FINAL MID-CHESAPEAKE BAY ISLAND ECOSYSTEM RESTORATION
INTEGRATED FEASIBILITY REPORT
& ENVIRONMENTAL IMPACT STATEMENT (EIS)

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Appendix A

Environmental Impact Statement
Index

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Acid Volatile Sulfide 3-19, 6-12
Air
Ozone 3-55, 3-56, 6-26, 9-12
Carbon Monoxide 3-55, 3-56
Emissions 6-26, 6-73
Lead.....3-55, 3-57, 3-58
Nitrogen Dioxide 3-55, 3-57
Particulate Matter 3-55, 3-56, 6-26, 9-12
Quality.....3-55, 3-57, 3-57, 6-26, 6-73
Sulfur Dioxide.....3-55, 3-56
Alignments
Barren Island.....4-9 to 4-17, 4-23, 4-26, 4-40, 4-42, 4-55, 4-58, 4-59 to 4-64, 5-11
James Island.....4-6 to 4-17, 4-22, 4-23, 4-26, 4-39, 4-41, 4-55, 4-56, 4-59 to 4-64, 5-8, 5-9, 5-11
Aquifers.....3-7
Bay Enhancement Working Group.....1-20, 1-21, 3-1, 4-4 to 4-8, 4-53, 9-2, 9-13, 9-17
Benthic
Communities.....3-25, 3-27 to 3-30, 3-85, 3-86, 3-116, 3-120 to 3-125, 4-14, 4-27, 4-28, 5-13, 6-10, 6-14 to 6-16, 6-45, 8-4 to 8-7
Index of Biotic Integrity.....3-29, 3-30, 3-124, 3-125, 4-27
Bird species
Blue Heron.....2-7, 3-47, 3-49, 3-50, 3-151, 6-23, 6-78
Colonial waterbirds.....2-1, 2-7, 3-48 to 3-50, 3-61, 3-62, 4-18, 4-66, 4-64, 4-67, 4-68, 4-76, 5-24, 6-23, 6-24, 6-31, 6-47, 9-9

Eagle, Bald 2-1, 3-47, 3-49, 3-51, 3-52, 3-54, 3-143, 3-146, 3-148, 3-149, 3-150, 3-152, 3-154, 3-155, 6-23, 6-25, 6-48, 6-77, 9-11, 9-13
Migratory 2-5, 2-7, 3-47, 4-2, 6-84
Nesting ..... 2-1, 2-7, 3-48, 3-49, 3-50, 3-51, 3-61, 4-18, 4-19, 4-32, 4-33, 5-8, 6-23 to 6-25, 6-43, 6-48, 6-77, 6-78
Surveys 3-48, 3-49, 3-143, 3-153
Birding 6-43, 6-44, 6-47
Blackwater National Wildlife Refuge 1-2, 1-15, 1-16, 1-20, 3-2, 3-41, 3-71, 6-47, 9-12
Boating 3-58, 3-71, 6-28, 6-30, 6-41, 6-42, 6-74
Channels
Access ..... 3-8, 4-6, 4-51, 5-2, 5-4, 5-8, 5-10, 6-3, 6-6, 6-7, 6-8, 6-9, 6-12, 6-14 to 6-17, 6-41, 6-70, 6-71
Navigation ..... 1-5 to 1-10, 1-14, 1-36, 3-1, 3-17, 3-39, 3-60, 4-6, 4-11, 5-1, 5-2, 5-7, 5-12, 6-4, 6-30, 10-1
C&D Approach 1-6, 1-8, 1-30, 2-3, 2-11
Chesapeake Bay Approach 1-1, 2-3, 2-11, 3-73
Baltimore Harbor ..... 1-4, 1-5 to 1-8
Main ..... 1-5 to 1-7
Chesapeake Bay 2000 Agreement 2-5, 2-6
Coastal Zone Management 3-60, 6-31, 6-84
Coastal Barrier Resources Act 3-61, 6-31, 6-84, 9-11
Cost Analysis ..... 4-21 to 4-26, 4-85, 4-86
Critical Areas 3-36, 3-60, 3-61, 6-30, 6-31, 6-47, 9-10

Diamondback Terrapin 3-45, 3-46, 3-51, 6-23, 9-5
Dike
Toe Dike.....4-9, 4-10, 4-54, 5-4, 5-9, 6-3
Construction.....4-8 to 4-11, 4-13, 4-14, 4-24, 4-27, 4-28, 4-30, 4-83, 5-2, 5-4, 5-8, 6-3, 6-8, 6-9, 6-12, 6-18, 6-19, 6-23, 6-26, 6-27, 6-30, 6-35, 6-41, 6-44, 6-80 7-3, 7-9, 8-9
Stone Armor.....4-6, 4-10, 4-51, 4-52, 5-4 to 5-8, 5-10, 6-3, 6-16, 6-44
Dorchester County .....1-2, 1-15, 1-16, 3-3, 3-6, 3-7, 3-41, 3-56, 3-57, 3-62, 3-65, 3-69, 3-72, 3-156, 3-157, 4-31, 4-47, 5-12, 6-26, 6-34, 6-74, 9-2 to 9-6, 9-8, 9-12 to 9-14
Dredged Material Management Plan
Federal.....1-1, 1-2, 1-3, 1-5, 1-9, 1-15, 1-16, 1-21, 2-2, 2-3, 2-7, 3-1, 4-1, 4-2, 4-3, 4-4, 4-14, 4-24, 4-29, 4-31, 6-44, 6-45, 7-4, 9-8, 9-13, 9-17
State.....1-15, 1-20, 1-21, 3-1, 3-73, 4-1, 4-4 to 4-7, 7-6
Education 1-17, 3-71, 3-72, 4-32, 4-33, 5-5, 6-43
Essential Fish Habitat .....3-34 to 3-36, 6-17, 9-9, 9-12
Fisheries
Commercial
Blue Crab 3-36, 3-38, 3-39, 3-134, 6-35, 6-36
Clam.....3-36, 3-37, 3-133, 6-18, 6-35

Finfish 3-34, 3-36, 3-39, 6-19, 6-36, 6-37 6-72, 6-74
Oyster .....3-36, 3-37 to 3-38, 3-133, 6-35
Recreational 3-72, 4-88, 5-6, 6-27, 6-40, 6-41
Surveys .....3-26 to 3-34, 9-4
Hazardous Toxic Radioactive Waste 3-58, 6-30, 6-73
Hunting 3-68, 3-71, 3-72, 4-88, 6-42, 6-77
Island
Hoopers 2-11, 3-2, 3-9, 3-14, 3-54, 3-69, 3-74, 3-107, 3-156, 4-6, 4-7, 4-29, 4-47, 4-48, 4-52, 4-53, 6-2, 6-7, 6-8, 6-10, 6-28, 6-39, 6-36, 6-45, 6-47, 6-70
Hart-Miller 1-2, 2-3, 3-73, 4-5, 6-28, 10-1
Pooles 1-2, 1-9, 2-2, 2-3, 4-5, 4-31, 4-48, 10-1
Taylors .....1-16, 3-2, 3-21, 3-40, 3-60, 3-69, 3-107, 3-156, 4-11, 4-48, 6-5 to 6-8, 6-17, 6-27, 6-33, 6-39, 6-41, 6-45, 6-47, 6-48, 9-4, 9-5
Island Community Units .....4-15, 4-17 to 4-26, 4-30, 4-77 to 4-82, 4-84 to 4-86, 6-44
Little Choptank River .....1-16, 3-2, 3-14, 3-38 to 3-40, 3-134, 4-47, 4-48, 6-10, 6-39, 6-41, 6-47
Material
Borrow .....4-6, 4-8, 4-10, 4-11, 4-13, 4-14, 4-16, 4-51, 4-52, 4-54, 4-56 to 4-60, 5-3, 5-4, 5-8, 5-18, 6-3, 6-8, 6-14, 6-44, 7-4, 7-5, 9-12

Foundation 4-6, 4-10, 4-11, 4-51, 4-52, 4-54
National Environmental Policy Act 1-17, 1-18, 1-19, 3-1, 3-62, 3-70, 6-1, 9-1, 9-3, 9-6
National Historic Preservation Act 3-63, 6-32
National Register of Historic Places 3-63, 6-32
Natural Oyster Bars.....3-38, 4-8 to 4-9, 4-11, 4-12, 4-29 , 6-7 to 6-9, 6-35, 6-70, 6-72, 8-9
Noise .....3-57, 3-58, 4-27, 4-28, 4-88, 6-22, 6-23, 6-26 to 6-28, 6-41, 6-42, 6-43, 6-61, 6-62, 6-72, 6-73, 6-80
Plankton
Ichthyoplankton .....3-23 to 3-25, 3-117, 3-118, 6-15, 9-4
Phytoplankton 3-12, 3-13, 3-16, 3-16, 3-20, 3-23, 3-25, 3-26, 6-13, 6-14
Zooplankton .....3-23 to 3-26, 3-117, 3-119, 6-13, 6-14, 9-4
Project Delivery Team .....1-19, 1-21, 2-1, 3-1, 3-31, 4-1 to 4-3, 4-5 to 4-9, 4-11, 4-13, 4-15 to 4-17, 4-20 to 4-22, 4-26, 4-28, 4-31, 5-1, 5-10 to 5-12, 8-3
Project Management Plan 1-2, 4-2
Rare, Threatened, and Endangered Species.....2-1, 3-46, 3-48-50, 3-51, 3-52, 3-53, 3-54, 3-55, 3-62, 3-74, 3-154, 3-155, 6-23 to 6-25, 6-29, 6-44, 8-3, 9-12
River and Harbor Act.....1-5, 1-8
Sediment
Coastal Plain 3-3, 3-6
Deposits.....3-3 to 3-6, 3-67
Quality.....3-17, 3-25, 3-30, 5-13, 6-11, 6-12, 6-71, 8-4

Suspended Solids 3-13, 3-26, 6-10, 6-11, 6-16, 6-43
Sedimentation Modeling.....3-10, 6-3
Submerged Aquatic Vegetation .....1-16, 2-1, 2-4, 2-6, 3-1, 3-12, 3-13, 3-14, 3-17, 3-19 to 3-22, 3-27, 3-31, 3-34, 3-36, 3-73, 3-74, 3-87, 3-88, 4-8, 4-10, 4-11, 4-17, 4-15, 4-18, 4-19 to 4-22, 4-27 to 4-69, 4-31, 4-32, 4-72, 4-73, 4-77 to 4-80, 4-88, 5-1 to 5-3, 5-6, 5-7, 5-11, 5-23, 6-2, 6-3, 6-6, 6-8, 6-10, 6-12, 6-13, 6-15, 6-17, 6-33, 6-44 to 6-47, 6-69, 8-4, 8-10, 8-11, 9-4, 10-2
Substrate.....3-5, 3-6, 3-18, 3-25, 3-26, 3-28 to 3-30, 3-34, 3-42, 3-43, 3-72, 4-8, 4-29, 5-24, 6-9, 6-14, 6-45, 8-3
Turtles
Kemp's Ridley 3-51, 3-53, 3-156, 6-25, 9-9
Green Sea 3-51, 3-53, 6-25, 9-9
Leatherback 3-51, 3-53, 6-25, 9-9
Loggerhead 3-28, 3-51, 3-53, 3-156, 6-25, 9-9
Unexploded Ordinance 4-6, 4-47, 4-48, 4-51, 4-52, 6-30
Water
Dissolved Oxygen.....3-11, 3-12, 3-13, 3-15, 3-16, 3-25, 3-27, 3-109, 3-110, 3-113, 11-3, 11-7 to 11-9
pH.....3-14, 3-16, 3-109, 3-110, 3-113, 6-9, 6-11, 8-5, 8-9

Quality.....1-3, 1-16, 1-17, 2-5, 3-11 to 3-16, 3-20, 3-25, 3-28, 3-41, 3-60, 3-61, 3-84, 3-109 to 3-115, 4-5, 5-13, 6-3, 6-8 to 6-11, 6-36, 6-40, 6-47, 6-48, 6-71, 8-4 to 8-6, 8-9, 9-4, 9-8, 9-10
Turbidity .....3-13, 3-14, 3-16, 3-20, 3-109 to 3-111, 4-2, 4-28, 4-29 5-12, 6-1, 6-8, 6-9, 6-12, 6-14, 6-16, 6-18, 6-19, 6-36, 6-71, 8-3, 8-6, 8-9
Water Resources Development Act .....1-3, 1-7, 1-16, 1-17, 7-1 to 7-3, 7-9, 9-11
Wetland Restoration.....1-2, 1-3, 1-15 to 1-17, 2-4, 3-2, 3-72, 4-27, 4-28, 4-31, 5-6, 5-7, 5-11, 5-12, 6-10, 6-12, 6-15, 6-20 to 6-23, 6-31, 6-45, 6-71, 9-12

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APPENDIX B

PLAN FORMULATION PROCESS

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TABLE OF CONTENTS

B.1 POLICY GUIDANCE 1
B.2 RECOMMENDATIONS OF THE FEDERAL AND STATE DREDGEDmATERIAL MANAGEMENT PROCESSES 2
B.2.1 Federal DMMP 2
B.2.2 State of Maryland DMMP 3
B.2.3 Recommendation for the Mid-Chesapeake Bay Island Restoration Study 4
B.3 GOALS, OBJECTIVES, AND CONSTRAINTS 4
B.3.1 Project Goal 4
B.3.2 Project Objectives 4
B.3.3 Project Constraints 4
B.4 ALTERNATIVES FORMULATION AND SCREENING 5
B.5 ISLAND RESTORATION SITE SELECTION 5
B.5.1 Identifying Potential Sites 6
B.5.2 Site Ranking and Screening 12
B.5.2.a Engineering Suitability 12
B.5.2.b Environmental Suitability 17
B.5.3 Public Input 17
B.5.4 Result of the Island Site Selection Process 17
B.6 IDENTIFYING POTENTIAL ALIGNMENTS USING GIS ANALYSIS 19
B.6.1 Engineering Design Considerations 19
B.6.2 Environmental Design Considerations 19
B.6.3 GIS Analysis and Development of Alignments 21
B.6.3.a Proximity to existing island remnants. 21
B.6.3.b Proximity to natural oyster bars (NOBs) 21
B.6.3.c Presence of submerged aquatic vegetation (SAV). 22
B.6.3.d Foundation material 22
B.6.3.e Quality of on-site borrow material. 23
B.6.3.f Constructability of a perimeter dike with a toe dike. 23
B.6.3.g Constructability of a perimeter dike without a toe dike. 23
B.6.3.h Navigation restrictions. 23
B.6.3.i Results of the GIS Analysis 23
B.6.3.j Proposed Alignments Based on the Results of the GIS Analysis 33
B.7 SCREENING OF POTENTIAL ALIGNMENTS 34
B.7.1 Initial Habitat Screening 35
B.7.1.a Constructability 38
B.7.1.b Capacity/Dredged Material Placement 38
B.7.1.c Location of Borrow Areas 38
B.7.1.d Agency Preference/Environmental Benefits 39
B.7.1.e Cost per Habitat Output 39
B.7.2 Results of the Initial Alternatives Screening 39
B.7.3 Re-Evaluation of the Remaining Alternatives 50
B.7.3.a PDT Consensus 50
B.7.3.a.1 Optimization of the Upland to Wetland Ratio 50
B.7.3.a.2 Minimizing the Project Footprint 52
B.8 Island Community Unit (ICU) Analysis 52

B.8.1 Methods ... 53
B.8.2 Results of the Environmental Benefits Calculation ... 61
B.9 COST EFFECTIVENESS/INCREMENTAL COST ANALYSIS ... 62
B.9.1 Project Output Analysis ... 63
B.9.1.a No-Action (Without Project) Alternative ... 63
B.9.1.b Project Alternatives ... 63
B.9.2 Alternatives Cost Analysis ... 64
B.9.3 Environmental Benefits (ICU) Evaluation ... 65
B.9.4 Cost Effectiveness Analysis ... 65
B.9.5 Incremental Analysis of Cost Effective Alignments ... 66
B.10 RE-EVALAUATION OF THE TWO ISLAND ALTERNATIVE ... 69
B.11 EVALUATION OF PROJECT OBJECTIVES ... 70
B.11.1 Results of Objectives Evaluation ... 72
B.12 NED/NER TRADEOFF ANALYSIS ... 73
B.13 ASSESSMENT OF PROJECT ALTERNATIVES BASED ON USACE PRINCIPLES AND GUIDELINES ... 75
B.13.1 No-Action Alternative ... 75
B.13.2 Barren Island Alignment A ... 76
B.13.3 James Island Alignment 5 plus Barren Island Alignment D ... 76
B.13.4 James Island Alignment 5 plus Barren Island Alignment E ... 76
B.14 SELECTION OF THE RECOMMENDED PLAN ... 79
B.15 OPTIMIZATION OF RECOMMENDED (NER) PLAN AT JAMES ... 79
B.15.1 Scenarios Evaluated ... 80
B.15.2 Dredged Material Placement Analysis ... 80
B.15.3 Benefit Calculations ... 80
B.15.4 Cost/Benefit Analysis ... 81
B.15.5 Results ... 81
B.15.6 Conclusions of Timing Analysis of Recommended Plan ... 82
B.16 NET ICU ANALYSIS ... 83
B.17 REFERENCES ... 87

APPENDIX B

PLAN FORMULATION PROCESS

The determination of the recommended plan for the Mid-Chesapeake Bay Island Restoration Study was the result of an extensive planning process. Project alternatives were formulated to identify specific ways to achieve planning objectives within constraints and, thereby, to solve the problems and realize the opportunities that were identified as part of the project scoping process. A range of alternative plans was identified at the beginning of the planning process and screened and refined in subsequent iterations. The development, refinement, and selection of project alternatives followed Corps guidance and integrated recommendations from USACE-Baltimore, Maryland Port Administration (MPA) (the non-Federal sponsor), resource agencies, and the project delivery team (PDT). The following sections summarize the plan formulation process; the engineering and environmental factors considered; the methodologies used to evaluate, rank, and screen out alternatives; and the selection of the recommended plan.

B.1 POLICY GUIDANCE

Planning for Federal water resources projects constructed by the USACE is based on The Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (the Principles and Guidelines) (USWRC, 1983). The USACE Planning Guidance Notebook (ER 1105-2-100), which incorporates the Principles and Guidelines, provides the overall direction by which USACE Civil Works projects are formulated, evaluated, and selected for implementation.

Ecosystem restoration is a primary mission of the Corps' Civil Works program. The Corps' objective in ecosystem restoration planning is to contribute to national ecosystem restoration (NER) by increasing the net quantity and/or quality of desired ecosystem resources. Measurement of NER is based on improvements to habitat quality and/or quantity, and the benefits of ecosystem restoration projects can be quantified using acres, habitat units, or indexes (not monetary units). Ecosystem restoration plans are formulated and evaluated in terms of their net contributions to increases in ecosystem value (NER outputs).

The intent of the Mid-Chesapeake Bay Island Ecosystem Restoration study was to meet the NER objective by identifying island restoration opportunities. However, the beneficial use of dredged material also contributes to national economic development (NED), because it addresses federal channel maintenance requirements within the Chesapeake Bay. The alternative plans were formulated to assure that they would meet the dredged placement capacity needs outlined in the Federal Dredged Material Management Plan, DMMP, (USACE, 2005), in accordance with Corps guidance on beneficial use of dredged material projects.

To meet the NER and NED objectives, the Mid-Chesapeake Bay Island Ecosystem Restoration study followed a process that integrated the NEPA process into the USACE's six-step planning process (ER 1105-2-100), as described below:

Step 1: Identify problems and opportunities (project scoping)
Step 2: Inventory and forecast conditions
Step 3: Formulate alternative plans
Step 4: Evaluate alternative plans
Step 5: Compare alternatives (impacts analysis)
Step 6: Select and describe the recommended plan

It is important to note that the steps in the planning process usually occur iteratively, and sometimes concurrently, to formulate efficient, effective, complete, and acceptable alternative plans.

B.2 RECOMMENDATIONS OF THE FEDERAL AND STATE DREDGEDMATERIAL MANAGEMENT PROCESSES

The USACE-Baltimore District's and State of Maryland's DMMP processes both have similar goals of identifying suitable placement sites to contain dredged material from the Federal, State, and local non-Federal channels over at least the next 20 years. The close coordination between USACE-Baltimore District and the State has been essential in developing a comprehensive program for the Port of Baltimore, providing cost effective dredging and placement operations, and protecting, conserving, and restoring coastal resources.

B.2.1 Federal DMMP

The Corps' ER 1105-2-100 (22 April 2000) mandates that Corps' Districts develop a dredged material management plan (DMMP) for all Federal harbor projects where there is an indication of insufficient placement capacity to accommodate maintenance dredging for the next 20 years. The DMMP is a planning document that ensures maintenance-dredging activities are performed in an environmentally acceptable manner, use sound engineering techniques, and are economically warranted. A DMMP was prepared by the Baltimore District that covered the dredging of the channels from the mouth of the Chesapeake Bay in Virginia to and including the Port of Baltimore and the southern approach channels to the C&D Canal as far north as the Sassafras River (USACE, 2005).

The purpose of the Federal DMMP was to identify, evaluate, screen, and recommend dredged material management alternatives so that dredging and placement operations could be conducted in a timely, environmentally sensitive, and cost-effective manner. Based on the evaluation of remaining capacity in existing placement sites, the Federal DMMP identified the need for an additional 40 mcy of additional placement capacity for dredged material from the Upper Chesapeake Bay Approach Channels, including the southern approach channels to the C&D Canal, within the next 20 years (USACE, 2005). Five of the seven alternatives selected as the recommended plan to meet the 20-year dredged material capacity needs of the Port of Baltimore were applicable to dredged material placement for the Upper Chesapeake Bay Approach Channels:

- Large Island Restoration – Middle Chesapeake Bay
- Poplar Island Environmental Restoration Project (PIERP) Expansion

- Optimized use of existing dredged material management sites in Maryland, including PIERP, Pooles Island Open Water Site, Hart-Miller Dredged Material Containment Facility, and Cox Creek Dredged Material Containment Facility.
- Wetland Restoration – Dorchester County
- Continue to work with the State of Maryland to investigate innovative use alternatives

One of the seven recommendations of the Federal DMMP was to identify a large island restoration project in the Mid-Chesapeake Bay region (USACE, 2005). Based on the analysis, the Federal DMMP also concluded that only large island restoration (islands whose historic acreage was greater than 200 acres), could cost-effectively accommodate the needed dredged material placement capacity (USACE, 2005). This size criterion (greater than 200 ac) was used in the initial screening process to identify potential island restoration sites in the Mid-Chesapeake Bay region.

