



**Line Report: Proposed Baseline and Setback Line
Garden City Beach
October 6, 2017**

Background

South Carolina Code of Laws §48-39-280, as amended, requires the Department of Health and Environmental Control's Office of Ocean and Coastal Resource Management (OCRM or Department) to establish and periodically review the position of the two lines of beachfront jurisdiction (the baseline and the setback line) once every seven to ten years. For all oceanfront land that is developed or potentially could be developed, the average annual shoreline change rate, also known as the average long-term erosion rate, is also reviewed during this timeframe. The purpose of these jurisdictional lines is to implement §48-39-280(A), which states:

"A forty-year policy of retreat from the shoreline is established. The department must implement this policy and utilize the best available scientific and historical data in the implementation. The department must establish a baseline which parallels the shoreline for each standard erosion zone and each inlet erosion zone. Subject to Section 48-39-290(D), the baseline established pursuant to this section must not move seaward from its position on December 31, 2017."

The baseline is the more seaward of the two jurisdictional lines. Seaward of the baseline, permitted activities are limited to wooden walkways, small wooden decks, fishing piers, golf courses, normal landscaping, groins, activities authorized by emergency orders, beach renourishment projects, and structures authorized by a special permit. The setback line is the landward line of beachfront jurisdiction. Between the baseline and setback line, the Department exercises regulatory permitting authority for such activities as habitable structures and associated infrastructure, decks, gazebos, other public access structures, and sand dune management. Seaward of the setback line, construction of new shore-parallel erosion control structures (i.e. seawalls, revetments or bulkheads) is prohibited. However, existing erosion control structures may be maintained or repaired with prior authorization by the Department.¹

As part of the process of delineating these jurisdictional lines, the Department has collected beach survey data statewide since 1988 at monitoring stations that are typically spaced 2,000 feet apart. Sections of the coast that are not likely to be developed, such as Cape Romain National Wildlife Refuge, are not surveyed. Surveys begin landward of the primary oceanfront sand dune, if one exists, and extend down the beach and offshore. In addition to this beach erosion monitoring data, the Department utilizes recent dune field topographic data such as Light Detection and Ranging (LIDAR), elevation measurements collected with a survey-grade GPS unit, vegetation measurements collected with a mapping-grade GPS unit, current and historical aerial photographs dating back at least 40 years that show the shoreline location, and previous shoreline change analysis data or reports. These data were viewed and analyzed using ESRI's Geographic Information System (GIS) software.

¹ S.C. Code Ann. §48-39-290(A).

Process for Establishing the Baseline Position

To establish the baseline position, the shoreline must first be classified as an inlet zone or a standard zone. Areas that are close to inlets with non-parallel offshore bathymetric contours and non-parallel historical shoreline positions are classified as inlet zones, while all other areas are classified as standard zones. Inlet zone classifications are further refined as either unstabilized, or stabilized by jetties, groins, or seawalls.

In stabilized inlet zones and standard zones, the baseline is located at the crest of the primary oceanfront sand dune using beach survey data or dune field topographic data such as LIDAR. The primary oceanfront sand dune is defined as a dune with a minimum height of 3 feet, as measured vertically from the crest to the toe of the dune. This dune must also form a continuous line for 500 shore parallel feet.² If the shoreline has been altered naturally or artificially by the construction of erosion control devices, groins, or other man-made alterations, the baseline must be established where the crest of the primary oceanfront sand dune would be located if the shoreline had not been altered.³

To calculate a dune crest position at an armored⁴ location, the volume of sand on the beach seaward of the erosion control structure is determined from survey data and then compared to the volume of sand from a nearby unarmored reference profile that displays a representative sand dune. The reference profile is overlaid on the armored profile in such a way that the measured sand volumes match, and then the dune crest position can be transferred from the reference profile to the armored profile. This calculated dune crest position then becomes the baseline.

In unstabilized inlet zones, the baseline is established at the most landward shoreline position at any time during the past 40 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. This baseline position is established by analyzing shorelines created from historical aerial photographs or shoreline data collected in the field, and identifying the most landward shoreline position.⁵

Process for Establishing the Setback Line Position

The setback line position is dependent on the baseline position and the average annual shoreline change rate, also known as the average long-term erosion rate. The shoreline change rate is calculated using available historical shoreline data and GIS software. The setback line is established landward of the baseline a distance which is 40 times the average annual shoreline change rate or not less than 20 feet.⁶

During this line review, the shoreline change rate calculation was performed using AMBUR (Analyzing Moving Boundaries using R), a tool available through the R-forge statistical environment. Shoreline change analysis was performed every 200 feet. Once the shoreline change rates were calculated, they were analyzed and grouped using the ESRI ArcGIS spatial statistics tool called 'Grouping'. The values within each group were averaged to obtain an

² S.C. Code Regs. 30-1(D)(43).

