

32. Description of the overall project and each activity in or affecting US waters or state critical areas

The proposed activity is a sand scraping and transfer project on Isle of Palms, SC. The project is intended to restore a dry sand beach along critically eroded areas of the beach. The project is intended to provide temporary erosion relief until a large-scale shoal bypass event attaches to the beach. CSE expects the shoal to attach in the next 12-18 months based on current migration rates. More details of the current beach and shoal condition are provided later. The project is similar in design and scope as prior projects completed in 2012 and 2014 under permit (2010-1041-2IG). The 2012 project moved ~80,000 cy of sand from the shoal attachment site while the 2014 project moved ~80,000 cy from the area near 53rd Ave and ~200,000 cy from the shoal attachment site (Figure 1). Sand was placed along erosional arcs at Beachwood East and near Seascape and Ocean Club condo units.

The applicant proposes to harvest sand from the intertidal beach at the site of shoal attachment (Harvest Area). The harvest area is shown in Sheets 2 and 3 of the permit drawings. The applicant proposes to shift up to 250,000 cy per event from the Harvest Area. Available quantities will depend on the configuration of the shoal as it attaches. The applicant has provided a 400 ft buffer between properties and any excavation area at the Harvest Area. Based on the shoal configuration and proximity to the shoreline, the applicant anticipates that only one transfer event will be required; however, the applicant requests that the permit allow for up to two events to occur over the 5 year life of the permit should the erosion pressure continue into the future. Shoal attachments are dynamic and do not always result in predictable changes to the beach, especially when considering post-attachment accretion trends.

Up to 30 acres of exposed intertidal beach will be utilized to harvest up to a cumulative total of 400,000 cubic yards (cy) of sand in up to two discrete events over the course of five years. Any single event will be limited to a total of 250,000 cy.

All work under this alternative will be performed by land-based equipment working between low water and high water along the intertidal beach to minimize impacts to dry-beach habitat. Sand will be used to construct a dune and dry sand berm along the placement areas. The dune elevation will be +14 ft NAVD, and the berm at +6ft NAVD. The berm will be up to 50 ft wide along the fill areas.

The Applicant is in the initial stages of design and permitting of another large-scale nourishment effort. The previous project was constructed in 2018, and has protected the east end of the island since that time. The proposed project will be scaled to provide an interim solution to the episodic erosion along portions of Isle of Palms affected by the shoal. It will offer sufficient restoration to allow for removal of emergency measures presently installed along the erosion area.



Figure 1. Photos from the 2014-2015 shoal management project showing sand harvesting from the attaching shoal and from a harvest area just north of 53rd Ave.

33. Overall project purpose and the basic purpose of each activity in or affecting US waters

The purpose of the project is for sand management along Isle of Palms, wherein excess sand in accreting sections of the island is shifted mechanically to eroding areas to provide storm protection to properties and maintain public use of the beach at all stages of the tide. The project seeks to augment the natural shoal bypass cycle and restore a viable profile along eroded sections of the shoreline until the shoal bypass cycle completes. Figure 2 shows the current condition of the beach along Beachwood East, within Wild Dunes. Persistent erosion has been occurring at the site for several years, but has accelerated recently. The area has lost ~300 ft of beach since 2019, resulting in a critically eroded condition at Beachwood East. Sandbags have been placed to protect structures along ~1,000 lf of beach. It is likely that erosion will spread north and south in the future, leaving additional properties threatened.

The effect of sediment bypassing at tidal inlets on receiving shorelines has been well documented (Williams and Kana 1987, Gaudio 1998, Kana et al 1999). Shoals migrating onshore bring new sand to a beach; however, they usually cause large, rapid changes to the shoreline during the process. Changes are generally temporary, but can cause significant problems when development is threatened. Large fluctuations in the shoreline position near inlets led to the SC DHEC-OCRM classification of Unstabilized Inlet Erosion Zones, which impose stricter setback criteria than standard zones away from inlets.

At Isle of Palms, aerial images dating to the 1940s confirm ongoing shoal-bypass events averaging one every 6.6 years (Gaudio 1998). The addition of sand as a result of these events accounts for the accretion observed along the downcoast portion of the island, which has been gaining 2.6 cubic yards per foot per year (cy/ft/yr) since 1998 (CSE 2010). A bypass event occurring in the early 1980s was used by Kana et al (1985) to model the “shoal-bypass cycle,” identifying three stages of evolution where the shoal:

- Stage 1) Emerges offshore, usually as a circular-shaped, sub-aerial sand mound.
- Stage 2) Migrates closer to shore, often as a horseshoe-shaped bar, causing accretion in its lee and erosion of adjacent areas.
- Stage 3) Fully attaches to the beach, allowing new sand to spread into previously eroded areas.

The shoal-bypass events act as natural nourishment to the Isle of Palms and contribute to the net accretion observed over the majority of the island over the past century. Two notable shoal-bypass events occurred in the 1980s, followed by another in the mid-late 1990s, and others between 2004 and 2007. After the nourishment project in 2008 (P/N 2007-02631-2IG-P), two smaller shoal-bypass events occurred, bringing more sand to the beach near Beach Club Villas and the Property Owners Beach House, but causing erosion near Seascape Villas, Ocean Club Villas, and the 18th hole of the Ocean Course (see Sheet 04 for property locations). These events necessitated the first shoal-management permit (2010-1041-2IG). A large shoal event attached to the beach in 2015, and there has been no significant shoal event since 2015.

The City of Isle of Palms sponsored a large-scale nourishment of the area in 2018. That project (P/N 2016-00803) placed ~1.7 million cy of sand on the beach between 57th Ave and the Links Course. CSE has monitored the beach annually since the project, noting that there has been extensive erosion along the center portion of the fill area (centered near Beach Club Villas). The area spanning the beach between stations 264 and 290 presently shows lower unit volumes than the pre-nourishment condition. The majority of the nourishment area still holds 50-100 cy more sand than before nourishment. Erosion is likely to continue along Beachwood East until the shoal attaches and sand shifts laterally from the attachment site. CSE expects that erosion along the eastern end of IOP may accelerate over the next 12 months, possibly affecting the area near Seascape and Ocean Club (as was the case in 2012 and 2014). The applicant has included the latter area in the permit application in anticipation of future erosion.