B.2.2 State of Maryland DMMP

The Dredged Material Management Program for MPA (State of Maryland DMMP) is a comprehensive process used to establish long-term dredging placement plans and to identify potential new placement sites. The State of Maryland's DMMP program is an on-going process that continuously reevaluates dredging options in response to changes in the short- and long-term dredging requirements.

A subset of highly ranked potential placement sites was identified and taken through a series of conceptual, pre-feasibility, and feasibility studies to examine environmental, engineering, geotechnical, and social considerations and constraints for each site. Technical experts involved in Bay Enhancement Working Group (BEWG) developed a matrix to evaluate positive and negative environmental impacts for each option. A total of 52 environmental factors were identified and used to rank the 28 options identified as potential placement sites. The screening process developed by the BEWG was used utilized in the island restoration site selection process, and is further described in Section B.5. Potential placement sites were screened using five sorting variables – (1) environmental screening, (2) the year the placement site would become available, (3) annual capacity of the placement site, (4) capacity through 2022, and (5) unit cost. Based on the results of the screening process, sites were next prioritized (high priority, low priority, or not feasible), and additional studies were conducted (or are on-going) as needed.

As of 2004, the State of Maryland's DMMP Executive Committee recommendations for dredged material from the open bay channels were (DMMP, 2004):

- Mid-Bay Island Restoration - Conclude the USACE feasibility study of restoring James Island and Barren Island, both located off of Dorchester County, Maryland.

- Poplar Island Re-Evaluation - Conclude the USACE feasibility study of expanding, through dike raising and/or lateral expansion, the PIERP off of Talbot County, Maryland.

B.2.3 **Recommendation for the Mid-Chesapeake Bay Island Restoration Study**

Both the Federal and State DMMP processes recommended that large island restoration in the Mid-Chesapeake Bay region as one alternative to offset the projected dredged material placement capacity shortfall (USACE, 2005; DMMP, 2004). Therefore, USACE-Baltimore District and MPA initiated this Integrated Feasibility Report and Environmental Impact Statement (EIS) to determine the most appropriate location for a large island restoration project in the Mid-Chesapeake Bay region.

B.3 GOALS, OBJECTIVES, AND CONSTRAINTS

Goals, objectives, and constraints for the Mid-Chesapeake Bay Island Restoration Study were developed by the PDT, which consisted of the USACE-Baltimore District team and representatives from the MPA and natural resource agencies at the State and Federal level.

B.3.1 Project Goal

The goal of the Mid-Chesapeake Bay Island Restoration Study was to restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.

B.3.2 Project Objectives

Planning objectives are statements that describe the desired results of the planning process by solving the problems and taking advantage of the opportunities identified. The Mid-Chesapeake Bay Island study had seven primary objectives:

1) Restore and protect marsh, aquatic, and terrestrial island habitat for fish, reptiles, amphibians, birds, and mammals;
2) Protect existing island ecosystems, including sheltered embayments to prevent further loss of island habitat;
3) Provide capacity for placement of dredged material (3.2 mcy/yr) (The Federal DMMP identified a need to place 30 to 70 million cubic yards of material over a 20 year period);
4) Increase wetlands acreage in the Chesapeake Bay watershed to assist in meeting the Chesapeake 2000 Agreement (C2K) goals (CBP, 2000);
5) Decrease local erosion and turbidity;
6) Promote conditions to establish and protect submerged aquatic vegetation; and
7) Promote conditions that support oyster recolonization.

B.3.3 Project Constraints

Constraints are restrictions that limit the planning process. Constraints that need to be considered include resource constraints, including focused value judgments over what environmental, fishery, and social impacts would be acceptable/unacceptable, and legal and policy constraints. Resource constraints are those associated with limits on knowledge, expertise, experience,

ability, data, information, money and time. Legal and policy constraints are those defined by law, Corps policy and guidance.

A number of environmental, engineering, and legal constraints were considered by the PDT based on recommendations of the Federal DMMP, results of reconnaissance studies at selected project sites, and lessons learned from the Poplar Island Environmental Restoration Project (PIERP), but the following four constraints were initially identified as the most critical in evaluating the feasibility of the recommended plan:

1) Minimize impacts to existing fisheries nursery, feeding, and protective habitats;
2) Minimize impacts to rare, threatened, and endangered species and their habitat;
3) Minimize impacts to existing commercial fisheries; and
4) Minimize establishment of invasive species to maximum extent possible.

B.4 ALTERNATIVES FORMULATION AND SCREENING

Alternative plans are formulated to identify specific ways to achieve planning objectives within constraints and, thereby, to solve the problems and realize the opportunities that were previously identified. The purpose of the screening process is to eliminate options that do not meet the goals and objectives of the study or cannot be built within the socioeconomic, engineering, environmental, legal/policy, and agency constraints.

The plan formulation process for the Mid-Chesapeake Bay Islands Restoration Study had two primary phases, both of which included various ranking, scoring, and screening processes. First, potential locations that would be suitable for a large island restoration project that would meet the project objectives of habitat restoration and dredged material capacity were identified. Once a potential site (or sites) was identified, feasible alternative alignments were developed to meet the engineering and environmental design constraints. The development, screening, and selection of the alternatives considered during this second phase of the Mid-Chesapeake Bay Islands Restoration Study involved multiple analysis tools, including:

1) Geographic information system (GIS) analysis,
2) Engineering and design suitability screening,
3) Environmental benefits determination,
4) Cost effectiveness/incremental cost analysis, and
5) Input from resource agencies.

Evaluation of the alignments during the plan formulation process included consideration of environmental resources, cultural resources, real estate, engineering factors, agency comments, and public input. The following sections describe the plan formulation process and the methodologies used to evaluate, rank, and screen out alternatives.

B.5 ISLAND RESTORATION SITE SELECTION

The process to select a site for large island restoration had two components: 1) identify all potential locations for a large island restoration project within the study area, and 2) rank these sites using criteria that would eliminate sites not feasible for large island restoration.

B.5.1 Identifying Potential Sites

To identify potential locations for a large island restoration project within the Mid-Chesapeake Bay study area, the Maryland State Archives database island database (2002) was used. There were a total of 105 named islands identified within the study area, which were initially screened using best professional judgment, existing technical information, and the following screening criteria:

1) Maximize restoration potential based on conclusion of Federal DMMP that only large island restoration can cost-effectively accommodate the needed dredged material placement capacity;
2) Must have convenient shoreline access for staging areas;
3) Must not unduly interfere with existing navigation;
4) Minimize hydraulic impacts to environmentally sensitive areas;
5) Minimize shoreline impacts (e.g. increased sedimentation or erosion);
6) Minimize shallow water impacts [submerged aquatic vegetation (SAV), fishing habitat];
7) Avoid potential unexploded ordnances (UXO's);
8) Must not be part of an existing USACE or MPA project or study;
9) Avoid major population centers;
10) Whether support must be acquired from landowners for islands that are currently State or Federally managed as a wildlife area;
11) Must be within authorized study area; and
12) Island location is known and available on recent maps.

This initial screening eliminated 83 of the 105 islands, leaving 22 eligible islands for restoration (Table B-1). Two additional islands, Clay and Sandy Islands (both located in Dorchester County), were eliminated based on MDNR's conclusion that restoration of these islands would not be significantly beneficial to migrating waterbirds. The 20 remaining islands were combined into eight island/island complexes based on their historic inclusion as larger complexes (archipelagos). Therefore, a total of eight sites (islands or island complexes) - James, Ragged, Little Deal, Barren (two islands), Holland (four islands), Hoopers (four islands), Smith (four islands), and South Marsh (three islands) - were carried forward into the island ranking process.

Table B-1. Initial Screening of Island Complexes

No.	Island/Location (County)	Limited Restoration Potential (Area < 200 ac)	Shoreline Access for Staging Area	Navigation Impacts	Hydraulics Impacts	Shoreline Impacts	Shallow Water	Unexploded Ordnance (UXO)	Other USACE /MPA Initiatives	Population Center	Managed Area/No interest stated	Out of Study Area	No Current Location
	DORCHESTER COUNTY												
1	Adam Island, Holland Straits – Bloodsworth Complex							X					
2	Asquith Island, Honga River	X								X			
3	Axies Island, Nanticoke River	X			X								
4	Barren Island, Chesapeake Bay												
5	Bettys Island, Blackwater River		X										
6	Billys Island, Honga River							X					
7	Bloodsworth Island, Chesapeake Bay							X					
8	Bull Point Island, Meekins Creek		X										
9	Cattail Island, Chesapeake Bay	X											
10	Chance Island, Transquaking River		X										
11	Cherry Island, Little Choptank River	X	X										
12	Clay Island, Fishing Bay												
13	Dunnock Island, Dunnock Slough	X	X										
14	Elliott Island, Fishing Bay	X				X							
15	Grays Island, Fishing Bay	X											
16	Gunners Island, Chesapeake Bay		X										
17	Hog Island, Hoopers Straits					X							
18	Holland Island, Chesapeake Bay												
19	Hoopers Island, Chesapeake Bay												
20	James Island, Chesapeake Bay												
21	Jenny Island, Chesapeake Bay	X											
22	Langrells Island, Nanticoke River		X										
23	Long Island, Chesapeake Bay Holland Complex												
24	Lower Hoopers Island, Chesapeake Bay -Hoopers Complex												

Table B-1. (continued)

No.	Island/Location (County)	Limited Restoration Potential (Area < 200 ac)	Shoreline Access for Staging Area	Navigation Impacts	Hydraulics Impacts	Shoreline Impacts	Shallow Water	Unexploded Ordnance (UXO)	Other USACE /MPA Initiatives	Population Center	Managed Area/No interest stated	Out of Study Area	No Current Location
25	Middle Hoopers Island, Chesapeake Bay - Hoopers Complex												
26	Northeast Island, Chesapeake Bay							X					
27	Opossum Island, Tar Bay - Barren Island Complex												
28	Pone Island, Chesapeake Bay -Bloodsworth Complex							X					
29	Poplar Island, Fishing Bay	X											
30	Pot Island, Honga River	X	X										
31	Punch Island, Chesapeake Bay	X	X							X			
32	Ragged Island, Little Choptank River												
33	Rowland Island, Blackwater River		X										
34	Sandy Island, Nanticoke River												
35	Sharpes Island, Chesapeake Bay											X	
36	Snake Island, Fishing Bay		X				X						
37	Spriggs Island, Blackwater River		X										
38	Spring Island, Holland Straits - Holland Complex												
39	Stingaree Island, Blackwater River		X										
40	Swan Island, Chesapeake Bay - Holland Complex												
41	Taylors Island, Chesapeake Bay					X							
42	Upper Hoopers Island, Chesapeake Bay - Hoopers Island Complex												
43	Woods Island, Blackwater River		X										
44	Woolford Island, Parsons Creek	X			X								
45	Wroten Island, Honga River	X	X										
	KENT COUNTY												
46	Cacaway Island, Langford Bay	X	X										

Table B-1. (continued)

No.	Island/Location (County)	Limited Restoration Potential (Area < 200 ac)	Shoreline Access for Staging Area	Navigation Impacts	Hydraulics Impacts	Shoreline Impacts	Shallow Water	Unexploded Ordnance (UXO)	Other USACE /MPA Initiatives	Population Center	Managed Area/No interest stated	Out of Study Area	No Current Location
47	Chase Island, Chester River	X	X				X						
48	Cockey Island, Chester River - Eastern Neck Complex	X				X							
49	Eastern Neck Island, Chesapeake Bay					X			X				
50	Little Neck Island, Chesapeake Bay	X			X								
51	Millers Island, Chester River	X											
52	Pooles Island, Chesapeake Bay											X	
53	Rush Island, Chesapeake Bay - Eastern Neck Complex	X		X	X								
	QUEEN ANNE'S COUNTY												
54	Bodkin Island, Eastern Bay	X											
55	Carpenter Island, Chester River	X			X								
56	DeCoursey Island, Wye River	X	X										
57	Herring Island, Eastern Bay												X
58	Hog Island, Prospect Bay	X											
59	Johnson Island, Crab Alley Bay	X			X								
60	Kent Island, Chesapeake Bay									X			
61	Little Island, Crab Alley Bay	X											
62	Long Marsh Island, Eastern Bay	X											
63	Parson Island, Eastern Bay	X							X				
64	Philpots Island, Eastern Bay	X			X					X			
65	Wye Island, Wye River	X											
	SOMERSET COUNTY												
66	Ballards Island	X											
67	Big Island, Tangier Sound	X	X		X		X						
68	Boat Island, Chesapeake Bay	X	X		X								
69	Deal Island, Tangier Sound									X			

Table B-1. (continued)

No.	Island/Location (County)	Limited Restoration Potential (Area < 200 ac)	Shoreline Access for Staging Area	Navigation Impacts	Hydraulics Impacts	Shoreline Impacts	Shallow Water	Unexploded Ordnance (UXO)	Other USACE /MPA Initiatives	Population Center	Managed Area/No interest stated	Out of Study Area	No Current Location
70	Deep Banks Island, Holland Straits - South Marsh Complex												
71	Fishing Island, Manokin River	X	X		X								
72	Gab Island, Chesapeake Bay												X
73	Hog Neck Island, Chesapeake Bay												X
74	Horse Hammock, Tangier Sound - Smith Island Complex												
75	House Island, Tangier Sound												X
76	Janes Island, Chesapeake Bay										X		
77	Jersey Island, Little Annemessex River	X			X					X			
78	Little Deal Island, Tangier Sound												
79	Little Troy Island, Chesapeake Bay												X
80	Maddox Island, Manokin River	X	X		X								
81	Monie Island	X											
82	Otter Island, Tangier Sound - Smith Island Complex												
83	Piney Island, Manokin River - Smith Island Complex												
84	Pry Island - South Marsh Complex												
85	St. Pierre Island, Manokin River	X											
86	Smith Island, Chesapeake Bay								X				
87	Solomons Lump, Kedges Straits - Smith Island Complex												
88	South Marsh Island, Chesapeake Bay												
89	Swan Island, Chesapeake Bay		X										
90	Troy Island, Chesapeake Bay		X										
91	Turtle Egg Island, Holland Straits												X
92	Western Islands, Kedges Straits - South Marsh Complex												

Table B-1. (continued)

No.	Island/Location (County)	Limited Restoration Potential (Area < 200 ac)	Shoreline Access for Staging Area	Navigation Impacts	Hydraulics Impacts	Shoreline Impacts	Shallow Water	Unexploded Ordnance (UXO)	Other USACE /MPA Initiatives	Population Center	Managed Area/No interest stated	Out of Study Area	No Current Location
	TALBOT COUNTY												
93	Avalon Island, Harris Creek	X											
94	Bruffs Island, Wye River	X		X			X						
95	Coaches Neck Island, Chesapeake Bay - Poplar Island Complex								X				
96	Goat Island, Chesapeake Bay	X				X							
97	Hambleton Island, Broad Creek	X			X								
98	Herring Island, Miles River												X
99	Jefferson Island, Chesapeake Bay - Poplar Island Complex								X				
100	Nelson Island, Choptank River	X											
101	Poplar Island, Chesapeake Bay								X				
102	Royston Island, Choptank River	X											
103	Sharps Island, Chesapeake Bay												
104	Tilghman Island, Chesapeake Bay					X				X			
	WICOMICO COUNTY												
105	Round Island, Nanticoke River	X	X		X								

Key
Selected main island
Selected island as part of main island complex

B.5.2 Site Ranking and Screening

Engineering and environmental criteria were used to rank the remaining eight island/island complexes, with the ultimate goal of choosing the top one or two islands/island complexes for detailed plan formulation and evaluation.

B.5.2.a Engineering Suitability

The engineering criteria identified those islands/island complexes that are physically best suited for restoration. A total of ten engineering criteria, many based on lessons learned in the design and construction of the PIERP, were used to evaluate the eight island/island complexes (Table B-2):

- Possible Total Restoration Size. Increased project size allows greater operational efficiency because dredged material can be spread out over a larger area in thinner lifts. Sites with less than 300 acres do not meet this requirement, sites from 300 and 700 acres marginally satisfy this requirement, areas between 700 and 1000 acres should fully satisfy the requirements, and areas over 1000 acres exceed the requirements.

- Possible Dredged Material Capacity. The dredged material capacity must satisfy minimum annual placement needs and provide a project life that will alleviate cell overloading. The site must be capable of accommodating annual dredged material placement of 3.2 mcy for most of the project life without overloading wetland cells and with minimal overloading of upland cells. The total site acreage required to satisfy this requirement will vary depending on the proportion of upland to wetland areas, and the required project life.

- Dike Foundation Material. The cost of the containment dikes will be affected by the foundation material. The most favorable material consists of sand with minor silt or clay content. Good materials include silty or clayey sand, or stiff clay materials with high shear strength and low compressibility characteristics. Poor foundations include very soft clay and silt materials where both shear strength and compressibility are unacceptable.

- Borrow Material Location, Quantity and Quality. The project containment dikes will be constructed using sand obtained from borrow sources on the Bay bottom within or near the project site to minimize costs associated with transport. It is desirable to obtain all materials required for construction of the containment dikes from borrow sites within the footprint of the project or from the access channel required to deliver dredged material to the completed project to minimize the amount of the Bay bottom that is disturbed as a result of the borrow material dredging.

- In addition to the location of borrow materials, the project cost is affected by the quantity and quality of materials available for dike construction. Minimum cost is associated with borrow sources that consist of clean sand (less than 30 percent silt and clay fines) and provide at least twice the quantity required for the project dikes. Where sand sources are located beneath a layer of silt or clay materials, cost for recovery of those materials increases and the rating is adjusted downward accordingly.

- Depth of Water Beneath Site. The depth of water affects the construction cost for the containment dikes and the available placement capacity. Depths between 8 and 10 ft below MLLW are considered ideal. Depths greater than 10-ft increase the cost of dike construction and armor stone placement (because of the trapezoidal shape of the dikes) even though the site capacity increases. Depths less than 5-ft could also increase the cost of stone placement if there is a need to dredge an access channel along the exterior toe of the dike to accommodate the draft of the loaded stone barges. Decreasing the quantity of stone per barge (light loading) to accommodate depths less than 5-ft would also increase the cost of stone placement because it would increase the overall number of barge trips.

- Length of Access Channel. Placement of dredged material within the site requires an access channel between deeper water (elevation –25 ft MLLW) and the project. The costs of the initial construction and the maintenance of the channel are directly proportional to the channel length.

- Mean Tidal Range. The mean tidal range at a site is an important characteristic in determining the potential to maintain tidal exchange and circulation within contstructed wetland cells.

- Armor Stone Size. The largest component of the initial construction cost is associated with the armor stone used to protect the submerged portion of the sand perimeter dike from erosion and wave activity. Larger stone size results in greater stone quantities associated with greater armor thickness. The required stone size is associated with the exposure to greater wave energy, which is governed by the depth of water, fetch, and orientation of the dike alignment relative to dominant wind directions.

- Dredged Material Hauling Distance. The distance between the location of the dredging and the placement site will have a direct affect on the costs associated with transport of the dredged material. With increased distance from the point of dredging, costs increase to account for the longer duration of each barge trip and greater number of barges required to efficiently transport the material.

- Possibility of Finding Unexploded Ordnance (UXO). Based on the historical use of some island sites, there is the potential that UXO is still present at some sites. Sites where there is the potential for the presence of UXO will have potential design constraints and higher costs associated with preliminary site surveys and the removal of any UXO.

The engineering criteria do not all carry the same level of importance. Those factors associated with the source and quality of borrow materials for dike construction are critical with respect to initial construction cost and potential environmental impacts. Therefore, each criterion was ranked on a scale of 1 (least important) to 4 (most important) in the following order: possible capacity (4); hauling distance (3); possible restoration size (2); borrow material found on site (2); foundation material (2); depth of water at the site (2); access channel length (2); mean tidal range (1); possibility of finding UXO (1); and armor stone size (1) (Table B-2).

Table B-2: Screening Criteria to Determine Engineering Suitability for Island Restoration

Criteria	Description	Ranking	Weighted Factor
Possible restoration size (ac)	<300	0	2
	300-700	2	
	700-1,000	4	
	1,000-2,000	5	
Possible capacity (mcy)	< 10	0	4
	11-20	1	
	21-30	2	
	31-40	3	
	41-50	4	
	>50	5	
Foundation material	Soft silt/clay	0	2
	Medium silt/sand	3	
	Stiff lay or silty sand	4	
	Sand	5	
Borrow material found on site (should be sand)	Clay or silt	0	2
	Covered sand	3	
	Sand	5	
Depth of site range (should be 8-10 ft)	<5	0	2
	5-8	2	
	8-10	5	
	10-12	2	
	>12	0	
Length of access channel (mi)	< 0.5	5	2
	0.5-1	3	
	1-2	1	
	>2	0	
Mean Tidal Range (ft)	<1	0	1
	1-1.5	3	
	>1.5	5	
Stone size (lbs)	<1,500	5	1
	1,500-3,000	3	
	>3,000	1	
Hauling Distance (mi)	<30	5	3
	31-40	4	
	41-60	3	
	61-70	2	
	>70	0	
Possibility of finding UXO	Yes	0	1
	Potential	3	
	No	5	

Tables B-3 and B-4 summarize the scoring, weighting, and ranking of the alignments for engineering suitability. (See Appendix C for more detailed explanations of the criteria, the scoring of the alignments, and the weighting of the criteria). The final ranking of island/island complexes (highest to lowest score), based on engineering suitability, was: James (77), Barren (74), Hoopers (49), Ragged (49), Holland (49), Smith (45), South Marsh (39), and Little Deal (29). As indicated by the results, James Island and Barren Island both ranked well above the other potential sites.

