dhec
Healthy People. Healthy Communities.

May 9, 2017

Mayor Dick Cronin
Post Office Box 508
Isle of Palms, South Carolina 29451

RE: State Approval of the Local Comprehensive Beach Management Plan for the City of Isle of Palms

Dear Mayor Cronin,

In accordance with the Beachfront Management Act, S.C. Code Ann. § 48-39-250 *et seq.*, South Carolina Department of Health and Environmental Control's Office of Ocean and Coastal Resource Management (DHEC-OCRM) has reviewed and hereby approves the locally adopted Comprehensive Beach Management Plan for the City of Isle of Palms. Congratulations on your achievement and thank you for your commitment to effective collaborative management of our state's coastal resources.

Implementation of your state-approved local plan begins immediately and DHEC-OCRM published a public notice to that effect on Tuesday, May 9, 2017. As you are aware, the City's Local Comprehensive Beach Management Plan must be updated at least every five years in coordination with DHEC-OCRM. Prior to your next scheduled plan update, we welcome your input as we work to streamline the plan development process, improve coordination and enhance the value of your plan as a meaningful resource for the City and its residents and visitors.

Congratulations again on the approval of the Local Comprehensive Beach Management Plan for the City of Isle of Palms We look forward to working with you on this and other efforts to promote and protect our coastal environment.

Sincerely,

Elizabeth B. von Kolnitz
Chief, Ocean and Coastal Resource Management

Enclosure: Response to Public Comments

cc: Linda Tucker, City Administrator, City of Isle of Palms
Dan Burger, Director, Coastal Services Division, DHEC-OCRM
Will Salters, Planner, Coastal Services Division, DHEC-OCRM

RESOLUTION

BY THE CITY COUNCIL OF THE CITY OF ISLE OF PALMS, SOUTH CAROLINA, TO ADOPT AN UPDATED LOCAL COMPREHENSIVE BEACH MANAGEMENT PLAN FOR THE CITY OF ISLE OF PALMS.

IT IS RESOLVED BY THE CITY COUNCIL FOR THE CITY OF ISLE OF PALMS, SOUTH CAROLINA, THAT:

WHEREAS, the City of Isle of Palms, in accordance with the South Carolina Beachfront Management Act (SC Code Section 48-39-250 et seq.), did draft its initial Local Comprehensive Beach Management Plan in 2007, which was adopted by resolution on February 26, 2008 and approved by the South Carolina Department of Health and Environmental Control's Office of Ocean and Coastal Resource Management (DHEC-OCRM) on April 7, 2008; and

WHEREAS, pursuant to SC Code Section 48-39-350, the City of Isle of Palms is required to periodically update its Local Comprehensive Beach Management Plan in accordance with applicable South Carolina laws and regulations; and

WHEREAS, on August 23, 2016, the City of Isle of Palms approved by Resolution the first draft of an updated Local Comprehensive Beach Management Plan dated August 23, 2016; and

WHEREAS, the City of Isle of Palms submitted the first draft of the updated Local Comprehensive Beach Management Plan to DHEC-OCRM for review and approval and has made certain revisions based on comments received from DHEC-OCRM; and

WHEREAS, the City of Isle of Palms believes its updated Local Comprehensive Beach Management Plan, revised January 26, 2017, to be in the best interest of the City, in furtherance of its duty to protect the City's natural resources and in compliance with the provisions of the South Carolina Beachfront Management Act.

NOW, THEREFORE, BE IT RESOLVED that City Council, in meeting duly assembled, hereby adopts the final updated Local Comprehensive Beach Management Plan dated January 26, 2017, including the Appendices, attached hereto and incorporated herein by reference.

PASSED AND APPROVED BY THE CITY COUNCIL FOR THE CITY OF ISLE OF PALMS, SOUTH CAROLINA, ON THE 28th DAY OF FEBRUARY, 2017.

Richard F. Cronin, Mayor

Attest:

Marie B. Copeland, City Clerk

April 5, 2016
photos

Local Comprehensive Beach Management Plan

City of Isle of Palms

January 26, 2017

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Submitted by:
Christopher P. Jones, P.E.
Durham, NC

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1. Introduction

1.1 Purpose

This document is an update of the 2008 Local Comprehensive Beach Management Plan (LCBMP) of the City of Isle of Palms (IOP). The update is being carried out for two reasons: 1) to compile updated beach management information and 2) to remain eligible for State beach management funding.

The City's LCBMP represents considerable effort, inventory, and deliberation on the part of the City, and establishes a strategy for the management of the Isle of Palms beach for the sustainable enjoyment by residents and visitors. This LCBMP is intended for incorporation into the State Beachfront Management Plan in accordance with the provisions of the State Beachfront Management Act.

1.2 History of Plan Approvals and Revisions

The City initiated drafting its Local Comprehensive Beach Management Plan in 1992. A Plan was submitted to the South Carolina Coastal Council (SCCC) and the City received SCCC comments in March 1994. Subsequent efforts by the City to address the comments were not entirely successful, and the City set aside its work on the LCBMP, concentrating on other matters.

In July 2006, the City reactivated its efforts to create and adopt a LCBMP. The City Council adopted the LCBMP in March 2007 and the Plan was submitted to DHEC OCRM in April 2007. DHEC OCRM provided comments to the City in November 2007, revisions were made to the Plan and the City adopted the revised Plan on February 22, 2008. DHEC OCRM approved the LCBMP on April 7, 2008.

1.3 Overview of Municipality/History of Beach Management Approaches

The City of Isle of Palms was formed on January 12, 1953 (Isle of Palms Planning Commission, 2015). The City has a Council form of government, with a Mayor and eight Council Members. A City Administrator is appointed by and reports to the Council; the Administrator carries out tasks assigned by Council and oversees daily operations of City departments.

The City Council is responsible for adopting ordinances that, when implemented, form the basis for beach management on IOP (See Section 4.2). The City Council is also responsible for the expenditure of City funds toward beach management efforts.

The City's vision for beach management was articulated by the City's Long-Term Beach Management Citizens Advisory Group (Jones, 2008):

- a dry sand beach at all stages of the tide, capable of providing recreational opportunities for residents and visitors, protecting upland development and sustaining our natural resources

- elimination of the chronic and periodic erosion problems that threaten buildings and loggerhead nesting habitat along the shoreline
- minimizing the need for emergency protection of upland structures and development
- avoiding future shoreline development practices which perpetuate or exacerbate problems of the past, where some buildings were sited close to a dynamic inlet shoreline
- cooperation between all City residents to ensure that this vision is implemented and that generations to come can enjoy the beach on Isle of Palms

The City has pursued this vision through a number of actions:

- instituting regulations and policies for planning, zoning, development, environmental protection, and public safety
- developing and maintaining an excellent public beach access system
- prohibiting hard erosion control structures on the beach
- monitoring beach and dune conditions
- acting as permit applicant and providing funds for beach nourishment and shoal management projects

1.4 Current Beach Management Issues

There are three main beach management issues facing IOP at present:

1. Beach and dune erosion, particularly in the unstabilized inlet erosion zone near Dewees Inlet at the eastern end of the island (although there has been some recent erosion in the unstabilized inlet erosion zone near Breach Inlet at the west end of the island).
2. Balancing public beach parking demand with available safe parking capacity on the island.
3. Drainage of low-lying areas, an issue highlighted by tidal and rainfall flooding during October 2015 (Joaquin)

2. Inventory of Existing Conditions

2.1 General Characteristics of the Beach

Isle of Palms is a seven-mile-long barrier island located eight miles east of Charleston on the South Carolina coast (Figure 1). This long and relatively narrow island varies in width from 0.35 mile at the west end to 1.6 miles at the east end, and its slightly curving shoreline has an orientation of southwest to northeast. For descriptive purposes, the end of the island nearest Charleston is referred to as the “west” end, while the opposite end of the island is referred to as the “east” end. The total area of the island is four and one-half square miles.

The island is bounded on the north by Hamlin Creek and the Intracoastal Waterway, on the east by Dewees Inlet and Dewees Island, on the south by the Atlantic Ocean, and on the west by Breach Inlet and Sullivan's Island.

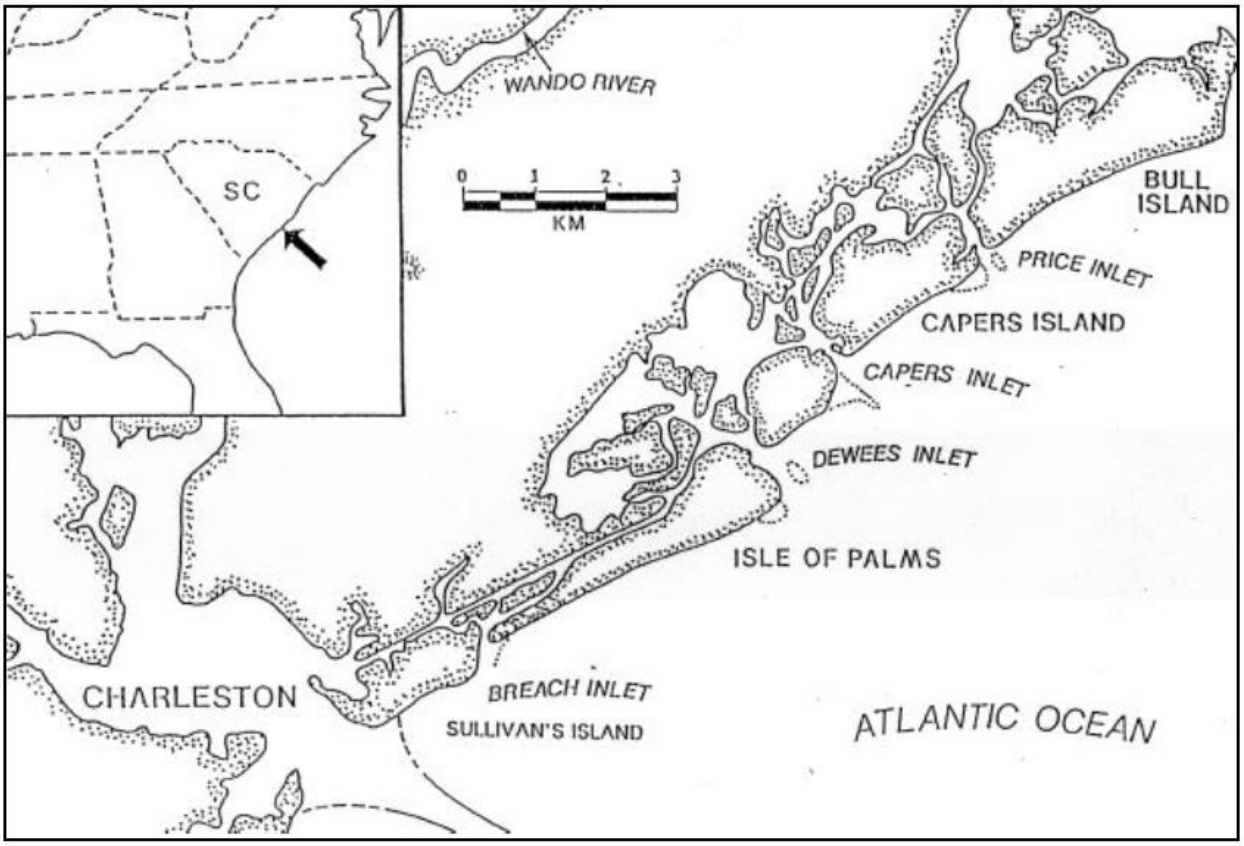

Figure 1. Isle of Palms Location Map.

Isle of Palms has a characteristic "drumstick" shape (Figure 2), with a wider upcoast (east) end due to the influence of Dewees Inlet and to the inlet shoal migration and attachment west of the inlet (Coastal Science & Engineering – CSE, 2015a). Because of this inlet shoal bypass process, however, the shoreline along the east end of Isle of Palms is highly dynamic, with localized advance or retreat by hundreds of feet in short periods of time (Figure 3). Eventually, much of the bypassed sediment travels along Isle of Palms, leading to a persistent, long-term trend of accretion at the west end of the island (Jones, 1986). The west end of the island is also dynamic (but not nearly as dynamic as the east end) as a result of sediment being bypassed from Isle of Palms across Breach Inlet to Sullivan's Island.

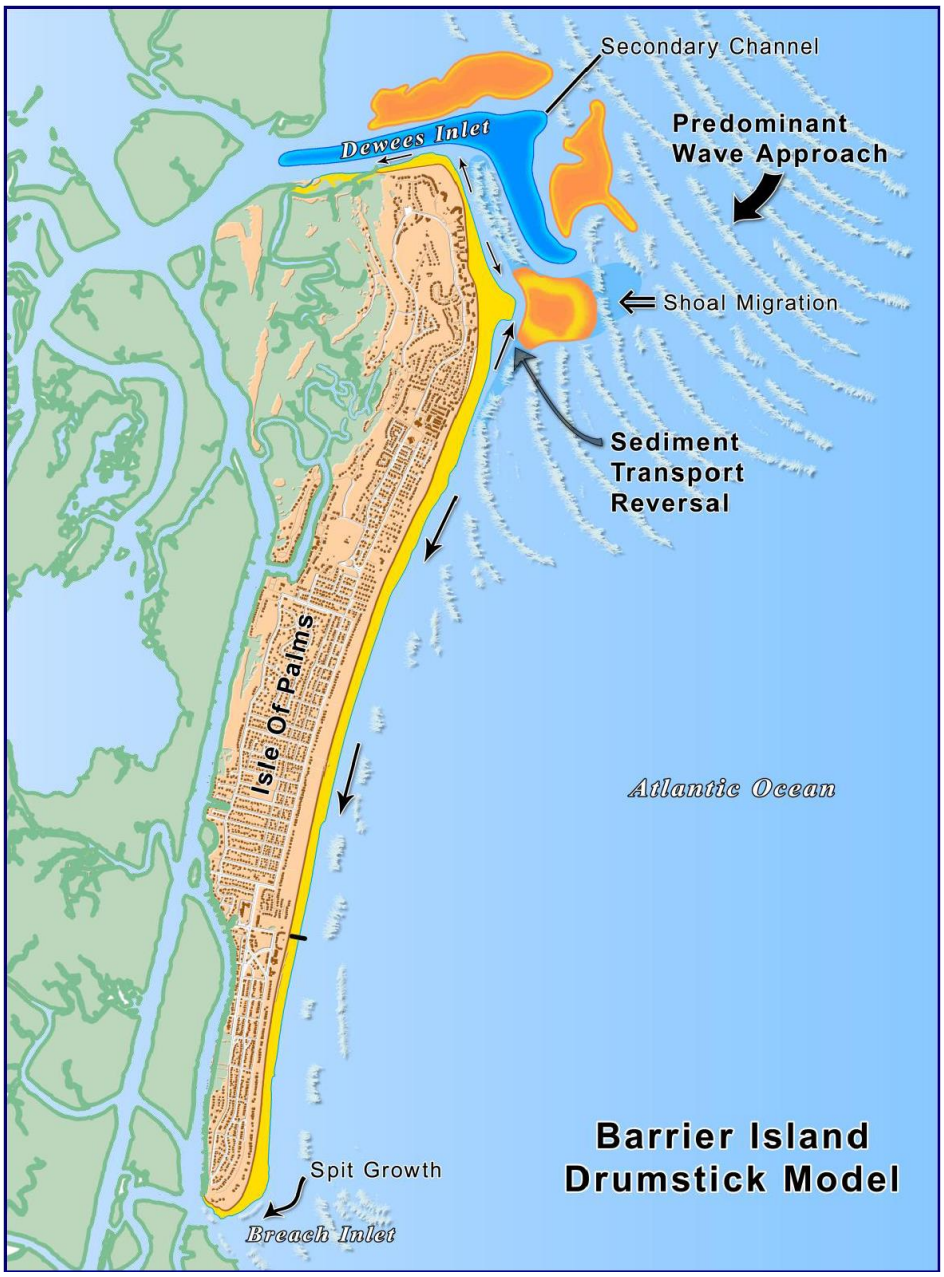

Figure 2. Isle of Palms exhibits a "drumstick" shape due to inlet shoal bypassing at Dewees Inlet at the east end of the island, and westerly sediment transport toward Breach Inlet (bottom). Figure from CSE (2015a).

Between 1941 and 1997, inlet shoals bypassed Dewees Inlet and attached to the beach at the east end of Isle of Palms every four to ten years, with an average interval between attachments of ~ 6 years (Guadiano and Kana, 2001). That shoal attachment frequency has continued through 2016. CSE (2015a) estimates that inlet shoal attachments add approximately 100,000 cy/yr of sediment to the island.

Figure 3. February 2007 view northeast toward Dewees Inlet (CSE, 2015a). Migrating inlet shoal leads to a wide beach immediately landward of the migrating shoal, and focused erosion adjacent to the location of shoal attachment.

Beaches are composed of fine-to-medium sand with a small percentage of shell. As a result, beach slopes on Isle of Palms are relatively flat, and the typical beach width (distance between the dune toe and the water line) tends to be ~20-50 feet at high tide and ~200 feet or more at low tide. However, in areas immediately landward of and adjacent to attaching inlet shoals, beach widths vary considerably – high tide beach width can be hundreds of feet in areas immediately landward of attaching inlet shoals, but can disappear entirely in areas adjacent to attaching shoals. Once a shoal attaches the added sediment spreads along the beach and beach widths return to a more normal condition.

Dune fields along the island are well-developed along the western and central portions of the island, ranging from approximately 50 ft to 250 ft wide. Along the eastern end of the island, dune width depends on the recent history of shoal attachments, and ranges from 0 ft to ~ 200 ft. Crest elevations of well-developed dunes reach ~ 12-15 ft NAVD (North American Vertical Datum), while crests of newer dunes may be just a few feet above the beach elevation. The 6 ft NAVD contour tends to define the typical boundary between the dune toe and the back of the beach berm.

Ground elevations on the island range from as high as 17 ft above at some points along a ridge on the ocean side of the island, down to sea level at the margins of the island. However, the topography of most of the island is relatively flat with an average ground elevation of approximately 6-8 ft NAVD.

2.2 General Land Use Patterns

Land use on Isle of Palms is depicted on the City's Current and Future Land Use Map (Figure 4). Land Use on the island is a mix of residential (low, medium, high density), commercial, park/recreation and conservation. The following alongshore lengths of land use occur on Isle of Palms:

- Low-density residential exists along approximately 4.4 miles (63%) of the ocean shoreline: 1.4 miles between Breach Inlet and 10th Ave., 2.7 miles between 21st Ave and 57th Ave, and 0.3 mile along Beachwood East and Dunecrest Lane.
- Medium-density residential exists along approximately 0.1 mile east of IOP County Park.
- High-density residential exists along approximately 1.1 miles (16%) of the ocean shoreline, all in the Wild Dunes Planned Development District: 0.25 miles in the vicinity of Grand Pavilion and Seagrove, and approximately 0.8 mile between the Property Owners Beach House and Ocean Club.
- Commercial exists along approximately 0.3 miles (4%) of the ocean shoreline, between 10th Ave. and 14th Ave.
- Park and recreation exist along approximately 0.6 mile (9%) of the ocean shoreline: ~400 ft at Isle of Palms County Park, and approximately 0.5 mile at the Wild Dunes Links Course.
- Conservation exists along the Dewees Inlet shoreline north of the Links Course.

Approximately 330 oceanfront parcels have been platted for residential or commercial use along the ~ 7-mile ocean shoreline. Approximately 90% of these parcels are single family residential.

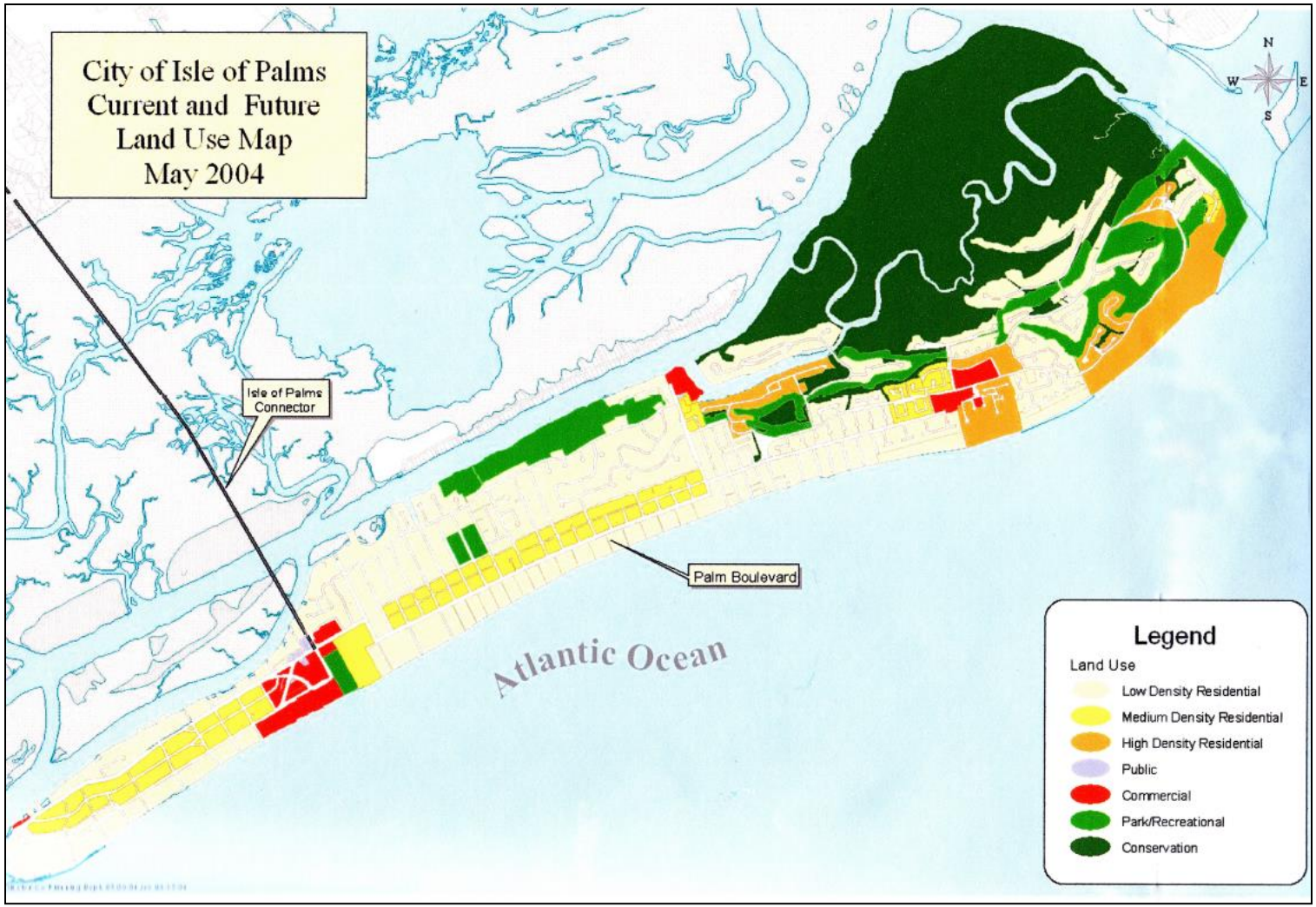

Figure 4. City of Isle of Palms Current and Future Land Use Map.

Unlike many coastal communities, the majority of the oceanfront development on Isle of Palms is set back a reasonable distance from the shoreline, and the area at greatest risk to erosion is along the northeastern third of the island (generally, from 55th Avenue to Dewees Inlet) where inlet shoal attachments occur on a regular basis. Unfortunately, the northeastern end of the island is also the area where the oceanfront development density is greatest, and the buildings are the largest.

In recognition of erosion hazards influenced by land use patterns at the east end of the island, the City has a beach nourishment and focused erosion shoal management strategy, which addresses long-term erosion, storm impacts and episodic erosion due to shoal attachments. The City and the Wild Dunes community cooperate and coordinate on the issue, and Wild Dunes helps fund erosion strategies along the northeast portion of the shoreline.

According to the Comprehensive Plan (Isle of Palms Planning Commission, 2015):

- The 2010 resident population of Isle of Palms was 4,133. The resident population is fairly stable.
- During the summer beach season, the island's population rises to 12,000 people and may increase to as many as 20,000 people during peak weekends such as Memorial Day, Fourth of July and Labor Day.
- There were 4,274 housing units on the island in 2010. Approximately 35% were owner-occupied, approximately 8% were occupied by (long-term) renters, and approximately 57% were seasonal rentals or vacant. Approximately 48% of all housing units are in Wild Dunes.

2.2.1 Beach Use

There are a variety of beach uses on Isle of Palms, including: walking, jogging, shelling, wading, skim boarding, sunbathing, volleyball, bicycling, swimming, fishing, paddle boarding, surfing, kite boarding, kayaking, boating and others.

There are generally no restrictions on which of these permissible uses can be carried out along the beach, except:

- Motorized vehicles, including golf carts, are not permitted on the beach (except for emergency vehicles, trash pick-up, etc.)
- A "swimming zone" has been designated from the Isle of Palms Pier east for 450 ft (incorporating the County Park shoreline), where activities other than swimming, wading and related activities are prohibited.
- Swimming and wading are prohibited along the Breach Inlet shoreline.
- Operation of boats, motorboats and jet skis is prohibited within 100 yard of Police jurisdiction, except in emergencies.
- Parasailing is prohibited within Police jurisdiction.

- Tents, canopies, beach chairs, kites, coolers, beach umbrellas and similar property are allowed on the beach after sunset only so long as such property is being attended to by the user.
- No personal property shall be located within 25 feet of any emergency beach access or any turtle nest.
- Any personal property, except "Hobie Cat" style sailboats which are operable and kept in good working condition or poles supporting volleyball nets adjacent to commercially zoned property, left on the beach after sunset shall be deemed abandoned and subject to disposal by the City.
- Overnight sleeping on the beach is prohibited.
- Glass bottles, fireworks, bonfires and alcoholic beverages are prohibited on the beach.
- Dogs may be on the beach and off leash, from 5:00 AM until 9:00 AM April 1st through September 14th, and 4:00 PM until 10:00 AM September 15th through March 31st. Dog owners must have leash in hand and have their dog under voice command. At all other times, dogs must be on leash and under complete control, even in the water.

2.2.2 Benefits and Value of the Beach

Like most beach communities, Isle of Palms owes its existence mainly to the beach. Golf and boating are also important contributors to the Island's prosperity, but the beach is the main draw. Property values, real estate activity, tourist visitation, commercial activity and City revenues depend directly or indirectly on the presence of a healthy beach. Data from a decade ago showed tourists spent an estimated $130 million annually on Isle of Palms (based on City information and Oh, 2006). This figure has likely increased significantly.

City data from FY 2013 to FY 2015 show the following revenues which are tied to the fact that Isle of Palms is a beachfront community:

- Municipal/County/State Accommodations Tax revenues to the City have averaged approximately $2.8 million annually
- City Hospitality Tax has brought in approximately $0.6 million annually.
- City Residential License fees have brought in approximately $0.5 million annually.
- The City's recently instituted Beach Preservation Fee raised approximately $1 million in its first year.

City data show that approximately half of the revenues described above are associated with rental/vacation properties and tourist activity at Wild Dunes.

2.3 Beachfront Developments and Zoning

City regulations pertaining to Land Use, Zoning and Building are contained in Title 5 (Planning and Development) of the Code of Ordinances,

https://www.municode.com/library/sc/isle_of_palms/codes/code_of_ordinances?nodeId=14483. The newest, adopted ordinances not yet incorporated into the Code are posted on the City web site http://www.iop.net/ordinances.

Zoning was established on October 25, 1956, approximately 3 years after incorporation by the City. The entire zoning code has been repealed and readopted, or amended substantially, in 1975, 1981, 1989 and 1992-1993 (Isle of Palms Planning Commission, 2015). Other amendments to zoning regulations have been ongoing since that time. The latest Zoning Map was adopted in February 2016 (Figure 5). The Planning and Zoning Commission was created on December 10, 1986. The City also adopted an ordinance in 1981 creating a Board of Adjustment, which has since been renamed the Board of Zoning Appeals.

In 1975 City Council approved a Planned Residential Development (PRD) zoning district for the eastern, then undeveloped, end of the island. Today this area includes the gated resort community of Wild Dunes and several adjacent residential areas. The PRD was the first zoning agreement of its type in the State of South Carolina. Under the PRD zoning, the eastern end of the island was developed to include a wide variety of housing types: low to high density single-family detached units, townhouses, and low-rise and high-rise condominium multi-family units. Within the gated section of Wild Dunes many of the approximately 2,067 residential units are used as seasonal rental properties. Wild Dunes also includes offices and conference facilities and other resort amenities. The PRD also includes a few properties on 43rd through 45th Avenues outside the Wild Dunes gates.

In the PRD zoning district, the use, subdivision, and development of property is governed through deed restrictions enforced by the Wild Dunes Community Association. The City has implemented zoning control in Wild Dunes only on a few matters not specifically described in the PRD documents (e.g., tree cutting, conservation overlay, marsh setback). Development within Wild Dunes is also subject to OCRM requirements.

In 2000 the name of the zoning district for planned developments changed from Planned Residential District (PRD) to Planned Development District (PDD). The new designation more accurately describes the land use activities.

