2022 Buxton Beach Renourishment

Project Summary — August 30, 2022 **Issue No. 2**

For additional project information, visit MoreBeachToLove.com.

Great Lakes Dredge & Dock Company (GLDD) delivered the last load for the Buxton beach renourishment project around 7:00 p.m. Tuesday, **August 16, 2022**. After nearly 48 days of construction since the start date of Thursday, June 30, 2022, the total project volume (1.2 million cubic yards of sand) has been placed along 2.9 miles of oceanfront from the Haulover Day Use Area to the ocean groin field near the former location of the Cape Hatteras Lighthouse. An initial frontal dune with a typical width of 20 feet was also built along the Village of Buxton. The entire project was completed ahead of schedule without any safety or environmental incidents. Demobilization started immediately after the last load was delivered. All shore pipes and equipment have been removed from the beach and were transported out of the staging area by Thursday, August 25, 2022, and the last section of the submerged pipeline was demobilized on Sunday, **August 28, 2022**. According to the agreement between Dare County and GLDD, the final completion of the Buxton project has been achieved.

This newsletter documents the milestones that GLDD achieved during construction. It explains what to expect after nourishment, including initial beach profile adjustment, natural dune growth, sand fencing, and vegetation plans. It also provides guidance to oceanfront property owners who wish to conduct sand scraping or build any type of structure on their property in the future.

Construction Summary

The Buxton beach renourishment project officially commenced on **Thursday, June 30, 2022,** from the landing point near South Tower Circle with the hopper dredge *Ellis Island*. By Monday, July 11, 2022, the 1,800-foot southern section of the project from South Tower Circle to the ocean groin field near the old Cape Hatteras Lighthouse was completed. Afterward, pumping proceeded north from the landing point toward the northern boundary of the Village of Buxton. GLDD made steady progress over the next seven days with the dredge *Ellis Island*, and approximately 30,000 cubic yards of sand were placed in the project area every day. By the evening of Monday, July 18, 2022 approximately 410,000 cubic yards of sand had been placed, and over 3,000 feet of oceanfront had received nourishment sand. This oceanfront included the beach adjacent to Ocean Drive and continued all the way to the groin field. Upon finishing this area, the *Ellis Island* departed the job site and headed to Norfolk for maintenance and refueling.

The 1,800-foot southern section from South Tower Circle to the ocean groin field was the first portion of beach nourished during construction.

Photo taken on July 11, 2022.

Pumping operations were resumed on July 28, 2022, when the dredge *Liberty Island* arrived at the Buxton job site.

Photo taken on July 28, 2022.

After a 10-day pause in construction, the second hopper dredge, the *Liberty Island*, arrived at the Buxton project site and resumed work in front of Oramar Drive on Thursday morning, July 28, 2022.

Five days later, on Tuesday morning, August 2, 2022, the dredge *Ellis Island* returned to Buxton and joined the dredge *Liberty Island* for a week of operations that continued until Tuesday evening, August 9, 2022.

In addition to the first landing point located near South Tower Circle, GLDD installed another two landing points – both used by the two dredges operating on-site simultaneously. The second landing point was located approximately 3,000 feet north of the northern boundary of Buxton, and the third landing point was located approximately one mile further north from the second landing point.

With two dredges on-site and relatively calm ocean conditions, pumping operations proceeded rapidly and smoothly. By Friday, August 5, 2022, nourishment in front of the Village of Buxton was completed, and the most vulnerable section of the project area was protected.

After the dredge *Ellis Island* departed the Buxton job site on August 9, 2022, the dredge *Liberty Island* worked steadily and completed the remaining sections of the beach. As of Wednesday, August 10, 2022, the 3,000-foot northernmost section adjacent to the Haulover Day Use Area was nourished.

Nourishment in front of the Village of Buxton was completed by Friday, August 5, 2022.