Table B-3. Engineering Suitability Scores for Smith, Little Deal, James, and Barren Island Alternatives

		SMITH			LITTLE DEAL			JAMES			BARREN		
Criterion	**Weighting Factor**	**Data**	**Raw Score***	**Weighted Score**	**Data**	**Raw Score***	**Weighted Score**	**Data**	**Raw Score***	**Weighted Score**	**Data**	**Raw Score***	**Weighted Score**
Possible Restoration Size (ac)	2	800-1000	4	8	400-500	2	4	978-2,200	5	10	700-1,000	4	8
Possible Capacity (mcy)	4	22-28	2	8	7.5-9	0	0	36-79	4	16	30-40	3	12
Dike Foundation Material	2	Silty-sand (good)	4	8	Assume Holland	3	6	Silty-sand (good)	4	8	Silty-sand (excellent)	5	10
Borrow Material on Site	2	Good	4	8	Assume Holland	3	6	Good	4	8	Excellent	5	10
Range of Water Depth (mean) (ft)	2	0-5 (3)	0	0	0-6 (3)	0	0	3-12 (6)	3	6	0-10 (6)	3	6
Length of Access Channel (mi)	2	3	0	0	1-2	1	2	<0.5	4	8	<0.5	4	8
Water Levels ***Mean Tidal Range (ft)*** ***Storm Surge, 35 yr/100yr (ft)***	1	1.6 5.8	5	5	1-1.2 5.7 / 7.4	3	3	1.2-1.6 (1.4) 4.5 / 5.6	3	3	1.4 4.1 / 5.4	3	3
Armor Stone Size (lb)	1	Assume Holland	3	3	Assume Holland	3	3	700-5,000	1	1	2,600-3,000	3	3
Distance to Haul (mi)	3	>75	0	0	>75	0	0	40	4	12	55	3	9
Possible UXO	1	no	5	5	no	5	5	no	5	5	no	5	5
Total Weighted Score				**45**			**29**			**77**			**74**
Ranking				**6**			**8**			**1**			**2**

** scores range from 1 to 5, with 5 indicating the optimal conditions for a given criterion*
Field surveys were conducted at Holland, James, and Barren Islands. "assume Holland, etc. indicates that conditions were assumed to be the same as those at an island where a field survey was conducted.

Table B-4. Engineering Suitability Scores for Holland, South Marsh, Hoopers, and Ragged Island Alternatives

		HOLLAND			SOUTH MARSH			HOOPERS			RAGGED		
Criterion	**Weighting Factor**	**Data**	**Raw Score***	**Weighted Score**	**Data**	**Raw Score***	**Weighted Score**	**Data**	**Raw Score***	**Weighted Score**	**Data**	**Raw Score***	**Weighted Score**
Possible Restoration Size (ac)	2	930-1,639	4	8	300-900	3	6	700-1,000	4	8	400-500	2	4
Possible Capacity (mcy)	4	26-46	3	12	Assume Holland	2	8	Probably 20-30	2	8	8-9	0	0
Dike Foundation Material	2	Silty - sand (fair)	3	6	Assume Holland	3	6	Assume Barren	4	8	Assume James	4	8
Borrow Material on Site	2	Fair / mixed	3	6	Assume Holland	3	6	Assume Barren	4	8	Assume James	4	8
Range of Water Depth (mean) (ft)	2	0-11 (4)	2	4	1-6 (3)	0	0	3-5 (4)	0	0	1-4 (2)	0	0
Length of Access Channel (mi)	2	3	0	0	>3	0	0	>2	0	0	0.5-1	3	6
Water Levels ***Mean Tidal Range (ft)*** ***Storm Surge, 35 yr/100yr (ft)***	1	1.9 6.0 / 6.8	5	5	Assume Holland	5	5	Assume Barren	3	6	Assume James	3	6
Armor Stone Size (lb)	1	300-3,000	3	3	Assume Holland	3	3	Assume Barren	3	3	Assume James	3	3
Distance to Haul (mi)	3	70	0	0	73	0	0	68	2	6	40	4	12
Possible UXO	1	no	5	5	no	5	5	no	5	5	no	5	5
Total Weighted Score				**49**			**39**			**49**			**49**
Ranking				**5**			**7**			**3**			**4**

** scores range from 1 to 5, with 5 indicating the optimal conditions for a given criterion*
Field surveys were conducted at Holland, James, and Barren Islands. "assume Holland, etc. indicates that conditions were assumed to be the same as those at an island where a field survey was conducted.

B.5.2.b Environmental Suitability

The environmental ranking process used in the State DMMP process evaluated a total of 28 sites for dredged material placement, six of which were options for island restoration - James Island, Barren Island, Lower Eastern Neck Island, Holland Island, Parsons Island, and Sharps Island. Therefore, the results of the environmental ranking method developed by the BEWG as part of the State DMMP process were used to compare the environmental suitability of the three island/island complexes included in the evaluation (Barren, James, and Holland Islands).

The BEWG environmental impact criteria consisted of 52 parameters related to the environmental suitability of proposed placement options (Table B-5). The parameters were divided into ten categories based upon similar attributes: 1) water quality, 2) shallow water habitat, 3) wetlands, 4) aquatic biology, 5) rare/threatened/endangered species, 6) waterbirds, 7) terrestrial, 8) physical parameters, 9) human use attributes, and 10) beneficial attributes. The BEWG then assigned each parameter a weighting factor based upon the consensus of the group. To evaluate alternatives each parameter was assigned a raw score of +1 (potential positive impact), 0 (neutral impact), or -1 (potential negative impact) for each alternative based upon existing data and historical information, as well as the collective experience and knowledge of the BEWG and the technical study team (Attachment A). Placement options were ranked from highest (most environmentally suitable) to lowest (least environmentally suitable) based on the final normalized score of the 52 factors. The total scores were normalized by dividing by the number of applicable parameters for that option so that options are not unduly (positively) weighted for resources that cannot exist at the option. The normalized scores were for relative comparison among the options, and a positive or negative score did not indicate that an option had an overall positive or negative impact.

Results of the BEWG ranking for all sites considered are presented in Attachment A. Of the 28 sites evaluated, the three islands/island complexes that overlapped with the list of potential sites for large island restoration in the Mid-Chesapeake Bay region (Barren, James, and Holland Islands) ranked highly as potential alternatives (Table B-6). Therefore, both the engineering suitability and BEWG environmental ranking identified James and Barren Island as potential sites for large island restoration.

B.5.3 Public Input

A series of public scoping meetings was conducted in February and March 2003 (Appendix G, Public Involvement) to solicit input and get public feedback on the results of the engineering suitability and environmental ranking of the islands. Overall, the public preference was for island restoration at James and Barren Islands, with additional public support for Hoopers Island as a potential restoration site. Public comments from the meeting are provided in Appendix G, Attachment C.

B.5.4 Result of the Island Site Selection Process

Based on the engineering and environmental suitability analysis and public support, James and Barren Islands were selected for detailed alternatives development for the Mid-Chesapeake Bay Island Ecosystem Restoration Study. Hoopers, Ragged, Holland, Smith, South Marsh, and Little Deal Islands were each eliminated from further consideration because both James and Barren Islands had a substantially higher engineering suitability ranking and were both also

environmentally suitable for large island restoration (Table B-6). It should be noted that even though some sites were eliminated from further analysis during this feasibility study, it does not mean that there would not be benefits to implementing future improvements at those sites. Many of the island complexes that were not carried forward as alternatives in this feasibility study may be more appropriate for restoration projects that could be implemented at another time by other agencies represented on the BEWG.

Table B-5. Environmental Factors Considered in the State of Maryland's DMMP Screening Process

• Dissolved Oxygen	• Thermal Refuge	• CERCLA/UXO Potential
• Nutrient Enrichment	• Recreational Fishery	• Fossil Shell Mining
• Turbidity	• Protected Species	• Floodplains
• Salinity	• Habitat of Particular Concern	• Recreational Value
• Groundwater	• Waterfowl Use	• Aesthetics and Noise
• Benthic Community	• Wading and Shorebird Use	• Cultural Resources
• Shallow Water Habitat	• Wildlife Habitat	• Navigation
• Submerged Aquatic Vegetation	• Forests	• Beneficial Use – Wetlands
• Tidal Wetlands	• Streams	• Beneficial Use – Uplands
• Non-tidal Wetlands	• Lakes and Ponds	• Beneficial Use – Faunal
• Finfish Spawning Habitat	• Other Natural Avian Habitat	• Beneficial Use – Recreational Enhancement
• Finfish Rearing Habitat	• Toxic Contaminants	• Hydrodynamic Effects
• Larval Transport	• Substrate/Soil Characteristics	• Essential Fish Habitat
• Air Quality	• Public Health	• Infrastructure
• Socioeconomics – Commercial Income and Assets	• Public Safety	• Existing Land Use
• Socioeconomics – Residential Assets	• Environmental Justice	• Shoreline Protection
• Commercially Harvested Species and Habitat	• Prime or Unique Agricultural Land	• Beneficial Use – Adjacent Habitat Enhancement
• Noise		

Source: DMMP, 2002

Table B-6. Ranking of Mid-Chesapeake Bay Islands for Large Island Restoration

Option	Rank Based on Environmental Factors		Rank Based on Engineering Factors	
	BEWG Score	BEWG Overall Rank*	Mid-Bay Score	Mid-Bay Rank*
James Island	**2.2684**	**7**	**77**	**1**
Barren Island	**2.5500**	**4**	**74**	**2**
Hoopers Island	NA	NA	**49**	**3**
Ragged Island	NA	NA	**49**	**3**
Lower Eastern Neck Island	**2.2077**	**9**	NA	NA
Holland Island	**1.9270**	**10**	**47**	**4**
Smith Island	NA	NA	**45**	**5**
South Marsh	NA	NA	**39**	**6**
Little Deal Island	NA	NA	**29**	**7**
Parsons Island	**1.7158**	**12**	NA	NA
Sharps Island	**0.7710**	**25**	NA	NA

NA = not accessed using this method

B.6 IDENTIFYING POTENTIAL ALIGNMENTS USING GIS ANALYSIS

After James and Barren Islands were selected as the most feasible potential island restoration sites, preliminary alignments were proposed for each island based on the geotechnical and environmental information gathered during earlier reconnaissance studies conducted by MPA. Alignments vary in size, orientation, and boundary location. Preliminary alignments were developed to meet the following engineering and environmental design constraints:

B.6.1 Engineering Design Considerations

1) Dredged material construction sequencing (i.e. upland areas should be built over borrow areas);
2) Depth to substrate (the ideal water depth for perimeter dike construction with a toe dike is between 5-8 ft);
3) Substrate type (sandy substrate types acceptable for cell construction); and
4) Navigational limitations (i.e. Bay pilot staging area, military restrictions).

B.6.2 Environmental Design Considerations

1) Avoid Natural oyster bar (NOB) locations;
2) Avoid SAV locations;
3) Size of upland;
4) Size of wetland cells, and ratio of wetland types (high marsh vs. low marsh);
5) Amount of tidal gut or open water;

6) Island/hammock size;
7) Distance between islands/hammock; and
8) Distance of the project footprint from the existing island remnants.

For James Island, the reconnaissance study proposed five preliminary alignments, ranging in size from 979 to 2,202 acres (Figure B-1) (MPA, 2002b). For Barren Island, the reconnaissance study proposed two preliminary alignments - 1,000 and 2,000 acres (Figure B-2) (MPA, 2002a).

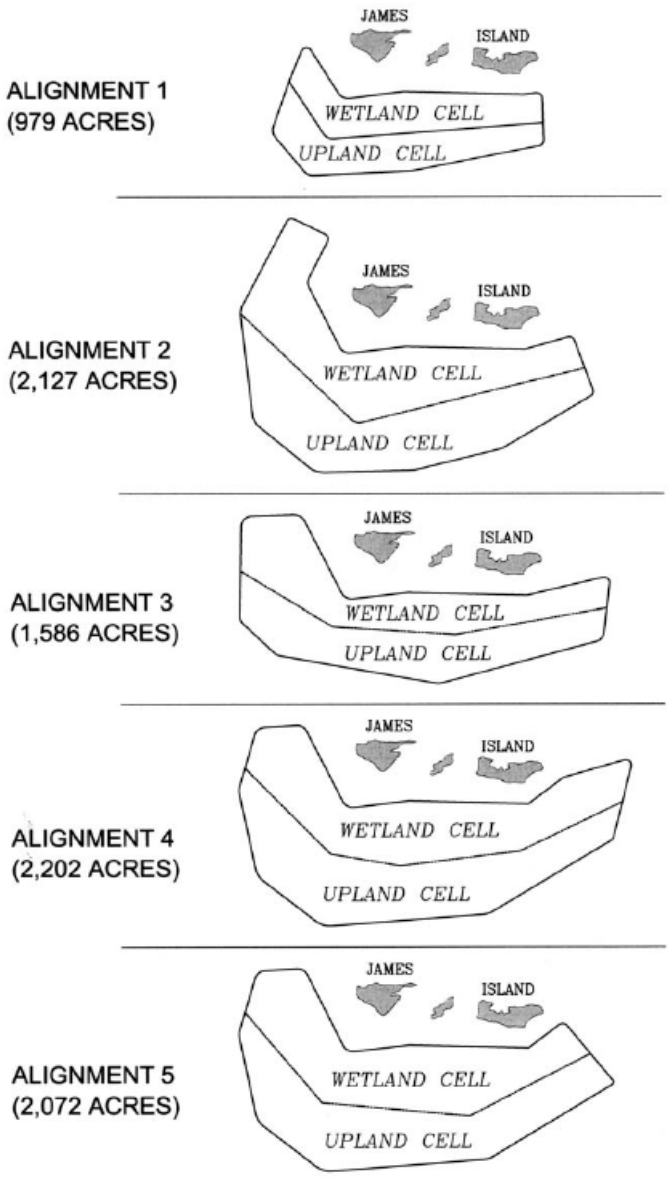


Figure B-1. Proposed Reconnaissance Level Alignments for James

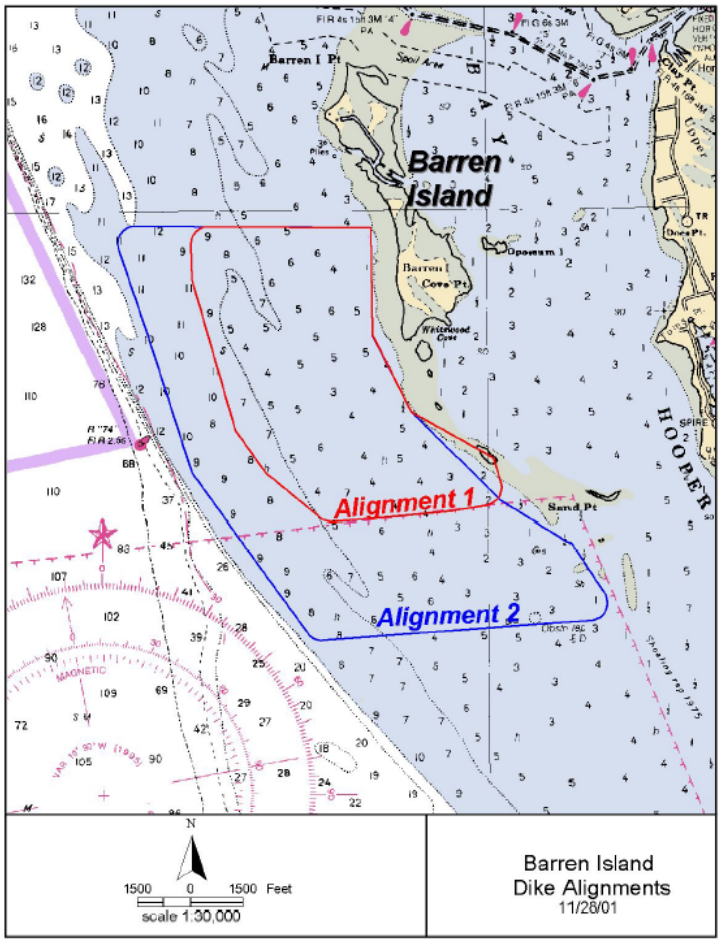


Figure B-2: Proposed Reconnaissance Level Alignments for Barren.

B.6.3 GIS Analysis and Development of Alignments

GIS analysis was then used to determine the optimal alignment locations at both at both James and Barren Islands. Eight equally weighted engineering and environmental factors were translated into GIS layers and mapped, resulting in composite assessment of the area in the vicinity of both sites. Criteria used to rank each factor are presented in Table B-7 and explained in the following sections.

B.6.3.a Proximity to existing island remnants.
Lessons learned at the PIERP indicated that the optimal separation between existing island remnants and the project footprint is approximately 250 to 500 ft. Smaller separations may restrict tidal flow and limit the establishment of certain desirable habitats. Wider separations could result in increased erosion from wave energy.

B.6.3.b Proximity to natural oyster bars (NOBs).
Construction activity in and around NOBs has the potential to negatively impact existing oyster habitat, because construction activity has the potential to increase local sedimentation. Locations further away from existing NOBs were deemed more optimal than locations within and directly

adjacent to the legally defined limits of NOBs. Current state regulations require a buffer of 500 yards from NOBs during dredging activities. However, the PDT agreed on a minimum distance of 500 ft between the NOB and the proposed toe dike because it is the current distance used at the PIERP and because the toe dike will not contain any dredged material.

B.6.3.c Presence of submerged aquatic vegetation (SAV).
SAV beds are a critical component of a healthy Chesapeake Bay. Any area within the limits of an existing SAV bed (as determined by the 2001 SAV survey conducted by the Virginia Institute of Marine Science) was specified as an unacceptable project location. Although there is substantial yearly variation in location and size, SAV beds were more expansive during 2001 than in any other recent year.

B.6.3.d Foundation material.
The cost of containment dikes and breakwaters for the various alternatives will be affected by the foundation conditions. Suitable conditions would include foundation material consisting of sand with minor silt or clay content, silty or clayey sand, and stiff clay materials with high shear strength and low compressibility characteristics. Unsuitable conditions would include very soft clay and silt materials where both shear strength and compressibility are unacceptable.

Table B-7. Ranking Criteria for the GIS Analysis

Criteria	Description	Ranking (0-10, with 10 being optimal)
Proximity to existing island remnants	<100’	0
	100-250’	2
	250-500’	10
	500-1,000’	7
	1,000-1,500’	2
	>1,500’	0
Proximity to natural oyster bars	within boundary	0
	within 500’ of boundary	5
	beyond 500’ of boundary	10
Presence of submerged aquatic vegetation	within bed	0
	outside of bed	10
Foundation material	Suitable	10
	unsuitable	0
Borrow material quality	unsuitable borrow	0
	suitable borrow of lower quality	5
	suitable borrow of higher quality	10
Constructability of a perimeter dike with a toe dike (based on water depth)	<2’ deep	2
	2-5’ deep	4
	5-8’ deep	10
	8-10’ deep	7
	10-12’ deep	4
	>12’ deep	0
Constructability of a perimeter dike without a toe dike (based on water depth)	<2’ deep	10
	2-5’ deep	5
	>5’ deep	0
Navigation restrictions	within a restricted area	0
	within a dredge spoil area	4
	in an unrestricted area	10

B.6.3.e Quality of on-site borrow material.
Project cost is affected by the quality of materials available for dike construction. Suitable borrow material includes material that consists of sand with less than 50 percent silt and clay fines. Higher quality borrow material has a smaller percentage of silt and clay fines than lower quality borrow. Unsuitable borrow consists of material containing more than 50 percent silt and clay fines**.**

B.6.3.f Constructability of a perimeter dike with a toe dike.
Project costs can be impacted by the difficulty of construction resulting from environmental conditions such as water depth. Lessons learned during the construction of the PIERP have shown that the optimal water depth for the construction of a perimeter dike with toe dike is between 5 and 8 ft.

B.6.3.g *Constructability of a perimeter dike without a toe dike.*
Lessons learned during the construction of the PIERP have shown that the optimal water depth for the construction of a perimeter dike without a toe dike is less than 2 feet. Construction of this type of dike becomes more difficult in water that is deeper than 2 feet. Perimeter dikes without a toe dike are generally used in sheltered areas (typically the eastern shoreline of restored islands) where smaller stone is used for armoring.

B.6.3.h Navigation restrictions.
Areas identified as restricted on nautical charts were determined to be unacceptable locations for the proposed project. Areas with unrestricted navigation were considered to be the most optimal location for the project. Historical dredged material placement areas were also deemed to be less than optimal since they may contain unsuitable foundation material. A historical dredged material placement area is located north of James Island, and therefore was avoided during consideration of the locations for potential alignments.

B.6.3.i Results of the GIS Analysis
The GIS data layers for each design consideration for Barren and James are included in Figures B-3 to B-10, and the composite suitability score for each island is presented in Figure B-11. The alignment shown in each figure is only shown to provide a spatial perspective. Those areas with an optimal ranking (shown in blue) were considered the ideal location for proposed alignments.

For James Island, the GIS analysis indicated that the area to the northwest of the existing island was the least suitable locations for an alignment footprint primarily based on the poor foundation material and limits imposed by the oyster bars located to the north and east of James Island (Figure B-4). The potential for suitable sand borrow material for dike construction is poor throughout the area, with the exception of an area to the north and northwest of James Island (Figure B-7), therefore, borrow material was not a significant limiting factor in the location of a potential alignment for at James Island. Additionally, the presence of SAV was not a limiting factor because small SAV beds are only found off the eastern shoreline of existing James Island (Figure B-5).

For Barren Island, the GIS analysis indicated that areas to the northeast and south of the existing island were the least suitable, primarily because of navigation restrictions and poor foundation

material (Figure B-10). Several other factors limited the location of potential alignments: areas to the northwest and southeast of Barren Island are restricted because of the existing NOBs (Figure B-4); areas east and southeast of the existing island have substantial SAV beds (Figure B-5); and the area southeast of the existing island had poor foundation material and poor sand borrow material for dike construction (Figures B-6 and B-7).

