Town of Surfside

SUSTAINABILITY & RESILIENCY COMMITTEE MEETING

AGENDA

July 17, 2019 – 6:30 p.m.
Chief Terrill Williamson Police Training Room
9293 Harding Ave, 2nd Floor, Surfside, FL 33154

1. Call to Order/Roll Call
2. Approval of Meeting Minutes: April 17, 2019
3. Presentation by Elizabeth Wheaton, Miami Beach Director Environment & Sustainability Department
4. Recap of Dune Management Report (previously provided)
5. Review of previous meetings' items
6. Role of CGA and CGA's responsibilities
7. Public Comments (*3-minute time limit per speaker*)
8. Adjournment

THIS MEETING IS OPEN TO THE PUBLIC. IN ACCORDANCE WITH THE AMERICANS WITH DISABILITIES ACT OF 1990, ALL PERSONS THAT ARE DISABLED; WHO NEED SPECIAL ACCOMMODATIONS TO PARTICIPATE IN THIS MEETING BECAUSE OF THAT DISABILITY SHOULD CONTACT THE OFFICE OF THE TOWN CLERK AT 305-861-4863 EXT. 226 NO LATER THAN FOUR DAYS PRIOR TO SUCH PROCEEDING.

AGENDA ITEMS MAY BE VIEWED AT THE OFFICE OF THE TOWN CLERK, TOWN OF SURFSIDE TOWN HALL, 9293 HARDING AVENUE. ANYONE WISHING TO OBTAIN A COPY OF ANY AGENDA ITEM SHOULD CONTACT THE TOWN CLERK AT 305-861-4863. A COMPLETE AGENDA PACKET IS ALSO AVAILABLE ON THE TOWN WEBSITE AT www.townofsurfsidefl.gov.

TWO OR MORE MEMBERS OF TOWN COMMISSION OR OTHER TOWN BOARDS MAY ATTEND AND PARTICIPATE AT THIS MEETING.

THESE MEETINGS MAY BE CONDUCTED BY MEANS OF OR IN CONJUNCTION WITH COMMUNICATIONS MEDIA TECHNOLOGY, SPECIFICALLY, A TELEPHONE CONFERENCE CALL. THE LOCATION 9293 HARDING AVENUE, SURFSIDE, FL 33154, WHICH IS OPEN TO THE PUBLIC, SHALL SERVE AS AN ACCESS POINT FOR SUCH COMMUNICATION.

Town of Surfside

SUSTAINABILITY & RESILIENCY COMMITTEE MEETING

MINUTES

April 17, 2019 – 6:30 p.m.
Chief Terrill Williamson Police Training Room
9293 Harding Ave, 2nd Floor, Surfside, FL 33154

1. Call to Order/Roll Call

The meeting was called to order at 6:38 p.m.

The following were present:	Chair Andrea Travani Vice Chair Clara Diaz-Leal Deborah Cimadevilla Bertha Goldenberg
Absent:	Nirit Tayas Zamir
Also present:	Daniel Dietch, Mayor, Town Commission Liaison Guillermo Olmedillo, Town Manager Duncan Tavares, Asst. Town Manager Lillian Arango, Town Attorney James Hickey, Town Planner Frantza Duval, Recording Clerk

2. Approval of Meeting Minutes: January 16, 2019

Committee Member Goldenberg made a motion to approve the minutes. The motion received a second from Committee Member Cimadevilla and all voted in favor.

3. Abbot Avenue Drainage

Town Manager Olmedillo presented the item to the members of the Committee and spoke about the different options that were presented to the Town Commission.

Assistant Manager Tavares spoke on the item and introduced Muhammed Sharifuzzaman, a member of Calvin Giordano and Associates' team, to answer any questions. Mr. Sharifuzzaman presented an in-depth presentation of all three options to the Committee.

Questions were posted by members of the committee and answered by Mr. Sharifuzzaman.

Discussion took place about the placement of pump stations on the right of ways.

After an extensive discussion, and after exploring all options, Vice Chair ~~Committee~~ Diaz-Leal made a motion to recommend option number 1 at first and to proceed with option 2 if necessary. The recommendation came with the request to seek grant funding if possible and for the Town Commission to budget accordingly starting with FY19/20. Additionally, the Committee recommend placing proposed pump station(s) in a roundabout and not the right of way if possible. The motion received a second from Committee Member Cimadevilla and all voted in favor.

Committee Member Cimadevilla asked if the settlement agreement with Indian Creek will apply to this project as it affects 91st Street.

4. **Dune Height Graphs –** James Hickey, CGA
   Assistant Town Manager Tavares introduced the item to the members of the Committee and provided an update related to the Beach Renourishment project. There is a proposed Community meeting set for June 6 to provide everyone with an update.

   Mr. Sharifuzzaman spoke about the dune height calculation that were provided in the agenda packet.

   After some discussion the consensus was to wait to see Miami Beach and Hollywood Dune Management Plans before moving forward.

5. **Public Comments (*3-minute time limit per speaker*)**
   There was a person in the public but did not wish to speak.

6. **Adjournment**
   Committee Member Cimadevilla moved to adjourn the meeting at 8:38 p.m. Vice Chair Diaz-Leal seconded the motion and all voted in favor.

   Respectfully submitted:

Accepted this _____day of _____, 2019

_____
Andrea Travani
Committee Chair

Attest:

_____
Sandra Novoa, MMC
Town Clerk

Town of Surfside

9293 Harding Avenue
Surfside, FL 33154

Beach and Dune Report
W.A. 110
CGA Project number: 18-9942

Prepared By: Calvin, Giordano & Associates, Inc.
EXCEPTIONAL SOLUTIONS™

BEACH CREATION AND STATUS

The approximate one mile length of public beach and dune along the Town of Surfside's (Town or Surfside) ocean frontage was created from a beach renourishment program. The federally-authorized Dade County Shore Protection Project, which included Surfside, began in 1978 and was completed in January 1982 using sand from offshore borrow sites. This project included creation of a 20 foot wide dune at elevation +10.7 foot NGVD and a 50 foot wide level storm protection berm at elevation +8.2 foot NGVD. Additional fill material, equivalent to ten years of advance nourishment, was placed seaward of the design berm with this initial program. The Miami-Dade (County) *Erosion Control Master Plan* (Plan) reports that an additionally 590,000 cubic yards of sand was placed in Surfside again in 1999. The attached aerial photographs of Surfside in 1970 and 1984 demonstrate the initial beach renourishment effort and the 1999 aerial photographs (February and December) demonstrate the follow-up project. See Exhibit A. Aerial photograph of Surfside 1970 and 1984 and 1999.

The December 2017, *Critically Eroded Beaches in Florida,* report from the Florida Department of Environmental Protection (FDEP) states that most of the County's barrier island coast north of Cape Florida is critically eroded. FDEP, pursuant to rule 62B-36.002(5), Florida Administrative Code (F.A.C.), defines a critically eroded shoreline as, "a segment of the shoreline where natural processes or human activity have caused or contributed to erosion and recession of the beach or dune system to such a degree that upland development, recreational interests, wildlife habitat, or important cultural resources are threatened or lost. Critically eroded shorelines may also include peripheral segments or gaps between identified critically eroded areas which, although they may be stable or slightly erosional now, their inclusion is necessary for continuity of management of the coastal system or for the design integrity of adjacent beach management projects." The report identifies three critically eroded areas (17.0 miles), two non-critically eroded areas (1.4 miles) and one non-critically eroded inlet shoreline area (0.3 mile) in the County. Between Bakers Haulover Inlet and Government Cut (R27 – R74.4) are 9.4 miles of critical erosion, which threaten development and recreational interests along Bal Harbour, Surfside and Miami Beach. See Exhibit B. Critically Eroded Beaches Map.

The Town is approximately 0.85 miles south of Bakers Haulover Inlet. The Plan states that "areas immediately south of most inlets typically experience erosion due to sand being lost, creating a deficit on the downdrift side. At Bakers Haulover Inlet, sand is lost due to high current velocities, which tend to jet sand coming into the inlet either offshore, or into Biscayne Bay, where it accumulates in ebb and flood shoals, respectively. While these shoals are periodically dredged and the sand placed on the beach, there are inherent losses which create erosional conditions. In addition to the direct effects of the inlet, the curved jetty structure on the south side of the inlet can result in wave refraction under certain weather conditions that can accelerate the loss of sand from the beach in the vicinity of the jetty." Although Bal Harbour, which lies immediately south of the jetty and to the north of Surfside, is most strongly affected by the inlet, the lack of downdrift sand also impacts the Town and the beaches to the south, by depletion of the sand source that naturally should drift south. Inlets throughout Florida are studied, monitored and managed in accordance with their adopted Inlet Management plans; *The Baker Haulover Inlet Management and Implementation Plan* was jointly developed by FDEP and the County. Ongoing is a *Baker Haulover Inlet Feasibility Study* that is funded by FDEP with the County leading this project. A Techincal Advisory Group comprised of Surfside, Bal Harbour, Sunny Isles Beach, the County, FDEP and the Florida Inland Navigation District, has been meeting over this past year to collaboratively work with the firm of Moffat & Nichol to finalize the report that is evaluating and investigating improvements to sand bypassing at the inlet . It is anticipated the report will be completed in the spring of

2019. FDEP will then review and utilize the report to update the inlet management plan. The FDEP process may take an additional year.

