

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(cl); G.S. 113A-107; 113A-113; 113A-115;
113A118; 113A-124

Necessity The Coastal Resources Commission proposes to amend this rule to allow more flexibility with 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 being placed on the recipient beach.

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, took effect in February 2007, and sets forth the protocols for characterizing the native beach sediments prior to a fill project, sampling and characterizing potential borrow area sediments, and ensuring that the two are compatible. "Native beach" sediment characterization is the process of characterizing the sand found on the beach prior to the construction of a beach fill project. Sediment 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), to match the borrow sediment 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 such as 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). If too restrictive, the sampling protocol can also severely limit applicants' ability to use existing data from past projects.

The proposed rule amendments will serve several purposes: 1) ensure consistency with Session Law 2017-10 (S131) Section 3.15 requirement 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); 2) allow use of historic data and more flexibility in sampling where there are sampling challenges; 3) strengthen sediment

characterization of beach sediment in an effort to better assure sediment compatibility between the beach and offshore borrow areas, and; 4) avoidance of placing large material (rocks and shell) on the recipient beach and possibly delaying projects or adding cost associated with cleaning incompatible material.

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.*”)

Description of the Proposed Rules

The CRC’s Technical Standards for Beach Fill Projects,, 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 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 recipient beaches, 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, within certain parameters, 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): Sub Item (1)(c) requires a minimum of five transects spaced no more than 5,000 feet in the shore-parallel direction within the boundaries of the beach fill project to be used for the purpose of surveying and characterizing native beach. The CRC is amending this rule for clarification purposes and to reference NC General Statutes pertaining to surveying standards rather than specifying horizontal and vertical datums in this section.

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 extending oceanward at six-foot depth increments out to a depth of 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 of calcium carbonate to 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 by requiring the percentage by weight calcium carbonate to 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 between mean low water (MLW) and the frontal dune toe, and within the project area as defined in 07H. 0312(1)(h). Based on experiences with large material being placed on the recipient beach during projects, it has been determined that this method does not always adequately characterize the large sediment for the entire project area. Therefore, the CRC is amending this method to require a visual observation of a 10,000 square feet area centered on each transect and between mean tide level (MTL) and the front dune toe. This will spread sampling over the entire project area versus on single area. Additionally, instead of defining the background value to be a single count of sediment and shell material greater than or equal to three inches in diameter for a single area, a simple arithmetic mean shall be calculated for both sediments greater than or equal to one inch in diameter, and shell material greater than or equal to three inches in diameter by summing the totals for each at each transect and dividing by the total number of transects, which would then be considered a representative sample of the entire project area, and referred to as the “background” values for large sediment and shell material. This method would still result in a minimum total of 50,000 square feet being analyzed, however the results would better reflect the entire project area, and not just one specific area.

15A NCAC 07H. 0312(2): Defines the methods to characterize the sediment at borrow sites from which material will be removed and placed on the beach. The CRC is amending Item (2) to be consistent with the Session Law 2017-10 (S131) Section 3.15 requirement 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)(a): Requires characterization of sediment from borrow areas that captures the three-dimensional spatial variability of the sediment characteristics including grain size, sorting, and mineralogy. The CRC has determined that “three-dimensional” isn’t necessary given that sampling methods required by 07H. 0312(2)(c)-(2)(d) result in capturing both horizontal

and vertical data (“three-dimensional”), and that “spatial variability” is sufficient for describing intent of sampling methods.

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 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 define 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): This rule defines the requirement for collecting acoustic imagery of the seafloor. The CRC has determined that certified professionals utilize industry standards for this surveying, and there is no need to reference US Army Corps of Engineers standards for navigation and dredging in this rule. Additionally, this Section is being amended to reference NC General Statutes that pertain to surveying standards rather than specifying each vertical and horizontal datums. This would eliminate a need to amend this rule should amendments occur in Chapter 56 (21 NCAC 56 .1600) of the NC General Statutes.

15A NCAC 07H. 0312(2)(d): This rule defines grid spacing requirements for geophysical imaging of the seafloor subsurface at sediment borrow sites. The CRC has determined that certified licensed professional engineers and/or geologists should have flexibility to design a site specific 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 Sub Item (2)(d) to remove the maximum grid spacing requirement for geophysical imaging of the seafloor. Additionally, this section is being amended to reference NC General Statutes that pertain to surveying standards rather than specifying each vertical and horizontal datums. This would eliminate a need to amend this rule should amendments occur in Chapter 56 (21 NCAC 56 .1600) of the NC General Statutes.

