10. SUMMARY AND CONCLUSIONS

The Poplar Island Environmental Restoration Project (PIERP) is located in the Chesapeake Bay; approximately 39 miles south-southeast of the Port of Baltimore, and two miles northwest of Tilghman Island in Talbot County, Maryland. Dredged material from the Upper Chesapeake Bay Approach Channels to the Port of Baltimore is being beneficially used to restore 1,140 acres of remote island habitat (approximately 570 acres of wetlands and 570 acres of uplands), and it is estimated that by 2014 the existing PIERP will provide up to 40 mcy of dredged material placement capacity.

The USACE-Baltimore District, USACE-Philadelphia District, and the MPA coordinate maintenance of the Port of Baltimore's channel system, and continually assess dredging needs and placement capacity. Channel maintenance and improvement projects require 4-5 mcy of sediment dredged from the Federal and State channels each year. The scheduled closure of the Pooles Island open water placement areas in 2010, the scheduled closure of the Hart-Miller Island Containment Facility in 2009, and the unavailability of open water placement options in Maryland waters have reduced the ability of USACE-Baltimore and Philadelphia Districts and MPA to meet dredged material placement capacity needs. Dredged material placement capacity remaining after 2009 will be insufficient to meet the annual need for maintenance dredging activity, unless new placement options are developed. To plan for the dredged material placement capacity shortfall, USACE-Baltimore District and MPA have initiated processes and studies to evaluate long-term (minimum 20 years) placement options; to address the dredging needs of Federal, State, and local projects; and to maximize the use of dredged material as a beneficial resource.

To address the predicted dredged material placement capacity shortfall, USACE-Baltimore and MPA initiated the Poplar Island expansion study, which was documented in this Integrated GRR/SEIS. A reassessment of a previously authorized project is documented in a GRR when a significant period of time has elapsed or if conditions have changed since the initial feasibility study was completed (ER 1105-2-100). The purpose of the GRR/SEIS was: (1) to investigate the environmental effects of a lateral and/or vertical expansion to the existing PIERP to increase habitat restoration and additional dredged material capacity; (2) to evaluate other project enhancements at both the PIERP and within Poplar Harbor; (3) to evaluate the placement of dredged material from other channels; and (4) to assess additional actions for the completion of the existing project.

This Integrated GRR/SEIS documents the NEPA compliance for the proposed expansion of the PIERP, provides information specific to the actions of the GRR, and supplements the *Poplar Island Restoration Study, Maryland: Integrated Feasibility Report and Environmental Impact Statement* (ERP No. D-COE-D350557-MD) (USACE/MPA, 1996). The objectives of the PIERP Integrated GRR/SEIS include increasing habitat restoration, providing additional dredged material capacity, accepting dredged material from other channels, and evaluating other project design modifications.

10.1 STUDY NEED

Engineering Regulation (ER) 1105-2-100 requires dredged material management planning for Federal harbor projects to ensure that sufficient dredged material placement capacity is available during the life of a navigation project. The *Baltimore Harbor and Channels Dredged Material Management Plan, Preliminary Assessment* (USACE, 2001a) identified insufficient dredged material capacity to meet Federal and State of Maryland needs in the next twenty years, insufficient time to create new placement sites, and the potential for inefficiencies (such as overloading of placement sites and subsequent loss of capacity) at existing placement sites, if new sites are not constructed. USACE guidance (Policy Guidance Letter No. 40) specifies that the expansion of existing sites should be considered for placement capacity before new placement sites are proposed.

The *Baltimore Harbor and Channels Dredged Material Management Plan and Tiered Environmental Impact Statement* (USACE, 2005) identified a combination of seven alternatives to meet the 20-year dredged material capacity needs of the Port of Baltimore (USACE, 2005). The expansion of the PIERP was one of five alternatives recommended in the DMMP and Tiered EIS (USACE, 2005) that were applicable to the Upper Chesapeake Bay Approach Channels to the Port of Baltimore. The expansion of PIERP was also identified as a high priority based on preliminary dredging needs studies for the Upper Chesapeake Bay Channels that were conducted as part of the State of Maryland's DMMP [*Interim Report to the Maryland General Assembly Concerning Implementation of the Dredged Material Management Act of 2001*, (DMMP, 2001)].

Specifically, this Integrated GRR/SEIS evaluated the following:

- Lateral expansion of the existing PIERP footprint, including the creation of an open-water embayment;
- Vertical raising of the existing PIERP upland cells (Cell 2 and 6);
- A combination of a lateral and a vertical expansion;
- Increased recreational and educational opportunities;
- Actions required to complete the existing project; and
- The potential for accepting dredged material from additional Federal, State, and local channels.

Actions required to complete the existing project include temporarily raising the existing upland cells from +23 ft MLLW to +25 ft MLLW to support water drainage (dewatering) in the upland cells necessary for consolidation; the closure and dike raising of Cell 6 to +25 ft MLLW; the construction of the southern access channel, pier, bulkhead, and discharge structures associated with the closure of Cell 6; the restoration of internal borrow sites within Cell 4; and miscellaneous cell development, such as the construction of temporary cross dikes in Cell 5.

Accepting dredged material from the southern approach channels (south of the Sassafras River) to the Chesapeake and Delaware (C&D) Canal was specifically evaluated for inclusion in the re-authorization of PIERP. These dredged materials are currently being placed at the Pooles Island open water placement sites, which are scheduled for mandatory closure by 2010.

10.2 STUDY AUTHORITY

In 2003, USACE-Baltimore and MPA initiated the Integrated GRR/SEIS under the existing PIERP Congressional Authorization, Section 537 of WRDA 1996. Authorization for projects '*for the protection, restoration, and creation of aquatic and ecologically related habitats, including wetlands, in connection with dredging for construction, operation, or maintenance by the Government of an authorized navigation project*' is included in Section 204 of the WRDA of 1992, as amended by Section 207 of the WRDA of 1996. The PCA for the construction of the PIERP (USACE/MPA, 1997) between the Department of the Army, represented by the Assistant Secretary of the Army (Civil Works), and the State of Maryland ('the non-federal sponsor'), represented by the Secretary of MDOT was signed on 4 April 1997.

