EXECUTIVE SUMMARY

Volusia County Erosion Assessment Study for Shorelines from Ponce DeLeon Inlet to Canaveral National Seashore

The County of Volusia, Florida contracted Taylor Engineering, Inc. to perform a regional-scale beach management study for its beaches from Ponce DeLeon Inlet to Canaveral National Seashore. Recent devastation from Hurricanes Floyd and Irene in the study area, about 11 miles (mi) long, brought a sense of urgency to the study. This broad approach, by allowing the analysis of coastal processes on a regional basis, afforded the opportunity to assess beach behavior, causative mechanisms, and management opportunities on both a large and a small scale. A key element of the study includes a sequence of meetings with technical review committees, citizens' groups, and public workshops at key project milestones to receive community input and to facilitate public education during the course of the study.

The coastal processes analysis portion of the study documents shoreline changes over the past 130 years and beach volume changes over the past 30 years to understand long- and short-term beach behavior of the area from Ponce DeLeon Inlet to Canaveral National Seashore. Analysis of 20 years of wave and wind data provides input to model wave-driven longshore and wind-driven cross-shore sand transport. Results of these analyses form the basis for a sediment budget. Shoreline encroachment, defined by relating the longshore variability of upland structures to the temporal variation of the shoreline, provide an indication of areas currently at risk and a baseline for assessing future storm effects. Application of a dune erosion model derives the storms' effects to upland structures. These analyses indicate the need for beach management actions for all nine miles of state-designated critical erosion areas along the 11 mi of coastline. Size and composition criteria characterized the native beach sands. Through an environmental review, the study identifies marine and terrestrial fauna of special concern in the study area. An integrated analysis of relevant coastal metrics forms the basis for a holistic beach condition assessment.

The results of the coastal processes analysis indicate that the beaches generally experience mild erosion for the majority of the area with the exception of the accretive trend in the two-mile area just south of the inlet. The shorefront development risk analysis — which combined beach erosion simulations, historic shoreline variability, and the variability of shorefront structure locations — indicated that a 20-year (yr) return period storm, that is, a storm

with a 1 in 20 chance or 5% probability of occurrence in any given year, will affect the majority (63%) of the shorefront structures in Reaches 2 – 8; 50- and 100-yr return period storms will affect more than three-fourths of the structures (79% and 82%) in Reaches 2 – 8.

Given the above findings, the study evaluated the following beach management alternatives: no action, beach restoration (sand placement), dune restoration (sand placement and dune vegetation), and dune management (sand fences, dune vegetation, and traffic control such as beach access, post-and-rope system, and dune walkovers). The generally eroding characteristic of the beach, the susceptibility of structures to storm effects, and the high value of upland development warrant beach management action(s) for all reaches except Reach 1 (the two-mile beach segment immediately south of Ponce DeLeon Inlet). This study evaluated beach and dune restoration for Reaches 2 – 8 based on the degree of protection offered, project performance, maintenance requirements, environmental impacts, and project costs.

Because of the greater longevity (better project performance) associated with a longer beach restoration project, this study recommends combining similar reaches to create longer project lengths. Considering sand characteristics and beach driving regulations, this study combines Reaches 2 and 3 to form Segment A, Reaches 4 and 5 to form Segment B, and Reaches 6, 7, and 8 to form Segment C. Notably, each of these segments lie in state-designated critical erosion areas.

The data and evaluations presented in this study support the recommendation to restore the beaches and restore and manage the dunes in Segments A, B, and C.

Possible borrow sources for beach restoration include:

- The Atlantic Ocean bottom offshore the beaches of south Volusia County. Targeting this area would require a detailed sand source investigation — beyond the scope of the present study — to identify offshore borrow areas with sands of sufficient volume and size and composition characteristics compatible with the native sands of Segments A, B, and C;
- Ponce DeLeon Inlet flood shoals. A sediment analysis based on size and composition characteristics reveals the compatibility of sand from the shoal with

the native beach sand in Segments A and B. Ponce DeLeon Inlet flood shoals contain between 600,000 to 2,500,000 cy of beach compatible sand; and