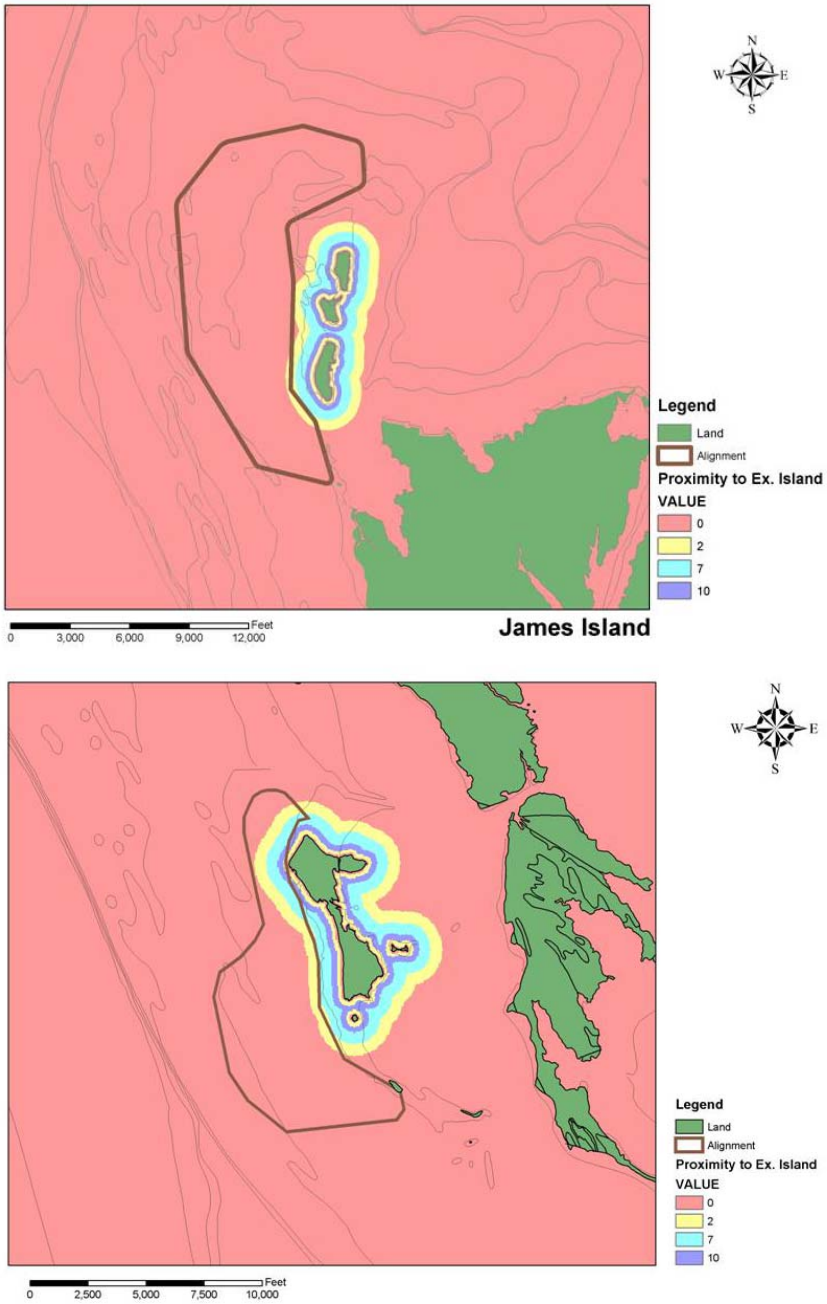


Figure B-3. Proximity of James (top) and Barren (bottom) Islands to Existing Island Remnants

Red indicated areas that were rated sub-optimal (0) for this component of the GIS analysis because they were located too far from the island (greater than 1,500 ft) to provide sufficient

shoreline protection. Blue indicated areas from 200 to 500 ft from the existing island remnants that were considered optimal (10) to provide adequate shoreline protection from erosion while maintaining tidal exchange. *(Alignments in the figures are generic representations of the project footprint, and are provided for spatial perspective only)*.

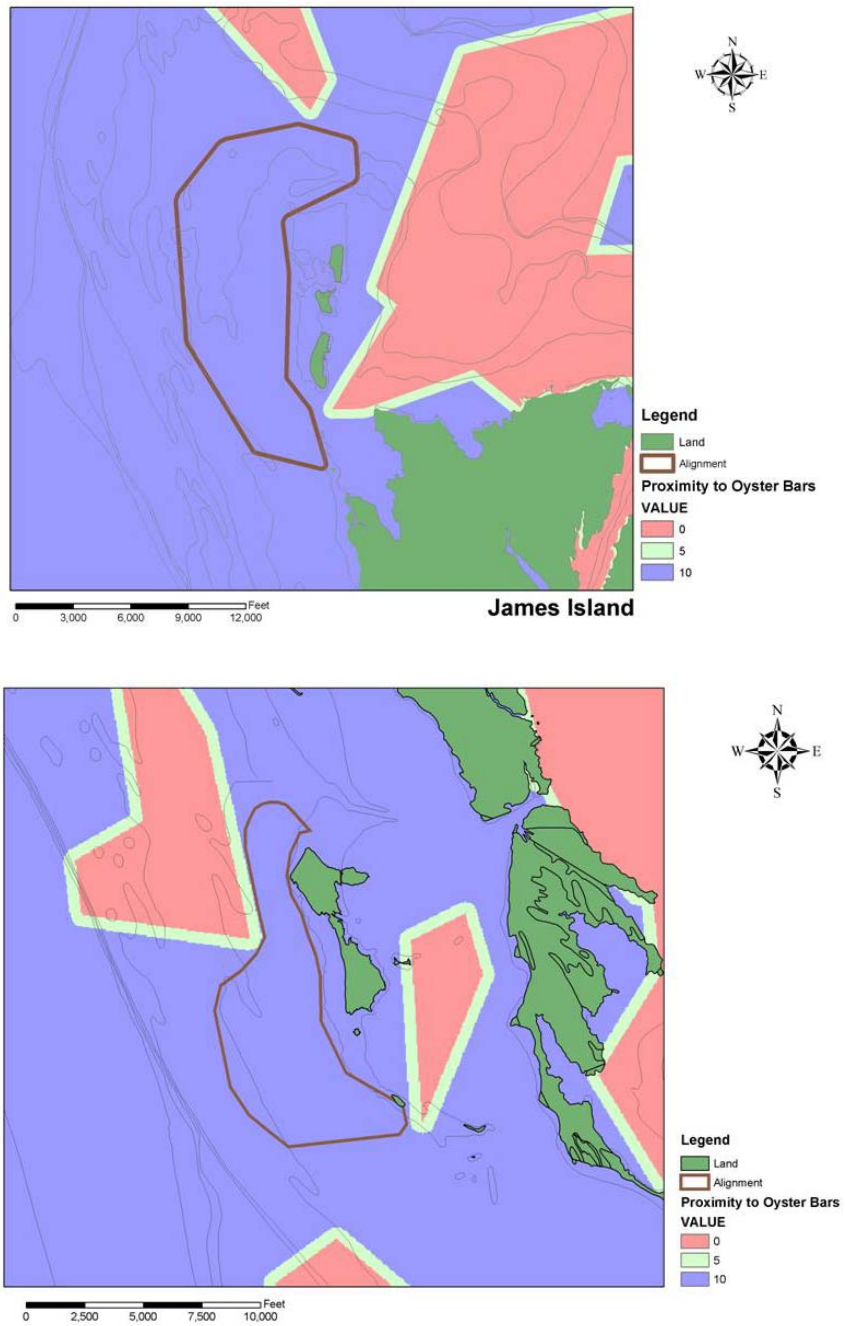
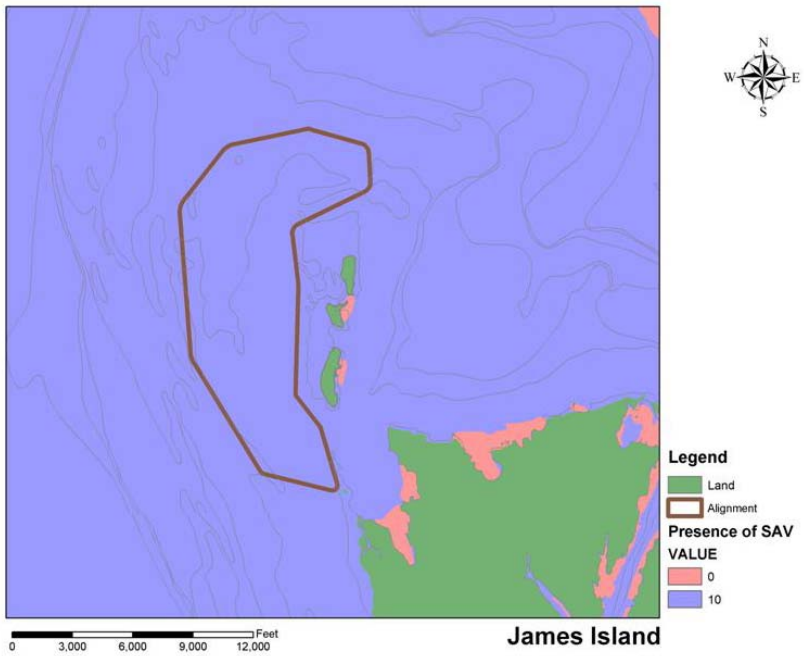


Figure B-4. Proximity of James (top) and Barren (bottom) Islands to Natural Oyster Bars (NOBs)

Blue indicated areas greater than 500 ft from the NOB boundary that were considered optimal (10) areas for proposed alignments to reduce the potential for impacts from increased

sedimentation on the NOBs. Green and red indicated areas within 500 ft of the NOB boundary that would be avoided during construction. *(Alignments in the figures are generic representations of the project footprint, and are provided for spatial perspective only)*



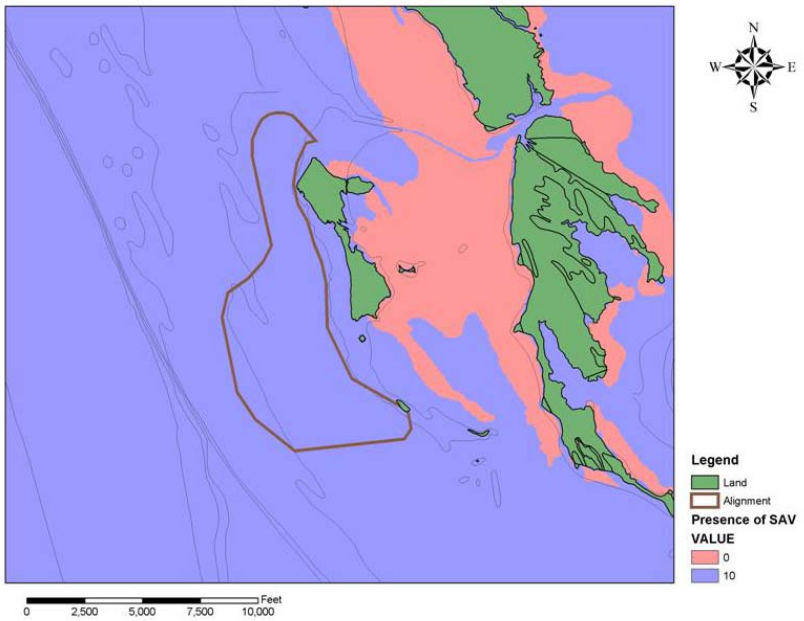
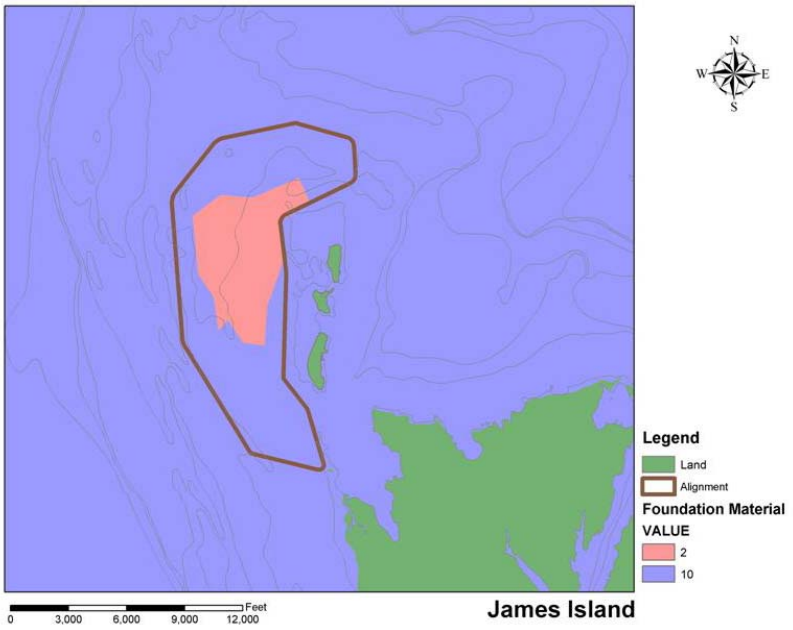


Figure B-5. Submerged Aquatic Vegetation (SAV) near James (top) and Barren (bottom) Islands

Blue indicated areas outside of existing SAV beds that were considered optimal (10) areas for proposed alignments to avoid the existing habitat. Red indicated areas within existing SAV beds (0) that would be avoided during construction to minimize impacts. SAV distribution based on

Virginia Institute of Marine Science (VIMS) SAV survey conducted in 2001. *(Alignments in the figures are generic representations of the project footprint, and are provided for spatial perspective only)*



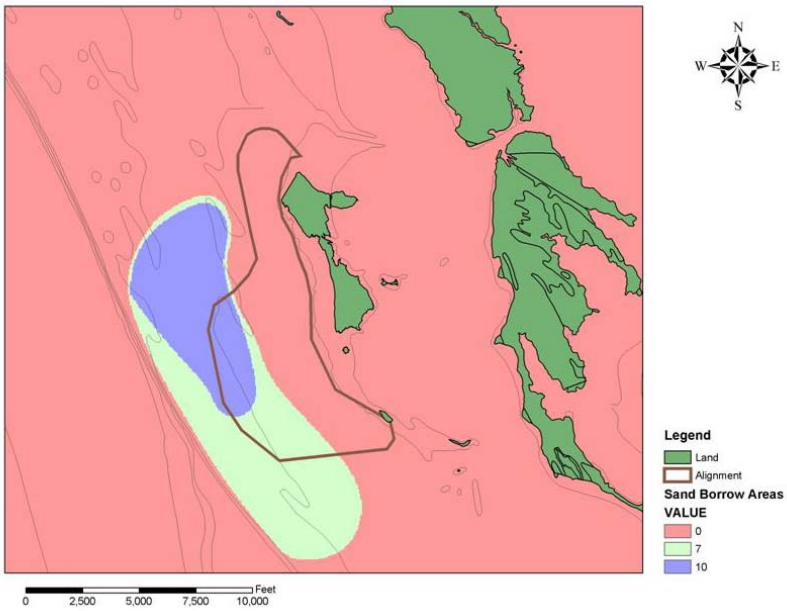


Figure B-6. Suitability of Foundation Material in the Vicinity of James (top) and Barren (bottom) Islands

Blue indicated areas with suitable foundation material (10), primarily sands with high shear strength and low compressibility characteristics that could support construction of the proposed alignments. Light green and red indicated areas of marginal (7) or unsuitable foundation material (0), primarily soft clays and silty substrates that would not support project construction.

(Alignments in the figures are generic representations of the project footprint, and are provided for spatial perspective only)

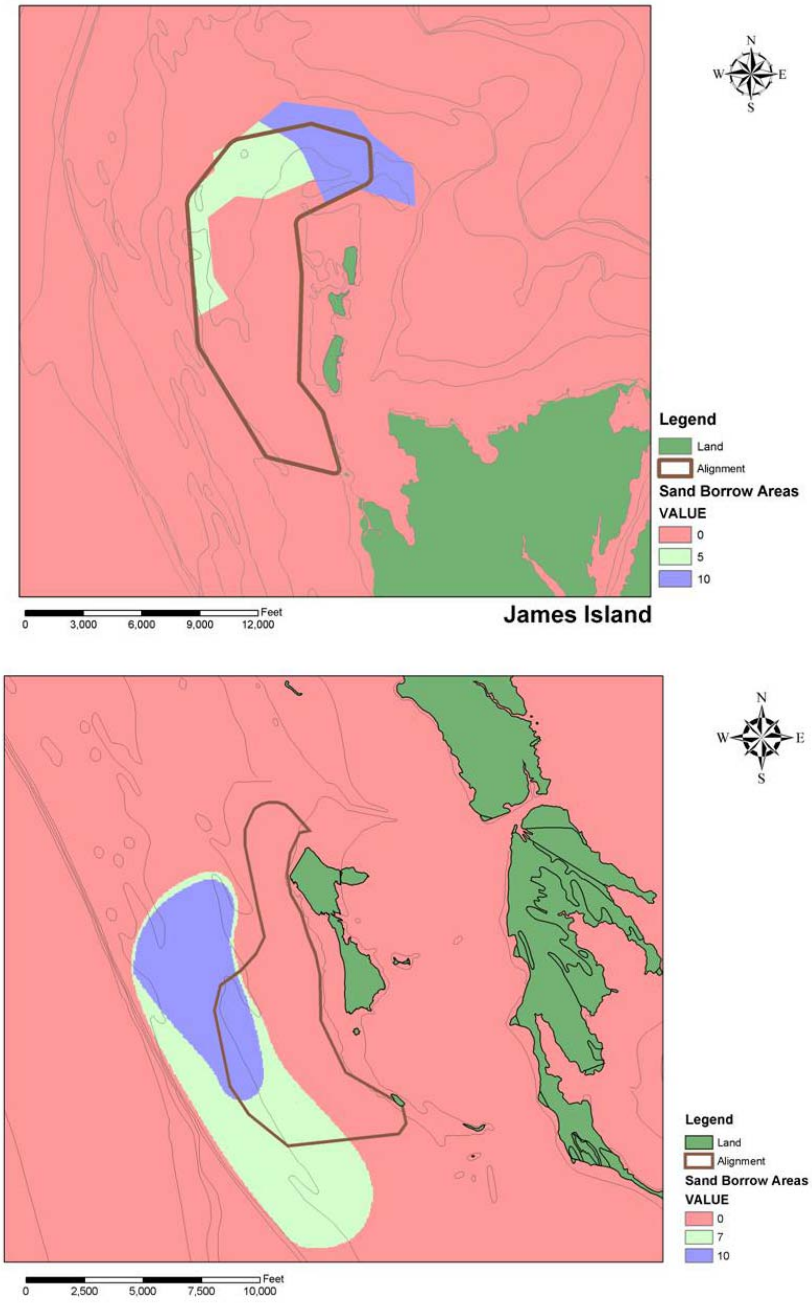


Figure B-7. Potential Sand Borrow Areas in the Vicinity of James (top) and Barren (bottom) Islands

Blue indicated areas with suitable high quality sands (10) that could used as sand borrow sources for perimeter dike construction. Light green indicated areas with suitable low quality sands (7) that could still be used as a sand borrow source, but contain a higher percentage of fine grained silts and clays. Red indicated areas of substrates unsuitable for used as borrow areas (0) because they were comprised of greater than 50 percent silt and clay. *(Alignments in the figures are generic representations of the project footprint, and are provided for spatial perspective only)*

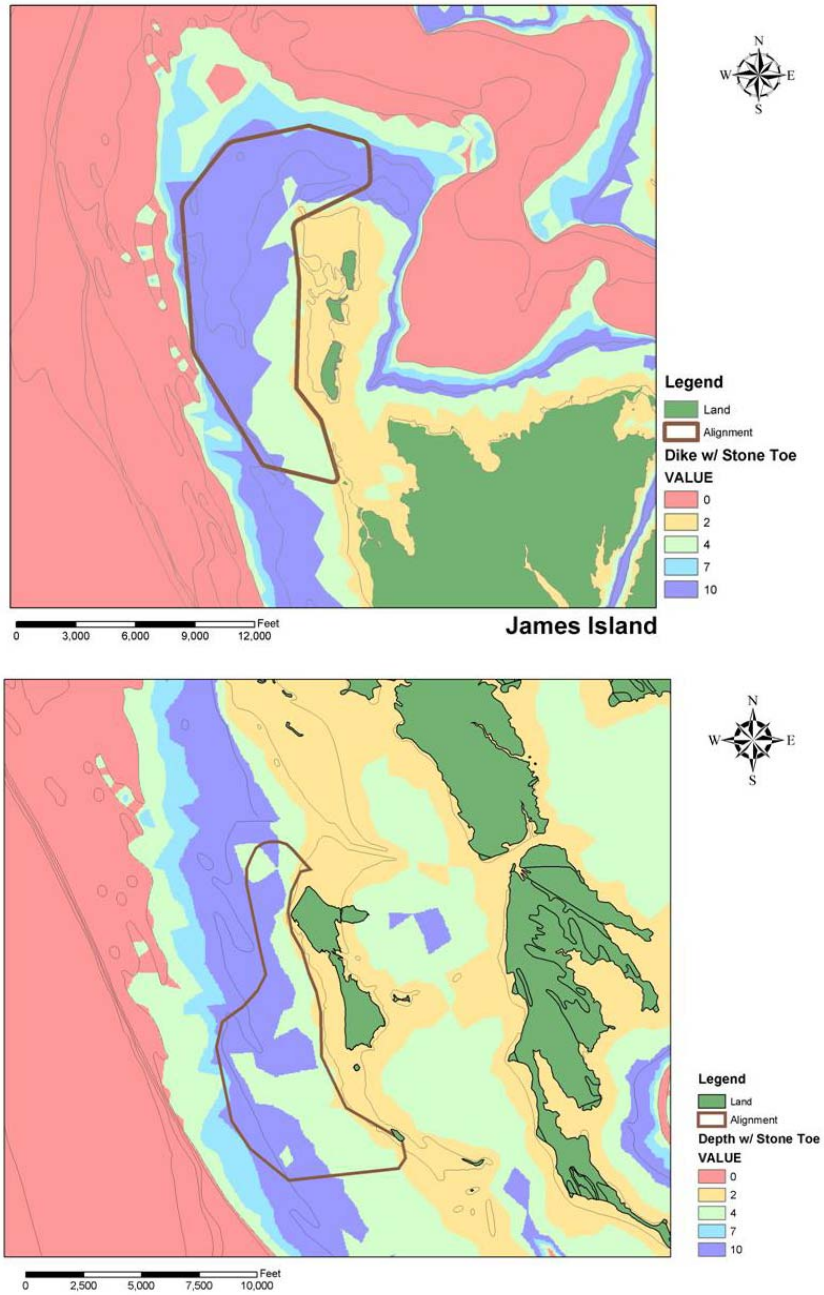


Figure B-8. Constructability of Perimeter Dike with a Toe Dike of James (top) and Barren (bottom) Islands