³ S.C. Code Ann. §48-39-280(A)(1).

⁴ S.C. Code Ann. §48-39-250(5).

⁵ S.C. Code Ann. §48-39-280(A)(2).

⁶ S.C. Code Ann. §48-39-280(B).

annual shoreline change rate. This rate was multiplied by 40 to generate the setback distance from the baseline.

Garden City Beach Baseline

The southern portion of Garden City Beach is located in Georgetown County, and the northern portion of Garden City Beach is located in Horry County. The section in Georgetown County begins at Murrells Inlet and extends northward to the Georgetown/Horry County Line near OCRM Monument 4980. The portion of Garden City Beach in Georgetown County is primarily a standard zone with the exception of the area between Murrells Inlet and the north jetty, which is a stabilized inlet zone.

Southern Stabilized Inlet Zone Adjacent to Murrells Inlet

In the small stabilized inlet zone between Murrells Inlet and the north jetty, the baseline is set at the primary dune crest identified in LIDAR data from 2014.

Central Standard Zone (Georgetown County)

In the central standard zone in Georgetown County from the north jetty of Murrells Inlet to OCRM Monument 4920, several erosion control structures are present, and the baseline position was calculated using the volume calculation method. Using armored transects at GC1 (2035 Waccamaw Drive S), GC2 (1951 Waccamaw Drive S), and a reference, unarmored transect at GC3 (1417 Waccamaw Drive S.), calculations were performed to determine the location of the primary dune crest, if the shoreline were not armored. At GC1, the primary dune crest would be located 174 feet landward of the erosion control structure. At GC2, the primary dune crest would be located 140 feet landward of the erosion control structure. The erosion control structures were buffered by these distances to establish the baseline.

From OCRM Monument 4920 to OCRM Monument 4960, the baseline is set at the primary dune crest identified in LIDAR data from 2014 and verified in the field by OCRM staff in October 2016 using survey-grade GPS equipment. For the area between OCRM Monument 4960 and just north of 4970, the baseline transitions between an area with beachfront dunes and an area with an erosion control structure. This transition was made because no dunes were present in this area.

Between OCRM Monument 4970 and the Georgetown/Horry County Line, erosion control structures are present, and the baseline position was calculated using the volume calculation method. Using armored transects at GC4 (745 Waccamaw Drive S), GC5 (703 Waccamaw Drive S), GC6 (619 Waccamaw Drive S), and a reference, unarmored transect at GC3 (1417 Waccamaw Drive S), it was determined that, if the shoreline were not armored, the primary dune crest would be located landward of the erosion control structures by 77 feet (GC4), 86 feet (GC5), and 86 feet (GC6), respectively. The erosion control structures were buffered by these distances to establish the baseline.

Northern Standard Zone (Horry County)

The northern section of Garden City Beach in Horry County begins at the Georgetown/Horry County Line and extends northward to the southern limit of the Town of Surfside Beach near

OCRM Monument 5100 and Melody Lane. This section of shoreline is considered a standard zone. Several erosion control structures are present, and the baseline position was calculated using the volume calculation method. Armored transects were collected at GC7 (100 Waccamaw Drive N), GC8 (700 Waccamaw Drive N), GC9 (912 Waccamaw Drive N), GC10 (1210 Waccamaw Drive N), and GC11 (1514 Waccamaw Drive N), GC12 (1690 Waccamaw Drive N), GC13 (1990 Waccamaw Drive N) and a reference, unarmored transect was collected at GC3 (1417 Waccamaw Drive S). It was determined that, if the shoreline were not armored, the primary dune crest would be located landward of the erosion control structures by 55 feet (GC7), 55 feet (GC8), 118 feet (GC9), 118 feet (GC10), 105 feet (GC11), 67 feet (GC12), and 44ft (GC13), respectively. The erosion control structures were buffered by these distances to establish the baseline.

