SEDIMENT QUALITY ASSURANCE / QUALITY CONTROL PLAN FOR BEACH AND DUNE RESTORATION OR NOURISHMENT USING AN UPLAND SAND SOURCE

1 INTRODUCTION

Pursuant to Florida Administrative Code (F.A.C.) 62B-41.008 (1) (k) 4.b., dune and beach restoration or nourishment shall include a quality assurance/control plan that will ensure that the sediment from the upland sand source(s) to be used in the project will meet the standard in 62B-41.007(2)(j), F.A.C. To protect the environmental functions of Florida's beaches, only beach compatible fill shall be placed on the beach or in any associated dune system. Beach compatible fill is material that maintains the general character and functionality of the material occurring on the beach and in the adjacent dune and coastal system.

The Department of Environmental Protection (Department) has received the results of geotechnical investigations that provide adequate data concerning the character of the sediment and the quantities available within the spatial limits of the upland sand source(s). The Department has received an analysis of the proposed upland sand source(s) including the methods of mining and post-mining processing, that demonstrates its compatibility with the naturally occurring beach sediment in accordance with 62B-41.007(2)(j), F.A.C. The sediment analysis was performed using established industry standards, and are certified by a Professional Engineer (P.E.) and a Professional Geologist (P.G) registered in the State of Florida.

Based upon this information, the Department has determined that use of the sediment from the upland sand sources(s) will maintain the general character and functionality of the sediment occurring on the beach and in the adjacent dune and coastal system. Furthermore, this information provides sufficient quality assurance/quality control (QA/QC) that the mean grain size and carbonate content of the sediment from the upland sand source(s) will meet the requirements of 62B-41.007(2)(j), F.A.C.; hence, additional QA/QC procedures are not required for these sediment parameters during construction.

This plan outlines the responsibilities of each stakeholder in the Project as they relate to the placement of beach compatible material on the beach. These responsibilities are in response to the possibility that non-beach compatible sediments may exist within the upland sand source(s) and could be unintentionally placed on the beach. The QC Plan specifies the minimum construction management, inspection and reporting requirements placed on the Contractor and enforced by Lee County, to ensure that the sediment from the upland sand source(s) to be used in the Project meet the compliance specifications. The QA Plan specifies the minimum construction oversight, inspection and reporting requirements to be undertaken by Lee County or Lee County's On-Site Representative to observe, sample, and test the placed sediments to verify the sediments are in compliance.

2 SEDIMENT QUALITY SPECIFICATIONS

The sediment from the upland sand source(s) is similar in Munsell color and grain size distribution to the material in the existing coastal system at the beach placement site. The Department and Lee County acknowledge that it is possible that discrete occurrences of non-beach compatible sediments may exist within the permitted upland sand source(s) that do not comply with the limiting parameters of 62B-41.007(2)(j) 1. – 5., F.A.C., or vary in Munsell color from the composite value. Furthermore, the Department may consider more restrictive values for the sediment parameters to ensure that the sediment from the upland sand source(s) is similar in color and grain size distribution to the sediment in the existing coastal system at the beach placement site. Therefore, fill material compliance specifications for the sediment from the upland sand source(s) proposed for this Project are provided in Table 1.

The compliance specifications take into account the variability of sediment on the native or existing beach, and are values which may reasonably be attained given what is known about the upland sand source sediment. Beach fill material which falls outside of these limits will be considered unacceptable and subject to remediation.

Table 1- Sediment Compliance Specifications

Sediment Parameter	Parameter Definition	Compliance Value
Max. Silt Content	passing #230 sieve	**3%**
Max. Shell Content*	retained on #4 sieve	**1%**
Munsell Color Value	moist Value (chroma = 1)	**8/1 or lighter**
Mean Grain Size	Mean calculated by moment method	**0.25 mm to 0.40 mm**
The beach fill material shall not contain construction debris, toxic material, other foreign matter, coarse gravel or rocks.		

