

Fiscal Analysis

TECHNICAL STANDARDS FOR BEACH FILL PROJECTS 15A NCAC 07H .0312

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Summary

Agency DEQ, Division of Coastal Management (DCM)
Coastal Resources Commission (CRC)

Title of the Proposed Rules Technical Standards for Beach Fill Projects
Citation 15A NCAC 07H .0312

Description of the Proposed Rule This rule ensures that sand used for beach nourishment closely matches the sand on the existing beach. The rule requires that the sediment intended for beach placement, as well as the sand on the existing beach be analyzed for grain size and composition, and that they be within defined ranges of similarity before the project can begin.

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Authority G.S. 113-229(c1); G.S. 113A-107; 113A-113; 113A-115;
113A118; 113A-124

Necessity The Coastal Resources Commission proposes to amend this rule to allow the project's consultant/engineer to design a sampling protocol that assures sediment compatibility between the beach and borrow area, while strengthening recipient beach sampling protocols.

Impact Summary State government: Yes
Local government: Yes
Substantial impact: No
Federal government: No
Private citizens: Yes

Introduction and Purpose

The Coastal Resources Commission (CRC) adopted 15A NCAC 07H.0312 Technical Standards for Beach Fill Projects with an original effective date of February 1, 2007. The CRC adopted the rule to ensure that sand used for beach nourishment closely matches the sand on the existing beach. The rule requires that the sediment intended for beach placement as well as the sand on the existing beach be analyzed for grain size and composition and be within defined ranges of similarity before the project begins.

It is important to require the excavated sediment from the borrow site to be compatible with existing beach sediment because the movement and placement of these large volumes of sediment can affect water quality, surf zone fishes, benthic resources (surf zone & nearshore ocean), essential fish habitat (hard bottoms), endangered and threatened species (sea turtles), and recreational and aesthetic resources if the sediment is not compatible.

The intent of a beach fill project is primarily to replace beach sand where it has been lost to erosion. Wider beaches provide more wildlife habitat, better protection from storms, and more room for recreation. The CRC's Technical Standards for Beach Fill Projects Rule, 15A NCAC 07H.0312, first took effect in February 2007, and sets forth the protocols for characterizing the native beach sediments prior to a fill project, for sampling and characterizing potential borrow area sediments, and for ensuring that the two are compatible. "Native beach" sediment characterization is the process of defining the type of sand found on the beach prior to the construction of a beach fill project. Compatibility is important mostly to ensure that material placed on beaches is not too fine (mud or clay), or too coarse (rocks and large shells), in order to construct a new beach that is generally made up of sediment similar to pre-project beach sediment. The rule also establishes general criteria for excavation and placement of sediment.

Since 2007, the rule has been amended to change the requirements for seafloor surveys and geophysical imaging of the seafloor in areas with water depths of less than 10 feet due to the technical challenges and physical limitations of sampling at these shallow depths. The rule has also been previously revised to reduce the sampling intensity and costs in areas like Ocean Dredged Material Disposal Sites (ODMDSs) and maintained navigation channels and associated sediment basins that have historically held and been re-filled with beach-quality sand (effective August 1, 2014).

The current sampling protocol associated with the sediment criteria rules is highly precise with regards to sample design, spacing, numbers of cores, etc. This precision can limit flexibility in sample design and can also limit the ability of communities to pursue small projects or respond to nourishment opportunities in a short period of time. The sampling protocol can also severely limit applicants' ability to use existing data from past projects. Additionally, the sampling protocol may eliminate the ability of communities to take advantage of beneficial use projects (e.g. inlet dredging) that present themselves late in the planning process (i.e. too late to be able to hire a firm and/or mobilize to take the extra samples required).

The proposed rule amendments serve two purposes: 1) meet the Session Law 2017-10 (S131) Section 3.15 mandate to exempt sediment characterization of beaches receiving the material from

a cape shoal, and borrow areas within the cape shoal system – such as Frying Pan shoals at Cape Fear, Cape Lookout, and Diamond Shoals), and; 2) to eliminate the rigid data sampling protocol in favor of a simpler process where the project’s consultant or engineer is allowed flexibility to design a sampling protocol that assures sediment compatibility between the beach and borrow area. The CRC will retain existing standards for the various grain sizes (e.g. the percentage of “fines” shall not exceed more than 5% over the recipient beach), and strengthen recipient beach sampling protocols but substitute language similar to that in the terminal groin legislation (Section 1. G.S. 113A-115.1(e)(4), which requires the applicant’s consultant/engineer attest to sediment compatibility from borrow sites (e.g. “*Compatibility with these sediment standards shall be documented by a professional engineer licensed to practice pursuant to Chapter 89C of the General Statutes.*”)

In addition to directing the agency to adopt a rule to exempt beaches receiving the material from a cape shoal and borrow areas within the cape shoal system from sediment characterization, Session Law 2017-10 (S131) Section 3.15 required the rule to be substantively identical to the provisions in the Session Law and required the agency to implement the Session Law in the intervening period. Therefore, Session Law 2017-10 is considered to be the regulatory baseline and this fiscal note will not address the impact of the conforming rule provisions at 15A NCAC 07H. 0312(1)(a) and 15A NCAC 07H. 0312(2).

This document will assess the impact of the remainder of the proposed rule changes.

