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CARTERET COUNTY BEACH COMMISSION

Agenda Topic Cover Sheet

Presentation - North Carolina's Sediment Criteria Recommendations for Beach Nourishment and Dredged Material Disposal.	
Meeting Date: 4/25/05	Topic No. 5
Suggested Action: None.	

Introduction

Jeff Warren, Coastal Hazards Specialist with the N.C. Division of Coastal Management (NCDCM), will be giving the Beach Commission a presentation regarding the State's proposed sediment criteria guidelines for beach nourishment and dredged material disposal at our regularly-scheduled meeting. The criteria were developed by the State's Science Panel on Coastal Hazards, which is an eleven member group providing the Coastal Resources Commission (CRC) with scientific data and recommendations pertaining to coastal topics (see <http://dcm2.enr.state.nc.us/Hazards/scipanel.htm> for the panel's roster). The Science Panel was requested to develop the criteria as an outgrowth of concerns raised during the construction of the Bogue Banks Restoration Project - Phase I (Pine Knoll Shores and Indian Beach) and the Oak Island Turtle Restoration Project, both completed in the 2001 - 2002 timeframe. The concerns that garnered the most attention were the biological and aesthetic impacts of emplacing coarse material along the oceanfront shoreline including shells for the Bogue Banks and sandy, limestone rocks for the Oak Island Projects, respectively. These concerns were coupled with a perceived lack of detail regarding the State's current rules guiding sediment compatibility and the rules apparent inability to establish thresholds and triggers for when "poor" material is encountered during reconnaissance studies and mitigating measures during beach construction. The purpose, proposed sampling and analytical protocols, and historical perspective of the sediment compatibility issue is available at the Division's new sediment criteria website at <http://www.nccoastalmanagement.net/sediment.htm>. The proposed criteria is attached for the Beach Commission's review and is essentially organized into 6 headings that are briefly summarized below.

Part 1 - General Definitions

This section provides succinct definitions to the terminology utilized in beach nourishment project development and implementation. One issue that garnered a considerable amount of discussion by the Science Panel is the difference between a sand *reserve* and a sand *resource*, which stems from the discipline of economic geology. Essentially, a "resource" is a deposit of sand that could ultimately be available for use, but is

currently considered unavailable utilizing present-day extraction techniques. Conversely, a “reserve” represents a known quantity of sand that can be extracted with existing technology and present economic conditions. It is important to note that a resource includes both the reserve *and* the present-day, unavailable material. As a macroscopic example, the Cape Lookout shoal complex could be considered as a “resource” but not a “reserve” – a quantified source of sand that can not be utilized for nourishment along Bogue Banks under current economic (haul distance) and logistical circumstances (wave conditions).

Part II – Characterization of the Beach to be Nourished

The terminology “beach to be nourished” rather than “native beach” is used in this instance to capture beaches where nourishment has occurred in the past and therefore a new beach characterization would not truly represent a native, undisturbed beach. This section provides the sampling protocols the State would require to properly characterize the beach to be nourished and as detailed in the criteria, a beach would require a minimum of three transects where individual samples would be taken at 8 discreet geomorphological zones along a single transect (dune, mid berm, trough, etc.). The transect spacing should not exceed 5,000 linear feet in the shore parallel direction.

Part III – Characterization of Borrow Site Material

The characterization of a potential borrow site has two overlying distinctions and accordingly have two different sets of parameters; (a) borrow sites confined to navigation channels, and (b) upland or submerged borrow sites. For upland or submerged borrow sites, appropriate remotely-sensed survey techniques shall be used to help delineate the 3-dimensional framework of the sand reserve and resource. Remotely-sensed surveys include technologies such as seismic reflection, side-scan sonar, and ground penetrating radar. Also sediment samples shall also be obtained, preferably based upon the remotely-sensed data, and analyzed with three important classifications; (a) the *fine fraction* (diameter of grains <0.0625 mm), (b) the *sand fraction* (diameter of grains between 0.0625 mm and 4.76 mm), and (c) the *coarse fraction* (diameter of grains >4.76 mm). These three classifications are also utilized for the beach to be nourished analysis and therefore can be compared to one another as detailed in Part IV of the proposed criteria. Sediment composition (calcium carbonate, quartz, phosphate, garnet and other heavy minerals, etc.) shall be reported but no strict guidelines comparing the beach to be nourished vs. borrow sites is required with one exception that is discussed in Part IV. In general, characterization and sediment sampling shall not be required from a site that is completely confined to a regularly maintained navigation channel.