Dark blue indicated areas with water depths from 5 to 8 ft, which were considered optimal (10) for tow dike construction. Light blue indicated water depths from 8 to 10 ft that were considered potential areas for toe dike construction (7). Light green, yellow, and red indicated areas with water depths shallower than 5 ft and deeper than 10 ft (0) that would result in substantial challenges and costs in constructing the toe dike. *(Alignments in the figures are generic representations of the project footprint, and are provided for spatial perspective only)*

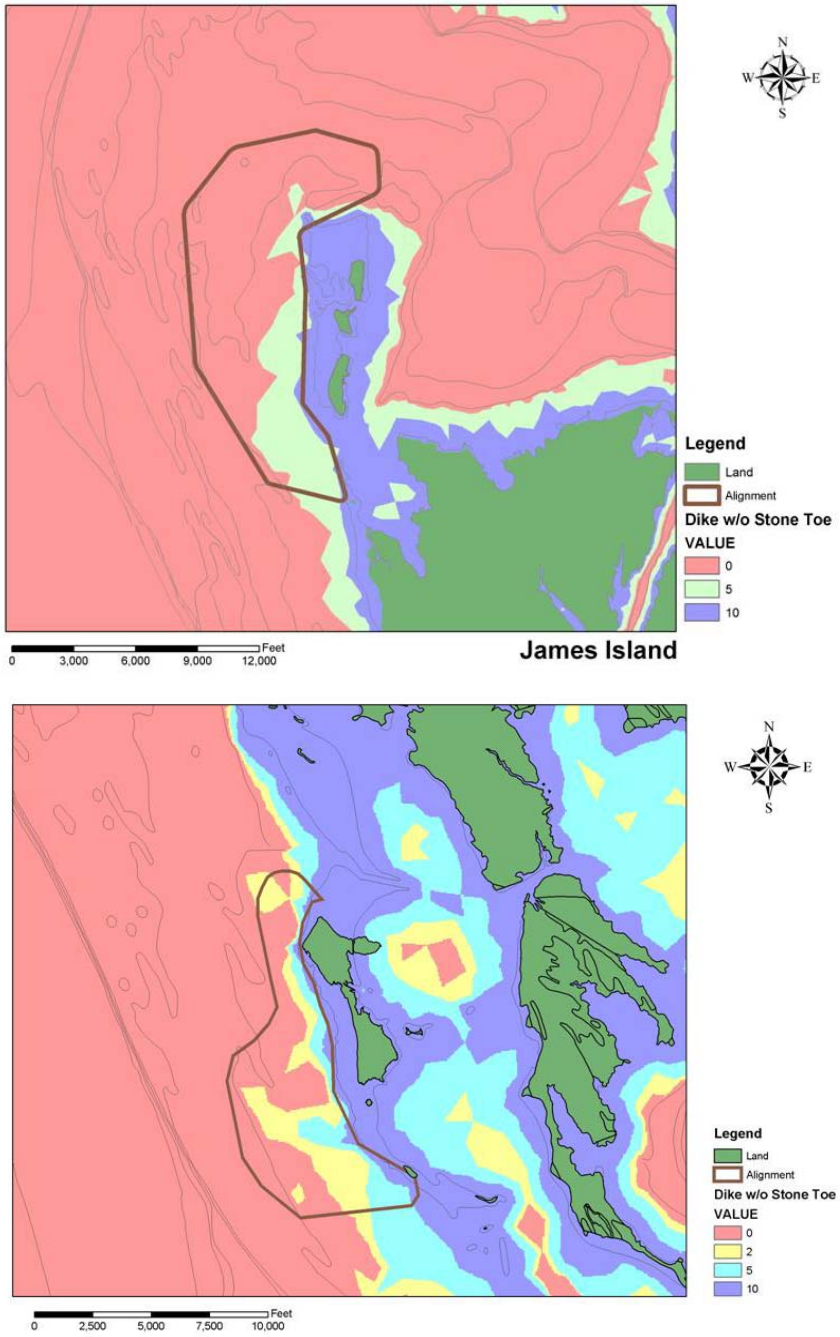


Figure B-9. Constructability of Perimeter Dike without a Toe Dike of James (top) and Barren (bottom) Islands

Red indicated areas with water depths less than 2 ft deep, which were considered optimal (10) for construction of a perimeter dike without a toe dike. Light blue indicated water depths from 2 to 5 ft that were considered potential areas for perimeter dike construction (5). Red indicated areas with water depths greater than 5 ft (0) that would result in substantial challenges and costs to construct the perimeter dike. *(Alignments in the figures are generic representations of the project footprint, and are provided for spatial perspective only)*

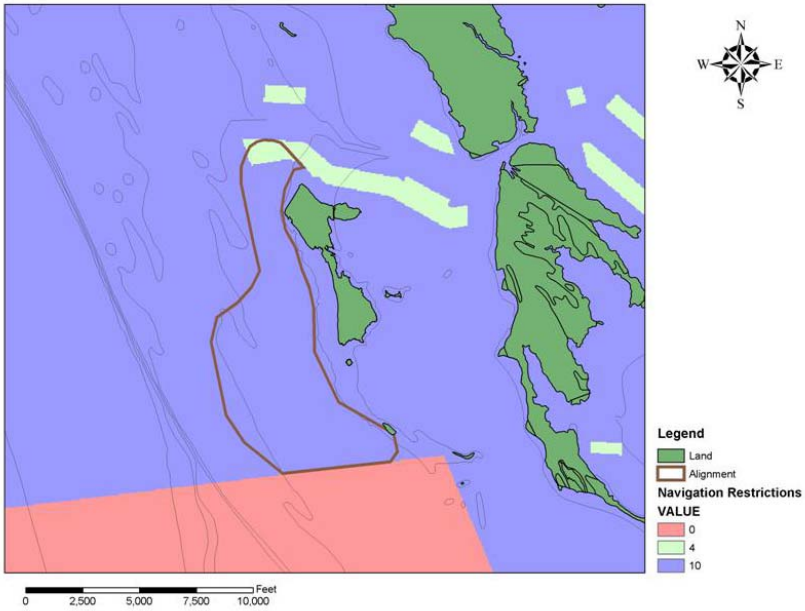


Figure B-10. Navigation Restrictions in the Vicinity of James (top) and Barren (bottom) Islands

Blue indicated areas that were located in an unrestricted navigation area, and were therefore considered optimal (10) as potential alignment locations. Light green indicated areas within a historical dredged material placement area (which may be indicative of unsuitable foundation materials), and red indicated areas within a restricted navigation area. Red areas were avoided in the siting of potential alignments. *(Alignments in the figures are generic representations of the project footprint, and are provided for spatial perspective only)*

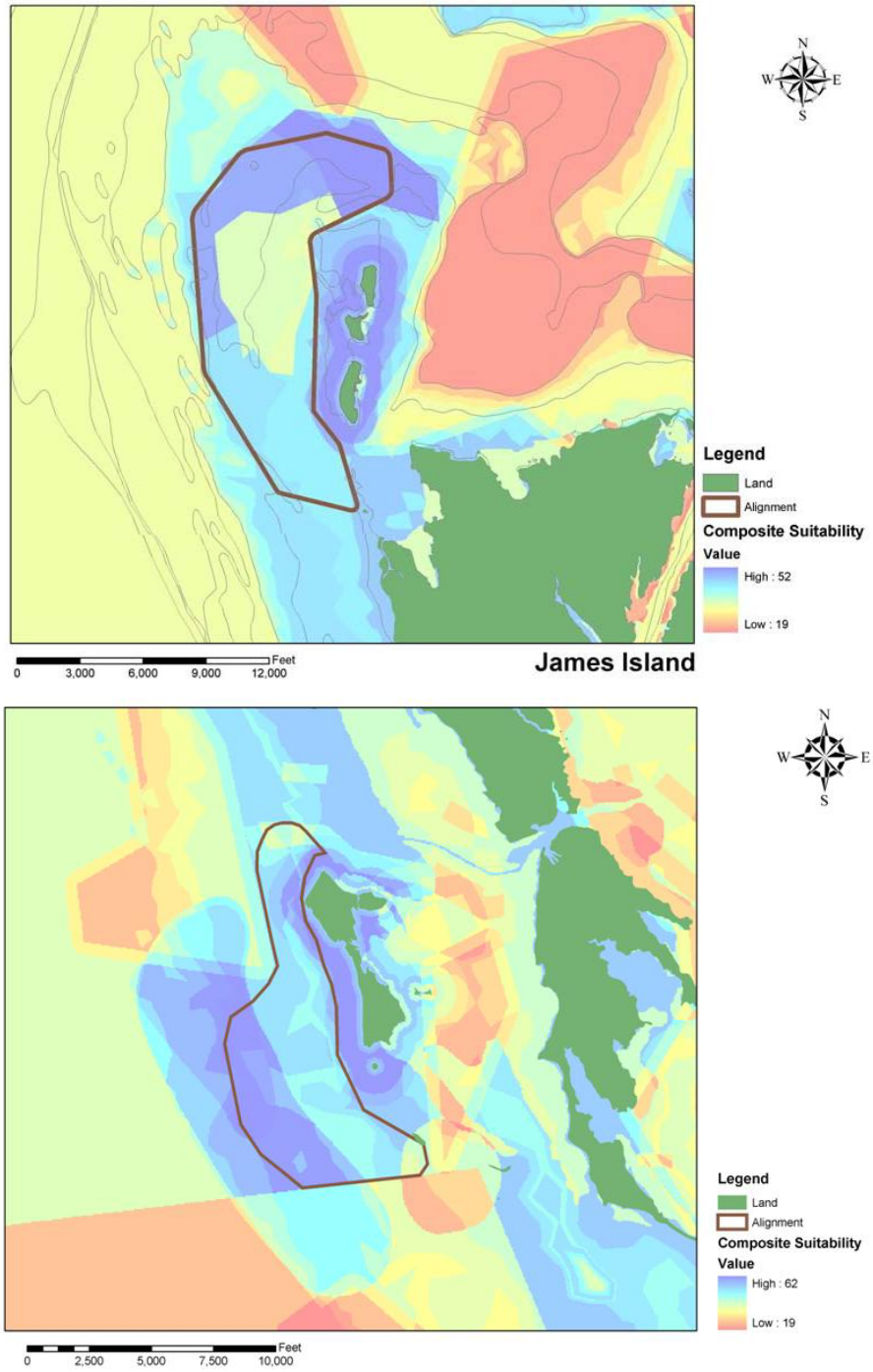


Figure B-11. Composite Suitability for Potential James (top) and Barren (bottom) Islands Restoration Alignments

Dark and light blue indicated areas that had the highest composite score based on all of the ranking criteria. These areas were considered the most optimal locations for potential alignments

based on the screening criteria used in the GIS analysis. *(Alignments in the figures are generic representations of the project footprint, and are provided for spatial perspective only)*

B.6.3.j Proposed Alignments Based on the Results of the GIS Analysis

The alignments proposed by MPA in the reconnaissance studies (MPA, 2002) were revised based on the GIS analysis of engineering and environmental criteria, as well as input from the resource agency team members. Based on the GIS analysis, four Barren Island alignments and five James Island alignments (Figures B-12 and B-13) were considered feasible alignments that were carried into the next step of the plan formulation process.

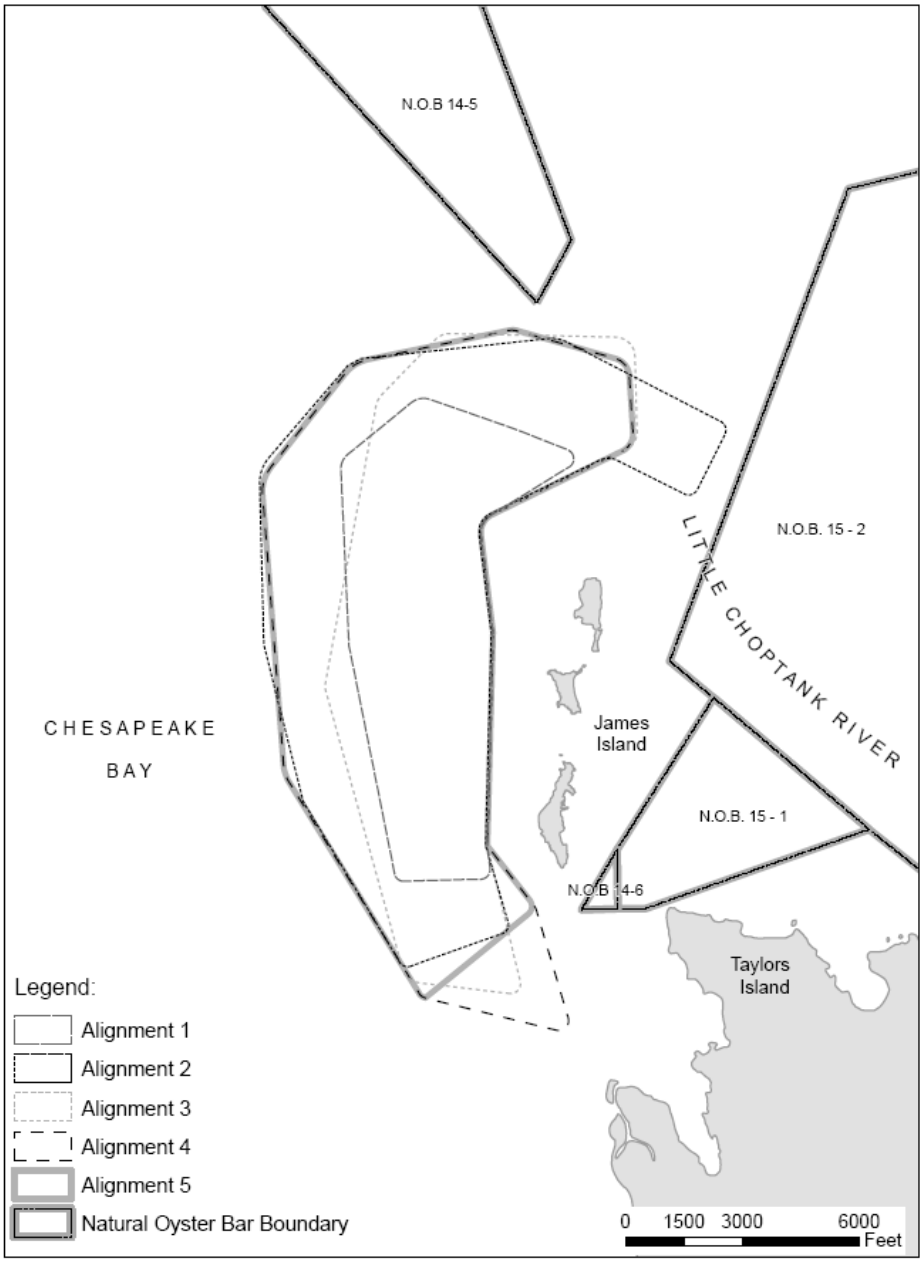


Figure B-12. James Island - Proposed Alignments

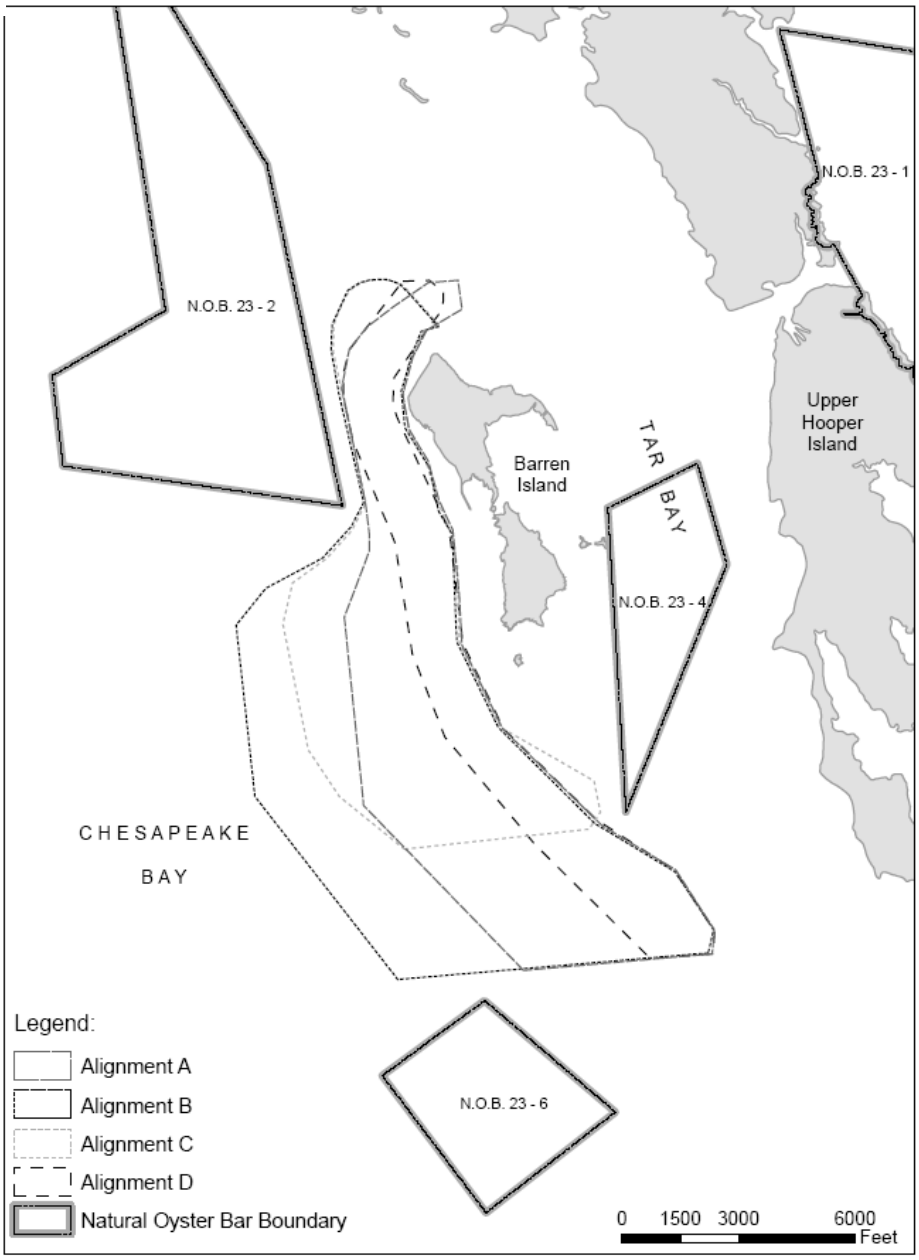


Figure B-13. Barren Island - Proposed Alignments

B.7 SCREENING OF POTENTIAL ALIGNMENTS

The four Barren Island and five James Island alignments were used to develop an array of feasible alignment alternatives for evaluation. In addition to the individual alignments themselves, 20 additional alignments that were combinations of an alignment at James Island and an alignment at Barren Island were also considered. These 29 alignment combinations are summarized in Table B-8.

Table B-8. Mid-Chesapeake Bay Island Restoration Alignments Proposed Based on the GIS Analysis

Site	Alignment	Total Acreage
Barren Island	A	1,354
	B	2,059
	C	1,125
	D	690
James Island	1	978
	2	2,126
	3	1,586
	4	2,200
	5	2,072
Combined Alignments for James Island and Barren Island Letter = Barren Island Alignment Number = James Island Alignment	A1	2,308
	A2	3,456
	A3	2,916
	A4	3,530
	A5	3,402
	B1	3,037
	B2	4,185
	B3	3,645
	B4	4,259
	B5	4,134
	C1	2,103
	C2	3,251
	C3	2,711
	C4	3,325
	C5	3,197
	D1	1,668
	D2	2,816
	D3	2,276
	D4	2,890
	D5	2,762

B.7.1 Initial Habitat Screening

Once the size of the potential alignment footprints were determined, multiple variations of the wetland to upland habitat proportion within the footprint were evaluated to determine the most suitable proportion that would most adequately achieve both project objectives - restoring island ecosystem habitat and maximizing dredged material placement capacity. Potential alignments were analyzed for the full range of theoretically possible upland and wetland habitat proportions. Construction of wetlands provides a higher proportion of environmental benefits, while construction of uplands provides the greater dredged material placement capacity.

The initial habitat screening involved evaluating habitat diversity to optimize the balance between maximum placement volume (100 percent uplands) and maximum habitat value (100 percent wetlands). A range of wetland components that theoretically could be developed, ranging from 0 to 100 percent wetlands, was evaluated. An initial sequence of five habitat proportions were evaluated:

- 100% uplands
- 100% wetlands
- 70 % uplands / 30 % wetlands
- 50% uplands / 50% wetlands
- 30% uplands / 70% wetlands

Because maximizing dredged material placement capacity was a primary project objective, and the majority of the placement capacity of the restoration project is in the upland cells, preliminary habitat screening assessments also considered alignments with upland areas of 700 and 900 acres, with the remaining areas of the project developed as wetlands. These two options, in addition to the upland / wetland ratios described above, resulted in a preliminary assessment of 199 potential alignments. However, the alignments with 700 and 900 acre upland areas were eliminated prior to the habitat screening process because the dredged material capacity needs these alignments were designed to accommodate were adequately addressed by alignments based on upland / wetland ratios. Therefore, a total of 145 alignment alternatives (29 alignment combinations with five potential habitat proportions) were evaluated in the habitat screening process (Table B-9).

The habitat screening process integrated information collected from field surveys, an engineering evaluation, and input from natural resource agencies. The engineering evaluation consisted of a series of dredged placement analyses and analysis of the potential source of dike construction materials (Appendix C, Attachments B and C). These evaluation elements were the basis for defining the minimum alignment area and capacity that would be required to efficiently accommodate average annual dredged material placement needs.

The 145 alignment alternatives were screened using the following criteria:

- constructability;
- capacity and dredged material placement;
- cost (preliminary);
- location of sand borrow areas;
- agency preferences/environmental benefits; and
- cost per habitat output (preliminary).

Alignments screened out because of one criterion were eliminated from consideration and not evaluated using subsequent screening criteria. Results of the screening process are described below and in Tables B-10 through B-12.

