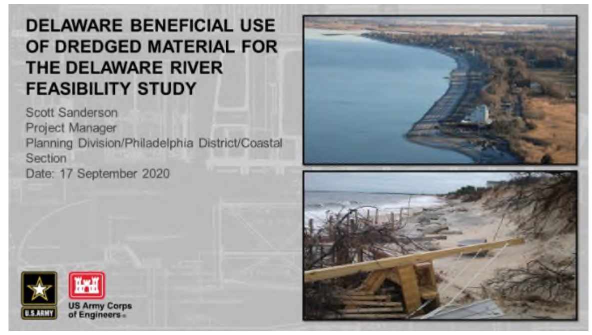
Beneficial Use of Dredged Material for the Delaware River Feasibility Study
September 17, 2020
Q&A Session



This webinar provided an overview of the Delaware Beneficial Use of Dredged Material for the Delaware River (DE DMU) feasibility study. The DE DMU feasibility study identified beneficial use opportunities for sediment dredged from a Federal navigation project to provide coastal storm risk management (CSRM) benefits. Presented by Scott Sanderson (Coastal Planning Chief, Planning Division, Philadelphia District) described the study's formulation process, while highlighting lessons learned related to resource agency coordination, specifically concerning the Coastal Barrier Resources Act/Coastal Barrier Improvement Act and the impact of environmental windows on dredged material placement. In addition, the presentation discussed the impact of the navigation project Federal Standard on the benefit/cost analysis.

This summary of the Question / Answer session of the webinar is not a transcription; questions and responses have been edited and reordered for clarity.

<u>Beneficial Use of Dredged Material (BUDM) Cost Considerations</u>

Why was the cost used for the benefit-cost ratio the delta between BUDM and operations and maintenance (O&M) costs, and not the total cost of O&M and BUDM together?
The study cost engineer started out by calculating the total project cost summary, which included the cost to mobilize the dredge and the additional cost to transport the material to the beach communities and build the beaches. Once that total cost was calculated, a negative line item was applied to the total project cost summary to represent the mobilization of the dredge, leaving the material transportation and beach building as the remaining cost.

Some project delivery teams (PDTs) appear to shy away from BUDM because they think it is too time and resource intensive to quantify the benefits. What are some ways to encourage PDTs to consider BUDM?
There was a need to be very persistent on communicating the value of BUDM with the DE DMU study from the beginning, as there was a tendency to want to fall back to the Federal Standard and least cost environmentally acceptable disposal location. One helpful factor was that the PDT could lean on the specific study authority, which directed the PDT to consider BUDM to gain coastal storm risk management (CSRM) benefits. The PDT also addressed the issue of resistance to BUDM by building in multiple sensitivity analyses into the study. In addition, the PDT used consistent messaging to ask the question: "If this material has to be dredged for navigation purposes regardless, why not look for a way to use it beneficially?"

How did the PDT find the BUDM cost per acre for this study compared to other BUDM projects?
There were several factors that drove up the cost per acre for this particular study, including the fact that per the study authorization, dredged material had to be taken from a designated area in the main navigation channel (as opposed to nearshore or offshore borrow areas) and then must be pumped over a long distance to the beach nourishment sites. This led to a total project cost of just over $330M for all

seven proposed sites at approximately $60 to $70 a cubic yard. This is significantly high compared to other traditional beach nourishment projects.

How did project longevity impact the benefit-cost ration of the project, assuming loss of beach over time?
The economics portion of the study included a 50-year period of analysis, and certain modeling assumptions were made in Beach-fx about the number of rebuilds and repairs based on certain percentages of structural damage before a structure would be taken out of the inventory. Regarding the rebuild assumptions, the following modeling assumptions were made in Beach-fx:

- **Damage Element Condemnation Ratio:** 50% – maximum damage a Damage Element can receive from a single storm event before becoming condemned and temporarily removed from the inventory. Once a Damage Element is removed from the inventory, it can no longer receive further damages until rebuilt.
- **Number of Rebuilds:** 50 – maximum number of repairs a Damage Element can undergo during the project lifecycle. For clarification, a rebuild does not refer to a total rebuild event (100% of structure value), but rather to a repair event. A repair is defined as removing any previously sustained damage, even exceptionally low damages, from a Damage Element. The number of rebuilds is limited to prevent overstating CSRM damages. If a structure uses the full 50 rebuilds allotment, it is no longer rebuilt in that lifecycle.

In addition, periodic nourishment (every 6 years) was part of the recommended plan to help sustain the design template. Lastly, the PDT found that the highest benefit of the project came from mitigating long-term erosion and storm-induced erosion damages as opposed to mitigating inundation from flanking and marsh side flooding.

<u>**Deviating from the Federal Standard**</u>

Was the cost of beneficially reusing the material more expensive than the cost of disposing of it at Buoy 10? If so, what procedural steps needed to be taken to recommend a deviation from the Federal Standard?
Yes, the cost of beneficially reusing the material at the beach sites was much higher than disposing of the material at Buoy 10 (the Federal Standard). The actual implementation of this project is particularly complicated because there are two accounts involved – Navigation O&M (to dredge material) and the Construction General (CG) account (to get the sand to the beaches). This will prove to be a challenge if and when the project gets built, since the dredging cycle will need to match the funding cycles across business lines. However, the PDT took into consideration the fact that Buoy 10 only has 10 years of working capacity remaining – with the cost to take material to the next closest approved disposal area (Artificial Island) 40 miles upriver being significantly higher – and that there is more environmental benefit for horseshoe crabs and migratory red knots by placing sand on beaches vs. disposing of it.