15A NCAC 07H. 0312(2)(e): This section establishes the minimum sediment sampling requirements of borrow sites using a vertical sampling device no less than three inches in diameter. This sampling is the most critical because sediment within the borrow site is collected and characterized for the purpose of analyzing and verifying compatibility with that of the recipient beach. The CRC does recognize that sampling below the surface of the seafloor in water depths less than ten feet can pose challenges and physical limitations for vertical sampling techniques, and is amending this section to allow the Division of Coastal Management the ability to evaluate sampling requirements on a case-by-case basis for shallow areas that are completely confined to maintained navigational channels or associated sediment basins within the active nearshore, beach or inlet shoal system. Unlike dredged material from submarine sites, sediment from upland borrow sites are stockpiled on land prior to being distributed and placed on the beach. For this reason, the CRC is excluding the use of vertical sampling devices for upland borrow areas but continuing to require sediment from those sites be compatible with the recipient beach sediment.

5A NCAC 07H. 0312(2)(f): The current Sub Item (2)(f) defines the minimum grid spacing for sampling offshore dredged material disposal sites (ODMDS). The sediment placed at these locations are generally considered beach compatible and are required to meet EPA standards (40 CFR Part 227) before being deposited in an ODMDS. For this reason, the CRC feels this rule is unnecessary.

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. Because this is essentially required in Sub Item 0312(2)(e) where it states, “Vertical sampling shall penetrate to a depth equal to or greater than permitted dredge or excavation depth or expected dredge or excavation depths...,” the CRC has determined that is redundant in rule language, and that the existing Sub Item (a) is no longer needed.

15A NCAC 07H. 0312(4)(b): This rule (currently (4)(b), amended to be (4)(a)) 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, unless specific exceptions are granted by the Division following consultation with other resource 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 (currently (4)(c), amended to be (4)(b)) is to ensure that large material, sediment with a diameter greater than one inch in diameter, and shell material with a diameter greater than or equal to three inches, does not exceed twice the background value as measured on the beach prior to the start of the beach fill project. Currently, the background value is a sum of all large material greater than or equal to three inches in diameter within a 50,000 square foot area within the project boundary. However, based on experiences with previous beach fill projects, the current requirement does not always accurately define the background value, thus resulting in incompatible material being placed on the beach. As a result, the CRC is amending this rule to require a 10,000 square foot area centered on each transect will result in a better representation of material greater than three inches since sampling is dispersed over the entire project area. This change will also require separate counts for sediment (rock) and

shell, and background values will be defined as the simple arithmetic mean calculated for both sediments and shell by summing the totals for each at each transect and dividing by the total number of transects. The CRC is amending this rule for clarity, and also to 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 OR NEUTRAL IMPACTS

Since technical standards for beach fill projects first went into effect in 2007, costs associated with complying with these 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. In terms of cost associated with these amendments, the CRC anticipates that there would be added cost for re-sampling and characterizing the recipient beach for sediment greater than or equal to one inch in diameter, shell material greater than or equal to three inches for 10,000 square feet areas centered on each transect, rather than the current requirement of one single 50,000 square feet area. These amendments will allow for the use of historic data where it is sampled using methods consistent with these rules which may possibly reduce sampling cost.

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.

For large material, sediments/rock (≥ 1 inch in diameter) and shell material (≥ 3 inches in diameter), the CRC is proposing to replace the method for sampling a single 50,000 square feet area, with a 10,000 square feet area centered on each transect. It is anticipated that this will result in a more accurate representation of the entire project area, rather than one specific location serving to represent the entire project area. Once analyzed using this method, sediment characterization will serve as the baseline for all future projects within the same area. However, because Sub Item (1)(h) this Rule (07H.0312) does specify a new sampling requirement for counting large sediment,

this amendment will result in a one-time added cost for resampling for all beaches in areas that have already been characterized.

