

POPLAR ISLAND ENVIRONMENTAL RESTORATION PROJECT: PROJECT SUCCESSES, LESSONS LEARNED, AND FUTURE PLANS

Peggy Derrick¹, Jeffrey McKee², Scott Johnson³, and Mark Mendelsohn⁴

ABSTRACT

The Poplar Island Environmental Restoration Project (PIERP) is a national model for the beneficial use of dredged material. The existing project benefits the environment and navigation, fits into the U.S. Army Corps of Engineers' (USACE) watershed planning approach for ecosystem restoration projects, supports the USACE Environmental Operating Principles, integrates lessons learned and adaptive management, and has national recognition and public support. Coordination with agencies and technical experts from academic institutions is an integral and continuous part of the PIERP. Multiple project working groups address technical and management questions and include personnel from eleven State and Federal agencies, four academic institutions, and representatives of local government and other private-interest groups and organizations that are stakeholders in the Chesapeake Bay (conservation groups, boaters, watermen, etc.). A General Reevaluation Report (GRR) and Supplemental Environmental Impact Statement (SEIS) for the project was completed and finalized in 2005. The recommended plan includes a 232 hectare (575-acre) lateral expansion and a 1.5 m (5-ft) vertical expansion of the existing upland dikes, placement of dredged material from southern approach channels to the Chesapeake & Delaware Canal, incorporation of design modifications for the existing project, and the development of recreational and educational enhancements. The proposed expansion will provide approximately 21.5 million cubic meters (m³) (28 million cubic yards (mcy)) of additional dredged material placement capacity, will provide additional habitat of value, and will allow for sufficient time to implement other large-scale regional beneficial use projects. Lessons learned from engineering, environmental, and stakeholder interests are being applied to future wetland cell development, are being used for the proposed expansion design, and are being incorporated into plans for future island restoration projects.

Keywords: Marsh restoration, dredged material management, beneficial use, stakeholders, adaptive management

INTRODUCTION

The existing Poplar Island Environmental Restoration project (PIERP) beneficially uses dredged material from the Federal navigation channels serving the Port of Baltimore to restore 460 hectares (1,140 acres) of remote island habitat in Chesapeake Bay, Maryland, including 230 hectares (570 acres) of tidal wetlands and 230 hectares (570 acres) of upland habitat. The PIERP is located in the upper middle Chesapeake Bay, approximately 63 kilometers (39 miles) southeast of the Port of Baltimore, Maryland (Figure 1). The U.S. Army Corps of Engineers (USACE) serves as the Federal sponsor of the project and the Maryland Port Administration (MPA), under the auspices of the Maryland Department of Transportation, serves as the non-Federal sponsor. The USACE and MPA completed an *Integrated Feasibility Report and Environmental Impact Statement (EIS)* for the project in 1996. The project is congressionally authorized by Section 537 of the Water Resources Development Act (WRDA) of 1996.

¹ Project Manager / Senior Scientist, EA Engineering, Science, and Technology, 15 Loveton Circle, Sparks, Maryland 21152, USA, T: 410-329-5126, F: 410-771-4204, Email: pderrick@eaest.com.

² Chief, Deep Draft Navigation Section, U.S. Army Corps of Engineers, Baltimore District, Operations Division, P.O. Box 1715, Baltimore, Maryland 21203-1715, USA, T: 410-962-5657, F: 410-962-6033, Email: Jeffrey.A.McKee@nab02.usace.army.mil.

³ Resident Engineer, U.S. Army Corps of Engineers, Baltimore District, Aberdeen Resident Office, P.O. Box 205, Gunpowder, Maryland 21013-0205, USA, T: 410-436-1900, F: 410-436-4377, Email: Scott.Johnson@nab02.usace.army.mil.

⁴ Biologist, U.S. Army Corps of Engineers, Baltimore District, Planning Division, P.O. Box 1715, Baltimore, Maryland 21203-1715, USA, T: 410-962-9499, F: 410-962-4698, Email: Mark.Mendelsohn@nab02.usace.army.mil.

Exterior dike construction at the PIERP was initiated in 1998, and dredged material inflow began in April 2001. During the 15-20 year life of the project, approximately 30.6 million m³ (40 mcy) of dredged material will be utilized for the wetland and upland habitat restoration. To date, one 13 hectare (32-acre) wetland cell (Cell 3D) has been completed, along with one wetland demonstration cell (Cell 4DX) and one upland demonstration cell (Cell 4D). Although not yet complete, the project is already providing substantial benefits to fish and wildlife and to the natural and human environment of the region.



Figure 1. Location map.