Because this project deviates from the Federal Standard, will it be funded under both O&M and CG for BUDM to support CSRM, or will it only be funded under O&M? How will the design of the BUDM impact the ability to complete the O&M dredging? Will these two components line up for execution during a dredge cycle?
This is a question the PDT has been challenged by throughout the entirety of the study, as the O&M dredge schedule will have cascading effects on the project (i.e., on whether it will line up with receipt of

CG funding, and on whether environmental windows for dredge placement can be accommodated or the biologists will have to reopen coordination with the resource agencies). In order for this CSRM project to be implemented, O&M funding (for the navigation dredging mobilization) and CG funding (for the placement of material at the beach communities) will need to be appropriated at the same time. If O&M dredging occurs outside of the environmental windows and the beaches can therefore be built, the project will then need the CG funding to line up in the same timeframe. The PDT is hopeful that the results of the study will challenge the norm and push the agency to take the opportunity to make the funding component work.

Based on the project lifecycle, how long would it take the project to be designed and constructed? Based on that timeframe, would it be close enough to the end of life of Buoy 10 so that a new Dredged Material Management Plan (DMMP) could be established with beach placement as the new standard over Artificial Island?
The PDT anticipates approximately one year for the preconstruction engineer and design (PED) phase. For project implementation, initial construction quantities (1.3 million cy) exceeded the projected quantity assumed to be available from each dredging cycle. Therefore, the projected implementation of this recommended plan assumes initial construction to be split over two operations in 2023 and 2029. The southernmost three sites (Lewes, Prime Hook, and Slaughter) will be constructed in 2023, and the remaining four northern sites (Pickering, Kitts Hummock, Bowers, and South Bowers) will be constructed in 2029 during the first periodic nourishment cycle for the three southernmost sites. In 2035, all seven sites will be on the same 6-year periodic nourishment cycle.

Regarding the Buoy 10 capacity and the DMMP, the current DMMP calls for dredged material disposal in Artificial Island if Buoy 10 reaches capacity; however, it is difficult to say at this time if beach placement could become the new Federal Standard instead of Artificial Island.

<u>Sea Level Rise & Resiliency</u>

How did the PDT define resiliency for this project, and what metrics were used to evaluate how alternatives affected resiliency?
The PDT leaned on the North Atlantic Coast Comprehensive Study's (NACCS) definition of resilience and adaptive capacity (i.e., an alternative's ability to adapt to changing conditions). The NACCS criteria for assessing each measure's resilience was applied to determine if a measure met Objective 2 ("Increase the resiliency of coastal Delaware, specifically along the Delaware Estuary and Delaware Inland Bay shoreline, via the beneficial use of dredged material"). Specifically, if the NACCS ranking indicated a "medium" or higher "adaptive capacity" for a selected measure, USACE determined that the measure increased the shoreline resilience and met Objective 2. Adaptive capacity is defined as a measure's ability to adjust through natural processes, operation and maintenance activities, or adaptive management to preserve the measure's function. Beach restoration floated to the top as an alternative – the periodic beach nourishment built into the proposed plans will help berms respond to changing conditions.

Did the PDT take sea level rise (SLR) into account during design discussions of alternatives?
Yes. During formulation, the PDT applied the intermediate SLR curve in Beach-fx and then conducted a sensitivity analysis for the low and high SLRs when the recommended plan was identified. The majority of sites in the national economic development (NED) plan are not very sensitive to changes in relative

sea level change (RSLC). The overall project average annual net benefits increase 7.26% from low RSLC to intermediate RSLC, and then a further 9.89% from intermediate RSLC to high RSLC. Potential damages avoided are accrued at a slightly faster rate than increases in project cost. The only outlier site is Lewes Beach, which increases 54.52% (+$140,442) and then a further 107.00% (+$425,901) in average annual net benefits as a greater portion of the inventory enters the potential damage pool in the intermediate and high RSLC scenarios. The overall increase in average annual net benefits is partially offset by South Bowers Beach and Prime Hook Beach, which drop -$61,206 and -$92,537 from the intermediate RSLC to high RSLC curves, respectively. Overall NED plan sensitivity to RSLC is fairly low with the project experiencing a net increase in average annual net benefits from the intermediate RSLC to high RSLC, while maintaining positive average annual net benefits in the low RSLC curve scenario.

Calculating Benefits

Was an evaluation of environmental benefits incorporated into the study, and if so, were any models used to quantify those benefits?
Although the PDT did not quantify environmental benefits, it did extensively discuss the benefits of beach restoration compared to the alternative plans and to taking no action in the environmental assessment. The study area includes an important pathway for the migratory red knot, and creating beach habitat for this species was qualified as an environmental benefit. The designs and slopes of the proposed beaches took this aspect into consideration.

Were you able to claim any FRM benefit for this study?
The study predominantly focused on measuring FRM benefits, and specifically CSRM. The primary damage mechanism that drove CSRM benefits was erosion, both long term and storm induced.

Miscellaneous

Are there any local coastal regulatory considerations or constraints that could limit the array of locally supportable plans for this project?
The PDT coordinated closely with the project sponsor (Delaware Department of Natural Resources and Environmental Control) and is not aware of any local regulatory constraints to the project.

What is the current status of the project? Has it been authorized yet?
The Chief's Report for the project was signed earlier this year, but the project has not yet been authorized. The PDT is currently in discussions with the Office of Management and Budget and Office of the Secretary of the Army for Civil Works to address questions about the study, and anticipates that a decision will be made over the coming weeks and months regarding whether the project will be recommended to Congress for authorization.