Description of the Proposed Rules

The CRC’s Technical Standards for Beach Fill Projects Rule, 15A NCAC 07H.0312 contains four specific sections: (1) defines the method to characterize native beach sediment in order to establish a baseline for the beach that will receive the sediment; (2) defines the methods to characterize the sediment at borrow sites from which material will be removed and eventually placed on the beach; (3) defines the method and standards to be used to determine sediment compatibility of borrow site and sediment on the beach, and; (4) defines sediment excavation limit in terms of depth and time. The below rule amendments are intended to provide additional clarity to existing rules, strengthen the methodology required for characterizing sediment beach, and eliminate the rigid data sampling protocol in favor of a simpler process where the project’s consultant or engineer is allowed to design a sampling protocol that assures sediment compatibility between the beach and borrow area.

15A NCAC 07H. 0312(1)(a): The CRC is amending Sub Item (1)(a) to meet the Session Law 2017-10 (S131) Section 3.15 mandate to exempt sediment characterization of beaches that is receiving the sediment from a borrow site that is completely contained within the cape shoal system (Frying Pan shoals at Cape Fear, Cape Lookout, and Diamond Shoals at Cape Hatteras).

15A NCAC 07H. 0312(1)(c): After consultation with stakeholders, the Commission decided that the existing requirement in Sub Item (1)(c) which establishes the maximum allowed transect spacing (5,000 feet), almost 1 mile, is insufficient for the purpose of surveying and characterizing native beach. The CRC is amending this rule to reduce transect spacing to one-half mile (2,640

feet), which could potentially double the amount topographic and bathymetric surveying needed to characterize native beach sediment.

15A NCAC 07H. 0312(1)(d): This rule currently requires that sediment samples be taken from each of the morphodynamic zones starting from the frontal dune and oceanward and at six feet depth increments out to twenty feet, or a distance of 2,400 feet seaward of mean low water (MLW), whichever is more landward. This rule also requires a minimum of thirteen sediment samples be taken along each transect, and that the number of samples taken landward of MLW to equal the total number of samples taken seaward of MLW. The CRC is amending this rule to remove the minimum sample requirement and required number of samples above and below MLW as they are deemed not necessary given that the rule already has sampling requirements, and not all locations will have each of the morphodynamic zones listed within the rule.

15A NCAC 07H. 0312(1)(g): Requires the percentage by weight calcium carbonate be calculated from a composite of all sediment samples along each transect defined in Sub Item (1)(d) of this rule. The CRC is amending this rule for simplicity, and requiring the percentage by weight calcium carbonate to simply be calculated from a composite of all sediment samples, and removes the reference to Sub Item (1)(d).

15A NCAC 07H. 0312(1)(h): Establishes the method for determining the number of sediments and shell material greater than three inches in diameter on the native beach. Currently, this rule requires a visual observation for an area of 50,000 square feet within the project area as defined in 07H. 0312(1)(h). Because this method does not adequately characterize the sediment for the entire project area, the CRC is amending this method to require a visual observation of a three square meter (approximately 10 square feet) at each sample point along each transect between mean low water (MLW) and the front dune.

15A NCAC 07H. 0312(2): Defines the methods to characterize the sediment at borrow sites from which material will be removed and eventually placed on the beach. The CRC is amending Item (2) to meet the Session Law 2017-10 (S131) Section 3.15 mandate to exempt sediment characterization of borrow areas that are completely contained within the cape shoal system (Frying Pan shoals at Cape Fear, Cape Lookout, and Diamond Shoals at Cape Hatteras).

15A NCAC 07H. 0312(2)(b): The intent of this rule is to allow the use of historic data for the purposes of characterizing sediment. Use of historic data can potentially save or reduce time and costs associated with sampling of borrow areas. The CRC is amending this rule because it does not sufficiently provide the framework needed to qualify historic data. The amended language references Sub Items within this rule that specifically defines the methods for sampling, thus allowing the use of data that was sampled in a manner consistent with required methods.

15A NCAC 07H. 0312(2)(c-f): These rules collectively define methodologies for surveying and sampling sediment borrow sites. The CRC has determined that these rules are overly prescriptive, and do not allow certified licensed professional engineers and/or geologist the opportunity to design a site specific sampling protocol that is best suited for the purpose of determining if the sediment contained within the borrow site is compatible with that of the native beach. Therefore, the CRC is amending the following: Sub Item (2)(d) is being amended to remove the maximum

grid spacing requirement for geophysical imaging of the seafloor; Sub Item (2)(e) is being amended to remove maximum grid spacing requirement for core sampling, and; the CRC is eliminating the existing Sub Item (2)(f) that defines the sampling grid spacing for offshore dredged material disposal sites (ODMDS). The CRC determined that this Sub Item is not necessary since they are allowing the use of historic data, and allowing the project engineer or geologist to design the most suitable sampling method for borrow sites.

15A NCAC 07H. 0312(3): This rule defines the criteria for determining sediment compatibility between the native beach and borrow site(s). The CRC is amending this rule to require compliance with these standards to be certified by a licensed individual pursuant to Chapter 89C or 89E of the N.C. General Statutes.

15A NCAC 07H. 0312(4): This rule requires excavation and placement of sediment to conform to the criteria defined within this rule.

15A NCAC 07H. 0312(4)(a): This Sub Item requires the depth of sediment excavation from the seafloor not exceed the maximum depth of recovered core at each coring location for the purpose of ensuring that the sediment being excavated has been sampled, analyzed, and confirmed to be compatible with the native beach sediment. The CRC has determined that by allowing the project's licensed individual to design the borrow site sampling protocol for each site, and also certify conformity to these rules, that the existing Sub Item (a) is no longer needed.