Beaches and dunes are not discrete units confined by municipal limits; they are components of a larger ecosystem. The beach and dune system along Surfside is a part of the larger managed beach dune system along the County's Barrier Islands. An upcoming United States Army Corps of Engineers (ACOE) driven project proposes to place 300,000 cubic yards of sand along the beach front of Surfside from coastal range monument 31.5 to 36.5 (the entire length of the Town). This project is in the final stages of permit processing and it is anticipated work will begin in mid-2019. The proposed renourishment will have a typical berm crest of 6.1', a berm width of 240' and a construction slope of 1 vertical to 10 horizontal. The Town is an active partner with the ACOE and the County in this project. The Town is providing surveying services and permit processing services for this project. The State is reviewing the project and will be issuing a joint coastal permit through the Beaches, Inlets and Ports Program that falls within the FDEP. The County and the ACOE are co-permittees on this project and will also be issuing permits. For the Surfside project sand will be hauled to the site from approved inland sand mines sources.

The Town beach renourishment project is a component of an overall ACOE driven project in the County that also includes the Bal Harbour beach and the inlet. The Bal Harbour component involves inlet dredging as well as sand placement on the beach. It is anticipated work will begin in mid-2020 on this component. Other components of the overall County project include Sunny Isles Beach and segments of Miami Beach. These other components will run through 2020. Beach monitoring and renourishment throughout the County is a monitored and managed project with the ACOE and the County taking lead roles.

BEACH OWNERSHIP, FEATURES AND REGULATORY STRUCTURE

To understand ownership, responsibility and the applicable regulatory structure of the beach and dune system there are three distinct delineations that must be understood; these are: 1) the erosion control line (ECL), 2) the ocean bulkhead line and 3) the coastal construction control line (CCCL). These are shown on Exhibit C. Beach Aerial with ECL, Bulkhead and CCCL Delineations

1) Erosion Control Line: The ECL is defined in F.A.C. 62B-41.002(15) as "the line determined in accordance with the provisions of sections 161.141-.211, Florida Statute (F.S.) and recorded pursuant to section 161.181, F.S., in connection with beach restoration projects. Where established, an erosion control line represents the landward extent of the claims of the state in its capacity as sovereign title holder of the submerged bottoms and shores of the Atlantic Ocean, the Gulf of Mexico, the Straits of Florida and the bays, lagoons and other tidal reaches thereof."

The Plan describes the ECL as follows "Under Florida law, all land located seaward of the Mean High Water Line (MHWL) (with certain exceptions) is the property of the State of Florida. In implementing a beach nourishment or other activity that will artificially move the MHWL seaward, the State requires, pursuant to Chapter 161, F.S., that the project sponsor establish an ECL in order to allow the State to maintain ownership of these previously submerged areas. Prior to the establishment of an ECL, a riparian owner's seaward property line is the MHWL and is subject to fluctuation based on naturally occurring erosion or accretion. The establishment of an ECL occurs by surveying the location of the pre-project MHWL prior to the project using established survey procedures. This surveyed shoreline position then becomes a fixed property line known as the ECL. Once established, this line remains the seaward extent of the riparian owner, regardless of the change on the MHWL by fill placement or other means. In most cases, any new beach established seaward of the ECL is under State ownership and is available as public beach."

Within the Town the ECL runs roughly along the crest of the storm protection dune (slightly landward of the footpath that runs along the crest of the dune). Everything seaward of the ECL is owned by the State and is open for public recreation. See Exhibit C. Beach Aerial with ECL, Bulkhead and CCCL Delineations. This line identifies the shoreline prior to the beach renourishment completed in 1982. Although not owned by the Town, the beach area east of the ECL does fall within the corporate limits of the Town. Other than one lifeguard station, there are no piers, cabanas, marinas or other structures on the public beach.

The beach and associated dune system seaward of the footpath is maintained through agreement and on behalf of the State by the County Park and Recreation Department. The beach is maintained in a natural condition. The County specifically mechanically and manually cleans the beach, removes seaweed, empties the trash cans and removes/levels any escarpments that form. The Town Commission recently approved and adopted in the 2018-2019 budget for additional mechanical beach raking to supplement that done by the County, the Town is working on implementing this raking program. The Town maintains the walking path on the crest of the dune.

Unless an extremely significant storm event would occur to move the MHWL landward of the existing ECL and a subsequent publically funded renourishment program would trigger the necessity for a new ECL survey, the ECL will remain static in the Town.

2) Ocean Bulkhead Line: The Town has established an ocean bulkhead line that falls within and applies to the privately owned beach front properties east of Collins Avenue; this line is also shown on Exhibit C. Beach Aerial with ECL, Bulkhead and CCCL Delineations. The Town zoning code prohibits development or redevelopment seaward of the ocean bulkhead line. Seaward of this bulkhead line there are approximately 19 acres that lie adjacent to the State owned beach. Within this ocean bulkhead setback area, along the landward side of the dune, there is an unimproved maintenance path that is utilized by the State, the County and the Town that runs the entire length of the Town. This maintenance path is and has historically been, a popular public walking and biking path. This maintenance path, which is also utilized for emergency vehicles, is maintained by the Town. Any commercial use of the maintenance path, for construction or special events, etc., requires a Police Department Escort permit. Nearly all of the property owners have provided landscape improvements in the area between the bulkhead line and maintenance path. The maintenance path, also referred to as the 'Hardpack' is defined in Sec. 34-3 of the Town code as "The sand road west of the Erosion Control Line used by public safety and other authorized vehicles, pursuant to section 90-60.1(5) of the Town Code of Ordinances."

Relating to the ocean bulkhead line, Article IV, Division 2 of the Town Code specifically states the following within Section 14:

> Sec. 14-87. - Construction east of line. It shall be unlawful for any person to construct any groin, bulkhead, seawall, jetty, breakwater or other protective work or to place any permanent or temporary structure of any nature whatsoever east of the ocean bulkhead line. It shall also be unlawful for any person to repair, extend, alter or replace any existing structure lying east of the ocean bulkhead line.
> Sec. 14-88. - Construction west of line. Except as provided in section 90-187 no structure of any nature whatsoever may be erected within 20 feet west of the ocean bulkhead line and it shall be unlawful to repair, extend, alter or replace any existing structure lying within 20 feet west of the ocean bulkhead line which is not permitted under the provisions of section 90-187.
> Sec. 14-89. - Vehicles east of line. It shall be unlawful for any person to drive, park, store or leave unattended any vehicle east of the ocean bulkhead line. In case of an emergency, the Town manager may

grant temporary permission for vehicular access, upon such terms and conditions as he shall deem appropriate.

Additionally, Sec. 90-60 of the Town code addresses construction adjacent to the ocean bulkhead line and states the following:

90-60.1 Ocean bulkhead lines are established in section 14-86 and the following regulations shall control construction adjacent thereto:

(1) No permit shall be issued for the construction of any habitable, fully-enclosed structure east of the ocean bulkhead line.

(2) No permit shall be issued for the repair, extension, alteration or replacement of any habitable, fully-enclosed structure east of the ocean bulkhead line.

(3) No permit shall be issued for the construction of any habitable, fully enclosed structure closer than 20 feet to the west of the ocean bulkhead line.

(4) No permit shall be issued for the repair, extension, alteration or replacement of any habitable, fully enclosed structure lying within 20 feet to the west of the ocean bulkhead line.

(5) All properties east of Collins Avenue which upon redevelopment or expansion of habitable, fully enclosed structures require a permit from the town shall be required to provide an access easement to the town granting the perpetual use of the hardpack to the public, provided that the development creates an impact on public safety and the need for the easement is proportional to the impact created. The hardpack is defined as the sand road west of the Erosion Control Line used by public safety vehicles. Each access easement agreement shall be in a form acceptable to the town manager and approved as to legal sufficiency by the town attorney and shall contain a signed and sealed boundary survey and legal description of the easement area.