A Notice of Intent (NOI) to initiate the Integrated GRR/SEIS was published in the Federal Register in June 2003. The USACE–Baltimore District, and a non-Federal sponsor, the MPA, under the auspices of the MDOT, are the sponsors for the PIERP Integrated GRR/SEIS.

10.3 STUDY GOALS AND OBJECTIVES

Project goals express the long-term strategy of a project, and the objectives of the study are intended to facilitate the completion of the project goals. The overall objectives of the expansion study were intended to be consistent with both the existing PIERP and the concurrent Mid-Chesapeake Bay Island Ecosystem Restoration Feasibility Study and were meant to be flexible, measurable, attainable, and congruent.

The goals of the GRR/SEIS were:

- Investigate alternative modifications to the existing PIERP to increase the size of the habitat restoration and increase the opportunity for beneficial use of dredged material,
- Provide additional dredged material capacity to meet the annual placement needs and help offset the projected dredged material placement shortfall, as recommended in the Federal DMMP (2005),
- Evaluate elements that could be added to the existing PIERP and the proposed expansion, such as recreational and educational resources,
- Assess additional components/activities necessary for completion of the existing authorized project,
- Remain consistent with the success of the existing PIERP,
- Build on lessons learned from the existing PIERP, and
- Evaluate acceptance of dredged material from other channels.

The objectives of the GRR/SEIS were:

- Restore and enhance marsh, aquatic, and terrestrial island habitat for fish, reptiles, amphibians birds, and mammals;
- Protect existing island ecosystems, including sheltered embayments;
- Minimize impacts to existing fisheries nursery, feeding, and protective habitats;

- Increase wetlands acreage in the Chesapeake Bay watershed;
- Decrease local erosion and turbidity;
- Promote conditions to establish and enhance submerged aquatic vegetation;
- Promote conditions that support oyster recolonization;
- Minimize impacts to rare, threatened, and endangered species and their habitats;
- Minimize impacts to existing commercial fisheries;
- Minimize establishment of invasive species to maximum extent possible; and
- Optimize the site capacity for placement of dredged material.

Ultimately, the recommended plan from the Integrated GRR/SEIS is intended to be complimentary to, and consistent with, the success of the existing PIERP, and is based on lessons learned to improve site efficiency and habitat quality.

10.4 PLAN FORMULATION AND PREFERRED EXPANSION ALIGNMENT

The plan formulation process for the expansion study included analysis of numerous lateral alignments, wetland/upland proportions, and combinations of lateral expansion and vertical dike raising scenarios. Three initial options for expansion were considered: 1) vertical expansion only, 2) lateral expansion only, and 3) lateral expansion plus vertical expansion.

Analysis of the vertical raising option indicated that vertical raising of the existing uplands alone would not provide substantial additional environmental benefits to the existing project, and would not achieve the optimum capacity of the upland cells because the upland cells could not efficiently accommodate the projected annual dredged material quantities. In addition, the public voiced concerns at early scoping meetings regarding negative viewshed (aesthetic) impacts associated with dike raising. Therefore, vertical expansion alone was not considered a viable option. Vertical expansion could, however, increase the overall placement capacity and increase the potential for successful wetland development (by allowing more placement in the upland cells and smaller placement volumes in wetland cells to achieve final elevations). Therefore, vertical expansion was pursued in combination with a lateral expansion alternative.

For the lateral expansion, six alignments were initially developed and studied as part of a reconnaissance-level assessment (GBA, 2003), and a seventh alignment was added during the early stages of the USACE-Baltimore's plan formulation process. Project constraints for the lateral expansion included socioeconomic, environmental, engineering, legal/policy, and public and agency concerns that were derived from site-specific investigations, public scoping meetings, and agency input.

An initial screening process, which considered cost, site capacity and life, engineering suitability, environmental resources, and agency and public concerns, indicated that a northern lateral alignment provided the optimal geographical location. A second screening process was conducted to determine the wetland to upland habitat proportion that would most efficiently achieve the project goals. The size of the wetland areas was constrained by the minimum acreage necessary to achieve environmental goals (50 percent wetland habitat) and

the maximum acreage that would allow for efficient operation and management of the site (approximately 60 percent wetland habitat).

Following the initial screening for the lateral component, northern lateral expansion alternatives were evaluated in more detail within a Study Area located to the north and northeast of the existing PIERP, consisting of approximately 1,080 acres bounded by the oyster bars to the west, north, and east. A conceptual northern alignment was developed within the Study Area with consideration to the following environmental and engineering constraints:

- Avoid intrusion on oyster bars,
- Minimize loss of shallow water habitat (-6.5 ft MLLW and shallower),
- Provide protection for Poplar Harbor,
- Avoid deep water (-12 ft MLLW or greater),
- Avoid constructing dikes in areas of unsuitable foundation material,
- Provide a minimum of 50 percent wetlands,
- Provide a minimum 500 acres of expansion area to accommodate the average annual dredged material placement needs of approximately 3.2 mcy,
- Use sand borrow material from within the site footprint or access channel, and
- Use sand borrow material from upland cell areas only.

It was anticipated that the footprint of the northern conceptual alignment would be adjusted, in the future as necessary, within the 1,080-acre Study Area to avoid constructing dikes over unsuitable foundation material or other unforeseen site conditions. The Study Area for the expansion project also included a sand borrow area located southwest of the existing PIERP. This southwestern borrow area would be required in addition to borrow from within the alignment footprint to attain sufficient sand for the expansion construction.

Additional analyses were conducted to determine the optimal size of the northern lateral expansion. Results of additional subsurface testing, the dredged material placement analysis and a site capacity evaluation indicated that a placement area of 575-acres was the optimal size for the northern lateral alignment. Therefore, a proposed conceptual alignment consisting of approximately 575 acres of placement was developed within a Study Area (consisting of 1,080 acres) north of the existing project. To support a potential increase in the wetland proportion of the lateral expansion and to assure optimal development of the wetlands in the existing PIERP, a 5-ft vertical expansion component (of the existing upland Cell 2 and 6) was also incorporated into the analysis.

