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MEMORANDUM

To: Susan Parker, Town Administrator, Town of Sunset Beach

From: Robert Neal, PE

Date: April 15, 2016

Subject: 2016 Shoreline Management and Pre-Dredge Analysis
Path Forward for Design & Permitting (April 15, 2016)

M&N Job No.:9269

The Town of Sunset Beach (Town) has completed the initial phase of the 2016 Shoreline Management and Pre-Dredge Analysis and intends to evaluate the path forward. The proposed work involves the maintenance dredging of Mary's and Turtle Creek along with the North Shore Drive entrance channel and adjoining finger canals. The work also includes the initial dredging of Jinks Creek and the Canal Drive feeder canal. Upon evaluating the path forward the Town may elect to proceed with permitting and design of any, all, or none of the proposed work areas.

The outline below provides the anticipated tasks necessary to complete the design and permitting of the overall project. The tasks derive from comments received during the March 24, 2016 agency coordination meeting and may be refined based on additional agency coordination and input. A recommended next step follows the task outline and provides a path to reach the next agency coordination meeting. Please note the discussion below does not consider the necessary efforts to permit an upland disposal site, but does provide a path to identify a site for further development.

The recommended next step provides a cost estimate of \$212,154.⁰⁰ to bring the project to the next agency coordination meeting. The tasks included in the next step will provide an engineered design suitable for permitting and a dredge volume necessary to estimate construction costs. In addition, the next step includes some initial environmental work that will be necessary for Mary's and Turtle Creek. Under current assumptions, the schedule for the next step (tasks 1 – 7) covers a 6 month time frame with project construction most likely occurring in the winter or 2017-2018.

TASK 1 - PROJECT COORDINATION

M&N will continue to provide coordination efforts through the next phase of the project, anticipated for a 6 month duration. The efforts include written progress reports documenting the project status and current work efforts on a monthly basis. M&N staff will also remain available for conference calls and email correspondence at the Town's convenience to discuss the project and answer any questions that may arise. M&N anticipates one (1) Town council meeting and one (1) public meeting may be necessary within the next phase of work to update the council and Town residents on the project status. M&N will prepare for and attend these meetings at the request of the Town. In addition, as the initial step in the next phase M&N will assist the Town in applying for a Water Resource Development project grant through DEQ as was done for the Eastern Channel Project for the Town of Oak Island. **The grant may provide up to a 50% cost share for the design, engineering, and construction of the proposed project.**

Total Lump Sum Cost for Task 1 - Project Coordination: \$16,465

TASK 2 - REFINED DESIGN

Based on the comments received at the March 24th Agency Coordination Meeting, Moffatt & Nichol (M&N) will provide a refined design template for the dredge areas suitable for permitting each phase of the project. The design will provide cross-sections and plan view drawings showing the work area and dredge depths. M&N will develop the design based on the navigation goals established by the Town and will coordinate with the environmental agencies responsible for permitting the project to help provide an acceptable template to the agencies and Town.

Based on the comments received at the agency coordination meeting the USACE will require some type of hydraulic modeling showing the proposed work in Jinks Creek will not create additional shoaling in the AIWW crossing. The USACE will most likely also require modeling to show tidal velocities traversing the 'S' curve in Jinks Creek will not create additional scour to alter the creek's historic alignment after project construction. The USACE also recommended analyzing how Tubbs Inlet would adjust with the proposed work. To address these concerns M&N will conduct a hydraulic model analysis of Jinks Creek to identify the relative change in tidal velocities expected from the proposed work. The model analysis will build upon a 2005 analysis of the AIWW in Sunset Beach and will show the relative change in velocities between existing and 'with project' conditions. The analysis will focus on the AIWW crossing with Jinks Creek, the 'S' curve and the entrance to Tubbs Inlet. **(This work assumes the USACE will accept a hydraulic model analysis and will not require a morphologic model (which would be a significant undertaking itself). Prior to initiating this task M&N will verify again, the acceptance of a hydraulic model with USACE staff. A morphologic model shows anticipated shoaling and scour areas, where a hydraulic model shows where velocities magnitudes experience a change. With a hydraulic model, the shoaling or scour effect may be estimated from the velocity magnitude change.)**

To complete the modeling analysis, M&N will contract Geodynamics to collect additional topographic and bathymetric survey data surrounding Tubbs Inlet. The initial survey work collected during Phase I focused on the potential dredge areas and did not capture the conditions of the inlet, as the modeling task was not required at the initiation of Phase I. Quantifying the current conditions of Tubbs Inlet will be necessary to describe the inlets anticipated response. The survey area within the AIWW will also be expanded to identify existing conditions within the federal navigation channel. This bathymetric survey will aid in simulating the tidal velocities within Jinks Creek and may also serve as a pre-construction survey for the AIWW. (The USACE will most likely require a comparison of the pre-construction conditions with annual surveys obtained after the Jinks Creek work is complete.) The list below shows the estimated lump sum cost for the Refined Design task for each work area. The estimated cost for Jinks Creek includes the anticipated surveying and modeling efforts described above.