3) Coastal Construction Control Line: The CCCL Program is an integral component of the state's Beach and Shore Preservation Act pursuant to Part I of Chapter 161, F.S. Per FDEP, the program regulates and protects Florida's beaches and dunes from imprudent construction that could jeopardize the beach/dune system, accelerate erosion, threaten upland structures and property and interfere with public beach access while allowing reasonable use of private property. The CCCL program is administered through the FDEP. Other than a few limited exceptions, all development seaward of the CCCL requires a permit from FDEP. The CCCL permitting criteria is contained in F.A.C. 62B-26 through 56. Within the Town the CCCL runs roughly through the middle of the developable portions of the properties that fall east of Collins Avenue, this line is also shown on Exhibit C. Beach Aerial with ECL, Bulkhead and CCCL Delineations.

As stated on the FDEP website "the Coastal Construction Control Line defines that portion of the beach and dune system subject to severe fluctuations based on a 100-year storm event and establishes the landward limit of jurisdiction of the Department of Environmental Protection along sandy beaches of the state which front on the Gulf of Mexico, the Atlantic Ocean and the Straits of Florida. Unless otherwise exempt; a permit is required from FDEP for construction and excavation activities seaward of the CCCL. The CCCL is not a seaward limit for construction of upland structures (as in a setback line), but is an area where special siting and design considerations are necessary to protect the beach and dune system, proposed or existing structures, adjacent properties, public beach access, native salt-tolerant coastal vegetation and marine turtles."

There are seven platted right of ways that run east to the ECL, these are 96th, 95th, 94th, 92nd, 90th 89th and 88th streets. The improved roadways end near the ocean bulkhead line with unimproved paths that continue and crossover the dune and provide public access to the beach. To limit impacts to the dune and dune vegetation, there are a total of sixteen dune cross-over pathway locations that have been established within the Town, seven of these cross-overs correspond to the termination of the platted public right-of-ways referenced above and another one is in front of the Town Community Center providing public access to the beach. Although the remaining cross-overs begin on private properties, the established 'hardpack' maintenance path provides public access to the beach on these cross-overs as well. Creation or relocation of a dune cross-over requires a CCCL permit from the FDEP and notification to the Town.

In addition to the Hardpack maintenance path there is also a narrower walking path along the crest of the dune. This foot path has a coquina crushed shell base and post and rope edging to protect adjacent vegetation from foot traffic. This post and rope fencing also abuts the established maintenance path to block foot traffic from entering into the vegetated dune. The post and rope fencing is maintained by the Town.

To summarize, development on the properties east of Collins Avenue is subject to the FDEP CCCL permitting program, development within these properties adjacent to and east of the ocean bulkhead line is highly restricted through the Town code –the landward side of the dune and the public maintenance path falls within this area-and eastward of the ECL the dune and beach system is state owned and maintained by the County.

BEACH AND DUNE FUNCTIONS

In addition to the recreational functions, the beach and dune system protects upland properties from storm damage and provides habitat for plants and animals. Dunes block storm surge and absorb wave energy; vegetated dunes minimize erosion and accrete sand and enhance beautification. Impacts to dunes and dune vegetation are regulated by the State of Florida through the CCCL program. The CCCL program directs development away from the dunes, protects dune vegetation and regulates the relocation of sand within the permitted project area. The CCCL program also ensures that any relocated sand or imported sand is compatible with the existing beach sand.

The following definitions are contained in F.A.C. 62B-55.002:

(2) "Beach" means the zone of unconsolidated material that extends landward from the mean low water line to the place where there is a marked change in material or physiographic form, or to the line of permanent vegetation, usually the effective limit of storm waves.

(9) "Dune" means a mound or ridge of loose sediments, usually sand-sized, lying landward of the beach and deposited by any natural or artificial mechanism.

(10) "Frontal dune" means the first natural or man-made mound or bluff of sand which is located landward of the beach and which has sufficient vegetation, height, continuity and configuration to offer protective value.

To strengthen protection for the beach and dune system, Sec. 34-2 of the Town Code states "It is hereby declared and determined that preserving and enhancing the quality of the Town's beaches is essential to serve and benefit the town's residents and visitors. The chemical and physical composition of beach sand must not interfere with the health, safety or welfare of the public." The Town has also installed 'diverter' dunes at the ocean-side ends of the beach access pathways at 96th street and the cross-over located between 90th and 92nd street (adjacent to the Surfclub development). Diverter dunes

are small triangular shaped dunes structures created within the seaward side openings of the beach access paths designed to impede and slow the velocity of the storm surge entering the access way opening. The Town is exploring opportunities to install additional diverter dunes at other access pathway openings.

FDEP also administers the Beaches, Inlets and Ports Program (BIPP). The BIPP program permits beach renourishment projects and piers and per FDEP, "projects that generally are below the mean high water line and extend into the sovereign submerged lands and are likely to affect the distribution of sand along the beach."

FLORA AND FAUNA CONSIDERATIONS

Florida's sandy beaches are nesting sites for several species of threatened or endangered marine turtles. Turtle nesting season runs from May 1 to October 31 in the County. Activities that interfere with the movement of turtles up or along the beach, result in a change in the basic character of the beach itself, or result in improper lighting, can inhibit the successful nesting of turtles. The marine turtles listed below in Table 1. Protected Marine Turtle Species in Florida; are protected under the Federal Endangered Species Act of 1973 and Florida's Marine Turtle Protection Act, F.S. 379.2431.

Florida Statutes restrict the take, possession, disturbance, mutilation, destruction, selling, transference, molestation, and harassment of marine turtles, nests or eggs. Protection is also afforded to marine turtle habitat. Additionally, specific authorization from the Florida Fish and Wildlife Conservation Commission (FWC) staff is required to conduct scientific, conservation, or educational activities that directly involve marine turtles in or collected from Florida, their nests, hatchlings or parts thereof, regardless of applicant's possession of any federal permit.

Table 1. Protected Marine Turtle Species in Florida

Green sea turtle	*Chelonia mydas*	Federally-designated Threatened
Hawksbill sea turtle	*Eretmochelys imbricata*	Federally-designated Endangered
Kemp's ridley sea turtle	*Lepidochelys kempii*	Federally-designated Endangered
Leatherback sea turtle	*Dermochelys coriacea*	Federally-designated Endangered
Loggerhead sea turtle	*Caretta caretta*	Federally-designated Threatened

Historically hatchling turtles were guided to the ocean by an instinct to travel away from the dark silhouettes of the dune vegetation and toward the brightest horizon which was the light from the sky reflecting off the ocean. Many coastal areas are highly populated with artificial lights near the beach that can deter females from nesting and disorient hatchling sea turtles. When disoriented, the hatchlings travel inland toward the artificial lights where they often die from dehydration, entrapment predation, or sometimes crawling onto roads where they are run over by cars.

FDEP and FWC dually review permits under the CCCL program for coastal construction under Chapter 62B, F.A.C. for affects to marine turtles. FDEP also regulates mechanized beach cleaning under the Florida Beach and Shore Preservation Act, F. S. 161. In order for beach cleaning to occur during nesting season, FWC and FDEP have developed special conditions to protect marine turtles, their nests and hatchlings.

To protect turtle hatchlings from disorientation the Town code established lighting standards for new and existing development in Sec. 34-84. - *Lighting Standards for Coastal Construction Activities*, which states the following:

(a) *Lighting standards for new development.* It is the policy of the Town of Surfside that no artificial light shall illuminate within direct line-of-sight of the beach that has potential to interfere with turtle nesting. To meet this intent, new development construction within line-of-sight of the beach shall comply with the following:

(1) Exterior artificial light fixtures shall be designed and positioned so that:
   a. The point source of light or any reflective surface of the light fixture is not directly visible from the beach;
   b. Areas seaward of the frontal dune are not directly or indirectly illuminated; and
   c. Areas seaward of the frontal dune are not cumulatively illuminated.

(2) Exterior artificial light fixtures within direct line-of-sight of the beach are considered appropriately designed if:
   a. Completely shielded downlight only fixtures or recessed fixtures having low wattage (i.e., 50 watts or less) bug type bulbs and non-reflective interior surfaces are used. Other fixtures that have appropriate shields, louvers, or cut-off features may also be used if they are in compliance with subsection (a)(1)a.—c. above; and
   b. All fixtures are mounted as low in elevation as possible through use of low-mounted wall fixtures, low bollards, and ground-level fixtures.

(3) Floodlights, uplights or spotlights for decorative and accent purposes that are directly visible from the beach, or which indirectly or cumulatively illuminate the beach, shall not be used.

(4) Exterior lights used expressly for safety or security purposes shall be limited to the minimum number and configuration required to achieve their functional role(s). The use of motion detector switches that keep lights off except when approached and that switch lights on for the minimum duration possible are preferred.