A total of six combinations of vertical and/or lateral expansion combined with variations of the wetland to upland habitat proportion for the 575-acre northern lateral alignment were evaluated using dredged material placement analysis, environmental benefits determination, cost effectiveness/incremental cost analysis, and risk analysis. The six combinations were:

- 50 percent wetland habitat, 50 percent upland habitat
- 55 percent wetland habitat, 45 percent upland habitat

- 60 percent wetland habitat, 40 percent upland habitat
- 50 percent wetland habitat, 50 percent upland habitat with 5-ft raising of existing upland cells
- 55 percent wetland habitat, 45 percent upland habitat with 5-ft raising of existing upland cells
- 60 percent wetland habitat, 40 percent upland habitat with 5-ft raising of existing upland cells

The placement analyses supported the conclusion that a 575-acre placement area would be minimally large enough (given a maximum upland proportion of 50 percent and a 25-acre tidal gut) to accommodate the average annual dredged material placement needs of approximately 3.2 mcy (in conjunction with the existing PIERP) and to provide sufficient dike fill material for dike construction from borrow sources located within the footprint of the upland cells of the expansion footprint. In addition, operability of the expansion site would be improved by raising the existing upland cells to increase the upland placement capacity.

Following the completion of the formal plan formulation process, a proposal from NMFS and subsequent discussions with USEPA, USFWS, MDNR, and MDE led to the development and evaluation of an open-water embayment that could be incorporated into a northern lateral alignment. The inclusion of an open-water embayment within the footprint of the lateral expansion would provide semi-protected fisheries habitat adjacent to wetland and upland cells, and would increase the trophic interaction between the wetland cells and the open-water embayment within the lateral expansion. The bottom habitat of the open-water embayment would remain essentially undisturbed, conserving the existing bathymetry and benthic habitat. In addition, the construction of small rock reefs within the open-water embayment would provide cover and enhance fish habitat. Overall, there was general agreement that diversity of habitat types could be more beneficial than creating more of the same type of habitat currently under construction. With the incorporation of the open-water embayment, the lateral expansion would be 575-acres with a habitat proportion of 29 percent wetland habitat (165 acres), 47 percent upland habitat (270 acres), and 24 percent open-water embayment habitat (140 acres); plus a 5-ft vertical expansion of the existing upland cells.

The open-water embayment design, including the size of the embayment; location within the expansion (eastern vs. western portion); stability and function of the embayment; access for the public, commercial watermen, and recreational fishermen; and long-term maintenance still have to be optimized. Based on consultation to-date with resource agencies, the open-water embayment could potentially range between 80 to 140 acres in size. Specifically, USFWS has proposed reducing the size of the open-water embayment to between 80 and 90 acres. Reducing the size of the open-water embayment to 80-acres, as recommended by USFWS, would result in a habitat proportion of 39 percent wetland (225 acres), 47 percent upland (270 acres), and 14 percent open-water (80 acres) within the lateral expansion. MDNR has requested further evaluation of the location of the proposed open-water embayment and the size of the embayment (as it related to long-term maintenance and stability), and MDE has raised concerns about sediment transport and water quality issues that could potentially arise from the location of the open-water embayment on the western side of the lateral expansion.

The final size and location of the open-water embayment will be discussed and evaluated further in the next design phase of the project based on additional consultation with the resource agencies and MPA (the non-Federal sponsor); results of additional hydrodynamic modeling studies; and additional design considerations. For the purposes of the analyses and description of the recommended plan in this document, the size of the open-water embayment within the northern lateral expansion is estimated at 130 acres in size.

Based on the results of the dredged material placement analysis, environmental benefits determination, cost effectiveness/incremental cost analysis, and risk analysis, three alternatives, in addition to the no-action alternative were carried forward in the impacts analysis:

1. **Alternative 1:** A 575-acre lateral expansion with 60 percent wetland habitat and 40 percent upland habitat, plus 5-ft vertical expansion of the existing upland cells. Sand borrow excavation from the southwestern borrow area would disturb approximately 91 acres of the borrow area. Approximately 315 acres of additional wetland habitat would be constructed. Alternative 1 would provide approximately 29 mcy of dredged material placement capacity.

2. **Alternative 2:** A 575-acre lateral expansion with 50 percent wetland habitat and 50 percent upland habitat, plus 5-ft vertical expansion of the existing upland cells. Sand borrow excavation from the southwestern borrow area would disturb approximately 49 acres of the borrow area. Approximately 275 acres of additional wetland habitat would be constructed, and Alternative 2 would provide approximately 30 mcy of dredged material placement capacity.

3. **Alternative 3 (Recommended Plan):** A 575-acre lateral expansion with of 29 percent wetland habitat, 47 percent upland habitat, and 24 percent open-water embayment habitat; plus 5-ft vertical expansion of the existing upland cells. Alternative 3 would incorporate an approximately 130-acre open-water embayment into the lateral expansion. Sand borrow excavation from the southwestern borrow area would disturb approximately 19 acres of the borrow area. This alternative will provide approximately 28 mcy of dredged material placement capacity.

4. **The No-Action Alternative**: The existing PIERP at its authorized configuration of 1,140 acres in size with 570 acres of upland habitat and 570 acres of wetland habitat. This alternative would not provide any additional dredged material placement capacity.

Alternative 3 is the environmentally preferred alternative because it increases the complexity and diversity of habitat types with the lateral expansion, providing a connection between deep and shallow subtidal zones, an open water pelagic zone, mudflat habitat, tidal guts throughout the wetland cells, submerged reef habitat, and rock reef habitat. The open-water embayment would provide forage access and refugia in the small tributaries and tidal guts in the wetland cells for juvenile fish species, juvenile blue crabs, and diamondback terrapins**.** The alignment with the open-water embayment would impact the least amount of borrow area outside the

footprint of the lateral expansion (19 acres, as opposed to 91 and 49 acres), and results of the environmental benefit analysis indicated that the alignment with the open-water embayment will produce the greatest number of environmental benefits (9,768 ICU).

