by beach construction activities, the contractor shall immediately notify the FWC permitted individual responsible for nest relocation so that the nest can be moved to the beach hatchery.

g. A report describing the actions taken to implement the terms and conditions shall be submitted to the USFWS within 60 days of completion of the proposed work for each year when activity has occurred. The report shall include the dates of actual construction activities, names and qualifications of personnel involved in nest surveys and relocation activities, descriptions and locations of the hatcheries, nest survey and relocation results and hatching success of the nests.

h. Nourished beaches would be surveyed for escarpments immediately after construction and prior to April 1, for 3 subsequent years. Any escarpments that exceed 18 inches in height and 100 feet length would be leveled by April 1.

i. Measures will be taken to reduce night time beach lighting including: eliminating extraneous lighting to an amount necessary for safe operations and safety of personnel.

j. The drag arms of the hopper dredge will be fitted with a rigid sea turtle deflector draghead, and modified as necessary to eliminate sites of inadvertent entrainment of sea turtles.

k. The inflow to the hoppers will be screened as close to 100% as possible. There will be 100% observer coverage to monitor the screens for evidence of turtle take.

l. To minimize the potential for sea turtle entrainment, the dredge pumps would be shut down before the draghead is lifted off the bottom and would not be turned on until the draghead is placed on the bottom. NOTE: If the actual dredging operation has difficulty with this procedure, the Corps reserves the right to re-consult with NMFS to delete or modify this requirement.

(4) Monitor turbidity at both the dredging and discharge sites. Should monitoring reveal turbidity levels above State standards, outside the allowable mixing zone, work would be suspended until turbidity levels return to within those standards.

(5) Precautions would be implemented during construction to minimize potential impacts to hardground communities adjacent to the borrow area. A 400 foot buffer zone would be established around any hardground areas.

(6) A biological monitoring program to assess possible impacts of dredging and construction operations to reef and live-bottom habitats near the borrow and renourishment area, would be conducted.

(7) Artificial reefs would be constructed to mitigate for adverse impacts to hardground habitat due to the placement of the discharge pipelines.

6 COMPLIANCE WITH ENVIRONMENTAL REQUIREMENTS

6.1 NATIONAL ENVIRONMENTAL POLICY ACT OF 1969

Environmental information on the project has been compiled and a Draft Environmental Assessment has been prepared for public review and comment. The project is in compliance with the National Environmental Policy Act.

6.2 ENDANGERED SPECIES ACT OF 1973

In a letter dated June 5, 2000 the Corps submitted project information to the National Marine Fisheries Service (NMFS) pursuant to Section 7 of the Endangered Species Act. In the letter the Corps had determined that the proposed project activities were covered under the Regional Biological Opinion (RBO) concerning hopper dredging on the South Atlantic Coast as amended on September 25, 1997. In a letter dated July 10, 2000 NMFS concurred with the Corps' determination. In a letter dated June 5, 2000 the Corps submitted project information to the U S Fish and Wildlife Service (USFWS) pursuant to Section 7 of the Endangered Species Act. In the letter the Corps determined that the USFWS Biological Opinion, issued on October 24, 1996, for Region III of the Coast of Florida Erosion and Storm Effects Study applied to this project. In a letter dated October 4, 2000 the USFWS concurred with that determination. Refer to Appendix C for correspondence. This project was fully coordinated under the Endangered Species Act and is therefore, in full compliance with the Act.

6.3 FISH AND WILDLIFE COORDINATION ACT OF 1958

This project has been coordinated with the U.S. Fish and Wildlife Service (USFWS). A Final Coordination Act Report (CAR) was submitted by the USFWS (refer to Appendix D). There has been no change in the project design or the source of beach fill material since submittal of the CAR. This project is in full compliance with the Act.

6.4 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 State Historic Preservation Officer (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 4.13 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.

6.5 CLEAN WATER ACT OF 1972

The project is in compliance with this Act. Application for a Section 401 water quality certification has been submitted to the Florida Department of Environmental Protection. All State water quality standards would be met. A Section 404(b) evaluation is included in this report as Appendix A. A public notice was issued on June 1, 2000 that satisfied the requirements of Section 404 of the Clean Water Act.

6.6 CLEAN AIR ACT OF 1972

Refer to Section 4.8 in the EA for a discussion on the compliance with the Clean Air Act General Conformity Rules. No air quality permits would be required for this project. This project has been coordinated with U.S. Environmental Protection Agency (EPA) and is in compliance with Section 309 of the Act. The draft EA was forwarded to EPA for their review. Refer to EPA letter dated November 9, 2000 in Appendix C.

6.7 COASTAL ZONE MANAGEMENT ACT OF 1972

A federal consistency determination in accordance with 15 CFR 930 Subpart C is included in this report as Appendix B. State consistency review was conducted during the coordination of the draft EA. Refer to letters from the State Clearinghouse dated December 4, 2000 and December 18, 2000 in Appendix C.

