



December 21, 2012

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RE: P/N 2010-1041-2IG – Isle of Palms Shoal Management Project [CSE 2384]
Request for permit modification

Dear Mary Hope and Steve,

This letter is submitted on behalf of the City of Isle of Palms, SC, regarding the above referenced permit. The City requests a modification of the permit as follows:

- 1) Increase the number of allowable scraping events from two to four over the life of the permit.
- 2) Change the expiration date of the OCRM permit to match the USACE permit, with is 31 March 2017.

The City is not requesting an increase in the total volume that can be scraped and transferred under the permit, which is a maximum of 500,000 cy. Nor is the City requesting to increase the maximum allowable volume scraped during one event, which is 250,000 cy. Typical excavation and fill sections will remain unchanged, and the City will apply all conditions of the existing permitted events to the new events, if this modification is granted. A general project layout for a potential 2013 project is giving in Figure 1 of Appendix A. The reason for this request is related to the timing, scale, and sand availability in the present shoal bypassing event.



Existing Permit

The permits, issued by OCRM on 31 August 2011 and by USACE on 27 February 2012, allow for sand redistribution along the northeast end of Isle of Palms to mitigate recent erosion and in anticipation of future erosion associated with shoal-bypass events and inlet delta dynamics. Conditions of the permit limit the number of redistribution events to two, each of which can involve moving up to 250,000 cy of sand from the beach in stable or accretional areas to eroded areas. The permit stipulates that sand can only be borrowed from areas of the beach with at least 400 ft of width seaward of structures (defined by a “buffer line” in the permit drawings). No excavations are allowed landward of the buffer line. Also, a 100 ft “trigger line” is established which provides a threshold minimum beach condition before a project is justified (ie, the +5 ft NAVD contour needs to be less than 100ft from a building before a project is done).

Factors contributing to a request for permit modification

- 1) The 100 ft trigger has been met along a portion of the project area (Figure 2). Erosion has led to loss of dune area and is impacting walkovers and infrastructure. CSE expects erosion in the area to continue, and perhaps worsen over the next year due to the ongoing shoal-bypass event. Some type of erosion mitigation will be required to ensure that the ocean does not encroach on buildings.
- 2) The ongoing shoal bypass event is much larger than typical bypassing events at IOP and is thereby taking more time to progress. Based on the July 2012 condition, the oncoming shoal and sandbars on the landward (southwestern) side of the Dewees Inlet main channel contain ~2 million cy of sand above local closure depth. This compares to typical events contain less than 500,000 cy (Gaudio 1998). This shoal will have major impacts on the IOP shoreline for several years, but it is not close enough yet to use as a borrow source. Managing shoal-induced erosion will require more flexible mitigation options.
- 3) The City wishes to minimize the number of scraping events by doing fewer but larger projects (as discussed in the permit application), but must coordinate work with the timing of shoal bypass events. The current condition requires something be done; however, a large project is unfeasible at the present time due to the shoal configuration.
- 4) A permit modification is the preferred alternative compared to additional small-scale additions of upland sand. If the City uses the remaining permitted event this winter (without a modification), they will not have a mechanism to mitigate potentially severe erosion, which is expected to occur as the offshore shoal gets closer to the shoreline. If nothing is done, continued erosion will pressure property owners to place emergency sandbags.



2012 Project (Event 1 under the existing permit)

The first construction event occurred over 21 working days from 12 March thru 10 April, 2012. Work involved three off-road dump trucks, one excavator, and one bulldozer. The project moved 87,763 cy of sand. Sand was excavated from a ~2,000 linear ft borrow area between station 276 and 296, and placed along a ~1,400 linear ft fill area between stations 306 and 320. Fill was placed in a triangular planform, with the apex at station 314 (Ocean Club complex). Photos of the project are shown in Figure 3 in Appendix A.