In addition to the expansion of the PIERP, USACE-Baltimore District assessed the current project and identified several additional actions required to complete the existing project. These actions were not specifically evaluated in the initial EIS for the existing project (USACE/MPA, 1996), and are, therefore, included in the Integrated GRR/SEIS for NEPA evaluation. These actions included: (1) raising the existing upland cells from +23 ft MLLW to +25 ft MLLW, (2) closing Cell 6 and relocating the access channel and turning basin, and (3) implementing recreational/educational components. Because these activities will occur regardless of which alternative is ultimately selected, they were evaluated separately, and impacts associated with these activities were common to each of the alternatives considered (Section 10.5.1). It is anticipated that approximately half of the sand borrow required to complete the existing project, (between 1.0-1.5 mcy) will be dredged from the southwestern borrow area, disturbing approximately 119 acres of Bay bottom. This disturbance in the southwestern borrow area will be in addition to the 19 acres of sand borrow disturbance required for construction of the preferred alternative. Therefore, a maximum of approximately 138 acres of the southwestern sand borrow area will be disturbed to complete the recommended plan. In addition, the Cell 6 closure will also utilize the sand resulting from the dredging of approximately 28 acres for the relocation of the southern access channel and basin.

Additional considerations such as the acceptance of dredged material from other channels were also studied as part of the Integrated GRR/SEIS, but were not subject to the screening and iterative evaluation of the plan formulation and impacts analysis. Summaries of the study results for these considerations were included in the recommended plan.

10.5 IMPACTS ANALYSIS

As a requirement of the NEPA process, the potential impacts of the project to environmental and cultural resources and quality of human environment must be evaluated. Each of the three alternatives, in addition to the no-action alternative, was evaluated in the impacts assessment.

The impacts analysis for the proposed lateral expansion component included dike construction activities, site operations, inflow, crust management, habitat development, and dredging in the sand borrow areas. The impacts analysis for the vertical dike raising component included impacts associated with an increase in elevation of 5-ft, to a final design height of +25 ft MLLW of the existing upland cells (Cells 2 and 6). Currently, the authorized final height of the existing upland cells is +20 ft MLLW (the authorized temporary dike height is +23 ft MLLW).

10.5.1 Impacts Common to All Alternatives

The existing project is not yet completed, and site operations – dredged material placement and habitat development – are ongoing at the PIERP. Several additional project actions are required to complete the existing project. These actions included: (1) raising the existing upland cell dikes from a temporary dike height of +23 ft MLLW to a temporary dike height of

+25 ft MLLW; (2) closing Cell 6 and relocating the southern access channel and turning basin; (3) restoration/development of existing cells; (4) construction of a new discharge, pier, and bulkhead structures to accommodate ongoing operations after the closure of Cell 6; and (5) implementing recreational/educational components. Because these activities are needed regardless of which alternative is ultimately selected, they were evaluated separately. Impacts associated with these activities would be common to each of the lateral and vertical expansion alternatives considered, and impacts associated with these activities were assessed in addition to the impacts identified for each alternative, including the no-action alternative.

The primary impacts associated with the construction activities proposed for the existing project would result from the dredging required for the additional perimeter dike construction, sand borrow excavation, and the southern access channel construction. In addition the sand borrow required for the lateral and vertical expansion, sand borrow would also be required to support activities required to complete the existing project - approximately 119 acres of the southwestern borrow area; 60 acres in Borrow Area F; and 35 acres in Borrow Area G. The acreage within Borrow Areas F and G has all been previously disturbed. Dredging of approximately 28 acres would also be necessary to relocate the southern access channel and basin. Therefore, a total of approximately 242 acres (119 + 60 + 35 + 28 acres) of Bay bottom outside the footprint of the lateral expansion would be disturbed by actions required to complete the existing PIERP.

Short-term, minor impacts to air quality and noise quality may occur from raising the existing upland cells from a temporary dike height of +23 ft MLLW to a temporary dike height of +25 ft MLLW, but effects are expected to be similar to those noted during current site operations at the PIERP. Aesthetic impacts associated with increasing the height of the temporary dike raising for Cells 2 and 6 by two feet to +25 ft MLLW would be negligible and short-term.

Short-term water quality impacts associated with increased turbidity during dredging will affect the water clarity in the project area and may indirectly affect the phytoplankton and zooplankton communities, clams, oysters, blue crabs, finfish species, and potentially the EFH species summer flounder. Dredging in the sand borrow areas may potentially impact clam species, blue crabs, benthic species, and finfish species expected to utilize this area following sand borrow activities. Dredging the southwestern borrow area could also have potential short-term impacts on noise quality, light, and commercial and recreational fishing. Additionally, the sand borrow from the southwestern borrow area will increase the water depths to a maximum depth of -25 ft MLLW, which may have an impact on blue crab and finfish utilization of this area following sand borrow activities, particularly in warmer months when deeper areas of the Chesapeake Bay are prone to oxygen depletion.

The educational and passive recreational components that are being considered as part of this project will not interfere with the original project goal of remote island habitat and will be constructed to avoid or minimize impacts to the created habitats and the wildlife species currently using the interim habitats available at the PIERP. Additional beneficial impacts to wildlife would result from the construction of nesting platform and rock reefs.

10.5.2 Comparison Of the Impacts Associated with the Lateral and Vertical Expansion Alternatives

The most notable differences in environmental impacts between the three alternatives are a difference in the amount of open water habitat and Bay bottom that will be disturbed by constructing the northern lateral alignment (approximately 600 acres for Alternatives 1 and 2; approximately 470 acres for Alternative 3), and a difference in the amount of Bay bottom in the southwestern sand borrow area that will be disturbed during hydraulic dredging (91 acres for Alternative 1; 49 acres for Alternative 2; and 19 acres for Alternative 3). However, because the overall project footprints are similar for each of the three alternatives, many of the impacts associated with the vertical and lateral expansion are the same for each alternative.