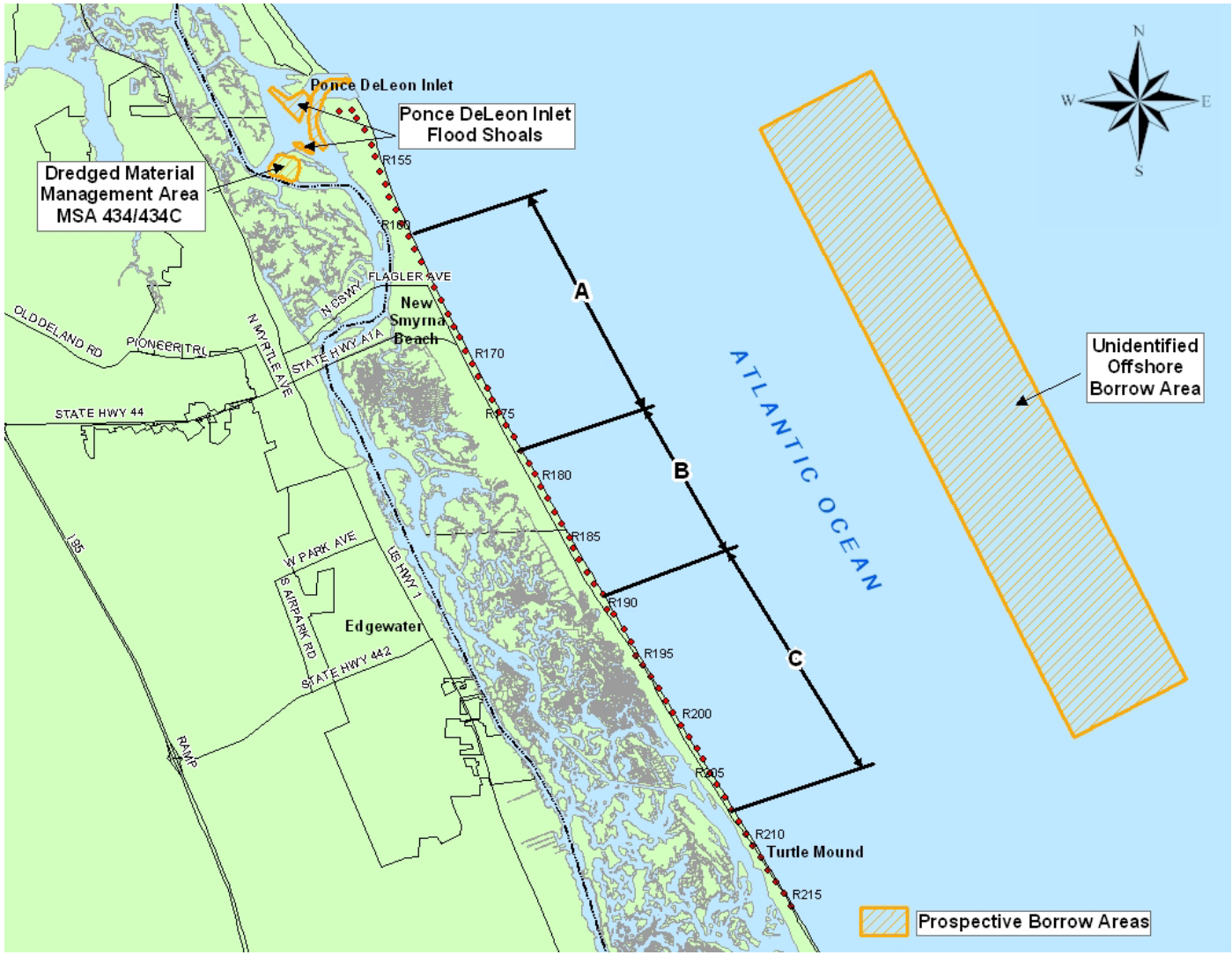
- The Intracoastal Waterway (ICWW). Sand dredged from ICWW in the past — currently present on upland sand management site MSA-434 — or sand dredged from the ICWW in the future could provide sand for beach placement. A sediment analysis based on size and composition characteristics reveals the compatibility of sand from MSA-434 with the native beach sand in the Segments A and B. MSA-434, and the ICWW currently possess about 1,200,000 cy of sand.

The recommended implementation strategy — developed by considering technical and economic criteria and existing beach driving regulations — includes the following actions:

- Conduct an offshore sand source investigation to identify borrow areas with sufficient volumes of sand with beach compatible characteristics for Segments A, B, and C;
- Restore the beach and dune in Segment C (Reaches 6, 7, and 8 — south end of van Kleek Drive to Canaveral National Seashore in Silver Sands/Bethune Beach) with sand from an offshore borrow area. Vegetate the restored dune.
- Restore the beach and dune in Segment B (Reaches 4 and 5 — 27th Avenue to south end of van Kleek Drive in New Smyrna Beach) with sand from an offshore borrow area, the Ponce DeLeon Inlet flood shoal, the ICWW, or MSA-434. Vegetate the restored dune. Monitor this segment to ascertain the effects of the beach restoration sand on beach driving; and
- Restore the beach and dune in Segment A (Reaches 2 and 3 — Sapphire Road to 27th Avenue in New Smyrna Beach) with sand obtained from an offshore borrow area, the Ponce DeLeon Inlet flood shoal, the ICWW, or MSA-434. Vegetate the restored dune.

One can expect minimal potential environmental impacts from the proposed beach management activities. The low background erosion rates and the relatively long project segments suggest low maintenance requirements of the beach and dune restoration projects. Post-construction monitoring, typically a requirement of relevant environmental permits, should examine turtle nesting, scarp formation, sand compaction, and project physical performance.

Project and Borrow Area Map



Segment A—Sapphire Road to 27th Avenue — Length: 3 Miles

Segment B—27th Avenue to South Van Kleek — Length: 2 Miles

Segment C—Silver Sands/Bethune Beach to Canaveral Seashore — Length: 4 Miles