While project permits allow for up to 250,000 cy to be moved during each event, the 2012 project moved less than 90,000 cy due to limited availability of sand in the borrow area. Recent erosion of the area near Beach Club Villas I (western end of 2012 borrow area) led to a reduced quantity of sand in the borrow area seaward of the 400 ft buffer line compared to when the plan was being developed (2010). During project planning, the City's goal was to minimize the number of scraping events by moving sufficient sand volumes (up to 250,000 cy) to realign the shoreline during shoal events and provide enough of a buffer to weather erosion in between events. The ideal borrowing condition generally occurs just before and after a shoal attaches to the beach. However, the 2012 shoreline condition was not ideal because the present-bypassing shoal has not yet attached to the beach, where it could be accessed and used as a borrow source. Meanwhile, the erosion trigger was reached in the vicinity of the Ocean Club and 18th hole of the Links Course.

Since completion of the 2012 scraping project, nearly all the sand placed in the fill area has eroded and shifted to the north and south. Over 50% was lost between project completion in April and late July. Fall storms and Hurricane Sandy in late October removed the balance. The borrow area has generally remained stable and shows early stages of buildup as the offshore shoal moves closer to the beach (presently its leading edge is situated ~1,000 ft from Mariners Walk and it has been migrating landward at about 600 ft/yr – CSE 2012, Figure 4 in Appendix A).

Causes of Erosion

Rapid erosion of the fill around Ocean Club is likely due to several factors:

- 1) Limited quantity of sand moved, which was well below the volume anticipated in each scraping event under the permit.
- 2) Wave focusing (Figure 5 in Appendix A) through the new Dewees Inlet channel, which is presently positioned directly offshore of the fill area (near Ocean Club and the 18th hole of the Links Course). A channel break in the delta shoals allows larger waves to focus on the landward shoreline. Wave diffraction through the gap in the shoals directs sediment transport away from the center of the impact area (in this case, the erosion hotspot near Ocean Club).



- 3) Erosion associated with the current shoal bypass event, which is beginning to create a salient in the shoreline near Mariner's Walk and Shipwatch. Erosional arcs typically associated with each shoal bypassing event are developing along adjacent areas.

More details of the current beach condition and justification for a permit modification are given in Appendix A to this letter (enclosed). Please contact me if you have any questions regarding the requested permit modification or need additional information. We appreciate your timely response so that planning may continue and stakeholders are informed.

Thank you for your consideration.

Sincerely,

Coastal Science & Engineering (CSE)

A handwritten signature in black ink, appearing to read 'S. Traynum', written in a cursive style.

Steven B Traynum
Coastal Scientist / Project Manager
cc: Linda Tucker (City of Isle of Palms)



Appendix A – Additional Information

Shoreline Changes 2011 to 2012

Figures 6-8 show the location of the +5 ft NAVD contour (approximate normal high-tide swash line) for 5 surveys between June 2011 and December 2012. Note that the background image was obtained in July 2011 and the beach condition has changed significantly since then, especially at the western end of the 2012 scraping areas (highlighted yellow area). At the 2012 borrow area (Fig 6), the western end of the area retreated between June 2011 and March 2012, before significant scraping had taken place. This retreat was due to sand losses from the previous shoal bypass events. This area is where oncoming shoals attached to the beach between 2007 and 2010, leading to a significant “bulge” in the shoreline and a wide beach. This area has eroded following attachment as the shoreline attempts to reach a more linear morphology. The eastern end of the borrow area has remained very stable over the past 1.5 years (and since large-scale nourishment in 2008). This is true despite removal of sand during the 2012 project.

The 2012 fill area (stations 308-320 in Figure 1) is the location of the erosion hotspot, and has been fairly stable along the western portion of the image, and erosional at the central and eastern portion (near Ocean Club and the 18th hole). The effects of the 2012 project are visible in the seaward displacement of the April 2012 contour (orange line) compared to the June 2011 line (blue line). By July 2012 (green line), the contour had essentially returned to the June 2011 condition, and by December 2012 (red line), the contour is landward of the 2011 condition everywhere except at the Ocean Club walkover. This is a loss of ~100 ft of beach width since April 2012. The seaward displacement of the contour in December 2012 at Ocean Club is due to placement of upland sand by the property owners to rebuild a dune following Hurricane Sandy. The beach condition has reached a point where water no dunes remain in front of Ocean Club and the 18th hole. Water has breached the dune line along the fairway of the 18th hole and has entered bunkers and portions of the fairway.