Figure 5 shows that the approximate 7-mile length of ocean and inlet shoreline can be broken down as follows:

- Single family residential: 4.2 miles in SR-1, SR-2, SR-3 districts (between Breach Inlet and 10th Ave., and between Isle of Palms County Park and 57th Ave.)
- General Commercial: 0.4 mile in GC-2 and GC-2 district (between 10th Ave. and 14th Ave., and Isle of Palms County Park)
- Wild Dunes PDD: 3.4 miles, with a mixture of low- and high-density residential and the Links Course

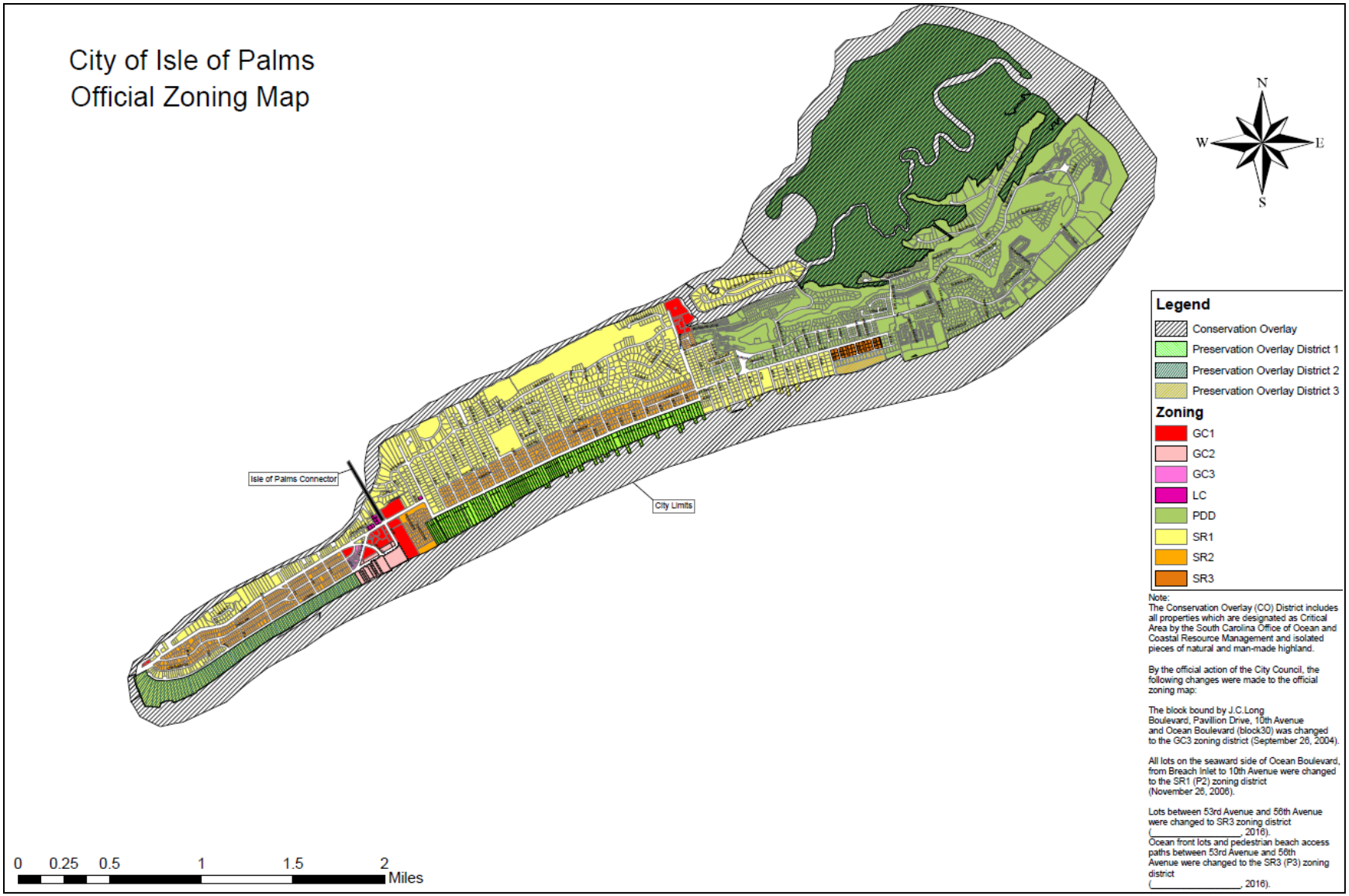

Figure 5. February 2016 Isle of Palms Zoning Map.

Since 1989, a Conservation District Overlay Zone has been established along the entire ocean, inlet and marsh shorelines. Permitted activities are limited to recreation, public utility lines, beach nourishment and special activities and franchises approved by the City.

Preservation Overlay Zones have been established landward of the Conservation District along 3.3 miles of ocean shoreline. The zones were established to preserve natural barriers against forces from the ocean, to preserve adequate light, air and open space, and to preserve scenic, historic and ecologically sensitive areas.

- In 1990 the City established a Preservation Overlay Zone (P-1) between 21st Ave. and 41st Ave.
    - The seaward limit of construction (structures and their stairs) is 130 ft seaward of the Palm Blvd. right of way (on-site waste disposal systems may extend beyond 130 ft).
    - Other activities permitted seaward of the construction limit include one dune walkover per lot, as permitted by the City Code and DHEC OCRM regulations; one open air gazebo per lot, as permitted by the City Code and DHEC OCRM regulations, not to exceed 100 square feet in floor area or 16 feet in height.
- In 2006, a second Preservation Overlay Zone (P-2) was established between Breach Inlet and 10th Ave.
    - The seaward limit of construction is given by the "Maximum Building Line" shown on the January 8, 1988 final plat by E.M. Seabrook, and generally lies 150 ft to 250 ft seaward of Ocean Blvd., putting the limit landward of the DHEC OCRM Setback line in all but a few instances.
    - Other activities permitted seaward of the construction limit include one dune walkover per lot, as permitted by the City Code and DHEC OCRM regulations; one swimming pool per lot, as permitted by the City Code and DHEC OCRM regulations.
- In 2016, a third Preservation Overlay Zone (P-3) was established between 53rd Ave. and 56th Ave when the area was rezoned from PDD to SR-3.
    - The seaward limit of construction is 110 ft from 54th, 55th and 56th Ave. rights of way (see City Ordinance 2015-15). The construction limit is landward of the DHEC OCRM Setback Line along 54th Ave., but seaward along 55th and 56th Ave.
    - Other activities permitted seaward of the construction limit include one dune walkover per lot, as permitted by the City Code and DHEC OCRM regulations; one swimming pool per lot, as permitted by the City Code and DHEC OCRM regulations.

2.3.1 Beachfront Structural Inventory

Section 7 (Appendix) of this LCBMP provides maps and inventories of beach accesses and structures extending seaward of the DHEC OCRM 40-yr Setback Line. The information contained therein is summarized below.

A review of 2015 aerial photography and limited 2016 field inspections showed the following structures[1] extend seaward of the 2009 DHEC OCRM 40-year setback line (the vast majority of these encroachments are at the east end of the island, between 55th Ave and Dewees Inlet):

- ~71 detached single family buildings
- ~16 multifamily buildings that include a total of 222 residential units
- ~20 wooden decks attached to buildings
- ~12 swimming pools and/or pool decks
- 3 other structures (gazebo, pool equipment building)
- 1 private pier
- 2 golf course holes
- rock revetments (exposed and buried)

Of these, the following[2] extend seaward of the 2009 DHEC OCRM baseline:

- ~55 detached single family buildings
- ~14 multifamily buildings that include a total of 222 residential units
- ~7 wooden decks attached to buildings
- ~7 swimming pools and/or pool decks
- 3 other structures (gazebo, pool equipment building)
- 1 private pier
- 2 golf course holes
- rock revetments (exposed and buried)

Construction of additional buildings along the Isle of Palms shoreline is unlikely, given the fact that the ocean shoreline of Isle of Palms is essentially built-out. However, an increasingly common occurrence on Isle of Palms is the teardown of existing homes and construction of new homes on those properties. New homes tend to be larger than the pre-existing homes, but must comply with all City and State requirements and regulations. It is highly unlikely that additional buildings will be constructed seaward of the DHEC OCRM setback line.

[1] Note: some counts are approximate. Accurate determinations at some locations will require field surveys.
[2] Note: some counts are approximate. Accurate determinations at some locations will require field surveys.

2.4. Natural Resource and Ecological Habitats

Isle of Palms, like most South Carolina barrier islands, is characterized by a beach and dune ridge system, with an extensive tidal marsh along the northern side of the island. The island is surrounded by navigable waters. Prior to development, the island was covered by maritime forest.

Three terrestrial habitats are found around the Isle of Palms' beachfront, namely the beach community, maritime shrub thickets, and maritime forest.

- The beach community generally includes the open beach and dune habitats, as well as the foreshore zone that is frequently inundated by the tides.
- Maritime shrub thicket communities commonly grow in older dunes, behind the primary dunes, and include salt tolerant shrubs such as wax myrtle, yaupon holly, and red cedar.
- Maritime forests are upland communities typified by live oak, cabbage palmetto, and loblolly pine, and remnant patches of this habitat are scattered throughout the island. Each ecological community provides benefits to plants and animals that use the habitat to forage, as shelter, for nesting, or for a combination of these uses.

The importance of barrier islands like Isle of Palms as habitat for plants and animals is significant. Many animals are dependent on smaller prey available on open beach habitats as part of complex food webs. Some animals also require the sands of primary dunes on barrier islands for nesting sites and are unable to successfully reproduce without access to this habitat. In the water, nearshore subtidal bars and sand flats can support large numbers and species of marine invertebrates and fish that cannot thrive in the open ocean. Long-term or permanent alteration to these habitats can affect the type, health, and vitality of the flora and fauna.

Natural habitats and resources are also recognized for the social and economic benefits that they provide. Protection of natural resources is identified in the City's Comprehensive Plan as essential to maintaining the high quality of life on the Isle of Palms. Residents indicate that the attributes of coastal ecosystems, including marshes, mature trees, marine waters, and sandy beaches influenced their decision to purchase property on Isle of Palms. In addition, the accessible ocean beach is a predominant factor in the local tourism and vacation rental economy. Eco-tourism has also increased in recent years as an economic market around Charleston and on Isle of Palms.

2.4.1 Threatened and Endangered Species

South Carolina Department of Natural Resources (SCDNR) does not maintain island-specific listings of rare, threatened or endangered species for Isle of Palms. A list does exist for Charleston County (http://www.dnr.sc.gov/species/pdf/Charleston2014.pdf), but not for the island. The Charleston County List is shown in Table 1.

Table 1. SCDNR List of Rate, Threatened and Endangers Species and Communities Known to Occur in Charleston County (6/11/2014).

Scientific Name	Common Name	USESA Designation	State Protection	Global Rank	State Rank
Vertebrate Animals					
Accipiter cooperii	Cooper's Hawk			G5	S3?
Acipenser brevirostrum	Shortnose Sturgeon	LE: Endangered	SE: Endangered	G3	S3
Acris crepitans	Northern Cricket Frog			G5	S5
Aimophila aestivalis	Bachman's Sparrow			G3	S3
Ambystoma cingulatum	Flatwoods Salamander	LT: Threatened	SE: Endangered	G2	S1
Ambystoma tigrinum tigrinum	Eastern Tiger Salamander			G5	S2S3
Caretta caretta	Loggerhead	LT: Threatened	ST: Threatened	G3	S3
Charadrius wilsonia	Wilson's Plover		ST: Threatened	G5	S3?
Clemmys guttata	Spotted Turtle		ST: Threatened	G5	S5
Condylura cristata	Star-nosed Mole			G5	S3?
Corynorhinus rafinesquii	Rafinesque's Big-eared Bat		SE: Endangered	G3G4	S2?
Crotalus horridus	Timber Rattlesnake			G4	SNR
Dendroica virens	Black-throated Green Warbler			G5	S4
Elanoides forficatus	American Swallow-tailed Kite	SC: Sp. of Concern	SE: Endangered	G5	S2
Haliaeetus leucocephalus	Bald Eagle		ST: Threatened	G5	S2
Heterodon simus	Southern Hognose Snake			G2	SNR
Ictinia mississippiensis	Mississippi Kite			G5	S4
Lasiurus cinereus	Hoary Bat			G5	SNR
Limnothlypis swainsonii	Swainson's Warbler			G4	S4
Melanerpes erythrocephalus	Red-headed Woodpecker			G5	SNR
Microtus pennsylvanicus	Meadow Vole			G5	SNR
Micrurus fulvius	Eastern Coral Snake			G5	S2
Mycteria americana	Wood Stork	LE: Endangered	SE: Endangered	G4	S1S2
Myotis austroriparius	Southeastern Bat			G3G4	S1
Neotoma floridana	Eastern Woodrat			G5	S3S4
Neotoma floridana floridana	Eastern Woodrat			G5T5	S3S4
Ophisaurus compressus	Island Glass Lizard			G3G4	S1S2
Pelecanus occidentalis	Brown Pelican			G4	S1S2
Phoca vitulina	Harbor Seal			G5	SNA
Picoides borealis	Red-cockaded Woodpecker	LE: Endangered	SE: Endangered	G3	S2
Plegadis falcinellus	Glossy Ibis			G5	SHB,SNRN
Pseudobranchus striatus	Dwarf Siren		ST: Threatened	G5	S2

Table 1 (continued).

Scientific Name	Common Name	USESA Designation	State Protection	Global Rank	State Rank
Rana capito	Gopher Frog		SE: Endangered	G3	S1
Sciurus niger	Eastern Fox Squirrel			G5	S4
Seminatrix pygaea	Black Swamp Snake			G5	SNR
Sterna antillarum	Least Tern		ST: Threatened	G4	S3
Tyto alba	Barn-owl			G5	S4
Ursus americanus	Black Bear			G5	S3?
Vermivora bachmanii	Bachman's Warbler	LE: Endangered	SE: Endangered	GH	SX
Animal Assemblage					
Waterbird Colony				GNR	SNR
Vascular Plants					
Agalinis linifolia	Flax Leaf False-foxglove			G4?	SNR
Agrimonia incisa	Incised Groovebur			G3	S2
Amaranthus pumilus	Seabeach Amaranth	LT: Threatened		G2	S1
Amphicarpum muehlenbergianum	Blue Maiden-cane			G4	S2S3
Anthaenantia rufa	Purple Silkyscale			G5	S2
Asclepias pedicellata	Savannah Milkweed			G4	S2
Botrychium lunarioides	Winter Grape-fern			G4?	S1
Calopogon barbatus	Bearded Grass-pink			G4?	S2
Canna flaccida	Bandana-of-the-everglades			G4?	S2
Carex decomposita	Cypress-knee Sedge			G3G4	S2
Carex elliottii	Elliott's Sedge			G4?	S1
Chasmanthium nitidum	Shiny Spikegrass			G3G4	S1
Coreopsis gladiata	Southeastern Tickseed			G4G5	SNR
Coreopsis integrifolia	Ciliate-leaf Tickseed			G1G2	S1
Cornus racemosa	Stiff Dogwood			G5?	S1?
Cyperus tetragonus	Piedmont Flatsedge			G4?	S2
Dionaea muscipula	Venus' Fly-trap			G3	S3
Eleocharis tricostata	Three-angle Spikerush			G4	S2?
Eleocharis vivipara	Viviparous Spike-rush			G5	S1
Eryngium aquaticum var. *ravenelii*	Ravenel's Eryngo			G4T2T3	S1
Eupatorium anomalum	Florida Thorough-wort			G2G3	S1?
Eupatorium fistulosum	Hollow Joe-pye Weed			G5?	SNR
Forestiera godfreyi	Godfrey's Privet			G2	S1
Galactia elliottii	Elliott's Milkpea			G5	S1
Helenium pinnatifidum	Southeastern Sneezeweed			G4	S2
Hypericum nitidum	Carolina St. John's-wort			G4	S1

Table 1 (continued).

Scientific Name	Common Name	USESA Designation	State Protection	Global Rank	State Rank
Ipomoea macrorhiza	Large-stem Morning-glory			G3G5	S1
Ipomoea stolonifera	Beach Morning-glory			G5?	SNR
Iris hexagona	Walter's Iris			G4G5	S1
Lepuropetalon spathulatum	Southern Lepuropetalon			G4G5	S2
Lilaeopsis carolinensis	Carolina Lilaeopsis			G3G5	S2
Listera australis	Southern Twayblade			G4	S2
Litsea aestivalis	Pondspice			G3?	S3
Lobelia boykinii	Boykin's Lobelia			G2G3	S3
Ludwigia lanceolata	Lance-leaf Seedbox			G3	S1
Lysimachia hybrida	Lance-leaf Loosestrife			G5	S1
Monotropsis odorata	Sweet Pinesap			G3	S2
Muhlenbergia filipes	Bentgrass			G5?Q	S3S4
Orobanche uniflora	One-flowered Broomrape			G5	S2
Oxypolis canbyi	Canby's Dropwort	LE: Endangered		G2	S2
Paspalum bifidum	Bead-grass			G5	S2
Peltandra sagittifolia	Spoon-flower			G3G4	S2
Physostegia leptophylla	Slender-leaved Dragon-head			G4?	SNR
Pieris phillyreifolia	Climbing Fetter-bush			G3	S1
Plantago sparsiflora	Pineland Plantain			G3	S2
Platanthera integra	Yellow Fringeless Orchid			G3G4	S1
Psilotum nudum	Whisk Fern			G5	S1
Pteroglossaspis ecristata	Crestless Plume Orchid			G2G3	S2
Quercus austrina	Bluff Oak			G4?	S1
Rhexia aristosa	Awned Meadowbeauty			G3G4	S3
Rhynchospora breviseta	Short-bristle Baldrush			G3G4	S1
Rhynchospora careyana	Horned Beakrush			G4?Q	S3
Rhynchospora globularis var. *pinetorum*	Beakrush			G5?T3?	S1
Rhynchospora harperi	Harper Beakrush			G4?	S1
Rhynchospora inundata	Drowned Hornedrush			G4?	S2?
Rhynchospora tracyi	Tracy Beakrush			G4	S3
Sageretia minutiflora	Tiny-leaved Buckthorn			G4	S3
Sarracenia rubra	Sweet Pitcher-plant			G4	S3S4
Schwalbea americana	Chaffseed	LE: Endangered		G2G3	S2
Scleria baldwinii	Baldwin Nutrush			G4	S2
Spiranthes laciniata	Lace-lip Ladies'-tresses			G4G5	S1S2

Table 1 (continued).

Scientific Name	Common Name	USESA Designation	State Protection	Global Rank	State Rank
Tridens carolinianus	Carolina Fluff Grass			G3G4	S1
Tridens chapmanii	Chapman's Redtop			G3	S1
Triphora trianthophora	Nodding Pogonia			G3G4	S2
Xyris brevifolia	Short-leaved Yellow-eyed Grass			G4G5	S1
Xyris difformis var. *floridana*	Florida Yellow-eyed Grass			G5T4T5	S2
Xyris elliottii	Elliott Yellow-eyed Grass			G4	S2
Xyris stricta	Pineland Yellow-eyed Grass			G4	S1
Communities					
Atlantic coastal plain depression meadow	Depression Meadow			G5	SNR
Bald cypress - tupelo gum swamp				G5	S4
Bald cypress - water tupelo swamp	Bald Cypress - Tupelo Gum Swamp			G5	SNR
Bottomland hardwoods				G5	S4
Depression meadow				G3	S2
Estuarine intertidal mud flat	Intertidal Mud/sand Flat			G5	SNR
High pocosin	Pocosin			G3G4	SNR
Interior freshwater marsh				G3	SNR
Juniperus virginiana var. *silicicola* - *zanthoxylum clava-herculis* - *quercus virginiana* - (*sabal palmetto*) / *sageretia minutiflora* - (*sideroxylon tenax*) woodland	South Atlantic Coastal Shell Midden Woodland			G2?	SNR
Longleaf pine flatwoods				GNR	SNR
Maritime forest				G2	S2
Maritime shrub thicket				G4	S2S3
Mesic mixed hardwood forest				G5	S4
Middens				GNR	S3
Non-alluvial swamp forest				G5	S4S5
Pine - scrub oak sandhill				G4	S4
Pine flatwoods				G5	S3S4
Pocosin				G3G4	S3S4
Pond cypress pond				G4	S4
Pond cypress savanna				G3	S2

Table 1 (continued).

Scientific Name	Common Name	USESA Designation	State Protection	Global Rank	State Rank
Salt marsh				G5	S5
Salt shrub thicket (allard)	Salt Shrub Thicket			G5	SNR
South atlantic inland maritime forest	Maritime Forest			G2	SNR
Spruce pine - mixed hardwood forest				G3	S2
Spruce pine / mixed hardwood				GNR	SNR
Swamp tupelo pond				G3	S3
Tidal freshwater marsh				G3	S3
Geological					
Carolina bay				GNR	SNR

Limited island-specific information exists in the 2015 Isle of Palms Comprehensive Plan:

- Seven species of birds are listed on the federal endangered or threatened list which may be found in the area. The endangered species are the bald eagle, Bachman's warbler, wood stork and red-cockaded woodpecker. Threatened birds are the piping plover, peregrine falcon and red knot.
- No federally listed endangered or threatened plants are known to be located on the island. The primary tree species on the island are palmetto, live oak, loblolly pine, wax myrtle, and crepe myrtle. In 1989 the City adopted its first tree ordinance to prevent parcels from being completely cleared during development. In 2002, the ordinance was amended to include further protection for all live oak trees and other trees in excess of eight inches in diameter.
- The loggerhead sea turtle, a threatened species, visits the island to lay eggs along the beach. South Carolina beaches have the largest number of nest sites in the "population" tracked between North Carolina and Northern Florida.

2.4.2 Turtle Nesting

Since 2000 the annual number of loggerhead sea turtle nests along Isle of Palms has fluctuated between approximately 10 and 60. It is thought that individual turtles may return to historical/ regional nesting sites every two to five years, accounting for the wide fluctuation in the number of nests from year to year. Enforcement of the island's lighting ordinance, which prohibits lighting directed at the beach, as well as other City ordinances (e.g., requiring the removal of overnight beach furniture, filling in holes in the sand, properly disposing of all trash and garbage, and the banning of single-use plastic bags at retail checkout) are thought to reduce interference and entanglement of sea turtles and to contribute to survival of this threatened species.

Green, Leatherback and Kemp's ridley turtles can nest on South Carolina beaches, but nesting on Isle of Palms is rare. The last Green turtle nest on Isle of Palms was in 1998; there has been one Kemp's ridley nest since 1980. According to the SCDNR Marine Turtle Conservation Program, the Hawksbill turtle does not nest in South Carolina.

The City of Isle of Palms participates in the Island Turtle Team, a group of volunteers that monitors the critical habitat and nesting of loggerhead turtles on Isle of Palms and Sullivan's Island, and posts current nesting information on their web site http://www.iop.net/turtle-team. Team members identify nest locations, mark and safeguard the nests, and relocate nests where required. Isle of Palms is also frequently used for a release point for sea turtles rehabilitated by the SC Aquarium Sea Turtle Hospital.

Turtle nesting statistics for 2009 through 2016 are shown in Table 2 http://www.seaturtle.org/nestdb/index.shtml?year=2016&view_beach=49.

Table 2: 2009 - 2016 Marine Sea Turtle Nesting Data for Isle of Palms. Source: Island Turtle Team, SCDNR Marine Sea Turtle Conservation Program and Seaturtle.org.

	2009	2010	2011	2012	2013	2014	2015	2016
Number of Nests	19	23	42	62	34	11	31	27
False Crawls	12	18	17	24	26	6	15	25
Nests Relocated	13	16	24	46	26	8	22	23
Nest Success*	19	19	31	58	32	11	31	26
Eggs	2,396	2,380	4,226	6,426	3,866	1,397	3,640	3,151
Hatched Eggs	2,094	1,923	2,628	5,088	3,130	1,199	3,225	2,524
Emerged Hatchlings	1,898	1,761	2,424	4,830	2,723	1,101	3,095	2,293
Emergence Success**	79%	76%	57%	74%	71%	80%	85%	73%

* number of nests with at least 10% hatch success

** (number of hatchlings that emerge from nests/number of eggs laid) x 100

The eastern section of the island -- which is most subject to erosion -- typically accounts for approximately 1/4th of marine turtle nesting on the island (2006 personal communication, SCDNR Marine Turtle Conservation Program).

2.5 Existing Public Access and Map

Public beach access along Isle of Palms is excellent. There are 56 public access points along approximately 4.5 miles of shoreline between Breach Inlet and 57th Ave (average spacing between public access points is approximately 400 ft). The three easternmost of the 56 access points (between 54th Ave. and 57th Ave.) are actually owned and maintained by the Wild Dunes Community Association, but have no use restrictions and are available to the general public as well.

East of 57th Ave., beach access is available via 14 community access points for residents and guests of Wild Dunes (average spacing between community access points is approximately 875 ft, or 1/6 mi).

Public beach access and parking information is posted on the City's web site http://www.iop.net/beach-access-parking, and is tabulated in this LCBMP (this section and Appendix). Public beach access locations also are shown on the SC Beach Guide http://gis.dhec.sc.gov/beachaccess/ and Figure 6, taken from the SC Beach Guide.

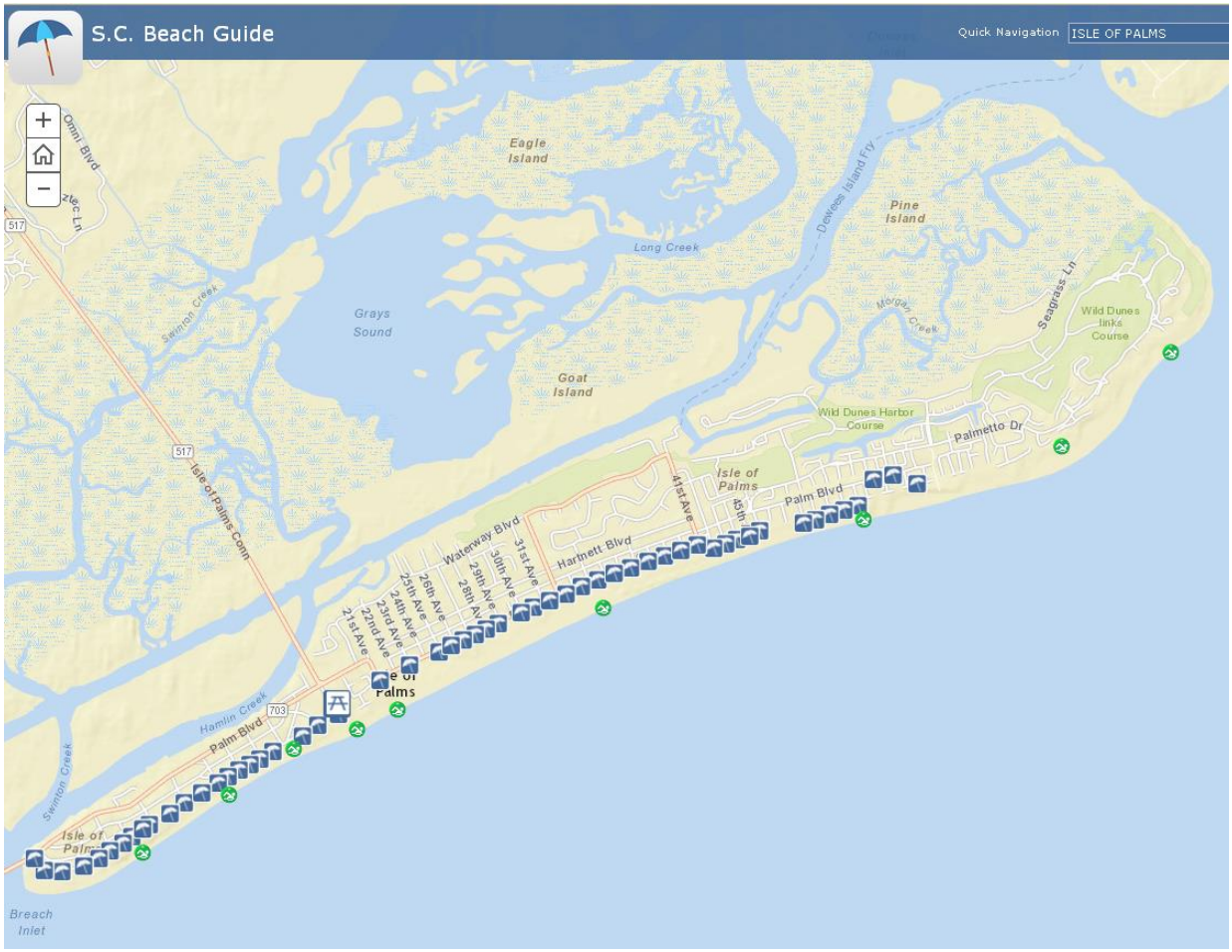

Figure 6. Public beach access points (umbrella and picnic table symbols). From SC Beach Guide http://gis.dhec.sc.gov/beachaccess/

Isle of Palms public access points are identified by numbered signs (landward and seaward ends) and marked with 'Beach Access' signs. The access points also have beach regulation signs, and trash and recycling receptacles, and many have dog waste collection and disposal containers. The City maintains the access paths and signs, and replaces lost or damaged signs.

Public access paths are shown on plats of the island, and the City will not permit any development or encroachments on the paths, since this would reduce or eliminate public beach access. The City routinely inspects public access paths and notifies adjacent property owners if their vegetation or property uses encroach into the public access paths, and the City requires those owners to correct the situation.

Public restrooms are available at the public beach access between 1116 and 1122 Ocean Boulevard, and at the Isle of Palms County Park.

Beach access for emergency vehicles is available at 5th Ave., 14th Ave., 25th Ave., 42nd Ave., 53rd Ave. and at the Property Owners Beach House (Wild Dunes).

Public parking is available within 500 ft of the landward terminations of beach access paths between Breach Inlet and 57th Avenue (some distances to beach parking exceed 500 ft due to the distance between the rear of the dune and Palm Blvd. between 41st Ave. and 57th Ave. (DHEC OCRM staff indicated in April 2015 that this was acceptable). Parking spaces are in the form of either paved parking spaces or lots, unpaved spaces (gravel or grass surface lots), and parking along public road rights-of-way ("on-street" parking) on the Isle of Palms.

Four public parking lots are available to beachgoers:

- 10-space paved lot (free) near Breach Inlet
- two gravel parking lots (pay) on Pavilion Blvd. with a total of +/- 422 spaces
- paved/grass parking lot (pay) with +/- 441 spaces at Isle of Palms County Park

In addition, approximately 141 spaces (pay) are situated in the commercial district along Ocean Blvd. between 10th Ave. and 14th Ave. The pay parking areas are shown in Figure 7.

Figure 7. Pay parking areas between 10th Ave. and Isle of Palms County Park
http://www.iop.net/beach-access-parking

In 2015 the City completed deliberation and multi-year analysis of parking supply and demand on the island, incorporating input from residents, businesses, SCDOT and other stakeholders. The result is implementation of a Managed Beach Parking Plan (Parking Concept C) for the 2016

summer beach season (the City is currently reviewing the Managed Parking Plan for possible changes for the 2017 season). The Plan establishes resident parking districts and beach (public) parking districts to improve public safety and to better control on-street (rights-of-way) parking on the Isle of Palms. The beach parking districts (see Figure 8) are listed in Ordinance 2015-13 http://www.iop.net/Data/Sites/1/media/ordinances/ordinance_2015.13_sign_plan.pdf, adopted by the City Council on November 17, 2015 and include:

- 3rd Ave. between Ocean Blvd. and Charleston Blvd.
- 4th Ave. between Ocean Blvd. and Charleston Blvd.
- 5th Ave. between Ocean Blvd. and Carolina Blvd.
- 6th Ave. between Ocean Blvd. and Carolina Blvd.
- 7th Ave. between Ocean Blvd. and Carolina Blvd.
- East side of 8th Ave. between Ocean Blvd. and Carolina Blvd.
- East side of 9th Ave. between Ocean Blvd. and Carolina Blvd.
- Palm Blvd., between 21st Ave. and 57th Ave.