*Shell Content is used as the indicator of fine gravel content for the implementation of quality control/quality assurance procedures

3 QUALITY CONTROL PLAN

The contract documents shall incorporate the following technical requirements, or equivalent language that addresses the sediment quality monitoring on the beach, and, if necessary, remedial actions. Lee County will seek to enforce these contract requirements during the execution of work. The Contractor's Quality Control Plan shall be submitted for review and acceptance by Lee County. This Plan shall also address sediment quality assurance by including: (1) the specific sampling frequency and testing methodology to be provided by the Contractor, (2) the name, address and point of contact for the Licensed Testing Laboratory to be used for the required collection of samples and laboratory testing, and (3) how the Contractor intends to assess compliance with the Sediment Compliance Specifications as shown in Table 1 above.

The Contractor should be aware that it is possible for material of differing characteristics to be present and that the mining process may correspondingly require revisions to produce beach compatible sand consistent with the Sediment Compliance Specifications in Table 1.

1. Assessment at Upland Sand Source. The material shall be observed while the material is being loaded into the trucks for transport to the Construction Access/ Staging Area. Both the Contractor and Lee County will have benchmark samples labeled with the permit number, "Benchmark Sample", date collected, site name and information on where the sample was attained. The benchmark sample shall be material that has been deemed beach compatible in accordance with the Sediment Compliance Specifications, and shall serve as the minimum requirement for the material being placed on the beach. If any material appears to be non-compliant, it shall be set aside for testing and/or further processing and not transported to the beach.

a. For conventional excavation and stockpiling. The Contractor will collect a sediment sample at not less than 4 samples for the 6,000 tons of stockpiled material to visually assess grain size, Munsell color, shell content, and silt content against the benchmark sample. The sample shall be a minimum of 1 U.S. pint (approximately 200 grams). This assessment will consist of handling the fill material to ensure that it is predominantly sand to note the physical characteristics and assure the material meets the sediment compliance parameter specified in this Plan. If deemed necessary by Lee County, quantitative assessments of the sand will be conducted for grain size, silt content, shell content and Munsell color using the methods outlined in Section 4.7. Each sample will be archived with the date, time, and location of the sample. The results of these daily inspections, regardless of the quality of the sediment, will be appended to or notated on the Contractor's Daily Report. All samples will be stored by Lee County for at least 60 days after Project completion.

b. For material requiring special handling and material processing. If special handling and material processing are necessary to produce beach compatible material consistent with the Sediment Compliance Specifications in Table 1, then sampling and laboratory testing of the processed sand shall be conducted at the upland mine(s) from the stockpiled material before the material is transported to the Construction Access/Staging Areas. The Contractor will collect 5 representative samples from the 6,000 tons of material in the stockpile no less than 6 inches below the surface. The samples shall be tested at a Licensed Testing Laboratory using the criteria outlined in Section 4.7.

If a sample does not meet the Sediment Compliance Specifications in Table 1, then the material represented by that sample shall not be transported to the Construction Access/Staging Area. The material may undergo further processing to meet the Sediment Compliance Specifications with additional testing to verify the additional processing produce material that meets the Sediment Compliance Specifications, or the material shall be set aside and not used.

2. Beach Observation. The Contractor will continuously visually monitor the sediment being placed on the beach. An assessment will be made during placement at a minimum of once every hour. This assessment will consist of handling the fill material to ensure that it is predominantly sand and to note the physical characteristics, and assure the material meets the Sediment Compliance Specifications in Table 1. If noncompliant sediment is placed on the beach, the Contractor will immediately cease placement until any stockpiled material at the beach construction staging area can be verified as beach compatible and verbally notify Lee County, providing the time, location, and description of the noncompliant sediment. The Contractor will take the appropriate remediation actions as directed by Lee County.

4 QUALITY ASSURANCE PLAN

Lee County will seek to enforce the construction contract and Department Emergency Final Order related to sediment quality. In order to do so, the following steps shall be followed:

1. **Construction Observation.** Construction observation by Lee County's On-Site Representative will be performed on a daily basis during upland sand fill placement. The County will collect a sediment sample to visually assess grain size, Munsell color, shell content, and silt content against the benchmark sample. The observation will include handling the fill material to ensure that it is predominantly sand to note the physical characteristics and assure the material meets the sediment compliance parameter specified in this Plan. If deemed necessary, quantitative assessments of the sand will be conducted for grain size, silt content, shell content and Munsell color using the methods outlined in Section 4.7.