Beach profiles from station 314+00 (Ocean Club) are shown in Figure 2. The red line represents the pre-nourishment profile of March 2008. Large-scale nourishment (via offshore dredge) restored the beach and added over 200 ft of beach width at this site. Erosion was rapid through 2010, then slowed through 2011. Presently, there is ~80 ft more beach compared to the pre-nourishment condition; however, the high-water line has breached dunes and threatens infrastructure. This threat has led to multiple additions of sand via small-scale inland trucking operations at high cost. As of this writing, private property owners have placed ~9,000 cy of sand at a cost of roughly \$176,000 (~20 dollars per cy). These small additions do little to offer protection during above-average tides or storm events, and due to the current erosional processes described above, are short lived.



Request for Permit Modification

The City requests a permit modification to allow for up to two additional scraping events to occur. The City does not request an increase on the total volume of sand to be moved over the life of the permit (500,000 cy) or to increase the maximum moved under one event (250,000 cy). The City does not wish to modify any other condition relating to construction or monitoring. A modification would allow the City to perform another small-scale scraping event while the oncoming shoal is still offshore. A large-scale project is unfeasible until the shoal becomes accessible by land-based equipment, or a sufficient salient has formed on the beach to provide sufficient borrow material (presently, ~100,000 cy of material are available seaward of the 400 ft buffer line in the permitted borrow areas). As of July 2012, the shoal was ~1,200 ft from the beach, moving landward at a rate of ~600 ft per year over the previous year (Figure 4). This rate is likely to increase as the shoal approaches the shore and increases in elevation. As the shoal approaches, a salient in the leeward shoreline will extend seaward, increasing the apparent attachment rate. Hurricane Sandy and winter storms have likely pushed the shoal further landward, though no survey data are currently available. CSE estimates that the shoal will become accessible within the next two years, possibly by early 2014.

In applying for a modification, CSE expects that erosion along the area near Seascape, Ocean Club, and the 18th hole will worsen over the next two years due to continued wave diffraction through the channel break and formation of an erosional arc due to the attaching shoal. If the City proceeds with a project this winter (completed by 1 May 2013), they will not have a mechanism to redistribute sand when the shoal attaches and state of the beach may be more eroded. If the City chooses to wait another year or two until the shoal attaches, then continued small-scale additions of sand from upland sources will no longer be feasible and the beach will continue to retreat, likely eroding the remaining beach fronting Ocean Club and destroying a portion of the 18th hole. At that point, the property owners will likely pursue emergency measures to protect structures.

A modification would allow an additional project(s) to occur, which will move a moderate amount of material to restore and protect the hotspot over the next year. It is assumed that a project of similar scale to the 2012 project (on the order of 100,000 cy) will be necessary. This sand would be borrowed from beach in the lee of the oncoming shoal (which will be restored naturally as the shoal migrates onshore) and from the northeast point of the island, which has gained sand consistently since the 2008 nourishment. These locations are presently included in the permit as available borrow areas. The City understands that this sand is not likely to remain in place permanently due to the processes mentioned previously; however, it would offer storm protection for a period of time, or until a larger project can be done when the shoal attaches (if necessary).

It is anticipated that a project would be done in a similar fashion as the 2012 project, using similar types and numbers of equipment and requiring less than 30 working days (working during daylight hours). Photos from the 2012 project are shown below. Project construction involves excavating sand



in linear trenches near the water line, following the tides. Space is left between trenches to allow sand to infill the trenches during the ensuing high tide. This allows the beach to maintain a natural profile during construction. Generally, sand deposited in the fill area is allowed to be distributed by the tides to a natural slope rather than being bulldozed to a defined elevation; though some shaping may be required if the nightly high tide does not fully redistribute the sand.

The permittee understands potential cumulative impacts of repeated construction events, but feels that the method of construction and quantity of sand redistributed is similar to natural changes associated with shoal bypassing events.