10.5.2.a Long-Term Impacts of the Lateral and Vertical Expansion The primary long-term, adverse impact from the lateral expansion will be the permanent loss of open water and bottom habitat within the footprint of the alignment. The construction of Alternatives 1 and 2 would result in the loss of approximately 600 acres of open water and Bay bottom habitat, while the construction of Alternative 3 would result in the loss of approximately 470 acres of open water and Bay bottom habitat. The loss of open water habitat would have a direct impact on finfish species, the blue crab fishery, and indirect impacts to some avian species. Each of these groups would be displaced, but most species would utilize the surrounding area after the construction is complete. The loss of bottom habitat would have a direct impact on the benthic community, clams, and blue crabs, and an indirect impact on the potential for SAV recovery within the proposed alignment. Specifically, the loss of approximately 100 acres of shallow-water habitat within the proposed footprint (regardless of the alternative) may affect utilization by fish species for which the area serves as EFH, recreational fisheries and blue crabs, and will affect the potential for SAV and clams to repopulate this area.

An additional long-term adverse impact of the lateral and vertical expansion that would result from implementing any of the three alternatives is a change in the viewshed to both Coaches and Jefferson Islands. The proposed alignment would permanently occupy a larger portion of the currently unobstructed view of the Bay from Coaches and Jefferson Islands. The lateral expansion would also require both commercial watermen and recreational boaters to motor further north to avoid the northern tip of the expansion. Noise-related impacts to parcels located on Jefferson and Coaches Islands are anticipated from sound-generating activities that will occur day and night, such as movement of tugs and barges and operation of pumps. These activities are associated with inflow, and therefore will persist for the duration of the project development.

A long-term beneficial impact of the lateral and vertical expansion for each of the three alternatives evaluated will be to increase dredged material placement capacity to help meet the short-term dredged material placement needs outlined in the Federal DMMP (USACE, 2005). The northern lateral expansion would increase the placement area, and thus the amount of remote island habitat at the PIERP, by approximately 575 acres. The lateral expansion evaluated in this Integrated GRR/SEIS is expected to provide an additional dredged material capacity of approximately 23 mcy for Alternative 1, 24 mcy for Alternative 2, or 22 mcy for Alternative 3. The vertical expansion would add an additional six mcy of dredged

material capacity. The success of the existing PIERP is an indication that a multitude of terrestrial and aquatic species will utilize the wetland and upland habitat created through the beneficial use of dredged material, even prior to complete cell development.

With the inclusion of the open-water embayment (Alternative 3), the interaction between the wetland and open-water embayment habitats would be expected to increase the overall productivity of the habitats created within the northern lateral alignment, resulting in a beneficial impact to avian, fish, and wildlife species, particularly when the vegetation within each cell matures. The open-water embayment would provide greater diversity of habitat within the northern lateral expansion, including deep and shallow subtidal zones; an open-water pelagic zone; mudflat habitat; tidal guts throughout the wetland cells; submerged reef habitat; and rock reef habitat. The trophic exchange and interaction between wetland cells and open water could particularly benefit EFH species such as summer flounder, and would support juvenile blue crabs, and a diversity of juvenile fish species, including Atlantic silverside. The open-water embayment would provide forage access and refugia in the small tributaries and tidal guts in the wetland cells for juvenile fish species, juvenile blue crabs, and diamondback terrapins. Additional created fish habitat would include the submerged rock reefs and the avian nesting islands within the open-water embayment and the stone breakwater structure that would provide in-water refugia and physical habitat for finfish species, including EFH species. The conservation of the bottom habitat within the open-water embayment will have a beneficial impact on the benthic community, clams, and blue crabs. The anticipated enhancement of the existing benthic community within the open-water embayment will providing more forage opportunities for EFH species and other finfish. In addition, the 130-acre open-water embayment should create quiescent conditions that could potentially support additional SAV beds along the shorelines and HAPC preferred by EFH species, other finfish species, and waterfowl.

Long-term beneficial impacts resulting from each of the three lateral and vertical expansion alternatives evaluated also include the protection of Jefferson Island, which will decrease water column turbidity, thereby improving water clarity in Poplar Harbor. Increased water clarity and enhanced protection of Poplar Harbor would provide additional quiescent areas in Poplar Harbor for blue crabs, clam species, finfish species, and EFH. Protected areas in Poplar Harbor could support the reestablishment of SAV and provide cover for finfish. Other beneficial impacts include the creation of additional wetland habitat that would both provide nursery area for juvenile finfish species and be utilized by the avian community and other wildlife.

Additional long-term beneficial impacts resulting from each of the expansion alternatives include creating additional remote island habitat at the PIERP. This habitat would have a beneficial impact to numerous avian and wildlife species, in particular when the vegetation and habitat within the cells matures. Habitat types proposed as part of the proposed expansion, including low tidal marsh, high tidal marsh, avian nesting islands in the marsh, tidal and non-tidal pools in the marsh, uplands, freshwater wetlands in the uplands, and mudflats. The development of island habitat specifically for targeted avian species would provide a significant long-term positive impact as a result of the lateral expansion. Offshore remote islands are a unique ecosystem component in the Chesapeake Bay watershed, and are preferentially selected by many migratory birds and water birds as resting and nesting locations. Although similar

vegetative communities may occur on the mainland, the isolation relative lack of human disturbance, and reduced number of predators make remote islands more desirable as nesting sites for colonial water birds and other avian species, including the Federally-listed Bald Eagle.

Southwestern Borrow Area

The impacts associated with the dredging of the southwestern borrow area are to the existing Bay bottom habitat. The excavation of the southwestern borrow area will increase the water depth in this area an average of approximately 10 ft across the bottom. The depth of dredging for sand in the southwestern borrow area is proposed to a maximum bottom limit of –25 ft MLLW, although some gradual shoaling may occur in this area. Dredging the southwestern borrow area will, therefore, change the existing bathymetry in the borrow area. As previously stated in Section 10.5.1, an increase in water depth could affect such fisheries as the blue crab and finfish species. Potentially, oxygen depletion may occur as a result and could decrease the habitat value for the clams, blue crabs, benthos, finfish, and EFH species once dredging is complete.