(5) Only low intensity lighting shall be used in parking areas within line-of-sight of the beach. Such lighting shall be:
   a. Set on a base which raises the source of light no higher than 48 inches off the ground or higher if necessary to conform with life safety codes; and
   b. Positioned or shielded so that the light is cast downward and the source of light or any reflective surface of the light fixture is not visible from the beach and does not directly or indirectly illuminate the beach.

(6) Parking areas and roadways, including any paved or unpaved areas upon which motorized vehicles will park or operated, shall be designed and located to prevent vehicular headlights from directly or indirectly illuminating the beach.

(7) Vehicular lighting, parking area lighting, and roadways lighting shall be shielded from the beach through the use of ground-level barriers. Ground-level barriers must not interfere with marine turtle nesting or hatchling emergence, or cause short-or long-term damage to the beach/dune system.

(8) Tinted glass shall be installed on all windows and glass doors of single and multi-story structures within line-of-sight of the beach.

(9) Use of appropriately shielded low pressure sodium vapor lamps and fixtures shall be preferred for high-intensity lighting applications such as lighting parking areas and roadways, providing security, and similar applications.

(10) Temporary lighting of construction sites during the marine turtle nesting season shall be restricted to the minimal amount necessary and shall incorporate all of the standards of this section.

(11) Properties that abut the beach which have signage facing the beach or in the line-of-sight of the beach, including building identification signs, shall not be illuminated during the nighttime hours of the nesting season. Properties that face the beach but do not abut the beach which have signage visible from the beach shall be properly shielded with downward facing fixtures where the chosen background does not reflect the light source and signs that are lit internally must illuminate only the text and have the appropriate shielding, and not reflect the light source.

(b) *Lighting standards for existing development.* It is the policy of the Town of Surfside that no artificial light shall illuminate any area within direct line-of-sight of the beach that has the potential to interfere with turtle nesting. To meet this intent, within 12 months of the effective date of this article or when an existing development has begun renovations exceeding 50 percent of the tax assessed value of the structure as determined by the building official, an existing development shall be in compliance with the following:

(1) Existing artificial light fixtures shall be repositioned, modified, or removed so that:
a. The point source of light or any reflective surface of the light fixture is not directly visible from the beach;
b. Areas seaward of the frontal dune are not directly or indirectly illuminated; and
c. Areas seaward of the frontal dune are not cumulatively illuminated.

(2) The following measures shall be taken to reduce or eliminate the negative effects of existing exterior artificial lighting:
a. Reposition fixtures so that the point source of light or any reflective surface of the light fixture is no longer visible from the beach;
b. Replace fixtures having an exposed light source with fixtures containing recessed light sources or shields;
c. Replace traditional light bulbs with bug type bulbs not exceeding 50 watts or any alternative lighting source as defined herein;
d. Replace nondirectional fixtures with directional fixtures that point down and away from the beach;
e. Replace fixtures having transparent or translucent coverings with fixtures having opaque shields covering an arc of at least 180 degrees and extending an appropriate distance below the bottom edge of the fixture on the seaward side so that the light source or any reflective surface of the light fixture is not visible from the beach;
f. Replace pole lamps with low-profile, low-level luminaries so that the light source or any reflective surface of the light fixture is not visible from the beach;
g. Replace incandescent, fluorescent, and high intensity lighting with the lowest wattage low pressure sodium vapor lighting possible for the specific application or an alternative lighting source;
h. Plan or improve vegetation buffers between the light source and the beach to screen light from the beach;
i. Construct a ground level barrier to shield light sources from the beach. Ground-level barriers must not interfere with marine turtle nesting or hatchling emergence, or cause short- or long-term damage to the beach-dune system;
j. Permanently remove or permanently disable any fixture that cannot be brought into compliance with the provisions of these standards.

(3) Properties that abut the beach which have signage facing the beach or in the line-of-sight of the beach, including building identification signs, shall not be illuminated during the nighttime hours of the nesting season. Properties that face the beach but do not abut the beach which have signage visible from the beach shall be properly shielded with downward facing fixtures where the chosen background does not reflect the light source and signs that are lit internally must illuminate only the text and have the appropriate shielding, and not reflect the light source.

(4) One or more of the following measures shall be taken to reduce or eliminate the negative effects of interior light emanating from doors and windows within line-of-sight of the beach:
a. Apply window tint or film that meets the standards in the definition of "tinted or filmed glass";
b. Rearrange lamps and other moveable fixtures away from windows;
c. Use window treatments (e.g., blinds, curtains) to shield interior lights from the beach; and/or
d. Turn off unnecessary lights.

Additionally, Sec. 34-83. - *Prohibited Activities Disruptive to Marine Turtles,* includes the following provisions:

(a) *Prohibited activities.* The following activities involving direct illumination of portions of the beach are prohibited on the beach at nighttime during the nesting season for the protection of nesting marine turtle females, nests and hatchlings:

(1) The operation of all motorized vehicles, except emergency and law enforcement, or emergency beach maintenance vehicles or those permitted on the beach for marine turtle's conservation and/or research.

(2) The building of campfires or bonfires.

(3) Fireworks displays, except those that have town special event permits and, if applicable, a FDEP permit; however, nothing in this article shall prohibit the town's July 4th fireworks display.

(4) Special events pursuant to chapter 35, article 1, of the town Code, unless allowed first by permit issued by FDEP.

The Town also affords protection for turtle nesting and hatchlings through the following Town codes: Sec. 86-30. - *Limitations on Beach Furniture* and Sec. 86-31. - *Beach Furniture Permit Requirements,* specifying that beach furniture shall not inhibit access to the public beach, nor obstruct reasonable access on the beach for pedestrians and emergency vehicles, nor impact native vegetation, nor affect sea turtles or other wildlife; and requiring a hotel beach furniture operator to procure a local business tax receipt and comply with the regulations of section 70-41 of the Town of Surfside Code and all required licenses or permits from the County, the State of Florida and federal entities.

Predation or destruction of nests can occur by raccoons or uncontrolled dogs. A comprehensive beach maintenance program should include the control of these animals. The Town does not allow dogs on the public beach as specified in Code Sec. 10-33 stating **"**No dog, whether on a leash or without a leash, muzzled or unmuzzled, shall be permitted at any time on any public beach in the town. Nothing in this section shall be construed to apply to any deaf or hard of hearing person, totally or partially disabled person, or physically disabled person accompanied by a guide dog or service dog specially trained for the purpose."

Throughout Florida a multitude of citizen volunteers walk beaches during nesting season to report on crawls, nesting activity and nest locations. FWC's Fish and Wildlife Research Institute (FWRI) coordinates nesting beach survey programs around the state and the FWRI staff members coordinate the Florida Sea Turtle Stranding and Salvage Network (FLSTSSN), which is responsible for gathering data on dead or debilitated (i.e., stranded) sea turtles found in Florida. The beach survey program is administered on behalf of FWRI locally by the County and the Town's Park and Recreation Depart staff maintain communication with the County staff.

Sea Oats (*Uniola paniculata*) and Seagrapes (*Coccolobis uvifera*) are considered the most common dune vegetation. These are protected under F.S. 161.242 which states "Harvesting of sea oats and sea grapes prohibited; possession prima facie evidence of violation.

(1) The purpose of this section is to protect the beaches and shores of the state from erosion by preserving natural vegetative cover to bind the sand.

(2) It is unlawful for any purpose to cut, harvest, remove, or eradicate any of the grass commonly known as sea oats or Uniola paniculata and Coccolobis uvifera commonly known as sea grapes from any public land or from

any private land without consent of the owner of such land or person having lawful possession thereof. Possession of either Uniola paniculata or Coccolobis uvifera by other than the owner of such land shall constitute prima facie evidence of violation of this section. However, licensed, certified nurserymen who grow any of the native plants listed in this section from seeds or by vegetative propagation are specifically permitted to sell these commercially grown plants and shall not be in violation of this section of the law if they do so, as it is the intent of the law to preserve and encourage the growth of these native plants which are rapidly disappearing from the state."

The FDEP has established *Sea Grape Trimming Guidelines* for maintenance trimming of sea grapes, any trimming outside the established guidelines, or the need to remove a tree, will require a permit from the FDEP.