2. **On-Site Representative.** Lee County will provide on-site observation by individuals with training or experience in beach nourishment and construction inspection and testing, and who are knowledgeable of the project design and permit conditions.

3. **Pre-Construction Meeting.** The Project QA/QC Plan will be discussed as a matter of importance at the pre-construction meeting. The Contractor will be required to acknowledge the goals and intent of the herein described QA/QC Plan, in writing, prior to commencement of construction.

4. **Contractor's Daily Reports.** Lee County will review the Contractor's Daily Reports which characterize the nature of the sediments encountered and placed along the project shoreline with specific reference to moist sand color and the occurrence of rock, rubble, shell, silt or debris that exceeds acceptable limits.

5. **On Call.** Lee County will be continuously on call during the period of construction for the purpose of making decisions regarding issues that involve QA/QC Plan compliance.

6. **Addendums.** Any addendum or change order to the Contract between Lee County and the Contractor will be evaluated to determine whether or not the change in scope will potentially affect the QA/QC Plan.

7. **Laboratory Testing.** If deemed necessary, quantitative assessments of the sand will be conducted by Lee County for grain size, silt content, shell content, and Munsell color using the methods outlined as follows:

   a. Sampling and testing of the fill material will be conducted to verify that the sediment placed on the beach meets the expected criteria/characteristics. Upon completion of an acceptance section of constructed beach, Lee County will collect two (2) duplicate sand samples to quantitatively assess the grain size distribution, moist Munsell color, shell content, and silt content for compliance. Lee County will collect the sediment samples of a minimum of 1 U.S. pint (at least 200 grams) each from the bottom of a test hole a minimum of 18 inches deep

within the limits of the constructed berm. Lee County will visually assess grain size, Munsell color, shell content, and silt content of the material by handling the fill material to ensure that it is predominantly sand, and further to note the physical characteristics. Lee County will note the existence of any layering or rocks within the test hole. One sample will be sent for laboratory analysis while the other sample will be archived by Lee County. All samples and laboratory test results will be labeled with the Project name, FDEP Reference Monument Profile Line designation, State Plane (X,Y) Coordinate location, date sample was obtained, and "Construction Berm Sample" or "Construction Dune Sample" as applicable.

b. All samples will be evaluated for visual attributes (Munsell color and shell content), sieved in accordance with the applicable sections of ASTM D422-63 (Standard Test Method for Particle-Size Analysis of Soils), ASTM D1140 (Standard Test Method for Amount of Material in Soils Finer than No. 200 Sieve), and ASTM D2487 (Classification of Soils for Engineering Purposes), and analyzed for carbonate content. The samples will be sieved using the following U.S. Standard Sieve Numbers: 3/4", 5/8", 3.5, 4, 5, 7, 10, 14, 18, 25, 35, 45, 60, 80, 120, 170, 200, and 230.

c. A summary table of the sediment samples and test results for the sediment compliance parameters shall accompany the complete set of laboratory testing results. The column headings will include: Sample Number; Mean Grain Size (mm); Sorting Value: Silt Content (%); Shell Content (%); Munsell Color Value; and a column stating whether each sample MET or FAILED the compliance values found in Table 1. The sediment testing results will be certified by a P.E or P.G. registered in the State of Florida. A statement of how the placed fill material compares to the sediment analysis and volume calculations from the sand search investigation and design shall be included in the sediment testing results report. Lee County will submit sediment testing results and analysis report to the Department within 90 days following beach construction.

d. In the event that a section of beach contains fill material that is not in compliance with the sediment compliance specifications, then the Department will be notified. Notification will indicate the volume, aerial extent and location of any unacceptable beach areas and remediation planned.

5 REMEDIATION

1. **Compliance.** If a sample does not meet the compliance value for construction debris, toxic material, other foreign material, coarse gravel, rock, or high silts, Lee County shall determine the aerial extent and the Contractor shall remediate regardless of the extent of the noncompliant material.