10.5.2.b Short-Term Impacts of the Lateral and Vertical Expansion Short-term, adverse impacts of the lateral expansion would include an increase in water column turbidity and sedimentation in the construction and dredging areas. These short-term impacts would directly affect the water quality in the project area, and may indirectly affect the phytoplankton and zooplankton communities, the adjacent NOBs, clams, blue crabs, finfish species, and SAV species in Poplar Harbor. These impacts are not considered significant because of their short duration and localized effects. TOY restrictions will be in place to protect resources and minimize adverse impacts during dredging and construction activities. Another short-term impact of the lateral expansion is an increase in the duration of project-related noise and night-time lighting during perimeter dike construction and general island site operations. Specifically, the residents and wildlife of Jefferson Island would experience increased noise levels during the construction phases of the project. These noise-related impacts will be most prevalent during the exterior dike construction and dike raising phases of the expansion, which are expected to occur concurrently over approximately two years.

Additional short-term beneficial impacts associated with the lateral expansion include additional interim benefits related to the additional acreages of wetland and upland habitat, and the increased spending that will create jobs both locally and at the state level. The jobs created as part of the expansion would benefit employment rates, income, and revenues.

Southwestern Borrow Area

To support the construction of the each of the three lateral and vertical expansion alternatives evaluated in this Integrated GRR/SEIS, sand borrow will be required from a southwestern sand borrow area located outside of the project footprint. Hydraulic dredging in the southwestern sand borrow area for the lateral and vertical expansion alternatives will temporarily disturb approximately 91 acres for Alternative 1, 49 acres for Alternative 2, and 19 acres for Alternative 3 (Table 10-1). Sand borrow from the southwestern borrow area for actions to complete the existing project totals will disturb approximately an additional 119 acres of bottom, assuming that dredging to relocate the south access channel and turning basin will yield a minimum of 0.6 mcy of suitable construction sand.

Table 10-1. Acres of Bay Bottom Habitat Disturbed for Sand Borrow from the Southwestern Borrow Area (approximate)

	Alternative 1	Alternative 2	Alternative 3
Dredging in the Southwestern Borrow Area - Lateral and Vertical Expansion	91	49	19
Dredging in the Southwestern Borrow Area – Actions to Complete Existing PIERP*	119	119	119
TOTAL	**210**	**168**	**138**

**Assumes that approximately 0.6 mcy (28 acres) of sand will be available for construction from dredging associated with relocation of south access channel and turning basin.*

The dredging of the southwestern borrow area will impact both open water and bottom habitat (discussed above in long-term impacts), adverse impacts. The affects of dredging in the southwestern borrow area also include short-term water quality impacts associated with increased turbidity during dredging and the loss of benthic organisms in the substrate. These short-term impacts will affect the water quality in the project area and may indirectly affect the phytoplankton and zooplankton communities, clam species, blue crabs, finfish species, and potentially the EFH species summer flounder. The temporary use of the southwestern borrow area may also conflict with pound net and gill net fisheries if nets cannot be shifted to equally productive sites.

10.5.3 Impacts from the No-Action Alternative

The primary benefit of the no-action alternative would be no loss of open water habitat, Bay bottom habitat, or shallow water habitat within the footprint of the proposed expansion alignment. None of the anticipated short-term impacts associated with the perimeter dike construction, dredging for the northern access channel or site operations for the lateral and vertical expansion would occur.

The no-action alternative has several adverse impacts. Without construction of a PIERP expansion, the capacity goals of the DMMP will not be met. This would result in the inability to maintain the navigation channels to authorized depths or placement of higher than expected quantities of dredged material in the existing PIERP on an annual basis, decreasing placement efficiency, overloading the cells, creating complications related to proper cell habitat development, and shortening the overall life capacity of the existing project. Another adverse impact of the no-action alternative will be that additional valuable remote island wetland habitat and upland habitat would not be created and available to avian species, diamondback terrapins, and other wildlife. The third adverse impact of the no-action alternative would be the lack of additional protection for Poplar Harbor and Jefferson Island. Without the protection from wave action provided by the lateral expansion, continued rates of erosion for Coaches Island and Jefferson Island are expected. As a result of the erosion, habitats located on Jefferson and Coaches Island would continue to be lost.

10.6 CUMULATIVE IMPACTS

Cumulative impacts are those combined effects on quality of the human environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Recent and reasonably foreseeable human actions that have converted or would convert open water habitat to island upland and tidal wetland habitat include the existing PIERP, the proposed lateral expansion of the PIERP, the proposed placement area of remote island habitat at James Island in the Mid-Bay region, the proposed protection of Barren Island, the proposed SAV and wetlands protection and restoration measures at Smith and Tangier Islands, and the wetland restoration project in Dorchester County (USACE, 2005). The cumulative impact of these USACE projects would total approximately 3,803 acres of open water habitat lost and approximately 4,168 acres of bottom habitat lost or disturbed. However, these same projects would also create/restore approximately 3,571 acres of wetland habitat and approximately 1,770 acres of upland habitat, and would minimize future loss of existing island habitat.

Although a cumulative areal impact of 4,168 acres of bottom habitat from these USACE projects is a considerable amount of bottom area, its loss is not anticipated to have major cumulative impacts on fisheries of the region. The island restoration areas near Poplar and James Islands have been sited to minimize fisheries impacts by avoiding oyster bars and prime fish habitat. In addition, the type of habitat being affected is common throughout the Chesapeake Bay. It is expected that fish and most fishermen will be able to shift to new regions outside the footprints of the island restoration projects. The long-term effects of these restoration projects on recreation and education are all expected to be positive.

The additional wetland habitat will provide important nursery habitat, and both projects are being designed to protect Tier I SAV habitat. Tidal creeks and marshes are important nursery habitat, particularly for red drum. Recovery of SAV adjacent to the PIERP and James Island would be a significant positive cumulative affect on habitat of particular concern for summer flounder and red drum in this reach of the Chesapeake Bay.