BACKGROUND

More than 210 kilometers (km) (130 miles) of dredged shipping channels serve the Port of Baltimore, and channel maintenance and improvement projects require that approximately 3-4 million m³ (4-5 mcy) of sediment be dredged from the Federal and State channels each year. The State of Maryland's Dredged Material Management Act of 2001 phases out open water placement of dredged material within Maryland waters by 2010. Along with closure of the only existing upland placement site, Hart-Miller Island, in 2009, this results in insufficient placement capacity to meet the annual need for maintenance dredging activity after 2009. To plan for the dredged material capacity shortfall, the USACE-Baltimore District and the MPA initiated studies to: 1) evaluate long-term (minimum 20 years) placement options; 2) address the dredging needs of the Federal, State, and local projects; and 3) maximize the use of dredged material as a beneficial resource.

The *Baltimore Harbor and Channels Dredged Material Management Plan and Tiered Environmental Impact Statement* (USACE, 2005) identified a combination of seven alternatives, including the expansion of the PIERP, to meet the 20-year dredged material capacity needs of the Port of Baltimore (USACE, 2005). The expansion of the 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 Dredged Material Management Program (DMMP) [*Interim Report to the Maryland General Assembly Concerning Implementation of the Dredged Material Management Act of 2001* (DMMP, 2001)].

The USACE and MPA initiated the Poplar Island Expansion Study (PIES) under the existing PIERP congressional authorization, Section 537 of the Water Resources Development Act (WRDA) of 1996. The General Reevaluation Report (GRR) and Supplemental Environmental Impact Statement (SEIS) for the Poplar Island Environmental Restoration Project was completed in 2005 and documents the National Environmental Policy Act (NEPA) compliance for the 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* (USACE/MPA, 1996).

The objectives of the PIERP GRR/SEIS included increasing habitat restoration, providing additional dredged material capacity, and evaluating other project design modifications. The overall habitat and operational objectives of the expansion were meant to be flexible, measurable, attainable, and congruent. The objectives were also intended to be consistent with both the existing PIERP and other concurrent Mid-Chesapeake Bay island restoration studies. Ultimately, the recommended plan from the Integrated GRR/SEIS was intended to be complementary to, and consistent with, the success of the existing PIERP, and was based on lessons learned to improve site efficiency and habitat quality.

Specifically, the purposes of the GRR/SEIS were: (1) to investigate the environmental effects of a lateral and/or vertical expansion to the existing PIERP to increase habitat restoration and provide 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 at the PIERP from Federal navigation channels not authorized in the 1996 Environmental Impact Statement (EIS); and (4) to assess additional actions for the completion of the existing project.

This paper summarizes the PIERP achievements to date, discusses the recommended plan for the future expansion of the PIERP, and summarizes the lessons learned that have been incorporated into the planning process for the expansion, into the Adaptive Management Plan (AMP), and into plans for future similar island restoration projects.

PROJECT SUCCESSES

To date, the PIERP has demonstrated a number of environmental and social achievements. Specifically, the project has: 1) been developed to support the USACE's Environmental Operating Principles, 2) restores remote island habitat for fish and wildlife, 3) provides habitat for special status species, 4) has national recognition and public support, 5) promotes environmental education, 6) has an extensive network of stakeholder involvement, and 7) has a comprehensive environmental monitoring program and Adaptive Management Plan (AMP).

USACE Environmental Operating Principles

The PIERP and proposed expansion support each of the seven USACE Environmental Operating Principles. The PIERP *strives to achieve environmental sustainability* by creating a diverse, productive ecosystem to replace rapidly vanishing remote island habitats, including sheltered open-water, vegetated wetlands, intertidal zones, uplands, and bird islands, that will be utilized by a wide variety of terrestrial and aquatic species. The PIERP *recognizes the interdependence of life and the physical environment* by creating habitats representative of typical wetland and uplands in the Chesapeake Bay region that will promote interaction and exchange with the surrounding ecosystems. The PIERP *seeks balance and synergy among human development activities and natural systems* by managing sediments that originate from land use practices within the watershed, by maintaining consistency with the existing aesthetics of the region, and by promoting recreational and educational use of the project. The Corps *accepts responsibility and accountability under the law* to ensure that the project complies with all applicable Federal laws, continues extensive environmental monitoring, and utilizes adaptive management practices. The PIERP *seeks ways*

and means to assess and mitigate cumulative impacts to the environment by minimizing environmental consequences to important regional resources, such as open-water, shallow water, and Bay bottom habitats, while providing direct and indirect environmental benefits through creation of scarce island wetland and upland habitats. Since the inception of the PIERP, the Poplar Island Work Group, which is comprised of a diverse group of stakeholders, has provided oversight and technical expertise to the Project Delivery Team (PDT), allowing them to listen to, respect, and learn from the perspectives of individuals and groups interested in Corps activities. The PDT has worked with these stakeholders to develop a win-win solution – a project and recommended plan that meets the dredged material capacity need while minimizing impacts to natural resources, preserving open-water habitat, and maximizing environmental benefits. Through extensive and on-going consultation with the Work Group, and coordination and outreach with other Federal and State agencies, scientific experts from universities, local government, and the public, the PIERP will continue to build and share an integrated scientific, economic, and social knowledge base.