There are several listed plant species that may make their home in the sandy dune habitat of south Florida. These include but are not limited to the plants listed below in Table2. Listed Dune Plant Species

Table 2. Listed Dune Plant Species

Scientific name	**Common Name**	**Status**
Coccothrinax argentata	Florida Silver Palm	Threatened-State
Ernodea cokeri	Coker's Beach Creeper	Endangered-State
Heliotropium gnaphalodes	Sea Rosemary; Sea Lavender	Endangered-State
Leucothrinax morrisii	Brittle Thatch Palm	Threatened-State
Okenia hypogaea	Beach Peanut	Endangered-State
Scaevola plumieri	Beachberry; Inkberry; Gullfeed	Threatened-State

There are several aggressive invasive plant species that can flourish in the sandy dune habitat and disrupt native vegetative communities. In particular the Hawaiian half-flower or beach naupaka (*Scaevola taccada*) is a common invasive exotic dune plant plaguing south Florida beaches. The plant's shallow roots and fragile stems are easily destroyed in high winds or storms making it far less effective in dune stabilization than sea oats and other native species. This aggressive plant will colonize and block out native vegetation. Brazilian-pepper trees *(Schinus terebinthifolius)* and Australian-pine trees *(Casuarina equisetifolia)* can also infest and disrupt dune vegetative communities. All three of these species are recognized as Category I invasive species by the Florida Exotic Pest Plant Council. A Category I species is defined as "Invasive exotics that are altering native plant communities by displacing native species, changing community structures or ecological functions, or hybridizing with natives."

For the landward side of the dune on the private properties, when these properties pursue development permits the Town code in Section 90-90.3 states **"**As a condition of approval, the property owner shall remove all invasive exotic species from the property prior to final approval." The Town also regulates native vegetation through the following codes: Sec. 90-86 "All buildings, structures, new developments, redevelopment and changes of use requiring a permit shall require submittal of a landscape and irrigation plan"; and Sec. 90-97 "Tree removal/relocation permits and native plant community vegetation removal permits are required prior to the removal/relocation of trees, specimen trees, or any vegetation, pursuant to section 24-60 of the County Code. Also, tree abuse including hack racking is prohibited with in the town. Tree protection barriers are required during site development to preserve existing and relocated trees. The County Department of

Environmental Resources Management (DERM) is responsible for administering and enforcing these provisions." As a component of a project specific CCCL permit the FDEP may require dune plantings and the removal of invasive vegetation on the dune system adjacent to a development project.

The Town partnered with the not-for-profit Youth Environmental Alliance (YEA), on a one-time dune planting project along with the removal of the invasive Scaevola plant.

RECOMMENDATIONS

The Town's capacity to directly manage or impact the beach and dune system activity is limited due to their limited ownership; however, below are some best management practices (BMPs) that the Town can pursue to provide protection for sea turtles and the dune system.

Control Light Pollution: Turning out unnecessary lights is the simplest, most effective and most energy efficient solution to avoid negative impacts to wildlife from light pollution. However, this is not a feasible solution where lighting is required for safety and security.The FWC wildlife lighting criteria specifies that a fixture, lamp, or community lighting must be able to satisfy three (3) conditions. These conditions are: 1) keep it low, 2) keep it shielded and 3) keep it long. These are described as follows:

- "Keep it low" means that the fixtures must be able to be mounted as low as possible and still be appropriate for the needed purpose, must be able to accept lamps that produce only the lumens necessary for the needed purpose and bulb must produce the lowest lumens necessary for the needed purpose.
- "Keep it shielded" means that the: fixture must meet or exceed full cut-off (meaning the fixture blocks light from shining at an upward angle), must be able to shield the bulb, lamp, or glowing lens from the beach, wildlife corridor, or protected natural area (when mounted appropriately) and that the bulb must be able to be used in an FWC approved fixture.
- "Keep it long" means that the fixture must accept long wavelength bulbs. The acceptable long wavelength light is 560 nanometers (nm) while anything below 560 nm would be unacceptable.

The site plan review, CCCL and Town building permit processes ensure that new oceanfront lighting complies with the FDEP and FWC lighting criteria, the Town code compliance process can ensure that lighting remains in compliance. Lighting Surveys of beach facing properties can be conducted to identify any existing lighting that may need to be brought into compliance.

Provide Public Education: Many visitors to the Town are unfamiliar with beach and dune habitat and marine turtles. Educational signage at public beach access points can inform visitors. Information on the Town website and in the Surfside Gazette can reach and inform residents and visitors alike. The Town can utilize useful education material on turtles from http://myfwc.com/education/wildlife/sea-turtle/. The Town can publicize the FWC Wildlife Alert phone number (1-888-404-FWCC) to inform people where to report information on injured or stranded turtles.

Beach Furniture Compliance: The Town code compliance process can ensure that beach furniture placement remains in compliance and that any hotel or condominium that plans to put beach furniture on the beach obtain the required Town permit.

Protect Native Dune Vegetation: Native dune species help to trap and hold sand and inhibit erosion. Invasive dune species can crowd out and impede the growth of native species and often have shallow roots and fragile stems that are easily destroyed in high winds or storms making them ineffective in dune stabilization. The removal of invasive species and installation of native dune species restores the dune's natural functions and biodiversity. The following measures protect and enhance native dune vegetation and the dune structure:

- Remove invasive vegetation. Coordinate with the County to ensure invasive/aggressive vegetation is removed from the state owned portions of the dune. Conduct the follow-up inspection on private properties to ensure invasive species are completely removed when required through the issuance of a Town development permit. On the platted right of ways and Town-owned properties all invasive vegetation should be removed with a routine inspection and follow-up eradication program established.
- Do not leave removed invasive vegetation on-site. Removed invasive exotic vegetation shall be completely removed (including root systems) and properly disposed of; do not shred or chip and leave on site.
- Protect native vegetation during exotic plant removal. To ensure native species are not collaterally damaged during the removal of non-natives, barriers should be installed prior to the removal of invasives.
- Immediately replant cleared areas. To impede re-infestation of aggressive non-native vegetation, any cleared dune area should immediately get installed with diverse native materials. See attached DEP brochure for a list of native dune species. Exhibit D. Recommended Florida Native Beach and Dune Plants for Beachfront Properties and Dune Restoration.
- Sea oats planting. Coordinate with FDEP and the County and support sea oat planting programs and sponsor a Town planting program.
- Limit dune crossovers. Coordinate with FDEP when CCCL permits are sought to ensue no additional dune crossovers are permitted and constructed.
- Maintain the rope and post sand fencing. To impede foot traffic into the dune and the creation of addition unpermitted dune crossovers of convenience, routinely inspect and conduct or coordinate any needed repairs to the rope and post fencing system.

Dune Management: Develop a Town Dune Management program addressing vegetation, wildlife, lighting, maintenance and interagency coordination. Include information on which public and/or private entities currently conduct any beach or dune maintenance activities and what these are.

Code Review: Review the Town code to determine if amendments are needed to provide definitions or to strengthen beach and dune protection measures.

Control Raccoons and Feral Cats: The raccoon is a native species with a year-round hunting and trapping season in Florida. Raccoons are known to carry a wide variety of diseases and parasites and they destroy marine turtle nests. Per Florida Rule 68A-9.010 if a raccoon is a nuisance, it can be captured or taken as a nuisance animal using legal and humane methods. The best way to avoid raccoons is to not attract them, do not feed raccoons. Per F.A.C.68A-4.001, placing food outside attracts wild animals and intentional feeding of raccoons is illegal. Ensure trash cans and dumpsters are not accessible to raccoons and are frequently emptied. When raccoons are reported as frequenting the beach, professional firms can be hired that lawfully remove them. Large populations of feral cats can impact native dune wildlife species, management plans should

implement spay and neutering programs for feral cats to ensure population levels are maintained. Professional firms can be hired that can humanly capture injured or unhealthy cats for appropriate treatment and adoption if feasible.

Maintain Interagency Communication: Multiple agencies play roles in the ownership, management, maintenance, protection and restoration of the beach and dune. The Town does and should continue to maintain effective communication with these agencies to facilitate effective management.

FWC's Fish and Wildlife Research Institute (FWRI) coordinates nesting beach survey programs around the state, volunteers ensure crawls are identified and nests are marked as soon as they are established. The Town maintains communication with the local ongoing beach survey program to best understand local nesting activity, locations and beach conditions.

The County conducts beach maintenance including trash and debris removal. In addition to being unsightly, trash on the beach can entrap, entangle or be ingested by marine turtles and be detrimental. The beach maintenance program should ensure debris does not easily escape from trash receptacles and that loose debris is picked-up. On occasion tar washes onto the beach; this can be detrimental to hatchlings. The beach maintenance program should include removal and proper disposal of any tar that has washed ashore. Compacting beach sand can also be detrimental to marine turtle nesting, the County ensures beach cleaning firms adhere to FWC requirements relating to tire pressure. Other than for life safety, vehicles should be prohibited from the beach. The Town coordinates with the County to designated established access points for emergency and other vehicles to prohibit vehicles from destroying the structure of the existing dunes in other locations. When applicable, mobi-mats should be used for beach access for other special purpose needs.