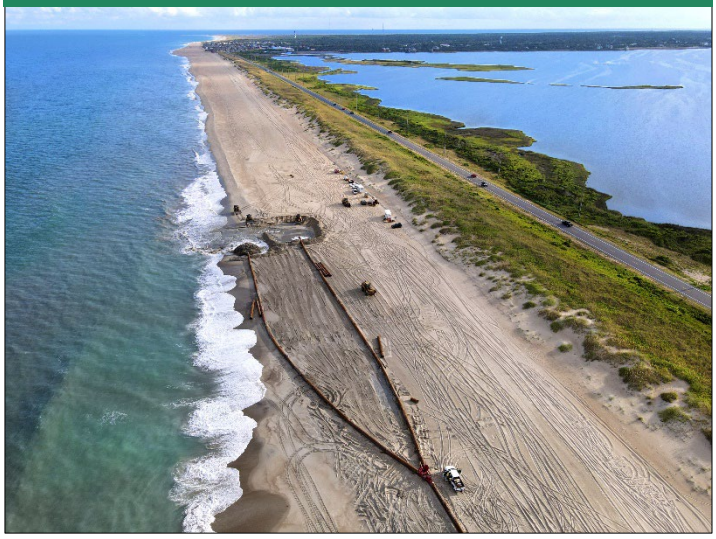
Photo taken on August 5, 2022.

The 3,000-foot northernmost section adjacent to the Haulover Day Use Area was nourished by August 10, 2022.

Photo taken on August 11, 2022.

After completing the northern section, the dredge *Liberty Island* started pumping south toward the Village of Buxton to nourish the final section of the project. As GLDD was finishing the last 70,000 cubic yards in the home stretch, mechanical delays occurred on Saturday morning, August 13, 2022, and the dredge had to shut down for repairs. GLDD immediately transported the necessary parts from Texas and scheduled the bull gang for offshore repairs as soon as the parts arrived. The *Liberty Island* resumed pumping early in the morning on August 15, 2022. By Tuesday evening, August 16, 2022, the dredge delivered her last load, and at that time, GLDD announced that the total project volume (1.2 million cubic yards) had been placed along the 2.9-mile project area.

Photo taken Tuesday evening, August 16, 2022, when the *Liberty Island* delivered her last load at approximately 1.2 miles north of the northern boundary of the Village of Buxton.



Two Dredges and Three Submerged Pipelines

The first hopper dredge GLDD used to begin the Buxton beach renourishment project, the *Ellis Island*, is America's largest dredge, with a capacity of over 10,000 cubic yards of sand per load. During the 26 days when the *Ellis Island* worked at the Buxton job site, it completed a total of 668,000 cubic yards of sand placement. This quantity is equivalent to approximately 56 percent of the total project volume.

By comparison, the second hopper dredge, the *Liberty Island*, has half the capacity per load, but it only requires half of the digging and pumping turnaround time. During the 20 days of working in Buxton, the *Liberty Island* was able to place approximately 532,000 cubic yards of sand. This quantity is equivalent to approximately 44 percent of the total project volume.

Both the *Liberty Island* (left) and the *Ellis Island* (right) were on-site between August 2, 2022, and August 8, 2022. Having two dredges work simultaneously enabled GLDD to rapidly complete the Buxton renourishment project.