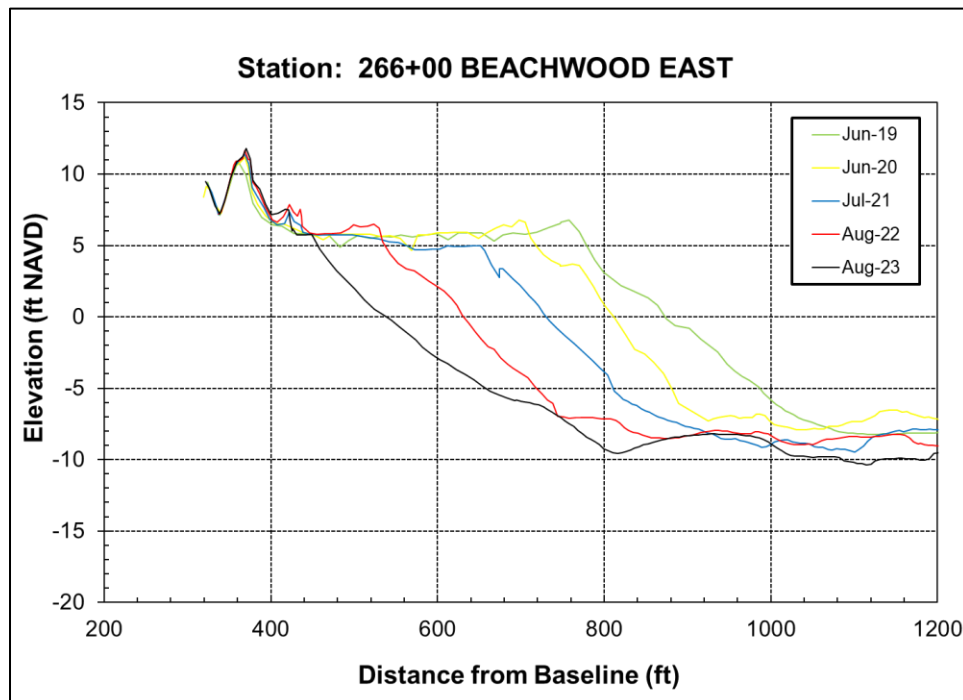


Figure 2. Photo and beach profile of the Beachwood East Area in February 2024.

Figure 3 shows the condition of the shoal as of August 2023. The shoal was positioned ~800 ft from the beach, with the center mass of the shoal extending from Beach Club Villas to Mariners Watch. The area of focused erosion is along the beach adjacent to the southern end of the shoal. The shoal has moved landward at a rate near 1,000 lf per year over the past three years (Figure 4). CSE expects the shoal to attach to the shoreline in the next 12-18 months. At that point, it will be accessible for sand harvesting, though the exact quantity of sand that will be available for harvesting is unknown. The applicant wishes to minimize sand quantities transferred under this permit to the minimal necessary to mitigate emergency erosion.

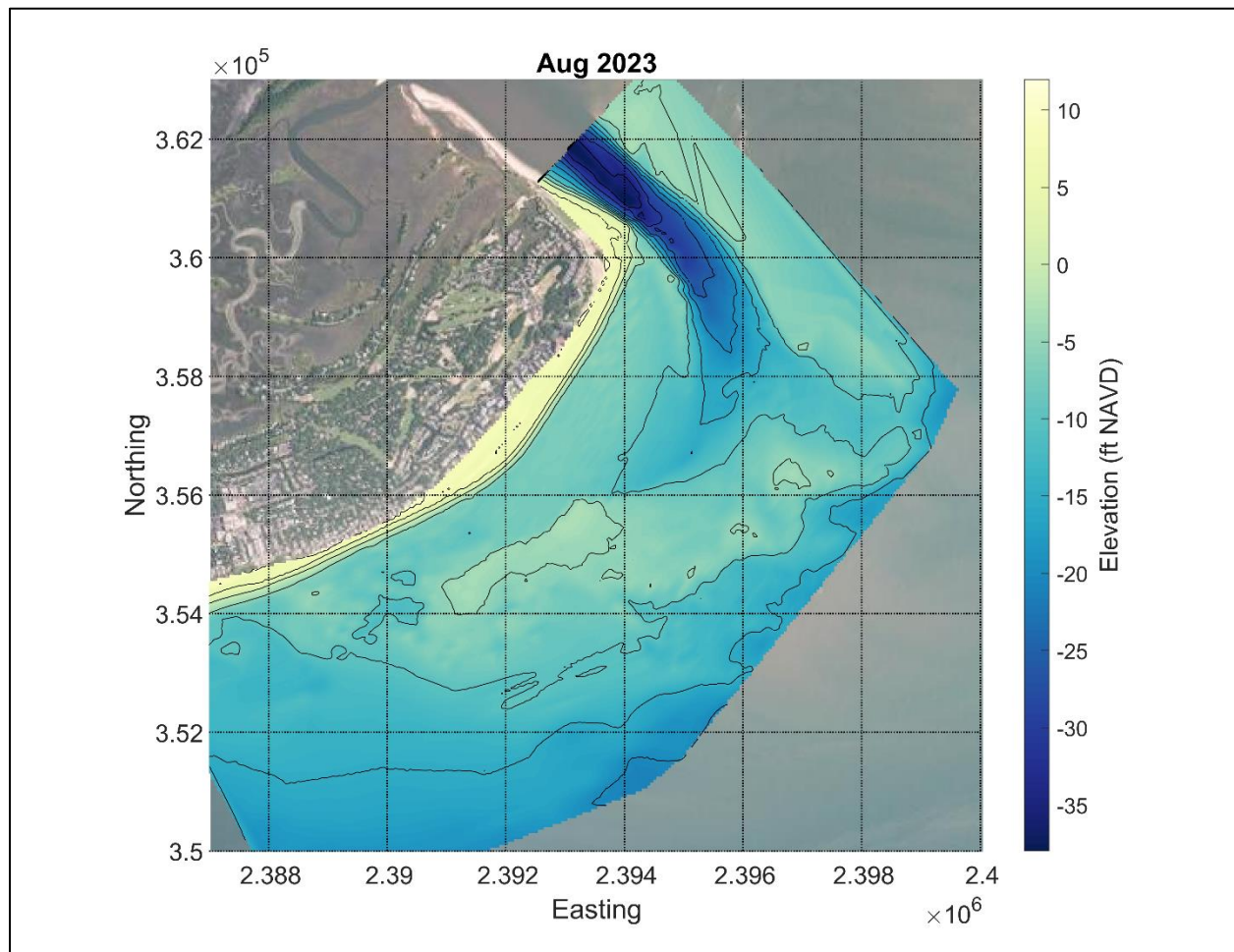


Figure 3. Elevation model of the east end of Isle of Palms inshore zone in August 2023. The approaching shoal is visible in the yellow shades ~800 ft off the beach at this time.