6.8 FARMLAND PROTECTION POLICY ACT OF 1981

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

6.9 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.

6.10 MARINE MAMMAL PROTECTION ACT OF 1972

Incorporation of the safe guards used to protect threatened or endangered species during dredging and disposal operations would also protect any marine mammals in the area, therefore, this project is in compliance with the Act.

6.11 ESTUARY PROTECTION ACT OF 1968

No designated estuary would be affected by project activities. This act is not applicable.

6.12 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). Another area of compliance includes the public beach access requirement on which the renourishment project hinges (Section 1, (b)).

6.13 FISHERY CONSERVATION AND MANAGEMENT ACT OF 1976

The project has been coordinated with the National Marine Fisheries Service (NMFS) and is in compliance with the act (refer to correspondence in Appendix C from NMFS).

6.14 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.

6.15 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.

6.16 RIVERS AND HARBORS ACT OF 1899

The proposed work would not obstruct navigable waters of the United States. The proposed action has been subject to the public notice (June 1, 2000), with opportunity for a public hearing, and other evaluations normally conducted for activities subject to the act. The project is in full compliance.

6.17 ANADROMOUS FISH CONSERVATION ACT

Anadromous fish species would not be affected. The project has been coordinated with the National Marine Fisheries Service and is in compliance with the act.

6.18 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.

6.19 MARINE PROTECTION, RESEARCH AND SANCTUARIES ACT

The term "dumping" as defined in the Act (3[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.

6.20 MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

This act requires the preparation of an Essential Fish Habitat (EFH) Assessment and coordination with NMFS. The EFH Assessment has been integrated within the EA and was coordinated with NMFS during coordination of the Draft EA. Refer to NMFS letter dated November 15, 2000 and the Corps response dated December 27, 2000 in Appendix C.

6.21 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.

6.22 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. Refer to Dade County Beaches, Florida, Beach Erosion Control and Hurricane Surge Protection, General Design Memorandum, Phase 1, 1974. Project is in compliance.

6.23 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. Project is in compliance.

6.24 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 minimize impacts. Artificial reefs would be constructed to mitigate for any reef impacts associated with the placement of discharge pipelines. Refer to Section 4.4 in the EA. Project is in compliance.

7 LIST OF PREPARERS

7.1 PREPARERS

This Environmental Assessment was prepared by the following personnel:

Preparer	Discipline	Role
Michael Dupes	Biology	Principal Writer
Thomas Birchett	Archeology	Historic Properties
Doug Rosen	Coastal Geology	Geotechnical Analysis

7.2 REVIEWERS

This Environmental Assessment was reviewed by Kenneth Dugger, Team Leader, Environmental Branch, Environmental Coordination Section.

8 PUBLIC INVOLVEMENT

8.1 SCOPING AND DRAFT EA

Scoping for the proposed action was initiated by a Public Notice dated June 1, 2000. The Public Notice was distributed to the appropriate Federal, State and Local agencies, appropriate city and county officials, and other parties known to be interested in the project. Copies of the Public Notice, the list of addressees used to distribute the notice, and letters of response are included in Appendix C, Pertinent Correspondence. A Notice of Availability (dated October 17, 2000) of the draft EA was prepared and sent to appropriate Federal, State and Local agencies, appropriate city and county officials and other interested parties.

8.2 AGENCY COORDINATION

The Draft EA was coordinated with the following agencies: U.S. Fish and Wildlife Service, National Marine Fisheries Service, U.S. Environmental Protection Agency, Florida State Clearinghouse, Florida State Historic Preservation Officer (SHPO), Florida Fish and Wildlife Conservation Commission, and the Florida Department of Environmental Protection.

8.3 COMMENTS RECEIVED

Letters of comment on the draft EA were received from the U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Florida State Clearinghouse, Florida Department of Environmental Protection, Florida Fish and Wildlife Conservation Commission, State Historic Preservation Officer and the South Florida Regional Planning Council. Copies of these letters can be found in Appendix C.

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APPENDIX A - SECTION 404(B) EVALUATION

SECTION 404(b) EVALUATION

RENOURISHMENT AT MIAMI BEACH IN THE VICINITY OF 63RD STREET DADE COUNTY BEACH EROSION CONTROL AND HURRICANE PROTECTION PROJECT DADE COUNTY, FLORIDA

I. Project Description

a. Location. The project is located in Dade County on the southeast coast of Florida. The area to be renourished is a portion of Miami Beach located in the vicinity of 63rd Street between FDEP monuments R-44 and R-46A. The proposed work will be performed as a part of the Dade County Beach Erosion Control and Hurricane Protection Project. Refer to location map, figure 1, in the Environmental Assessment (EA).

b. General Description. The proposed action consists of placing approximately 200,000 cubic yards of material along 2,800 feet of Atlantic shoreline in Miami Beach, Florida. The construction berm width is 205 feet from the ECL at an elevation of +9 feet mean low water (MLW), with a construction tolerance of +/- 0.5 feet. The front slope of the fill will be at 1 vertical on 15 horizontal (refer to figure 2, plan view of beach fill area and figure 3, typical beach profile in the EA). The borrow areas proposed for the beach fill is located south of Government Cut and east of Key Biscayne (see figure 1, in the EA).