Currently, large material sampling for a single beach fill project requires observation and count of material (sediment/rock and shell material) greater than or equal to three inches in diameter for any area within the project boundaries equal to 50,000 square feet – regardless of the project’s size (length, width, or volume). The cost to sample large material for a single project is approximately \$2,000 to \$3,000. To characterize sediment less than 3 inches in diameter requires a minimum set of 13 samples, and a sieve and carbonate analysis for each sample costing approximately \$100; making the minimum cost to sample and analyze sediment that is less than three inches in diameter at each transect equal approximately \$1,300. Current rules require a minimum five transects spaced no more than 5,000 feet apart within the project area, which would make the minimum sampling cost equal to approximately \$6,500 ($\$1,300 \times 5$). The total cost of sampling sediment on the recipient beach, and using the methodology defined in current rules is approximately \$8,500 to \$9,500 ($\$6,500 + \$2K$ to $\$3K$), or approximately \$10,000. This cost does not include expenditures 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.

These amendments would result in additional one-time expenditure for sampling large material (sediments/rock greater than or equal to 1 inch in diameter, and shell material greater than or equal to 3 inches in diameter) in areas where sediment has already been characterized using methods consistent with those defined in rules. Because the amended rules change the methodology from a single 50,000 square feet area to multiple 10,000 square feet areas centered on each transect, it is estimated that the cost per transect to sample large material would range from \$330 to \$1,100¹. The added cost per transect resulting from the proposed rule amendments, does include per diem for 2 to 3 technicians (Table 1).

¹ Moffat & Nicol, Johnny Martin, PE, 2020 and Coastal Protection & Engineering, Ken Wilson, 2020

Table 1. This table illustrates an estimation of total cost to characterize sediment greater than one inch in diameter and shell material greater than three inches for a 10,000 square foot area centered on each transect, and for all 160 miles of developed shoreline. This information is based on 2 to 3 technicians in the field with the ability to sample 5 transects per day.

		Note:
Total shoreline length (miles)	160 miles	assumes only “developed shoreline” sampled
Total shoreline length (feet)	844,800 feet	
Required Transects (per 160 miles)	169	transect spacing < 5,000 ft.
Technician per diem	\$200.00	for 1 technician
Number of technicians needed	2 to 3	
Number of transects per day	5	less if tides and weather prohibit
Sampling Cost per Transect	\$330 to \$1,100 Avg. est. = \$750	Only for counting sediment ≥1 inch & shell material ≥3 inches (rock & shell)

For a new project area, where a beach fill project has never been installed, and beach sediment has never been characterized, it is anticipated that cost to sample beach sediment would be approximately the same when comparing current large material sampling cost (\$2,000 to \$3,000) for a single 50,000 square foot area, to the least cost (\$1,650) and average cost (\$3,750) estimations for a minimum of five 10,000 square foot areas (centered on each transect) as required by amended Rule 15A NCAC 07H. 0312(1)(h). While the higher cost estimation of \$5,500 (\$1,100 x 5) is possible, and would exceed current approximate cost by \$2,500, it is anticipated that this cost would be less likely given that technicians and gear would already be mobilized and in the field for the purpose of sampling all grain sizes on the same transects and for the same project. The current cost range (\$2K to \$3K) is already based on this premise, while the \$330 to \$1,100 cost per transect is based on technicians and gear being mobilized for the sole purpose of sampling large material using the method defined in these rule amendments (15A NCAC 07H. 0312(1)(h)).

For areas where projects have already been installed, and the beach sediment has already been characterized, there would be an added cost to re-sample those beaches using the amended methodology prescribed in rule amendments (07H. 0312(1)(h)). North Carolina has 160 miles of developed oceanfront beaches, and of those, 89(+) miles has experienced the installation of large-scale (>300,000 cubic yards) beach fill projects (80% of the oceanfront communities). As previously illustrated, the cost to sample per transect would be approximately \$330 to \$1,100, and if the estimated cost per transect is applied to 89 miles of shoreline, with transect spacing not in excess of 5,000 feet, the minimum number of transects needed would be 94; making the overall minimum cost to re-sample large material sediments equal to approximately \$31,020 to \$103,400.

Although these rule amendments would theoretically increase the total costs of characterizing sediment on the recipient beach where it has already been characterized, the overall impact would

be minimal for several reasons: 1) the cost to characterize beach sediment where it has not been previously characterized, is estimated to be approximately the same; 2) these amendments would still allow for the use of historic data and only require the recipient beach to be characterized one time, and since those communities that have already fulfilled requirements to characterize those sediments (fine-grained, granular, gravel, or calcium carbonate) defined in 07H. 0312(3)(b)-(c) through past projects, the added cost would be only for sampling large material; 3) potential avoidance of cost associated with having to remove large material once it is placed on the recipient beach as a result of improved beach sediment characterization, and; 4) the cost increase could potentially be offset by cost-savings resulting from the additional rule amendments that will allow more flexibility for qualified/certified contractors to coordinate with NC DCM Staff to evaluate borrow site sampling if conditions prohibit (i.e. water depth).