FDEP produces the annual critically eroded beaches report and administers the CCCL permitting program. Coordinate with FDEP when CCCL permits are sought to ensue no additional dune crossovers are permitted and constructed.

Beach renourishment is a region-wide multi-agency program including Federal, State, County and Local agencies with the Army Corps of engineers taking the lead role. The Town maintains contact with the Corps and with the County to ensure they are apprised of all proposed or pending activities and to ensure the Town’s needs and concerns are considered in project planning and implementation.

ATTACHMENTS

Exhibit A. Aerial photograph of Surfside 1970 and 1984 and 1999

Exhibit B. Critically Eroded Beaches Map

Exhibit C. Beach Aerial with ECL, Ocean Bulkhead Line and CCCL Delineations

Exhibit D. Recommended Florida Native Beach and Dune Plants for Beachfront Properties and Dune Restoration

Exhibit A. 1970, 1984~~,~~ and 1999 Aerial photographs of Surfside

1970 Aerial photo of Surfside from the University of Florida Map and Imagery Library (before beach renourishment)

1984 Aerial Photo of Surfside from the University of Florida Map and Imagery Library (after beach renourishment)

February 1999

December 1999

Aerial Photos of Surfside from Google Earth

Exhibit B. Critically Eroded Beaches Map

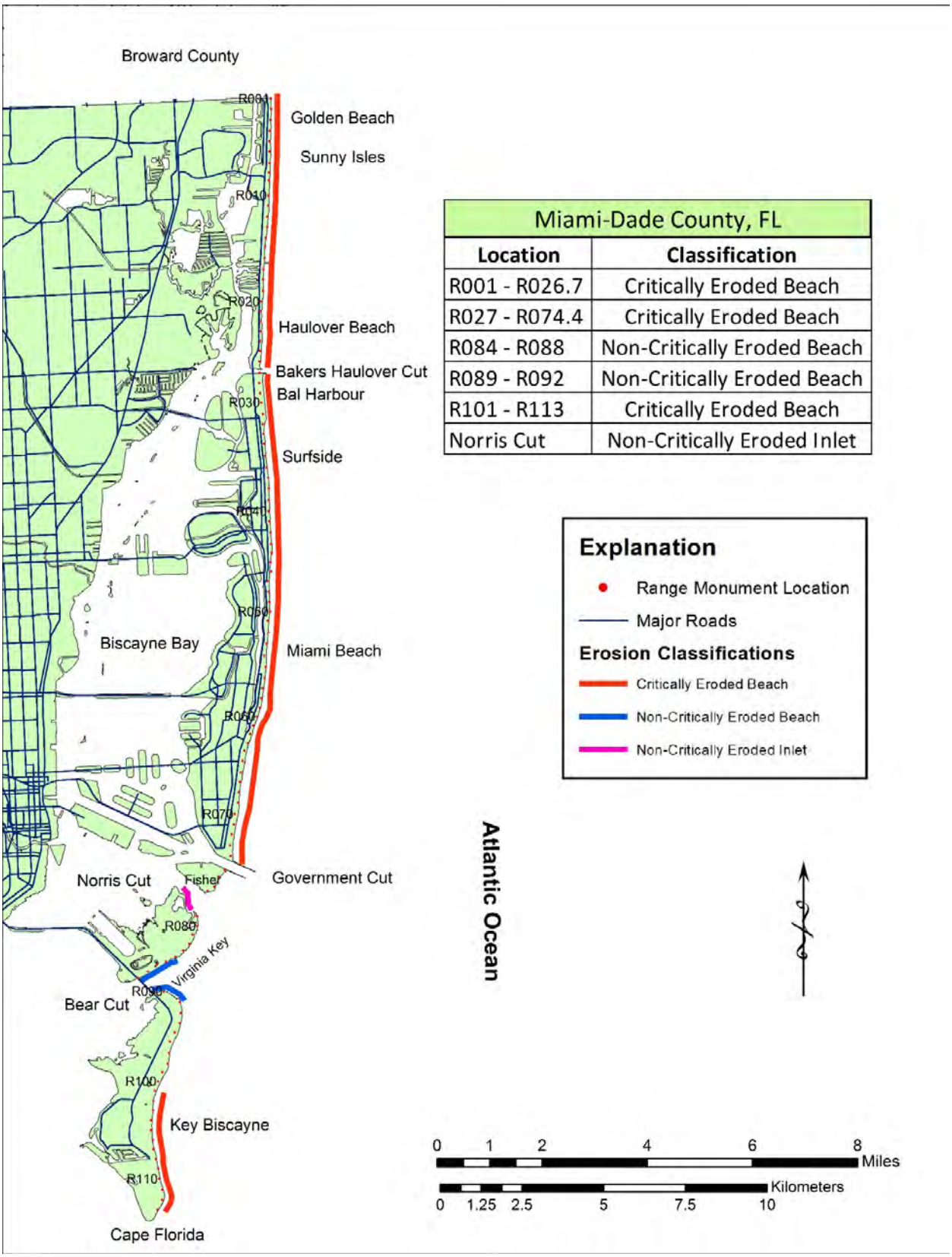
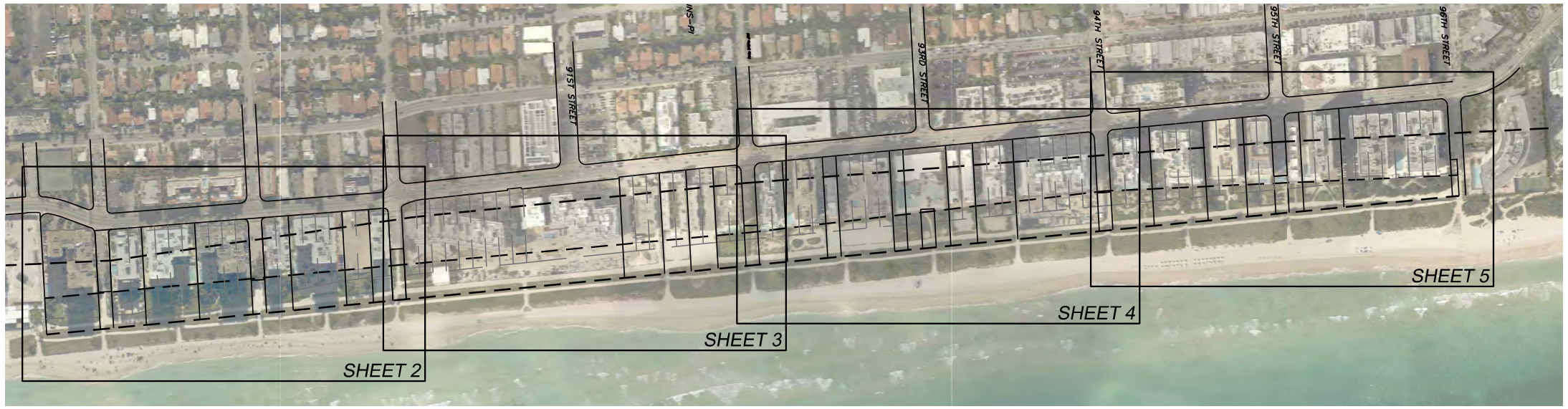