The cumulative effects to water quality are expected to be minimal. The potential restoration of James Island within the middle Chesapeake Bay would introduce a second source of discharge points into the Bay. However, yearly placement should be completed at PIERP prior to initiation of placement at James Island, thus minimizing discharges from two facilities concurrently. If approved for implementation, dike construction activities may occur at James Island concurrent with site operations, inflow, crust management, and cell development at PIERP. Cumulative air emissions will only last during the overlap period of construction and completion of project inflow at PIERP.

10.7 RECOMMENDED PLAN

Based on the results of the engineering screening, the environmental benefits determination, the cost effectiveness/incremental cost analysis (CE/ICA), and the impacts assessment, the recommended plan of the Integrated GRR/SEIS includes implementation of the following: 1)

Alternative 3 - a northern lateral expansion of the existing PIERP with inclusion of an open-water embayment and 5 ft raising of existing upland Cells 2 and 6; 2) actions to complete the existing project; 3) the development of recreational and educational components at the PIERP; and 4) acceptance of dredged material from the southern approach channels to the C&D Canal and other small Federal navigation projects. The recommended plan is in full compliance with the NEPA of 1969, the Clean Water Act of 1972 (as amended), the Endangered Species Act of 1973, the Fish and Wildlife Coordination Act of 1958 (as amended), the Clean Air Act of 1972 (as amended), and Section 106 of the National Historic Preservation Act (NHPA) of 1966. A Clean Water Action Section 404(b)(1) evaluation was completed and is included in the GRR/SEIS.

Lateral and Vertical Expansion

The recommended plan consists of the expansion of the existing PIERP to the north and northeast, with a 575-acre lateral expansion component consisting nominally of 29 percent wetland habitat (165 acres), 47 percent upland habitat (270 acres), and 24 percent open-water embayment habitat (130 acres); plus a vertical expansion component consisting of a 5-ft raising of the upland cells of the existing project. The wetland habitat will include high marsh, low marsh, mudflat/intertidal areas, small channels throughout the marsh, and bird islands. The lateral and vertical expansion in the recommended plan would require dredging 19 acres of sand from the southwestern sand borrow area. In additional, the lateral expansion would require approximately 30 acres of dredging (and Bay bottom disturbance) for construction of a northern access channel and turning basin. A total of 49 acres of Bay bottom (19 + 30) outside the footprint of the lateral expansion would be disturbed to support construction. The recommended plan would provide an additional 28 mcy of placement capacity and would extend the project life by approximately seven years.

Actions to Complete Existing PIERP

Based on the re-evaluation of the existing project, the following actions necessary to complete the existing project are also included in the recommended plan: raising the existing upland dikes from a temporary height of +23 ft MLLW to a temporary height +25 ft MLLW; closing Cell 6; miscellaneous cell restoration and development activities; relocating the access channel and turning basin; and relocating inflow and discharge support structures to accommodate the closure of Cell 6. For the actions required to complete the existing project, approximately 119 acres in the southwestern sand borrow area, 60 acres in Borrow Area F, and 35 acres in Borrow Area G will be disturbed for sand borrow. In addition, 28 acres of dredging (and Bay bottom disturbance) will be required for the realignment of the southern access channel. It is anticipated that the sand dredged for relocation of the southern access channel and turning basin will be used for the Cell 6 closure and dike raising activities of the existing project. A total of approximately 242 acres (119 + 60 + 35 + 28 acres) of Bay bottom outside the footprint of the lateral expansion would be disturbed by actions required to complete the existing PIERP.

Recreational / Educational Opportunities and Facilities

The recommended plan includes suggested recreational and educational components for the PIERP that are compatible with the project's ecosystem restoration purpose and objectives and are intended to enhance the public's experience by taking advantage of natural values (ER 1105-2-100). The social, cultural, scientific, and educational values of recreational and

educational components will be implemented only to the extent that recreation does not adversely impact the ecosystem restoration process. Recreational and educational opportunities would be limited to areas of the PIERP with controlled access. Only passive recreation components were considered feasible for implementation at the PIERP because of the need to protect the habitat restoration goals of the project. Activities with the potential for substantial adverse influences on the existing project and created habitats were eliminated from consideration (i.e., camping areas, playgrounds or playing fields, food services, beach areas with visitor access). Components included for further consideration utilize a combination of passive recreation, education, and habitat-based improvements.

The following recreational/educational opportunities may be considered for the PIERP:

- Public tours of the island
- Self-guided/interpretive nature trails and boardwalks
- Kiosks with informative signage
- Avian observation areas
- Research opportunities for educational institutions
- Volunteer opportunities
- Docking area for authorized visiting boats
- Picnic areas
- Demonstration garden
- Stone sculpture/monument/memorial area
- Resting/viewing areas

Additionally, several proposed project features would provide increased recreational opportunities around the project. The rock reefs, segmented breakwater structures, and armored perimeter dikes constructed for the lateral expansion will provide additional fish cover, increasing their potential as high-functioning fish habitat that could support a more productive recreational fishery in the vicinity of the project. The inclusion of an open-water embayment within the footprint of the lateral expansion would provide semi-protected fisheries habitat adjacent to wetland and upland cells, and would increase the trophic interaction between the wetland cells and the open-water embayment within the lateral expansion and enhance fish habitat. Access to the open-water embayment may also provide additional opportunities for recreational fishermen and recreational boaters using non-motorized boats such as canoes and kayaks.

Recreational and educational features implemented at PIERP or within the proposed lateral expansion area will be consistent with the goals of the restoration project, and implementation will be coordinated with interested parties and local jurisdictions. In the future, stakeholders will be encouraged to participate and provide input on the specific types of recreational/educational uses, and to help shape the plan for the island. Recreational and educational features will not exceed 10 percent of the project total cost as per USACE guidelines (Policy Guidance Letter No. 59).