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 and allows for the use of historic data. It is anticipated that rule amendments proposed in this Section will not result in added costs.

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.

Local Government

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 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.

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

As mentioned, these rule amendments change the definition of large material and the methodology for sampling large material (sediment/rock greater than one inch in diameter, and shell material greater three inches in diameter) from one 50,000 square foot area within the project boundary, to sampling 10,000 square foot areas centered on each transect. Because sampling using a transect method and be evenly dispersed throughout the entire project area, or barrier island, the results would more accurately reflect the entire project area. These amendments will require a one-time cost per transect, ranging between \$330 to \$1,100 for both those locations where sediment has been characterized, and for new beach fill projects where sediment has not yet been characterized. However, where sediment has not been characterized, it is anticipated that these amendments will not require additional cost to new projects. As previously mentioned, there are currently over eighty percent (80%) of the State's oceanfront communities that have completed a large-scale beach nourishment projects, and would therefore would only be required to re-characterize large material according to the new protocol, and that the estimated minimum cost to re-sample large material would equal approximately \$31,020 to \$103,400. Therefore, it is not anticipated that these amendments will have a substantial economic impact.

Private Property Owners

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 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 a beach nourishment project is planned. Because the sediment on the majority of the state's beaches have already been characterized, it is not anticipated that any adjustments of the special tax districts will be needed.

Division of Coastal Management

The Division of Coastal Management does not anticipate any change in how beach nourishment projects are permitted or changes to permitting receipts because of these amendments.

BENEFITS

Local Governments

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. Since the majority (>80% of oceanfront shoreline) of the oceanfront communities have already installed large-scale beach nourishment projects, these amendments would only require re-characterization of large material

(sediment/rock greater than one inch in diameter, and shell material greater than three inches) according to the new protocol, then allow future projects in these areas to move forward without the expense of collecting and re-characterizing sediment on the recipient beach. Where resampling would be required, the cost per transect is estimated to be \$330 to \$1,100. Coastwide, it is estimated that the cost to re-characterize large material would range from \$31,020 to \$103,400. However, this a one-time cost, and could potentially be offset by: 1) avoidance of cost associated with removal of large material from the recipient beach, and; 2) allowing more flexibility for qualified/certified contractors to coordinate with NC DCM Staff to evaluate borrow site sampling if conditions prohibit (i.e. water depth)

If needed, the cost to characterize beach sediment in those communities that have not installed beach nourishment projects (<20% of oceanfront shoreline) using amended methods, is estimated to be the approximately the same as the cost associated with sampling using methods defined in current rules. The overall goal of these amendments is better characterization of beach sediment, and avoidance of placing large material on the recipient beach. It is the hope of the CRC that these amendments will benefit all communities in avoiding cost associated with removing large material from the beach.

Private Property Owners

Beach fill projects are not undertaken by private property owners. Therefore, there should be no cost to private property owners because of the rule amendments. Property owners in these communities will also benefit from cost savings associated with the use of historical data associated with past beach fill projects and local governments will not need to adjust tax rates associated with beach fill project to cover the increased cost of sampling the recipient beach.

Although there are no anticipated costs to private property owners, or the general public as a result these rule amendments, there are indirect benefits to everyone when the quality of NC's beaches is maintained. The intent of a beach fill project is primarily to replace beach sand where it has been lost to erosion. Then intent of these rules is to better ensure that as these projects are installed, that the sand placed on the beach matches (is compatible) existing beach sediment. Wider and healthier beaches provide more wildlife habitat, better protection from storms, and more room for recreation.

NC 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).