Exhibit C. Beach Aerial with ECL, Bulkhead Line and CCCL Delineations



LOCATION & KEY MAP

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DUNE SURVEY
&
BEACH MANAGEMENT PLAN
TOWN OF SURFSIDE

BEACH FRONT
PROPERTY MAP

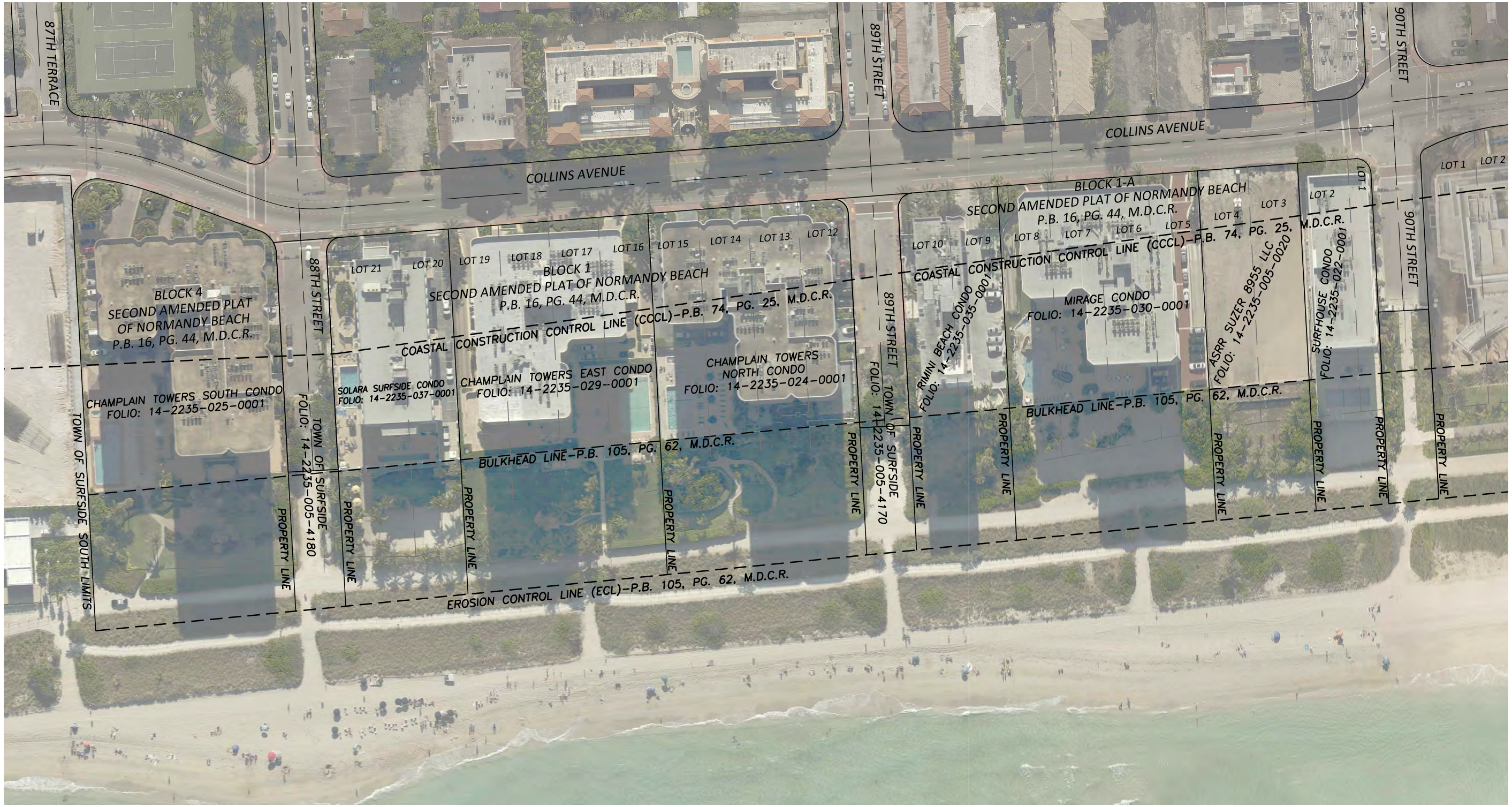
SCALE: N/A

PROJECT No: 18-9942

WORK AUTHORIZATION NO: 110

SHEET: 1 OF 5

Exhibit C. Beach Aerial with ECL, Bulkhead Line and CCCL Delineations



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DUNE SURVEY
&
BEACH MANAGEMENT PLAN
TOWN OF SURFSIDE

BEACH FRONT
PROPERTY MAP

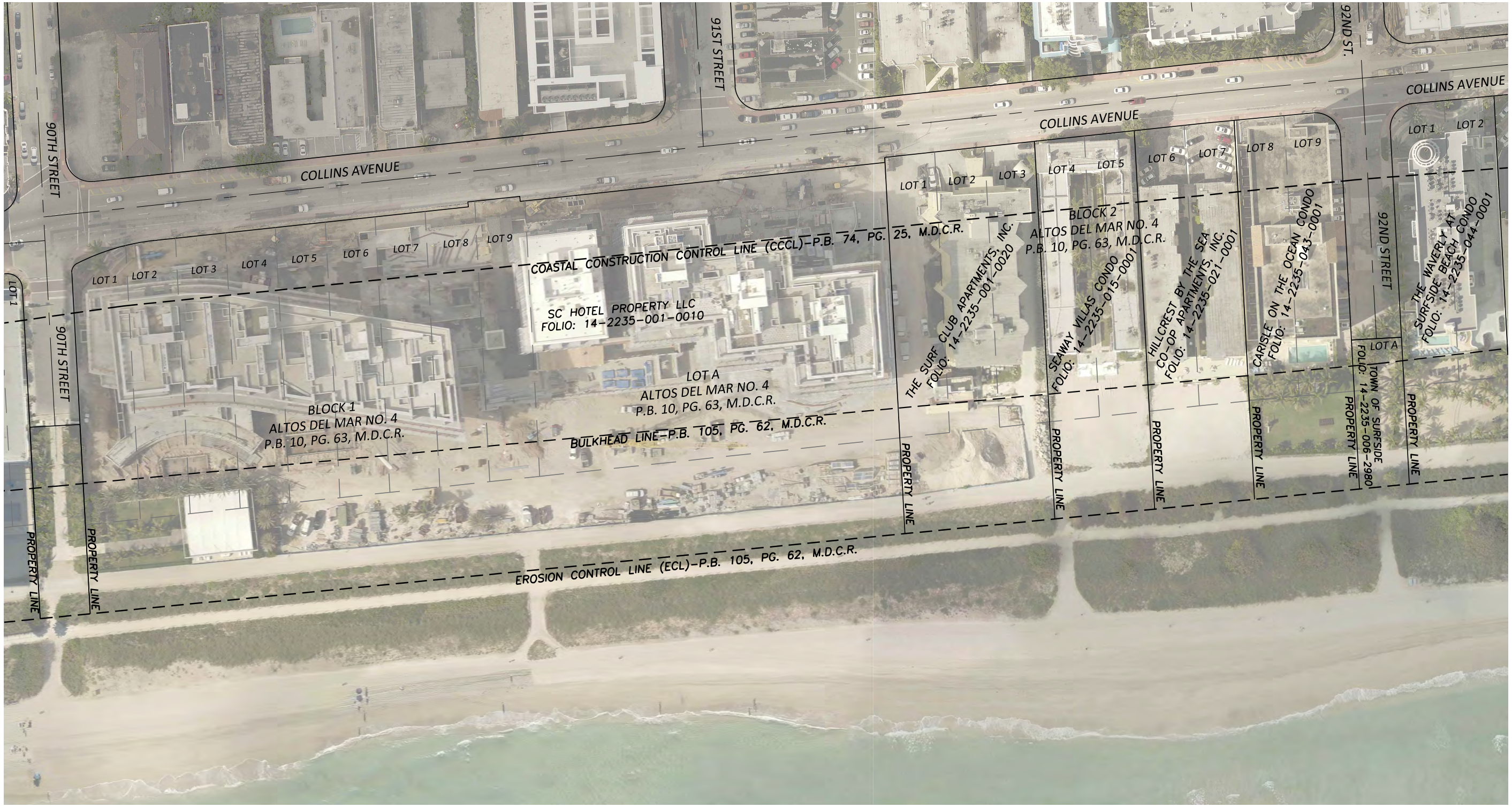
SCALE 1'=100'

PROJECT No 18-9942

WORK AUTHORIZATION NO: 110

SHEET 2 OF 5

Exhibit C. Beach Aerial with ECL, Bulkhead Line and CCCL Delineations



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DUNE SURVEY
&
BEACH MANAGEMENT PLAN
TOWN OF SURFSIDE

BEACH FRONT
PROPERTY MAP

SCALE 1'=100'

PROJECT No 18-9942

WORK AUTHORIZATION NO: 110

SHEET 3 OF 5

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Exhibit C. Beach Aerial with ECL, Bulkhead Line and CCCL Delineations

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DUNE SURVEY
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BEACH MANAGEMENT PLAN
TOWN OF SURFSIDE

BEACH FRONT
PROPERTY MAP

SCALE 1'=100'

PROJECT No 18-9942

WORK AUTHORIZATION NO: 110

SHEET 4 OF 5

Exhibit C. Beach Aerial with ECL, Bulkhead Line and CCCL Delineations

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DUNE SURVEY
&
BEACH MANAGEMENT PLAN
TOWN OF SURFSIDE

BEACH FRONT
PROPERTY MAP

SCALE 1'=100'

PROJECT No 18-9942

WORK AUTHORIZATION NO: 110

SHEET 5 OF 5

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Exhibit D.

