Mid-Chesapeake Bay Islands Ecosystem Restoration
U.S. Army Corps of Engineers (USACE) responses to IEPR comments

Synopsis: The Independent External Peer Review (IEPR) for the Mid-Chesapeake Bay Island Ecosystem Restoration feasibility study was managed by an outside eligible organization that assembled a panel of four experts in the fields of engineering, estuarine ecology, economics and plan formulation, and hydrology. Ultimately, the panel identified and documented 14 comments. Four were classified as low significance and included comments about the influence of climate change on design, the addition of figures to the main body of the report, citations for restoration literature, and clarification of the location for dredged material in the most probable future without project condition. These comments were addressed with minor modifications to the feasibility report. Eight of the comments were classified as medium significance. They included the level of rigor/review of the preferred alternative; the use of a sensitivity analysis and the documentation of risk and uncertainty; the schedule for establishment of a fully functioning marsh; further discussion of the link between the need and scale of the project with the target volume of dredged material; description of the environmental monitoring; connectivity between the salt marsh and the estuary; inclusion of climate change, sea level rise, and invasive species in the Adaptive Management Plan; and potential discounting of environmental outcomes over the project lifetime. As a result, clarification was added to the report, a cost and schedule risk assessment was conducted, and a detailed monitoring plan and Adaptive Management Plan are being developed with the assistance of the panel's recommendations. The remaining two panel comments were determined to be of high significance. One concern was that the analysis of environmental benefits was biased by the failure to subtract quantitative habitat injuries, making the selection process and justification of the preferred alignment unreliable. In response, the study team worked with fishery managers to quantify negative benefits from filling the water column and benthic habitat and provided a discussion to support the conclusions produced by the plan formulation selection process. The second concern was that water quality impacts associated with construction and the potential negative impacts of resettled suspended sediment were not addressed. As suggested by the IEPR reviewers, the study team prepared an assessment that considered sediment re-suspension, transport, and deposition, and oyster and submerged aquatic vegetation requirements to assess construction impacts for Barren and James Islands. The comments and USACE responses are discussed in more detail below.

High Significance Comments

- Comment 1:

The analyses of environmental benefits are biased by the failure to subtract quantitative habitat injuries (costs) arising from filling water column and especially benthic habitats, rendering the selection process and justification for the preferred island alignment unreliable.

USACE Response: Adopted. Additional analyses were conducted to quantify environmental injuries (losses) from filling the water column and benthic habitats with dredged material. Additional Island Community Indices for the open water column were developed (including benthic habitats) to add to the existing Island Community Unit (ICU) methodology. The ICU method quantified the benefit of creating island habitat and protecting submerged aquatic vegetation resources. ICUs were calculated for the offshore area that would be filled at James and Barren Island thereby allowing net ICUs to be calculated. The plan selection process was revisited using net benefits as opposed to gross benefits. The final report includes a discussion of this in Section 4.7 and in the Report Summary. These analyses led to the determination that the selected plan was appropriate, considering both gross and net benefits. By considering the ecosystem impacts of the project in a more detailed fashion, justification of the recommended plan was strengthened.

- Comment 2

Water quality impacts associated with construction and the potential negative impacts of resettled suspended sediment to submerged aquatic vegetation (SAV) and natural oyster beds (NOBs) were not addressed.

USACE Response: Adopted. USACE prepared a "Simplistic Assessment" as suggested by the IEPR reviewers to consider sediment resuspension, transport, and deposition, and oyster and SAV requirements. Construction impacts were assessed for both Barren and James Island. As part of the simplistic assessments for each island, the project delivery team considered the proposed distances from the project areas to SAV and Oyster Bars, construction technique (i.e. mechanical placement and distance between dredging operations and the SAV and oyster bars), time of year restrictions for work near SAV and Oysters, and the experience level of the District this application based on similar projects (Poplar Island and north Barren Island dike construction).

This assessment concluded that there will be no significant turbidity or environmental impacts to the oyster bars or SAV from construction at Barren or James Island, due to construction techniques, time of year restrictions, experience and distance from SAV beds and oyster bars. Text in Section 6 of the report discusses this and the results of sediment transport modeling results. No issues were raised by the simplistic assessment to warrant the 3D hydrodynamic and sediment modeling proposed by the IEPR reviewers should the simplistic assessment prove inconclusive.