Table B-9. Mid-Chesapeake Bay Island Restoration Alternatives (n = 145)

	Alignment (ac)	100% Uplands	100% Wetlands	70% Uplands/ 30% Wetlands	50% Uplands/ 50% Wetlands	30% Uplands/ 70% Wetlands
Barren Island						
1	Alignment A (1,354)	AU	AW	AUW30	AUW50	AUW70
2	Alignment B (2,059)	BU	BW	BUW30	BUW50	BUW70
3	Alignment C (1,125)	CU	CW	CUW30	CUW50	CUW70
4	Alignment D (690)	DU	DW	DUW30	DUW50	DUW70
James Island						
5	Alignment 1 (978)	1U	1W	1UW30	1UW50	1UW70
6	Alignment 2 (2,126)	2U	2W	2UW30	2UW50	2UW70
7	Alignment 3 (1,586)	3U	3W	3UW30	3UW50	3UW70
8	Alignment 4 (2,200)	4U	4W	4UW30	4UW50	4UW70
9	Alignment 5 (2,072)	5U	5W	5UW30	5UW50	5UW70
Barren & James Island Combinations						
10	Alignment A1 (2,308)	A1U	A1W	A1UW30	A1UW50	A1UW70
11	Alignment A2 (3,456)	A2U	A2W	A2UW30	A2UW50	A2UW70
12	Alignment A3 (2,916)	A3U	A3W	A3UW30	A3UW50	A3UW70
13	Alignment A4 (3,530)	A4U	A4W	A4UW30	A4UW50	A4UW70
14	Alignment A5 (3,402)	A5U	A5W	A5UW30	A5UW50	A5UW70
15	Alignment B1 (3,037)	B1U	B1W	B1UW30	B1UW50	B1UW70
16	Alignment B2 (4,185)	B2U	B2W	B2UW30	B2UW50	B2UW70
17	Alignment B3 (3,645)	B3U	B3W	B3UW30	B3UW50	B3UW70
18	Alignment B4 (4,259)	B4U	B4W	B4UW30	B4UW50	B4UW70
19	Alignment B5 (4,134)	B5U	B5W	B5UW30	B5UW50	B5UW70
20	Alignment C1 (2,103)	C1U	C1W	C1UW30	C1UW50	C1UW70
21	Alignment C2 (3,251)	C2U	C2W	C2UW30	C2UW50	C2UW70
22	Alignment C3 (2,711)	C3U	C3W	C3UW30	C3UW50	C3UW70
23	Alignment C4 (3,325)	C4U	C4W	C4UW30	C4UW50	C4UW70
24	Alignment C5 (3,197)	C5U	C5W	C5UW30	C5UW50	C5UW70
25	Alignment D1 (1,668)	D1U	D1W	D1UW30	D1UW50	D1UW70
26	Alignment D2 (2,816)	D2U	D2W	D2UW30	D2UW50	D2UW70
27	Alignment D3 (2,276)	D3U	D3W	D3UW30	D3UW50	D3UW70
28	Alignment D4 (2,890)	D4U	D4W	D4UW30	D4UW50	D4UW70
29	Alignment D5 (2,762)	D5U	D5W	D5UW30	D5UW50	D5UW70

**Alternative alignments are summarized according to the following example: D4UW70 = Barren Alignment D plus James Alignment 4, with a habitat ratio of 70% upland / 30% wetland*

B.7.1.a Constructability

The conclusion of the initial placement evaluation was that any alignment consisting entirely of wetland habitat was not feasible because of the dredged material capacity limitations. Alignments with 100% wetlands would not achieve one of the two primary project objects – providing sufficient dredged material placement capacity (3.2 mcy per year) to meet the shortfall predicted in the Federal DMMP.

Wetland cell construction requires a highly ordered and controlled sequence of dredged material placement that will assure that wetland cells are never overloaded beyond the quantities required to achieve the target wetland surface elevations. Keeping the wetland cells from being overloaded restricts the amount of dredged material that can be placed in each cell on an annual basis, and because wetland cells are typically developed at a rate of one cell per year, sites developed with 100% wetlands would result in an exceptionally inefficient and costly dredged material placement operation**.**

The engineering analysis for the Mid-Chesapeake Bay Island Restoration Study was based on a design scheme in which wetland cells will not be constructed on top of sand borrow areas (Appendix C). This design criterion was based on the lesions learned at the PIERP, and the difficulties that have been encountered in attempting to achieve the target wetland surface elevations in wetlands above borrow areas at the PIERP. Therefore, alignments at James and Barren Island that consisted of 100% wetlands would need to obtain all borrow material for dike construction from the access channel and/or locations outside the project footprint.

B.7.1.b Capacity/Dredged Material Placement

The results of the Federal DMMP indicated that the dredged material placement capacity for any proposed alternative would need to be sufficient to accommodate a total of 30 to 70 mcy over a 20 year lifespan for of material (USACE, 2005). The site must be capable of accommodating annual dredged material placement of 3.2 mcy/yr for most of the project life without overloading wetland cells and with minimal overloading of upland cells (USACE, 2005). Therefore, alternatives that did not provide 25 to 75 mcy (30 to 70 mcy ± 5 mcy) were screened out.

A preliminary engineering analysis showed that it is necessary to retain approximately 75 to 80 percent of the total site placement capacity within the upland cells for the latter project years to assure that upland placement capacity lasts through placement in all wetland cells. As a result, alternatives with 70% wetland, 30% upland ratios were screened out. Alternatives with wetland percentages as high as 70% could not efficiently and cost-effectively handle the placement of dredged material, which would significantly increase operating costs in later years.

B.7.1.c Location of Borrow Areas

To minimize impacts to bottom habitat, the smallest project footprint possible was desirable. Those alternatives requiring borrow areas for dike construction outside of the alignment's footprint were deemed undesirable for further consideration because of impacts to benthic organism and finfish fish habitat. Alternatives that would also require building wetland cells over borrow areas within the footprint were also considered infeasible to construct because the inefficient

consolidation of deep deposits of dredged material would not be a suitable foundation for wetland cells (Appendix C, Attachments B and C).

B.7.1.d Agency Preference/Environmental Benefits

After further discussion on the proposed alternatives, several agencies expressed concerns about the habitat value of alternatives with less than 50 percent wetlands. Therefore, only those alternatives that contained wetland components of 50 percent or more were supported by many of the resource agencies.

In addition, based on field investigations showing that the productivity of benthic and fishing habitat at Barren Island, all Barren Island alternatives greater than 1,000 ac were eliminated to minimize the project footprint. Minimizing the footprint of the Barren Island project was supported by the watermen to avoid winter gillnetting and crabbing areas to the west of Barren Island. Field studies indicated that the benthic habitat at James Island was not as productive or diverse as the benthic habitat at Barren Island; therefore, a larger footprint, limited to approximately 2,000 ac, at James Island was considered acceptable to both the agencies and the watermen.

B.7.1.e Cost per Habitat Output

A preliminary calculation of habitat output versus the cost for the alternative was developed based on initial discussions with the PDT and analysis of the PIERP. Those alternatives in which the cost was large [defined as a cost per habitat unit ($/unit) greater than eight (Tables B-10 through B-12)] compared to the habitat benefits were not carried forward for further consideration. The habitat units for this screening were refined and eventually changed to Island Community Units (ICUs), as described in Section 4.4.2, for detailed benefit analysis of alternatives remaining after this screening step.

B.7.2 Results of the Initial Alternatives Screening

After the alignments were screened based on habitat proportions, four of the 145 alignment alternatives remained:

- James Alignment 3, with 50% upland, 50% wetlands;
- James Alignment 5, with 50% upland, 50% wetlands;
- James Alignment 3 plus Barren Alignment D, with 50% uplands, 50% wetlands; and
- James Alignment 5 plus Barren Alignment D, with 50% uplands, 50% wetlands.

Table B-10. Screening Criteria Applied to Island Restoration Alternatives for James Island

Alternatives	Preliminary Calculations								Screening criteria					
	Upland (ac)	Wetland (ac)	Habitat Units (HU)	Capacity (M yd^3)	cost (millions)	$/HU	HU/ ac	$/percent wetland	Construct-ability	Capacity/ Dredge Placement	Borrow areas	$/HU high	Agency Preference	Environ-mental Benefits
Alignment 1 Total acres=978 Total acres minus dike=878														
1W	0	878	725.2	13.2	210.7	0.2906	0.7415	2.11	X	X	X			
1UW70	263.4	614.6	539.3	19.8	316.1	0.5861	0.5514	4.52		X				
1UW50	439	439	412.0	24.1	386.3	0.9378	0.4212	7.73		X				
1UW30	614.6	263.4	277.0	28.5	456.6	1.6483	0.2832	15.22		X			X	
1U	878	0	105.4	35.1	561.9	5.3333	0.1077	0				X	X	X
Alignment 2 Total acres=2126 Total acres minus dike=2026														
2W	0	2026	1684.0	30.4	486.2	0.2887	0.7921	4.86	X		X		X	
2UW70	607.8	1418.2	1251.7	45.6	729.4	0.5827	0.5888	10.42		X			X	
2UW50	1013	1013	958.3	55.7	891.4	0.9302	0.4508	17.83					X	
2UW30	1418.2	607.8	672.2	65.8	1053.5	1.5672	0.3162	35.12					X	
2U	2026	0	243.1	81.0	1296.6	5.3333	0.1144	0		X		X	X	X
Alignment 3 Total acres=1586 Total acres minus dike=1486														
3W	0	1486	1235.2	22.3	356.6	0.2887	0.7788	3.57	X	X	X			
3UW70	445.8	1040.2	912.7	33.4	535.0	0.5861	0.5755	7.64		X				
3UW50	743	743	702.9	40.9	653.8	0.9302	0.4432	13.08						
3UW30	1040.2	445.8	489.7	48.3	772.7	1.5781	0.3087	25.76					X	X
3U	1486	0	178.3	59.4	951.0	5.3333	0.1124	0				X		X

Table B-10. (continued)

Alternatives	Preliminary Calculations								Screening criteria					
	Upland (ac)	Wetland (ac)	HU	Capacity (M yd^3)	cost (millions)	$/HU	HU/ ac	$/percent wetland	Construct-ability	Capacity/ Dredge Placement	Borrow areas	$/HU high	Agency Preference	Environ-mental Benefits
Alignment 4 Total acres=2200 Total acres minus dike=2100														
4W	0	2100	1745.5	31.5	504.0	0.2887	0.7934	5.04	X		X		X	
4UW70	630	1470	1297.5	47.3	756.0	0.5827	0.5898	10.80					X	
4UW50	1050	1050	993.3	57.8	924.0	0.9302	0.4515	18.48					X	
4UW30	1470	630	696.8	68.3	1092.0	1.5672	0.3167	36.40					X	
4U	2100	0	252.0	84.0	1344.0	5.3333	0.1145	0		X		X	X	X
Alignment 5 Total acres=2072 Total acres minus dike=1972														
5W	0	1972	1639.1	29.6	473.3	0.2887	0.7911	4.73	X		X			
5UW70	591.6	1380.4	1218.4	44.4	709.9	0.5827	0.5880	10.14		X				
5UW50	986	986	932.8	54.2	867.7	0.9302	0.4502	17.35						
5UW30	1380.4	591.6	654.3	64.1	1025.4	1.5672	0.3158	34.18					X	
5U	1972	0	236.6	78.9	1262.1	5.3333	0.1142	0				X	X	X

An 'X' denotes that an alternative did not meet the specified criteria. Only shaded alternatives that are shaded were carried to next step of plan formulation process.

Key: *#W = 100% wetland*
#UW70 =70% upland, 30% wetland
#UW50 =50% upland, 50% wetland
#UW30 =30% upland, 70% wetland
#U =100% upland

Table B-11: Screening Criteria Applied to Island Restoration Alternatives for Barren

Alternatives	Preliminary Calculations								Screening criteria					
	Upland (ac)	Wetland (ac)	HU	Capacity (M yd^3)	cost (millions)	$/HU	HU/ ac	$/percent wetland	Construct-ability	Capacity/ Dredge Placement	Borrow areas	$/HU high	Agency Preference	Environ-mental Benefits
Alignment A Total acres=1354 Total acres minus dike=1253														
AW	0	1253	1041.5	18.8	319.5	0.3068	0.7692	3.20	X	X				
AUW70	375.9	877.1	769.6	28.2	479.3	0.6228	0.5684	6.85		X				
AUW50	626.5	626.5	613.3	34.5	585.8	0.9551	0.4530	11.72					X	
AUW30	877.1	375.9	412.9	40.7	692.3	1.6767	0.3049	23.08					X	
AU	1253	0	150.4	50.1	852.0	5.6667	0.1110	0				X	X	X
Alignment B Total acres=2059 Total acres minus dike=1942														
BW	0	1942	1614.2	29.1	495.2	0.3068	0.7840	4.95	X	X			X	
BUW70	582.6	1359.4	1199.8	43.7	742.8	0.6191	0.5827	10.61					X	
BUW50	971	971	918.6	53.4	907.9	0.9884	0.4461	18.16					X	
BUW30	1359.4	582.6	644.4	63.1	1073.0	1.6652	0.3129	35.77					X	
BU	1942	0	233.0	77.7	1320.6	5.6667	0.1132	0				X	X	X
Alignment C **Total acres=1172** **Total acres minus dike=1084**														
CW	0	1084	895.4	16.3	276.4	0.3087	0.7640	2.76	X	X			X	
CUW70	325.2	758.8	665.8	24.4	414.6	0.6228	0.5681	5.92		X			X	
CUW50	542	542	512.7	29.8	506.8	0.9884	0.4375	10.14					X	
CUW30	758.8	325.2	357.2	35.2	598.9	1.6767	0.3048	19.96					X	
CU	1084	0	130.1	43.4	737.1	5.6667	0.1110	0				X	X	X

Table B-11: (continued)

Alternatives	Preliminary Calculations								Screening criteria					
	Upland (ac)	Wetland (ac)	HU	Capacity (M yd^3)	cost (millions)	$/HU	HU/ ac	$/percent wetland	Construct-ability	Capacity/ Dredge Placement	Borrow areas	$/HU high	Agency Preference	Environ-mental Benefits
Alignment D **Total acres=684** **Total acres minus dike=584**														
DW	0	584	482.4	8.8	148.9	0.3087	0.7052	1.49	X	X				
DUW70	175.2	408.8	366.1	13.1	223.4	0.6102	0.5352	3.19		X				
DUW50	292	292	274.0	16.1	273.0	0.9964	0.4006	5.46		X				
DUW30	408.8	175.2	183.4	19.0	322.7	1.7593	0.2681	10.76		X			X	
DU	584	0	70.1	23.4	397.1	5.6667	0.1025	0		X		X	X	X

An 'X' denotes that an alternative did not meet the specified criteria. Only shaded alternatives that are shaded were carried to next step of plan formulation process.

Key: *#W = 100% wetland*
#UW70 =70% upland, 30% wetland
#UW50 =50% upland, 50% wetland
#UW30 =30% upland, 70% wetland
#U =100% upland

Table B-12. Screening Criteria Applied to Combined Island Restoration Alternatives for James and Barren

Alternatives	Preliminary Calculations				Screening criteria					
	upland (ac)	wetland (ac)	capacity (M yd^3)	cost (M)	Constructability	Capacity/ Dredge Placement	Borrow areas	$/HU high	Agency Preference	Environmental Benefits
Alignment A1 **Total acres=2308** **Total acres minus dike=2208**										
A1W	0	2208	33.1	529.9	X		X		X	
A1UW70	662.4	1545.6	49.7	794.9					X	
A1UW50	1104	1104	60.7	971.5					X	
A1UW30	1545.6	662.4	71.8	1148.2		X		X	X	
A1U	2208	0	88.3	1413.1		X		X	X	X
Alignment A2 Total acres=3456 Total acres minus dike=3356										
A2W	0	3356	50.3	805.4	X		X		X	
A2UW70	1006.8	2349.2	75.5	1208.2		X			X	
A2UW50	1678	1678	92.3	1476.6		X			X	
A2UW30	2349.2	1006.8	109.1	1745.1		X		X	X	
A2U	3356	0	134.2	2147.8		X		X	X	X
Alignment A3 Total acres=2916 Total acres minus dike=2816										
A3W	0	2816	42.2	675.8	X		X			
A3UW70	844.8	1971.2	63.4	1013.8		X				
A3UW50	1408	1408	77.4	1239.0		X				
A3UW30	1971.2	844.8	91.5	1464.3		X		X	X	
A3U	2816	0	112.6	1802.2		X		X	X	X

Table B-12. (continued)

Alternatives	Preliminary Calculations				Screening criteria					
	upland (ac)	wetland (ac)	capacity (M yd^3)	cost (M)	Constructability	Capacity/ Dredge Placement	Borrow areas	$/HU high	Agency Preference	Environmental Benefits
Alignment A4 Total acres=3530 Total acres minus dike=3430										
A4W	0	3430	51.5	823.2	X		X		X	
A4UW70	1029	2401	77.2	1234.8		X			X	
A4UW50	1715	1715	94.3	1509.2		X			X	
A4UW30	2401	1029	111.5	1783.6		X		X	X	
A4U	3430	0	137.2	2195.2		X		X	X	X
Alignment A5 Total acres=3402 Total acres minus dike=3302										
A5W	0	3302	49.5	792.5	X		X		X	
A5UW70	990.6	2311.4	74.3	1188.7		X			X	
A5UW50	1651	1651	90.8	1452.9		X			X	
A5UW30	2311.4	990.6	107.3	1717.0		X		X	X	
A5U	3302	0	132.1	2113.3		X		X	X	X
Alignment B1 Total acres=2103 Total acres minus dike=2003										
B1W	0	2003	30.0	480.7	X		X		X	
B1UW70	600.9	1402.1	45.1	721.1					X	
B1UW50	1001.5	1001.5	55.1	881.3					X	
B1UW30	1402.1	600.9	65.1	1041.6				X		
B1U	2003	0	80.1	1281.9		X		X	X	X

Table B-12. (continued)

Alternatives	Preliminary Calculations				Screening criteria					
	upland (ac)	wetland (ac)	capacity (M yd^3)	cost (M)	Constructability	Capacity/ Dredge Placement	Borrow areas	$/HU high	Agency Preference	Environmental Benefits
Alignment B2 Total acres=3251 Total acres minus dike=3151										
	0	3151	47.3	756.2	X		X		X	
B2UW70	945.3	2205.7	70.9	1134.4					X	
B2UW50	1575.5	1575.5	86.7	1386.4		X			X	
B2UW30	2205.7	945.3	102.4	1638.5		X		X	X	
B2U	3151	0	126.0	2016.6		X		X	X	X
B3W	0	2611	39.2	626.6	X		X		X	
B3UW70	783.3	1827.7	58.7	940.0		X			X	
B3UW50	1305.5	1305.5	71.8	1148.8		X			X	
B3UW30	1827.7	783.3	84.9	1357.7		X		X	X	
B3U	2611	0	104.4	1671.0		X		X	X	X
Alignment B4 Total acres=3325 Total acres minus dike=3225										
B4W	0	3225	48.4	774.0	X		X		X	
B4UW70	967.5	2257.5	72.6	1161.0		X			X	
B4UW50	1612.5	1612.5	88.7	1419.0		X			X	
B4UW30	2257.5	967.5	104.8	1677.0		X		X	X	
B4U	3225	0	129.0	2064.0		X		X	X	X
Alignment B5 Total acres=3197 Total acres minus dike=3097										
B5W	0	3097	46.5	743.3	X		X		X	
B5UW70	929.1	2167.9	69.7	1114.9		X			X	
B5UW50	1548.5	1548.5	85.2	1362.7		X			X	
B5UW30	2167.9	929.1	100.7	1610.4		X		X	X	
B5U	3097	0	123.9	1982.1		X		X	X	X

Table B-12. (continued)

Alternatives	Preliminary Calculations				Screening criteria					
	upland (ac)	wetland (ac)	capacity (M yd^3)	cost (M)	Constructability	Capacity/ Dredge Placement	Borrow areas	$/HU high	Agency Preference	Environmental Benefits
Alignment C1 Total acres=1588 Total acres minus dike=1488										
C1W	0	1488	22.3	357.1	X	X	X		X	
C1UW70	446.4	1041.6	33.5	535.7					X	
C1UW50	744	744	40.9	654.7					X	
C1UW30	1041.6	446.4	48.4	773.8				X		
C1U	1488	0	59.5	952.3				X	X	X
Alignment C2 Total acres=2736 Total acres minus dike=2636										
C2W	0	2636	39.5	632.6	X		X		X	
C2UW70	790.8	1845.2	59.3	949.0		X			X	
C2UW50	1318	1318	72.5	1159.8		X			X	
C2UW30	1845.2	790.8	85.7	1370.7		X		X	X	
C2U	2636	0	105.4	1687.0		X		X	X	X
Alignment C3 Total acres=2196 Total acres minus dike=2096										
C3W	0	2096	31.4	503.0	X		X		X	
C3UW70	628.8	1467.2	47.2	754.6					X	
C3UW50	1048	1048	57.6	922.2					X	
C3UW30	1467.2	628.8	68.1	1089.9				X	X	
C3U	2096	0	83.8	1341.4		X		X	X	X
Alignment C4 Total acres=2810 Total acres minus dike=2710										
C4W	0	2710	40.7	650.4	X		X		X	
C4UW70	813	1897	61.0	975.6		X			X	
C4UW50	1355	1355	74.5	1192.4		X			X	
C4UW30	1897	813	88.1	1409.2		X		X	X	
C4U	2710	0	108.4	1734.4		X		X	X	X

Table B-12. (continued)

Alternatives	Preliminary Calculations				Screening criteria					
	upland (ac)	wetland (ac)	capacity (M yd^3)	cost (M)	Constructability	Capacity/ Dredge Placement	Borrow areas	$/HU high	Agency Preference	Environmental Benefits
Alignment C5 Total acres=2682 Total acres minus dike=2582										
C5W	0	2582	38.7	619.7	X		X		X	
C5UW70	774.6	1807.4	58.1	929.5		X			X	
C5UW50	1291	1291	71.0	1136.1		X			X	
C5UW30	1807.4	774.6	83.9	1342.6		X		X	X	
C5U	2582	0	103.3	1652.5		X		X	X	X
Alignment D1 Total acres=1668 Total acres minus dike=1558										
D1W	0	1558	23.4	373.9	X	X	X			
D1UW70	467.4	1090.6	35.1	560.9		X				
D1UW50	779	779	42.8	685.5			X			
D1UW30	1090.6	467.4	50.6	810.2				X		
D1U	1558	0	62.3	997.1				X	X	X
Alignment D2 Total acres=2816 Total acres minus dike=2716										
D2W	0	2716	40.7	651.8	X		X		X	
D2UW70	814.8	1901.2	61.1	977.8					X	
D2UW50	1358	1358	74.7	1195.0		X			X	
D2UW30	1901.2	814.8	88.3	1412.3		X		X	X	
D2U	2716	0	108.6	1738.2		X		X	X	X

Table B-12. (continued)

Alternatives	Preliminary Calculations				Screening criteria					
	upland (ac)	wetland (ac)	capacity (M yd^3)	cost (M)	Constructability	Capacity/ Dredge Placement	Borrow areas	$/HU high	Agency Preference	Environmental Benefits
Alignment D3 Total acres=2276 Total acres minus dike=2176										
D3W	0	2176	32.6	522.2	X	X	X			
D3UW70	652.8	1523.2	49.0	783.4		X				
D3UW50	1088	1088	59.8	957.4						
D3UW30	1523.2	652.8	70.7	1131.5		X		X		
D3U	2176	0	87.0	1392.6		X		X	X	X
Alignment D4 Total acres=2890 Total acres minus dike=2790										
D4W	0	2790	41.9	669.6	X		X		X	
D4UW70	837	1953	62.8	1004.4		X			X	
D4UW50	1395	1395	76.7	1227.6					X	
D4UW30	1953	837	90.7	1450.8				X	X	
D4U	2790	0	111.6	1785.6				X	X	X
Alignment D5 Total acres=2756 Total acres minus dike=2656										
D5W	0	2656	39.9	638.9	X		X			
D5UW70	796.8	1859.2	59.9	958.3		X				
D5UW50	1328	1328	73.2	1171.3						
D5UW30	1859.2	796.8	86.5	1384.2				X		
D5U	2656	0	106.5	1703.7				X	X	X

An 'X' denotes that an alternative did not meet the specified criteria. Only shaded alternatives that are shaded were carried to next step of plan formulation process.

