



**Figure 1. Project Location Map.**

### III. SURVEY DATA COLLECTION

Beach profile surveys were conducted along the Town’s shoreline in November 2011, September 2013, May 2015, December 2017 and June 2018. All surveys consist of a total of 34 profiles with a spacing of roughly 1,000 feet along the Town’s oceanfront beach. With the exception of the June 2018 survey, two profiles were surveyed both north and south of the Town limits to evaluate adjacent trends that might impact future project formulation should these areas be included in future plans. During the June 2018 survey, the two (2) profiles located north of the Town in Pine Island (PI-17 and PI-18) were surveyed, however, the two (2) profiles south in Southern Shores (SS-01 and SS02) were not surveyed as the Town of Southern Shores recently implemented a beach monitoring program that may provide additional data during future surveys.

Survey data were collected along transects listed in Table 1. Coordinates shown in Table 1 are referenced to the North Carolina State Plane coordinate system in feet NAD83 and the profile azimuth refers to degrees referenced to true north. Transects listed in Table 1 are shown graphically in Appendix A – 2018 Town of Duck Monitoring Survey Report. Appendix A also includes detailed survey methodology, monument information, profile plots, ground digital photography, and field book notes.



Figure 2. Detailed project area map showing the Project Area, North Monitoring Area, South Monitoring Area, and the location of the monitoring profiles.

**Table 1. Profile Survey Baseline and Azimuth**

<b>Profile<sup>(1)</sup></b>	<b>Easting</b>	<b>Northing</b>	<b>Azimuth</b>
PI-17	2950657.3	920098.9	70
PI-18	2951026.0	919175.4	70
D-01	2951387.5	918267.7	70
D-02	2951733.8	917384.4	70
D-03	2952103.0	916429.4	70
D-04	2952464.0	915495.3	70
D-05	2952849.3	914598.0	70
D-06	2953224.4	913696.9	70
D-07	2953607.3	912798.8	70
D-08	2953983.0	911897.9	70
D-09	2954356.7	910994.8	70
D-10	2954759.1	910066.7	70
D-11	2955158.1	909133.1	70
D-12	2955461.4	908412.5	70
D-13	2955874.3	907478.4	70
D-14	2956252.1	906578.3	70
D-15	2956628.6	905677.8	70
D-16	2956978.7	904767.7	70
D-17	2957333.7	903863.9	70
D-18	2957718.8	902886.5	70
D-19	2957932.5	902331.0	70
D-20	2958139.7	901760.7	70
D-21	2958472.1	900958.7	70
D-22	2958754.0	900228.8	70
D-23	2958992.7	899515.6	70
D-24	2959267.2	898739.8	70
D-25	2959601.7	897824.3	70
D-26	2959928.6	896902.3	70
D-27	2960250.6	895981.9	70
D-28	2960604.1	895073.0	70
D-29	2960963.6	894166.2	70
D-30	2961317.7	893257.6	70
D-31	2961676.7	892350.7	70
D-32	2962078.1	891379.4	70
D-33	2962439.4	890553.2	70
D-34/-197+12	2962839.6	889616.1	70

<sup>(1)</sup>PI-Pine Island transects; D-Duck transects;

The 1996 LiDAR data used to measure long-term shoreline change along the portions of the Town not included in the 2017 beach nourishment project were collected by the USGS. The November 2011 beach profile data were collected by the USACE FRF staff through a combination of bathymetric surveys and terrestrial LiDAR surveys. The bathymetric data extended from the shoreline seaward to the -40-foot NAVD contour. The terrestrial LiDAR data extended from the dune seaward to the shoreline. These data were collected before Hurricane Sandy from PI-07 (10,000 feet north of PI-17) to 5,000 feet south of SS-04 (7,000 feet south of SS-02). In an effort

to create a continuous pre-Sandy profile, APTIM combined the 2011 bathymetric and terrestrial LiDAR data collected by the USACE FRF with 2009 LiDAR profile data landward of the dune.

The profile surveys collected by APTIM (formerly CPE-NC) in September 2013, May 2015, December 2017 and June 2018, extended landward until a structure was encountered or to a range 50 feet beyond the landward toe of dune, whichever was more seaward. Elevation measurements were also taken seaward along the profile to at least the -30-foot NAVD contour. Upland data collection included all grade breaks and changes in topography to provide a representative description of the conditions at the time of the work. The maximum spacing between data records along individual profiles was 25 feet. The upland survey extended into wading depths sufficiently to allow the offshore portion to overlap the upland portion by a minimum of 50 feet.