15A NCAC 07H. 0312(4)(b): This rule requires that no excavation or placement of sediment shall occur within the project area during any moratoriums designated by the Division of Coastal Management in consultation with other state or Federal agencies. The CRC is amending this rule for clarification purposes only. No existing restrictions are being removed from existing rule language, and no new restrictions are included.

15A NCAC 07H. 0312(4)(c): The intent of this rule is to ensure that large material, sediment with a diameter greater than three inches, does not exceed twice the background value as measured on the beach prior to the start of the beach fill project. The CRC is amending this rule for clarity, and to also require that in the event that more than twice the background value of incompatible sediment is placed on the beach, it will be the permittee's responsibility to remove the incompatible material in coordination with the Division of Coastal Management.

COSTS, BENEFITS, OR NEUTRAL IMPACTS

Since technical standards for beach fill projects first went into effect in 2007, costs associated with fulfilling these rule requirements occur within three phases of the project: 1) sampling and characterizing native beach; 2) sampling and characterizing the borrow site, and 3) if needed, any mitigation required in the event that non-compatible sediment is placed on the recipient beach.

Local Government, or Local, State, and Federal Government Partners

Typically, local governments initiate beach nourishment projects and serve as the permittee. In terms of cost associated with these amendments, the CRC anticipates that there could be added cost when sampling and characterizing the recipient beach due to the proposed increase in the number of sampling transects needed. However, the primary benefit associated with these rule amendments for local government is that the use of qualified historic data will be allowed for both characterization of the recipient beach and borrow site(s) where available; and once the sediment on a recipient beach has been characterized, there will be no requirement for subsequent data collection and analyses.

Sampling and Characterizing the Recipient Beach:

Currently, rules (15A NCAC 07H .0312(1)(c) -(h)) require sampling transects to be spaced no greater than 5,000 feet apart and no fewer than 13 samples per transect, or one sample from each morphodynamic zones with an equal number of samples below and above mean low water – making the total number of samples required to be approximately 13 per transect. In addition, the total number of sediments and shell material greater than or equal to three inches in diameter, observable on the surface of the beach between mean low water and the frontal dune toe, shall be calculated for an area of 50,000 square feet within the beach fill boundaries. After consultation with engineers/geologist conducting beach nourishment projects in North Carolina, the CRC has determined that these requirements may not always result in the recipient beach being adequately characterized.

The CRC is proposing to decrease the transect spacing from 5,000 feet to 2,640 feet (one-half mile) in order to require additional samples to produce finer resolution data to more accurately characterize the recipient beach before the beach nourishment project occurs. Currently, the transect spacing results in approximately one set of samples per mile of beach within the project area. The amendments will reduce the requirement to approximately one set of samples per one-half mile of beach, thus potentially doubling the cost.

For example, an approximate one-mile section of beach currently requires one set of samples for a minimum of 13 samples. Each sieve and carbonate analysis for each sample costs approximately \$100; making the minimum cost to sample and analyze sediment at each transect approximately \$1,300. By reducing the transect spacing to one-half mile, the cost per transect would increase to approximately \$2,600. This does not include cost associated with sample collection, vessel mobilization/demobilization, and engineering analysis and reporting; primarily due to costs varying based on project specifics such as vessel and ATV requirements/usage, or other project-specific mobilization and collection requirements. However, for the purposes of illustrating these potential costs, the Bogue Banks sediment characterization consisted of 25 transects (approximately 25 miles), and cost approximately \$10,000 for data collection and vessel mobilization/demobilization, and the engineering analysis and reporting cost an additional \$5,000

(total of \$15,000)¹. In this Bogue Banks example, the added cost for each individual sieve and calcium carbonate analysis (\$100) would be in addition to the \$15,000.

Using these costs as an estimation, and assuming that only the minimum number of samples were collected (13 per transect) along each transect as required in existing rules (15A NCAC 07H .0312), the total estimated cost would be approximately \$47,500 $\{(\$1,300 \times 25) + \$15,000 = \$47,500\}$. Because \$15,000 is not a ratio of cost per transect, we can assume that if the number of transects required for the same project were approximately doubled (from 25 to 50 transects), as required by these rule amendments, that this cost would increase in a range between \$15,000 and \$30,000, and that the total cost for sieve and carbon analyses would increase from \$32,500 to approximately \$65,000; thus resulting in a total cost range between \$80,000 to \$95,000. Compared to the current rule, the costs of the Bogue Banks project would have been \$33,000 to \$43,000 higher than under the proposed rule.

These amendments will nearly double the cost needed to characterize the sediment on the recipient beach with this increase of approximately \$2,000 per transect or \$33,000 to \$43,000 per project. However, these amendments will also allow the use of qualified historic data and only require a recipient beach to be analyzed once prior to the first beach nourishment project. Currently, over eighty percent (80%) of the State's oceanfront communities have completed a large-scale beach nourishment projects, and would therefore not be required to re-characterize sediment in the same area for subsequent projects. Approximately 20% of the oceanfront communities (43 miles of oceanfront shoreline), to include Sunset Beach, Surf City, Hatteras Village, Avon, Salvo, Waves and Corolla to VA have not constructed beach nourishment projects because there are either no pressing needs, or current plans to pursue a project. These communities would incur the same increased cost of approximately \$2,000 per transect or \$33,000-\$43,000 for their initial characterization should they choose to undertake a nourishment project in the future, assuming no historical data exists for any portion of these 43 miles, and that the cost for characterizing the recipient beach is comparable to the estimation calculated for the Bogue Banks project. Within the context of these amendments, it is anticipated that a one-time additional cost to characterize all 43 miles would range from approximately \$57,000 to \$74,000. Therefore, the CRC does not anticipate that these amendments will increase the cost of sampling enough to exceed the \$1M threshold.