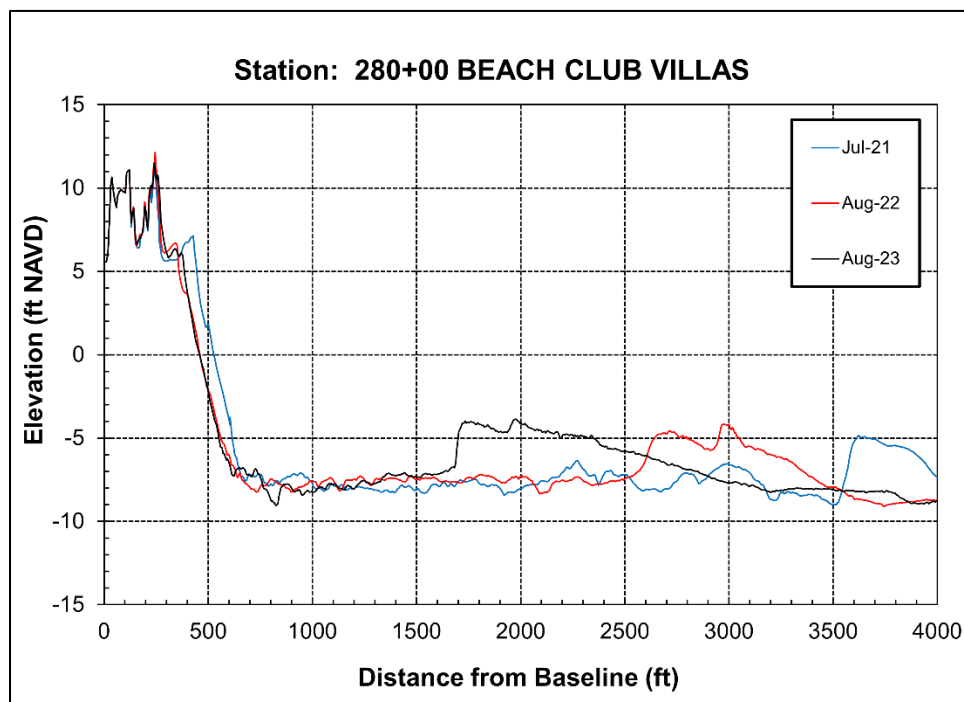
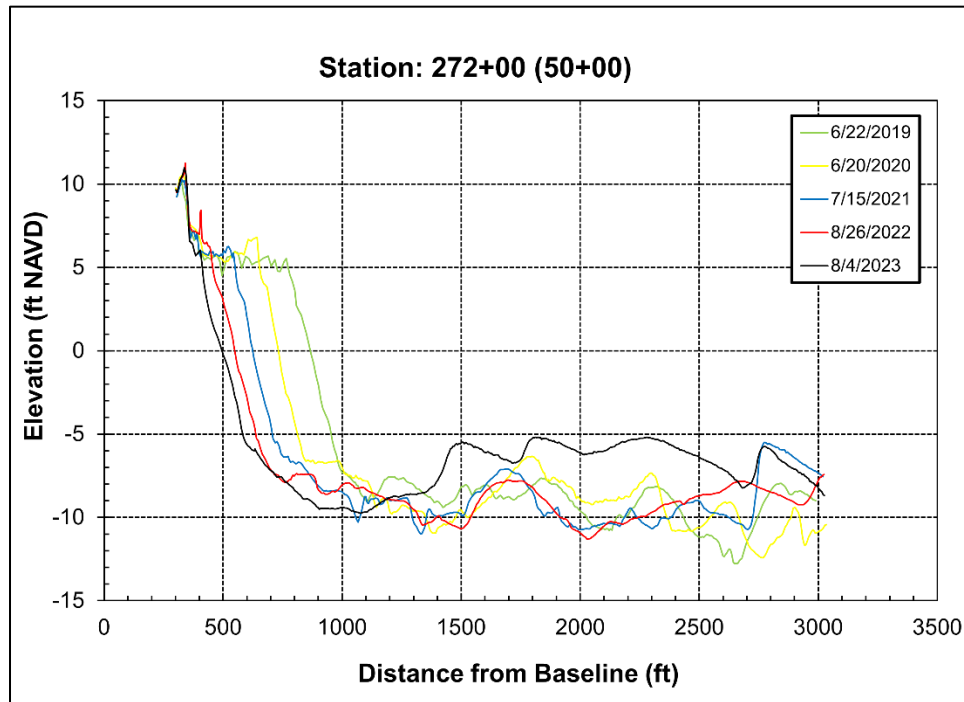


Figure 4. Elevation profiles showing the onshore shoal migration along the Beachwood East area (top) and seaward of Beach Club Villas (bottom). The shoal has migrated ~1,000 ft landward per year since 2021.

The Harvest Area includes the potential shoal attachment site. The area overlaps with potential placement areas to allow for uncertainty in the shoal attachment process and beach condition at the time of the project. Harvest Area will be utilized if the shoal is accessible by land-based equipment. As shown in Figure 1, once the shoal is accessible, there is ample room for land-based equipment to harvest sand along the seaward side of the shoal. This process accelerates onshore migration and recovery of the eroded sections of the beach, mimicking the natural sediment transport process of shoal attachment.

39. Describe measures taken to avoid and minimize impacts to waters of the US

The applicant has successfully completed two prior shoal management projects. Each of these projects provided improved beach health along the placement sites until another shoal-bypass cycle created additional erosion. The goal of the project is to provide localized erosion relief to areas under emergency conditions while allowing sufficient time for natural sediment transport process to provide longer-term relief. Presently, only a small area of the beach along the east end is critically eroded, and this condition does not justify a large-scale nourishment project. Mitigation of the limited area of erosion will extend the interval before another large-scale nourishment project is required.