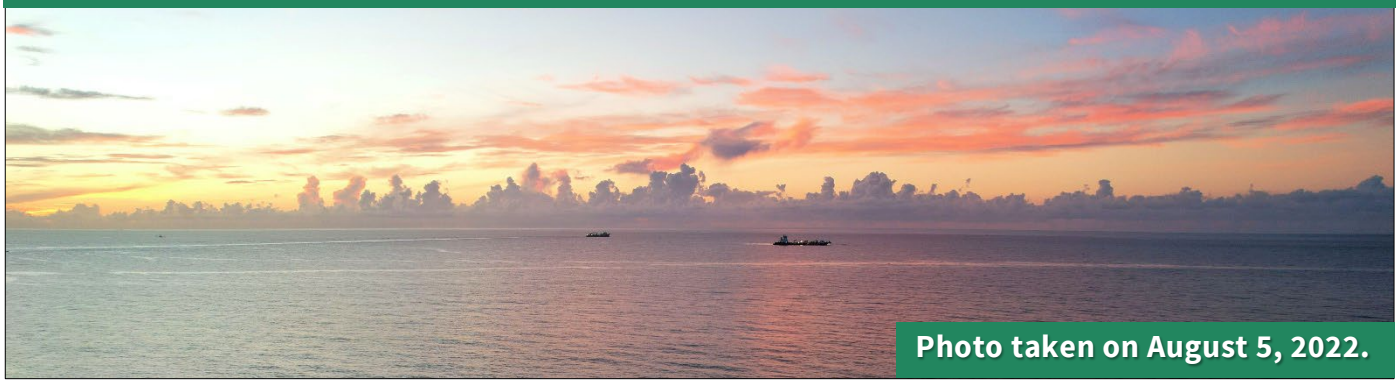
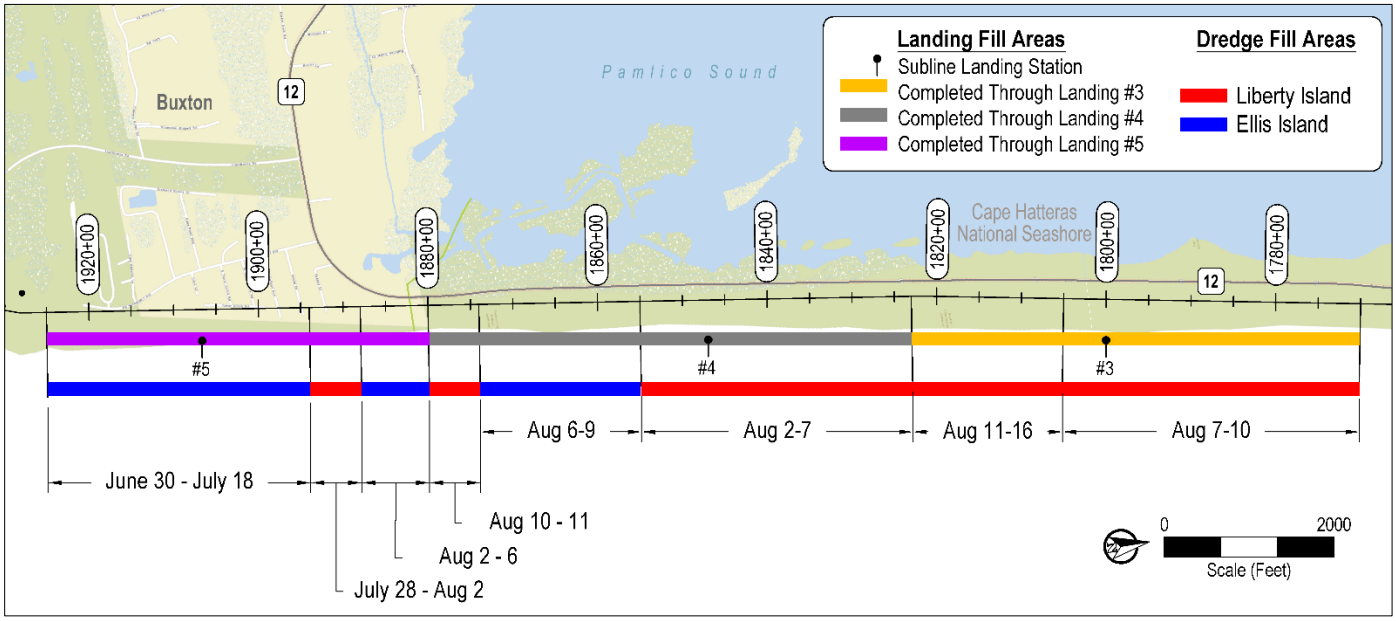


Photo taken on August 5, 2022.

Three submerged pipe landing points were strategically placed along the 2.9-mile project area. The map below identifies the section of beach each dredge nourished and the duration of construction along that section.



As part of the National Park Service's sediment management plan for Hatteras Island, the Buxton renourishment project widens the beach along highly eroding sections of oceanfront. It provides a buffer to reduce chronic damage to N.C. Highway 12 and replenishes the sand losses due to Hurricanes *Florence* (September 2018) and *Dorian* (September 2019). The contractor's original construction estimate was 40–60 working days, but GLDD was able to complete the project in 48 days (June 30, 2022, through August 16, 2022), which includes a 10-day pause from July 18, 2022, to July 28, 2022). Summer dredging has once again proven to be crucial for beach nourishment projects in the northern Outer Banks because inclement wave conditions in the fall and winter months would prevent safe operations of offshore dredging. The average daily production rate reached a record high compared to similar construction projects of this type under similar settings. As GLDD's management team commented on the project. "*In 30 years of doing this type of work, I haven't seen this kind of support and teamwork from all the stakeholders and general public.*"

Dare County Board of Commissioners Chairman, Bob Woodard (left) and Vice Chairman Wally Overman (middle) along with Commissioner Danny Couch and other county officials visited the job site on August 3, 2022. Tim Kana, Project Director for CSE, is shown on the right.

Photo courtesy of Dare County.