This one-time cost increase could be offset initially by cost-savings resulting from the additional rule amendments that will allow qualified/certified contractors an ability to design a sampling protocol for the borrow site, should the contractor determine that compatibility can be determined with fewer samples and surveys. Over the long term, communities may experience cost savings if the same beach is re-nourished or the same borrow site is used because no further sampling or surveys would be required. This would equate to a savings of \$2,000/transect or 47,000 per each subsequent project, assuming that the cost for characterizing the recipient beach is comparable to the estimation calculated for the Bogue Banks project.

Beach nourishment projects can be a cost share between local governments, state, and federal agencies, or they can be fully funded by local government. Local governments typically obtain

¹ Moffat & Nicol, Johnny Martin, PE, July 2018

their funds from an authorized portion of its occupancy tax (S.L. 2013-223), or from established oceanfront and non-oceanfront special property tax districts. These funds accumulate and are held in savings until they are needed for a project. For qualified projects, the State has a dedicated fund (Shallow Draft Navigation Channel Dredging & Aquatic Weed Fund) that is used for cost sharing with local governments. For Tier 1 counties the State contributes 75% and local contributes 25%; and for Tier 2 & 3 counties, the State will contribute 66.6% and local government 33.3%. Currently, the local governments that have utilized these also have had a sediment characterization analysis completed for previous projects and will not need to characterize the recipient beach. As these amendments will allow those previous analyses to be used for future projects, there will be cost savings for local governments or cost-sharing partners over the long term.

Sampling and Characterizing the Borrow Site:

Rules in 15A NCAC 07. 0312(2) define the methods used to characterize the sediment within a borrow site. Currently, these rules specify the grid spacing that is to be used to space vibracore sampling and geophysical imaging of the seafloor subsurface. The cost range for vibracores ranges between \$4,500 and \$10,000², and includes sieve and carbonate analysis, vessel mobilization/demobilization, collection, and engineering analysis and reporting. This amendment maintains the current minimum core spacing (one per 23 acres), but will allow the use of historic data, and allow the professional engineer/geologist to establish a vibracore spacing that is sufficient for characterizing the borrow site. By removing the specific grid spacing requirements, there is potential for a savings or neutral cost if the professional engineer or geologist can design a sampling regiment that requires fewer vibracores.

Private Entities

Property Owners and General Public

Although beach nourishment projects do come at a cost, studies suggest that there is a return on the investment³. Maintaining a healthy wide beach, that is also free of erosion control structures (i.e., sandbags, seawalls, groins), serves as a buffer to protect homes and businesses from storm damage, creates habitat for those species dependent on a sandy beach (threatened or endangered shore birds, turtles), and also improves the recreation quality of the beach, which is more appealing to tourist visiting and contributing to NC's coastal economy.

Excavation of sediment from a borrow site and placement of that sediment on an eroded beach also has the potential to negatively impact water quality, surf zone fishes, benthic resources (surf zone & nearshore ocean), essential fish habitat (hard bottoms), endangered and threatened species (sea turtles), and recreational and aesthetic resources. For these reasons, the intent of these rules in

² Moffat & Nicol, Johnny Martin, PE, July 2018; and APTIM, Ken Wilson, PG, July 2018

³ Beach Nourishment Executive Summary: A Report to the North Carolina General Assembly Joint Legislative Oversight Committee on Agriculture, Natural and Economic Resources, Session Law 2016-94 (House Bill 1030), Section 14.22.(a), NC Department of Environmental Quality, Division of Coastal Management, November 2016.

both current and amended form, are to ensure that when a beach nourishment project is installed, that the quality of the sand on the beach remains the same. Compared to current practices, these amendments are not intended to jeopardize the quality of NC's beaches, but rather strengthen the methodology for sampling and characterizing beach sediment.

Although the proposed rules would allow contractors to have more flexibility in sampling and characterizing potential borrow sites, the CRC believes that increasing the number of required beach samples to improve resolution of beach sediment data and allowing a licensed professional to design a sufficient sampling regime for potential borrow sites will result in a beach nourishment project that meets the intent of these rules, which is to ensure compatible sediment is placed on the beach; and if it is not, stop placement of sediment, and/or remove it. The State recognizes the qualifications of a certified/licensed engineer & surveyor (General Statutes Chapter 89C) and professional geologist (General Statutes Chapter 89E), and their data and analyses will continue to be reviewed by DCM staff, but the onus of ensuring compatibility is met by "certifying" that the sediment from the borrow site matches that of the recipient beach will be on the contractor. If it is not, the intent of Rule 07H.0312(4) is ensure that the incompatible material is removed from the beach.