A list of alternatives considered for beach management is provided below.

Alternative 1 – Do Nothing

The Do-Nothing alternative will allow for natural beach processes to continue, including continued erosion of the hotspot, onshore migration of the shoal, and eventually some level of accretion following attachment. Until the shoal attaches, erosion is expected to continue along Beachwood East, and is expected to accelerate at the east end of the island. Presently, there are sandbags along Beachwood preventing additional damage to properties. Should erosion continue along the eastern end of the project area, CSE expects that additional emergency measures will be required along Ocean Club and/or Seascape properties. While sandbags can protect upland property, they require regular maintenance, can impact the slope of the beach and impede public access, and can impact sea turtles nesting. Long-term exposure of sandbags results in high maintenance costs, debris on the beach, and poor storm protection. Rapid restoration of the beach will allow for removal of sandbags and improved beach health.

Benefits – Natural solution, no construction impacts

Negatives – Uncertain timing/scale of natural accretion, prolonged exposure of sandbags, property damage during storms, impacts of emergency measures/construction

Alternative 2 – Upland Sand Nourishment

This alternative would involve trucking beach compatible sand from an upland source to provide nourishment for eroded areas. While upland trucking of sand is feasible for small-scale projects, projects involving 100,000 cy of sand are generally too large to complete economically or efficiently via trucking. Trucked in sand is typically \$40-50 per cy, which is an order of magnitude higher than harvesting sand from the beach. It also involves significant impacts to the traffic flow, as a 100,000 cy project would require over 6,500 truckloads of sand. This alternative requires substantially more time to complete, as recent experiences shows that only up to ~1,500 cy of material is likely to be able to be trucked to the site each day. The applicant does not believe that trucking is a viable option for successful beach restoration.

Benefits – Does not require sand harvesting from the beach

Negatives – Cost, inefficiency, impacts to traffic and roads, sand compatibility

Alternative 3 – Shoal Management/Sand Recycling

This alternative is the project proposed herein. It involves focused restoration along an erosion hotspot at a modest cost (\$0.5-1 million). The project is anticipated to take 1-2 months to complete, and can be completed during the winter season to minimize impacts to public access and the environment. The project is considered to be an interim project to allow for the shoal process to complete, without having to do a large offshore nourishment project at a cost of ~\$15 million. The interim project will allow for an acceptable beach condition for several more years along the east end, extending the overall lifespan of the 2018 nourishment. Extending the lifespan of nourishment reduces cost and prevents construction impacts associated with offshore projects. The Applicant is proactively working towards a permit for the next large-scale nourishment effort, but will wait until the large project is warranted. Erosion affecting a larger section of the beach and an overall reduction in sand volume will trigger the next offshore project.

Benefits – Lower cost of sand (~25% of offshore sand cost, ~10% of upland sand cost), maintains steady sand supply to downcoast areas, delays large-scale project, limits impact areas to intertidal beach, can be constructed in winter

Negatives – Does not increase overall sand supply, may impact (but not eliminate) public use of beach along haul path, sand volume determined by site conditions at time of construction, use of shoal depends on attachment progress

Alternative 4 – Large-Scale Nourishment

The City of Isle of Palms has sponsored two large-scale nourishment projects (2008 and 2018) to mitigate erosion along the eastern end of the island. These projects were constructed in response to significant erosion occurring along ~6,000 lf of the east end, and added ~900,000 cy and 1.67 million cy, respectively. Large-scale nourishment is a common practice on developed shorelines, and impacts of the projects are typically well understood; however, they are large construction projects that involve substantial equipment and can interfere with the beach and borrow area. Impacts potentially include temporary increases in turbidity, lighting, and noise along the beach and borrow area, beach closures and limited access during construction, changes in sediment characteristics, beach compaction, and other impacts. The projects are also expensive, requiring mobilization costs of up to \$5 million and unit pumping costs of ~\$12 per cy.

As mentioned previously, the City of Isle of Palms is beginning work towards a permit for the next large-scale nourishment. This work involves extensive study of the offshore zone to find beach compatible sand while ensuring protection of known and unknown cultural resources. The applicant anticipates submission of the initial permit application in fall of 2024; however, no schedule has been determined

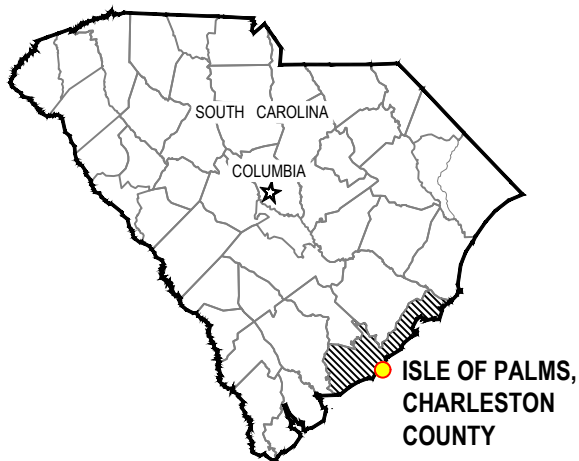
for implementation of the project. The City will continue to monitor the beach and determine when a large project is necessary based on the beach condition. The current condition will allow for restoration of the eroded area with the much smaller and more economical shoal-management project.

40. Provide a brief description of the proposed mitigation plan to compensate for impacts to aquatic resources or provide justification as to why mitigation should not be required

The proposed project is designed to mitigate beach erosion along a critically eroded areas of Isle of Palms and facilitate consistent sediment transport to downdrift areas of the island. The project will improve storm protection, restore the wet sand beach, restore dune habitat for sea turtle nesting, and allow for removal of emergency sandbags. The applicant believes that the restorative nature of the project offsets temporary impacts during construction and requests that no additional mitigation be required. To document the recovery of the system following construction, the applicant proposes the following monitoring plan:

- Annual orthophotography of the project area pre- and post-project and for three (3) years following the project. Photography will include coverage of the island north of 42nd Ave. Photo resolution will be greater than three (3) inches per pixel. The applicant will provide digital files of the orthophotography to regulatory and resource agencies upon request.
- Annual beach profiles of the island extending from a point landward of the primary dune to a minimum distance of 1,500 lf seaward of the dune for a three (3) years following the project. Profiles will be compared to pre and post construction profiles to document beach width, dune condition, and sand volume change.