Restoration of Scarce Remote Island Habitat for Fish and Wildlife

The PIERP restores remote island habitat, a scarce and rapidly vanishing ecosystem niche within the Chesapeake Bay region. Loss of remote island habitat within the Chesapeake Bay has been estimated at approximately 4,050 hectares (10,000 acres) in the last 150 years, a trend that will continue due to erosive forces and sea level rise.

Even though habitats are not fully developed and site operations are on-going at the PIERP, Poplar Island attracts a variety of wildlife, including a diverse community of birds, fish, and reptiles. Numerous species have already begun to nest at the existing project, including Least Terns; Common Terns; Snowy Egrets; Willets; Black Ducks; Osprey; and diamondback terrapins. Remote islands such as the PIERP provide a vital connection between open-water and mainland terrestrial habitats within the region. Remote islands in the Chesapeake Bay serve as an important stop-over point for migratory avian species, providing forage and protected resting habitat during spring and fall migration for many shorebird and waterbird species. Many migratory species have been identified utilizing the habitats at the PIERP, including Dunlin, Sanderlings, Semipalmated and Least Sandpipers, Greater and Lesser Yellowlegs, Forster's Terns, and Black Terns. Since 2001, 144 avian species were observed utilizing the habitat at the PIERP, and between March 2003 and March 2005, almost 200,000 birds were observed. Over the past several years, an average of 565 nesting pairs of Common Terns, 48 nesting pairs of Snowy Egrets, and 5 nesting pairs of Cattle Egrets were reported annually.

The constructed wetland habitats are functional, providing forage and cover for important commercial and recreational finfish species. For aquatic species, remote islands such as Poplar Island increase the potential for commercially important large predator finfish species (such as bluefish, striped bass, and Atlantic croaker) to utilize the habitat because of their proximity to deep open water as opposed to the shallows adjacent to mainland marshes. Results of recent monitoring have indicated that the first created marsh system at the facility is successfully supporting established populations of forage fish. In addition to the presence of birds and fish, as of May 2006, a total of 10 species of mammals, 11 species of reptiles and amphibians, and 33 species of butterflies and moths were observed utilizing habitat on the PIERP.

Special Status Species

The PIERP provides important foraging habitat for special status species such as the Federally-listed Bald Eagle, which nests on Coaches Island adjacent to the project. In addition, several State-listed avian species including Royal Terns; American Oystercatchers; Northern Harriers; and the Spotted Sandpiper, have been observed utilizing the habitat at the PIERP. Bird islands specifically designed to encourage nesting by State-listed Least Terns have been successful. Approximately 15 nesting pairs of Least Terns have been reported. In addition, in 2006, a confirmed pair of American Oystercatchers successfully fledged one young. This is the northern-most confirmed nesting in the Chesapeake Bay.

Diamondback Terrapins

Although not anticipated during habitat planning stages of the project, diamondback terrapins have been attracted to the sandy beaches along the exterior dikes on the south side of the island. The diamondback terrapin is the only North American turtle that lives in exclusively brackish water and prefers unpolluted tidal areas. The island

provides excellent nesting habitat that includes accessible sandy areas above the mean high tide, and to a lesser extent, provides hatchling and juvenile habitat that includes the salt flats and fringe marsh common along the Chesapeake Bay shoreline. The project initiated a comprehensive long-term diamondback terrapin monitoring program in 2002 to track the changes in the PIERP diamondback terrapin population as the PIERP progresses. Diamondback terrapin surveys were conducted by Ohio University terrapin researchers at the PIERP in 2002, 2003, 2004, 2005, and 2006 to identify major terrapin nesting beaches at the PIERP, to quantify nest and hatching success rates, and to mark and release hatchlings. In 2006, 191 nests and 576 hatchlings were observed, with 45 nests overwintering. From the period of 2002 through 2006, 779 nests and 4,390 hatchlings were tagged, marked, and released or kept in holding tanks. Both the large number of nests discovered and the rate of egg development into hatchlings are comparable to or better than other nesting areas in the Chesapeake Bay.



Figure 2. Diamondback Terrapin hatchling.

National Recognition, Public Support, and Environmental Education

The existing project contributes to the goals of the Chesapeake Bay Program watershed partnership through its habitat and ecosystem recovery and preservation efforts. In 2003, the PIERP received the *Coastal America Partnership Award* in recognition of the partnership among Federal, State, and local governments and other organizations. In addition, in 2006, the project won the *National Environmental Excellence Award for Environmental Stewardship Excellence* from the National Association of Environmental Professionals.