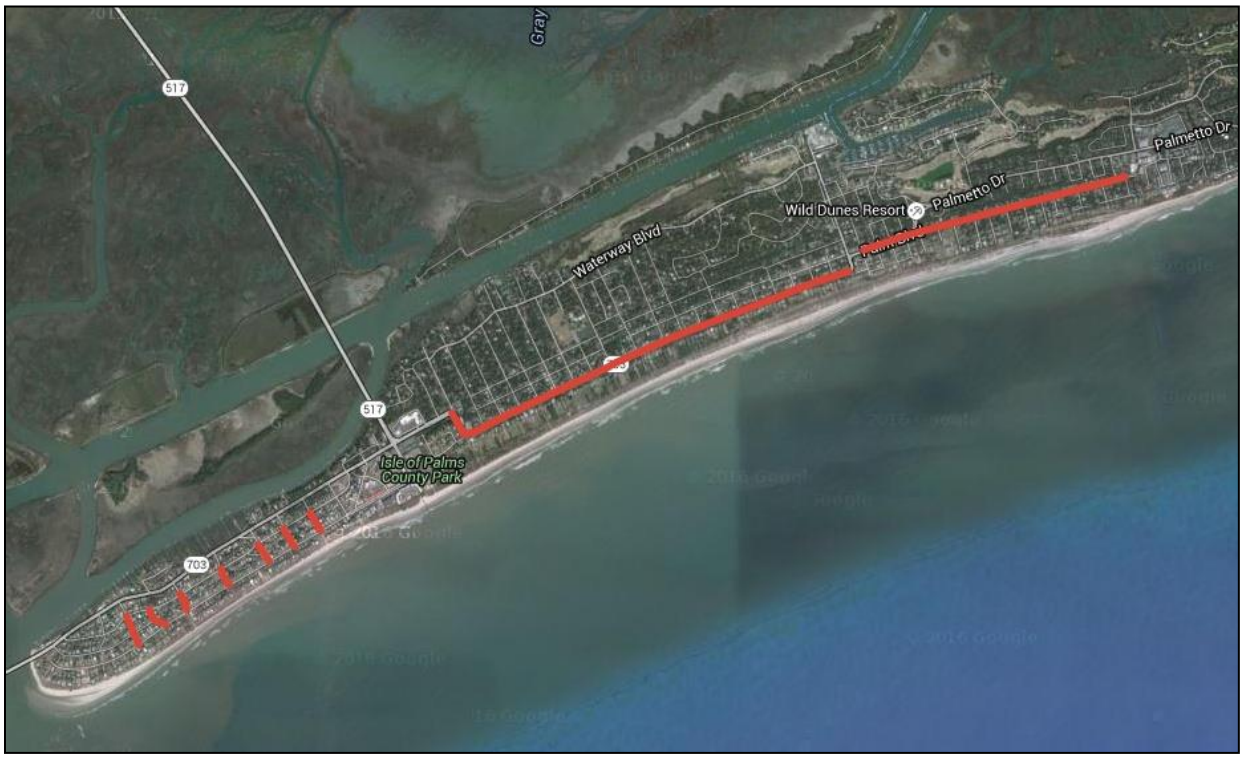

Figure 8. Beach parking districts (public parking along road rights-of-way) established by the 2015 Managed Parking Plan http://www.iop.net/beach-access-parking

The City installed over 400 signs along the roads of Isle of Palms during winter 2015-2016 to help residents and the public identify those areas where on-street (rights-of-way) parking is permitted (or not) per the Managed Beach Parking Plan.

Site inspections during preparation of the LCBMP show a total of approximately +/-1,566 public parking spaces are available for beach access purposes, broken down as follows:

- 10 spaces (including 1 handicap space) at Breach Inlet lot
- +/-61 spaces on road rights-of-way between 3rd Ave. and 9th Ave, including 2 paved handicap spaces off Ocean Blvd. at 9th Ave.
- +/-141 spaces along Ocean Blvd. between 10th Ave. and 14th Ave.
- +/-102 spaces, including 5 paved handicap spaces, in the City lot west of Pavilion Blvd.
- +/- 320 spaces in the City lot east of Pavilion Blvd.
- +/- 441 spaces, including 9 paved handicap spaces, in the Isle of Palms County park lots
- +/- 357 spaces on Palm Blvd. right-of-way between 21st Ave. and 41st Ave, including 2 paved handicap spaces off Palm Blvd. at 21st Ave.
- +/- 134 spaces on Palm Blvd. right-of-way between 41st Ave. and 57th Ave,

The above figures do not include designated golf cart parking spaces along the beach access paths at 25th Ave. (15 spaces), 28th Ave. (10 spaces) and 31st Ave. (10 spaces). Also not counted in the above figures -- the Property Owners Beach House in Wild Dunes provides +/- 50 paved vehicle parking spaces for Wild Dunes residents and guests, and provides space for approximately 30 golf carts along the community beach access path.

The City inspects road rights-of-way upon which public beach access parking is allowed, and prohibits any new encroachments. Some long-established encroachments persist due to complex legal issues, but those encroachments have been accounted for in the parking counts in this Plan.

In order to qualify for “full and complete public beach access” per State criteria, public parking and other facilities meeting the classification shown in Table 3 must be distributed along the shoreline (SC DHEC, 2012). According to LCBMP site inspections and Table 3:

- Isle of Palms County Park is classified as a *Regional Public Access Park*, and provides full and complete public access for 2 miles of shoreline, from 5th Ave to +/- 31st Ave.
- The Breach Inlet parking lot and parking along 3rd Ave. are each classified as a *Local Public Access Park*, and provide full and complete public access between Breach Inlet and 5th Ave (+/- 0.75 mile).
- Parking along Palm Blvd between 31st Ave. and 57th Ave, results in a continuous *Local Public Access Park* classification, and provides more than enough parking to yield full and complete public access for 2.0 miles, from +/- 31st Ave. to ¼ mile east of Access 57 (between 56th Ave. and 57th Ave.)

The number and distribution of public access points, facilities and parking exist to classify 4.8 miles of the Isle of Palms beach – from Breach Inlet to the Wild Dunes Grand Pavilion (¼ mile east of public beach access 57) -- as having full and complete access per the State guidelines (SC DHEC, 2012). See Figure 9.

Table 3. State Public Beach Access Facility Classification (SC DHEC, 2012).

Type of Facility	**Distance on Either Side of Access Point Which Will be Considered as Having Full and Complete Access**	**Minimum Facilities**
Public Access Point	1/8 mile	Trash receptacle, walkover/improved surface access; signage; on-street parking for 6 vehicles
Local Public Access Park	1/4 mile	As above, parking for 10 vehicles
Neighborhood Public Access Park	1/2 mile	As above, parking for 25 vehicles
Community Public Access Park	3/4 mile	As above, showers, lifeguards, concession, handicapped access and parking, parking for 75 vehicles
Regional Public Access Park	1 mile	As above, parking for 150 vehicles and greater

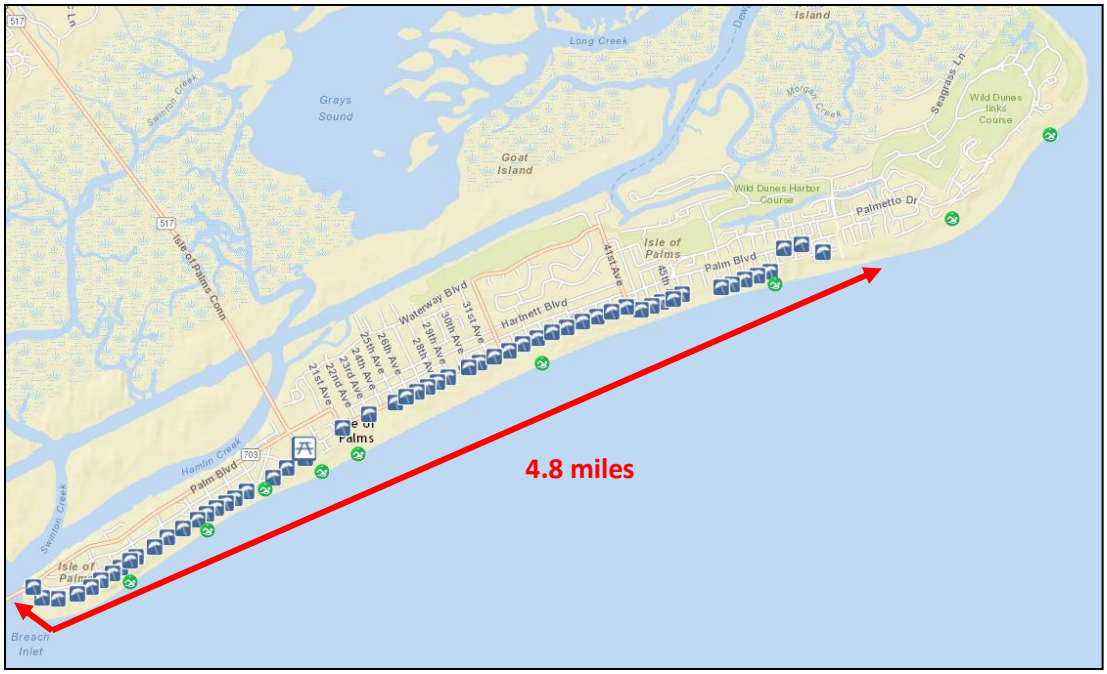

Figure 9. Full and Complete Public Beach Access (Breach Inlet to ¼ mile east of Access 57).

Calculations show that Isle of Palms could require as few as 7 access points (one *Regional Public Access Park* and six *Local Public Access Parks*) and approximately 210 public parking spaces to yield full and complete public access along the same 4.8 mile shoreline. Isle of Palms has 8 times as many public access points and approximately 7.5 times the minimum required number of public parking spaces to provide full and complete public access.

3. Beachfront Drainage Plan

Controlling stormwater and other discharges along the beachfront areas of the Isle of Palms is a priority. Uncontrolled, direct discharge to the beach cannot only lead to erosion of dune and beach areas, but can also affect water quality. Fortunately, Isle of Palms has no pipe outfalls or swashes discharging onto the beach, and periodic water quality monitoring along the Atlantic shoreline has shown no bacteria levels exceeding state standards and no requirement to post beach swimming advisories for at least the past ten years. Stormwater issues on the island typically are related to shallow flooding of upland areas due to heavy rainfall. Stormwater issues seaward of the State's 40-year setback line are minor.

In 1990, the USDA- Soil Conservation Service completed a stormwater management study for the City of Isle of Palms, covering all drainage structures, systems and watersheds between Breach Inlet and 56th Avenue.

Following an episode of serious island-wide flooding in October 1994, the Isle of Palms City Council hired consulting engineers to review the study data prepared by the USDA-SCS and to recommend engineered drainage improvements that would alleviate flooding conditions while

still meeting stormwater management objectives of the Beach Management Act. As a result of the engineering study, $7 million in new drainage infrastructure was proposed. A bond referendum was conducted by City Council in November 1995, but the proposed bond issue was defeated by a wide margin. Since that time, stormwater improvements have been addressed on a project-by-project basis, with priority informed by the prior studies and recommendations.

Recent City and community actions related to stormwater are summarized below:

- During 2001 Wild Dunes undertook a major drainage project to accommodate the run-off of an upcoming project. The City was able to work in conjunction with Wild Dunes and agreed to pay to upgrade the size of the drainage pipe to accommodate additional drainage from an abutting neighborhood.
- The City drafted a Storm Water Management Plan (October 28, 2005) to bring it into compliance with the National Pollution Discharge Elimination System (NPDES) permit requirements and into compliance with the State of South Carolina Stormwater Management and Sediment Reduction Act (SC Code Sec. 48-14-10) -- to facilitate the long range planning associated with the protection, maintenance, and enhancement of the environment of the City of Isle of Palms. The City's Stormwater Plan was subsequently approved, and in August 2007, the City adopted (see Ordinances 2007-14, 2007-15, 2007-16 and 2007-17) stormwater and sediment control regulations, and established a stormwater utility.
- In the fall of 2011, the City collaborated with Wild Dunes and completed a $1.1M drainage project that alleviated many of the drainage problems between 53rd Ave. and 57th Ave. The second phase of the project will address drainage issues between 45th Ave. and 52nd. Ave., and has been designed (estimated cost $1.3 to $1.4 million). Partial funding (~$800,000) is in hand and the remaining funds should be in place in the next 1-2 years, at which time the project will be constructed.
- In addition to the routine maintenance of existing drainage facilities, which is done with the assistance of the Charleston County Public Works Department and the SC Department of Transportation (SCDOT), the City has been employing an innovative rehabilitation technique that utilizes a water jet and sewer vacuum truck to re-grade and re-sculpt ditches while simultaneously removing spoil material and vegetation. This process has been successful in shaping ditches that were previously difficult to access with heavy equipment. The City plans to continue funding for future maintenance using this same technique.
- As required by the Priority Investment Act of 2007, an analysis was conducted of the likely federal, state and local funds available for public infrastructure and facilities on the Isle of Palms (Isle of Palms Planning Commission, 2015). Some of the possible projects are roadway and drainage improvements, and they might be eligible for funding by the Charleston County Transportation Development or by other funding sources. Installation of public sewers in areas served by septic systems and having marginal soils is considered a priority (specifically, septic tank systems in the areas near

the beach between 42nd and 53rd Ave., adjacent to the Recreation Center from 26th to 29th Ave. and in low areas of the Forest Trail subdivision which are affected by flooding and seasonal high water and would benefit from public sewer service).

- The City cooperates with SCDHEC to monitor beach water quality at eight locations: 4th Avenue, 7th Avenue, 12th Avenue, 21st Avenue, 34th Avenue, 53rd Avenue, Dunecrest Lane and Port O'Call. If needed, the City has a standard protocol for warning swimmers if bacteria levels in swimming waters are elevated. DHEC will notify the City if water quality sampling results indicate unsafe conditions, at which time the City and/or DHEC will post signs in any affected areas (media reports do not always reach visitors and residents, and are not relied upon). All posting of signs is coordinated between the City and DHEC.

4. Beach Management and Authorities

Beach management on Isle of Palms is exercised primarily through the entities listed below. More detail is provided for some of these entities in the sections that follow.

Federal:

USACE (permitting under Section 10 of the Rivers and Harbors Act; Section 404 of the Clean Water Act; post-disaster emergency assistance to the State)

USFWS and NMFS (principally via coordination with USACE on matters related to threatened and endangers species)

NOAA (principally via coordination with USACE and state agencies on coastal zone management and consistency issues; provides coastal zone management funding and training)

FEMA (oversees the National Flood Insurance Program; provides pre- and post-disaster hazard mitigation grant funds; provides disaster assistance to individuals and communities; provides training to fire, emergency management and other local government staff)

USEPA (principally on matters related to NPDES stormwater permitting, air quality, hazardous waste, etc.)

USCG (provides maritime safety and security; oil spill response),

State of South Carolina

SCDHEC (implementation of the Beachfront Management Act; water quality)

SCDNR (principally on matters related to rare/threatened/endangered species; flood mitigation)

SCDOT (transportation and parking)

SCEMD (emergency management coordination and assistance)

Charleston County (hazard mitigation and emergency management; planning and funding assistance with transportation and infrastructure)

City of Isle of Palms (land use and development regulations; public health and safety; environmental protection; public works)

4.1 State Authorities

4.1.1 Overview of State Policies (Beachfront Management Act)

The following overview was obtained from http://www.scdhec.gov/beach/BeachfrontManagement/.

In 1988, the South Carolina "Beachfront Management Act" (Coastal Tidelands and Wetlands Act, as amended, §48-39-250 et seq.) established a comprehensive statewide beachfront management program. The Act included several key legislative findings, including (summarized):

- the importance of the beach and dune system in protecting life and property from storms, providing significant economic revenue through tourism, providing habitat for important plants and animals, and providing a healthy environment for recreation and improved quality of life of all citizens;
- unwise development has been sited too close to and has jeopardized the stability of the beach/dune system;
- the use of armoring in the form of hard erosion control devices such as seawalls, bulkheads, and rip-rap to protect erosion-threatened structures has not proven effective, have given a false sense of security, and in many instances, have increased the vulnerability of beachfront property to damage from wind and waves while contributing to the deterioration and loss of the dry sand beach;
- inlet and harbor management practices, including the construction of jetties which have not been designed to accommodate the longshore transport of sand, may deprive downdrift beach/dune systems of their natural sand supply;
- it is in the state's best interest to protect and promote increased public access to beaches for visitors and South Carolina residents alike.
- a coordinated state policy for post-storm management of the beach and dunes did not exist and that a comprehensive beach management plan was needed to prevent unwise development and minimize adverse impacts.

Section 48-39-260 of the Beachfront Management Act then established eight state policies to guide the management of ocean beaches:

1. Protect, preserve, restore, and enhance the beach/dune system;
2. Create a comprehensive, long-range beach management plan and require local beach management plans for the protection, preservation, restoration, and enhancement of the beach/dune system, each promoting wise use of the state's beachfront to include a gradual retreat from the system over a forty-year period;

3. Severely restrict the use of hard erosion control devices and encourage the replacement of hard erosion control devices with soft technologies which will provide for the protection of the shoreline without long-term adverse effects;
4. Encourage the use of erosion-inhibiting techniques which do not adversely impact the long-term well-being of the beach/dune system;
5. Promote carefully planned nourishment as a means of beach preservation and restoration where economically feasible;
6. Preserve existing public access and promote the enhancement of public access for all citizens, including the handicapped, and encourage the purchase of lands adjacent to the Atlantic Ocean to enhance public access;
7. Involve local governments in long-range comprehensive planning and management of the beach/dune system in which they have a vested interest; and
8. Establish procedures and guidelines for the emergency management of the beach/dune system following a significant storm event.

DHEC OCRM is responsible for implementing these policies through a comprehensive management program that includes research and policy development, state and local planning, regulation and enforcement, restoration, and extension and education activities.

4.1.2 Beachfront Setback Area

The State of South Carolina established a forty-year policy of retreat as part of the Beachfront Management Act in 1988. That Act stated that the policy of retreat would include measures that:

> (a) stabilize the present beachfront shoreline position and sand volumes, through the use of renourishment in combination with groins, where such measures can be used without long term adverse effects on neighboring properties and the public beach,
>
> (b) discourage (or limit) new construction in the beach/dune Critical Area
>
> (c) prevent the seaward expansion of existing beachfront development
>
> (d) limit the size of structures within the beach/dune Critical Area
>
> (e) encourage the opportunistic, voluntary relocation of vulnerable structures and infrastructure;
>
> (f) prevent the loss of dry sand beaches, and the state's intertidal beaches, by restricting shore-parallel erosion control devices and,
>
> (g) encourage local governments, through zoning, to maximize space between existing oceanfront structures and the shoreline

DHEC OCRM, as the steward of the State's coastal resources, is responsible for implementing this policy. The policy is implemented by DHEC OCRM using jurisdictional lines along the ocean

shoreline. DHEC OCRM has established two jurisdictional lines along the open coast beaches of South Carolina:

- The "Baseline", which is established along the dune crest in "standard erosion zone" areas away from significant influence by unstabilized tidal inlets, and along the most landward shoreline (+/- vegetation line) in areas subject to significant influence by unstabilized tidal inlets. Although not applicable to the Isle of Palms, there is a third procedure used by OCRM to establish the baseline along shorelines near tidal inlets stabilized by jetties, terminal groins or other structures (the baseline is set in a manner similar to that in standard erosion zones). The Baseline is used as the reference feature from which the 40-year Setback Line is measured. Section 48-39-280 states that the baseline must not move seaward from its position on December 31, 2017.

  Section 48-39-280 states, "(1) The baseline for each standard erosion zone is established at the location of the crest of the primary oceanfront sand dune in that zone. In standard erosion zones in which the shoreline has been altered naturally or artificially by the construction of erosion control devices, groins, or other manmade alterations, the baseline must be established by the department using the best scientific and historical data, as where the crest of the primary oceanfront sand dunes for that zone would be located if the shoreline had not been altered. (2) The baseline for inlet erosion zones that are not stabilized by jetties, terminal groins, or other structures must be determined by the department as the most landward point of erosion at any time during the past forty years, unless the best available scientific and historical data of the inlet and adjacent beaches indicate that the shoreline is unlikely to return to its former position. In collecting and utilizing the best scientific and historical data available for the implementation of the retreat policy, the department, as part of the State Comprehensive Beach Management Plan provided for in this chapter, among other factors, must consider historical inlet migration, inlet stability, channel and ebb tidal delta changes, the effects of sediment bypassing on shorelines adjacent to the inlets, and the effects of nearby beach restoration projects on inlet sediment budgets. (3) The baseline within inlet erosion zones that are stabilized by jetties, terminal groins, or other structures must be determined in the same manner as provided for in item (1). However, the actual location of the crest of the primary oceanfront sand dunes of that erosion zone is the baseline of that zone, not the location if the inlet had remained unstabilized."

- The 40-year Setback Line, which establishes the landward limit of DHEC OCRM jurisdiction under the Beachfront Management Act, is drawn landward of the Baseline a distance equal to 40 times the average annual erosion rate or not less than twenty feet from the baseline for each erosion zone based on the best historical and scientific data adopted for the department as part of the State Comprehensive Beach Management Plan.

The DHEC OCRM Baseline and 40-year Setback Line were last updated for Isle of Palms in 2009. The 2009 lines are posted on the DHEC OCRM website http://www.scdhec.gov/beach/BeachfrontJurisdiction/, and are shown in Figures 10a through 10d, and the overlay maps in the LCBMP Appendix.

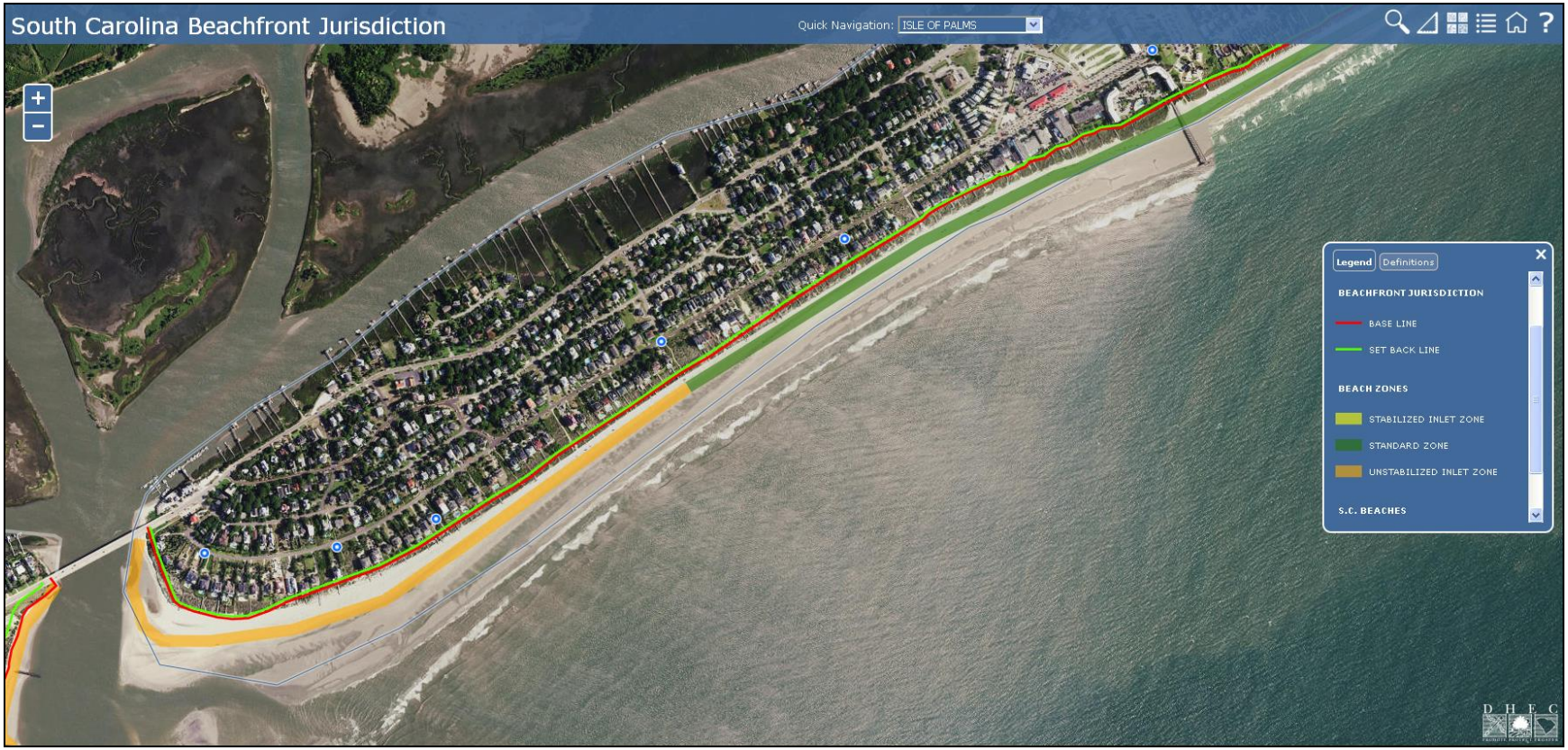

Figure 10a. 2009 Beachfront Jurisdictional Lines for Isle of Palms, Breach Inlet to Isle of 14th Ave. Red line = Baseline; green line = 40-year setback line; orange shading = unstabilized inlet erosion zone; green shading = standard erosion zone; blue dots = DHEC OCRM survey monuments and erosion rate locations.

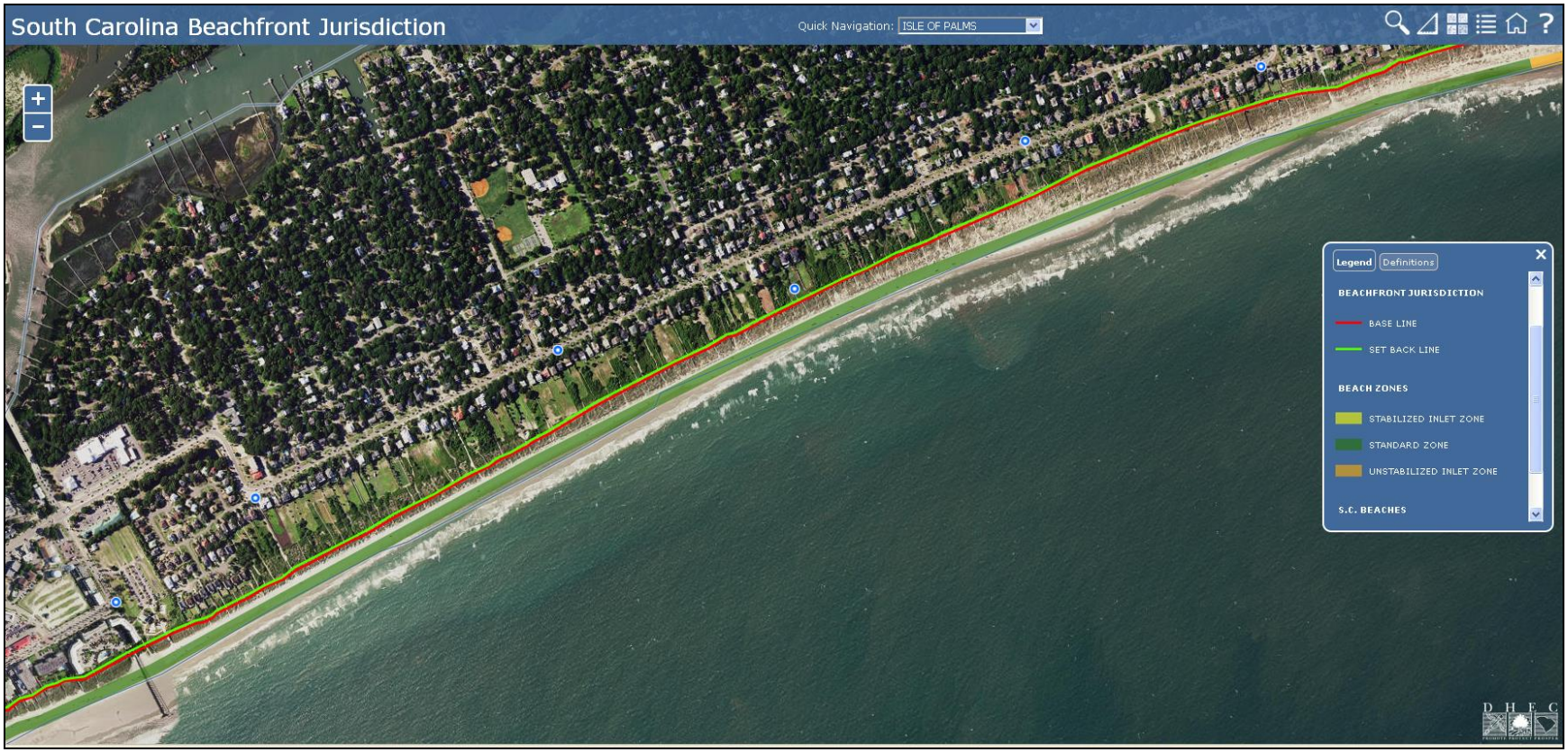

Figure 10b. 2009 Beachfront Jurisdictional Lines for Isle of Palms,14th Ave. to 41st Ave. Red line = Baseline; green line = 40-year setback line; orange shading = unstabilized inlet erosion zone; green shading = standard erosion zone; blue dots = DHEC OCRM survey monuments and erosion rate locations.

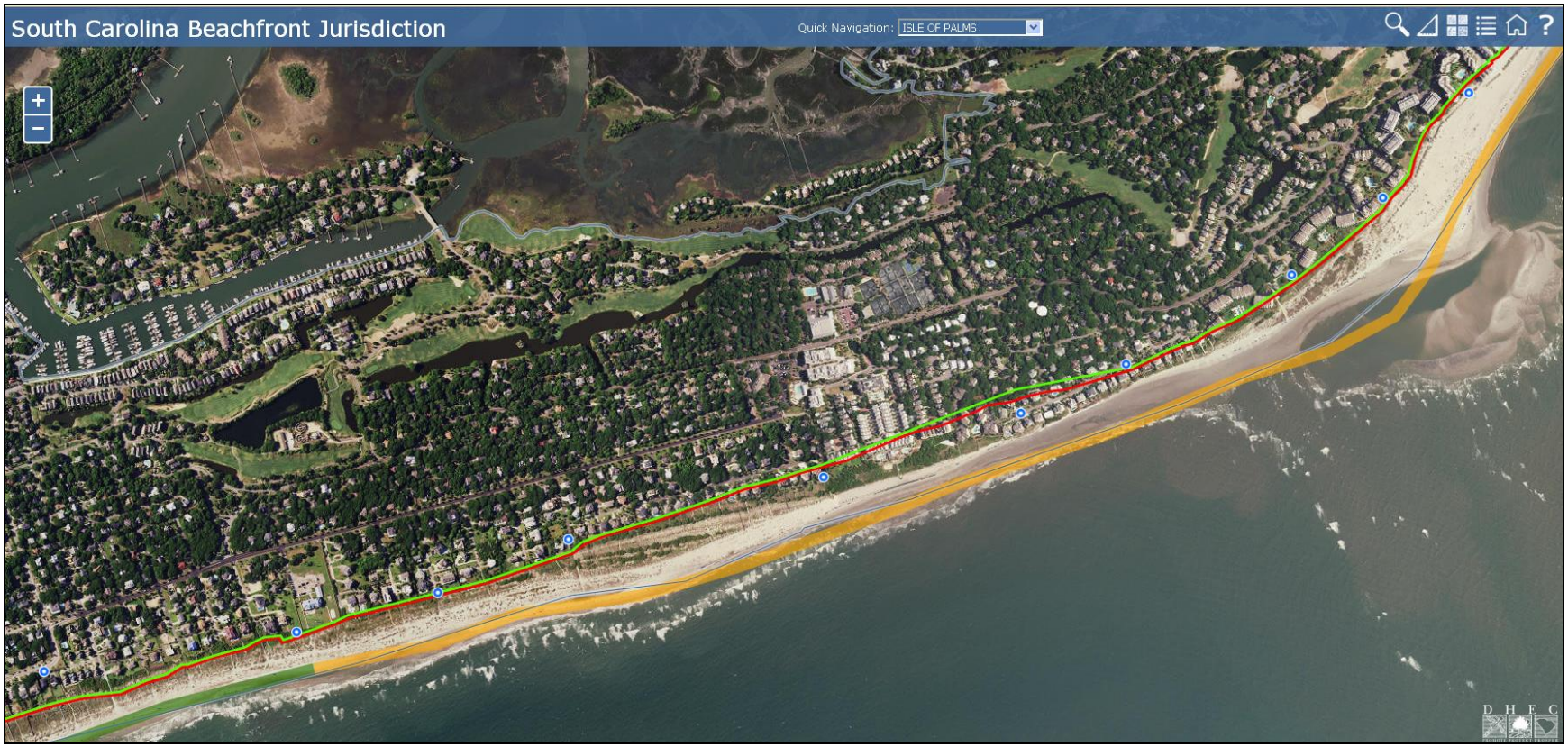

Figure 10c. 2009 Beachfront Jurisdictional Lines for Isle of Palms, 41st Ave. to Summer Dunes Lane. Red line = Baseline; green line = 40-year setback line; orange shading = unstabilized inlet erosion zone; green shading = standard erosion zone; blue dots = DHEC OCRM survey monuments and erosion rate locations.