Beach	Profile (Reference or Armored)	Monument # or Other ID	Upper Contour (ft)	Lower Contour (ft)	Calculated Volume (cy/ft)	X-Position to Match Volumes (ft)	X-Position of Dune Crest (ft)	X-Position Difference (ft) = landward offset from wall
Garden City	Armored	GC1	8.5	-5.237	28.94			174
Garden City	Reference	GC3	1.719	-5.195	30.06	354.822	180.876	
Garden City	Armored	GC2	8.898	-4.99	38.66			140
Garden City	Reference	GC3	3.059	-5.195	39.51	321.051	180.876	
Garden City	Armored*	GC4	10.582	-5.134	62.28			77
Garden City	Reference	GC3	6.12	-5.195	62.218	258.149	180.876	
Garden City	Armored	GC5	7.799	-5.085	57.877			87
Garden City	Reference	GC3	5.477	-5.195	58.449	267.406	180.876	
Garden City	Armored*	GC6	7.544	-5.116	60.097			87
Garden City	Reference	GC3	5.477	-5.195	58.449	267.406	180.876	
Garden City	Armored*	GC7	10.818	-4.932	66.261			56
Garden City	Reference	GC3	6.68	-4.718	65.027	236.49	180.876	
Garden City	Armored*	GC8	10.588	-4.29	60.16			56
Garden City	Reference	GC3	6.68	-4.289	60.166	236.49	180.876	
Garden City	Armored	GC9	10.046	-4.577	41.533			118
Garden City	Reference	GC3	4.221	-4.57	39.722	299.303	180.876	
Garden City	Armored	GC10	12.338	-4.66	41.079			118
Garden City	Reference	GC3	4.221	-4.718	41.339	299.303	180.876	
Garden City	Armored	GC11	8.029	-5.03	50.164			106
Garden City	Reference	GC3	4.524	-5.195	51.149	286.755	180.876	
Garden City	Armored	GC12	13.496	-5.07	68.071			67
Garden City	Reference	GC3	6.332	-5.195	66.462	248.115	180.876	
Garden City	Armored	GC13	14.169	-5.134	77.953			44
Garden City	Reference	GC3	7.664	-5.195	76.82	224.877	180.876	

Garden City Beach Setback Line

The following table identifies average annual shoreline change rates, from south to north.

Location Description	Shoreline Change Rate (ft/year) *	Multiplier	Setback Distance (ft)
Wrapping the south end of Garden City for 555 feet	-2.0693	40	83
For 106 feet to the south end of Sailfish Drive	-1.2671	40	51
For 75 feet at the south end of Sailfish Drive	-0.675	40	27
North for 8,105 feet to Basin Drive	^	N/A	20
Transition north for 193 feet, then north for 383 feet to the intersection of Basin Terrace and S. Waccamaw Drive	-0.7295	40	29
Transition north for 200 feet, then north for 576 feet	-1.0115	40	41
Transition north for 190 feet, then north for 388 feet along S. Waccamaw Drive	-1.2335	40	49
Transition north for 206 feet, then north for 1,236 feet along S. Waccamaw Drive	-1.4421	40	58
Transition north for 193 feet, then north for 2,025 feet along S. Waccamaw Drive	-1.6047	40	64
Transition north for 202 feet, then north for 407 feet along S. Waccamaw Drive	-1.3664	40	55
Transition north for 201 feet, then north for 1,198 feet along S. Waccamaw Drive	-1.1436	40	46
Transition north for 203 feet, then north for 406 feet along S. Waccamaw Drive	-0.8534	40	34
Transition north for 199 feet, then north for 1,011 feet along S. Waccamaw Drive	-0.6285	40	25
Transition north for 205 feet, then north for 7,966 feet to approximately 240 feet north of Oceanside Drive	^	N/A	20
Transition north for 195 feet, then north for 198 feet along N. Waccamaw Drive	-0.6285	40	25
North for 288 feet to Melody Lane	^	N/A	20

* A negative number indicates erosion.

^ When this symbol is present, it indicates that the minimum setback is required. The shoreline change rate in these areas is between -0.5 and +31.0 ft/year.

Final Product

Once the location of these proposed new beachfront jurisdictional lines is determined, this “line report” is prepared documenting how the new line positions were established. The proposed lines are then released for a 30-day public comment period, and a public hearing is held for public review and comment on the proposed line positions. The proposed lines are also made available for public review on the South Carolina Beachfront Jurisdiction viewer (<https://gis.dhec.sc.gov/shoreline>). Once the lines are adopted as final, the final versions can also be seen on the South Carolina Beachfront Jurisdiction viewer. The line coordinates are also made available on the DHEC web site in a format that allows them to be downloaded and imported into computer-generated plats by surveyors.