The PIERP has gained national and international recognition and has provided educational/recreational opportunities for thousands of people. The project has attracted regional media attention in magazines, newspapers and television, including coverage by CNN, Maryland Public Television, Fox 5 News, Chesapeake Life Magazine, Bay Weekly, The Baltimore Sun, The Washington Post, and The Annapolis Capital. Educational groups, national and international interest groups, local citizens, and environmental organizations have observed the success of the facility, including a Japanese delegation and delegation from the Chinese Dredging Association. In addition, the PIERP Adaptive Management Plan has been translated into Japanese for the Waterfront Vitalization and Environmental Research Center, a Japanese consortium of port and harbor developers, environmentalists, and ocean/harbor researchers in Japan.

The public has taken an overwhelming interest in the PIERP, and the facility has a full-time tour coordinator and seasonal educators (Figure 3). In 2006, the USACE and MPA provided more than 140 tours (totaling approximately 3,500 people) of the PIERP. Since 2003, more than 10,500 individuals have toured the facility. Since 2003, approximately 246 individuals have taken trips to the island exclusively for bird-watching. In addition, the project has developed unique partnerships with local/regional associations and citizens groups. In 2005, the National Aquarium in Baltimore coordinated and organized wetland planting efforts at the facility using local volunteers.

The USACE also has an agreement with the Horticultural Program at the Providence Center (a center for adults with developmental disabilities) to supply wetland plants.

The PIERP provides a multitude of environmental education opportunities for teachers, students, and researchers. A “teach the teachers” program has been initiated to facilitate the development of environmental curriculum related to wetlands and the Chesapeake Bay ecosystem. In addition, the facility has started a school program where diamondback terrapin hatchlings from PIERP are distributed throughout K-12 classrooms. The students rear the hatchlings for 8 months, while studying physical characteristics, husbandry practices, growth and feeding rates, and other measurable attributes. Following the 8-month period, the students travel to the PIERP to release their hatchlings back to the Chesapeake Bay. Lastly, researchers from various universities (including Ohio University, Anne Arundel Community College, and the University of Maryland Center for Environmental Science) actively participate in monitoring programs related to marsh growth, submerged aquatic vegetation (SAV), and wildlife habitat.



Figure 3. Poplar Island tour bus.

Stakeholder Involvement

Coordination with agencies and technical experts from academic institutions has been essential for the success of the existing project success and was an integral part of the Poplar Island Expansion Study (PIES). The Project Delivery Team (PDT) was directed by the USACE-Baltimore District (lead agency) and by the MPA (local sponsor), and included personnel from agencies including Maryland Department of the Environment (MDE), Maryland Department of Natural Resources (MDNR), Maryland Environmental Service (MES), Maryland Geological Survey (MGS), National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS), U.S. Environmental Protection Agency (USEPA), U.S. Fish and Wildlife Service (USFWS), U.S. Geological Survey (USGS), USEPA - Chesapeake Bay Program, University of Maryland Center for Environmental Science (UMCES) – Horn Point Environmental Laboratory, UMCES – Chesapeake Biological Laboratory, Ohio University, Anne Arundel Community College, and USACE-Philadelphia District. In addition, various other private-interest groups and organizations that are stakeholders in the Chesapeake Bay, such as the Talbot County Council, Talbot County Department of Parks and Recreation, Coastal Conservation Association (CCA), Citizen’s Advisory Committee (CAC), Maryland Watermen’s Association (MWA), conservation groups, sportsmen, boaters, and watermen were also involved in the development of the existing PIERP and the recommended expansion plan.

The USACE and the MPA have been committed to engaging in collaborative decision-making with other agencies and PDT members. The purpose of the PDT was to provide input and technical expertise and to guide the

preparation and information required for the original Poplar Island Feasibility Report and Environmental Impact Statement and the PIERP GRR/SEIS. The goals of the group included communication and cooperation to identify and resolve issues early and quickly, recognize and respect agency roles and responsibilities, and work in partnership to develop an acceptable methodology to complete the project. The PDT meetings were held monthly to bimonthly to discuss the progress of the project, resolve issues associated with the project, and provide project updates to team members. The PDT members provided comments, suggestions, and concerns throughout the project process and during formal public meetings and comment periods.

The PDT solicited comment and input from other organizations including the three committees that form the State of Maryland Dredged Material Management Program: the Executive Committee, the Management Committee, and Citizens Advisory Committee. These committees provide input for the establishment of a long-term dredging placement program, and are supported by several technical groups, including the Bay Enhancement Working Group (BEWG) and the Harbor Team, which are tasked with identifying, studying, reviewing, and prioritizing potential dredged material management plans.