Private property owners do not obtain permits for the purpose of beach nourishment, nor do all contribute to the cost of installing specific projects. However, some private property owners in certain communities (i.e., Emerald Isle, Indian Beach, Pine Knoll Shores) do contribute based on a special tax districts in relation to the oceanfront toward these projects. This tax is paid each year regardless of whether or not a beach nourishment project is planned. Because the sediment on these beaches have already been characterized, there will be no need to re-sample, thus no additional expenditures are required. Private property owners could benefit in the long term from cost savings assuming the scope and frequency of beach nourishment projects remains unchanged relative to the current rule baseline.

Beach Nourishment-Related Businesses

As previously mentioned, these rule amendments will require one-time additional sampling for characterizing the recipient beach, and is expected that a contractor would factor the additional work into the cost of completing the project. However, within the scope of the entire project, the cost to characterize beach sediment is relatively small (approximately 5-10%) compared to the cost of searching for and analyzing sediment within potential borrow sites. It is important to recall that once a section of beach has been characterized, these amendments will allow the initial analysis to serve as the baseline for subsequent projects on the same section of beach, and at that time a contractor would not be required to re-analyze the beach; which would no longer be a factor in the cost of completing future projects. This doesn't necessarily translate into a loss for contractors given the relatively small cost associated with analyzing the recipient beach and the uncertainties, challenges and cost that come with first finding potential sand sources, and then analyzing sediment at those borrow sites to make sure it is beach compatible. It is the intent of the CRC that these amendments will give flexibility to the contractor and allow them to use their

professional expertise and focus on identifying and placing compatible sediment on the beach, which is the overarching goal of these rules and amendments.

Division of Coastal Management

The Division of Coastal Management does not anticipate any change in permitting receipts as a result of these amendments. However, it is possible that because these amendments allow the permittee's contractor or engineer to calculate and determine sediment compatibility, it is possible, but not certain that the permit review process could be completed more efficiently.

Department of Transportation

Pursuant to G.S. 150B-21.4, the agency reports that the proposed amendments to 15A NCAC 7H.0312 will not significantly affect environmental permitting for the NC Department of Transportation (NCDOT). NCDOT does not perform beach fill projects, and currently does not intend to begin doing so. Dredging, spoil disposal, transportation-related fill, a dune fortification are exempt activities under this rule.

COST/BENEFIT SUMMARY

As previously mentioned, the CRC's rule amendments will serve two purposes: 1) meet the Session Law 2017-10 (S131) Section 3.15 mandate to exempt sediment characterization of beaches receiving material from a cape shoal, and borrow areas within the cape shoal system –Frying Pan shoals at Cape Fear, Cape Lookout, and Diamond Shoals), and 2) to eliminate the rigid data sampling protocol in favor of a simpler process where the project's consultant or engineer is allowed to design a sampling protocol that assures sediment compatibility between the beach and borrow area. This impact analysis focuses only on the latter changes to the sampling protocol and does not assess the impact of exempting material from a cape shoal.

The proposed rules require more data to be collected in order to establish improved baseline sediment characterization of the recipient beach and give the contractor or engineer greater flexibility to design the sampling protocol for potential borrow sites. Compatibility between the borrow areas and recipient beach is promoted by improving the resolution of beach sediment data and putting the onus of certifying the compatibility on the licensed professional engineer or geologist.

The placement of compatible sediment is important to minimize adverse impacts of beach nourishment projects on water quality, surf zone fishes, benthic resources (surf zone & nearshore ocean), essential fish habitat (hard bottoms), endangered and threatened species (sea turtles), and recreational and aesthetic resources.

Because sand sources are limited and not always uniform throughout, these rules alone do not guarantee that incompatible sediment will not be unintentionally placed on the beach during a beach nourishment project. However, it is the hope of the CRC that these rule amendments will

reduce potential for incompatible sediment being placed on the beach. If this goal is achieved, these proposed changes could also result in potential cost savings by not having to bear any added cost required for mitigation in the event that incompatible material is placed on the beach. For example, in 2018 it cost the Town of North Topsail Beach \$28,000 to remove large rocks from the beach over the course of three days following the completion of their nourishment project.

With the responsibility for establishing the sampling protocol placed on project applicants, the Division of Coastal Management staff will have more time to devote to the environmental review components of the project, and possibly decreasing the time to permit issuance.

In terms of cost, the CRC acknowledges that by decreasing the transect spacing to one-half mile, that the sediment characterization of the recipient beach would result in finer resolution data but would theoretically double the cost associated with characterizing sediment on the recipient beach. However, the CRC has also amended their rules to allow the use of qualified historic data and to only require a one-time sediment characterization analysis for the same project area that would serve as a baseline for all future projects. Eighty percent of local governments on the oceanfront have completed large-scale beach nourishment projects and would not need to re-characterize those same portions of beach, and nearly all of the remaining twenty percent (43 miles) does not have an immediate need or plan to nourish. Communities would incur an increased cost of approximately \$2,000 per transect or \$33,000-\$43,000 per project for their initial characterization (if no qualifying historical data are available) should they choose to undertake a nourishment project in the future. Over the long term, communities may experience cost savings if the same beach is re-nourished or the same borrow site is used because no further sampling or surveys would be required. This would equate to a savings of \$2,000/transect or 47,000 per each subsequent project, assuming that the cost for characterizing the recipient beach is comparable to the estimation calculated for the Bogue Banks project.