Accepting Dredged Material from Additional Navigation Channels

The potential for the PIERP to accept dredged material from additional Federal navigation channels, as well as other small navigation projects (including Federal, State, and local channels) not specified in the original EIS (USACE/MPA, 1996) and PCA (April 1997) was investigated in this Integrated GRR/SEIS. Specifically, dredged material from southern approach channels to the C&D Canal (south of the Sassafras River) was considered for placement at the PIERP. Under the existing PIERP authorization, dredged material approved for placement at PIERP is limited to the following Baltimore Harbor and Channels project upper Chesapeake Bay Federal navigation channels (Figure 1-3): Craighill Entrance Channel, Craighill Channel, Craighill Angle, Craighill Upper Range, Cutoff Angle, Brewerton Channel Eastern Extension, Tolchester Channel, and Swan Point Channel.

The recommended plan includes amending the project authorization to include the placement of dredged material from the southern approach channels to the C&D Canal at Poplar Island. On average, approximately 1.2 mcy of dredged material is removed from the southern approaches channels to the C&D Canal (south of the Sassafras River) each year (Figure 1-4). This material is currently placed at permitted open water placement sites near Pooles Island that have a maximum capacity of approximately 7.5 mcy. The Pooles Island sites are scheduled for closure by 2010, or earlier if the 7.5 mcy capacity is reached prior to 2010. Following closure of the Pooles Island sites, it is proposed that the material be placed at the PIERP. Placement of material from the southern approaches to the C&D Canal will increase the annual placement volume at the PIERP from approximately 2 mcy to 3.2 mcy per year. The lateral and vertical expansion components of the recommended plan were designed to accommodate this additional annual placement need.

A white paper study (EA, 2005b) was conducted to compare sediment quality data for the southern approach channels to the C&D Canal to Upper Chesapeake Bay approach channels to the Port of Baltimore that are currently authorized for placement at PIERP, and formal discussions with Federal and State regulatory and resource agencies [USACE-Baltimore District, USACE-Philadelphia District, MPA, MES, USEPA, MDE, MDNR, MGS, USFWS, and NMFS] were conducted.

Results of the white paper comparison indicated the sediments from the southern approach channels to the C&D Canal were physically and chemically consistent with the material authorized and already placed at PIERP (EA, 2005b), and formal discussions with Federal and State regulatory and resource agencies indicated that the agencies supported the recommendation for future placement of the material from the southern approach channels to the C&D Canal at the PIERP following the mandatory closure of the Pooles Island open water site in 2010. In addition, regulatory and resource agencies agreed that maintenance dredged material from other Federal navigation channels could be placed at PIERP if the material undergoes and passes the same testing requirements as the deep-draft navigation channels and if other beneficial uses and other placement options are not feasible within the near vicinity of each project. The agencies requested that the current Federal navigation channel testing program be updated and re-designed to include components from the *Upland Testing Manual* (USACE, 2003) that would applicable to beneficial use and island restoration projects. This request will be considered and implemented in consultation with appropriate regulatory and resource agencies.

Acceptance of dredged material from other State, County, or local navigation projects was also considered as part of the PIERP Final Integrated GRR/SEIS. Dredged material from Federal navigation channels within Baltimore Harbor/Patapsco River (west of the North Point-Rock Point line) (Figure 1-7) was not considered for placement at PIERP. Based on capacity issues, testing requirements, the commitment of State resources for the data review process, and other concerns, Federal and State regulatory and resource agencies did not support acceptance and placement of material from other State, County, or local dredging projects at the PIERP. Although USACE Policy Guidance Letter No. 47 states that the USACE may allow non-Federal entities to utilize Federal disposal facilities, acceptance of material from other non-Federal dredging projects at the PIERP is not part of the recommended plan because of the concerns expressed by Federal and State regulatory and resource agencies.

10.8 PROJECT COST

The total, fully-funded project cost for the PIERP is an estimated $715.7 million (not including the costs for the betterment). The fully funded cost for the PIERP, as currently authorized, is $401.5 million; and the estimated fully funded cost for the recommended plan for the lateral and vertical expansion of the PIERP is $314.2 million. The cost for the recommended plan for the lateral and vertical expansion of the PIERP is to be cost-shared $235.7 million for the Federal government (75 percent) and $78.5 million for the non-Federal sponsors (25 percent). The total, fully-funded project cost does not include approximately $6.4 million in costs for project betterments, which were paid for 100 percent by MPA, the non-Federal sponsor. Under an existing PCA, MPA has contributed approximately $59.3 million in cash and in-kind services to support the project, to date. It is anticipated that the existing PCA would be amended to include the expansion of the PIERP.

For the recreational components of the Integrated GRR/SEIS, economically justified facilities are cost shared 50 percent Federal and 50 percent non-Federal. The Federal cost of a project including recreation may not exceed the Federal cost of the project excluding recreation by more than 10 percent.

10.9 FUTURE EXPANSION AT PIERP AND OTHER FUTURE PROJECTS

In the future, if or when the USACE is in need of additional placement capacity, Corps policy will require an assessment of expansion and maximization of existing sites first. Based upon the results of the engineering analyses (including engineering suitability and placement analyses), agency concerns and public comments, environmental benefits analyses [including the ICU analysis to quantify the environmental benefits of the project], and the incremental cost analysis conducted as part of this study, it does not appear that further vertical expansion (additional raising of the upland dikes) would result in additional substantive environmental benefits to the PIERP. In addition, lateral expansion in the future would be geographically unlikely based on the existing environmental and engineering constraints at the site (i.e., locations of state protected oyster bars and availability of sand borrow materials). The current recommended plan was designed to maximize the benefits of a one-time lateral expansion.

Further study of additional environmental restoration in this geographic area (vicinity of the PIERP) would not, as currently assessed, lead to recommended future expansion scenarios at the PIERP.

It is important to note that USFWS and NMFS have stated that the inclusion of an open-water embayment in lieu of wetland habitat within the northern lateral expansion is an environmentally preferred option based on site-specific conditions at Poplar Island. Both agencies have indicated that the open-water embayment design would be applicable only to the lateral expansion of the PIERP. The general agency agreement of constructing 50 percent (minimum) vegetated wetland habitat would continue to be applicable for future island ecosystem restoration projects.