Alternatives

The permittee believes that the requested modification is a preferable alternative compared to other options. Other alternatives are:

- 1) Do a small-scale project in early 2013 with the remaining permitted event, using the ~100,000 cy of available material. This would essentially complete the allowed work under the existing permit.
- 2) Wait until the shoal attaches to complete a large-scale project (up to 250,000 cy), which is likely to be early 2014 or 2015. This would likely result in destruction of the remaining berm near Seascape and Ocean Club, and erosion of a portion of the 18th hole and green. Continued additions of upland sand would become cost-prohibitive and would require thousands of truckloads of sand to maintain a sufficient protective buffer. Emergency measures may be required.
- 3) Complete a small-scale project in 2013 (effectively ending the present permit) and immediately apply for another permit for future work. This would involve significant risk to the City in that there is no guarantee for another permit in sufficient time to construct a project if erosion worsens over the next two years. A permit application may get delayed during regulatory review or by litigation. If this occurs, and conditions deteriorate to levels similar to those that existed prior to the 2008 nourishment, emergency measures would be required.

The permittee believes that the proposed modification is the best solution to mitigation focused erosion at a manageable cost, while having minimal impact to the environment. The City has committed to an extensive monitoring program to track changes to the delta and associated shoals. This has allowed for a better understanding of the processes controlling erosion along the island and better predictions of future changes. The purpose of this modification is to ensure that the beach will be preserved over the next several years in response to what we are currently observing in the delta.



Modification of OCRM Expiration Date.

The permittee also requests that the expiration date of the SC DHEC OCRM permit (31 August 2016) be adjusted to match the expiration date of the USACE permit (31 March 2017). This would allow an event to take place over the winter of 2016-2017, should beach conditions warrant it and an event remains available under permit conditions. The goal of this modification is to allow for a project to be constructed in the permitted winter window if the shoal does not attach to the beach until 2016. It also allows for consistency in the City's planning for future permit requests and beach management goals.