As for amendments associated with characterizing sediment in the borrow site(s), these amendments will not require additional sampling criteria or restrictions, but rather allow the project's consultant or engineer to design a site-specific sampling design to insure that sediment placed on dredged from the borrow site has similar characteristics to that of the recipient beach. These amendments have the potential to reduce sampling costs.

References

“Ocean Isle Beach 2018 Annual Beach Monitoring Report”, Oct., 2018, Aptim Coastal Planning & Engineering of North Carolina, Inc.

“2016 Annual Beach Monitoring Report: Holden Beach, NC”, Sept. 2016, Applied Technology & Management

“Bald Head Island, NC Beach Monitoring Program: Monitoring Report No. 16 (May 2017 to May 2018)”, July 2018, Olsen Associates, Inc.

“Coastal Storm Risk Management Carolina Beach & Kure Beach New Hanover County, NC,” October 2018, USACE Wilmington District.

Oak Island Post-Matthew FEMA Emergency Dune Restoration Project, April 2017, Moffatt & Nichol

USACE Public Notice: Pea Island and Rodanthe, Action ID Number: SAW-2013-01129, July 2013, USACE Wilmington District

Town of Kill Devil Hills Shore Protection Project: Beach Maintenance Plan, August 2017, Coastal Planning & Engineering of NC, Inc.

15A NCAC 07H .0312 TECHNICAL STANDARDS FOR BEACH FILL PROJECTS

Placement of sediment along the oceanfront shoreline is referred to in this Rule as "beach fill." Sediment used solely to establish or strengthen dunes shall conform to the standards contained in 15A NCAC 07H .0308(b). ~~or Sediment used~~ to re-establish state-maintained transportation corridors across a barrier island breach in a disaster area as declared by the Governor is not considered a beach fill project under this Rule. Beach fill projects including beach nourishment, dredged material disposal, habitat restoration, storm protection, and erosion control may be permitted under the following conditions:

- (1) The applicant shall characterize the recipient beach according to the following methodology. ~~Initial characterization of the recipient beach shall serve as the baseline for subsequent beach fill projects:~~
 - (a) Characterization of the recipient beach is not required for the placement of sediment directly from and completely confined to a ~~cape shoal system, or~~ maintained navigation channel or associated sediment basins within the active nearshore, beach or inlet shoal ~~system.~~ ~~system;~~ For purposes of this rule, "cape shoal systems" include the Frying Pan Shoals at Cape Fear, Lookout Shoals at Cape Lookout, and Diamond Shoals at Cape Hatteras;
 - (b) Sediment sampling and analysis shall be used to capture the three-dimensional spatial variability of the sediment characteristics including grain size, sorting and mineralogy within the natural system;
 - (c) Shore-perpendicular ~~transects shall be established for~~ topographic and bathymetric surveying of the recipient beach. ~~beach shall be conducted to determine the beach profile.~~ Each transect shall extend from the frontal dune crest seaward to a depth of 20 feet (6.1 meters) or to the shore-perpendicular distance 2,400 feet (732 meters) seaward of mean low water, whichever is in a more landward position. Transect spacing shall not exceed ~~one half mile~~ 5,000 feet (1,524 meters) in the shore-parallel ~~direction;~~ ~~direction.~~ Elevation data for all transects shall be referenced to the North American Vertical Datum of 1988 (NAVD 88) and the North American Datum of 1983 (NAD 83);
 - (d) ~~No fewer than 13 sediment samples shall be taken along each beach profile transect.~~ ~~Along each transect, at~~ At least one sample shall be taken from each of the following morphodynamic zones where present: frontal dune, frontal dune toe, mid berm, mean high water (MHW), mid tide (MT), mean low water (MLW), trough, bar crest and at even depth increments from 6 feet (1.8 meters) to 20 feet (6.1 meters) or to a shore-perpendicular distance 2,400 feet (732 meters) seaward of mean low water, whichever is in a more landward position. ~~The total number of samples taken landward of MLW shall equal the total number of samples taken seaward of MLW;~~
 - (e) For the purpose of this Rule, "sediment grain size categories" are defined as "fine" (less than 0.0625 millimeters), "sand" (greater than or equal to 0.0625 millimeters and less than 2 millimeters), "granular" (greater than or equal to 2 millimeters and less than 4.76 millimeters) and "gravel" (greater than or equal to 4.76 millimeters and less than 76 millimeters). Each sediment sample shall report percentage by weight of each of these four grain size categories;
 - (f) A composite of the simple arithmetic mean for each of the four grain size categories defined in Sub-Item (1)(e) of this Rule shall be calculated for each transect. A grand mean shall be established for each of the four grain size categories by summing the mean for each transect and dividing by the total number of transects. The value that characterizes grain size values for the recipient beach is the grand mean of percentage by weight for each grain size category defined in Sub-Item (1)(e) of this Rule;
 - (g) Percentage by weight calcium carbonate shall be calculated from a composite of all sediment ~~samples.~~ ~~samples along each transect defined in Sub-Item (1)(d) of this Rule.~~ The value that characterizes the carbonate content of the recipient beach is a grand mean calculated by summing the average percentage by weight calcium carbonate for each transect and dividing by the total number of transects. For beaches on which fill activities have taken place prior to the effective date of this Rule, the Division of Coastal Management shall consider visual estimates of shell content as a proxy for carbonate weight percent;
 - (h) The ~~total~~ number of sediments and shell material greater than or equal to three inches (76 millimeters) in ~~diameter shall be calculated through visual observation at each transect~~

within the beach fill project boundaries for an observable 3 square meter surface area of the beach for each sample point between mean low (MLW) and the front dune toe as defined in Sub-Item (1)(d) of this rule. diameter, observable on the surface of the beach between mean low water (MLW) and the frontal dune toe, shall be calculated for an area of 50,000 square feet (4,645 square meters) within the beach fill project boundaries. This area is considered a representative sample of the entire project area. A grand mean shall be calculated for all transects and referred to as the "background" value;