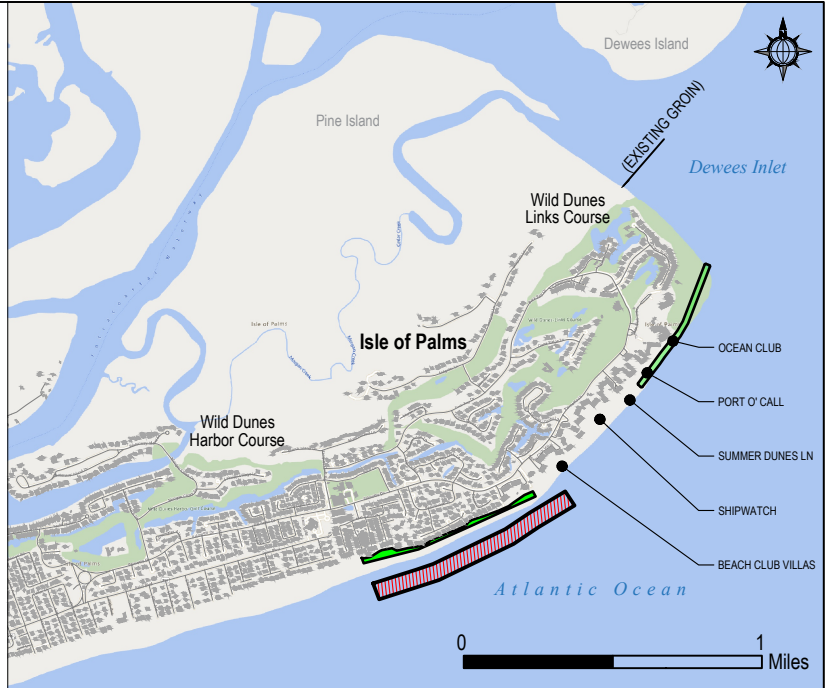
The project is proposed to be constructed outside of sea turtle nesting season (Nov 1 – Apr 30) to eliminate threats to nesting or hatching sea turtles. This will also keep construction to the period outside of peak biological recruitment permits for benthic infauna, and outside of peak tourist season. Construction equipment will be stored in areas devoid of vegetation and off the dune.



PROJECT LOCATION:

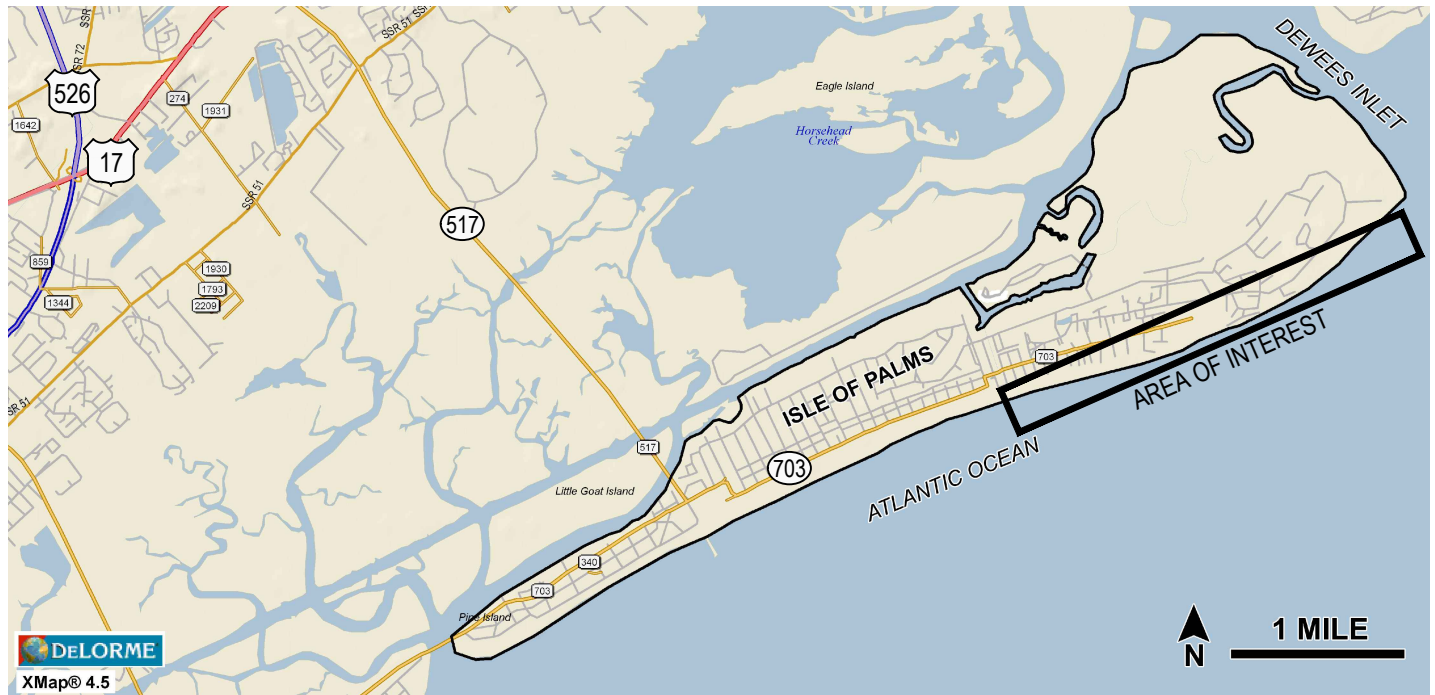
Latitude: 32° 48' 21" N

Longitude: W79° 43' 40"



DIRECTIONS:

FROM CHARLESTON, TAKE US-17 NORTH. TURN RIGHT ONTO SC 517 (ISLE OF PALMS CONNECTOR). TURN LEFT ONTO PALM BLVD. SITE IS NORTHEAST OF 47TH AVE EXTENDING ALONG TO DEWEES INLET ON THE NORTHEAST END OF ISLE OF PALMS.