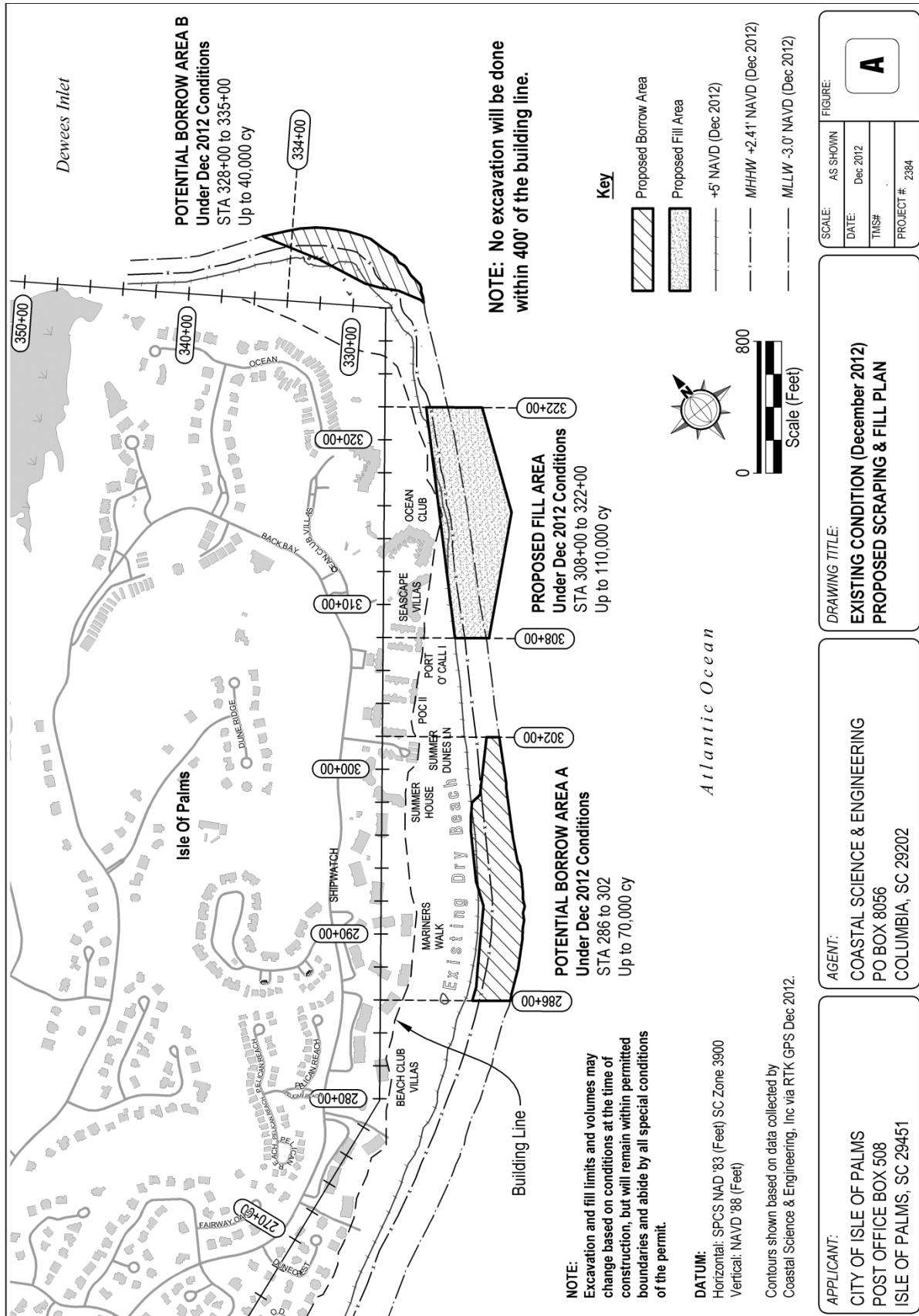


Figure 1. General construction plan for a winter 2013 scraping project if a permit modification is granted.