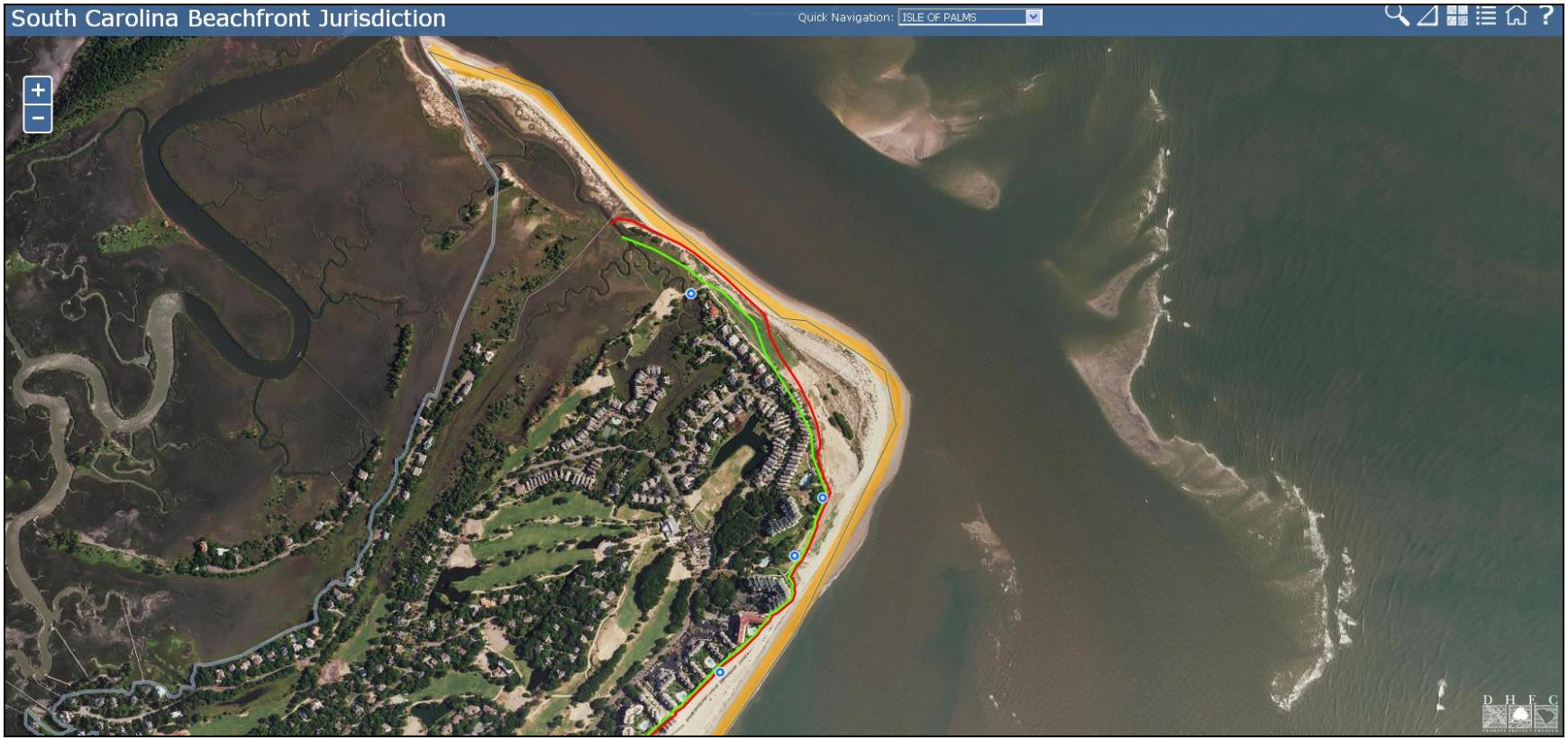

Figure 10d. 2009 Beachfront Jurisdictional Lines for Isle of Palms, Summer Dunes Lane to Dewees Inlet. Red line = Baseline; green line = 40-year setback line; orange shading = unstabilized inlet erosion zone; green shading = standard erosion zone; blue dots = DHEC OCRM survey monuments and erosion rate locations.

4.2 Local Government and Authorities

The City of Isle of Palms uses various plans to guide development and other activities on the island. It carries out those plans and exercises beachfront management authority through powers provided in various sections of its Code of Ordinances https://www2.municode.com/library/sc/isle_of_palms/codes/code_of_ordinances. Plans and pertinent sections of the City Code are discussed in sections 4.2.1 through 4.2.6 of this LCBMP.

4.2.1 Municipality's Comprehensive Plan

The Comprehensive Plan is intended to document the history of development on the Isle of Palms, to identify the community's problems and needs, and to articulate a vision for its future. The Plan is also intended to help guide future decision making in matters affecting the physical, social, and economic growth, development and redevelopment of the community. The plan is not a final product; it is part of a continuing planning process and is updated and revised as new information becomes available or as new problems and/or needs arise. The latest adopted Comprehensive Plan is dated May 26, 2015 http://www.iop.net/comprehensive-plan.

The Comprehensive Plan is guided by the following Vision Statement:

> *"Isle of Palms has developed into a premier barrier island residential community with a variety of housing styles, commercial uses and recreational facilities. Despite the natural cycle of beach erosion that is inherent on barrier islands and the extensive development of the island, the natural resources that make Isle of Palms such a wonderful place to live and visit remain intact and in good condition. Measures that will enhance the existing character of the island as a quality place to live, and protect the environment both on and around the island, must be taken to guide development and preserve the quality of life for generations to come."*

Issues most closely related to the beach and beach management are contained in the following elements of the Comprehensive Plan: Economic, Natural Resources, Community Facilities, Land Use, Transportation and Priority Investment.

Section 1.4 of this LCBMP identified three current beach management issues. These are listed below, accompanied by related extracts from the Comprehensive Plan and the status of City implementation for each.

- **Beach and dune erosion, particularly in the unstabilized inlet erosion zone at the eastern end of the island.** *(see Section 5.2.1 of this LCBMP)*

  Economic Element

  Goal 2.1 Balance the needs of residents and tourists with those of the environment.

  Strategy 2.1.1: Establish policies and procedures to ensure that beaches, marshlands and marinas are protected and preserved. *(Ongoing; Building Department and City Council)*

Strategy 2.1.3: Maintain and enhance an effective monitoring system to ensure beaches, marshlands and marinas are properly maintained. *(Ongoing; General Government and City Council)*

Natural Resources Element

Goal 3.3: Protect marshes, dunes and beaches.

Strategy 3.3.1: Create a public awareness/education program aimed at protecting the sensitive ecosystem of a barrier island, to include protection of dunes and marshes and their vegetation, as well as the importance of removing animal waste and trash from the beaches. *(2008; General Government and Building Department)*

Strategy 3.3.2: Support efforts to minimize the impact of erosion on the ends of the island including beach nourishment projects. *(Ongoing; General Government)*

Goal 3.5: Protect the island's wildlife and vegetation.

Strategy 3.5.1: Pursue enforcement of ordinance(s) aimed at protecting loggerhead turtle nesting activities and sites. *(Ongoing; Building Department and Police Department)*

Strategy 3.5.2: Support other regulations that protect wildlife and vegetation. *(Ongoing; General Government and Police Department)*

- **Balancing public beach parking demand with available safe parking capacity on the island.** *(see Section 2.5 of this LCBMP)*

  Transportation Element

  Goal 8.1: Improve traffic flow and reduce congestion on the roadways of the island.

  Strategy 8.1.4: Develop a management plan to lessen the effects beach traffic has on the island's roadways. *(2009; Building Department)*

  Goal 8.2: Discourage non-resident parking and traffic in residential neighborhoods.

  Strategy 8.2.1: Encourage appropriate measures including signs, traffic restrictions and parking restrictions. *(Ongoing; Managed Parking Plan being implemented; Police Department and City Council)*

- **Drainage of low-lying areas, an issue highlighted by tidal and rainfall flooding during October 2015 (Joaquin).** *(see Section 3 of this LCBMP)*

  Community Facilities Element

  Goal 5.6: The City should take initiatives to address drainage and storm water runoff on the island.

  Strategy 5.6.1: Continue to work closely with County and State agencies to properly maintain existing storm water and drainage systems. Clearly delineate the City's areas of responsibility and take appropriate action where feasible. *(Ongoing; General Government and City Council)*

Strategy 5.6.2: Consider funding for a comprehensive drainage study that would isolate the highest priority areas and provide engineering options and costs. *(Ongoing; General Government, Public Works and City Council)*

Strategy 5.6.3: Consider funding options, including special assessments, to address drainage problems. *(Ongoing; General Government and City Council)*

Strategy 5.6.4: The City should continue to work to remain in compliance with the National Pollution Discharge Elimination System Phase II as a small MS4 community. *(Ongoing; Building Department, General Government and City Council)*

Land Use Element

Goal 7.4: Ensure the adequacy of the infrastructure to support continued development and expanded uses.

Strategy 7.4.1: Continue to improve and expand the drainage system to alleviate the problems in those areas that drain poorly. *(Ongoing; Building Department and Public Works Department)*

Natural Resources Element

Goal 3.2: Improve the water quality of the ocean, waterway and creeks surrounding the island.

Strategy 3.2.4: Monitor DHEC/OCRM testing of ocean waters impacting the island. *(Ongoing; General Government and Building Department)*

Strategy 3.2.5: Create a public awareness/education program to address the impact of individual actions on the water ecology of the island. *(Ongoing; General Government, Building Department and Charleston County NPDES public education program)*

Priority Investments Element

Goal 9.1: Improve drainage in those areas that drain poorly.

Strategy 9.1.1: Identify problem areas and appropriate funding sources.

4.2.2 Municipality's Hazard Mitigation Plan

The City does not have a stand-alone Hazard Mitigation Plan, instead, elements of what would be a stand-alone plan are contained in the Charleston Regional Hazard Mitigation Plan, see http://www.charlestoncounty.org/departments/building-inspection-services/files/2015-2016-Hazard-Mitigation-Plan.pdf. The City has been and continues to be an active participant in the Regional Plan development and update process, and chose this approach to facilitate coordination and consistency with Charleston County and other jurisdictions. All IOP-specific hazard mitigation information is contained in the County plan. The City will actively pursue funding (in advance or reimbursement) for hazard mitigation activities described in the Plan, in its efforts to reduce future damage and loss along the City shoreline.

4.2.3 Municipality's Disaster Preparedness and Evacuation Plan

The City's Disaster Preparedness Plan is posted on the City's Emergency Preparedness web page http://www.iop.net/emergency-preparedness. The plan and the website provide important information to residents, day-workers and tourists.

The City hosts a Disaster Expo every year, usually in May. Local, state, federal, private and other organizations provide information to attendees.

The Governor and the Mayor have the authority to order evacuations of the island. Evacuation routes from the island have been designated by Charleston County and the State, and are posted on the City web site.

The City has instituted a hurricane re-entry sticker program to facilitate re-entry of residents after an evacuation.

Wild Dunes Community Association (2012) also has a Hurricane Emergency Preparedness Plan which is consistent with the City's.

4.2.4 Beachfront Development Regulations

Section 5-4-15(A) of the Code of Ordinances ensures that development and redevelopment seaward of the 40-year Setback Line will satisfy DHEC OCRM requirements. The section states, "No land or building situated in whole or in part in a critical area as defined in S.C. Code 1976, § 48-39-10, as amended, shall be used, occupied, constructed, altered or moved without compliance with the State of South Carolina Beachfront Management Act (S.C. Code 1976, § 48-39-10 et seq., as amended)."

Sections 5-4-151 through 5-4-170 (Flood Damage Prevention) govern additions, improvements and reconstruction of damaged buildings within the Special Flood Hazard Area (100-yr floodplain shown on Flood Insurance Rate Maps). On Isle of Palms, this area includes almost all of the island. These sections of the Code require new buildings to comply with flood-resistant design, construction and use standards, and require *substantially damaged* and *substantially improved* buildings to meet the requirements for new construction. City requirements are more restrictive than DHEC OCRM requirements regarding reconstruction/improvement in-place, but OCRM requirements govern retreat.

- The City Code defines s*ubstantial damage* to mean damage of any origin sustained by a structure whereby the cost of restoring the structure to its pre-damaged condition equals or exceeds fifty percent *(50%) of the fair market value* of the structure before the damage occurred. Note that this trigger for complying with current code requirements is more restrictive than DHEC OCRM classification of habitable structures that are destroyed beyond repair in R.30-1.C(17) and R.30-13.E (trigger is *66-2/3 % of replacement value*).
- The City Code defines *substantial improvement* to mean any combination of repairs, reconstruction, alteration, additions or improvements to a structure occurring within a

continuous period of five (5) years, measured from the date of the start of construction of improvement in which the cumulative cost equals or exceeds fifty percent (50%) of the fair market value of the structure before the start of construction. Note that this trigger for complying with current code requirements is more restrictive than DHEC OCRM treatment of: 1) additions to habitable structures in R.30-13.C (DHEC OCRM places no limit on the value of additions that trigger new construction requirements) and 2) repair and renovation of habitable structures that are not destroyed beyond repair in R.30-13.D (some habitable structures not captured by DHEC OCRM will be captured by the City Code).

Sections 5-4-45 through 5-4-48 of the Code of Ordinances generally permit nonconforming structures in the City to be used and rebuilt as long as the extent of the nonconformity is not increased, subject to certain limitations. The DHEC OCRM allowance in R.30-15.F (Activities Allowed Seaward of the Baseline, Special Permits) provides additional requirements related to non-conforming structures.

Several other portions of the City Code of Ordinances listed Section 4.2 of this LCBMP pertain directly to beachfront development and redevelopment regulations. These sections will be addressed in sections that follow.

4.2.5 Regulations on Beach and Shoreline Protection

Notwithstanding Section 5-4-15(A), it should be noted that while City zoning and land use regulations might permit construction or reconstruction of buildings larger than 5,000 sq ft in size (enclosed space), potential conflicts between DHEC OCRM and City regulations should not be a concern for most of the island. Outside the Wild Dunes PDD, City regulations specify a maximum single family residential building size (livable space) of 7,000 sq ft, or 40% of the lot area, whichever is less. While the maximum size permitted by the City can sometimes exceed the DHEC OCRM limit of 5,000 sq ft of heated space, other factors often limit single family residential building size below 7,000 sq ft (e.g., lot size, deed restrictions and covenants, City construction limits and setbacks).

A comparison of the City seaward construction limit for buildings and the 2009 DHEC OCRM Setback Line shows:

1. The seaward construction limit for buildings on lots in City Preservation Overlay Zone P-2 along 1.4 miles of shoreline between Breach Inlet and 10th Ave. (see Figure 5 and Section 2.3 of this LCBMP) generally lies approximately 20 ft to 150 ft landward of the DHEC OCRM Setback Line, except near the Breach Inlet bridge.
2. The seaward building construction limit in the commercial district (10th Ave. to 14th Ave) is 200 ft seaward of the Ocean Blvd. right of way -- see Section 5-4-36(3)(a). This setback is approximately 20 ft to 70 ft landward of the DHEC OCRM Setback Line.
3. The seaward building construction limit in the Sand Dune Lane area (east of County Park, west of 21st Ave.) is established by the neighborhood Architectural Review Committee, and has resulted in a more restrictive setback than the City would require through zoning. Buildings here are approximately 100 ft landward of the DHEC OCRM Setback Line.

4. The seaward building construction limit in City Preservation Overlay Zone P-1 along 1.6 miles of shoreline between 21st Ave, and 41st Ave. is approximately 100 ft to 450 ft landward of the DHEC OCRM Setback Line.
5. The seaward building construction limit along 0.7 miles of shoreline between 41st Ave. and 53rd Ave. is dictated by deed restrictions. The effective seaward limit of building construction is approximately 30 ft to 140 ft landward of the DHEC OCRM Setback Line.
6. The seaward building construction limit in City Preservation Overlay Zone P-3 along 0.3 miles of shoreline between 53rd Ave. and 56th Ave. is 110 ft from the rights-of-way for 54th, 55th and 56th Ave. The building construction limit is from approximately 50 ft landward of the DHEC OCRM Setback Line at 53rd Ave. to approximately *60 ft seaward* of the DHEC OCRM Setback Line near 57th Ave.
7. Within the Wild Dunes PDD, building construction limits are dictated by the development agreement. The seaward sides of buildings presently lie from approximately 25 ft landward of the DHEC OCRM Setback Line to approximately *275 ft seaward* of the DHEC OCRM Setback Line (Beachwood East).

The most likely location where buildings greater than 5,000 sq ft are, or could be, affected by the DHEC OCRM building size limitation is in the unstabilized inlet erosion zone east of 47th Ave., particularly where homes and condominium buildings already encroach significantly seaward of the Setback Line (between 56th Ave. and Port O'Call).

A review of the development agreement for Wild Dunes was not performed, nor was a review of individual documents for property regimes, and it is possible that these could contain minimum building size or other requirements that would conflict with DHEC OCRM building limitations -- but the City has no authority to initiate modifications to the development agreement or regime documents; therefore, these are not considered in this LCBMP.

4.2.6 Other Regulations on Beach Management

The following other City regulations pertain to beachfront management. Some of these were mentioned in Sections 2.2.1 and 4.2 of this LCBMP.

Title 3, Chapter 4 (Single-use plastic bags)

- Bans single-use plastic bags for checkout of retail goods.

Section 5-4-15 (Beach regulations)

- Prohibits development and activities that do not comply with the Beachfront Management Act.
- Prohibits construction of hard erosion control devices. Restricts sand bag installations.
- Requires only beach compatible sand be used for beach nourishment.
- Prohibits dune alteration except for dune walkovers that meet DHEC OCRM requirements.
- Requires sand fencing to meet DHEC OCRM requirements.
- Prohibits obstruction of public beach access.

Section 5-4-17 (Sea turtle outdoor lighting regulations)

- Prohibits illumination of the beach by lights from new and existing development between May 1 and October 31 each year.
- Establishes lighting fixture specifications and requirements.

Sections 6-2-15 (Dogs running at large), 6-2-23 (Dogs not to disturb protected species and habitats) and 7-3-15 (Restrictions on dogs on the beach)

- Prohibits off-leash dogs on the beach, except for between the hours of 4:00 p.m. to 10:00 a.m. from September 15 through March 31, and between the hours of 5:00 a.m. to 9:00 a.m. from April 1 through September 14. Requires owners of dogs off-leash to be in close proximity to the dog, have a leash in hand, and have the dog under control.
- Makes it unlawful for any person to allow their dog to disturb nesting sea turtles, turtle nests or turtle hatchings.
- Makes it unlawful for any person to allow their dog to enter into critical habitat areas which have been posted to prohibit such entry by the City or the State Wildlife and Marine Resources Department.

Title 7, Chapter 2 (Drinking on streets, beaches, etc., prohibited)

- Prohibits possession of containers of alcoholic beverages on the beach.

Title 7, Chapter 3 (Beach and Marine Recreation Regulations)

- Prohibits operation of motor vehicles on the beach, except for those determined by the City to be for emergency or public health and safety purposes.
- Prohibits use of surfboards or similar within 200 ft of the fishing pier or within 100 ft of any bather; requires surfers to use a surfboard leash within 200 ft of any bather or other surfers.
- Prohibits operation of motorboats and jet skis within 100 yards of the City police jurisdiction of the ocean.
- Prohibits beaching or launching of any motorboat or jet ski on the public beach, except in case of emergency.
- Prohibits parasailing within police jurisdiction.
- Prohibits littering or dumping of garbage or refuse or waste on the beach.
- Prohibits bringing glass bottles or receptacles onto the beach.
- Requires users to attend to any tents, canopies, beach chairs, kites, coolers, beach umbrellas and similar property on the beach after sunset.
- Prohibits locating any personal property within 25 ft of any emergency beach access or any turtle nest.

- Prohibits leaving personal property on the beach after sunset, except "Hobie Cat" style sailboats which are operable and kept in good working condition or poles supporting volleyball nets adjacent to commercially zoned property
- Prohibits overnight sleeping on the beach.
- Prohibits fires and fireworks on the beach, except for City-sponsored events.
- Prohibits physically harming, harassing, or otherwise disturbing any sea turtle (including eggs and hatchlings) or any sea bird (including eggs and young). Requires beached or stranded sea turtles, whales, or dolphins to be reported immediately to the City Police Department.
- Prohibits alteration, destruction or removal of any portion of a sand dune, except by obtaining valid permits for construction or development from all required governmental authorities.
- Prohibits any person from cutting, collecting, breaking, or otherwise destroying sea oat plants or other native dune grasses, or any part thereof, on public property or on private property without the owner's consent. *Same prohibition in Section 9-1-12.*
- Establishes a swimming zone east of the fishing pier and seaward of Isle of Palms County Park. Only swimming and wading and related activities are permitted in this zone when County lifeguards are on duty

Sec. 9-3-3 (Swimming and wading at Breach Inlet)

- Prohibits swimming and wading in the waters at Breach Inlet.

5. Erosion Control Management

5.1 Shoreline Change Analysis

There are two types of shoreline zones on the Isle of Palms: unstabilized inlet zones at each end, and a standard zone in the center. The zone extents are shown in Figure 10, and they are described below.

Breach Inlet unstabilized inlet zone: extends approximately 0.9 miles, from the Breach Inlet bridge to DHEC OCRM survey monument 3115B (6th Ave).

Standard zone: extends approximately 3.0 miles, between DHEC OCRM survey monuments 3115B (6th Ave.) and 3155 (47st Ave).

Dewees Inlet unstabilized inlet zone: extends approximately 3.1 miles, between DHEC OCRM survey monument 3155 and the end of Morgan Creek Spit (Dewees Inlet shoreline).

5.1.1 Beach Profiles

Beach profiles are used to monitor beach width, beach volume and beach/dune conditions over time. Beach profiles have been surveyed along portions of the Isle of Palms since the early 1980s. However, comprehensive beach profile measurements by DHEC OCRM contractors

began about 1987 and occurred on an annual (or more frequent) basis until about 2008; since that time, State monitoring on Isle of Palms occurred in 2013, 2015 and 2016. State beach profile measurements are taken from 24 survey monuments established by the State (Figure 11), starting with station 3100 near the Breach Inlet bridge, and extending to station 3190 on Dewees Inlet shoreline.

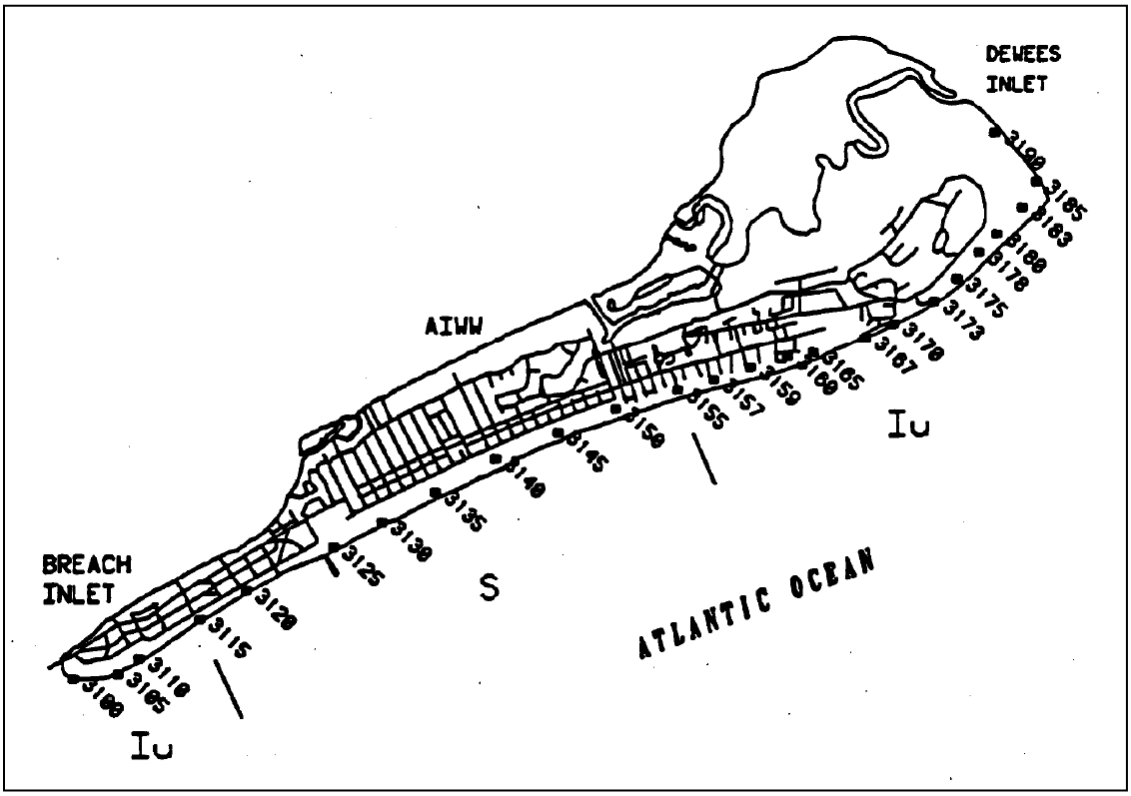

Figure 11. DHEC OCRM shoreline erosion zones (Iu = unstabilized inlet zone; S = standard zone) and beach profile survey monument designations (3100 to 3190) and locations (SCCC, 1992).

Older State beach profile data is stored in the Profile Management and Analysis System (PMAS), hosted here http://www.coastalgis.com/pmas/login/bmprofileselect.php?range=5995to0. Figure 12, 13 and 14 show examples of beach profiles over time for stations 3100B (Breach Inlet unstabilized inlet erosion zone, near Breach Inlet bridge), 3135B (standard erosion zone, at 27th Ave.) and 3175 (in Dewees Inlet unstabilized inlet erosion zone, at Mariner's Walk). The three figures are plotted at the same scale so they can be compared easily. It is apparent that the beach profile width and shape in the unstabilized inlet erosion zones – particularly the zone near Dewees Inlet -- fluctuate considerably over time, while the width and shape in the standard erosion zone is fairly constant. The fluctuations at station 3175 are attributable to the Dewees Inlet shoal attachment process. The fluctuations at station 3100B are attributable to less drastic changes at Breach Inlet. State beach profile data since 2012 are contained in the DHEC OCRM Berm Explorer web site https://gis.dhec.sc.gov/bermexplorer/ (see Figure 15).

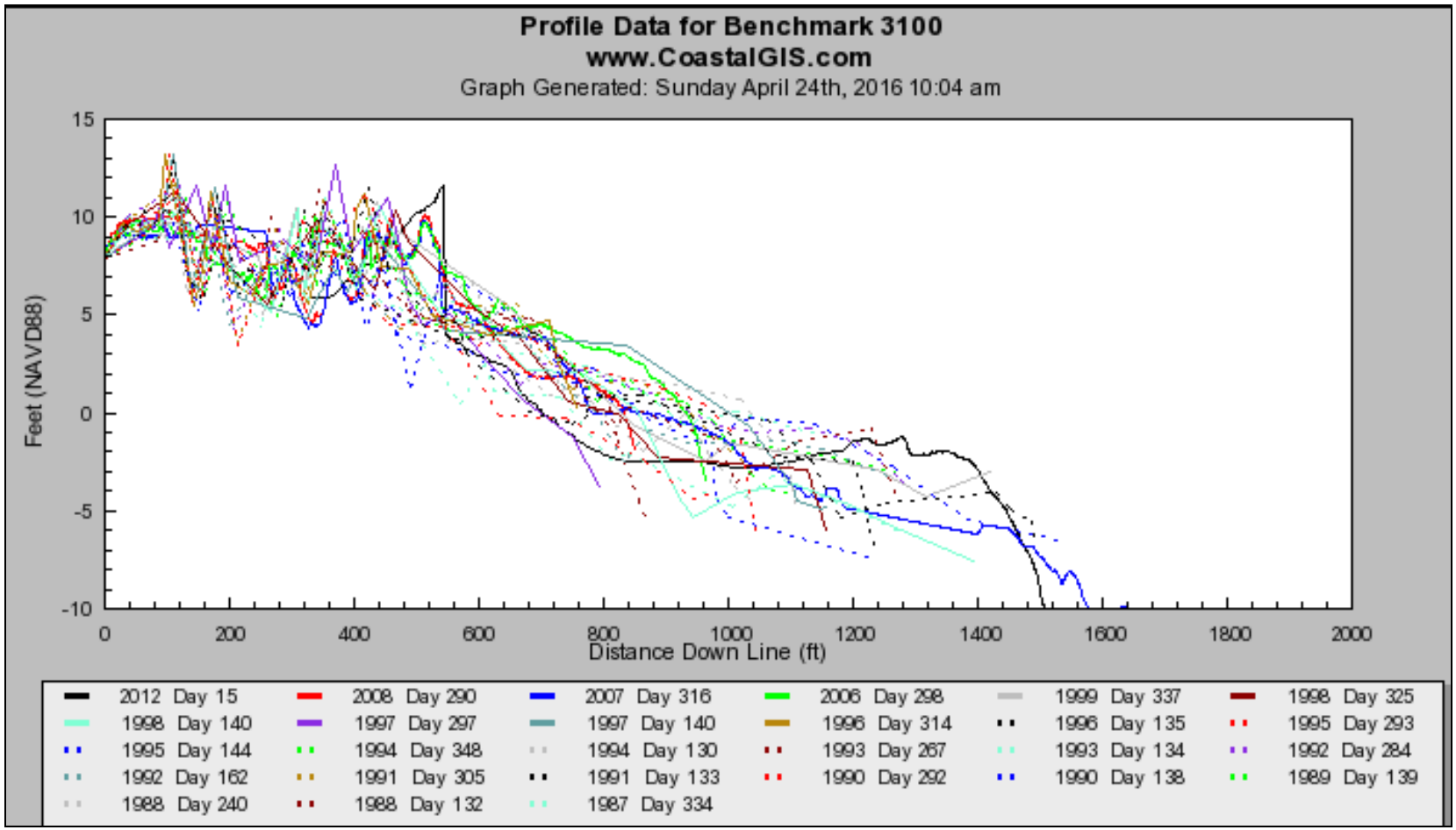

Figure 12. 1989 to 2012 PMAS beach profiles for Station 3100B (Breach Inlet bridge). Plotted at same scale as Figures 13 and 14.