APPLICANT:

CITY OF ISLE OF PALMS
1207 PALM BLVD
ISLE OF PALMS SC 29451

DRAWING TITLE:

City of Isle of Palms
Shoal Management
VICINITY MAP

AGENT:

COASTAL SCIENCE & ENGINEERING
PO BOX 8056
COLUMBIA, SC 29202

SCALE: AS SHOWN

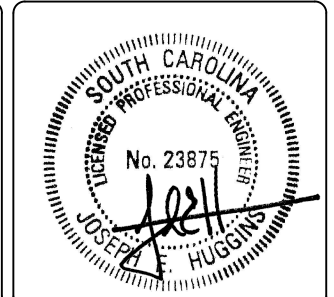
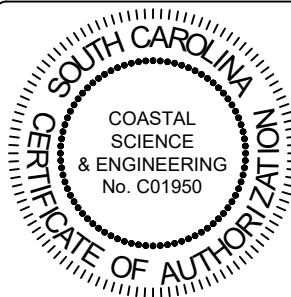
DATE: 05 April 2024

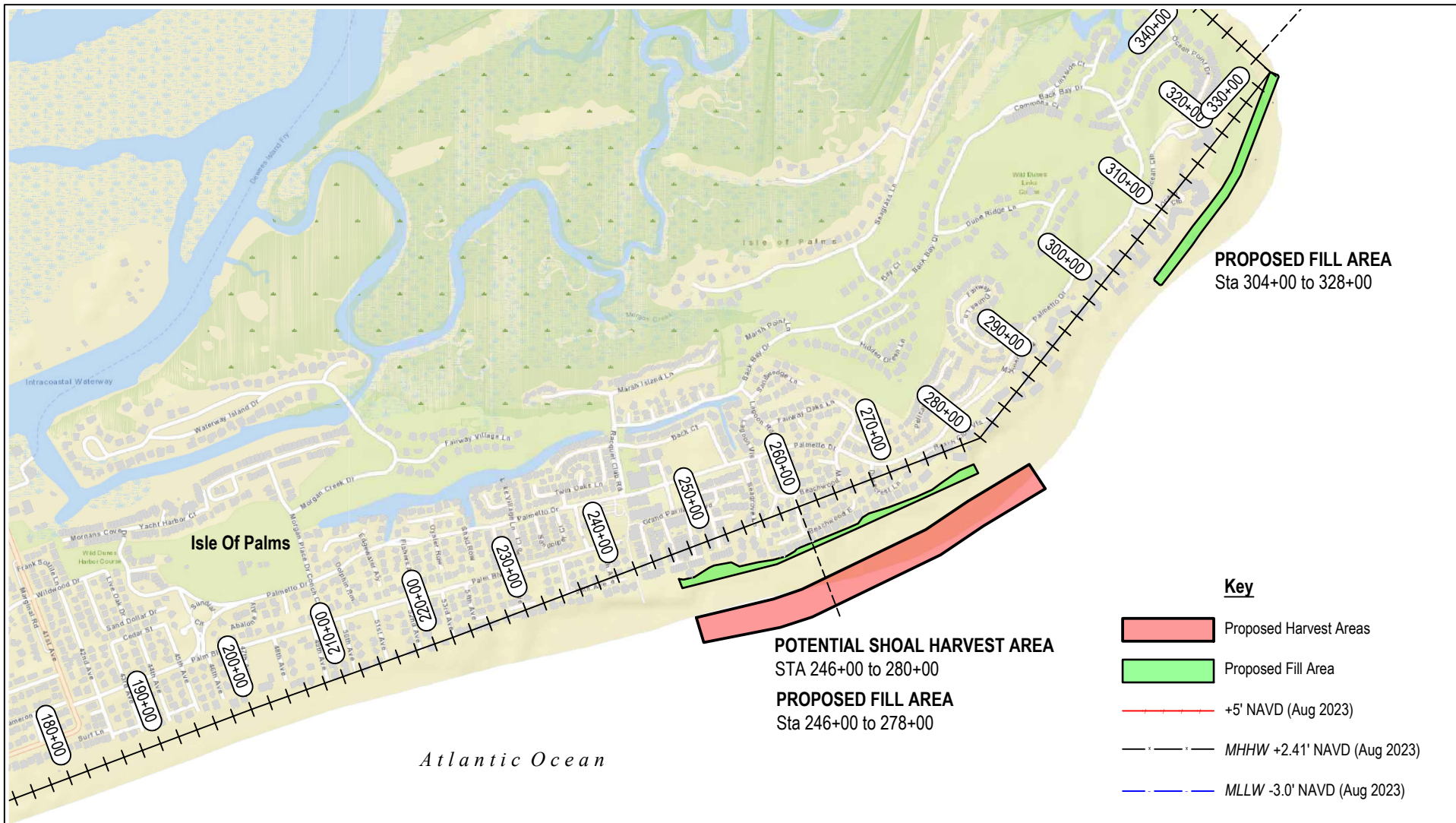
REVISED 18 June 2024

PROJECT #: 2589

SHEET:

01





DATUM:

Horizontal: SPCS NAD '83 (Feet) SC Zone 3900
Vertical: NAVD '88 (Feet)

Contours shown based on data collected by
Coastal Science & Engineering, Inc via RTK GPS Aug 2023.

NOTE:

Excavation and fill limits and volumes may change based on
conditions at the time of construction, but will remain within permitted
boundaries and abide by all special conditions of the permit.