Mary's & Turtle Creek:	\$5,234
North Shore Drive Entrance Channel and Finger Canals:	\$3,194
Jinks Creek & Canal Drive Feeder Canal:	\$61,822
Surveying for Jinks Creek Modeling (Geodynamics):	\$31,682

Total Lump Sum Cost for Task 2 - Refined Design: \$101,932



TASK 3 - SEDIMENT TESTING

Testing will be required in each proposed work area to classify the sediment composition for proper placement or disposal. M&N will contract with Catlin Engineers to collect and test the proposed sediment samples and provide written results of the tests. M&N will calculate composite information for each work area based off the test results provided by Catlin. M&N will use the composite information to estimate the volume of material requiring upland disposal and the volume of beneficial re-use material available within the proposed work template. M&N will provide a written report to the Town containing the testing results and volumetric estimates.

Collection of grab samples will most likely suffice for areas previously dredged, such as Mary's Creek, Turtle Creek and the North Shore Drive entrance channel and adjoining finger canals. The available volume, and material type, in these locations are anticipated to discourage beneficial use placement. However, vibracore samples will most likely be required within 'new' work areas such as Jinks Creek and the North Shore Drive feeder canal. The new work areas most likely contain material compatible for beach placement and may provide additional benefits to the project such as potential cost share partners. (Sediment testing is not anticipated along the beach front for beneficial use material placement, or within the USACE disposal islands.)

Material testing of the collected sediments will occur in accordance with the USACE "Sediment Testing Guidelines for Dredged Material Proposed for Disposal in Federal Project Disposal Areas by Applicants" dated May 2009 and the NCDQM Technical Standards for Beach Fill Projects (15A NCAC 07H.0312). Up to fourteen (14) samples will be collected in Jinks Creek and (8) samples in the Canal Street feeder canal (22 total vibracore samples will be collected). **(State guidelines require a minimum of 5 cores to be collected or 1 every 500 ft for a non-maintained navigation channel, whichever is greater. The sediment samples will help identify the volume of potential beneficial re-use material within Jinks Creek and the Canal Drive feeder canal. The Town of Ocean Isle has expressed an interest in receiving beneficial use material and participating as a cost sharing partner for the sand placement. Capturing all of the material eligible for beneficial use along the beach front will help reduce the overall project cost for the Town of Sunset Beach.)**

Two (2) grab samples will be collected in Mary's and Turtle Creek (total of 4 samples) for analysis. A composite for each creek will be tested for disposal authorization within a USACE disposal island in the AIWW. In addition, two (2) grab samples will be collected in each finger canal near North Shore Drive (total of 8 samples) and three (3) samples will be collected from the respective entrance canal. (A total of 15 grab samples will be collected.) The list below provides the estimated costs for the sediment collection and analysis work. (The cost assumes the work is completed in one effort, requiring only one mobilization.)

Mary's & Turtle Creek:	\$1,008. ²⁵
North Shore Drive entrance channel and Finger Canals:	\$1,008. ²⁵
Jinks Creek & Canal Drive Feeder Canal:	\$11,716. ⁵⁰
Sediment Collection & Testing Costs (Catlin):	\$43,059
Total Conceptual Cost for Task 3 - Sediment Testing	\$56,792



TASK 4 - USACE DISPOSAL LOCATIONS

As part of the initial work for this project, M&N obtained conceptual authorization from the USACE to use an AIWW disposal island for sediment non-compatible for beneficial re-use on the beach. The USACE stated multiple disposal islands would be available (pending the construction period) for use near Sunset Beach. However, the islands may require improvements pending the volume quantity proposed for placement and the islands current conditions. (Based on experience with the dredging of Eastern Channel adjacent to Oak Island, improvements to the disposal islands may range up to \$250,000 or more to satisfy USACE requirements.)