Medium Significance

- Comment 3

The Preferred Alternative did not undergo the same level of rigor/review as the two original alternatives. The Preferred Alternative was added after the cost-effectiveness (CE) analysis and the incremental cost analysis (ICA) were completed, which theoretically casts doubt on its justification. The preferred alternative should be incorporated in the CE/ICA process.

USACE Response: Adopted. The preferred alternative has undergone the same level of rigor in comparing it against the other alternatives. Section 4.7 of the report has been significantly changed to provide detailed information on how the recommended plan was selected. The selected alternative was formulated subsequent to the initial CE/ICA in an iterative re-formulation effort undertaken to take advantage of efficiencies in the production of benefits that were revealed during the original plan evaluation process. Had the preferred alternative been included in the CE/ICA, as presented in the report, the analysis would have shown it to be the best buy alternative in relation to the other alternative plans. This is demonstrated in Figure 4.9 of the final report.

- Comment 4

It appears that the sensitivity analysis was not conducted, and sources of risk and uncertainty and their impact on plan formulation are not documented.

USACE Response: Adopted. Sources of risk and uncertainty related to project costs, benefits, and schedule have been analyzed in support of plan formulation and selection. The report has been revised to more fully describe these analyses and results. A cost and schedule risk analysis was conducted to consider any aspects of the project which could cause the cost and/or schedule to vary from the estimators' cost estimate and schedule. The cost and schedule risk assessment utilized Crystal Ball software to conduct a risk analysis. The USACE Cost Engineering Directory of Expertise at Walla Walla District performed the Crystal Ball analysis, which determined appropriate contingency rates for the cost estimate such that the cost estimate could be certified to a 75% confidence level. Results are reflected in the cost estimates reported throughout the final report and the cost risk analysis report is presented in Appendix C. Risks and uncertainty relative to construction was based on real-world experience with Poplar Island. The uncertainty that was assigned to the cost parameters reflects this experience.

Risk and uncertainty relative to the predicted project benefits is shown in Section 5.8 of the report. Various scenarios were considered that could impact project benefits, such as large storm events, sea level rise, engineering decisions, excessive material consolidation, etc. A range of potential benefit units was determined and considered to be sufficient to support the project recommendation.

- Comment 5

It is overly optimistic to assume that the marsh will be fully functioning in five years.

USACE Response: Adopted. The Corps of Engineers agrees fully with comment, and the final report has been revised to more clearly depict the anticipated maturation of the restored wetlands. Wetland cells, in fact, do continue to increase in value through 10 years in the current Island Community Unit (benefit) quantification. Wetland maturity was not clearly communicated in the review draft of the report. The five year marker identified in the Feasibility Report was specific to vegetation development. In addition, the findings of Cornell et al. 2007 suggest that most major carbon fluxes are likely established in less than 5 years. However, additional wetlands function was accounted for and ICU increases do occur through year 10 as the benthic community develops. In the current formulation, the wetland cells gain nearly 20% of their value between years 5 and 10 as the benthic community matures. The increase in benefits from benthic development was identified only in a footnote in Table B-17 in Appendix B. Table B-17 was corrected to state that wetlands mature fully in 10 years, not 5 years and is accompanied by a discussion in Section B.8 and dates were changed in Table 4.21 to more accurately reflect the benefit calculations that were done. No changes were made to the ICU calculations as they conform to the reviewers concerns.

- Comment 6

The report should make it clear that the "need" for the project and the final project scale are both determined by the need to dispose of a target volume of dredged material rather than based on the incremental cost and incremental benefits.