APPLICANT:

City of Isle of Palms
1207 Palm Blvd
Isle of Palms, SC 29451

AGENT:

Coastal Science & Engineering
PO Box 8056
Columbia, SC 29202

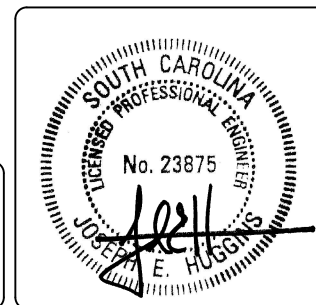
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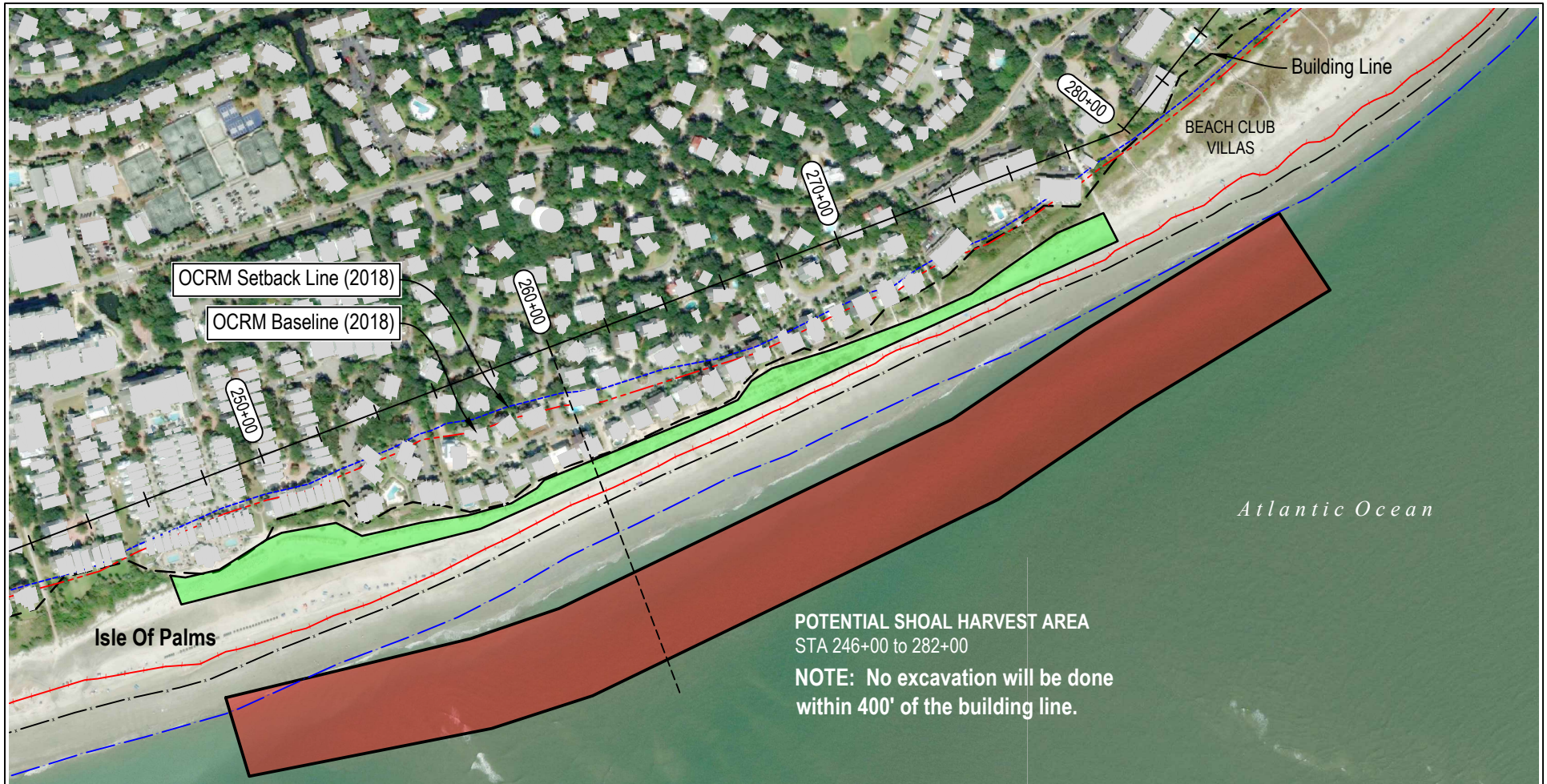
**EXISTING CONDITION (August 2023)
PROPOSED SCRAPING & FILL PLAN**

Scale: As Shown
Date: 05 April 2024
Revised: 18 June 2024
Project #: 2589

Sheet #:

02





POTENTIAL SHOAL HARVEST AREA
STA 246+00 to 282+00

NOTE: No excavation will be done within 400' of the building line.

Key

- Proposed Harvest Area
- Proposed Fill Area
- +5' NAVD (Aug 2023)
- MHHW +2.41' NAVD (Aug 2023)
- MLLW -3.0' NAVD (Aug 2023)

DATUM:

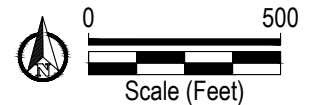
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Vertical: NAVD '88 (Feet)

Contours shown based on data collected by
Coastal Science & Engineering, Inc via RTK GPS Aug 2023.

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The Harvest Area anticipates future attachment of a shoal.
(See sheet 07 for photo)



APPLICANT:

City of Isle of Palms
1207 Palm Blvd
Isle of Palms, SC 29451

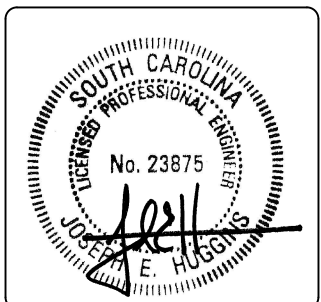
AGENT:

Coastal Science & Engineering
PO Box 8056
Columbia, SC 29202

DRAWING TITLE:

**PROPOSED HARVEST AREA
& PROPOSED FILL AREA**

Scale:	As Shown	Sheet #:
Date:	05 April 2024	03
Revised:	18 June 2024	
Project #:	2589	





Key

- Proposed Fill Area
- +5' NAVD (Aug 2023)
- MHHW +2.41' NAVD (Aug 2023)
- MLLW -3.0' NAVD (Aug 2023)

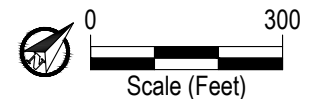
DATUM:

Horizontal: SPCS NAD '83 (Feet) SC Zone 3900
Vertical: NAVD '88 (Feet)

Contours shown based on data collected by
Coastal Science & Engineering, Inc via RTK GPS Aug 2023.

NOTE:

Excavation and fill limits and volumes may change based on conditions at the time of construction, but will remain within permitted boundaries and abide by all special conditions of the permit.