In an effort to determine the level of improvements (if any) required to place the dredge material within a disposal island, M&N will help select an appropriate island for use. As part of this effort M&N will inspect the current conditions of the disposal islands most appropriate for use. Up to three (3) disposal islands may be considered and evaluated for further development. Photographs will be logged and a general description of the level of work required for each island will be provided. Based on the inspection results, M&N will recommend one (1) island for material placement. The recommendation will consider the estimated level of work required to prepare the island for material placement, the volumetric quantity anticipated for the site, and the construction cost (pipe line distance) for using the island. **(No survey work is included for the disposal islands at this stage; however, survey work will most likely be required in the future to document pre-construction conditions and volumetric capacity.)**

The Lump Sum Cost for Task 4 – USACE Disposal Location is: \$6,325

TASK 5 - OYSTER SURVEY

The Division of Coastal Management (DCM) has requested an oyster survey be performed in Mary's and Turtle creeks due to know populations of shellfish in these systems. M&N will conduct the necessary surveys following protocols provided by DCM. It is assumed that approximately 130,000 square feet of creek bottom will require survey. Upon completion of in-field sampling, a report of findings will be provided to DCM and other relevant agencies for review. Our staff will coordinate mitigation options with relevant agencies to determine a course of action. Findings and mitigation options will be discussed with the Town and will be provided in the report.

The Lump Sum Cost for Task 5 – Oyster Survey is: \$22,183

TASK 6 – AGENCY COORDINATION MEETING (PRE-PERMIT SUBMITTAL)

Based on the results of the above tasks, M&N will request and chair a 2nd agency coordination meeting with representatives of the Town, the USACE, CAMA, and others to discuss the proposed project. M&N will present the refined design of the work areas along the results of the environmental studies to the invited members. A copy of the results will be provided to the attendees a minimum of 1 week prior to the meeting to allow each member ample review of the project. A written summary of the meeting will be provided to all participants along with contact information for each attendee.

This meeting is anticipated to serve as a pre-submittal meeting for the permit application. The outcome will confirm the path for permitting the project and should identify any additional concerns maintained by the agencies. This should accelerate the permitting process and reduce the potential for additional information requests from the agencies. M&N will provide a written summary of the meeting to all participants.

The Lump Sum Cost for Task 6 – Agency Coordination Meeting (Pre-Permit Submittal) is: \$6,427



TASK 7 - CONCEPTUAL COST ESTIMATE (CONSTRUCTION)

Based on the results of the agency coordination meeting, M&N will provide a conceptual estimate of construction costs, including development of construction plans and specifications, bidding the project, and construction oversight. The cost estimate will be based on the project parameters defined to date and will identify assumptions of outstanding items (such as the selection & development of a USACE disposal island.) The cost estimate will also identify any changes in the permitting process incurred from the agency comments.

The Lump Sum Cost for Task 7 – Conceptual Cost Estimate (Construction) is: \$2,030

TASK 8 - ESSENTIAL FISH HABITAT (EFH) ASSESSMENT

In keeping with requirements in the Magnuson-Stevens Fishery and Conservation Act and subsequent Essential Fish Habitat (EFH) Guidelines (50 CFR 600.05 - 600.930) adopted by NOAA Fisheries and the Fisheries Management Council, M&N will prepare an EFH study of managed fishery resources potentially affected by the project. The EFH will include all applicable species managed by the Mid-Atlantic and South Atlantic Fishery Management Councils, and the Atlantic States Marine Fisheries Commission. A focus will be on Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) which was not discussed in 2002 documentation for Sunset Beach dredging. The report will be submitted to National Marine Fishery Services (NMFS) for review and comment. We will coordinate with the Town of Sunset Beach and other members of the M&N planning team regarding any conditions outlined by NMFS with regards to likely impacts to schedules, construction protocols, or operations and maintenance that could affect proposed dredging operations. Two days for formal consultation has been included.

The Lump Sum Cost for Task 8 – EFH Assessment is: \$17,682

TASK 9 - BIOLOGICAL ASSESSMENT (BA) FOR PROTECTED SPECIES

There are 15 federally protected species in Brunswick County as well as a number of state listed species. M&N professionals will conduct a database search of listed species, including coordination with local agencies. On-site surveys will be conducted by qualified biologists to document presence or absence or to determine habitat potential for any listed species which are known to occur in the area or observed in the project area (detailed species specific surveys are not included if presence is identified). A Biological Assessment (BA) will be prepared that discusses listed species, life requisites, and potential environmental consequences. The BA will be coordinated with the US Fish and Wildlife Service (USFWS) and NMFS to obtain concurrence with the findings as part of the informal consultation process. We will coordinate with the Town of Sunset Beach and other members of the M&N planning team regarding any conditions outlined by either agency with regards to likely impacts to schedules, construction protocols, or operations and maintenance that could affect proposed dredging operations. Two days for formal consultation has been included.