For the expansion project alone, stakeholders participated in over 80 different formal and informal meetings that involved discussions related to the proposed PIERP expansion. In total, more than 100 individuals and more than 30 agencies, groups, and public organizations provided direct feedback to the formal planning process. Their direct involvement and buy-in to the project facilitated a NEPA schedule that was accelerated by approximately 12 months for the GRR/SEIS.

Environmental Monitoring and Adaptive Management

The PIERP has an extensive monitoring program that consists of both site operations monitoring and environmental monitoring that feeds data into a formal Adaptive Management Plan (EA, 2006). Approximately \$12.5 million (approximately 2%) of the total project cost (including the expansion) has been dedicated to measuring, recording, and monitoring the environmental success of the project. The site operations monitoring includes inspection and monitoring of the structural stability and integrity of the facilities, including the perimeter and interior dikes, armor stone, roadway surfaces, and spillways. The environmental monitoring framework includes 13 monitoring components: turbidity, shellfish bed sedimentation, sediment quality, wetland vegetation, water quality, benthic and epibenthic community, fisheries use of proximal waters, wetlands use by fish, wetlands use by wildlife, bird utilization, interior water quality/algae, terrapin monitoring, and SAV monitoring. The adaptive management process for the PIERP is more fully explained in the following WODCON manuscript: *Poplar Island Environmental Restoration Project: Adaptive Management Process for Assessment of Wetland Cell Development and Habitat Restoration Success* (Elseroad, et. al., 2007).

FUTURE PLANS

The recommended plan from the GRR/SEIS (Figure 4) includes both a lateral expansion of the existing PIERP to the north and northeast and a vertical raising of the upland cells of the existing project to provide additional dredged material placement capacity. The recommended plan was chosen because it provides sufficient dredged material capacity to help meet the near-term capacity need, impacts the minimum amount of borrow area outside of the lateral expansion footprint, is the most cost-effective alternative, and results in the greatest environmental benefits. The recommended plan also includes the placement of dredged material from the southern approach channels to the Chesapeake and Delaware (C&D) Canal and other Federal navigation projects at the PIERP, incorporation of design modifications required for the completion of the existing project, and development of recreational and educational enhancements for the PIERP. The proposed expansion project incorporates unique environmental design features to minimize impacts to open-water and Bay bottom habitats. Specifically, the proposed expansion includes an open-water embayment in lieu of wetland habitat and the potential inclusion of rock reefs and bird nesting islands within the embayment. This concept was proposed by a representative of the NMFS on the PDT; subsequently, endorsed and recommended by the PDT; and incorporated into the recommended plan by the project partners/sponsors (USACE and MPA). Each component of the recommended plan is detailed in the following sections.

Lateral and Vertical Expansion

The recommended plan includes the expansion of the existing PIERP to the north and northeast, with a 232 hectare (575-acre) lateral expansion component consisting nominally of 29 percent wetland habitat [67 hectares (165 acres)], 47 percent upland habitat [110 hectares (270 acres)], and 24 percent open-water embayment habitat [53 hectares (130 acres)]; plus a vertical expansion component to increase capacity consisting of a 1.5 m (5-ft) raising of the upland cells (Cells 2 and 6) 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 8 hectares (19 acres) of sand from the southwestern sand borrow area. In addition, the lateral expansion would require approximately 12 hectares (30 acres) of dredging (and Bay bottom disturbance) for construction of a northern access channel and turning basin. A total of 20 hectares (49 acres) of Bay bottom outside the footprint of the lateral expansion would be disturbed to support construction. The lateral and vertical expansion would provide an additional 21.5 million m³ (28 mcy) of placement capacity and would extend the project life by approximately seven years.

With the inclusion of the open-water embayment, the interaction between the wetland and open-water embayment habitats would be expected to increase the overall productivity of the habitats created, resulting in a beneficial impact to avian, fish, and wildlife species. The trophic exchange and interaction between wetland cells and open water could particularly benefit Essential Fish Habitat (EFH) species, and would support juvenile blue crabs, and a diversity of juvenile fish species. The open-water embayment would also provide forage access and refugia in the small tributaries and tidal guts. Because dredged material would not be placed in the open-water embayment, the existing substrate, benthic community, and natural bathymetry would be conserved. The conservation of the bottom habitat within the open-water embayment will have a beneficial impact on the benthic community, clams, and blue crabs. In addition, the open-water embayment should create quiescent conditions that could potentially support additional Submerged Aquatic Vegetation (SAV) beds along the shorelines and support habitats of particular concern that are preferred by EFH species, other finfish species, and waterfowl. The open-water embayment design features provide a win-win solution for the project sponsors, the regulatory and resource agencies, and the environment. Project stakeholders have been invited to participate in the next design phase of the project that will further evaluate location, size, long-term maintenance and stability, circulation and storm protection, and recreational use associated with the open-water embayment.