- (i) Beaches that received sediment prior to the effective date of this Rule shall be characterized in a way that is consistent with Sub-Items (1)(a) through (1)(h) of this Rule and shall use data collected from the recipient beach prior to the addition of beach fill. If such data were not collected or are unavailable, a dataset best reflecting the sediment characteristics of the recipient beach prior to beach fill shall be developed in coordination with the Division of Coastal Management; and
 - (j) All data used to characterize the recipient beach shall be provided in digital and hardcopy format to the Division of Coastal Management upon request.
- (2) Characterization of borrow areas is not required if completely confined to a cape shoal system. For purposes of this rule, "cape shoal systems" include the Frying Pan Shoals at Cape Fear, Lookout Shoals at Cape Lookout, and Diamond Shoals at Cape Hatteras. The applicant shall characterize the sediment to be placed on the recipient beach according to the following methodology:
- (a) The characterization of borrow areas including submarine sites, upland sites, and dredged material disposal areas shall be designed to capture the three-dimensional spatial variability of the sediment characteristics including grain size, sorting and mineralogy within the natural system or dredged material disposal area;
 - (b) The characterization of borrow sites shall include historical sediment characterization data collected using methods consistent with Sub-Items (2)(c) through (2)(g) of this Rule; (sediment characterization data provided by the Division of Coastal Management where available. These data can be found in individual project reports and studies, and shall be provided by the Division of Coastal Management upon request and where available;
 - (c) Seafloor surveys shall measure elevation and capture acoustic imagery of the seafloor. Measurement of seafloor elevation shall cover 100 percent, percent or the maximum extent practicable, of each submarine borrow site and use survey-grade swath sonar (e.g. multibeam or similar technologies). technologies) in accordance with current US Army Corps of Engineers standards for navigation and dredging. Seafloor imaging without an elevation component (e.g. sidescan sonar or similar technologies) shall also cover 100 percent, percent or the maximum extent practicable, of each borrow site. site and be performed in accordance with US Army Corps of Engineers standards for navigation and dredging. Because shallow submarine areas can provide technical challenges and physical limitations for acoustic measurements, seafloor imaging without an elevation component may not be required for water depths less than 10 feet (3 meters). Alternative elevation surveying methods for water depths less than 10 feet (3 meters) may be evaluated on a case-by-case basis by the Division of Coastal Management. Elevation data shall be tide- and motion-corrected and referenced to NAVD 88 and NAD 83. Seafloor imaging data without an elevation component shall be referenced to the NAD 83. All final seafloor survey data shall conform to standards for accuracy, quality control and quality assurance as set forth by the US Army Corps of Engineers (USACE). The current surveying standards for navigation and dredging can be obtained from the Wilmington District of the US Army Corps of Engineers (USACE). USACE. For offshore dredged material disposal sites, only one set of imagery without elevation is required. Sonar imaging of the seafloor without elevation is not required for borrow sites completely confined to maintained navigation channels, sediment deposition basins within the active nearshore, beach or inlet shoal system;
 - (d) Geophysical imaging of the seafloor subsurface shall be used to characterize each borrow site. site and shall use survey grids with a line spacing not to exceed 1,000 feet (305 meters). Offshore dredged material disposal sites shall use a survey grid not to exceed 2,000 feet (610 meters) and only one set of geophysical imaging of the seafloor subsurface is required. Survey grids shall incorporate at least one tie point per survey line. Because shallow submarine areas can pose technical challenges and physical limitations for

geophysical techniques, subsurface data may not be required in water depths less than 10 feet (3 meters), and the Division of Coastal Management shall evaluate these areas on a case-by-case basis. Subsurface geophysical imaging shall not be required for borrow sites completely confined to maintained navigation channels, sediment deposition basins within the active nearshore, beach or inlet shoal system, or upland sites. All final subsurface geophysical data shall use accurate sediment velocity models for time-depth conversions and be referenced to NAD 83;