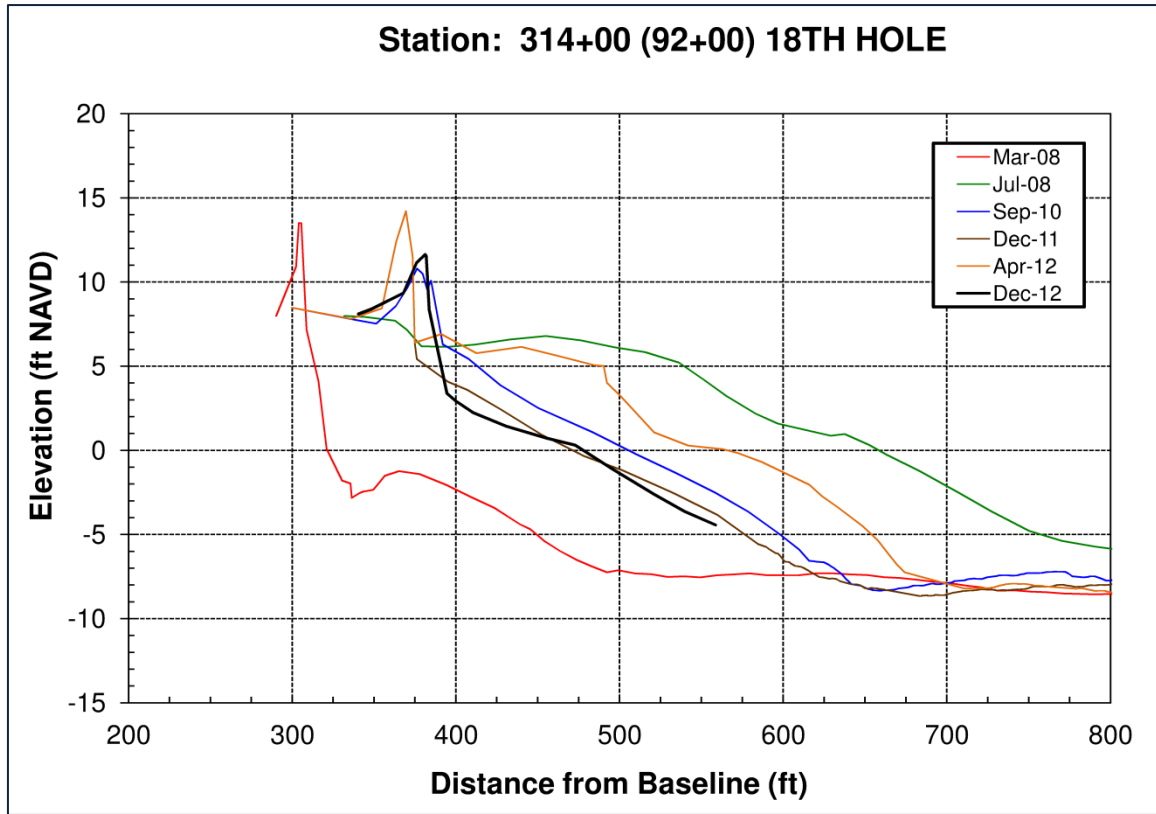


Figure 2. Beach profiles from Station 314+00, at Ocean Club and the 18th green. The red and green lines represent the pre and post-2008-nourishment profiles, respectively.

Figure 3.

Left: Typical excavations during the 2012 scraping project. Narrow channels were excavated following the tide.

Below: Sand was placed in piles and the ensuing tide was allowed to shape the fill naturally.



Above: The fill area near project completion in April 2012.

Right: The borrow area ~2 weeks after project completion in April 2012. No evidence of sand borrowing remained and the beach maintained a natural slope.