Actions to Complete Existing PIERP

Based on the re-evaluation of the existing project, the following actions necessary to complete the existing project were also included in the recommended plan: raising the existing upland dikes from a temporary height of +7 m (+23 ft) Mean Lower Low Water (MLLW) to a temporary height of +7.6 m (+25 ft) MLLW; closing Cell 6; miscellaneous cell restoration and development activities; relocating the southern access channel and turning basin; and relocating the steel bulkhead, inflow, and discharge support structures to accommodate the closure of Cell 6. For the actions required to complete the existing project, approximately 48 hectares (119 acres) in the southwestern sand borrow area, 24 hectares (60 acres) in Borrow Area F, and 14 hectares (35 acres) in Borrow Area G will be disturbed for sand borrow. In addition, 11 hectares (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 97 hectares (242 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 use 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 and 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 (USACE, 1998b)].

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 Project Cooperation Agreement (April 1997) was investigated in the GRR/SEIS. Specifically, dredged material from southern approach channels to the C&D Canal (from Pooles Island to 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: 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 0.9 million m³ (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. This material is currently placed at permitted open water placement sites near Pooles Island that have a maximum capacity of approximately 5.7 million m³ (7.5 mcy). The Pooles Island sites are mandated by State of Maryland law to close by 2010, or earlier if the 5.7 million m³ (7.5 mcy) capacity is reached prior to 2010. Following closure of the Pooles Island sites, the dredged material is proposed for placement 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 1.5 million m³ to 2.4 million m³ (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 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, 2005), 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 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 be applicable to beneficial use and island restoration projects. This request was 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 GRR/SEIS. Dredged material from Federal navigation channels within Baltimore Harbor/Patapsco River (west of the North Point-Rock Point line), however, 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 (USACE, 1998a) states that the USACE may allow non-Federal entities to utilize Federal placement facilities, acceptance of material from 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.

LESSONS LEARNED

Based on the experience gained from the design, construction, and operations at PIERP, several key ‘lessons learned’ have been incorporated into the existing Adaptive Management Plan (EA, 2006) and habitat development framework (MES, 2006), and the plan formulation and design phases of the proposed expansion (USACE/MPA 2005). An important consideration throughout the planning process for the proposed expansion was building in the flexibility and procedures to quickly respond to unanticipated occurrences during the life of the project, such as specific cell development and design constraints, controlling nuisance species, changing/moving the locations of habitat islands, and impacts from storm events. The AMP provides a vehicle and a structure for submitting and gaining approval from the project stakeholders for proposed changes. Key engineering, environmental, and stakeholder issues and the way in which they were incorporated into the planning process and design for the proposed expansion and other projects are outlined below.

Engineering Considerations

Define the extent of the sand borrow areas, and include the excavation of the sand in the impacts analysis. The sand borrow areas were identified and delineated early in the study process to accurately determine the sand quantities available for the development of the recommended plan, and the effects associated with excavation were included in the impacts analysis. Sand borrow areas that were not included within the lateral expansion footprint were incorporated into the existing conditions surveys and impact analysis.

Do not design wetland cells on top of sand borrow areas because filling in the excavated sand borrow areas may make it difficult to achieve the necessary final design elevations for the wetland cells due to uncertainty associated with consolidation and settling of material in deep borrow pits and the ability to maintain elevations for wetland success. For the expansion study, the upland cells were designed on top of the sand borrow area located within the proposed project footprint, resulting in a conceptual lateral configuration that has upland cells located on the eastern side of the proposed expansion, closest to the shoreline.