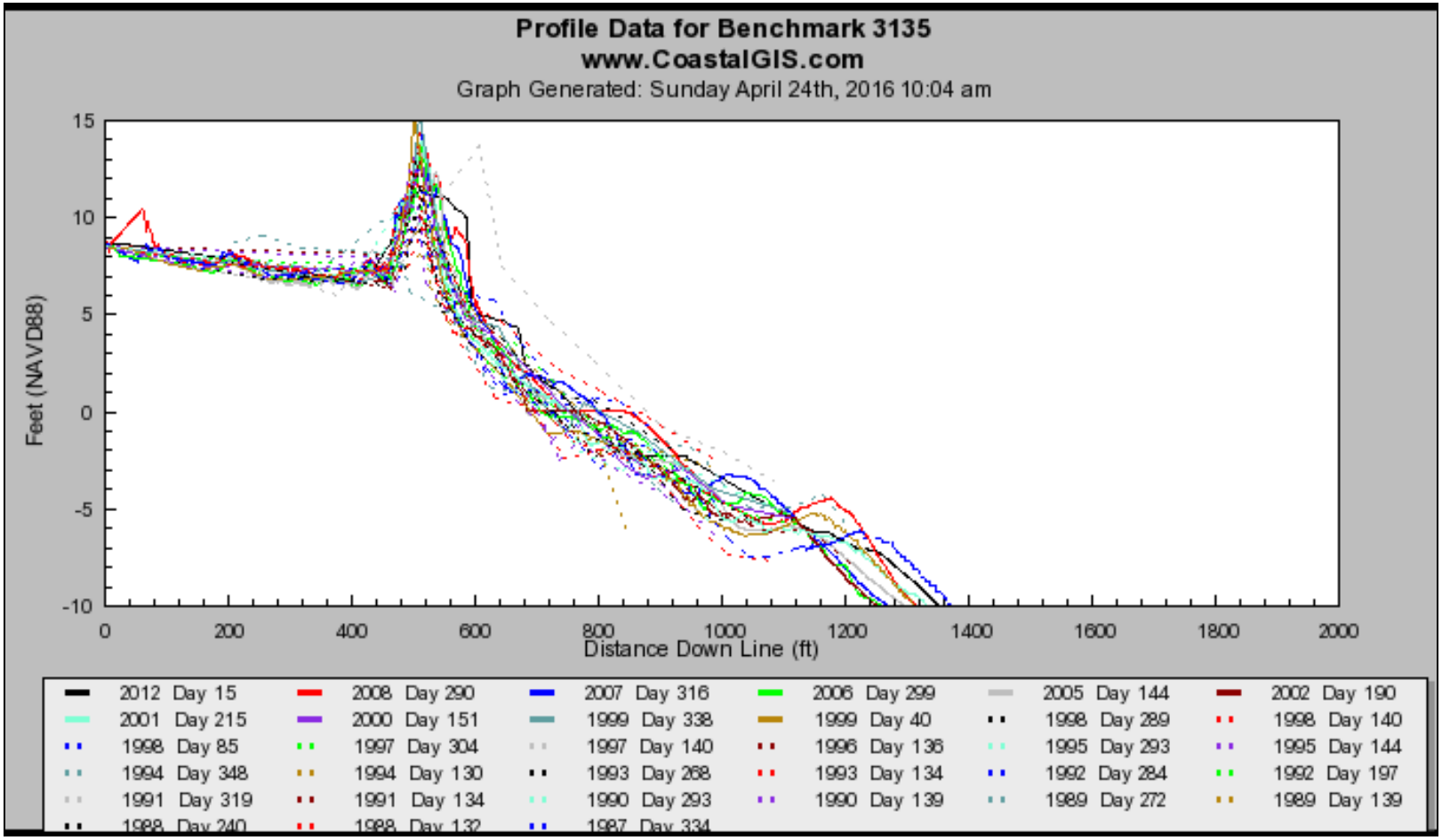

Figure 13. 1989 to 2012 PMAS beach profiles for Station 3135B (27th Ave.). Plotted at same scale as Figures 12 and 14.

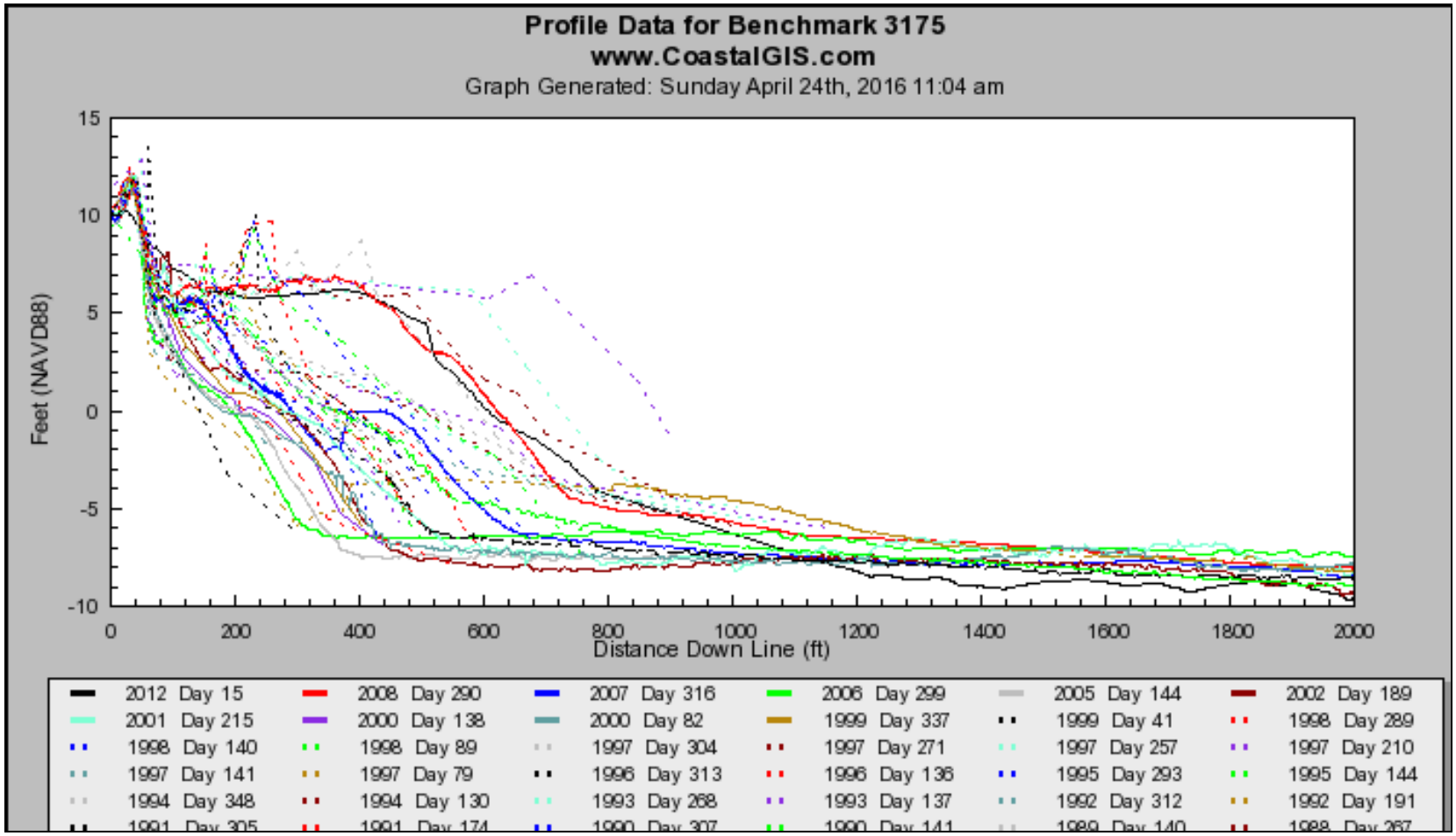

Figure 14. 1989 to 2012 PMAS beach profiles for Station 3175 (Mariner's Walk). Plotted at same scale as Figures 12 and 13.

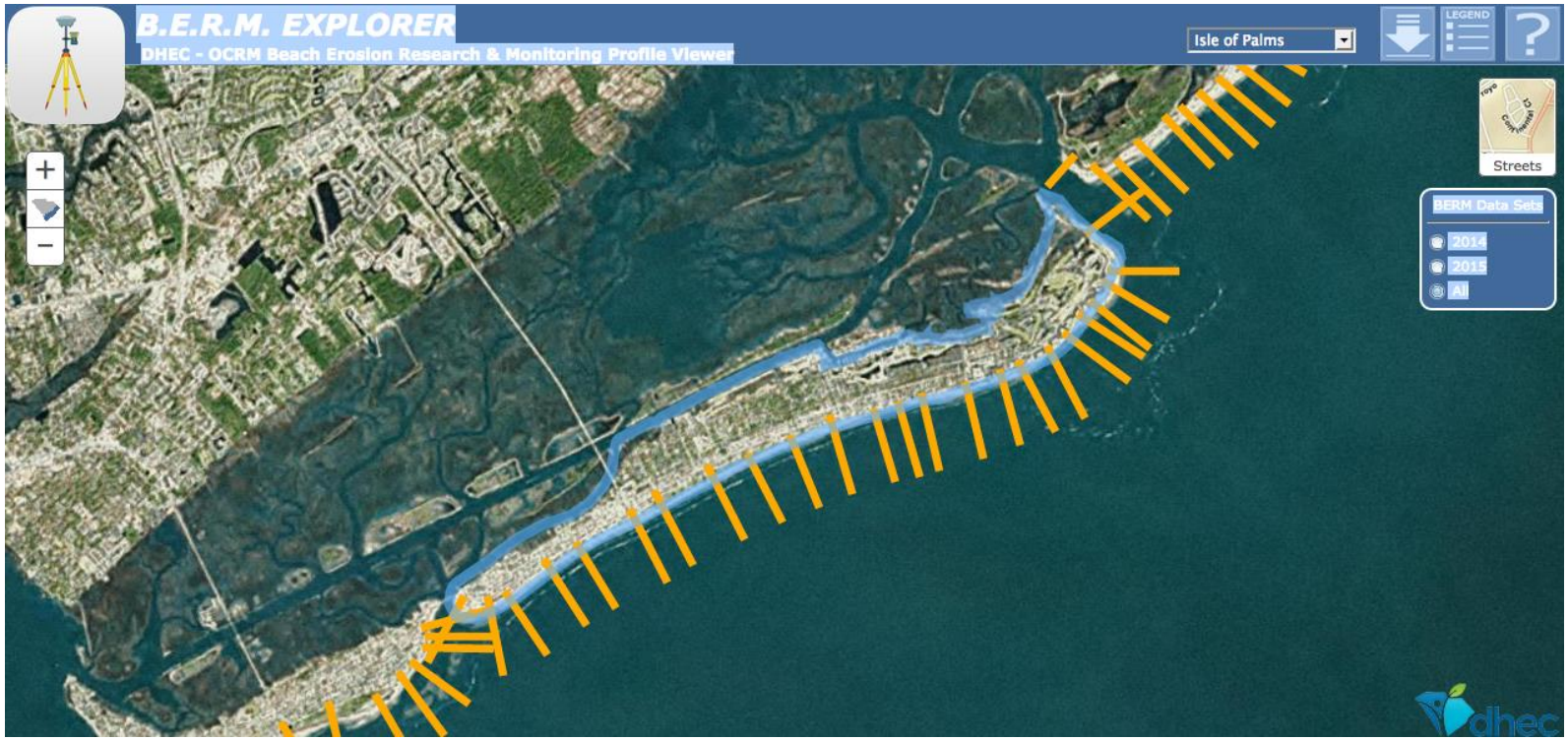

Figure 15. DHEC OCRM Berm Explorer beach profile site https://gis.dhec.sc.gov/bermexplorer/ showing profile locations for Isle of Palms.

Since 2008, the City has supplemented the State beach profile program with its own beach monitoring program, using more frequent and more closely spaced beach profiles (118 profile locations, including 24 DHEC OCRM stations). Collectively, the State and City-sponsored profile data provide a good picture of temporal and spatial changes along the shoreline. Reports written as part of the City-sponsored beach monitoring program (e.g., CSE, 2015a, CSE, 2016a) provide the most detailed beach profile change and volumetric calculations. See http://www.iop.net/beach-restoration for City beach monitoring reports.

The City beach monitoring program divides the shoreline into 7 reaches (see Figure 16). Reach 1 is the same as the DHEC OCRM unstabilized inlet zone at Breach Inlet. The DHEC OCRM standard zone includes monitoring reaches 2 and 3, and most of reach 4. The DHEC OCRM unstabilized inlet zone at Dewees Inlet includes part of monitoring reach 4, and all of reaches 5, 6 and 7.

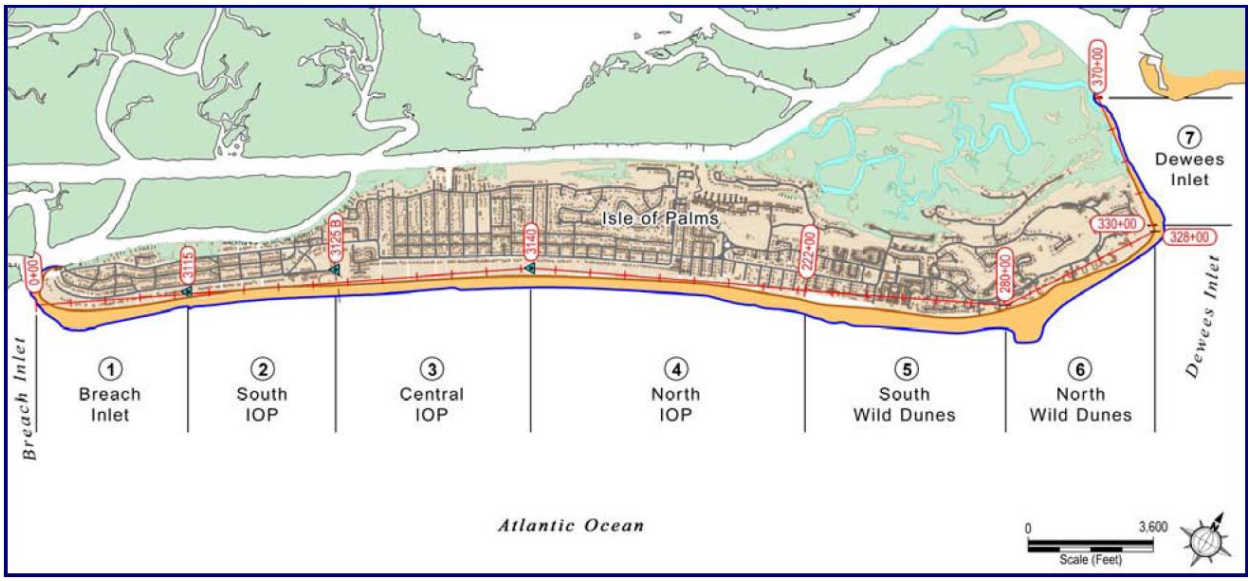

Figure 16. City beach monitoring reaches (CSE, 2015a).

5.1.2 Long-Term Erosion Rates and Shoreline Change

Prior studies have shown how shorelines have changed over a period of decades on Isle of Palms. For example, Figure 17 shows shoreline changes at the west end of the island between 1875 and 1983 (Jones, 1986). The long-term trend there has been accretion, with minor episodes of erosion. Figure 18 shows shoreline (vegetation line) movements along Beachwood East between 1949 and 1997 (data were developed as part of SCCC baseline establishment). As with many locations in the Dewees Inlet unstabilized inlet zone, the shoreline fluctuations here have been dramatic, often accreting or eroding hundreds of feet in just a few years.

DHEC OCRM has calculated long-term, average-annual rates of shoreline change at each of their survey monuments using historical shorelines and beach profile data. The rates are used to

determine the location of the 40-year Setback Line landward of the DHEC OCRM Baseline (setback distance = 40 time the long-term rate, but not less than 20 ft for areas that are stable or accretional over long periods of time). New erosion rates are adopted by DHEC OCRM when the Baseline and 40-year Setback Line are redrawn (approximately once every 8-10 years). Table 3 shows the erosion rates adopted with the 2009 Setback Line.

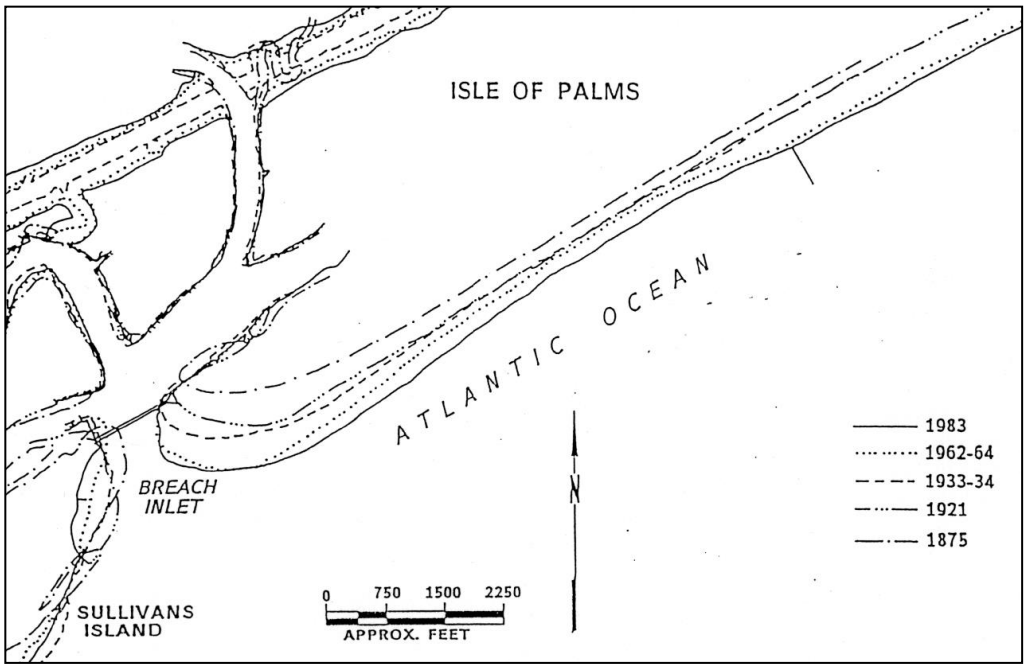

Figure 17. 1875 -1983 shoreline changes at the west end of Isle of Palms (Jones, 1986)

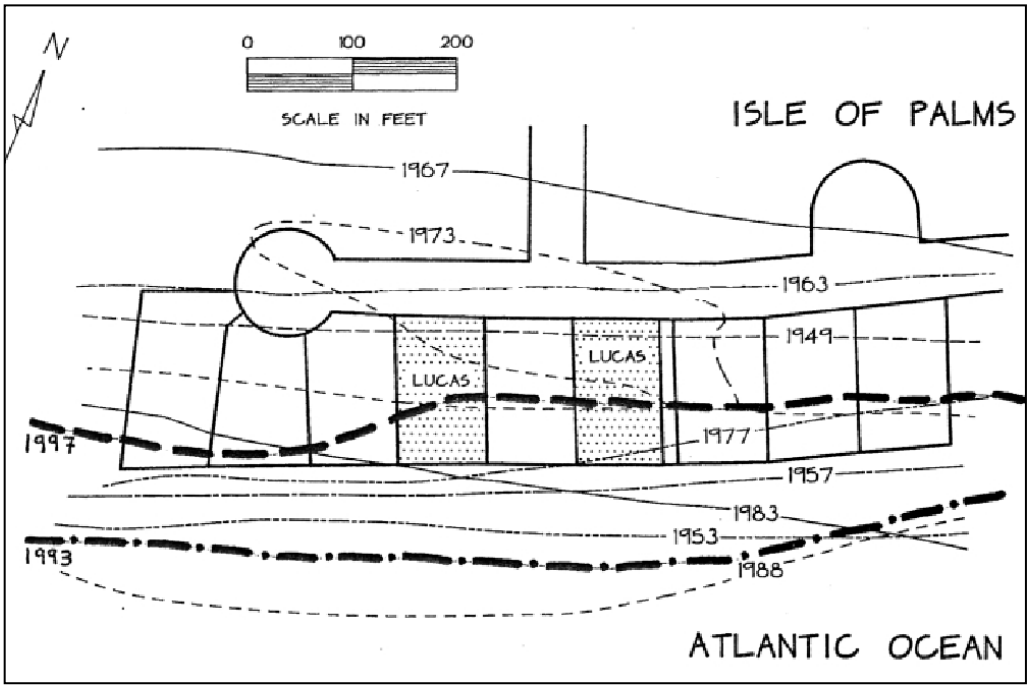

Figure 18. 1949-1997 movement of vegetation line in vicinity of Beachwood East.

Table 3. DHEC OCRM 2009 adopted erosion rates (ft/yr).

Monument	Long-term erosion rate (ft/yr)	Location
3100 B	0	Breach Inlet
3105 B	0	2nd Ave.
3110	0	3rd Ave.
3115 B	0	6th Ave.
3120 B	0	8th Ave.
3125 B	0	14th Ave.
3130 B	0	21st Ave.
3135 B	0	27th Ave.
3140	0	31st Ave.
3145 B	0	36th Ave.
3150 B	0	41st Ave.
3155	0	47th Ave.
3157	0	50th Ave.
3159 B	0	53rd Ave.
3165 B	-0.30	57th Ave.
3167 B	-1.80	Beachwood East (west end)
3170 B	0	Beachwood East (east end)
3173 B	0	Wild Dunes Property Owners Beach House
3175 B	0	Mariner's Walk
3178 B	0	Summer House
3180 B	0	Port O' Call
3183 B	0	Ocean Club
3185 B	0	18th fairway, Links Course
3190 B	-3.18	17th tee, Links Course

Notes:

1. "B" monuments are replacement monuments.
2. Erosion rates vary between monuments. See Surveyor's Package (DHEC OCRM, 2016)
3. Previously published erosion rates for 3165B, 3167B & 3190B were corrected by OCRM on May 9, 2016.

It should be noted that even though DHEC OCRM has classified the east end of Isle of Palms as an unstablized inlet zone, and even though portions of this zone have been subject to significant erosion over short periods of time (shoal attachments), DHEC OCRM has determined much of this zone to be *long-term* accretional. In areas like this the setback distance between the Baseline and Setback Line is the minimum established by the Beachfront Management Act (20 ft), but the Baseline is drawn on the most landward shoreline in the 40 years preceding Baseline and Setback Line establishment. Figure 19 (a close-up of Figure 10c) shows such a location where the State has determined the long-term trend to be accretional, but has established the Baseline landward of present development.

Figure 19. Example of long-term accretion and 20ft minimum setback distance, with DHEC OCRM Baseline and Setback Line landward of existing development.

5.2 Beach Alteration Inventory

There is one groin on Isle of Palms, on the Dewees Inlet shoreline near the Links Course 17th tee (Figure 20). The groin was constructed in the 1980s using large bags filled with grout. The groin is partially effective in maintaining the beach updrift (Links Course, 17th fairway) but has not significantly reduced the movement of sediment northward along the inlet shoreline. The Morgan Creek Spit continues to grow downdrift of the groin.

Figure 20. April 14, 2011 photos of groin at Wild Dunes Links Course, 17th tee.

There are thought to be five stone revetments east of 47th Ave – all but one buried by sand in April 2016. The approximate revetment locations and details (if known or estimated) are shown in the map overlays in the Appendix, and are described below:

- Rock revetment (see Figure 21). Length, approximately 700 ft, from approximately 600 ft west of DHEC OCRM station 3167 (Seagrove Villas) to approximately 100 ft east of DHEC OCRM station 3167 (west end of Beachwood East). Location, approximately 250 ft seaward of DHEC OCRM Setback Line. Condition, April 2016, exposed granite stone, ranging in size from approximately 6-in to 3-ft; woven filter fabric visible; other construction details unknown.
- Possible rock revetment. Length, approximately 600 ft, from approximately 170 ft west of 47th Ave. to approximately 100 ft east of 48th Ave. Location, approximately 40 ft seaward of DHEC OCRM Setback Line. Condition, April 2016, buried and not visible.
- Possible rock revetment. Length, approximately 1,300 ft, from 49th Ave. to 53rd Ave. Location, approximately 30 ft seaward of DHEC OCRM Setback Line. Condition, April 2016, buried and not visible.

- Possible rock revetment. Length, approximately 100 ft, near DHEC OCRM station 3165 east of 57th Ave. Location, approximately 100 ft seaward of DHEC OCRM Setback Line. Condition, April 2016, buried and not visible.
- Rock revetment. Length, approximately 1,100 ft (Beach Club II and Mariner's Walk). Location, approximately 60 ft seaward to 10 ft landward of DHEC OCRM Setback Line. Condition, April 2016, buried and not visible.

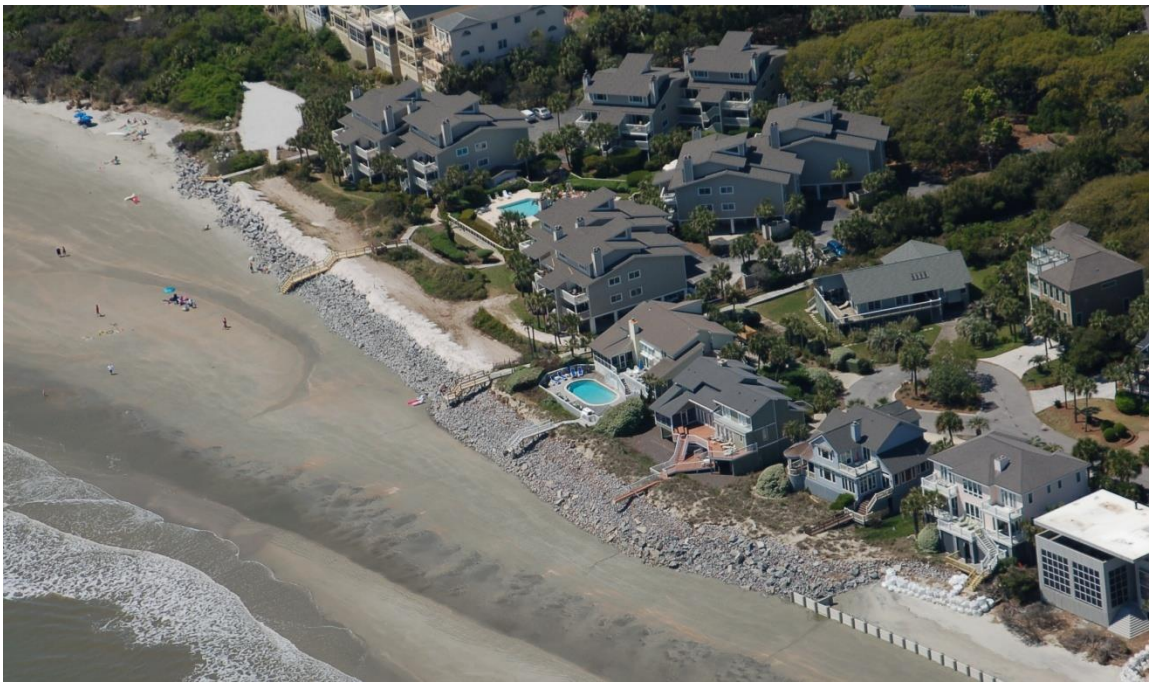

Figure 21. April 5, 2016 photo of exposed rock revetment near Seagrove/Beachwood East.

Kana, et al (1985) reported that approximately 3,300 ft of rock revetment was constructed in 1983, somewhere in the vicinity of Seagrove, Beach Club and Mariner's Walk. This length has not been confirmed as part of this LCBMP.

There are no known seawalls or bulkheads along the oceanfront, but there is one known timber retaining/landscaping wall near the east end of Beachwood East (approximately 80 ft long, plus return walls; other construction details are unknown) – see Figure 22.

As of January 19, 2017, there were three Wave Dissipation Systems (WDS) along the Isle of Palms oceanfront, all installed under pilot study authorization granted by the SC Legislature:

- Ocean Club. Length, approximately 350 ft.
- Seascape Villas. Length, approximately 200 ft (this is a replacement for a prior installation removed prior to a 2014 shoal management project).
- Beachwood East. Length, approximately 850 ft – see Figure 22.

DHEC OCRM ordered removal of the WDS by July 28, 2016, but the installations are still in place pending results of a legal challenge. The Citadel and a DHEC OCRM consultant evaluated the installations. DHEC OCRM staff recommended removal, and the issue is out for public comments as of January 19, 2017. The final resolution will occur after public comments are reviewed and the DHEC Board takes action. Documents and details may be found at http://www.scdhec.gov/homeandenvironment/water/wds/ .

Figure 22. April 5, 2016 photo of Wave Dissipation System installation at Beachwood East (same area as shown in Figure 17). WDS ties into rock revetment at west end, see Figure 21. A timber retaining/landscaping wall is also shown.

5.2.1 Beach Renourishment

There have been two large renourishment projects and numerous small projects, along the Wild Dunes shoreline. The small projects were truck-haul projects by property owners for emergency protection (1982 – 2008, details unknown).

There have also been two shoal management projects (2012, 2014-15) to redistribute sediment along the Wild Dunes shoreline in response to erosion from inlet shoal attachment.

The two large renourishment projects were both conducted using dredges:

- Nov. 1983 – Mar. 1984. 350,000 cy, pumped from new marina construction at the north side of the island onto the beach.

- May – June 2008. 934,000 cy (pay volume = 847,400 cy), pumped from 2.5 miles offshore onto three sections of beach totaling 10,200 ft in length (Figure 23) at a cost of $8.4 million (note: some references have reported a cost of $10 million, but this includes some of the subsequent shoal management work).

Figure 23. Locations of 2008 beach renourishment sites and offshore sediment borrow area (CSE, 2015a).

The 2008 project has been well-documented by a series of monitoring reports on the City web site http://www.iop.net/beach-restoration#2008. The latest report available (CSE, 2016a) shows that as of October 2015, 7+ years after construction:

- The project area east of 53rd Ave. contains 396,500 cy more sand than prior to the 2008 project.
- Fill retention in the project area has not been uniform, due principally to post-project inlet shoal attachments: fill reach C (monitoring reach 7) has gained sediment since the project; fill reach B (monitoring reach 6) has retained most of its fill placement, but losses at the eastern end (Ocean Club) have effectively resulted in loss of the entire fill placement there; as a whole, fill reach A (monitoring reach 5) has lost the entire fill volume, but losses along the eastern section have been greater than along the western section where much of the fill volume remains. See Figure 24.
- Downdrift portions of the Isle of Palms shoreline (i.e., west of 53rd Ave. and in monitoring reaches 1-4, see Figure 15) showed a gain of 561,000 cy between March 2009 and October 2015 (monitoring of reaches 1-4 was not conducted immediately pre-nourishment). Approximately 70% of the gain in monitoring reaches 1-4 was in reach 4 (31st Ave. to 53rd Ave.), since that reach benefitted first from downdrift transport of nourishment and shoal attachment sediment. See Figure 25.