USACE Response: Adopted in part. The "need" for the project is based primarily on the ecological significance of the resource. The scale of the proposed project is directly related to the quantity of dredged material available for beneficial use. The report has been revised to better describe this relationship. The dredged material disposal 'need' for the project is quantified in Objective 3 which states: Provide capacity for placement of dredged material (3.2 million cubic yards [mcy] per year), and the need to place 30 to 70 mcy of material over a 20-year period as determined by the Federal Dredged Material Management Plan in 2005. The placement capacity was considered at two steps in the plan formulation, 1) during the island ranking process as an engineering suitability criteria (Section 4.3.2a) and 2) as an engineering design consideration when developing island alignments (Section 4.4.1). A minimum size for the islands was determined to meet the annual and total placement need. The sections that were updated to clarify this need include:

Report Summary
Section 1.3- Study Purpose and Need
Section 2.1.2- Dredged Material Placement Needs
Section 4.1.1 Federal Objective

The report also shows the critical need to protect and restore island ecosystems, including marsh, terrestrial, and sheltered water habitats for a variety of fish, reptiles, amphibians,

birds and mammals. This is clearly stated in Objectives 1 and 2 in Section 4.1.4 and is inherent in the benefit calculation scheme. The availability of dredged material presents an opportunity for ecosystem restoration that would not likely be otherwise viable. Further, the project addresses significant habitat and resources within the Chesapeake Bay and is being designed to be sustainable. For example, the wetland cells are being developed with tidal guts that will not only supply critically needed water for the health of the marsh, but will also bring sediment into the system so that the marsh can naturally accrete and remain healthy as sea level rises.

- Comment 7

The design of the environmental monitoring to be conducted after initiation of the project is not described in sufficient detail to guarantee that the purposes of such monitoring can all be fulfilled.

USACE Response: Adopted in part. A detailed monitoring plan will be developed during the pre-construction engineering and design phase, at which point this comment will be fully adopted. USACE and the Maryland Port Administration have contracted with ARCADIS to develop Mid-Bay Island Ecological Design Criteria and a Habitat Development Work Plan in support of the Mid-Bay Adaptive Management Framework. The detailed monitoring plan is currently under development and will be based upon the selection of reference ecosystems within the similar environmental conditions as the constructed systems. It must be noted that the Poplar Island project has a standing workgroup made up of representatives from interested agencies and project partners that updates the Adaptive Management Plan for that project annually. Monitoring plans and data are reviewed frequently by the Workgroup as well as the construction staff. The process for the Mid-Bay project will be similar and will likely include many, if not most, of the Poplar Island Workgroup members.

- Comment 8

Connectivity between the salt marsh and estuary is unclear both during and post construction.

USACE Response: Adopted. Connectivity, fish access, and climate change are issues being considered for the implementation of the Mid-Bay project. Many of the members of the Mid-Bay team have worked to address these issues at Poplar Island through the Poplar Island Workgroup and the Habitat Subgroup. Specific designs for the control structures will be completed during the Pre-Construction Engineering and Design phase, and will be informed by different types of structures and methods that have been considered at Poplar Island. These lessons learned will be applied to the Mid-Bay project. Figures in the Engineering Appendix have been revised to clarify possible options for connectivity. Text is included in Sections 4, 5 and 6 to discuss the interaction between the estuary and the restored salt marshes, and the benefit to fish and other resources.

- Comment 9

The Adaptive Management Plan needs to include a discussion on how climate change, sea level rise, and invasive species will be addressed.

USACE Response: Adopted in part. The Adaptive Management Plan will include a discussion on how these issues will be addressed. The plan will be prepared during the Pre-Construction, Engineering and Design phase of the project at which point this comment will be fully adopted. The Poplar Island Workgroup updates a plan every year, and this will be the basis for informing development of the Mid-Bay plan. The Poplar Island Adaptive Management Plan has always included strategies for identifying and eradicating invasive species, and much effort has recently gone into plans for adapting to climate change and sea-level rise. This experience will be used as Mid-Bay plans are crafted. Some discussion of the risks posed by sea-level rise is discussed in Section 5.8. The preservation of project benefits under various sea-level and climate change scenarios will be considered in the detailed engineering to be conducted in the next phase of study.

- Comment 10

National Economic Development (NED) outcomes (e.g., Island Community Units, or ICUs) are not discounted over time like monetary costs. Yet the incidence of environmental benefits over the project lifetime may be uneven and should be considered in alternative plan formulation timelines.