Key: *#W = 100% wetland*
#UW70 =70% upland, 30% wetland
#UW50 =50% upland, 50% wetland
#UW30 =30% upland, 70% wetland
#U =100% upland

B.7.3 Re-Evaluation of the Remaining Alternatives

The four remaining alternatives were next re-evaluated to optimize the habitat proportions and environmental benefits), while still meeting the dredged material capacity needs.

B.7.3.a PDT Consensus

The alignment screening process eliminated each of the stand alone Barren Island alternatives, primarily in response to agency concerns to minimize potential environmental impacts by reducing the size of the project footprint. However, the PDT agreed that one stand alone Barren Island alternative should be carried forward in the plan formulation process. This would provide a detailed evaluation and comparison with the remaining four alignment alternatives. The Barren Island Alignment A (1,354 ac) 50% upland, 50% wetland alternative was chosen for reconsideration because it was the smallest alignment that met all other screening criteria.

B.7.3.a.1 ***Optimization of the Upland to Wetland Ratio***

The alignment screening process eliminated each alignment wetland proportions of less than 50 percent (based on agency concerns) and greater than 70 percent (based on the dredged material placement analysis). To maximize the environmental benefits of the project by increasing the proportion of wetland habitat, detailed dredged material analyses were conducted to evaluate the feasibility of constructing the remaining alignments with habitat proportions of 45% upland, 55% wetland and 40% upland, 60% wetland, in addition to the 50% upland, 50% wetland schemes, while still providing sufficient dredged material placement capacity over the life of the project.

The dredged material placement analyses indicated that an island alignment or alignment combination that was over 2,000 acres had sufficient capacity (72 to 92 mcy) to efficiently handle the predicted dredged material inflows while creating wetlands that covered greater than 50% of the overall island area (Appendix C). For island alignments or alignment combinations smaller than 2,000 to have a habitat proportion with greater than 50% wetlands and still have sufficient capacity to accommodate the annual dredged material inflows, the upland dikes would have to be constructed higher than +20 ft MLLW or the wetland cells would have to be developed at an accelerated rate (more than two wetland per year) (Table B-13).

Developing wetland cells at an accelerated rate would decrease the potential for achieving the full environmental benefit from these habitats, and it would result in a costly and inefficient use of the site capacity (Appendix C). Therefore, developing wetland cells at an accelerated rate was not considered a viable option to increase the proportion of wetlands for the project.

Raising the height of the upland dikes would increase the upland placement capacity without increasing the size of the project footprint, minimizing impacts to Bay bottom habitats. Raising the upland dikes would also provide a contingency to deal with the many uncertainties of wetland development. Based on the experience at the PIERP, a contingency of approximately two years is necessary to ensure proper wetland cell development (USACE, 2005). Therefore, the potential for successfully completing the wetland development while employing efficient (cost effective) dredged material placement methods would be enhanced.

Raising the height of the upland dikes also had some constraints. The maximum final design height was limited by the results of slope stability analysis that had shown that temporary dike heights above +40 MLLW might not be stable. In addition, for other projects constructed in this region (PIERP and Hart-Miller Island) the public has repeatedly voiced concerns about the impact that raising the dikes would have on the overall aesthetics of the project area. Therefore, only final upland dike heights of +20 ft MLLW, +25 ft MLLW, and +30 ft MLLW were considered feasible. In the determination of the potential alignments, the lowest dike height necessary to achieve the increased wetland proportion was considered the feasible alternative. Site capacity, site lifecycle, the potential for overloading cells, the efficiency of habitat development, the potential for full realization of environmental benefits were each used to evaluate potential alignment alternatives. The detailed results of the screening process to evaluation multiple dike heights for the alignment alternatives are presented in Appendix C, Attachment C.

Table B-13: Dredged Material Placement Efficiency Analysis

Placement Scheme	Size of Placement Scheme (acreage)													
	600	700	1,000	1,200	1,354	1,400	1,500	1,586	1,600	1,800	2,072	2,500	2,700	2,756
50% Upland 50% Wetland				X	X	X	X	X			X			X
45% Upland 55% Wetland					X			X			X		X	X
45% Upland 55% Wetland +25 MLLW upland					X			X						
45% Upland 55% Wetland borrow excavation											X			
40% Upland 60% Wetland							X	X	X	X	X		X	X
40% Upland 60% Wetland +25 MLLW upland					X	X	X	X	X		X			X
40% Upland 60% Wetland +30 MLLW upland					X	X	X	X	X	X	X			
40% Upland 60% Wetland borrow excavation											X			
40% Upland 60% Wetland accelerated wetland development							X							

An "X" denotes a placement scheme that was evaluated at the designated acreage. A shaded box denotes that the placement scheme at the designated acreage is feasible.

B.7.3.a.2 ***Minimizing the Project Footprint***

Additional geotechnical investigation of potential sand borrow areas indicated that a James 3 plus Barren D alignment would require borrow from outside the alignment footprint sites at both James and Barren islands, increasing the environmental impact to Bay bottom. The James 5 plus Barren D alternative would require sand borrow from outside the project alignment at Barren Island. A subsequent comparison between the James 5 plus Barren D alternative and the James 3 plus Barren D alternative indicated that the differences were not significant because the alternatives had similar placement capacity and potential environmental benefits. Because the James 5 plus Barren D alignment would impact a smaller area of Bay bottom, the James 3 plus Barren D alignment was eliminated from consideration.

Alternatives Remaining after the Screening Process

In addition to the no-action alternative, a total of eleven alternatives remained after the screening process (Table B-14).

Table B-14. Alternatives Remaining after the Screening Process

Alignment	Total Acerage (ac)	Upland (%, acres)	Wetland (%, acres)	Dike Height (ft)
Barren Alignment A	1,354	50%, 677	50%, 677	20
Barren Alignment A	1,354	45%, 609	55%, 745	25
James Alignment 5 / Barren Alignment D	2,756	50%, 1,378	50%, 1,378	20
James Alignment 5 / Barren Alignment D	2,756	45%, 1,240	55%, 1,516	20
James Alignment 5 / Barren Alignment D	2,756	40%, 1,102	60%, 1,654	25
James Alignment 3	1,586	50%, 793	50%, 793	20
James Alignment 3	1,586	45%, 174	55%, 872	25
James Alignment 3	1,586	40%, 634	60%, 952	30
James Alignment 5	2,072	50%, 1,036	50%, 1,036	20
James Alignment 5	2,072	45%, 932	55%, 1,140	20
James Alignment 5	2,072	40%, 829	60%, 1,243	25

To optimize the wetland/upland proportion relative to environmental benefits, cost, and site operations, an environmental benefits analysis and a cost effectiveness/incremental cost analysis (CE/ICA) were used to evaluate each of the eleven alternative alignments.

B.8 ISLAND COMMUNITY UNIT (ICU) ANALYSIS

Because ecosystem restoration is a primary mission of the USACE Civil Works program, the objective in ecosystem restoration planning is to contribute to national ecosystem restoration

(NER) by increasing the net quantity and/or quality of desired ecosystem resources. The benefits (outputs) of ecosystem restoration projects can be quantified using a variety of measures, and indices have been developed that combine multiple types of environmental benefits together into one unit for comparability of proposed alternatives.

To adequately evaluate the outputs of the proposed Mid-Chesapeake Bay Island restoration project at James and Barren Islands, it was necessary to design a method to quantify the environmental benefits (outputs) of the proposed alternative plans. At the start of the project it was decided that individual species would not be used to quantify environmental benefits, but rather the fish and wildlife communities that would inhabit the island ecosystems. (For purposes of this analysis, 'community' and 'guild' are used interchangeably to describe a group of interacting animals that utilize the resources of a given habitat in a similar way.) The method, developed by USACE-Baltimore with input from a working group involving resource agency representatives, calculates Island Community Units (ICUs) to quantify environmental benefits (with a focus on animal communities) over the life of the restoration project. This restoration measurement was reviewed and approved by the BEWG, and was also employed in the General Reevaluation Report (GRR) and Supplemental Environmental Impact Statement (SEIS) for the PIERP (USACE/MPA, 2005). Environmental benefits of fully developed (graded and planted) cells, in addition to interim environmental benefits realized during dredged material placement, were included in the analysis.

B.8.1 Methods

Step 1: Habitat Types and Workgroup Development

The Mid-Chesapeake Bay Island Plan Formulation group determined by consensus to focus on four habitat types that would be constructed as part of large island restoration: upland, high marsh, low marsh, and intertidal/mudflats. Table B-15 provides the aerial distribution of habitat types for the eleven alternatives analyzed. Uplands are important to the island ecosystem because of the nesting habitat they provide for colonial waterbirds (unvegetated) and colonial wading birds (vegetated). During Mid-Chesapeake Bay Island plan formulation, it was recognized that low marsh has greater primary productivity than high marsh, and that low marsh would provide additional habitat for fish and benthic invertebrates. Because of the value of the low marsh habitat and the large amounts of low marsh lost to erosion throughout the Chesapeake Bay region, an approximate distribution of 80 percent low marsh to 20 percent high marsh was agreed upon for the habitat development of PIERP for both the existing project and the proposed expansion (USACE/MPA, 2005). The 80 percent low marsh to 20 percent high marsh distribution was incorporated into the plan formulation process for the lateral expansion at PIERP.

Expansive mudflats/intertidal areas no longer exist in the Chesapeake Bay system and are thought to have been historically rare because of the low tidal range of the Chesapeake Bay system. However, mudflats created intermittently during dredged material placement at the PIERP have been extensively used as foraging habitat by a large variety of bird species. Because of their recognized value, mudflats are an important component of the created habitats of a large island restoration project, such as the project proposed at James Island. The plan formulation group agreed to include mudflats/intertidal acreage as approximately 10 percent of the low marsh acreage for formulation.

Table B-15. Distribution (in acres) of Habitat Types for Mid-Chesapeake Bay Island Study Alternatives

Alternative (Upland / Wetland Ratio)	Cell Acreage		Placement Acreage		Habitat Type		
	Upland	Wetland	Upland	Wetland	High Marsh**	Low Marsh**	Mudflat/ Intertidal**
Barren Alignment A (50/50)	677	677	619	619	117	421	81
Barren Alignment A (45/55)	609.3	744.7	577	682	130	466	86
James Alignment 5 / Barren Alignment D (50/50)	1378	1378	1261	1261	239	861	161
James Alignment 5 / Barren Alignment D (45/55)	1240.2	1515.8	1136.1	1386	264	951	171
James Alignment 5 / Barren Alignment D (40/60)	1102.4	1653.6	1008.8	1512	289	1041	182
James Alignment 3 (50/50)	793	793	726	726	139	199	88
James Alignment 3 (45/55)	713.7	872.3	653	798	153	550	95
James Alignment 3 (40/60)	634.4	951.6	580	871	167	603	101
James Alignment 5 (50/50)	1036	1036	948	948	183	658	107
James Alignment 5 (45/55)	932.4	1139.6	853	1043	202	728	113
James Alignment 5 (40/60)	828.8	1243.2	758	1138	221	797	120

**Actual placement areas are typically 91% of the nominal area of each cell after accounting for the dike footprint.*
***Based on placement acreage in each cell. Assumed that 80 percent of wetland is low marsh, 20 percent is high marsh, and 10 percent of low marsh acreage is mudflat/intertidal (acres are presented to the nearest acre).*

Additional information on island ecosystem habitat and the fish and wildlife communities utilizing island habitats was needed to quantify the environmental benefits large island restoration projects in the Chesapeake Bay. A workgroup was developed to gather the ecological data needed to determine the environmental benefits for each alternative. Members of the workgroup included representatives from state and Federal agencies, plus private consulting firms, and were chosen based on their expertise of remote island habitat or a specific ecological community. The goals of the workgroup were:

1) identify species that use the mid-Chesapeake Bay island and assign these species to communities, and

2) identify the limiting habitat requirements for guild/communities based on the species that comprise those communities.

The panel of experts was polled using the Delphi Method (Crance, 1987), the results of which were used to define an Island Community Index (Step 4) and calculate Island Community Units (Step 5).

Step 2: Guild/Community Identification

The next step was to identify the species that use remote island habitat in Chesapeake Bay, and then identify the key habitat requirements for those species. Mammals were not included as a specific community for the ICU analysis because birds and fish were identified as the primary users of remote island habitat. Based on the list of species identified, the guilds/communities that utilize remote islands were determined. A total of nine guilds/communities were identified as primary users of remote island habitat in the Chesapeake Bay:

- Colonial nesting wading birds (herons, egrets, and ibises)
- Waterfowl
- Colonial nesting waterbirds (gulls, herons, and skimmers)
- Raptors
- Shorebirds
- Herpetofauna
- Benthic Invertebrates
- Resident/Forage Fish
- Commercial/Predatory/Higher Trophic Level Fish

Step 3: Weighting of guilds/communities

Next, limiting conditions for guilds/communities were established using measurable key habitat features (i.e., feeding and reproductive strategies), and the habitat types that each guild would potentially use were identified. It was recognized that not all communities relied on or would use the restored island to the same degree. For example, some species may utilize all of the habitat types, while other species may preferentially use a single habitat type. Other species may utilize multiple habitat types by using different habitat types for feeding and reproduction. Therefore, a weighting factor was assigned to each guild/community depending on the extent to which a community would utilize remote island habitat (Table B-16). Weights were determined by consensus of the Mid-Chesapeake Bay Island Plan Formulation Group. Weights (W, as a proportion) are incorporated into the ICU calculation that is outlined in Step 5.

The heavy weight assigned to colonial wading birds and waterbirds, collectively, reflects the reliance these assemblages have on remote island habitat for nesting. The coastal plain, home to nearly 100 percent of the breeding population, is the most important physiographic region in Maryland for nesting colonial wading birds and waterbirds (DNR, 1996). DNR (1996) further identifies that most of the large islands of the Chesapeake Bay, specifically Barren, Bloodsworth, Coaches, Pooles, Poplar, and the Smith Island archipelago, support large numbers of colonial nesting birds. Although, not necessarily reflective of regional trends, a decline in Maryland colonies of Black Skimmer, Common Tern, Gull-Billed Tern, Laughing Gull, and Herring Gull was recorded between 1985 and 2003 (DNR, 2004).

Table B-16. Weighting Factors (W) Assigned to Each Guild/Community/Assemblage to Calculate ICUs

Colonial Nesting Wading Birds (herons, egrets, ibises)	12 %
Waterfowl	10 %
Colonial Nesting Waterbirds (gulls, herons, and skimmers)	12 %
Raptors	2 %
Shorebirds	14 %
Birds (total)	**50 %**
Resident/Forage Fish	23 %
Commercial/Predatory/Higher Trophic Level Fish	5 %
Fish (total)	**28 %**
Reptile/Herpetofauna	**2 %**
Benthic Invertebrate	**20 %**

Step 4: Island Community Index (ICI)

An Island Community Index (ICI) for each guild/community for each habitat type was defined. The index is a value between 0 and 1.0. The index is defined as follows:

- 1.0 = optimum/maximum use,
- 0.75 = use probable, but not optimum,
- 0.5 = use possible/some use,
- 0.25 = minimum use,
- 0 = no use/habitat value.

ICIs were then used to classify the probability that a guild/community would utilize a specific habitat type, based on the characteristics and limiting features (e.g., size, vegetation, substrate, maturity) of the habitat. The supporting information for defining ICIs was gathered from the expert workgroup and a literature search. For example, an intertidal/mudflat habitat with an area greater than 25 acres and a sandy beach/shoreline would be assigned a 1.0 (optimum/maximum use) for colonial nesting birds, while an intertidal/mudflat habitat with an area less than 12.5 acres and a sandy beach/shoreline would be assigned a 0.5 (use possible/some use) for colonial nesting birds. The complete list of ICIs used in the analysis is located in Attachment B.

Step 5a: Island Community Unit (ICU) Calculation- Constructed Habitat Benefit

The annual placement schedule and cell development plan (formulated by USACE Engineering) determined the size of each cell (in acres) and identified the years in which a cell would be filled, graded, and planted. Once planted, cells start to accrue habitat benefits. The maturity time (the time until a habitat develops full benefits) assumed for each habitat type is located in Table B-17. Since the exterior dikes provide a hard substrate used as benthic habitat, a minimum habitat benefit was assigned to the dike acreage and added to each year over the course of the project's life.

Incorporating the defined ICIs, guild weights, habitat areas determined by USACE- Baltimore Engineering, and maturity dates, ICUs were calculated using the following formula, derived by the Mid-Chesapeake Bay Island Plan Formulation Group:

$$\sum_{g} \left[\left[\sum_{H} (I_{gH} * A_{H}) \right] * w_{g} \right]_{g}$$

where g = guild/community
H = habitat type
I = Island Community Index (ICI) Value
A = acreage of habitat type
W = weighting factor for the guild/community (Table B-16).

Table B-17. Habitat Maturity Dates used for the Island Community Unit Incremental Calculation

Wooded upland for Colonial Nesting Wading Birds (nesting)-- (herons, egrets, and ibises)	25+ years
Upland nesting habitat for Colonial Nesting Waterbirds (gulls, terns, and skimmers) (This is essentially an expiration date. Use as nesting habitat is only viable until vegetation is established; after that no use for nesting.)	1 year
Upland for waterfowl use (including woody/shrubby cover surrounding pools for nesting)	10 years
High Marsh (no woody vegetation)	5 years*
High Marsh with woody/shrubby vegetation	10 years
Low Marsh	5 years*
Intertidal (mudflats) (maintained as unvegetated)	5 years*
Benthic invertebrate communities	10 years

**will have some additional benefits after 5 years as invertebrate community develops to maturity*

Based on the ICI analysis, ICUs were calculated for year 1, year 5, year 10, and year 25 after planting. ICUs for years between those calculated were evaluated according to the following assumptions:

a) For upland cells, environmental benefits increase equal amounts per year between years 1 and 5 and 5 and 10. ICUs are constant between years 10 and 25. A step increase occurs in year 25 when maximum upland benefits are reached.

b) The majority of the function for a wetland cell will be reached by year 5 with a small amount of increased benefits through year 10 when the benthic invertebrate assemblage matures. Of the function existing by year 5, it was assumed that 75 percent was achieved by year 3. Benefits increase equal amounts per year between years 1 to 3, 3 to 5, and 5 through 10. Wetland benefits are constant after year 10 until interior dikes can be

removed in year 15. Once the interior dikes are removed, the joined wetland cells would have increased benefits because of the increased expanse of habitat.

Step 5b: ICU Calculation- SAV Benefit

Due to significant benefits provided by SAV currently at Barren and historically at James, the PDT decided to include SAV as part of the ICU calculation. To accomplish this task, VIMS SAV maps for Barren and James Island vicinities were obtained for the period of record available, 1995 to 2003. SAV beds were then identified as polygons and each polygon was assigned a bed density and area. An average SAV ICU was calculated for Barren and James, respectively. Similar to the other habitat components within the ICI, the associated bed density was correlated to an index value:

- 1=70-110 % SAV density class
- 0.75 = 40-70 % SAV density class
- 0.5 = 10-40 %
- 0.25 = 0-10 %
- 0 = 0 % (no SAV/unmapped)

These index values were applied to the mapped areas (polygons) and the sum of the total ICU per year was calculated using the following formula:

$$\sum_{\text{All SAV polygons mapped in year i}} (\text{Area x Index}) = \text{Total ICU}_{\text{year i}}$$

The ICU yearly totals were then averaged to account for natural yearly variability in order to compute the final ICU for SAV habitat for each island. The SAV ICU is 2.8 for James Island and 234.4 for Barren Island.

A sample ICU calculation is provided in Figure B-14. The total ICU value presented is the sum of the constructed ICU plus the SAV ICU. ICI were assigned to the hundredth decimal place, however, ICU are rounded to the nearest tenth for analysis of alternatives. Tables summarizing the cell development and ICU analysis for each of the alternatives are presented in Attachment B.

Multiply Units by weight (as decimal percent) and then sum to calculate the wetland weighted sum by guild.