Beach-Fill Equilibration and Natural Dune Growth

Similar to what was observed after the 2017–2018 Buxton beach nourishment project, sand was mostly placed on the subaerial portion of the beach during construction, building a wide initial dry-sand berm and forming beach slopes that are steeper than the natural beach face. This construction method aims to ensure the safety of land-based equipment (i.e., bulldozers and front-end loaders); conveniently, it also results in construction efficiency and cost savings. Natural forces, such as waves and currents, will gradually move sand offshore and adjust the newly constructed berm to its natural shape. **This process, known as beach-fill equilibration, will result in a dry-sand beach that is narrower than its original width**. The fill templates at Buxton used an average berm elevation of approximately 7 feet above the mean sea level, matching the pre-nourishment berm with the expectation that king tide nuisance events or minor storms would produce wave overtopping and allow washover on the berm. This approach has been used in many other job sites along the East Coast. It has proved optimal because it creates a natural beach and inshore morphology with minimal formation of escarpments as the fill equilibrates.

An important feature of beach fill equilibration after nourishment is dune growth via natural wind forces. This process is also known as "aeolian transport." As the section of the beach north of Buxton had existing mature dune features before nourishment, an initial dune was *only* constructed along the oceanfront of the Village of Buxton, where there was essentially no dune and sand bags were exposed. The rationale for the county's plan to integrate an initial dune is to provide additional storm protection along that area and to further protect N.C. Highway 12. The plan also establishes relatively uniform standards to enhance dune growth and coastal resiliency in this area.

The wide dry-sand beach constructed by nourishment provides a new sand source for aeolian transport and will make natural dune growth possible for both the existing dune and the newly constructed dune. Sand fencing to be installed and vegetation to be planted after nourishment will concentrate sand along the back beach, further enhancing the foredune. After nourishment, the dune is expected to grow higher in elevation and wider at the dune base, and as a result, the dry-sand beach will appear to be narrower in comparison.

Sand Fencing and Vegetation to Enhance Dune Growth

Sand fencing and vegetation are components of Buxton beach renourishment, which form part of the overall dune management plan. Dare County has contracted Coastal Transplants (based in Bolivia, N.C.) to install sand fencing and plant vegetation along the portion of the Cape Hatteras National Seashore in front of the Village of Buxton, where the initial dune was constructed. Dare County is coordinating with the permitting agencies and Coastal Transplants to conduct the work from October 2022 to November 2022.

Following the North Carolina Coastal Area Management Act (CAMA) permit conditions, sand fencing will be installed on the newly constructed dune crest as close to the stable vegetation line as practical. Native, salt-tolerant plants (such as sea oats, Bitter Panic, or American Beachgrass) will be planted on the newly constructed dune crest and frontal face along the Village of Buxton.


Sea Oats


Bitter Panic


American Beachgrass

Property Owners' Dune Management Activities

Before the 2022 nourishment, there was little dry-sand beach in front of the Village of Buxton, and many sand bags were exposed. Dare County received permission from the North Carolina Department of Coastal Management before construction to allow the contractor to use nourishment sand to cover the sand bags if they were within the design templates. This solution significantly alleviated the potential expense that oceanfront property owners would have needed to spend to cover their sand bags. It also maintained the sand quality along the entire beach profile from the dune to the underwater portion of the project.

If property owners encounter sand encroachment issues to their oceanfront structure and wish to scrape sand or conduct any other activities (i.e., swimming pool, retaining wall, walkover, etc.) on the newly constructed dune and beach, they should first contact Dare County's Planning Department. The Planning Department is responsible for land-use planning and enforcement of state building codes in the unincorporated portions of Dare County. It has an office in Frisco that serves all of Hatteras Island, including the Village of Buxton. The contact information is as follows:

- Noah Gillam, Planning Director at noah.gillam@darenc.com, Tel: 252-475-5873
- Frisco Satellite Office, located at 50347 N.C. Highway 12, Frisco, N.C. 27936, Tel: 252-475-5878

The Planning Department will evaluate the property owners' proposed actions and direct them to apply for either a National Park Service Special Use Permit (252-475-9034 or caha_special_use_permits@nps.gov) if the action occurs on federal land, or to apply for a Coastal Area Management Act (CAMA) permit if the action occurs on state or private lands.

It is the property owner's responsibility to obtain permits before any action can be conducted.

Exposed sand bags were covered and the initial dune was built along the Village of Buxton during construction.

Photo taken on August 13, 2022.