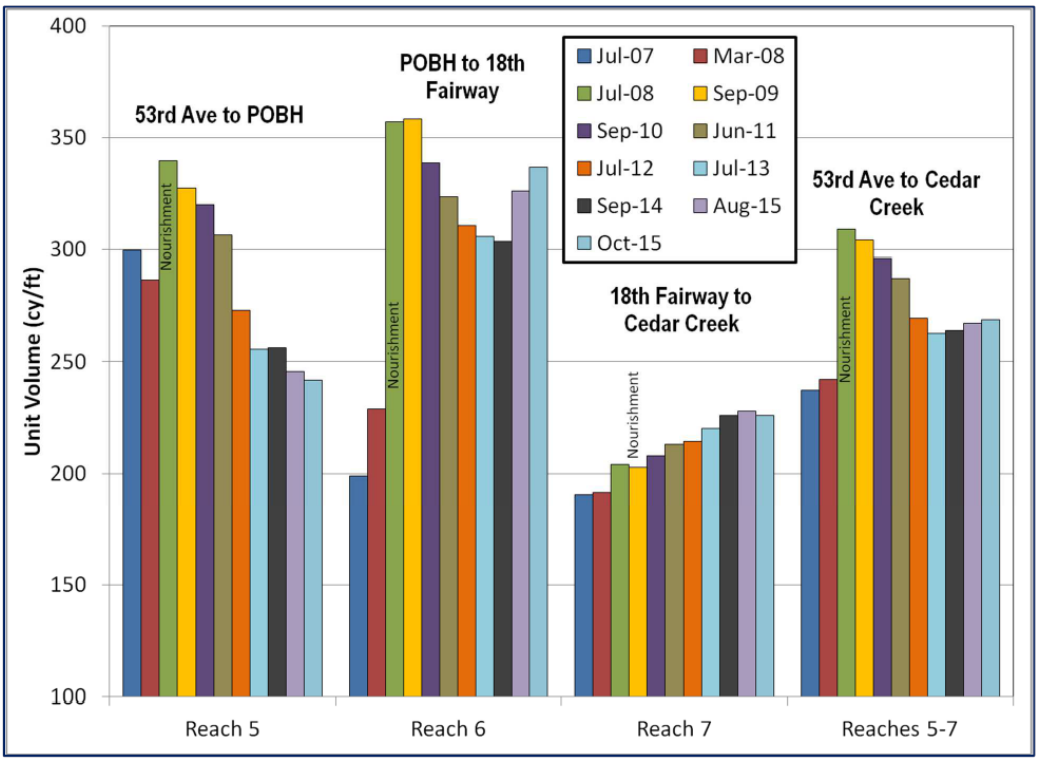

Figure 24. Unit volumes in monitoring reaches 5, 6 and 7, July 2007 to October 2015 (CSE, 2016a). See Figure 22 for fill locations and Figure 15 for beach monitoring reaches.

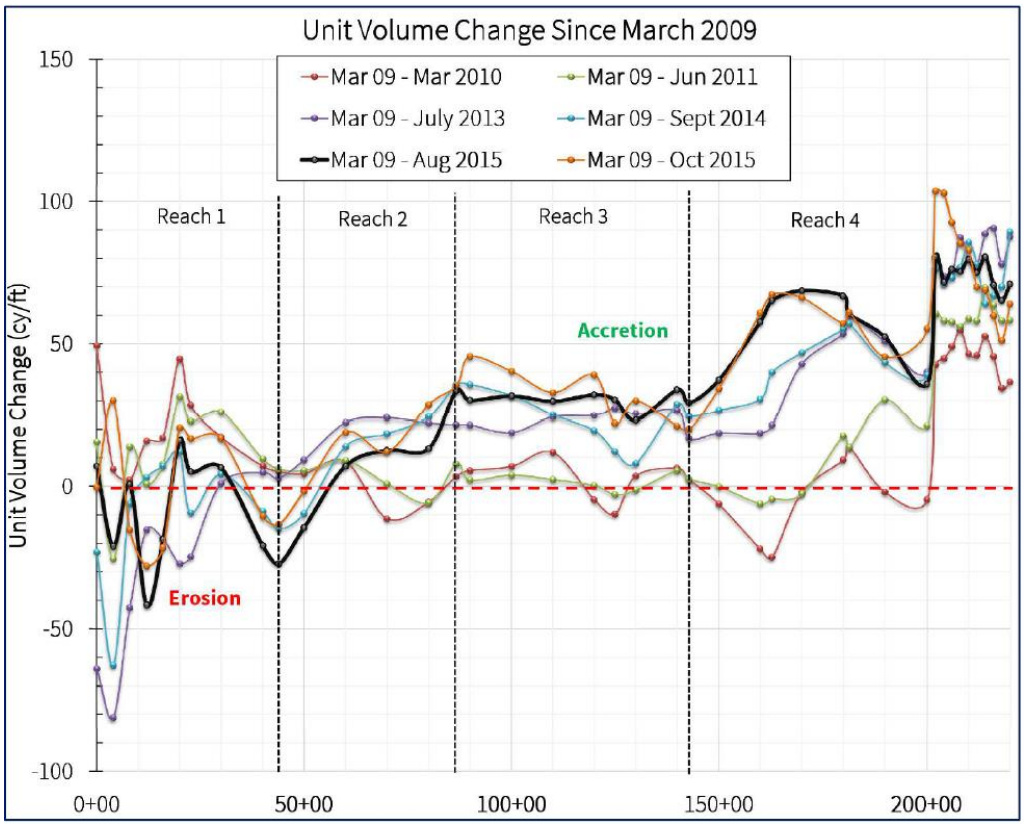

Figure 25. Unit volume changes in monitoring reaches 1-4, March 2009 to October 2015 (CSE, 2016a). See Figure 16 for beach monitoring reaches.

The two inlet shoal management projects were carried out using land-based equipment to address hot-spot erosion associated with post-nourishment inlet shoal attachment:

- Mar. - Apr. 2012. ~87,700 cy moved from a shoal attachment accretion area to an adjacent erosion area (Figure 26).

- Nov. 2014 – Feb. 2015. ~240,000 cy moved from accretion areas (53rd Ave. to 56th Ave., and Mariner's Walk/Shipwatch) to erosion areas (Beachwood East/Dunecrest lane, and Seascape/Ocean Club/18th hole). See Figure 27.

Shoal management work has proceeded under permits granted to the City by DHEC OCRM and USACE in 2011 and 2012. Those permits prescribe time windows (November 1 through April 30) during which work can take place; specifies a project size limit (two projects at up to 250,000 cy each, total volume = 500,000 cy); specifies a trigger for project initiation (+5 ft NAVD contour within 100 ft from building line); specifies excavation area buffer (excavation must take place at least 400 ft away from the building line).

Figure 26. Mar. – Apr. 2012 shoal management project (CSE, 2012).

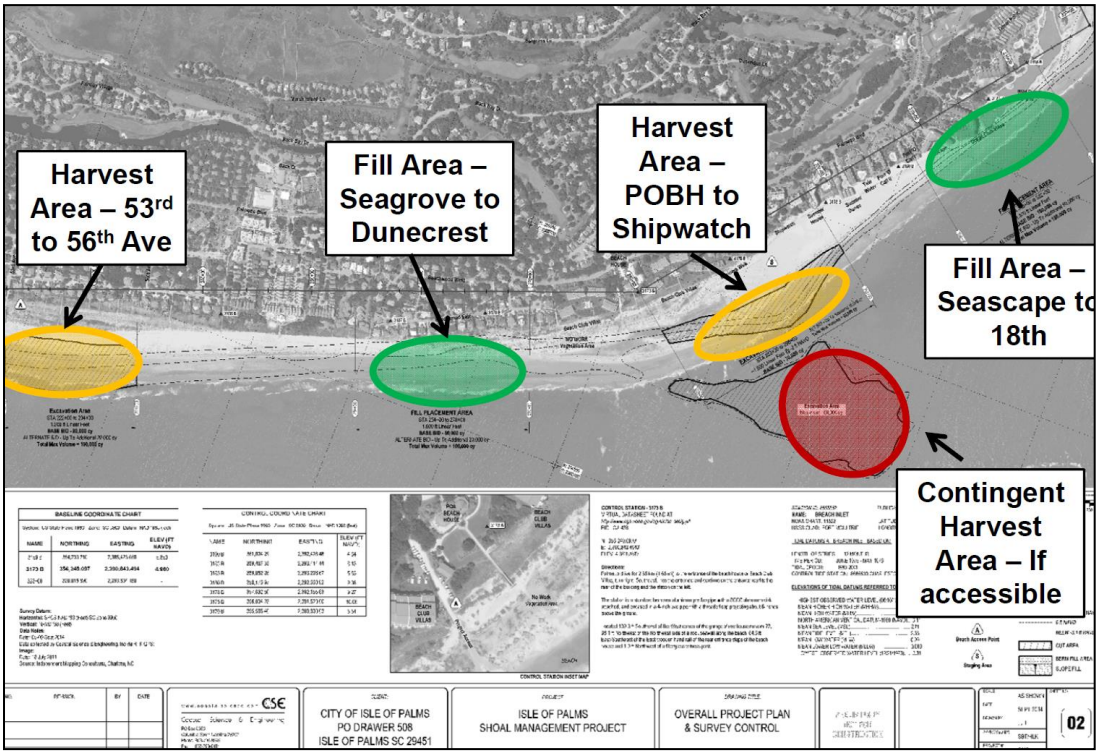

Figure 27. Plan for Nov. 2014 – Feb. 2015 shoal management project (CSE, 2014).

The shoal management permits were amended in April 2016 to increase the number of shoal management projects from two to four, and to increase the total project volume from 500,000 cy to 814,000 cy. The additional two shoal management projects must each be less than 250,000 cy, and no sediment can be excavated during the additional two projects from the area between 53rd Ave. and Grand Pavilion.

On November 2, 2016 the City submitted a permit application for a beach restoration project for the 11,000 ft reach between 53rd Ave. and Dewees Inlet (up to 1.4 million cy to be dredged from an offshore borrow area). On November 29, 2016 the City submitted an amended permit application to include the original planned nourishment, as well as a 9,000 ft reach between Breach Inlet and 14th Avenue (as a result of Hurricane Matthew effects). The amended project would include up to 2.0 million cy dredged from offshore, at an estimated cost of $19 million. The proposed project is out on public notice as of January 19, 2017.

The City has been coordinating with the State Historic Preservation Office and other agencies since July 2016 on identifying a borrow site that will not adversely impact an offshore historic district proposed for designation under the National Register of Historic Places and containing the Second Stone Fleet (the Second Stone Fleet was a group of thirteen (13) old whaling vessels secured by the Union forces and filled with rocks that were sailed into Charleston Harbor and sunk as part of their blockade of the port.).

5.2.2 Emergency Orders and Sandbags

Over the years, property owners have requested and received permission from DHEC OCRM for emergency sand placement (using upland, beach-compatible fill) and sand bag installation. The City has not issued any emergency orders for the work since 1996 but has concurred with DHEC OCRM issuance since that time. OCRM records show a total of 86 emergency orders were issued between 1996 and 2016 – all for properties in Wild Dunes – and eight of those emergency orders are still active as of August 2016 (see Table 4).

Prior to 2008, sand bag size was limited to 1 cubic ft, and the results were problematic – the small sand bags were dislodged and scattered by waves and currents. Starting in 2008, DHEC OCRM authorized the placement of 1 cy bags. No filter fabric beneath the bags was used, and the bags settled, requiring restacking and/or placement of additional bags.

Sand bags were removed prior to the 2008 beach nourishment project, but additional bags have been authorized and placed in eroding areas since then (in selected areas from Beachwood East to 18th hole of Links Course).

Following Hurricane Matthew, DHEC OCRM issued Emergency Orders EO-16-HM1, EO-16-HM2 and EO-16-HM3 on October 8, 2016 for all SC coastal counties, allowing sand bags, sand scraping and minor renourishment. The City entered into a contract to carry out sand scraping and emergency berm repairs shortly thereafter.

Table 4. Emergency Orders Issued on Isle of Palms, 1996-2016 (all Emergency Orders are expired except those shaded, which were issued on July 28, 2016). Source: SC DHEC - OCRM, April 28, August 2, 2016 and January 20, 2017.

Location (status)	By	Issue Date	Specified Mitigation Techniques
12 Beachwood East (expired)	City	19-Feb-96	Sand Scraping
13 Beachwood East (expired)	City	19-Feb-96	Sand Scraping
14 Beachwood East (expired)	City	19-Feb-96	Sand Scraping
15 Beachwood East (expired)	City	19-Feb-96	Sand Scraping
16 Beachwood East (expired)	City	19-Feb-96	Sand Scraping
17 Beachwood East (expired)	City	19-Feb-96	Sand Scraping
18 Beachwood East (expired)	City	19-Feb-96	Sand Scraping
19 Beachwood East (expired)	City	19-Feb-96	Sand Scraping
Wild Dunes Beachfront (expired)	OCRM	1-Apr-96	Sandbags, Sand Scraping, Renourishment
Ocean Club Villas (expired)	OCRM	19-Aug-05	Sand Scraping, Renourishment
Wild Dunes Beachfront (expired)	OCRM	9-Sep-05	Sand Scraping, Renourishment
Wild Dunes Beachfront (expired)	OCRM	18-May-06	Sandbags
6 Summer Dunes Ln (expired)	OCRM	1-Dec-06	Sandbags
7 Summer Dunes Ln (expired)	OCRM	1-Dec-06	Sandbags
8 Summer Dunes Ln (expired)	OCRM	1-Dec-06	Sandbags
9 Summer Dunes Ln (expired)	OCRM	1-Dec-06	Sandbags
Tidewater Villas (expired)	OCRM	1-Dec-06	Sandbags
Port O' Call Villas (expired)	OCRM	1-Dec-06	Sandbags
Ocean Club Villas (expired)	OCRM	14-May-07	Sandbags
Seascape Villas (expired)	OCRM	16-May-07	Sandbags
Summer House Villas (expired)	OCRM	21-Jun-07	Sandbags
Ocean Club Villas (expired)	OCRM	9-May-13	Sandbags
Wild Dunes Links Course (expired)	OCRM	8-Jul-13	Sandbags
Seascape Villas (expired)	OCRM	10-Mar-14	Sandbags
11 Beachwood East (expired)	OCRM	18-Mar-14	Sandbags
12 Beachwood East (expired)	OCRM	18-Mar-14	Sandbags
13 Beachwood East (expired)	OCRM	18-Mar-14	Sandbags
14 Beachwood East (expired)	OCRM	18-Mar-14	Sandbags
15 Beachwood East (expired)	OCRM	18-Mar-14	Sandbags
16 Beachwood East (expired)	OCRM	18-Mar-14	Sandbags
17 Beachwood East (expired)	OCRM	18-Mar-14	Sandbags
18 Beachwood East (expired)	OCRM	18-Mar-14	Sandbags
4 Dunecrest Lane (expired)	OCRM	18-Mar-14	Sandbags

Location (status)	By	Issue Date	Specified Mitigation Techniques
5 Dunecrest Lane (expired)	OCRM	18-Mar-14	Sandbags
19 Beachwood East (expired)	OCRM	21-Mar-14	Sandbags
20 Beachwood East (expired)	OCRM	30-Apr-14	Sandbags
Seascape Villas (expired)	OCRM	25-Sep-14	Renourishment
Seascape Villas (expired)	OCRM	1-Oct-14	Sandbags, Renourishment
Ocean Club Villas (expired)	OCRM	24-Oct-14	Renourishment
Ocean Club Villas (expired)	OCRM	20-Mar-15	Sandbags
11 Beachwood East (expired)	OCRM	24-Mar-15	Sandbags
12 Beachwood East (expired)	OCRM	24-Mar-15	Sandbags
13 Beachwood East (expired)	OCRM	24-Mar-15	Sandbags
14 Beachwood East (expired)	OCRM	24-Mar-15	Sandbags
15 Beachwood East (expired)	OCRM	24-Mar-15	Sandbags
16 Beachwood East (expired)	OCRM	24-Mar-15	Sandbags
17 Beachwood East (expired)	OCRM	24-Mar-15	Sandbags
18 Beachwood East (expired)	OCRM	24-Mar-15	Sandbags
19 Beachwood East (expired)	OCRM	24-Mar-15	Sandbags
11 Beachwood East (expired)	OCRM	27-May-15	Sandbags
12 Beachwood East (expired)	OCRM	27-May-15	Sandbags
13 Beachwood East (expired)	OCRM	27-May-15	Sandbags
14 Beachwood East (expired)	OCRM	27-May-15	Sandbags
15 Beachwood East (expired)	OCRM	27-May-15	Sandbags
16 Beachwood East (expired)	OCRM	27-May-15	Sandbags
18 Beachwood East (expired)	OCRM	27-May-15	Sandbags
19 Beachwood East (expired)	OCRM	27-May-15	Sandbags
11 Beachwood East (expired)	OCRM	28-Sep-15	Sandbags
13 Beachwood East (expired)	OCRM	28-Sep-15	Sandbags
14 Beachwood East (expired)	OCRM	28-Sep-15	Sandbags
Seascape Villas (expired)	OCRM	28-Sep-15	Sandbags
Ocean Club Villas (expired)	OCRM	28-Sep-15	Sandbags
15 Beachwood East (expired)	OCRM	29-Sep-15	Sandbags
16 Beachwood East (expired)	OCRM	29-Sep-15	Sandbags
17 Beachwood East (expired)	OCRM	7-Oct-15	Sandbags
Ocean Club Villas (expired)	OCRM	10-Nov-15	Renourishment
19 Beachwood East (expired)	OCRM	24-Nov-15	Sandbags
20 Beachwood East (expired)	OCRM	24-Nov-15	Sandbags
11 Beachwood East (expired)	OCRM	17-Dec-15	Sandbags
12 Beachwood East (expired)	OCRM	17-Dec-15	Sandbags
14 Beachwood East (expired)	OCRM	17-Dec-15	Sandbags
15 Beachwood East (expired)	OCRM	17-Dec-15	Sandbags

Location (status)	By	Issue Date	Specified Mitigation Techniques
16 Beachwood East (expired)	OCRM	17-Dec-15	Sandbags
17 Beachwood East (expired)	OCRM	17-Dec-15	Sandbags
19 Beachwood East (expired)	OCRM	17-Dec-15	Sandbags
20 Beachwood East (expired)	OCRM	17-Dec-15	Sandbags
Ocean Club Villas (expired)	OCRM	17-Dec-15	Sandbags, Renourishment
Seascape Villas (expired)	OCRM	22-Dec-15	Sandbags
11 Beachwood East (active)	OCRM	28-July-16	Sandbags
12 Beachwood East (active)	OCRM	28-July-16	Sandbags
14 Beachwood East (active)	OCRM	28-July-16	Sandbags
15 Beachwood East (active)	OCRM	28-July-16	Sandbags
16 Beachwood East (active)	OCRM	28-July-16	Sandbags
17 Beachwood East (active)	OCRM	28-July-16	Sandbags
19 Beachwood East (active)	OCRM	28-July-16	Sandbags
20 Beachwood East (active)	OCRM	28-July-16	Sandbags
Ocean shoreline, as needed (expired)	OCRM	8-October-16	Sandbags, sand scraping and minor renourishment (Hurricane Matthew)
8 Beachwood East (active)	OCRM	8-December-16	Minor renourishment
9 Beachwood East (active)	OCRM	8-December-16	Minor renourishment

5.2.3 Previous Hurricane or Storm Events

A number of hurricanes and storms have affected the Isle of Palms. The last major event was Hurricane Hugo in September 1989. Hugo was a Category 4 hurricane and its storm surge covered most of the island (peak water levels ranging between 15.5 feet above MSL along the beach and 12.5 feet above MSL along the back of the island). Hurricane Hugo damaged most buildings on the island and destroyed more than 200. Beach and dune erosion during Hugo was severe.

The more recent storms to affect Isle of Palms have been relatively minor, but still caused some flooding and erosion. The offshore passage of Hurricane Sandy in October 2012 caused erosion along the oceanfront. Hurricane Joaquin passed offshore (October 2015) but was accompanied by tides approximately 2 ft above predicted, strong waves and extremely heavy rainfall. The result was flooding of low-lying areas of the island and some erosion along the oceanfront. The effects on the island were documented by CSE (2015b).

Hurricane Matthew eroded dunes along the Isle of Palms shoreline in early October 2016. An erosion assessment was performed and recommendations were provided to the City in November 2016 (CSE, 2016b).

5.3 Discussion of Erosion Control Alternatives

Erosion control actions that have been employed on Isle of Palms have included a variety of measures: construction of rock revetments and a groin (Section 5.2), beach nourishment and shoal management (see Section 5.2.1), and emergency fill placement and sand bags (Section 5.2.2). Kana, et al. (1985) reports that property owners also used sand scraping and artificial seaweed in the early 1980s.

The City has maintained its prohibition on hard erosion control devices (within 250 ft of mean high water) for at least 30 years. The DHEC OCRM prohibition would apply landward of this point, if the State's 40-year setback line lies landward of the City's 250 ft zone. The City defers to the State on experimental erosion control devices.

Between the mid-1980s and 2007, the City was a mostly a passive participant in erosion control efforts, leaving those to property owners. However, the City agreed with the 2007 recommendations of the Long-term Beach Management Advisory Group (Jones, 2008) and authorized use of City funds for permitting, design and construction of major beach nourishment using offshore sediment, and for shoal management projects. The City also funds beach monitoring surveys and studies.

Going forward, the erosion control alternatives likely to be used on Isle of Palms are those that have proven most effective -- beach nourishment (offshore sediment), shoal management (excavation from accreting shoal areas and fill in eroding areas), and emergency sand bagging and fill placement by property owners. Other alternatives authorized by the State (e.g., experimental wave dissipation system installations) may also be used.

Retreat on Isle of Palms will be addressed via City zoning and construction setbacks (see Section 4.2.5) which are generally more restrictive than DHEC OCRM requirements for siting of new and reconstructed buildings west of 53rd Ave.

Within the Wild Dunes PDD, retreat is more difficult for two reasons: 1) this portion of the island is governed by development agreements and regime documents over which the City has no control, and 2) development in the PDD has many large, fully-engineered buildings, which are more resistant to destruction by surge, waves and erosion. In this district, retreat will likely depend on destruction of buildings by major storms, and by voluntary relocation of buildings.

The most likely "retreat" option in the PDD will involve moving the shoreline away from the buildings rather than moving the buildings away from the shoreline – at least until such time as a major storm destroys buildings that are seaward of the DHEC OCRM Setback Line. Even then, however, issuance of special permits by DHEC OCRM may moderate the goal of retreat from the shoreline.

5.3.1 Beach Renourishment

The City has demonstrated its commitment to beach renourishment, and plans to continue working with affected property owners and other stakeholders to implement this alternative in the future. In November 2016 the City submitted a permit application for another large nourishment project, and is securing funds for such a project.

The City advocated for and was successful in changing State law in 2014, allowing qualified communities to ask voters to institute a Beach Preservation Fee (http://www.scstatehouse.gov/sess120_2013-2014/bills/503.htm). In November 2014. City voters overwhelmingly passed a referendum establishing a City Beach Preservation Fee (1% of gross receipts for accommodations and certain rentals). Receipts from the Fee will be used for beach monitoring, beach nourishment, erosion mitigation, dune restoration and maintenance, and maintenance of public beach accesses.

State cost-sharing for renourishment areas designated as having full and complete public access is pursued by the City. This includes the western ¼ mile of the Wild Dunes shoreline (most of Wild Dunes is not eligible under current rules). The City also works closely with Wild Dunes on planning, permitting, funding and monitoring beach projects there.

5.3.2 Other Measures

Other erosion control alternatives to be used in the community were outlined above: beach nourishment (offshore sediment); shoal management (excavation from accreting shoal areas and fill in eroding areas); emergency sand bagging and fill placement by property owners; and other options authorized by the State (e.g., experimental wave dissipation system installations).

6. Needs, Goals and Implementation Strategies

As was stated previously in Sections 1.4 and 4.2.1 of this LCBMP, there are three principal beach management issues facing Isle of Palms. The City has implemented, and will continue to implement, those measures necessary to address these issues:

1. Beach and dune erosion, particularly in the unstabilized inlet erosion zone at the eastern end of the island. *Strategy: manage and minimize erosion effects through beach monitoring, beach nourishment, shoal management, and limited emergency protection as approved by DHEC OCRM. The Comprehensive Plan, City Code of Ordinances and Council/Department actions support these types of measures.*
2. Balancing public beach parking demand with available safe parking capacity on the island. *Strategy: document parking demand and capacity on the island (completed, 2015) and implement a managed beach parking program to balance public beach parking and resident needs (being implemented, 2016 beach season).*
3. Drainage of low-lying areas. *Strategy: adopt a stormwater plan and stormwater utility (accomplished) and identify and implement drainage projects and funding sources. This work is ongoing, and is supported by the Comprehensive Plan, the Code of Ordinances, and by Council/City department actions and operations. Fortunately, few drainage problems exist seaward of the DHEC OCRM Setback Line, and those that do are being addressed by the City.*

6.1 Retreat Strategy

The retreat strategy was discussed in Section 5.3 of the LCBMP. The area west of 53rd Ave. is largely built-out, and construction setbacks there are already more restrictive than DHEC OCRM requirements. Retreat west of 53rd Ave. is not likely to be necessary.

Given the positive sediment budget and low erosion rates for most of the island, landward movement of the DHEC OCRM Baseline and Setback line is unlikely except possibly in the unstabilized inlet zone at the east end of the island. Unfortunately, this is also the area at greatest risk to erosion effects associated with inlet shoal attachment. This is also the area (Wild Dunes PDD), where development agreements and other legal documents guide and regulate development and redevelopment. City zoning and land use requirements in this area have been established but may be of limited use in enforcing a retreat strategy. Instead the City will assist PDD property owners and entities in their efforts to maintain a wide beach and to minimize temporary erosion associated with inlet shoal attachments. Retreat in this area (or anywhere on the island) by acquisition and relocation of buildings is not likely feasible. Grant funds are limited and property values are high. Some individual property owners may voluntarily choose relocation, or relocation may be mandated by DHEC OCRM if structures are destroyed beyond repair.

6.2 Strategy for Preserving and Enhancing Public Beach Access

Maintaining public beach access on the island is very important and has been addressed by the City. There are 56 public beach access points along approximately 4.6 miles of beach. The beach accesses are recorded on plats and are protected against loss, encroachment or damage by City monitoring and enforcement. The City has over 7 times the necessary public beach access points and facilities to qualify 4.8 miles of beach as having full and complete public access according to SC DHEC criteria (see Table 3). However, all seven miles of Isle of Palms beaches are public beaches, and are accessible to the public. For the 2.2 miles of Wild Dunes beach beyond the SC DHEC full-and-complete-public-access designation, the public can visit the beach from the adjacent beach with full-and-complete-public-access, or from one of the many vacation/rental accommodations available in Wild Dunes.

7. References

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Appendix 1. Inventories

ISLE OF PALMS – Sheet 163

Structural Inventory

Street/ Development	Tax Map Number	Parcel Number	(*) Structure Inventory	(**) Structure Location (ft)	(**) Erosion Control Structure
Hunley Bridge	568-9-0	142	--	--	--
	568-9-0	147	--	--	--
	568-9-0	148	--	--	--
	568-9-0	149	--	--	--
	568-9-0	150	--	--	--
	568-9-0	151	--	--	--
	568-9-0	152	--	--	--
	568-9-0	153	--	--	--
	568-9-0	154	--	--	--
	568-9-0	155	--	--	--
	568-9-0	156	--	--	--
	568-9-0	157	--	--	--
	568-9-0	158	P	+15	--
	568-9-0	159	--	--	--
	568-9-0	160	--	--	--
	568-9-0	161	P	+20	--
2nd Ave	568-9-0	143	--	--	--
	568-9-0	162	--	--	--
	568-9-0	163	--	--	--
	568-9-0	164	--	--	--
	568-9-0	165	--	--	--
	568-9-0	166	--	--	--
	568-9-0	167	--	--	--
	568-9-0	168	--	--	--
	568-9-0	169	--	--	--
3rd Ave	568-9-0	144	--	--	--

Note:* A = Habitable Structure <5,000 sq. ft
B = Habitable Structure >5,000 sq. ft.
C = Ancillary Building
D = Deck
P = Pool/Pool Deck
PP = Private Pier
RV = Rock Revetment

*** Distances Measured Seaward From OCRM 40-Year Setback Line*

Note: Distances relative to 40-year setback line were calculated using 2015 USGS aerial imagery and information from DHEC OCRM. Distances are approximate and actual distances may vary. If more accurate distances are required a field survey is recommended.

ISLE OF PALMS – Sheet 164

Structural Inventory

Street/ Development	Tax Map Number	Parcel Number	(*) Structure Inventory	(**) Structure Location (ft)	(**) Erosion Control Structure
3rd Ave	568-9-0	144	--	--	--
	568-9-0	170	--	--	--
	568-9-0	171	--	--	--
	568-9-0	172	--	--	--
	568-9-0	173	--	--	--
	568-9-0	174	--	--	--
	568-9-0	175	--	--	--
	568-9-0	176	--	--	--
4th Ave	568-10-0	175	--	--	--
	568-10-0	178	--	--	--
	568-10-0	179	--	--	--
	568-10-0	180	--	--	--
	568-10-0	181	--	--	--
	568-10-0	182	--	--	--
5th Ave	568-10-0	176	--	--	--
	568-10-0	183	--	--	--
	568-10-0	184	--	--	--
	568-10-0	185	--	--	--
	568-10-0	186	--	--	--
	568-10-0	187	--	--	--
	568-10-0	188	--	--	--
	568-10-0	189	--	--	--
	568-10-0	190	--	--	--
	568-10-0	191	--	--	--
	568-10-0	192	--	--	--
	568-10-0	193	--	--	--
	568-10-0	194	--	--	--
6th Ave	568-10-0	177	--	--	--
	568-10-0	195	--	--	--
	568-10-0	196	--	--	--

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*** Distances Measured Seaward From OCRM 40-Year Setback Line*

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ISLE OF PALMS – Sheet 165
Structural Inventory

Street/ Development	Tax Map Number	Parcel Number	(*) Structure Inventory	(**) Structure Location (ft)	(**) Erosion Control Structure
6th Ave	568-10-0	197	--	--	--
	568-10-0	198	--	--	--
	568-10-0	199	--	--	--
	568-10-0	200	--	--	--
	568-10-0	201	--	--	--
	568-10-0	202	--	--	--
	568-10-0	203	--	--	--
	568-10-0	204	--	--	--
	568-10-0	205	P	+5	--
7th Ave	568-11-0	212	--	--	--
	568-11-0	216	--	--	--
	568-11-0	217	--	--	--
	568-11-0	218	P	+15	--
	568-11-0	219	--	--	--
	568-11-0	220	--	--	--
	568-11-0	221	--	--	--
	568-11-0	222	--	--	--
8th Ave	568-11-0	213	--	--	--
	568-11-0	223	--	--	--
	568-11-0	224	--	--	--
	568-11-0	225	--	--	--
	568-11-0	226	--	--	--
	568-11-0	227	--	--	--
	568-11-0	228	--	--	--
	568-11-0	229	--	--	--
9th Ave	568-11-0	214	P	+10	--
	568-11-0	230	--	--	--
	568-11-0	231	P	+10	--
	568-11-0	232	--	--	--
	568-11-0	233	--	--	--
	568-11-0	234	--	--	--
	568-11-0	235	--	--	--

Note:* A = Habitable Structure <5,000 sq. ft
B = Habitable Structure >5,000 sq. ft.
C = Ancillary Building
D = Deck
P = Pool/Pool Deck
PP = Private Pier
RV = Rock Revetment

**** ***Distances Measured Seaward From OCRM 40-Year Setback Line***

Note: Distances relative to 40-year setback line were calculated using 2015 USGS aerial imagery and information from DHEC OCRM. Distances are approximate and actual distances may vary. If more accurate distances are required a field survey is recommended.