2. **Notification.** If an area of newly constructed beach does not meet the sediment compliance specifications, then the Department (JCPCompliance@dep.state.fl.us) will be notified. Notification will indicate the aerial extent and location of any areas of noncompliant beach fill material and remediation planned. The results of any remediation will be reported to the Department following completion of the remediation activities and shall indicate the volume of noncompliant fill material removed and replaced.

3. **Sampling to determine extent.** Lee County shall sample the material in accordance with methods described in Section 4.7.

4. **Actions.** Lee County shall have the authority to determine whether the material placed on the beach is compliant or noncompliant. If placement of noncompliant material occurs, the Contractor will be directed by Lee County on the necessary corrective actions. Should a situation arise during construction that cannot be corrected by the remediation methods described within this QA/QC Plan, the Department will be notified. The remediation actions for each sediment parameter are as follows:

a. Silt: blending the noncompliant fill material with compliant fill material within the adjacent construction berm sufficiently to meet the compliance value, or removing the noncompliant fill material and replacing it with compliant fill material.
b. Shell: blending the noncompliant fill material with compliant fill material within the adjacent construction berm sufficiently to meet the compliance value or removing the noncompliant fill material and replacing it with compliant fill material.
c. Munsell color: blending the noncompliant fill material with compliant fill material within the adjacent construction berm sufficiently to meet the compliance value or removing the noncompliant fill material and replacing it with compliant fill material.
d. Coarse gravel: screening and removing the noncompliant fill material and replacing it with compliant fill material.
e. Construction debris, toxic material, or other foreign matter: removing the noncompliant fill material and replacing it with compliant fill material.

All noncompliant fill material removed from the beach will be transported by the Contractor to an appropriate upland disposal facility located landward of the Coastal Construction Control Line.

5. **Post-Remediation Testing.** Re-sampling shall be conducted following any remediation actions in accordance with methods described in Section 4.7.

b. The samples will be visually compared to the acceptable sand criteria. If deemed necessary by Lee County, quantitative assessments of the sand will be conducted for grain

size, silt content, and Munsell color using the methods outlined in Section 4.7. Samples will be archived by Lee County.

c. A site map will be prepared depicting the location of all samples and the boundaries of all areas of remediation actions.

6. **Reporting.** A post-remediation report containing the site map, sediment analysis, and volume of noncompliant fill material removed and replaced will be submitted to the Department within 7 days following completion of remediation activities.

All reports or notices relating to this permit shall be emailed and sent to the Department at the following locations:

Florida Department of Environmental Protection
JCP Compliance Officer
Beaches, Inlets and Ports Program
Division of Water Resource Management
Florida Department of Environmental Protection
2600 Blair Stone Road, MS 3590
Tallahassee, Florida 32399-2400
phone: (850) 245-7539
e-mail: JCP Compliance@dep.state.fl.us

EXHIBIT 1
STATE OF FLORIDA RULES FOR BEACH FILL QUALITY
62B-41.007 (2) (j), F.A.C.

To protect the environmental functions of Florida's beaches, only beach compatible fill shall be placed on the beach or in any associated dune system. Beach compatible fill is material that maintains the general character and functionality of the material occurring on the beach and in the adjacent dune and coastal system. Such material shall be predominately of carbonate, quartz or similar material with a particle size distribution ranging between 0.062mm (4.0ϕ) and 4.76mm (-2.25ϕ) (classified as sand by either the Unified Soils or the Wentworth classification), shall be similar in color and grain size distribution (sand grain frequency, mean and median grain size and sorting coefficient) to the material in the existing coastal system at the disposal site and shall not contain:

1. Greater than 5 percent, by weight, silt, clay or colloids passing the #230 sieve (4.0ϕ);

2. Greater than 5 percent, by weight, fine gravel retained on the #4 sieve (-2.25ϕ);

3. Coarse gravel, cobbles or material retained on the 3/4 inch sieve in a percentage or size greater than found on the native beach;

4. Construction debris, toxic material or other foreign matter; and

5. Not result in cementation of the beach.