The Lump Sum Cost for Task 9 – BA for Protected Species is: \$17,682



TASK 10 - CULTURAL RESOURCES

M&N will conduct a review of known cultural resource sites on file with the State Historic Preservation Office (SHPO). A summary of findings will be provided. If historic or archaeological studies are required for this project, we will work with a qualified subcontractor to conduct necessary studies. These additional services will be included in a supplemental agreement and are not part of this proposal. **(Please note, if historic or archaeological studies are required the cost could range up to \$25,000 or more.)**

The Lump Sum Cost for Task 10 – Cultural Resources is: \$2,100

TASK 11 - CAMA MAJOR PERMIT PACKAGE

M&N will assemble and complete the necessary information for a joint state-federal permit covering the proposed project. Agencies have stipulated that a major permit from DCM will be required, and DCM will assume the lead role with respect to permitting. The US Army Corps of Engineers has indicated a General Permit 0291 can be utilized to satisfy USACE requirements under the joint application process. Our environmental staff will draft and assemble the necessary documentation to complete the permit process.

Agency coordination will be undertaken as necessary to complete the permit package. We will respond to questions and requests for additional information during the agency review process. Two rounds of application reviews or requests for information are included in this scope. Application fees will remain the responsibility of the Town of Sunset Beach.

The Lump Sum Cost for Task 11 - CAMA Major Permit Package is: \$26,584

TASK 12 – USACE 408 PROCESS

Under 33 U.S.C. Section 408, the Secretary of the Army (generally designated to the USACE) has the right to insure that proposed alteration of a Federal project will not impair the usefulness of that project, retains the project's authorized purpose, and is not injurious to the public interest. If the project has a non-Federal sponsor, USACE must obtain concurrence from the sponsor as part of the 408 process. M&N has been involved in Section 408 analyses for projects where dredging and channel maintenance is necessary to support project purposes. While the 408 process is the responsibility of USACE to develop and evaluate, our role involves providing necessary documentation (scour analyses, circulation studies, vessel movement studies, etc) to move the process forward. Most importantly, by understanding the 408 process and the data needs associated with the analysis, we are able to coordinate with appropriate Federal authorities in an effective manner to facilitate permit approval. From an environmental prospective, our role will primarily involve coordination with USACE in order to provide them available information to support their analyses (no new studies proposed).

The Lump Sum Cost for Task 12 – USACE 408 Process is: \$1,810



Actions Recommended for Next Phase

Task	Estimated Cost
1. Project Coordination	\$ 16,465. ⁰⁰
2. Refined Design	\$101,932. ⁰⁰
3. Sediment Testing	\$ 56,792. ⁰⁰
4. USACE Disposal Locations	\$ 6,325. ⁰⁰
5. Oyster Survey	\$ 22,183. ⁰⁰
6. Agency Coordination Meeting	\$ 6,427. ⁰⁰
7. Conceptual Cost Estimate	\$ 2,030. ⁰⁰
Total (for Next Phase)	\$212,154.⁰⁰

Estimated Costs for Future Phased Work

Task	Estimated Cost
8. EFH Assessment	\$ 17,682. ⁰⁰
9. BA for Protected Species	\$ 17,682. ⁰⁰
10. Cultural Resources	\$ 2,100. ⁰⁰
11. CAMA Major Permit Package	\$ 26,584. ⁰⁰
12. USACE 408 Process	\$ 1,810. ⁰⁰
13. Environmental Management	\$ 6,709. ⁰⁰
14. Construction Documents	\$ 66,817. ⁰⁰
Total (for Future Work)	\$139,384.⁰⁰
Total (for all estimated work)	\$351,538.⁰⁰

1. Estimates do not include the following:
 - a. Efforts to permit any upland disposal site.
 - b. Coordination tasks to secure a cost share agreement with the Town of Ocean Isle.
 - c. Project coordination efforts for future phased work.
2. The estimated costs for preparing construction documents may be amended after the 2nd agency coordination meeting to reflect the necessary efforts to detail the improvements required to any upland disposal site.

M&N appreciates the opportunity to assist the Town of Sunset Beach and would be happy to discuss the proposed path or provide additional information regarding our understanding of the project. Please let me know if I may provide any additional clarification.