- (e) Sediment sampling of all borrow sites shall use a vertical sampling device no less than 3 inches (76 millimeters) in diameter. Characterization of each borrow site shall use no fewer than ~~one core every 23 acres, five evenly spaced cores or one core per 23 acres (grid spacing of 1,000 feet or 305 meters), whichever is greater.~~ Characterization of borrow sites completely confined to maintained navigation channels or sediment deposition basins within the active nearshore, beach or inlet shoal system shall use no fewer than five evenly spaced vertical samples per channel or sediment basin, or sample spacing of no more than 5,000 linear feet (1,524 meters), whichever is greater. Two sets of sampling data (with at least one dredging event in between) from maintained navigation channels or sediment deposition basins within the active nearshore, beach or inlet shoal ~~system, or offshore dredged material disposal site (ODMDS)~~ system may be used to characterize material for subsequent nourishment events from those areas if the sampling results are found to be compatible with Sub-Item (3)(a) of this Rule. In submarine borrow sites other than maintained navigation channels or associated sediment deposition basins within the active nearshore, beach or inlet shoal system where water depths are no greater than 10 feet (3 meters), geophysical data of and below the seafloor are not ~~required, required, and sediment sample spacing shall be no less than one core per six acres (grid spacing of 500 feet or 152 meters).~~ Vertical sampling shall penetrate to a depth equal to or greater than permitted dredge or excavation depth or expected dredge or excavation depths for pending permit applications. All sediment samples shall be integrated with geophysical data to constrain the surficial, horizontal and vertical extent of lithologic units and determine excavation volumes of compatible sediment as defined in Item (3) of this Rule; ~~Because shallow submarine areas completely confined to maintained navigation channel or associated sediment basins within the active nearshore, beach or inlet shoal system can pose technical challenges and physical limitations for vertical sampling techniques, geophysical data of and below the seafloor may not be required in water depths less than 10 feet (3 meters), and the Division of Coastal Management shall evaluate these areas on a case by case basis;~~
- ~~(f)~~ For offshore dredged material disposal sites, the grid spacing shall not exceed 2,000 feet (610 meters). Characterization of material deposited at offshore dredged material disposal sites after the initial characterization are not required if all of the material deposited complies with Sub-Item (3)(a) of this Rule as demonstrated by at least two sets of sampling data with at least one dredging event in between;
- ~~(g)~~(f) Grain size distributions shall be reported for all sub-samples taken within each vertical sample for each of the four grain size categories defined in Sub-Item (1)(e) of this Rule. Weighted averages for each core shall be calculated based on the total number of samples and the thickness of each sampled interval. A simple arithmetic mean of the weighted averages for each grain size category shall be calculated to represent the average grain size values for each borrow site. Vertical samples shall be geo-referenced and digitally imaged using scaled, color-calibrated photography;
- ~~(h)~~(g) Percentage by weight of calcium carbonate shall be calculated from a composite sample of each core. A weighted average of calcium carbonate percentage by weight shall be calculated for each borrow site based on the composite sample thickness of each core. Carbonate analysis is not required for sediment confined to maintained navigation channels or associated sediment deposition basins within the active nearshore, beach or inlet shoal system; and
- ~~(i)~~(h) All data used to characterize the borrow site shall be provided in digital and hardcopy format to the Division of Coastal Management upon request.

- (3) ~~Compliance with these sediment standards shall be certified by an individual licensed pursuant to Chapter 89C or 89E of the N.C. General Statutes.~~ The Division of Coastal Management shall determine sediment compatibility ~~is determined according~~ to the following criteria:

- (a) Sediment completely confined to the permitted dredge depth of a maintained navigation channel or associated sediment deposition basins within the active nearshore, beach or inlet shoal system is considered compatible if the average percentage by weight of fine-grained (less than 0.0625 millimeters) sediment is less than 10 percent;
 - (b) The average percentage by weight of fine-grained sediment (less than 0.0625 millimeters) in each borrow site shall not exceed the average percentage by weight of fine-grained sediment of the recipient beach characterization plus five percent;
 - (c) The average percentage by weight of granular sediment (greater than or equal to 2 millimeters and less than 4.76 millimeters) in a borrow site shall not exceed the average percentage by weight of coarse-sand sediment of the recipient beach characterization plus 10 percent;
 - (d) The average percentage by weight of gravel (greater than or equal to 4.76 millimeters and less than 76 millimeters) in a borrow site shall not exceed the average percentage by weight of gravel-sized sediment for the recipient beach characterization plus five percent;
 - (e) The average percentage by weight of calcium carbonate in a borrow site shall not exceed the average percentage by weight of calcium carbonate of the recipient beach characterization plus 15 percent; and
 - (f) Techniques that take incompatible sediment within a borrow site or combination of sites and make it compatible with that of the recipient beach characterization shall be evaluated on a case-by-case basis by the Division of Coastal Management.
- (4) Excavation and placement of sediment shall conform to the following criteria:
- ~~(a)~~ ~~Sediment excavation depths for all borrow sites shall not exceed the maximum depth of recovered core at each coring location;~~
 - ~~(a)(b)~~ In order to protect threatened and endangered species, and to minimize impacts to fish, shellfish and wildlife resources, no excavation or placement of sediment shall occur within the project area during any moratoriums times designated by the Division of Coastal Management in consultation with other State and Federal agencies, unless specifically approved by the Division of Coastal Management in consultation with other State and Federal agencies, agencies. The time limitations shall be established during the permitting process and shall be made known prior to permit issuance; and
 - ~~(b)(e)~~ A post-placement grand mean for sediment ~~Sediment~~ and shell material with a diameter greater than or equal to three inches (76 millimeters) shall be re-calculated according to the methodology described in Sub-Item (1)(h) of the Rule, and is considered incompatible if it has been placed on the beach during the beach fill project, is observed between MLW and the frontal dune toe, and is in excess of twice the grand mean background value of material within the boundaries of the beach fill project as observed, measured and calculated prior to the beach fill project, of the same size along any 50,000 square foot (4,645 square meter) section of beach. In the event that more than twice the background value of incompatible material is placed on the beach, it shall be the permittee's responsibility to remove the incompatible material in coordination with the Division of Coastal Management and other State and Federal resource agencies.

History Note: Authority G.S. 113-229; 113A-102(b)(1); 113A-103(5)(a); 113A-107(a); 113A-113(b)(5) and (6); 113A-118; 113A-124;
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