ISLE OF PALMS – Sheet 166

Structural Inventory

Street/ Development	Tax Map Number	Parcel Number	(*) Structure Inventory	(**) Structure Location (ft)	(**) Erosion Control Structure
9th Ave	568-11-0	235	--	--	--
10th Ave	568-11-0	236	--	--	--
	568-11-0	Dunescape	--	--	--
	568-11-0	206	--	--	--
Harbor Boulevard	568-11-0	240	--	--	--
	568-11-0	Seaside Inn	--	--	--
	568-11-0	Ocean Palms	--	--	--
	568-11-0	Ocean View	--	--	--
	568-11-0	245	--	--	--
	568-11-0	186	--	--	--
	568-11-0	187	--	--	--
	568-11-0	250	--	--	--
	568-11-0	193	--	--	--
Pavilion Drive	568-11-0	Ocean Blvd.	--	--	--
	568-11-0	Sea Cabin	--	--	--
	568-12-0	Sea Cabin	PP	+550	--
14th Ave	568-12-0	23	--	--	--
	568-12-0	252	--	--	--
	568-12-0	253	--	--	--
	568-12-0	254	--	--	--
	568-12-0	255	--	--	--
	568-12-0	256	--	--	--
	568-12-0	257	--	--	--

Note:* A = Habitable Structure <5,000 sq. ft
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D = Deck
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*** Distances Measured Seaward From OCRM 40-Year Setback Line*

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ISLE OF PALMS – Sheet 167

Structural Inventory

Street/ Development	Tax Map Number	Parcel Number	(*) Structure Inventory	(**) Structure Location (ft)	(**) Erosion Control Structure
14th Ave	568-12-0	257	--	--	--
	568-12-0	258	--	--	--
	568-12-0	259	--	--	--
	568-12-0	260	--	--	--
	568-12-0	230	--	--	--
	568-12-0	26	--	--	--
	568-12-0	303	--	--	--
	568-12-0	304	--	--	--
	568-12-0	029	--	--	--
21st Ave	568-12-0	231	--	--	--
	568-12-0	306	--	--	--
	568-12-0	307	--	--	--
	568-12-0	308	--	--	--
	568-12-0	309	--	--	--
22nd Ave	571-9-0	310	--	--	--
	571-9-0	160	--	--	--
	571-9-0	198	--	--	--
	571-9-0	199	--	--	--
	571-9-0	200	--	--	--
23rd Ave	571-9-0	201	--	--	--
	571-9-0	202	--	--	--
	571-9-0	166	--	--	--
	571-9-0	204	--	--	--
24th Ave	571-9-0	205	--	--	--
	571-9-0	206	--	--	--
	571-9-0	207	--	--	--
	571-9-0	208	--	--	--
25th Ave	571-9-0	172	--	--	--
	571-9-0	210	--	--	--

Note:* A = Habitable Structure <5,000 sq. ft
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P = Pool/Pool Deck
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**** ***Distances Measured Seaward From OCRM 40-Year Setback Line***

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ISLE OF PALMS – Sheet 168
Structural Inventory

Street/ Development	Tax Map Number	Parcel Number	(*) Structure Inventory	(**) Structure Location (ft)	(**) Erosion Control Structure
25th Ave	571-9-0	210	--	--	--
	571-9-0	211	--	--	--
	571-9-0	212	--	--	--
26th Ave	571-9-0	213	--	--	--
	571-9-0	177	--	--	--
	571-9-0	215	--	--	--
	571-9-0	216	--	--	--
	571-9-0	217	--	--	--
	571-9-0	218	--	--	--
27th Ave	571-9-0	219	--	--	--
	571-9-0	220	--	--	--
	571-9-0	221	--	--	--
	571-9-0	222	--	--	--
	571-9-0	223	--	--	--
	571-9-0	224	--	--	--
28th Ave	571-9-0	188	--	--	--
	571-9-0	226	--	--	--
	571-9-0	227	--	--	--
	571-9-0	228	--	--	--
	571-9-0	229	--	--	--
29th Ave	571-10-0	222	--	--	--
	571-10-0	223	--	--	--
	571-10-0	224	--	--	--
	571-10-0	184	--	--	--
	571-10-0	226	--	--	--
	571-10-0	227	--	--	--
	571-10-0	228	--	--	--
	571-10-0	188	--	--	--
13th Ave	571-10-0	255	--	--	--
	571-10-0	230	--	--	--
	571-10-0	231	--	--	--
	571-10-0	191	--	--	--
	571-10-0	233	--	--	--
	571-10-0	194	--	--	--

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RV = Rock Revetment

**** ***Distances Measured Seaward From OCRM 40-Year Setback Line***

Note: Distances relative to 40-year setback line were calculated using 2015 USGS aerial imagery and information from DHEC OCRM. Distances are approximate and actual distances may vary. If more accurate distances are required a field survey is recommended.

ISLE OF PALMS – Sheet 169

Structural Inventory

Street/ Development	Tax Map Number	Parcel Number	(*) Structure Inventory	(**) Structure Location (ft)	(**) Erosion Control Structure
13th Ave	571-10-0	194	--	--	--
	571-10-0	235	--	--	--
	571-10-0	236	--	--	--
31st Ave	571-10-0	237	--	--	--
	571-10-0	238	--	--	--
	571-10-0	239	--	--	--
	571-10-0	240	--	--	--
32nd Ave	571-10-0	241	--	--	--
	571-10-0	202	--	--	--
	571-10-0	243	--	--	--
	571-10-0	244	--	--	--
	571-10-0	245	--	--	--
33rd Ave	571-10-0	246	--	--	--
	571-10-0	207	--	--	--
	571-10-0	248	--	--	--
	571-10-0	249	--	--	--
34th Ave	571-10-0	210	--	--	--
	571-10-0	251	--	--	--
	571-10-0	252	--	--	--
	571-10-0	253	--	--	--
35th Ave	571-11-0	201	--	--	--
	571-11-0	202	--	--	--
	571-11-0	203	--	--	--
	571-11-0	204	--	--	--
	571-11-0	205	--	--	--
36th Ave	571-11-0	206	--	--	--
	571-11-0	207	--	--	--

Note:* A = Habitable Structure <5,000 sq. ft
B = Habitable Structure >5,000 sq. ft.
C = Ancillary Building
D = Deck
P = Pool/Pool Deck
PP = Private Pier
RV = Rock Revetment

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ISLE OF PALMS – Sheet 170
Structural Inventory

Street/ Development	Tax Map Number	Parcel Number	(*) Structure Inventory	(**) Structure Location (ft)	(**) Erosion Control Structure
36th Ave	571-11-0	207	--	--	--
	571-11-0	208	--	--	--
	571-11-0	151	--	--	--
37th Ave	571-11-0	210	--	--	--
	571-11-0	153	--	--	--
	571-11-0	154	--	--	--
	571-11-0	212	--	--	--
	571-11-0	213	--	--	--
38th Ave	571-11-0	214	--	--	--
	571-11-0	215	--	--	--
	571-11-0	216	--	--	--
	571-11-0	217	--	--	--
39th Ave	571-11-0	160	--	--	--
	571-11-0	161	--	--	--
	571-11-0	220	--	--	--
	571-11-0	163	--	--	--
40th Ave	571-11-0	222	--	--	--
	571-11-0	223	--	--	--
	571-11-0	166	--	--	--
	571-11-0	225	--	--	--
	571-11-0	226	--	--	--
41st Ave	571-12-0	183	--	--	--
42nd Ave	571-12-0	185	--	--	--
	571-12-0	186	--	--	--

Note:* A = Habitable Structure <5,000 sq. ft
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C = Ancillary Building
D = Deck
P = Pool/Pool Deck
PP = Private Pier
RV = Rock Revetment

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ISLE OF PALMS – Sheet 171

Structural Inventory

Street/ Development	Tax Map Number	Parcel Number	(*) Structure Inventory	(**) Structure Location (ft)	(**) Erosion Control Structure
42nd Ave	571-12-0	186	--	--	--
43rd Ave	571-12-0	187	--	--	--
	571-12-0	188	--	--	--
44th Ave	571-12-0	189	--	--	--
	571-12-0	190	--	--	--
45th Ave	571-12-0	191	--	--	--
	571-12-0	192	--	--	--
46th Ave	571-12-0	70	--	--	--
	571-12-0	69	--	--	Buried(?) RV (+35)
47th Ave	571-12-0	195	--	--	Buried(?) RV (+45)
48th Ave	571-12-0	171	--	--	Buried(?) RV (+50)
	571-12-0	170	--	--	--
	571-12-0	198	--	--	--
	571-12-0	172	--	--	--
49th Ave	604-9-0	287	--	--	Buried(?) RV (+35)
	604-9-0	3	--	--	Buried(?) RV (+35)
50th Ave	604-9-0	289	--	--	Buried(?) RV (+30)

Note: ***A = Habitable Structure <5,000 sq. ft***
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C = Ancillary Building
D = Deck
P = Pool/Pool Deck
PP = Private Pier
RV = Rock Revetment

**** ***Distances Measured Seaward From OCRM 40-Year Setback Line***

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ISLE OF PALMS – Sheet 172

Structural Inventory

Street/ Development	Tax Map Number	Parcel Number	(*) Structure Inventory	(**) Structure Location (ft)	(**) Erosion Control Structure
50th Ave	604-9-0	289	--	--	Buried (?) RV (+30)
	604-9-0	290	--	--	Buried (?) RV (+30)
51st Ave	604-9-0	291	--	--	Buried (?) RV (+30)
	604-9-0	23	--	--	Buried (?) RV (+30)
52nd Ave	604-9-0	293	--	--	Buried (?) RV (+30)
	604-9-0	294	--	--	Buried (?) RV (+30)
53rd Ave	604-9-0	41	--	--	--
	604-9-0	48	--	--	--
54th Ave	604-9-0	49	--	--	--
	604-9-0	50	--	--	--
	604-9-0	57	--	--	--
	604-9-0	245	--	--	--
	604-9-0	58	--	--	--
	604-9-0	65	--	--	--
55th Ave	604-9-0	66	D	+10	--
	604-9-0	67	D	+5	--
	604-9-0	74	D	+15	--
	604-9-0	246	--	--	--
	604-9-0	177	D	+5	--
	604-9-0	178	F	+20	--
56th Ave	604-9-0	179	A, P	+30, +50	--
	604-9-0	180	B	+70	--

Note:* A = Habitable Structure <5,000 sq. ft
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C = Ancillary Building
D = Deck
P = Pool/Pool Deck
PP = Private Pier
RV = Rock Revetment

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ISLE OF PALMS – Sheet 173

Structural Inventory

Street/ Development	Tax Map Number	Parcel Number	(*) Structure Inventory	(**) Structure Location (ft)	(**) Erosion Control Structure
56th Ave	604-9-0	179	A, P	+30, +50	--
	604-9-0	180	B	+70	--
	604-9-0	181	B	+70	--
	604-9-0	287	--	--	--
	604-10-0	7	--	--	--
	604-10-0	8	B	+60	--
57th Ave	604-10-0	9	B	+50	--
	604-10-0	10	B, D	+60, +80	--
	604-10-0	11	B, D	+60, +80	Buried (?) RV (+130)
Grand Pavilion	604-10-0	379/389	A	+10	--
	604-10-0	379/390	A	+15	--
	604-10-0	379/391	A	+25	--
	604-10-0	379/392	A	+30	--
	604-10-0	379/393	A	+30	--
	604-10-0	379/394	A	+35	--
	604-10-0	379/395	A	+35	--
	604-10-0	379/396	A	+40	--
	604-10-0	381/434	A	+60	--
	604-10-0	381/435	A	+65	--
	604-10-0	381/436	A	+65	--
	604-10-0	381/437	A	+70	--
	604-10-0	381/438	A	+75	--
	604-10-0	381/439	A	+80	--
	604-10-0	381	C, D, Px2	+140, 175, +130, +150	--
	604-10-0	381/455	A	+80	--
	604-10-0	381/456	A	+85	--
	604-10-0	381/457	A	+90	--
	604-10-0	381/458	A	+95	--
	604-10-0	381/459	A	+95	--
	604-10-0	381/460	A	+100	--

Note:* A = Habitable Structure <5,000 sq. ft
B = Habitable Structure >5,000 sq. ft.
C = Ancillary Building
D = Deck
P = Pool/Pool Deck
PP = Private Pier
RV = Rock Revetment

**** ***Distances Measured Seaward From OCRM 40-Year Setback Line***

Note: Distances relative to 40-year setback line were calculated using 2015 USGS aerial imagery and information from DHEC OCRM. Distances are approximate and actual distances may vary. If more accurate distances are required a field survey is recommended.

ISLE OF PALMS – Sheet 173 (cont.)

Structural Inventory

Street/ Development	Tax Map Number	Parcel Number	(*) Structure Inventory	(**) Structure Location (ft)	(**) Erosion Control Structure
Grand Pavilion	604-10-0	383/405	A	+100	--
	604-10-0	383/406	A	+100	--
	604-10-0	383/407	A	+105	--
	604-10-0	383/408	A	+110	--
	604-10-0	383/409	A	+110	--
	604-10-0	383/410	A	+115	RV (+260)
	604-10-0	383/411	A	+120	RV (+270)
	604-10-0	383/412	A	+120	RV (+275)
Seagrove Villas	604-10-0	Bldg 10	B	+215	RV (+285)
	604-10-0	Bldg 11	B	+205	RV (+285)
	604-10-0	Bldg 9	B	+110	RV (+285)
	604-10-0	Bldg 8	B	+55	RV (+285)
	604-10-0	Segrove	P	+195	RV (+320)
	604-10-0	Bldg 4	B	+85	
	604-10-0	Bldg 3	B	+145	
	604-10-0	Bldg 2	B	+245	
	604-10-0	Bldg 1	B	+260	
Beachwood East	604-10-0	34	A	+105	--
	604-10-0	35	A	+120	--
	604-10-0	28	A	+20	--
	604-10-0	36	A	+100	--
	604-10-0	37	A	+165	--
	604-10-0	38	B, P	+275, +305	RV (+335)
	604-10-0	39	B, D	+295, +320	RV (+350)
	604-10-0	40	A	+280	RV (+340)
	604-10-0	41	A	+260	WDS
	604-10-0	42	A	+245	WDS

Note:* A = Habitable Structure <5,000 sq. ft
B = Habitable Structure >5,000 sq. ft.
C = Ancillary Building
D = Deck
P = Pool/Pool Deck
PP = Private Pier
RV = Rock Revetment
WDS = Experimental Wave Dissipation System (May 2016)

*** Distances Measured Seaward From OCRM 40-Year Setback Line*

Note: Distances relative to 40-year setback line were calculated using 2015 USGS aerial imagery and information from DHEC OCRM. Distances are approximate and actual distances may vary. If more accurate distances are required a field survey is recommended.

ISLE OF PALMS – Sheet 174

Structural Inventory

Street/ Development	Tax Map Number	Parcel Number	(*) Structure Inventory	(**) Structure Location (ft)	(**) Erosion Control Structure
Beachwood East	604-10-0	41	A	+260	WDS
	604-10-0	42	A	+245	WDS
	604-10-0	43	A	+225	WDS
	604-10-0	44	A	+200	WDS
	604-10-0	45	A, P	+70, +95	--
	604-10-0	104	A	+30	--
	604-10-0	90	B, D	+175, +200	WDS
	604-10-0	91	B, D	+155, +185	WDS
	604-10-0	92	A	+135	WDS
	604-10-0	93	B	+115	L (+130), WDS
	604-10-0	94	A	+95	WDS
	604-10-0	95	A	+60	--
Dunecrest Lane	604-11-0	4	A	+65	--
	604-11-0	5	A, D	+55, +80	--
	604-11-0	6	B, D	+70, +105	--
	604-11-0	7	A	+65	--
	604-11-0	8	A, D	+40, +60	--
	604-11-0	9	A	+55	--
Beach Club Villas I	604-11-0	94 (105-112)	B	+55	--
	604-11-0	74 (75-82)	B	+70	--
WDCA Property Owners Beach House	604-11-0	211	C	+5	Buried RV (+95)

Note:* A = Habitable Structure <5,000 sq. ft
B = Habitable Structure >5,000 sq. ft.
C = Ancillary Building
D = Deck
P = Pool/Pool Deck
PP = Private Pier
RV = Rock Revetment
WDS = Experimental Wave Dissipation System (May 2016)
L = Timber Landscape Wall

*** Distances Measured Seaward From OCRM 40-Year Setback Line*

Note: Distances relative to 40-year setback line were calculated using 2015 USGS aerial imagery and information from DHEC OCRM. Distances are approximate and actual distances may vary. If more accurate distances are required a field survey is recommended.

ISLE OF PALMS – Sheet 175

Structural Inventory

Street/ Development	Tax Map Number	Parcel Number	(*) Structure Inventory	(**) Structure Location (ft)	(**) Erosion Control Structure
Beach Club Villas II	604-11-0	114 (127-134)	--	--	Buried RV (+60)
	604-11-0	114 (117-126)	--	--	Buried RV (+60)
	604-11-0	116	--	--	Buried RV (+60)
	604-11-0	115 (143-152)	--	--	Buried RV (+50)
	604-11-0	115 (135-142)	--	--	Buried RV (+45)
Mariners Walk	604-12-0	Mariners II	--	--	Buried RV (+10)
Shipwatch	604-12-0	Shipwatch	D	+90	--
Summer House	604-12-0	Summer House	B	+50	--
Summer Dunes Lane	604-12-0	505	--	--	--
	604-12-0	506	A	+80	--
	604-12-0	507	A	+80	--
	604-12-0	508	A	+80	--
	604-12-0	509	A	+80	--
Tidewater Villas	604-12-0	Bldg I	B	+5	--
	604-12-0	Pool deck	P	+5	--
	604-12-0	Pool Bldg	C	+20	--
Port O'Call	604-12-0	Bldg B	B	+35	--

Note:* A = Habitable Structure <5,000 sq. ft
B = Habitable Structure >5,000 sq. ft.
C = Ancillary Building
D = Deck
P = Pool/Pool Deck
PP = Private Pier
RV = Rock Revetment

*** Distances Measured Seaward From OCRM 40-Year Setback Line*

Note: Distances relative to 40-year setback line were calculated using 2015 USGS aerial imagery and information from DHEC OCRM. Distances are approximate and actual distances may vary. If more accurate distances are required a field survey is recommended.

ISLE OF PALMS – Sheet 176

Structural Inventory

Street/ Development	Tax Map Number	Parcel Number	(*) Structure Inventory	(**) Structure Location (ft)	(**) Erosion Control Structure
Port O' Call	604-12-0	Bldg B	B	+35	--
Port O'Call	604-12-0	Bldg F	B	+35	--
Seascape	604-12-0	Seascape	B	+30	WDS
Ocean Club	604-5-0	Bldg 9510	B	+20	WDS
Ocean Point	604-5-0	5	--	--	--
	604-5-0	174	--	--	--
	604-5-0	175	--	--	--
	604-5-0	176	--	--	--
	604-5-0	177	--	--	--
	604-5-0	178	--	--	--
	604-5-0	179	--	--	--
	604-5-0	180	--	--	--
	604-5-0	181	--	--	--
	604-5-0	182	--	--	--
	604-5-0	183	--	--	--
	604-5-0	86	--	--	--
	604-5-0	87	--	--	--
	604-5-0	88	--	--	--
	604-5-0	89	--	--	--
	604-5-0	90	D	+15	--
	604-5-0	91	D	+10	--
	604-5-0	92	D	+10	--
	604-5-0	93	D	+15	--
	604-5-0	94	A	+20	--
	604-5-0	95	A	+25	--
	604-5-0	96	A	+30	--
	604-5-0	97	A	+40	--
	604-5-0	98	A	+40	--
	604-5-0	99	A	+40	--

Note:* A = Habitable Structure <5,000 sq. ft
B = Habitable Structure >5,000 sq. ft.
C = Ancillary Building
D = Deck
P = Pool/Pool Deck
PP = Private Pier
RV = Rock Revetment
WDS = Experimental Wave Dissipation System (May 2016)

**** ***Distances Measured Seaward From OCRM 40-Year Setback Line***

Note: Distances relative to 40-year setback line were calculated using 2015 USGS aerial imagery and information from DHEC OCRM. Distances are approximate and actual distances may vary. If more accurate distances are required a field survey is recommended.

ISLE OF PALMS – Sheet 177
Structural Inventory

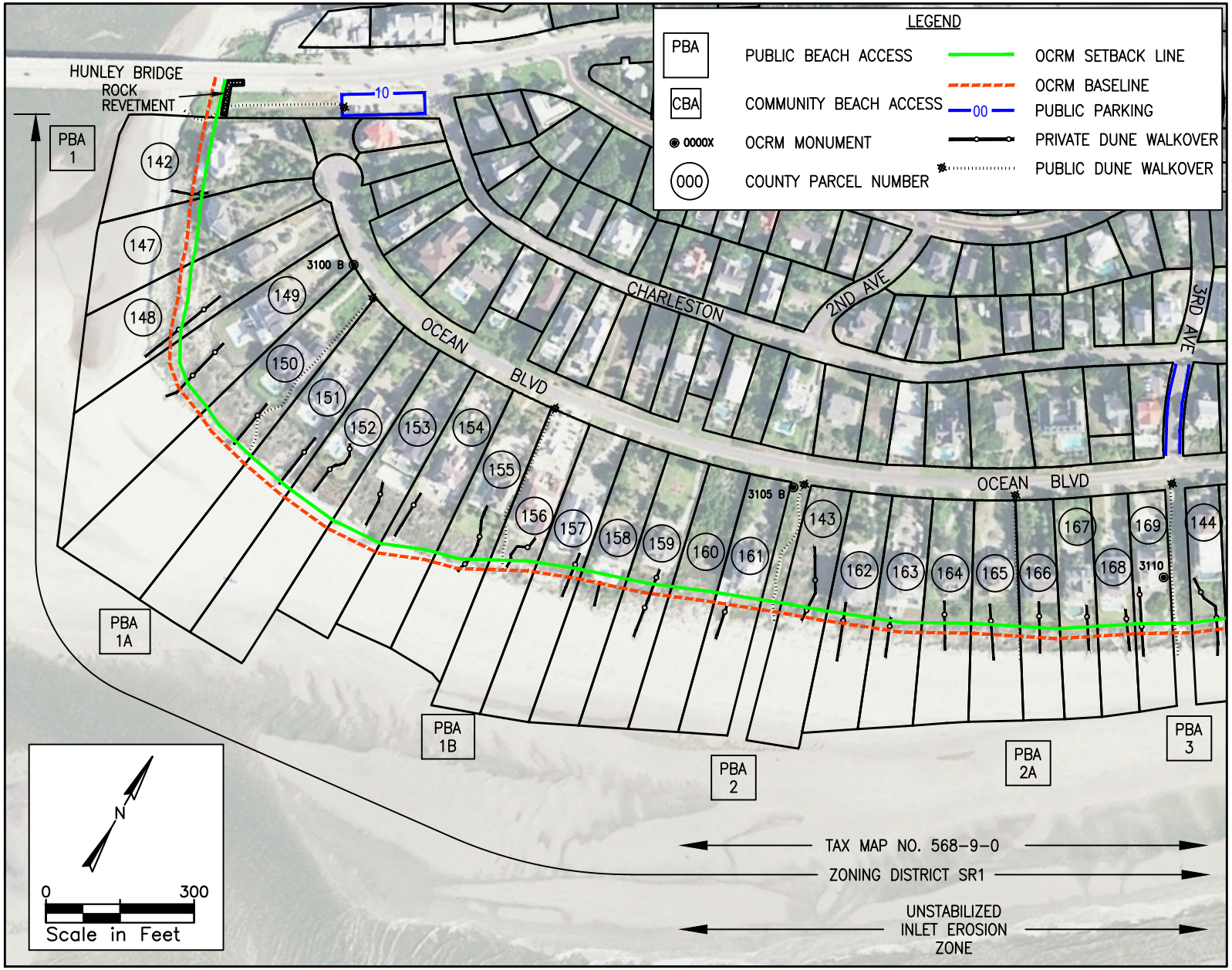
Street/ Development	Tax Map Number	Parcel Number	(*) Structure Inventory	(**) Structure Location (ft)	(**) Erosion Control Structure
Ocean Point	604-5-0	99	A	+40	--
	604-5-0	102	--	--	--
	604-5-0	103	--	--	--
	604-5-0	104	--	--	--
	604-5-0	105	--	--	--
	604-5-0	106	--	--	--
	604-5-0	107	--	--	--
	604-5-0	108	--	--	--
	604-5-0	109	--	--	--

Note:* A = Habitable Structure <5,000 sq. ft
B = Habitable Structure >5,000 sq. ft.
C = Ancillary Building
D = Deck
P = Pool/Pool Deck
PP = Private Pier
RV = Rock Revetment

**** ***Distances Measured Seaward From OCRM 40-Year Setback Line***

Note: Distances relative to 40-year setback line were calculated using 2015 USGS aerial imagery and information from DHEC OCRM. Distances are approximate and actual distances may vary. If more accurate distances are required a field survey is recommended.

Appendix 2. Maps



ISLE OF PALMS, BEACH MANAGEMENT PLAN (SHEET 163)

SOURCE: 2015 AERIAL PHOTOGRAPHY OBTAINED FROM USGS WEBSITE.
2016 PROPERTY LINES OBTAINED FROM CHARLESTON COUNTY GIS.
2009 SETBACK & BASELINE OBTAINED FROM SCDHEC/OCRM.

ATM
APPLIED TECHNOLOGY & MANAGEMENT

ISLE OF PALMS, BEACH MANAGEMENT PLAN (SHEET 164)

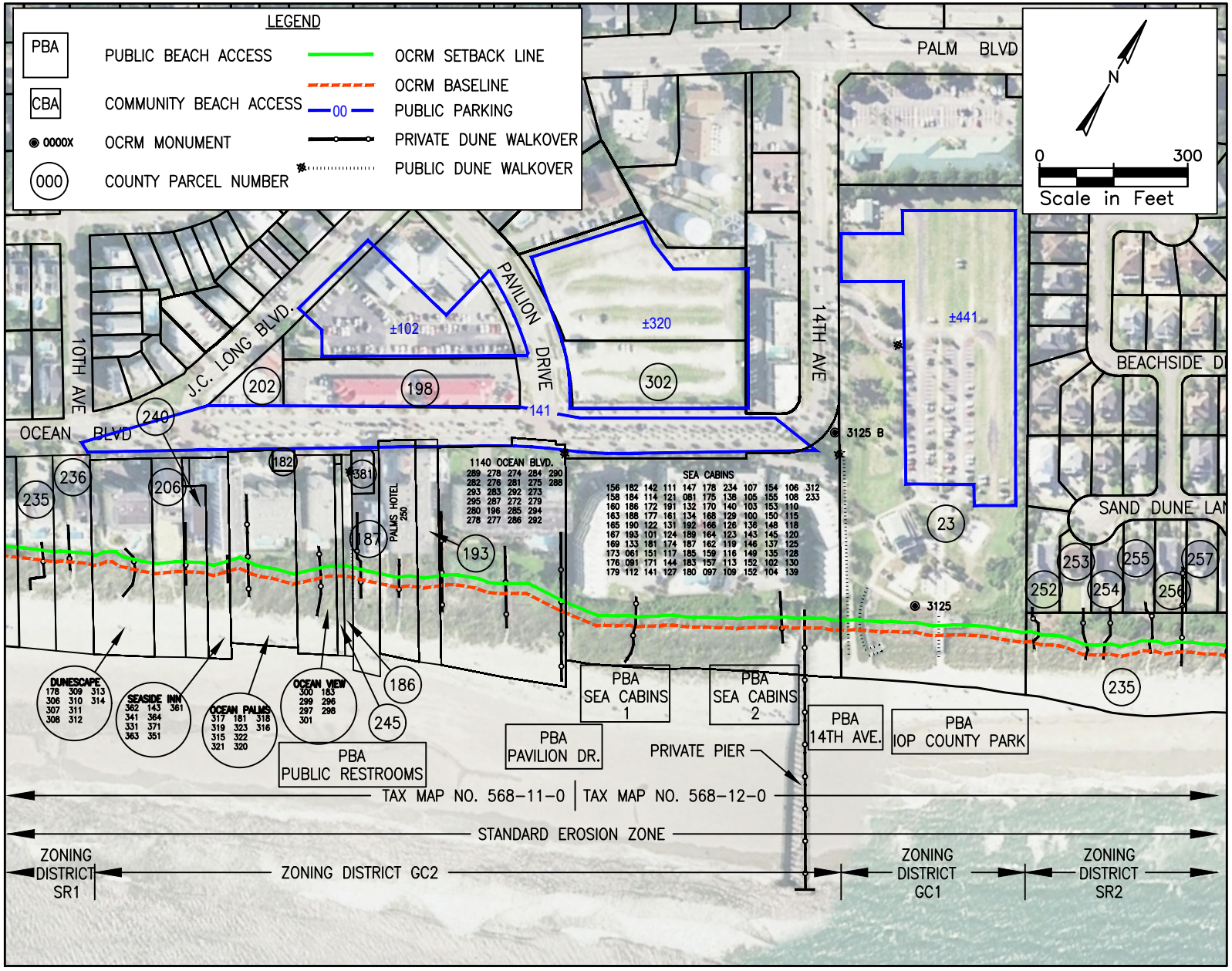
SOURCE: 2015 AERIAL PHOTOGRAPHY OBTAINED FROM USGS WEBSITE.
2016 PROPERTY LINES OBTAINED FROM CHARLESTON COUNTY GIS.
2009 SETBACK & BASELINE OBTAINED FROM SCDHEC/OCRM.

ATM
APPLIED TECHNOLOGY & MANAGEMENT

ISLE OF PALMS, BEACH MANAGEMENT PLAN (SHEET 165)

SOURCE: 2015 AERIAL PHOTOGRAPHY OBTAINED FROM USGS WEBSITE.
2016 PROPERTY LINES OBTAINED FROM CHARLESTON COUNTY GIS.
2009 SETBACK & BASELINE OBTAINED FROM SCDHEC/OCRM.