Recommended Florida Native Beach and Dune Plants for Beachfront Properties and Dune Restoration

Notes:

1. Salt tolerance: high (tolerant of heavy and frequent salt spray, salt water flooding); moderate (tolerant of salt spray but subject to leaf burn from heavy salt spray or root damage from flooding); low (tolerant of salt laden air and short duration, infrequent salt water flooding but usually in protected areas).
2. Region: NW = northwest Florida Panhandle; SW = Pinellas to Collier counties; NE = Nassau to Volusia counties; SE = Brevard to Dade counties; Keys = restricted to the Florida Keys and adjacent Dade and Monroe County islands. Regions have primarily been determined by the historic distribution of the plant in Florida's coastal upland natural communities, not necessarily by the range of areas or habitats where the plant could survive.
3. Soil Moisture: moist (subject to flooding as within low dune swales); moderate (not subject to frequent flooding but not adapted to deepest sands or driest conditions; dry (adapted to deep sands, dune ridges, or well drained rocky soils); and variations for plants adapted across a range of conditions.

References:

1. Nelson, Gil. 2003. Florida's Best Native Landscape Plants: 200 readily available species for homeowners and professionals. Florida Association of Native Nurseries. University Presses of Florida.
2. Williams, M.J. 2007. Native Plants for Coastal Dune Resotration: what, when and how for Florida. USDA, NRCS, Brooksville Plant Materials Center, Brooksville, Florida.
3. Wunderlin, Richard P., etal. Plant Atlas. University of South Florida (www.plantatlas.usf.edu).

Scientific Name	Common Name	Salt tolerance	Region (NW/SW/NE/SE/Keys)	Soil Moisture
Dune Grasses				
Distichlis spicata	salt grass	high	all	moist
Muhlenbergia capillaris var. filipes	Gulf hairawn muhly grass	moderate	all	moderate
Panicum amarum	bitter panic grass	high	all	dry
Panicum vaginatum	seashore paspalum	high	all	moderate
Schizachyrium scoparium	coastal bluestem	high	all	moderate
Spartina patens	marshhay	high	all	moderate
Sporobolus virginicus	seashore dropseed	high	all	moist
Uniola paniculata	sea oats	high	all	dry

Scientific Name	Common Name	Salt tolerance	Region (NW/SW/NE/SE/Keys)	Soil Moisture
Groundcovers				
Borrichia arborescens	sea oxeye	high	SW, SE, Keys	moist
Borrichia frutescens	sea oxeye	high	all	moist
Ernodea littoralis	golden beach creeper	high	SW, SE, Keys	moderate - dry
Gaillardia pulchella	blanket flower	moderate	all	dry
Helianthus debilis	East Coast dune sunflower	high	NE, SE, Keys	dry
Helianthus debilis spp. cucumerifolius	cucumber leaf dune sunflower	high	NW, SW	dry
Helianthus debilis ssp. vestitus	West Coast dune sunflower	high	SW	dry
Hymenocallis latifolia	beach spider lily	high	SW, NE, SE, Keys	moist - dry
Ipomoea imperati	beach morning glory	high	all	moderate - dry
Ipomoea pes-caprae	railroad vine	high	all	moderate - dry
Iva imbricata	beach elder	high	all	moist – dry
Sesuvium portulacastrum	sea purslane	high	all	moist - moderate
Solidago sempervirens	seaside goldenrod	high	NW, SW, NE, SE	moist – moderate
Yucca filamentosa	Adam's needle	moderate	NW, SW, NE, SE	dry
Shrubs				
Ardisia escallonoides	marlberry	moderate	SW, SE, Keys	moderate
Argusia gnaphalodes	sea lavender	high	SE, Keys	dry
Chrysobalanus icaco	coco plum	moderate	SW, SE, Keys	moderate - dry
Erythrina herbacea	coral bean	low	all	moderate - dry
Eugenia axillaris	white stopper	low	SW, SE, Keys	moderate
Eugenia foetida	Spanish stopper	low	SW, SE, Keys	moderate
Forestiera segregata	Florida privet	low	SW, NE, SE, Keys	moist -moderate

Scientific Name	Common Name	Salt tolerance	Region (NW/SW/NE/SE/Keys)	Soil Moisture
Shrubs (continued)				
Ilex vomitoria	yaupon	moderate	SW, NE, SE, Keys	moderate - dry
Myrica cerifera	wax myrtle	moderate	all	moist - moderate
Quercus geminata	sand live oak	moderate	NW, SW, NE, SE	dry
Quercus myrtifolia	myrtle oak	moderate	NW, SW, NE, SE	dry
Rapanea punctata	myrsine	moderate	SW, SE, Keys	moist - dry
Serenoa repens	saw palmetto	high	all	moist - dry
Suriana maritima	bay cedar	high	SW, SE, Keys	dry
Zamia pumila	coontie	moderate	SW, NE, SE, Keys	dry
Thorn/Scrub Plants				
Agave decipiens	false sisal	high	SW, SE, Keys	dry
Caesalpinia bonduc	gray nickerbean	moderate	SW, SE, Keys	moderate - dry
Erythrina herbacea	coral bean	low	all	dry
Opuntia spp.	prickly pears	high	all	moderate - dry
Serenoa repens	saw palmetto	high	all	moist - dry
Sideroxylon tenax	tough bully	low	NE, SE	dry
Smilax auriculata	earleaf catbrier	moderate	all	dry
Ximenia Americana	hog plum	low	NE, SE	dry
Yucca aloifolia	Spanish bayonet	high	all	dry
Yucca filamentosa	Adam's needle	moderate	NW, SW, NE, SE	dry
Yucca gloriosa	Moundlily yucca	moderate	NW, SW, NE	dry
Zanthoxylum clava-hercules	Hercules' club	moderate	NW, SW, NE, SE	dry
Zanthoxylum fagara	wild lime	moderate	SW, NE, SE, Keys	moderate - dry

Exhibit D.

Scientific Name	Common Name	Salt tolerance	Region (NW/SW/NE/SE/Keys)	Soil Moisture
Trees				
Acacia farnesiana	sweet acacia	moderate	all	moist - dry
Baccharis halimifolia	salt bush	high	all	moist - moderate
Bursera simauruba	gumbo limbo	moderate	SW, SE, Keys	moderate - dry
Capparis cynophallophora	Jamaica caper	moderate	SW, SE, Keys	dry
Celtis laevigata	hackberry	low	NW, SW, NE, SE	moist - moderate
Chrysophyllum oliviforme	satinleaf	moderate	SE, Keys	moderate - dry
Citharexylum spinosum	fiddleleaf	moderate	SE, Keys	dry
Coccoloba diversifolia	pigeon plum	high	SW, SE, Keys	moderate - dry
Coccoloba uvifera	sea grape	high	SW, SE, Keys	moderate - dry
Conocarpus ererctus	buttonwood	high	SW, SE, Keys	moist - moderate
Cordia sebestana	Geiger tree	moderate	SW, SE, Keys	moderate - dry
Ficus aurea	golden fig	moderate	SW, SE, Keys	moderate
Ilex x. attenuata	East Palatka holly	low	NW, SW, NE, SE	moderate
Ilex cassine	dahoon holly	low	NW, SW, NE, SE	moist - moderate
Ilex opaca	American holly	low	NW, SW, NE, SE	moderate
Ilex vomitoria	yaupon holly	moderate	NW, SW, NE, SE	moderate - dry
Juniperus silicicola	southern red dedar	moderate	NW, SW, NE, SE	moderate
Laguncularia racemosa	white mangrove	high	SW, SE, Keys	moist - moderate
Magnolia grandiflora	southern magnolia	moderate	NW, SW, NE	moderate
Persea borbonia	redbay	moderate	NW, SW, NE, SE	moderate

Exhibit D.

Scientific Name	Common Name	Salt tolerance	Region (NW/SW/NE/SE/Keys)	Soil Moisture
Trees continued				
Persea humilis	silkbay	moderate	SW, NE, SE	moderate - dry
Pinus clausa	sand pine	moderate	NW, SW, NE, SE	dry
Pinus elliottii	slash pine	moderate	NW, SW, NE, SE, Keys	moist - moderate
Quercus geminata	sand live oak	moderate	NW, SW, NE, SE	moderate - dry
Quercus virginiana	live oak	moderate	NW, SW, NE, SE, Keys	moderate - dry
Sideroxylon foetidissimum	mastic	moderate	SW, SE, Keys	moderate
Palms				
Acoelorrhaphe wrightii	paurotis palm	moderate	SW, SE, Keys	moist - moderate
Coccothrinax argentata	silver palm	high	SE, Keys	dry
Sabal palmetto	cabbage palm	high	all	moist - moderate
Serenoa repens	saw palmetto	high	all	moist - dry
Thrinax morrissii	brittle thatch palm	moderate	Keys	dry
Thrinax radiata	Florida thatch palm	moderate	Keys	dry

Fritz Wettstein
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Division of Water Resource Management
Florida Department of Environmental Protection
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