



**Line Report: Proposed Baseline and Setback Line  
Seabrook Island  
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.<sup>1</sup>

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.

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<sup>1</sup> 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.<sup>2</sup> 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.<sup>3</sup>

To calculate a dune crest position at an armored<sup>4</sup> 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.<sup>5</sup>

## 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.<sup>6</sup>

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

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<sup>2</sup> S.C. Code Regs. 30-1(D)(43).

<sup>3</sup> S.C. Code Ann. §48-39-280(A)(1).

<sup>4</sup> S.C. Code Ann. §48-39-250(5).

<sup>5</sup> S.C. Code Ann. §48-39-280(A)(2).

<sup>6</sup> 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.

### Seabrook Island Baseline

Seabrook Island is a barrier island approximately 4 miles long, situated between the North Edisto River Inlet and Captain Sam’s Inlet in Charleston County. Development on the island is a mix of single-family and multi-family structures.

#### *Southern Unstabilized Inlet Zone Adjacent to the North Edisto River Inlet*

The southwestern end of the island adjacent to the North Edisto River Inlet is classified as an unstabilized inlet zone. This stretch of shoreline extends from the end of the sandy beach to around Camp St. Christopher. In this zone, the baseline is set at the most landward point of erosion in the last 40 years. Specifically, the baseline position is comprised of vegetation line data collected by OCRM staff in November 2016, a wet/dry shoreline position from 1983, and historical vegetation line positions from 1977, 1993 and 2006.

#### *Central Stabilized Inlet Zone between the North Edisto River Inlet and Captain Sam’s Inlet*

In the middle portion of the island, from Camp St. Christopher to OCRM Monument 2565, the shoreline is classified as a stabilized inlet zone. For the section of the stabilized inlet zone that is not armored with rock revetments, from Camp St. Christopher to OCRM Monument 2515, the baseline follows the primary dune crest as identified in 2010 LIDAR data and verified in the field in November 2016 by OCRM staff using survey-grade GPS equipment.

Between OCRM Monument 2515 and just south of OCRM Monument 2565, a continuous 5,000-foot section of shoreline is armored with rock revetments. The revetment is completely exposed between OCRM Monuments 2515 and 2525 and partially exposed to just south of OCRM Monument 2545. Where the revetment is at least partially exposed, the baseline position was calculated using the volume calculation method. Using armored transects at OCRM Monuments 2520 and 2525 and a reference, unarmored transect at OCRM Monument 2570, it was determined that if the shoreline were not armored, the primary dune crest at OCRM Monument 2520 would be located 123 ft landward of the revetment and the primary dune crest at OCRM Monument 2525 would be located 48 ft landward of the revetment. These calculations were used to buffer distances from the revetment in order to set the baseline in the area between OCRM Monument 2515 and OCRM Monument 2545. From OCRM Monument 2545 to just south of OCRM Monument 2565, the baseline follows the crest of the revetment.

| 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 |
|------------------------|--------------------------------|------------------------|--------------------|--------------------|---------------------------|----------------------------------|-------------------------------|--|
| <b>Seabrook Island</b> | <b>Armored</b>                 | <b>2520</b>            | <b>13.62</b>       | <b>-5.128</b>      | <b>40.644</b>             |                                  |                               | <b>123</b>   |
| Seabrook Island        | Reference                      | 2570                   | 2.093              | -5.143             | 40.422                    | 433.172                          | 310.041                       |  |

| Beach                  | Profile<br>(Reference<br>or<br>Armored) | Monument<br># or Other<br>ID | Upper<br>Contour<br>(ft) | Lower<br>Contour<br>(ft) | Calculated<br>Volume<br>(cy/ft) | X-<br>Position<br>to Match<br>Volumes<br>(ft) | X-<br>Position<br>of Dune<br>Crest<br>(ft) | X-Position<br>Difference<br>(ft) =<br>landward<br>offset<br>from wall |
|------------------------|---|------------------------------|--------------------------|--------------------------|---------------------------------|---|--|---|
| <b>Seabrook Island</b> | <b>Armored</b>                          | <b>2525</b>                  | <b>12.786</b>            | <b>-5.015</b>            | <b>62.284</b>                   |   |  | <b>49</b>   |
| Seabrook Island        | Reference                               | 2570                         | 5.423                    | -4.959                   | 61.771                          | 358.771                                       | 310.041                                    |   |

*Northern Unstabilized Inlet Zone Adjacent to Captain Sam's Inlet*

The northeastern end of the island adjacent to Captain Sam's Inlet is classified as an unstabilized inlet zone. This stretch of shoreline extends from OCRM Monument 2565 to the end of the island at the mouth of Captain Sam's Inlet. In this zone, the baseline is set at the most landward point of erosion in the last 40 years. Specifically, the baseline position is comprised of a wet/dry shoreline position from 1983 and historical vegetation line positions from 1977, 1988, 1993, and 1998.

**Seabrook Island 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) |
|--|-----------------------------------|------------|-----------------------|
| For 850 feet along North Edisto River Inlet  | ^                                 | N/A        | 20                    |
| Transition for 178 feet, then for 362 feet along North Edisto River Inlet  | -0.6594                           | 40         | 26                    |
| For 375 feet along North Edisto River Inlet  | -1.4066                           | 40         | 56                    |
| For 1,632 feet along North Edisto River Inlet  | -2.2142                           | 40         | 89                    |
| Transition for 231 feet, then for 199 feet along North Edisto River Inlet  | -1.1473                           | 40         | 46                    |
| Transition for 175 feet, then wrapping the south end of Seabrook and continuing to the north end of Oyster Catcher Court | ^                                 | 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.