Part IV – Compatibility of Borrow Site Material to the Beach to be Nourished

As mentioned in Part III of the criteria, the comparison for borrow site vs. beach to be nourished sediments are evaluated by means of four different standards.

(1) Fine-grained fraction equals “native plus 5%”, thus the average percentage by weight of the fine-grained fraction in a borrow site shall not exceed the average percentage of the fine-grained fraction of the pre-nourished beach plus 5% (i.e., if the pre-nourished, fine-grained fraction is 10% of the total sediment population, the post-nourishment fine-grained fraction shall not account for more than 15% of the post-nourishment fine-grained fraction).

(2) Coarse-grained fraction equals “native plus 4%”, thus the average percentage by weight of the coarse-grained fraction in a borrow site shall not exceed the average percentage of the coarse-grained fraction of the pre-nourished beach plus 4% (i.e., if the pre-nourished, coarse-grained fraction is 5% of the total sediment population, the post-

nourishment coarse-grained fraction shall not account for more than 9% of the post-nourishment coarse-grained fraction).

(3) Sediment mineralogy thresholds are confined to a single parameter (the carbonate content fraction), whereby the percentage of calcium carbonate characterized in a borrow site shall not exceed the carbonate content of the beach to be nourished by 40% (i.e., the borrow site cannot be > 40% plus native CaCO₃). As the proposed regulations mention, this criterion warrants further investigation and shall be revisited as future data become available.

(4) Shoal material from the direct maintenance of coastal navigation channels shall be deemed suitable for beach placement with up to 10% fine-grained material, provided that the excavation does not exceed authorized channel dimensions. The “native plus 5%” recommendation for fine-grained material that is applied to borrow sites is not an analytical approach required for navigation channels.

One issue that may need reconciliation in the future is the effects of the hydraulic delivery method of nourishment sediments to beaches. Borrow site material is mixed with a relatively large volume of water and pumped to the beach in a slurry where much of the non-consolidated fine-grained sediments is permitted to discharge into the sea. Also the nature of the hopper dredge process tends to dilute the fine-grained fraction from the slurry before the material is pumped to the beach. These interactions tend to lower the fine-grained fraction and concordantly could increase the coarse-grained fraction of the sediments once placed on the beach, and therefore comparing the beach to be nourished with a borrow site reserve is not a “one-to-one” correlation once the beach is constructed. Thus for example a borrow site could have fine-grained percentage of “native plus 6%” rather than “plus 5%”, yet once placed on the beach may well be below the “native plus 5%” threshold.

Part V – Execution of a Nourishment Project

Many of the items included in this section, such as “Material used for beach nourishment shall not contain foreign matter including, but not limited to, construction debris, toxic material, and other man-made materials” would be fully integrated within the State and Federal scoping and permitting processes. It is not clear at this point if all of these items will be incorporated into law.

Part VI – Post-Nourishment Monitoring and Mitigation of Beach and Borrow Site

The first item in this section is mitigation-driven and may have been applied to Phase I and II of the Bogue Banks Restoration Project. If exceedingly coarse material (>64mm in diameter) is present in material used for beach nourishment and is greater than the fraction of similar exceedingly coarse material (>64 mm) of pre-nourished beach values plus 1%, then the coarse material shall be removed from the beach in an environmentally sound manner. This essentially equates to a “native plus 1%” threshold, thus if the pre-nourished coarse material accounts for 2% of the total population, then post-nourishment coarse material cannot account for more than 3% of the total population. The second and final item in this section of the proposed regulations regards post-construction monitoring and would be expanded upon during the permit formulation process.

What’s Next?

NCDCM is planning to implement a tripartite approach as the organization finalizes a recommendation for the CRC to adopt that would actually amend the current rule regarding sediment compatibility; (1) recommendation, (2) evaluation and development, and (3) implementation. The recommendation phase has been completed essentially by the Science

Panel and NCDRC staff, the evaluation and development phase is ongoing and should be completed by the fall of this year, and the implementation phase would constitute an approval by the CRC to amend current law. Actually, NCDRC's outreach effort to the Beach Commission and other stakeholders is part of the evaluation and development phase, and therefore Mr. Warren will be looking for input directly from the Commission once his presentation is completed.