Division of Coastal Management

The Division of Coastal Management does not anticipate any change in how beach nourishment projects are permitted or changes to permitting receipts because of these amendments

State Government

Typically, local governments initiate beach nourishment projects and serve as the permittee. 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 funds also have had a sediment characterization analysis completed for previous projects and will not need to characterize the recipient beach for those sediments (fine-grained, granular, gravel, or calcium carbonate) defined in 07H. 0312(3)(b)-(c). As for these amendments, most of the historical data collected for characterizing beach sediment can be used for future projects; however, there will be a one-time sampling requirement prescribed in these amendments that will be necessary for re-characterizing large material (sediment/rock with a diameter ≥ 1 inch, and shell material with a diameter ≥ 3 inches). Once sediment is characterized using the amended method defined in 07H. 0312(1)(h), the results will serve as the baseline for all future projects. The intent of these amendments is a better characterization of beach sediment and the avoidance of added cost associated with project delays and the removal of incompatible sediment (rocks) on the beach.

COST/BENEFIT SUMMARY

The CRC's rule amendments will serve several purposes: 1) ensure consistency with Session Law 2017-10 (S131) Section 3.15 requirement 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) allow use of historic data and more flexibility in sampling where there are sampling challenges; 3) strengthen sediment characterization of beach sediment in an effort to better assure sediment compatibility between the beach and offshore borrow areas, and 4) avoidance of placing large material (rocks and shell) on the recipient beach and possibly delaying projects or adding cost associated with cleaning incompatible material.

In terms of cost, changing the large material (sediment/rock ≥ 1 inch, and shell material ≥ 3 inches) sampling requirement from a single 50,000 square foot area to 10,000 square foot areas centered on each transect evenly dispersed within the project boundaries would result in finer resolution data, but would theoretically increase the associated cost for characterizing sediment on the

recipient beach (\$330 to \$1,100 per transect). In areas where beach fill projects have not been installed, and beach sediment has not been characterized, it is anticipated that sampling cost associated with these rule amendments would be approximately the same for sampling under current rules. However, it is estimated that there would be a one-time added cost to re-sample beaches that have previously characterized beach sediment (\$31,020 to \$103,400).

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.~~ Topographic and bathymetric surveying shall occur along a minimum of five shore-perpendicular transects evenly spaced throughout the entire project ~~area with spacing not to exceed 5,000 feet (1,524 meters) in the shore-parallel direction. direction.~~ 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 5,000 feet (1,524 meters) in the shore-parallel direction.~~ Elevation data for all transects shall be compliant with Chapter 56 (21 NCAC 56 .1600) of the N.C. General Statutes; ~~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 greater than or equal to one inch (25.4 millimeters) in diameter, and shell material greater than or equal to three inches (76 millimeters) in diameter shall be differentiated and calculated through visual observation of an area of 10,000 square feet centered on each transect, and between mean tide level (MTL) and the frontal dune toe within the beach fill project boundaries. A simple arithmetic mean shall be calculated for both sediments and shell by summing the totals for each across all transects and dividing by the total number of transects, and these values shall be considered representative of the entire project area, and referred to as the "background" values for large sediment and large shell material; 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 and referred to as the "background" value;~~
 - (i) ~~Beaches that received sediment prior to <MONTH DAY, YEAR> 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 may shall use data collected from the recipient beach prior to the addition of beach fill where data are available, and in coordination with the Division of Coastal Management, and; 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 may shall include historical sediment characterization data where available and collected using methods consistent with Sub-Items (2)(c) through (2)(g) of this Rule, and in coordination with the Division of Coastal Management; (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 compliant with Chapter 56 (21 NCAC 56 .1600) of the N.C. General Statutes, referenced to NAVD 88 and NAD 83. Seafloor imaging data without an elevation component shall also be compliant with Chapter 56 (21 NCAC 56 .1600) of the N.C. General Statutes, 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 also not required for borrow sites completely confined to maintained navigation channels, and for 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, and for 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 compliant with Chapter 56 (21 NCAC 56 .1600) of the N.C. General Statutes; ~~be referenced to NAD 83;~~
- (e) With the exception of upland borrow sites, sediment ~~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 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, 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. 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 shall be evaluated by the Division of Coastal Management on a case-by-case basis; 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;
- ~~(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. ~~Sediment~~ 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 seasonal environmental moratoria 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)~~(c) The total sediments with a diameter greater than or equal to one inch (25.4 millimeters), Sediment and shell material with a diameter greater than or equal to three inches (76 millimeters) is considered incompatible if it has been placed on the beach during the beach fill project, is observed between MTL, MLW and the frontal dune toe, and is in excess of twice the background value of material of the same size along any 50,000 square foot (4,645 square meter) 10,000 square feet section of beach within the beach fill project boundaries. 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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