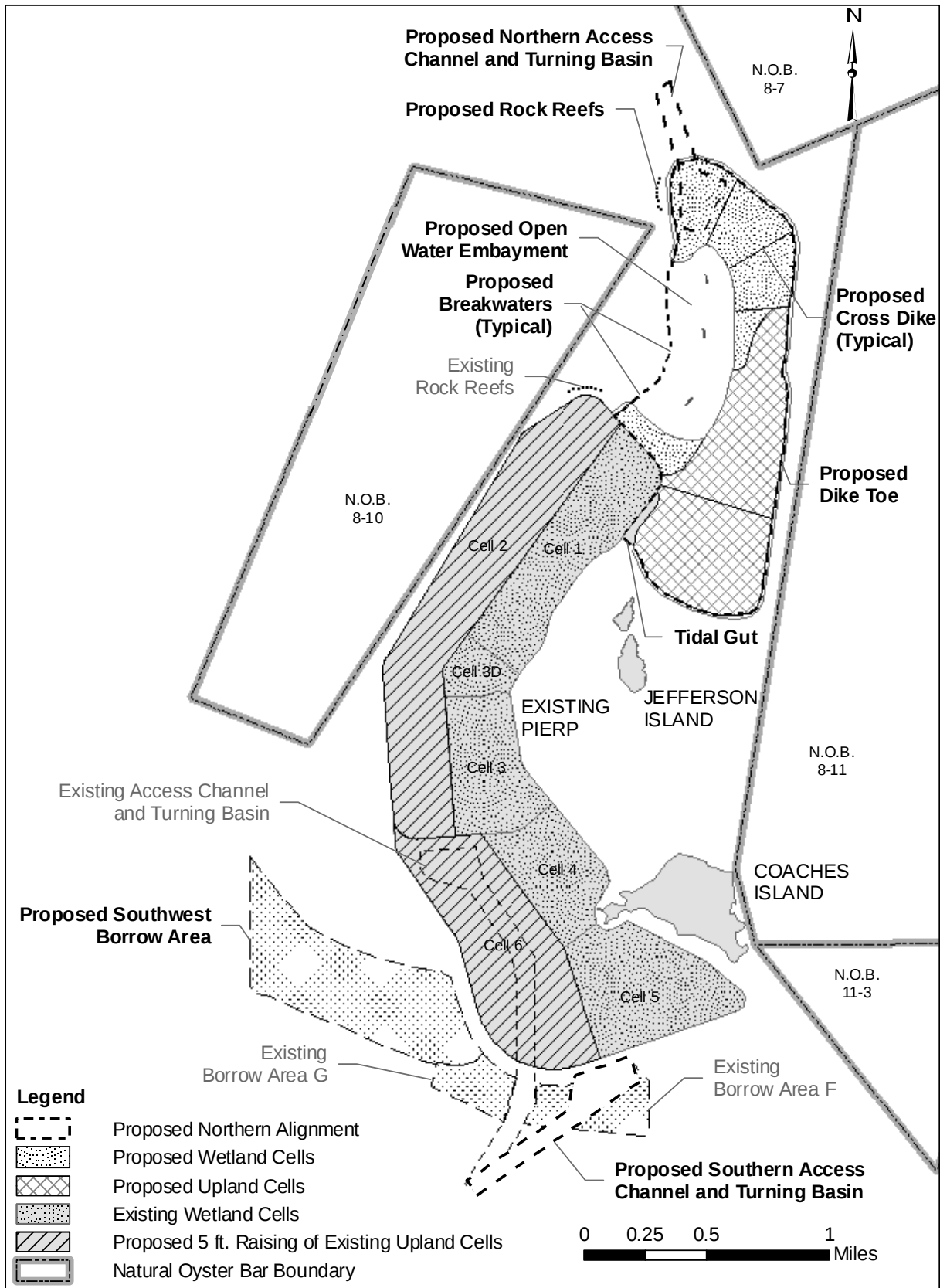


Figure 4. PIERP recommended expansion plan.

Include a defined area outside the extent of the toe dike needed for barge/equipment access and operations/maintenance activities related to the project. A “study area” that included a footprint for the lateral expansion was evaluated in the expansion study, rather than a specific alignment. The footprint included the proposed access channel and enough ‘buffer-area’ to allow for design adjustments so the exterior dike could be constructed in its optimal configuration in the final design stage.

Differentiate between the final dike height and the temporary construction dike height. An additional 5-ft of temporary dike height is necessary for the construction phase of the upland cells to facilitate dredged material placement, dewatering, and crust management to achieve target elevations. The impacts analysis for the visual assessment of the vertical expansion evaluated the permanent impacts of raising the height of the existing upland cells to the final design height of +25 ft MLLW, not to the temporary dike height of +30 ft MLLW. It was assumed that the duration of a temporary dike height of +30 ft MLLW would last for approximately 10 years, and that the dikes will be lowered to a final dike height of +25 ft MLLW after placement and dewatering have ceased.

Develop a procedure to submit and approve cell design changes and maintenance adjustments throughout the life of the project. Changes to the specific cell and subcells for PIERP are achieved through the adaptive management process and coordination with members of the Poplar Island Working Group. Construction activities, operations, maintenance, and monitoring of the lateral and vertical expansion components were incorporated into this process.

Explain that final elevations of dredged material within the upland cells will require uneven relief features to achieve the drainage necessary for proper dewatering and run-off to the wetland cells. Although the final dikes will be set to a specific elevation, the dredged material will have some relief to accommodate water run-off through the wetland cells. Consequently, the final dredged material surface will not be completely level or flat.

Environmental Considerations

Define in more detail the upland habitat goals for the project. Upland habitat goals are discussed in the habitat development framework for PIERP, and the upland habitat restoration targets are under development, to be implemented once the upland cells are completed for PIERP. Decisions made for the PIERP upland cells will be incorporated into the upland cells planned for the lateral expansion.