APPLICANT:

City of Isle of Palms
1207 Palm Blvd
Isle of Palms, SC 29451

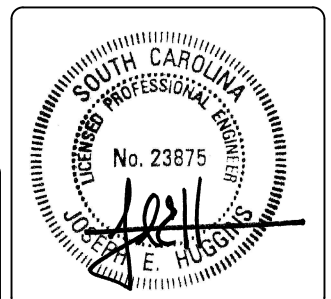
AGENT:

Coastal Science & Engineering
PO Box 8056
Columbia, SC 29202

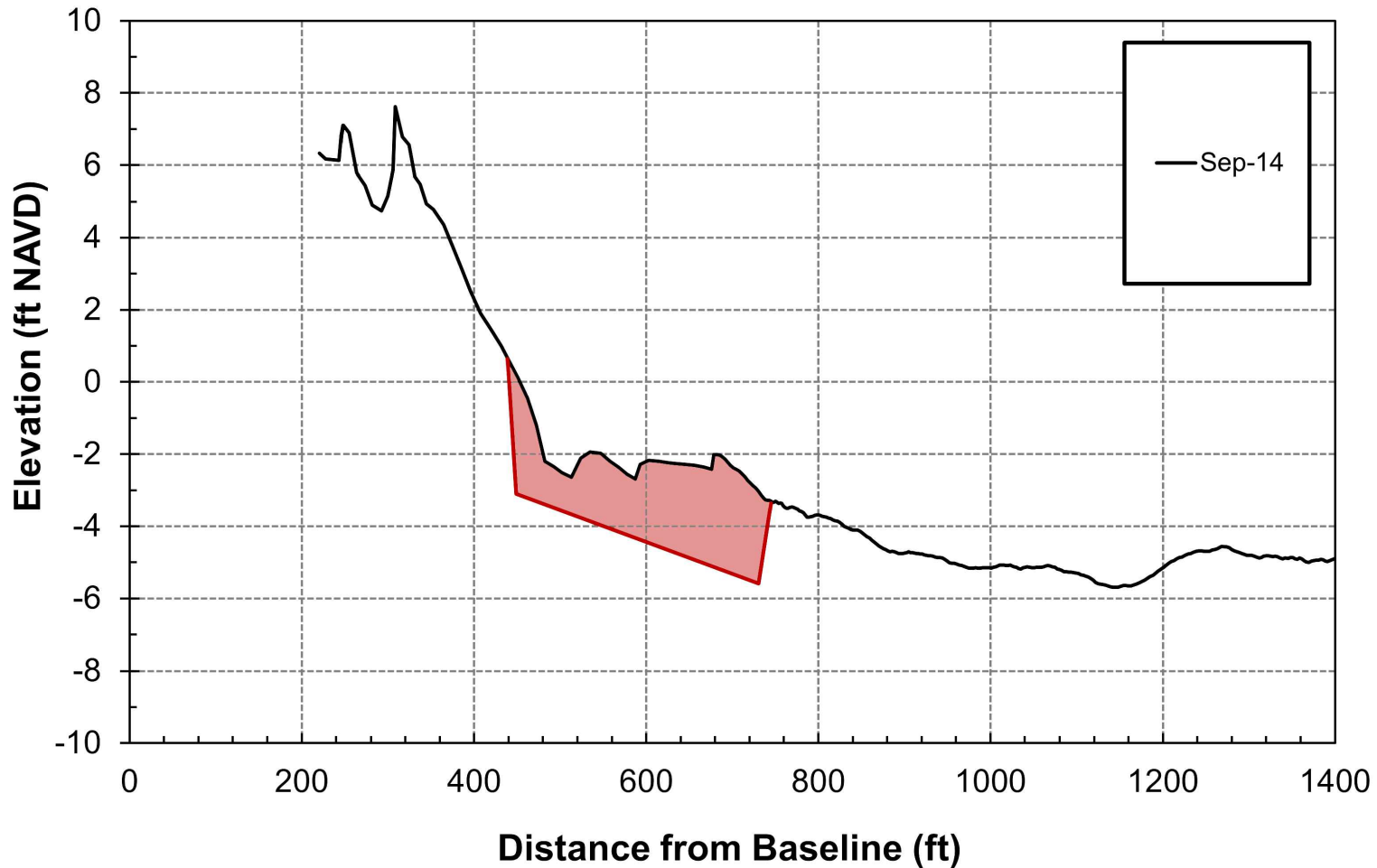
DRAWING TITLE:

PROPOSED FILL AREA
Sta 304+00 to 328+00

Scale:	As Shown	Sheet #:
Date:	05 April 2024	04
Revised:	18 June 2024	
Project #:	2589	



Station 260+00 Example Harvest Section



DATUM:

Horizontal: SPCS NAD '83 (Feet) SC Zone 3900
Vertical: NAVD '88 (Feet)

Contours shown based on data collected by
Coastal Science & Engineering, Inc via RTK GPS Aug 2023.

NOTE:

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of the permit.

APPLICANT:

City of Isle of Palms
1207 Palm Blvd
Isle of Palms, SC 29451

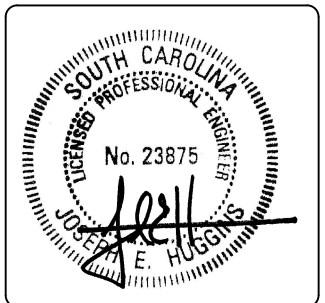
AGENT:

Coastal Science & Engineering
PO Box 8056
Columbia, SC 29202

DRAWING TITLE:

**TYPICAL HARVEST AREA SECTION
2008-2023**

Scale:	As Shown	Sheet #:
Date:	05 April 2024	05
Revised:	18 June 2024	
Project #:	2589	





MIGRATING SHOAL

Note:

Photo taken looking Northeast on January 16th 2024. Shoal anticipated to continue migrating toward the beach and attach creating harvest area shown on sheet 04.

APPLICANT:

City of Isle of Palms
1207 Palm Blvd
Isle of Palms, SC 29451

AGENT:

Coastal Science & Engineering
PO Box 8056
Columbia, SC 29202

DRAWING TITLE:

OBLIQUE AERIAL PHOTO
16 January 2024

Scale:	As Shown	Sheet #:
Date:	05 April 2024	06
Revised:	18 June 2024	
Project #:	2589	