c. Authority and Purpose. Initial authorization came from the Flood Control Act of 1968 authorization of the Beach Erosion Control and Hurricane Protection (BEC & HP) Project for Dade County, Florida (see figure 1, site map). In addition, Section 69 of the 1974 Water Resources Act (P.L. 93-251 dated 7 March 1974) included the initial construction by non-Federal interests of the 0.85 mile segment along Bal Harbour Village, immediately south of Bakers Haulover Inlet. The authorized project, as described in HD 335/90/2, provided for the construction of a protective/recreational beach and a protective dune for 9.3 miles of shoreline between Government Cut and Baker's Haulover Inlet (encompassing Miami Beach, Surfside and Bal Harbour) and for the construction of a protective/recreational beach along the 1.2 miles of shoreline at Haulover Beach Park. The Supplemental Appropriations Act of 1985 and the Water Resources Development Act of 1986 (Public Law 99-662) provided authority for extending the northern limit of the authorized project to include the construction of a protective beach along the 2.5 mile reach of shoreline north of Haulover Beach Park (Sunny Isles) and for periodic nourishment of the new beach. This authority also provided for the extension of the period of Federal participation in the cost of nourishing the authorized 1968 BEC & HP Project for Dade County, which covered 10.5 miles of shoreline extending from Government Cut north to the northern boundary of Haulover Beach Park, from 10 years to the 50-year life of the project.

Nourishment of Dade County Beaches has become a necessity to provide storm protection. The purpose of the project is to prevent or reduce loss of public beach front to continuing erosional forces and to prevent or reduce periodic damages and potential risk to life, health, and property in the developed lands adjacent to the beach.

d. General Description of Dredged or Fill Material.

(1) General Characteristics of Material. Sand from the proposed borrow areas is generally light gray, poorly graded carbonate sand with a trace of silt and gravel sized shell fragments. Silt content in the SGC-2 borrow area ranges from 1.3 to 10.3 percent with an average of 4.5 percent. The

composite mean grain size is 0.56 mm. In the SGC-EXT-1 borrow area the silt content ranges from 0.8 to 9.2 percent with an average of 3.7 percent. The composite mean grain size is 0.62 mm. In both borrow areas, rock fragments from 1 inch to 3 feet in diameter may make up to 5 percent of the material in the borrow area. The use of these borrow areas will require that all rock fragments larger than 1 inch be separated from the sand and disposed of in an approved area offshore. These borrow areas represent high quality beach nourishment sand sources that contain a low amount of silt.

(2) Quantity of Material. The amount of material needed for the 2,800 feet of beach is estimated at 200,000 cubic yards.

(3) Source of Material. The borrow areas proposed for use for the beach and transition fill is located south of Government Cut and east of Key Biscayne (see figure 1, in EA).

e. Description of the Proposed Construction Site.

(1) Location. The location of the beach fill is within the community of Miami Beach, Florida. The fill will cover approximately 2,800 feet of beach in the vicinity of 63rd Street between FDEP monuments R-44 and R-46A. Refer to figures 1 & 2 in EA.

(2) Size. The proposed fill is approximately 2,800 feet long with a berm width of 205 feet.

(3) Type of Site. The site for disposal of the sand material is a segment of eroded, sandy, recreational beach and inshore seabed. The permitted rock disposal site is a section of sandy offshore seabed.

(4) Type of Habitat. The beach disposal area consists of a currently eroding carbonate and quartz sand beach and inshore seabed. The borrow area is characterized by a sandy bottom. There are no known seagrass beds or hardgrounds in the borrow area.

(5) Timing and Duration of Dredging. The exact timing of nourishment is not known. It is anticipated that construction will occur during 2001.

f. Description of Disposal Method. It is anticipated that the material will be obtained from the offshore borrow area using a hopper dredge with pumpout capability. Once the material is pumped on the beach, grading will be performed using construction equipment to achieve the desired construction profile.

II. Factual Determinations

a. Physical Substrate Determinations.

(1) Substrate Elevation and Slope. The beach fill will be constructed with a berm elevation of +9.0 feet mean low water and a width of 205 feet from the ECL. The front slope of the beach fill will be 1 vertical on 15 horizontal. Refer to figure 3 in the EA.

(2) Type of Fill Material. Sand from the borrow area has a high carbonate (shell) content and ranges in size from fine to coarse.

(3) Dredge/Fill Material Movement. The fill material will be subject to erosion by waves with the net movement of fill material to the south.

(4) Physical Effects on Benthos. Some benthic organisms that are not mobile may be lost during dredging and may be covered by the beach fill. Recolonization soon after project completion is expected to replace those organisms that do not survive project construction. It is anticipated that no long-term adverse impacts will occur.