Allow for flexibility of habitat criteria target acreages. The habitat restoration goals for the proposed lateral expansion include ranges for the uplands to wetlands ratio. The final proportions of uplands and wetlands, and the final proportions of wetland types (high marsh to low marsh) will be based on environmental and engineering design constraints, and adjustments to the ratio may be refined by the Habitat Sub-Group throughout the life of the project.

Define the habitat expectations for the transitional area from wetland to upland, understanding that the transition will not be immediate. Habitat design and implementation strategies for the wetland to upland transition are currently under development for PIERP, and will be included in the Habitat Development Framework. Decisions will be incorporated in planning and design phases for PIERP as design details of the project become available.

Include the underwater habitat that has been, and would be created, on the exterior face of the armor stone as an environmental benefit. Epibenthic colonization on the exterior armor stone dikes has been evaluated and monitored for PIERP. The perimeter dike habitat was included as an interim benefit throughout the life of the project in the calculation of the environmental benefits (ICU) for both the existing PIERP and for the expansion project.

When describing habitat creation goals, discuss targeted community types of wildlife instead of identifying specific target species. The habitat goals specified in the PIERP EIS have been refined through the adaptive management process and the development of the Habitat Framework. The concept of revising the habitat development goals to plan for community types/guilds, such as colonial nesting waterbirds, or general flora types rather than individual target species is currently under review by the Poplar Island Habitat Work Group. The ICU methodology used to calculate the environmental benefits of PIERP and of the lateral/vertical expansion was based on habitat use by community groups. Habitat created through the proposed lateral expansion would be incorporated into both the adaptive management process and the habitat framework.

Incorporate a wildlife management plan that includes the control of nuisance species, in addition to the monitoring and protection of species of interest such as terrapins and terns. Some components of the wildlife management plan are being implemented, such as the lethal control of nuisance species including gulls, Canada geese, and foxes; maintenance of the habitat islands; and monitoring of diamondback terrapin habitat. Procedures in place for the existing PIERP will be extended to lateral expansion cells. Additional components of the wildlife management plan are currently under development, and others will be developed as needed as part of the adaptive management process.

Establish procedures for monitoring discharge through the spillways and develop a plan to respond to unanticipated events in a timely manner, including specific contingencies. A monitoring plan for discharge through the exterior spillways is in place for PIERP and will be extended to include exterior spillways and the tidal gut discharge location for the lateral expansion. The spillway monitoring program was developed by MES in conjunction with MDE and is periodically revised to reflect changes to operational status.

Establish a monitoring program that quantifies and evaluates sedimentation on NOBs (Natural Oyster Bars). Construction of the proposed lateral alignment would be close to NOB 8-11, east of the proposed project. Procedures will be put into place that will minimize NOB impacts during construction, and sedimentation monitoring will take place before, during, and after construction, as prescribed in the Monitoring Framework.

Stakeholder Considerations

Develop relationships with and seek input from key stakeholders early in the process. Monthly PDT meetings were conducted through the study period (scoping through final GRR/SEIS) to discuss project status and address concerns.

Conduct specific meetings for target groups affected by the project. Targeted meetings were conducted with MWA, Talbot County Council, and CCA to address specific concerns related to loss of commercial crabbing habitat and recreational opportunities. The targeted meetings allowed individuals to express concerns related only to specific topics and allowed the project sponsors to focus on solutions to those specific issues.

Keep stakeholders at all management levels informed of project status. The proposed PIERP expansion was an agenda item at the monthly Bay Enhancement Working Group meetings, at the quarterly Management Committee Meetings, and bi-annual Executive Committee meetings for the State of Maryland's Dredged Material Management Program. Consistent updates allowed stakeholders at the technical, regulatory, and management levels to be aware of the project status and latest findings and to provide comment before the public notices were distributed and draft documents were available.

CONCLUSIONS

The PIERP restores remote island ecosystem habitat while providing suitable dredged material placement sites to enable critical maintenance dredging of the Chesapeake Bay approach channels to the Port of Baltimore. The PIERP (and proposed future expansion) is an integral component of the Federal DMMP which is long-term regional plan for managing sediments from the Chesapeake Bay navigation channels. It is also an integral component of the DMMP for the State of Maryland. The significance of the fish and wildlife resources of the Chesapeake Bay is widely recognized by resource agencies, the public, and academic institutions. For more than 20 years, extensive efforts have been expended to support natural resources management and restoration plans in the Chesapeake Bay region. Overall, the existing project has demonstrated success in using dredged material to create valuable remote island habitat, which is rapidly vanishing in the Chesapeake Bay region, and the proposed expansion project will allow the USACE and the MPA to solve a near-term need for dredged material placement sites while providing additional habitat of value. The expansion will continue the contribution of the existing project to the goals of the Chesapeake Bay Program watershed partnership through its habitat and ecosystem recovery efforts. In addition, the integration of lessons learned and adaptive management will improve future habitat restoration initiatives.

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