ATM
APPLIED TECHNOLOGY & MANAGEMENT



ISLE OF PALMS, BEACH MANAGEMENT PLAN (SHEET 166)

SOURCE: 2015 AERIAL PHOTOGRAPHY OBTAINED FROM USGS WEBSITE.
2016 PROPERTY LINES OBTAINED FROM CHARLESTON COUNTY GIS.
2009 SETBACK & BASELINE OBTAINED FROM SCDHEC/OCRM.

APPLIED TECHNOLOGY & MANAGEMENT

ISLE OF PALMS, BEACH MANAGEMENT PLAN (SHEET 167)

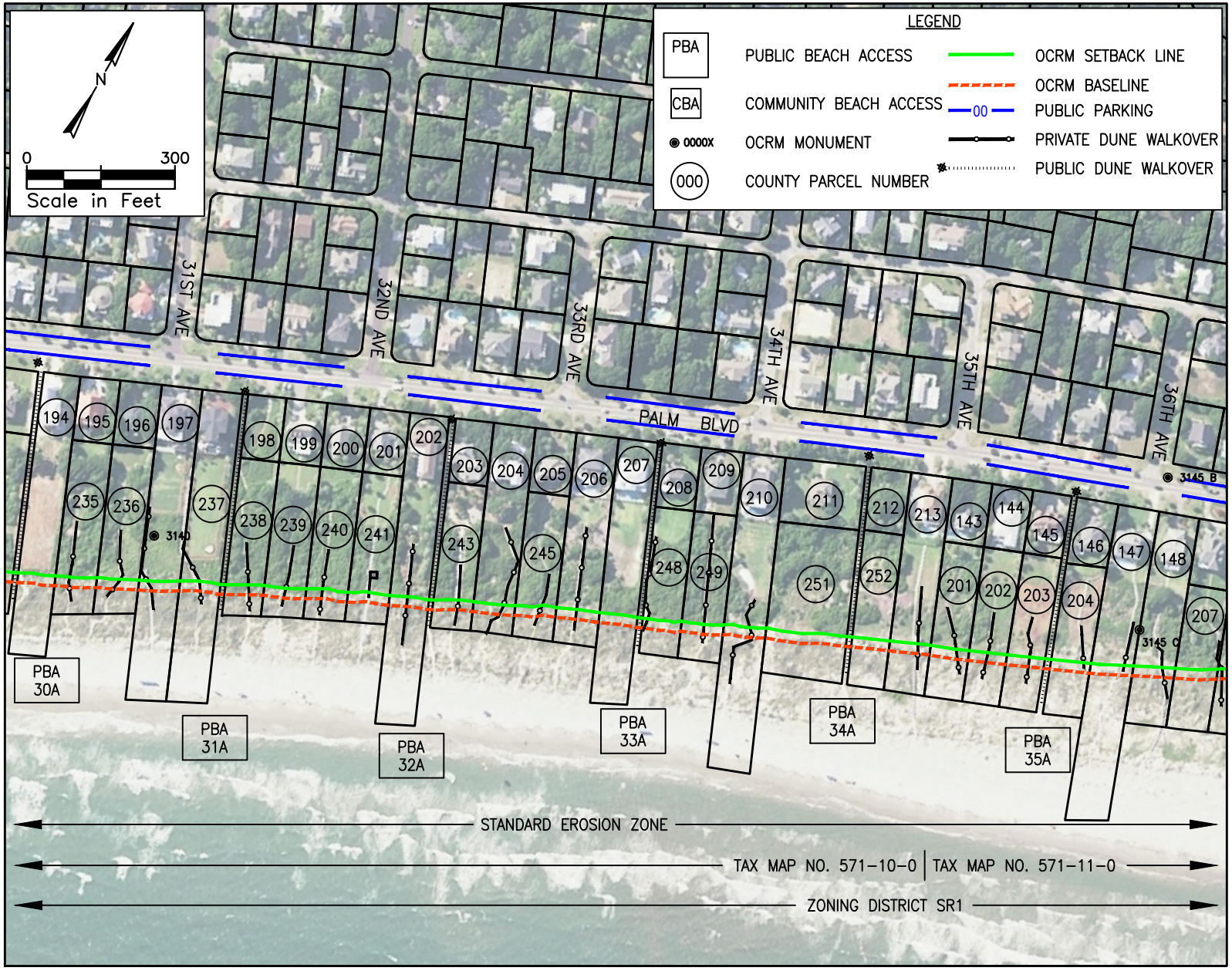
SOURCE: 2015 AERIAL PHOTOGRAPHY OBTAINED FROM USGS WEBSITE.
2016 PROPERTY LINES OBTAINED FROM CHARLESTON COUNTY GIS.
2009 SETBACK & BASELINE OBTAINED FROM SCDHEC/OCRM.

APPLIED TECHNOLOGY & MANAGEMENT

ISLE OF PALMS, BEACH MANAGEMENT PLAN (SHEET 168)

SOURCE: 2015 AERIAL PHOTOGRAPHY OBTAINED FROM USGS WEBSITE.
2016 PROPERTY LINES OBTAINED FROM CHARLESTON COUNTY GIS.
2009 SETBACK & BASELINE OBTAINED FROM SCDHEC/OCRM.

APPLIED TECHNOLOGY & MANAGEMENT



ISLE OF PALMS, BEACH MANAGEMENT PLAN (SHEET 169)

SOURCE: 2015 AERIAL PHOTOGRAPHY OBTAINED FROM USGS WEBSITE.
2016 PROPERTY LINES OBTAINED FROM CHARLESTON COUNTY GIS.
2009 SETBACK & BASELINE OBTAINED FROM SCDHEC/OCRM.

ATM
APPLIED TECHNOLOGY & MANAGEMENT

ISLE OF PALMS, BEACH MANAGEMENT PLAN (SHEET 170)

SOURCE: 2015 AERIAL PHOTOGRAPHY OBTAINED FROM USGS WEBSITE.
2016 PROPERTY LINES OBTAINED FROM CHARLESTON COUNTY GIS.
2009 SETBACK & BASELINE OBTAINED FROM SCDHEC/OCRM.

ATM
APPLIED TECHNOLOGY & MANAGEMENT

ISLE OF PALMS, BEACH MANAGEMENT PLAN (SHEET 171)

SOURCE: 2015 AERIAL PHOTOGRAPHY OBTAINED FROM USGS WEBSITE.
2016 PROPERTY LINES OBTAINED FROM CHARLESTON COUNTY GIS.
2009 SETBACK & BASELINE OBTAINED FROM SCDHEC/OCRM.

ATM
APPLIED TECHNOLOGY & MANAGEMENT

ISLE OF PALMS, BEACH MANAGEMENT PLAN (SHEET 172)

SOURCE: 2015 AERIAL PHOTOGRAPHY OBTAINED FROM USGS WEBSITE.
2016 PROPERTY LINES OBTAINED FROM CHARLESTON COUNTY GIS.
2009 SETBACK & BASELINE OBTAINED FROM SCDHEC/OCRM.

ATM
APPLIED TECHNOLOGY & MANAGEMENT

ISLE OF PALMS, BEACH MANAGEMENT PLAN (SHEET 173)

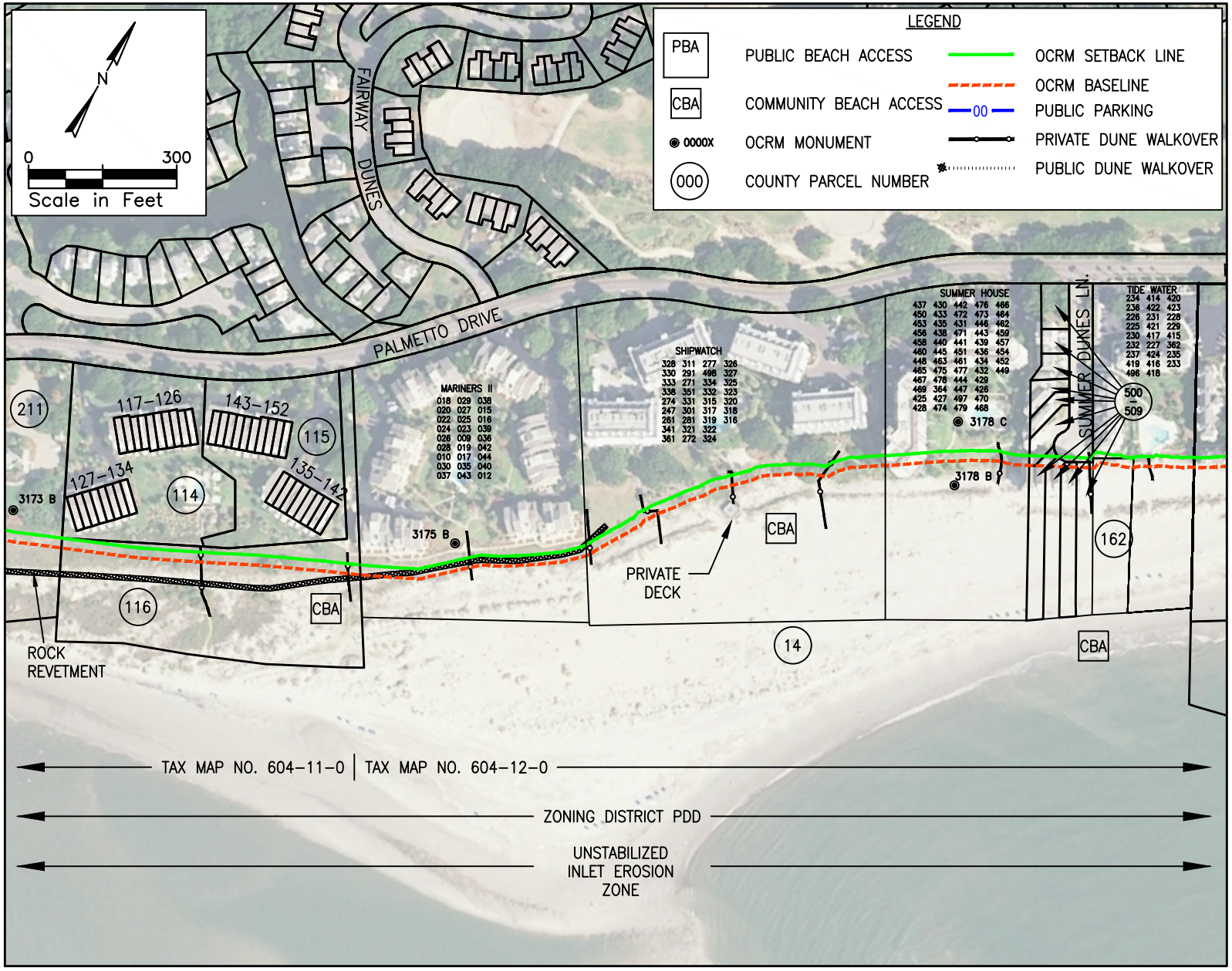
SOURCE: 2015 AERIAL PHOTOGRAPHY OBTAINED FROM USGS WEBSITE.
2016 PROPERTY LINES OBTAINED FROM CHARLESTON COUNTY GIS.
2009 SETBACK & BASELINE OBTAINED FROM SCDHEC/OCRM.

ATM
APPLIED TECHNOLOGY & MANAGEMENT

ISLE OF PALMS, BEACH MANAGEMENT PLAN (SHEET 174)

SOURCE: 2015 AERIAL PHOTOGRAPHY OBTAINED FROM USGS WEBSITE.
2016 PROPERTY LINES OBTAINED FROM CHARLESTON COUNTY GIS.
2009 SETBACK & BASELINE OBTAINED FROM SCDHEC/OCRM.

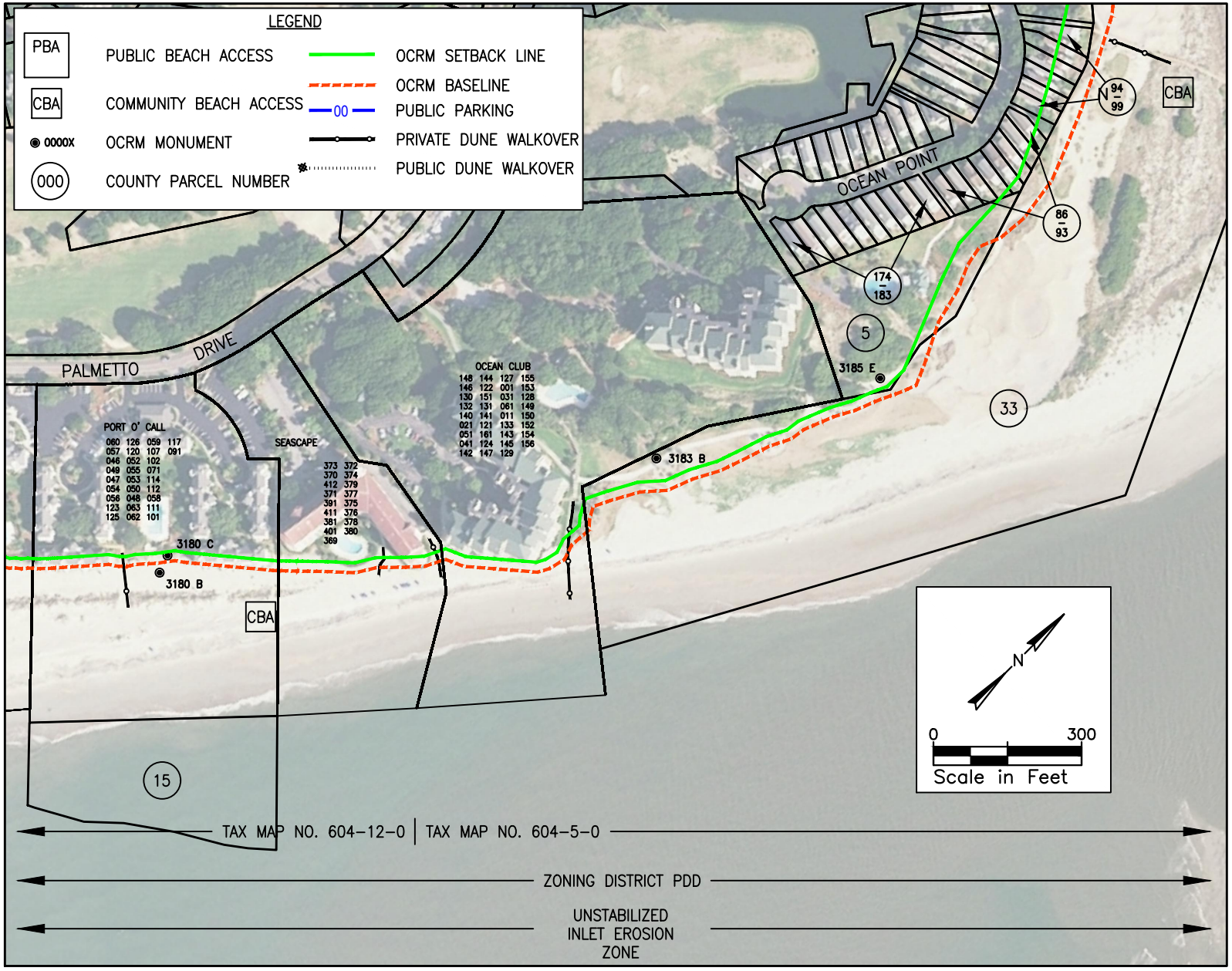
APPLIED TECHNOLOGY & MANAGEMENT



ISLE OF PALMS, BEACH MANAGEMENT PLAN (SHEET 175)

SOURCE: 2015 AERIAL PHOTOGRAPHY OBTAINED FROM USGS WEBSITE.
2016 PROPERTY LINES OBTAINED FROM CHARLESTON COUNTY GIS.
2009 SETBACK & BASELINE OBTAINED FROM SCDHEC/OCRM.

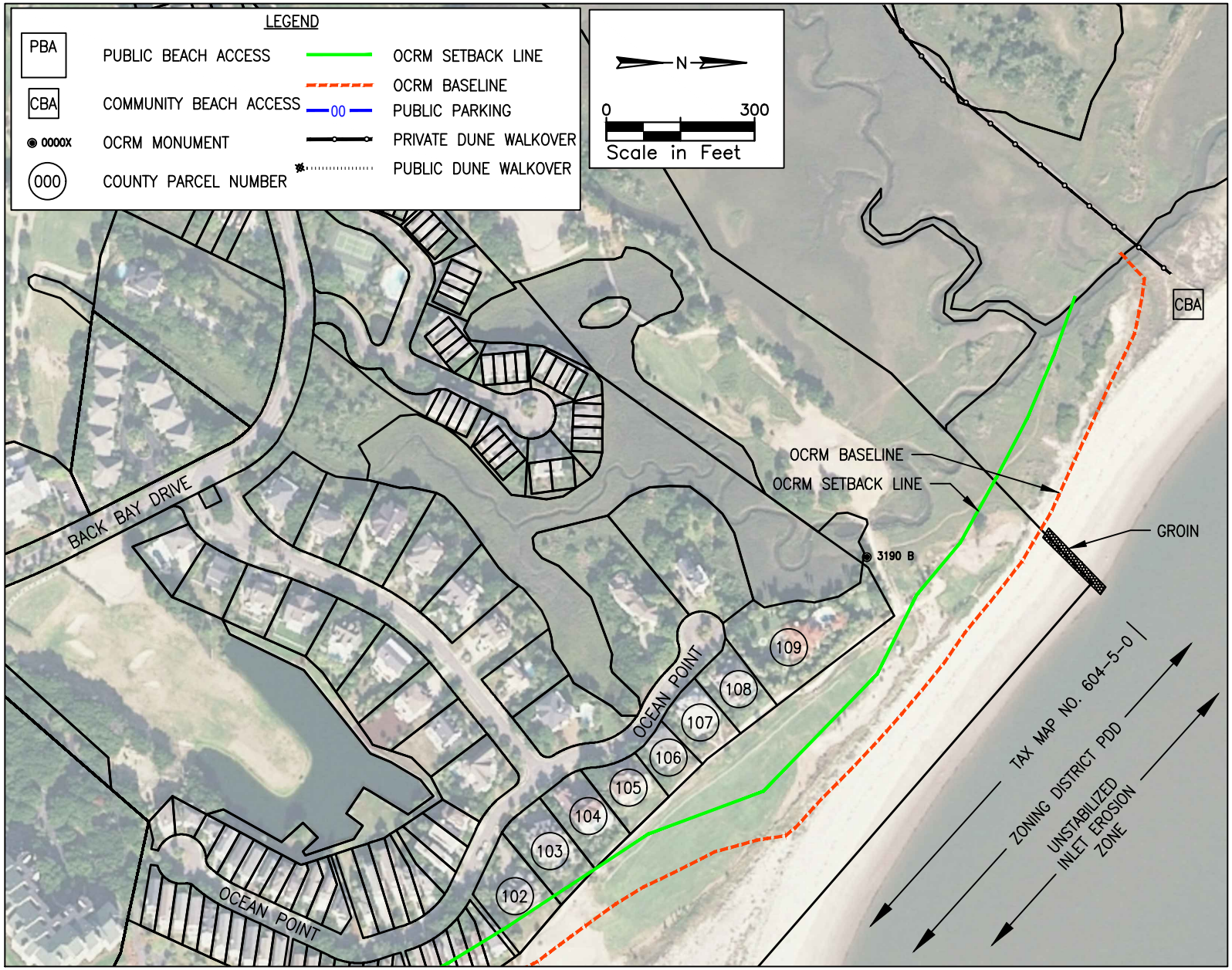
ATM
APPLIED TECHNOLOGY & MANAGEMENT



ISLE OF PALMS, BEACH MANAGEMENT PLAN (SHEET 176)

SOURCE: 2015 AERIAL PHOTOGRAPHY OBTAINED FROM USGS WEBSITE.
2016 PROPERTY LINES OBTAINED FROM CHARLESTON COUNTY GIS.
2009 SETBACK & BASELINE OBTAINED FROM SCDHEC/OCRM.

ATM
APPLIED TECHNOLOGY & MANAGEMENT



ISLE OF PALMS, BEACH MANAGEMENT PLAN (SHEET 177)

SOURCE: 2015 AERIAL PHOTOGRAPHY OBTAINED FROM USGS WEBSITE.
2016 PROPERTY LINES OBTAINED FROM CHARLESTON COUNTY GIS.
2009 SETBACK & BASELINE OBTAINED FROM SCDHEC/OCRM.

APPLIED TECHNOLOGY & MANAGEMENT

Healthy People. Healthy Communities.

Response to Comments Received
Local Comprehensive Beach Management Plan
for the City of Isle of Palms

DHEC-OCRM announced a 30-day public comment period and opportunity to request a public hearing on March 24, 2017 and posted the locally adopted plan on the DHEC-OCRM website. The 30-day public comment period closed on April 25, 2017.

Public comment was received via e-mail. Comments received during the public comment period were reviewed and considered in the development of the approval findings. This document summarizes the comments and provides response to comments received in consideration of the State Beachfront Management Act, S.C. Code Ann. § 48-39-250 *et seq.* and associated regulation.

Coastal Conservation League's Comment(s):

While the plan contains many valid recommendations, the League has serious concerns about some of the language and proposed actions in the plan related to erosion control and coastal retreat. To this point, we have outlined our specific recommendations below with language included from particular sections in question:

Beach (Re)nourishment

(Page 38) "4.2.1 Municipality's Comprehensive Plan: Strategy 3.3.2: Support efforts to minimize the impact of erosion on the ends of the island including beach nourishment projects. *(Ongoing; General Government).*"

- We recommend the following language change: "Support efforts to minimize the impact of erosion on the ends of the island through environmentally responsible projects that may utilize beach nourishment and other, less impactful, yet effective methods."

(Page 65) "5.3.1 Beach Renourishment: The City has demonstrated its commitment to beach renourishment, and plans to continue working with affected property owners and other stakeholders to implement this alternative in the future. In November 2016 the City submitted a permit application for another large nourishment project, and is securing funds for such a project."

- We recommend the following language change: "The City demonstrates its commitment to environmentally responsible beach protection through various measures, including careful beach renourishment…"

More Discussion of Erosion Control/Wave Dissipation System

(Page 65) "5.3 Discussion of Erosion Control Alternatives: Going forward, the erosion control alternatives likely to be used on Isle of Palms are those that have proven most effective -- beach nourishment (offshore sediment), shoal management (excavation from accreting shoal areas and fill in eroding areas), and emergency sand bagging and fill placement by property owners. Other

alternatives authorized by the State (e.g., experimental wave dissipation system installations) may also be used."

- We recommend the following language change: "Going forward, the erosion control alternatives likely to be used on Isle of Palms are those that have proven most effective and environmentally responsible – beach nourishment (compatible offshore sediment)…Other alternatives authorized by the State and proven to not harm the beachfront will also be considered and may be used after thorough analysis."

(Page 66) "5.3.2 Other Measures: Other erosion control alternatives to be used in the community were outlined above: beach nourishment (offshore sediment); shoal management (excavation from accreting shoal areas and fill in eroding areas); emergency sand bagging and fill placement by property owners; and other options authorized by the State (e.g., experimental wave dissipation system installations)."

- We recommend the following language change: "Other erosion control alternatives that may be used in the community were outlined above: beach nourishment (compatible offshore sediment)…and other options authorized by the State that have proven not to harm the beachfront and have been thoroughly vetted."

Retreat

(Page 65) "5.3 Discussion of Erosion Control Alternatives: Retreat on Isle of Palms will be addressed via City zoning and construction setbacks (see Section 4.2.5) which are generally more restrictive than DHEC OCRM requirements for siting of new and reconstructed buildings west of 53rd Ave.

Within the Wild Dunes Planned Development District, retreat is more difficult for two reasons: 1) this portion of the island is governed by development agreements and regime documents over which the City has no control, and 2) development in the PDD has many large, fully-engineered buildings, which are more resistant to destruction by surge, waves and erosion. In this district, retreat will likely depend on destruction of buildings by major storms, and by voluntary relocation of buildings.

The most likely "retreat" option in the PDD will involve moving the shoreline away from the buildings rather than moving the buildings away from the shoreline at least until such time as a major storm destroys buildings that are seaward of the DHEC OCRM Setback Line. Even then, however, issuance of special permits by DHEC OCRM may moderate the goal of retreat from the shoreline."

- In the second paragraph, we recommend the following language change: "…2) development in the PDD has many large, fully-engineered buildings, which are more resistant to destruction by surge, waves and erosion. However, given the use of experimental erosion control devices already ongoing in this area, retreat planning must still take place because these added devices will only inhibit destruction of buildings by major storms as well as voluntary relocation of buildings. If there is rationale to utilize such experimental devices, there is likely rationale to work on a retreat policy."

- In the third paragraph, we recommend the following language change: "The most feasible retreat option in the PDD would involve moving the shoreline away from the buildings, but given the increasing likelihood that more severe storms will

destroy buildings already seaward of the DHEC OCRM Setback Line and/or Baseline, it would be most beneficial for the City to begin planning a stronger retreat policy. The City will coordinate with developers, state agencies, and other relevant parties on this over the next several years."

The League has provided public comment on many past proposed projects that utilize erosion control devices on the Isle of Palms. We stand by our comments and provide our position on those below. We also provide rationale for establishing a stronger, more robust retreat policy over the next several years.

Beach Renourishment

A July 2016 study by the South Carolina Department of Natural Resources (DNR) found that beach renourishment projects have long-term, adverse impacts. The study examined renourishment that consisted of dredged, nearshore subtidal sand deposits, similar to what is suggested in this application. It found that the marine food chain experienced the loss of small shellfish, worms and bugs. These bottom-dwelling animals are essential to the food chain because larger marine animals such as fish, crabs, etc. depend on them for survival. This study raises concern not only for the larger marine animals that inhabit the coastal area, but also for the recreational and commercial anglers who rely upon them. The researchers recommended that borrow site location and the depth at which sediments are mined below grade may be important considerations in order to avoid long-term impacts to this benthic infaunal community.

In addition to the study, history of renourishment on Isle of Palms suggests that concerns are well-warranted. The City applied for a permit in 2007 and carried out a renourishment project in 2008, using nonnative sand from a borrow site about 1.5-3 miles offshore. Concerns about the project revolve around the borrow site's sediment characteristics being strikingly different in composition than that of the native sand. The permit in reference to this particular project is P/N # 2007-02631-2IG.

Specifically, the sand from the borrow area in 2008 contained more than double the amount of shell than in the native sand, both for >2mm and <2mm measurements. The result of this renourishment project was that the reach sites were covered in a significant amount of shell hash, which is in line with what the sediment quality measures suggested. The League is concerned about similar outcomes for future renourishment. We recommend a quality control/quality assurance plan to ensure that only beach compatible fill be placed along the beaches in all future renourishment projects that involve nonnative sand, to avoid an outcome similar to the 2008 project. We also strongly encourage the City to coordinate with DNR about nesting and feeding seasons for sea turtles, piping plovers, and red knots, all of which have been noted at Isle of Palms, to avoid any detrimental impacts on their populations.

We would also suggest that the City financially support a local study, preferably conducted by a local university or agency (e.g., College of Charleston, Coastal Carolina University, or DNR), to observe and determine the impacts of new sand and renourishment on their beaches.

Wave Dissipation System

Pursuant to 1976 Code Ann. Section 48-39-320(C), the Department of Health and Environmental Control (DHEC) is tasked with determining whether the WDS has been successful in addressing an erosional issue and whether it should be allowed for continued use. As publicly noticed, DHEC's analysis of all available information indicates that the WDS has not successfully addressed erosional issues at the installation sites, has resulted in negative impacts to the beach and does not meet the performance criteria of a qualified device as defined by statute. DHEC staff has recommended that the Board not approve the WDS for future use and that the existing structures be required to be removed from the beach following the final agency decision.

The Coastal Conservation League concurs that the installation of the WDS did not result in enough benefit to outweigh the costs. The construction of new seawalls and other hard erosion control structures on South Carolina's beaches is not permitted. Despite the temporary nature of the WDS, negative impacts from these plastic structures have still occurred, while protection of homes was minimal. The most important finding in GEL's assessment of the WDS is that, **"WDS designs observed during this study will not provide long-term protection for property subjected to long-term beach erosion."**

As noted in the GEL study, the WDS did not have the ability to protect properties and stabilize scarps without using sandbags in conjunction. The League firmly opposes the use of sandbags in non-emergency circumstances, and the Blue Ribbon Committee on Shoreline Management's recommendations on tightening up sandbag regulations were recently enacted by the state legislature. Increasingly problematic is the finding that sand volume landward of the WDS did not increase or even retain in amount, including in calm conditions. In fact, a quick visual inspection of the WDS reveals that sand has actually accumulated on the *seaward* side of the system, indicating that sand is not making its way through the horizontal slats as intended.

The GEL study also identifies that the WDS does not prevent scouring, though it could with temporary removal of panels. On the positive side, the GEL study states that WDS has less negative impacts than a permanent hard structure. However, the WDS does not prevent downdrift impacts.

Additionally, Hurricane Matthew washed portions of the WDS on Harbor Island away. Residents found some of the horizontal bars from the system littering their yards. Other portions of the system completely failed and were washed underneath elevated homes.

According to public reports in 2016, the WDS resulted in several false sea turtle crawls. Turtle Patrol volunteers documented these false crawls in photographs at three different WDS locations.

DHEC communications to DNR assert that WDS have blocked sea turtles from nesting on at least six different occasions. DNR's response indicates that long wave dissipation walls could hurt nesting—not necessarily based on the reported false crawls per se, but the larger looming problem with widespread and long-term use of WDS. While the legislature intended for WDS to be used outside of turtle nesting season, the project designers do not explicitly state the number of hours required to deploy or remove the horizontal panels. GEL's monitoring report of The

Citadel's project goes on to conclude, "reports do not address potential impacts to turtles in detail. The final report recommends removing the horizontal panels during turtle nesting season to avoid impacts, unless a structure is in imminent danger of losing structural support. The report also discusses maintenance of wing walls to avoid turtle entrapment. However, analyses or conclusions are not given regarding potential impacts to turtles or other fauna."

Retreat

Given the increasing number of permit applications to fully or partially rebuild seaward of the DHEC OCRM baseline on Isle of Palms, the League feels that it is in the City's best interest to adequately plan for a potential, but likely, future of residential coastal retreat. While we understand that various jurisdictions may dictate what this policy would look like, this will become more essential as time goes on and the beachfront continues to feel the brunt of severe weather events. The League would be happy to assist the City in identifying the appropriate parties to work with on this planning effort as it will clearly need to be multifaceted and take into account the various zoning and agency guidelines already in place on Isle of Palms.

We do not believe that simply extending the shoreline or relying on erosion control devices will be sufficient. Additionally, these methods are often times more harmful than they are beneficial. The City of Isle of Palms has an opportunity to be a leader on retreat planning in South Carolina's coastal communities. Considering the severe, increasing erosion that is unique to their beachfront, this leadership and planning would be most appropriate.

DHEC OCRM Response:

The Department's review of locally-approved Local Comprehensive Beach Management Plans is limited to determine if the ten required elements in S.C. Code Ann. §48-39-350 have been addressed.