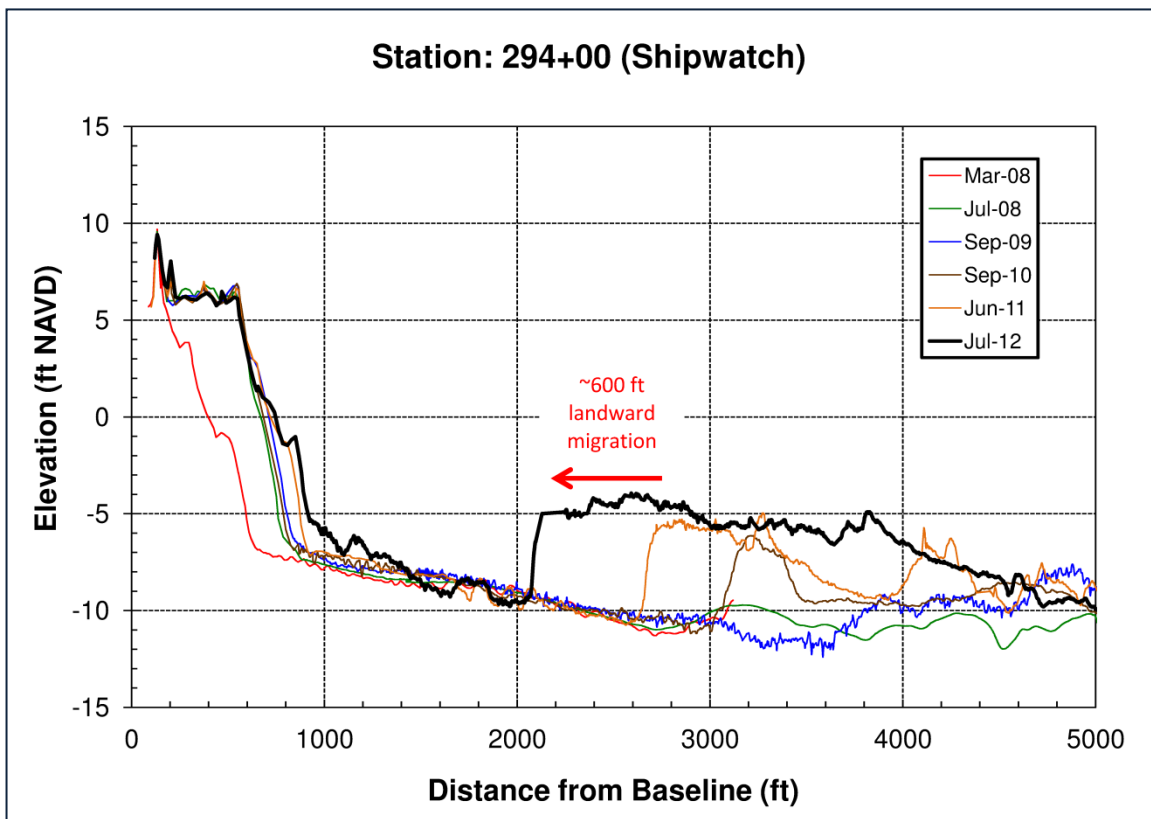


Figure 4: [Upper] September 2012 aerial image of the northeast end of Isle of Palms. Breaking waves indicate the extent of shoal sand which is migrating towards the beach. The arrow in the center of the image shows the leading edge of the shoal offshore of Shipwatch, which was ~1,200 ft from the beach in July 2012. [Lower] Profiles from station 294 (Shipwatch) showing a ~600 ft/yr migration rate of the offshore shoal over the past year.

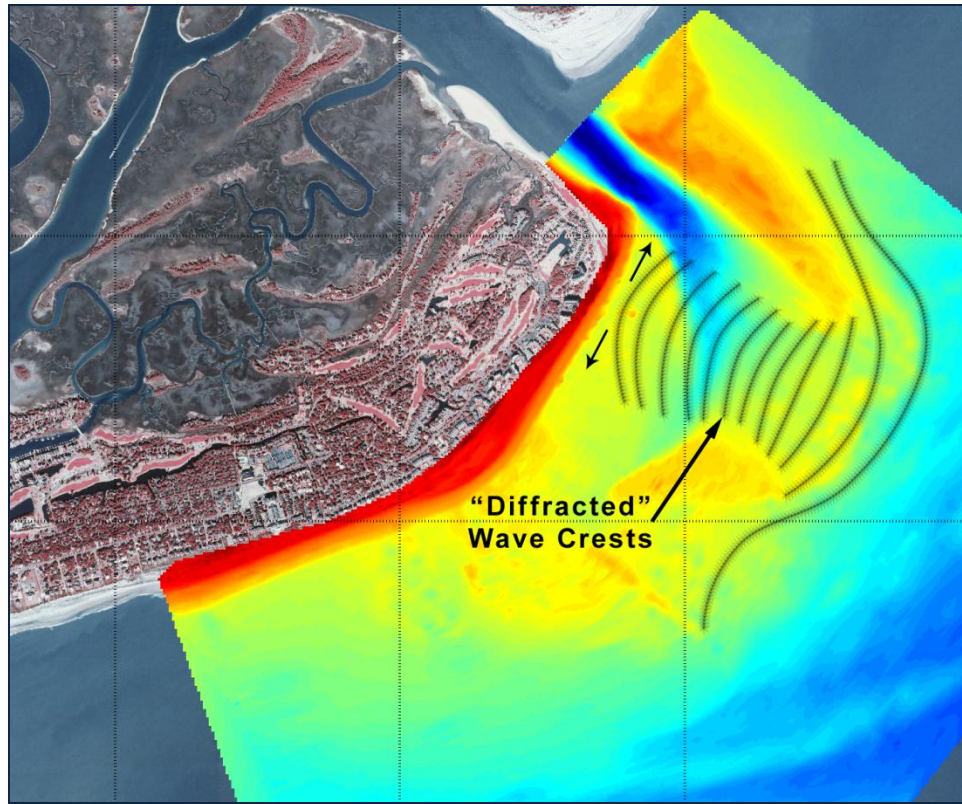


Figure 5: Wave focusing through the gap in the inlet delta creates an erosional hotspot near Ocean Club and the 18th hole. A channel avulsion event occurring over the past 4 years has relocated the channel from a southerly location to the present location.



Figure 6. Location on the +5 ft NAVD contour for recent dates along the northeast end of Isle of Palms. The borrow area for the 2012 scraping project is highlighted in yellow. Background imagery was obtained July 2011



Figure 7. Location on the +5 ft NAVD contour for recent dates along the northeast end of Isle of Palms. This area was the location of the 2012 scraping project fill area. Background imagery was obtained July 2011.



Figure 8. Location on the +5 ft NAVD contour for recent dates along the northeast end of Isle of Palms. This image shows the northeastern point of the island, and may be used as a borrow source under the existing permit.