USACE Response: Adopted. During the plan selection process, the ecosystem benefits of the project alternatives were determined by calculating an annual benefit for each of the 52 years of analysis (2008 through 2060). The benefits were determined considering the anticipated stage of habitat development during each year of project implementation. The project team used the same development plan schedule that was used to estimate the project cost. In general the benefits increase as the project is developed. Although by policy benefits are not discounted over time, the variability of benefits over time was considered throughout the analysis. The costs and benefits for each year of the project implementation and analysis are discussed in Section 4.5 and are shown in Tables D-11, D-12 and D-13 of Appendix B. The timing of benefits and of the project start date was considered separately. For alternatives that would come on-line prior to completion of the Poplar Expansion project in 2023, the effects of using both James and Poplar Islands together were considered. Three start dates and three corresponding benefits streams were compared to determine the optimum plan and the impact of the plans on the Poplar Island project. This timing analysis is summarized in Section 4.7.5 and is included in Appendix B, Section B.15. By recommending the plan that included placement of material starting in 2018, before completion of the Poplar Island Expansion project, it was found that benefits at Poplar Island could also be increased. Further, more efficient placement could be realized at both sites and the risk of having insufficient placement capacity for a dredging cycle was minimized.

Low Significance

- Comment 11

Address how climate change will influence the engineering design.

USACE Response: Adopted. The report was revised to acknowledge the potential for climate change and what influence relative sea level rise would have on the engineering design. Statements were added to Section 5.8 - Risk and Uncertainty to address how it may impact the project and to address potential measures to accommodate relative sea level rise. During the Pre-construction Engineering and Design phase, consideration will be given to increasing the width of the perimeter dikes to allow future raising of the top of the dikes without impact to operations. The impact on design of the dike armor stone with regard to size and elevation will also be assessed. The dike armor would most likely be extended up the slope if dike raising is required. The operation and maintenance costs would be adjusted as required to account for these future actions. The elevation ranges and percentages of high and low marsh will be assessed to possibly accommodate a limited rise in sea level. Detailed considerations of climate change will occur during detailed design of project features.

- Comment 12

To better illustrate the connectivity between the salt marsh and open water, duplicate Figures 10 and 16 of Appendix C in the appropriate section of the main body of the report.

USACE Response: Adopted in part. Figure 10 from Appendix C was revised to show the division of the salt marsh into cells that are connected either to tidal guts or directly to the bay, and is shown as Figure 5.4 in the main text. Figure 16 from Appendix C was not included in the main text since it is specific to Poplar Island. Whereas is offers a good example of a potential wetland cell design, it was determined that the extra detail added to Figure 5.4 was sufficient to show the intended connectivity.

- Comment 13

Since this project is presented as a restoration, some attention needs to be paid to literature on the subject.

USACE Response: Adopted. Numerous citations to the restoration literature have been provided in Appendix K of the Feasibility Study. The development of the Ecological Development Criteria that will be used in island design and development of the Adaptive Management Plan during the Pre-construction Engineering and Design phase relies heavily on the scientific literature, but was not provided to the reviewers. This work that will be used for Poplar Island as well as James Island cites over 200 scientific publications on ecology, engineering, macrofauna, microfauna, macroflora, microflora, soil, water quality, Chesapeake Bay flow dynamics, dredged material placement, and ecological restoration with dredged material. The project will also benefit from

experiential knowledge gained from the Poplar Island Restoration Project. USACE-Baltimore is at the forefront of environmental restoration using dredged material within the Mid-Atlantic region. Much information and experience specific to building islands within the Chesapeake Bay has been achieved through the Poplar Island project that is not available through any other sources.

- Comment 14

The "Most Probable Future Without-Project Conditions" (Section 3.5) does not specify where the dredged sediment will be placed if the project does not occur.

USACE Response: Adopted. Initially, Section 3-5 stated 'Further placement sites will need to be identified and online by 2016 in order to accommodate a 57-million cubic yard shortfall in dredged material placement capacity for C&D Canal approach channels and Chesapeake Bay approach channel maintenance, which is discussed in Section 2.' Additional language was added to Section 3.5 ('Most Probable Future Without-Project Conditions') to explain that if the proposed project does not proceed, the DMMP will need to be revisited. Other strategies will need to be devised to handle the shortfall in dredged material placement capacity. Under a worse case scenario, if no other alternatives are developed, ocean dumping could be used to dispose of the sediments. However, the cost of this practice is very high and would not be federally cost-shared.