Summary of subcell acreage

50% wetlands/50%uplands		Total (ac) = 1354										
		upland = 619		Island Community Index				Community Units				
YEAR 5		wetland subcell= 34.4		upland	high marsh	low marsh	intertidal	upland	high marsh	low marsh	intertidal	
	guild/community	WEIGHT	Sum of Weights	619	6.9	24.8	2.8					Wetland weighted sum by guild
BIRDS	colonial nesting wading birds	12			0.75	0.25	0.5		5.16	6.19	1.38	**1.53**
"	waterfowl	10			0	1	0.5		0	24.77	1.38	**2.61**
"	colonial nesting waterbirds	12	50		0.75	1	0		5.16	24.77	0.00	**3.59**
"	raptors	2			1	0.5	0		6.88	12.38	0.00	**0.39**
"	shorebirds	14			0.25	0.25	0		1.72	6.19	0.00	**1.11**
	rept/herps	2	2		1	1	1		6.88	24.77	2.75	**0.69**
	benthic invert.	20	20		0.5	0.5	0.5		3.44	12.38	1.38	**3.44**
FISH	resident/forage fish	23	28		0	0.75	0.75		0	18.58	2.06	**4.75**
"	commercial/predatory/higher	5			0	0.75	0.5		0	18.58	1.38	**1.00**
	TOTAL	**100**	**100**					Constructed Island Community Units				19.10

Breakdown of wetland acreage by habitat

For each habitat, multiply ICI by acreage to get Units

Sum 'weighted sum by guild' totals to calculate Total Constructed Island Community

Figure B-14. ICU Example Calculation: 50% wetlands, 50% uplands - wetland cell in Year 5

Table B-18. Habitat Features to be Included in Design to Reach Full Benefits

Upland:

1. Immature (newly constructed) uplands- the sparsely vegetated to open sand, soil, or shell is considered colonial nesting waterbird habitat. There will need to be intense predator control. Once vegetation is established uplands will no longer be used for colonial nesting waterbird habitat.
2. Freshwater ponds are included to provide benefits to colonial nesting wading birds and waterfowl.
3. Forested edge adjacent to high marsh to provide benefits to waterfowl.

High Marsh:

1. Include intertidal ponds for colonial nesting wading birds, waterbirds, shorebirds, waterfowl, and herpetofauna. At least some of these should be fishless (herpetofauna).
2. Include acreage adjacent to uplands for waterfowl.
3. Incorporate hummocks for waterfowl.
4. Include channels to enhance habitat for waterfowl and herpetofauna.

Low Marsh:

1. Some acreage should be upgrade from sand beach to provide benefits for colonial nesting wading birds and waterbirds, and waterfowl.
2. Some acreage should not be up grade from sand beach to benefit resident/forage fish and commercial/predatory/higher trophic.fish.
3. Low marsh needs to be cut with channels to benefit all communities with exception of raptors. Channels on eastern side will specifically benefit herpetofauna.
4. Include intertidal and tidal pools to benefit colonial nesting waterbirds, wading birds, waterfowl, and shorebirds.

Intertidal/Unvegetated Mudflat:

1. Include channels to provide benefits to herpetofauna, resident/forage fish and commercial/predatory/higher trophic fish
2. Include sandy beaches to benefit colonial nesting wading birds, waterbirds, shorebirds, and herpetofauna.
3. Sand beaches cut with channels provide benefit to resident/forage fish and commercial/predatory/higher trophic fish.
4. Intertidal mudflats adjacent to channel provide benefits to herpetofauna.

Bird Islands:

1. Vegetation and predator control is needed to maintain the bird islands for colonial waterbird nesting habitat. 1-2 ha (2.5 to 5 ac) is optimal size.

Step 6: Total ICU/year

Once the ICUs and interim ICUs for each subcell were calculated, ICUs for all cells for an individual year were summed to obtain Total ICU/year. The Total ICU/year versus time was plotted to determine how the habitat benefits will develop and come on-line with construction of the island alternative.

B.8.2 Results of the Environmental Benefits Calculation

To determine the environmental benefits from the each of the eleven alignment alternatives, ICU were calculated based on the engineering plan for placement and development of each subcell over a 50-year period of analysis (2010 – 2060) using the seven step method. Results of this analysis are presented for each of the eleven alignment alternatives in Table B-19. The ICUs for each cell for an individual year were summed to obtain the average annual ICUs, and the total average annual ICUs was used to directly compare the environmental benefits produced by each option.

The no-action alternative is defined as the projected future without project remaining acreage at both James Island and Barren Island. Rates of erosion were computed for each island based on long term historical loss rates at the islands. The estimated long term rate of erosion at James Island is 4.9 ac per year, and the estimated long term rate of erosion at Barren Island is 4.1 ac per year (Wray, 1995). These rates may vary from year to year based on extreme weather events. As of 2004, James Island was 79 ac, and if the no-action alternative is selected and the current erosion rate continues, James Island will be submerged by 2021. Barren Island will be submerged by 2052 if the no-action plan is chosen and current erosion rates continue.

Based on the current rates of erosion at the two islands, the ICUs (environmental outputs) for the existing and without project conditions were evaluated for both Barren Island and James Island (Attachment C), including the ICUs associated with SAV beds protected by the islands. At Barren Island, the no-action alternative had an annual average ICUs of 126.7, and at James Island, the no-action alternative had an annual average ICUs of 1.8. The combined no-action average annual ICUs for both islands was 128.5 ICU.

Table B-19. Summary of ICUs for Mid-Chesapeake Bay Island Restoration Alternatives

Alternative (Upland / Wetland Ratio)	Tot. ICUs (50 yr period)	Average Annual ICUs
Barren Alignment A (50/50)	32,467	649
Barren Alignment A (45/55)	33,385	668
James Alignment 5 / Barren Alignment D (50/50)	28,616	885
James Alignment 5 / Barren Alignment D (45/55)	45,641	913
James Alignment 5 / Barren Alignment D (40/60)	46,861	937
James Alignment 3 (50/50)	19,396	388
James Alignment 3 (45/55)	20,492	410

James Alignment 3 (40/60)	20,931	419
James Alignment 5 (50/50)	22,626	453
James Alignment 5 (45/55)	24,598	492
James Alignment 5 (40/60)	25,797	516

B.9 COST EFFECTIVENESS/INCREMENTAL COST ANALYSIS

USACE projects for flood control, navigation, shoreline protection, and other purposes, including ecosystem restoration projects (such as the Mid-Chesapeake Bay Island Restoration) rely on a benefit-cost analysis to provide the best plan for project implementation. The difference between the monetary cost of the plan and the value of plan benefits describes the plan's net benefits. USACE performs project-specific analyses to compare the costs and benefits of viable alternatives to identify the most cost-effective solution(s). This information is then used to provide guidance in decision-making.

For ecosystem restoration projects, the value of the ecological resources being protected, restored, or created must be established through legal or institutional recognition, scientific recognition, and public perception of value. A recommended plan is typically identified when the monetary and non-monetary outputs of the restoration project validate its incremental costs above the base plan. However, unlike traditional projects, there is no accepted method for quantifying environmental outputs in monetary terms. Because the benefits of restoration projects usually are not measured in currency, cost-effectiveness (CE) and incremental cost analyses (ICA) are more appropriate benchmarks of a project's value.

A cost effectiveness/incremental analysis (CE/ICA) was used to evaluate and compare the expected outputs and the expected costs associated with construction and development of the alternative alignments proposed for the Mid-Chesapeake Bay Island Restoration Study. Procedures for conducting cost-effectiveness and incremental analyses are based upon the conceptual framework of the U.S. Water Resources Council's *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies*. While the *Principles and Guidelines* places emphasis on plans to achieve NED benefits, it also gives reference to allowing cost-effective plans to achieve other benefits, such as environmental benefits. The Corps' planning regulation 1105-2-100, *Guidance for Conducting Civil Works Planning Studies*, directs that incremental cost analyses be performed to discover and display variation in costs and to identify the least-cost plan. The importance of cost effectiveness and incremental analysis is discussed in Engineering Circular 1105-2-210, *Ecosystem Restoration in the Civil Works Program.*

Cost effectiveness analysis is used to show that an alternative plan's output cannot be produced more cost effectively by another alternative. "Cost-effective" means that, for a given level of

non-monetary output, no other plan costs less and no other plan yields more output for less money. Incremental cost analysis is used to compare a variety of feasible alternatives to arrive at a "best" level of output within the limits of both the sponsor's and USACE's capabilities. The subset of cost effective plans are examined sequentially (by increasing scale and increment of output) to ascertain which plans are most efficient in the production of environmental benefits. Those most efficient plans provide the greatest increase in output for the least increases in cost and have the lowest incremental costs per unit of output. CE/ICA is a useful tool to determine whether additional ecosystem outputs gained by increasing levels of restoration are worth the additional monetary cost. Although CE/ICA analyses do not necessarily result in the identification of a single "best" alternative, it contributes to informed decision making for ecosystem restoration projects.

B.9.1 Project Output Analysis

The project outputs are the environmental benefits of each alignment alternative. As described in Section B.7., the environmental benefits of the no-action alternative and each alignment alternative were determined by using ICUs calculated over a 50-year period of analysis (2010 – 2060) (Table B-19).

B.9.1.a No-Action (Without Project) Alternative

The no-action, or without project alternative, was included in the CE/ICA analysis to provide a basis for output and cost comparisons. The period of analysis used was 50 years with a project base year of 2010, the first year of expected outputs with construction of a proposed alternative.

Based on the current rates of erosion at the two islands, the ICUs (environmental outputs) for the existing and without project conditions were evaluated for both Barren Island and James Island (Attachment C), including the ICUs associated with SAV beds protected by the islands. At Barren Island, the no-action alternative had an annual average ICUs of 126.7, and at James Island, the no-action alternative had an annual average ICUs of 1.8. The combined no-action average annual ICUs for both islands was 128.5 ICU.

B.9.1.b Project Alternatives

Eleven island ecosystem restoration alternatives were identified through initial and secondary screening using non-economic criteria and objectives to eliminate alternative alignments that did not meet project goals. The eleven alternatives include six James Island alternatives, two Barren Island alternatives, and three James Island/Barren Island combined alternatives (Table B-20). Each of these eleven alternatives was compared to the no-action alternative or without project condition.

Table B-20. Mid-Bay Island Restoration Alternatives

Alignment	Total Acreage (ac)	Upland (%, acres)	Wetland (%, acres)	Dike Height (ft)	Tot. ICUs (50 yr period)	Average Annual ICUs
Barren Alignment A	1,354	50%, 677	50%, 677	20	32,467	649
Barren Alignment A	1,354	45%, 609	55%, 745	25	33,385	668
James Alignment 5 / Barren Alignment D	2,756	50%, 1,378	50%, 1,378	20	28,616	885
James Alignment 5 / Barren Alignment D	2,756	45%, 1,240	55%, 1,516	20	45,641	913
James Alignment 5 / Barren Alignment D	2,756	40%, 1,102	60%, 1,654	25	46,861	937
James Alignment 3	1,586	50%, 793	50%, 793	20	19,396	388
James Alignment 3	1,586	45%, 174	55%, 872	25	20,492	410
James Alignment 3	1,586	40%, 634	60%, 952	30	20,931	419
James Alignment 5	2,072	50%, 1,036	50%, 1,036	20	22,626	453
James Alignment 5	2,072	45%, 932	55%, 1,140	20	24,598	492
James Alignment 5	2,072	40%, 829	60%, 1,243	25	25,797	516

B.9.2 Alternatives Cost Analysis

A conceptual level cost estimate for each alternative was developed based on the actual, historical costs of the existing PIERP project. These conceptual level costs were then used to estimate projected costs over the lifetime of the alternative.

Table B-21 displays the cost estimate for each alternative that were used in the CE/ICA analysis. The project costs are broken into three components in the following table: (1) dike construction, (2) all remaining construction costs excluding dike construction, and (3) an incremental cost for increasing the dike height above 20-ft. Project "costs excluding dike construction" consist of site development, habitat development and dredged material transportation and placement costs. Site development and habitat development were dependent on the size and wetland/upland ratio of the alternative and include all site operation costs, including: 1) environmental monitoring by various natural resource agencies; 2) habitat development, specifically site grading, developing channels and inlets for tidal flow and plantings; and 3) monitoring and management of inflow of dredged material, site operations, including crust management, dike maintenance, installing perimeter trenches, cutting interior drainage trenches, and maintaining trenches, sumps and bleeder channels. The incremental dike cost accounts for the cost to construct upland dikes higher than 20-ft and are only associated with alternatives proposed to have 25ft or 30ft dike heights. Increased dike heights resulted from additional dredged material placement analysis

(Table B-13 and Appendix C) and are related to efficient dredged material placement given an alignment acreage and upland to wetland ratio.

Table B-21. Mid-Bay Island Restoration Alternative Project Cost Analysis

Alternative	Total Acres	Upland Dike Height	Upland/ Wetland Ratio	Project Costs Excluding Dike Construction	20' Dike Construction Cost	Incremental Dike Height Cost	Total Project Cost
Barren Alignment A	1,354	20	50/50	$519,699,000	$167,247,000	$0	$686,946,000
Barren Alignment A	1,354	25	45/55	$512,089,000	$167,247,000	$18,279,000	$697,615,000
James Alignment 5 / Barren Alignment D	2,756	20	50/50	$949,599,000	$303,160,000	$0	$1,252,759,000
James Alignment 5 / Barren Alignment D	2,756	20	45/55	$941,130,000	$303,160,000	$0	$1,244,000
James Alignment 5 / Barren Alignment D	2,756	25	40/60	$910,373,000	$303,160,000	$66,144,000	$1,279,677,000
James Alignment 3	1,586	20	50/50	$549,614,000	$174,460,000	$0	$724,074,000
James Alignment 3	1,586	25	45/55	$532,034,000	$174,460,000	$21,411,000	$727,905,000
James Alignment 3	1,586	30	40/60	$514,453,000	$174,460,000	$38,064,000	$726,977,000
James Alignment 5	2,072	20	50/50	$713,922,000	$227,920,000	$0	$941,842,000
James Alignment 5	2,072	20	45/55	$699,177,000	$227,920,000	$0	$927,097,000
James Alignment 5	2,072	25	40/60	$684,431,000	$227,920,000	$49,747,000	$962,098,000

B.9.3 Environmental Benefits (ICU) Evaluation

Each of the eleven island restoration alignments was evaluated for a 50 year period of analysis to evaluate the expected output in ICUs associated with construction and development of the alignment. For this project, construction was estimated to begin in 2008, with environmental benefits to begin accruing benefits in 2010, two years after the start of construction. The ICUs were evaluated based on the unique site development plan and cell development plan for each alignment. For each alignment, an average yearly ICU amount was computed. Table B-19 displays the results of the evaluation of expected ICUs for each alignment.

B.9.4 Cost Effectiveness Analysis

Table B-22 displays the cost effectiveness analysis for the eleven island restoration alternatives and the No-Action alternative. Detailed information (year by year calculation of the ICU and project costs) for each of the eleven island restoration alternatives is provided in Attachment C. The project costs for each alternative were annualized using the FY 2005 interest rate of 5.375

percent that was applicable at the time of the analysis. The annualized cost is the amount that was used to compare the yearly average ICUs in the cost effectiveness analysis.

Table B-22. Mid-Chesapeake Island Restoration Alignment, Cost Effectiveness Analysis, FY 2005 Interest Rate 5.375%

Alternative (Upland/Wetland Ratio)	Total Cost ($000s)	Present Value Cost ($000s)	Total ICUs	Average Annual Cost ($000s)	Average Annual ICUs
No Action	$0	$0	6,427	$0	129
James Alignment 3 (50/50)	$724,074	$546,122	19,396	$31,664	388
James Alignment 3 (45/55)	$727,904	$549,011	20,492	$31,832	410
James Alignment 3 (40/60)	$726,977	$548,312	20,931	$31,791	419
James Alignment 5 (50/50)	$941,842	$710,371	22,626	$41,188	453
James Alignment 5 (45/55)	$927,097	$699,249	24,598	$40,543	492
James Alignment 5 (40/60)	$962,098	$725,647	25,797	$42,073	516
Barren Alignment A (50/50)	$686,946	$516,775	32,467	$29,963	649
Barren Alignment A (45/55)	$697,615	$518,692	33,385	$30,074	668
James Alignment 5 / Barren Alignment D (50/50)	$1,252,759	$944,875	44,234	$54,748	885
James Alignment 5 / Barren Alignment D (45/55)	$1,244,290	$941,133	45,641	$54,567	913
James Alignment 5 / Barren Alignment D (40/60)	$1,279,677	$965,177	46,861	$55,962	937

Table B-22 is arranged in ascending order from least to greatest output in ICUs. The table is arranged in ascending order from least to greatest output in ICUs. The No-Action alternative, listed first in the table, produces 129 expected yearly ICUs. The six James Island only alternatives (shaded in gray) were eliminated because the Barren Island Alternative A (50% upland, 50% wetland) produced more output for less cost than each of those six alternatives (Table B-22). The combined island alternatives were evaluated using the same cost per ICU comparison method, and based on this evaluation the James Alignment 5 plus Barren Alignment D (50% upland, 50% wetland) alternative was also eliminated (shaded in gray). Based on the cost effectiveness analysis, four alternatives remained (those not shaded in the table). From a cost effectiveness perspective, selection of any of these four alternatives would be acceptable.

B.9.5 Incremental Analysis of Cost Effective Alignments

The next step is to examine the efficiency of each of the cost effective plans through an incremental cost analysis. In incremental analysis the cost effective plans that provide the

greatest increase in output for the least increase in cost are identified. The decision rule in incremental analysis is to select the plan with the lowest cost per unit and then remove from consideration any plans that provide a smaller output level than the selected plan. These plans are deemed less efficient in production, producing a lower level of output at a higher unit cost.

Table B-23 displays the incremental analysis of the four cost effective alignments. The table is arranged by output in ascending order starting with the No-Action alternative. Table B-23 displays the incremental ICUs gained with each alignment compared to the No-Action alternative, and the incremental cost on an annual basis of each plan compared to the No-Action alternative. Table B-23 also displays the cost per incremental ICU gained by construction of the alignment compared to the No-Action alternative.

Table B-23. Mid-Chesapeake Bay Island Restoration Alignments, Incremental Analysis of Cost Effective Alignments, Cost per ICU of Implementing Each Remaining Plan Instead of the No-Action Plan, FY 2005 Interest Rate 5.375%

Alternative (Upland/Wetland Ratio)	Average Annual Cost ($000s)	Annual ICUs	Incremental ICUs	Incremental Cost ($000s)	$/Incremental ICU
No Action	$0	129	N/A	N/A	N/A
Barren Alignment A (50/50)	$29,963	649	520	$29,963	$57,620
Barren Alignment A (45/55)	$30,074	668	539	$30,074	$55,800
James Alignment 5 / Barren Alignment D (45/55)	$54,567	913	784	$54,567	$69,600
James Alignment 5 / Barren Alignment D (40/60)	$55,962	937	808	$55,962	$69,260

Table B-23 shows the incremental cost per unit of implementing each remaining alternative instead of the no-action plan. The Barren Alignment A, 45% upland, 55% wetland alternative produces 668 ICUs. The cost per incremental ICU of the Barren Alignment A, 45% upland, 55% wetland alternative is the lowest in relation to the no-action plan of the remaining alternatives (539 incremental ICUs at an additional cost of $55,800 per ICU). Therefore, the Barren Alignment A, 50% upland, 50% wetland alternative was eliminated from further consideration.

For the next iteration of incremental analysis, the Barren Alignment A, 45% upland, 55% wetland alternative was used as the basis for comparison (Table B-24). This table shows the incremental cost per unit of implementing each remaining alternative instead of Barren Alignment A (45% upland, 55% wetland). Compared to the Barren Alignment A alternative, the cost per incremental ICU of James Alignment 5 plus Barren Alignment D (40% upland, 60% wetland) was the lowest of the remaining alternatives ($96,240). Therefore, the James Alignment 5 plus Barren Alignment D (45% upland, 55% wetland) alternative was eliminated from the analysis.

Table B-24. Incremental Cost Analysis Compared to Barren Alignment A (45% Upland, 55% Wetland)

Alternative	Average Annual Cost ($000s)	Annual ICUs	Incremental ICUs	Incremental Cost ($000s)	$/Incremental ICU
No Action	$0	129	N/A	N/A	N/A
Barren Alignment A (45/55)	$30,074	668	539	$30,074	$55,800
James Alignment 5 / Barren Alignment D (45/55)	$54,567	913	245	$24,493	$99,970
James Alignment 5 / Barren Alignment D (40/60)	$55,962	937	269	$25,888	$96,240

Based on the results of the incremental analysis, two cost effective alternatives were identified when compared to the no-action alternative (Table B-25):

- **Barren Island Alignment A**: This alignment would total 1,354 acres, with a habitat distribution of 45% upland, 55% wetland and an upland dike height of 25 ft. The incremental cost per ICU of implementing the Barren Island Alignment A alternative instead of the No-Action alternative would be $55,800.

- **James Island Alignment 5 plus Barren Island Alignment D**: This alignment would total 2,756 acres, with a habitat distribution of 40% upland, 60% wetland and an upland dike height of 25 ft. The incremental cost per ICU of implementing the James Island Alignment 5 plus Barren Island Alignment D alternative instead of the No-Action alternative is $96,240.

Table B-25: Mid-Bay Island Alternatives Remaining After Incremental Analyses

Alternative (Upland/Wetland Ratio)	Average Annual Cost ($000s)	Annual ICUs	Incremental ICUs	Incremental Cost ($000s)	$/Incremental ICU
No Action	$0	129	N/A	N/A	N/A
Barren Alignment A (45/55)	$30,074	668	539	$30,074	$55,800
James Alignment 5 / Barren Alignment D (40/60)	$55,962	937	269	$25,888	$96,240

B.10 RE-EVALAUATION OF THE TWO ISLAND ALTERNATIVE

The James Alignment 5 plus Barren Alignment D option was identified in the plan formulation process as the alternative that resulted in the greatest environmental benefit (937 average annual ICUs). However, based on comments from resource agencies and the public, and additional field data collected since the inception of the alignments, the PDT decided that the Barren Island portion of the plan could be scaled down to reduce costs and avoid negative impacts to fisheries in the area surrounding Barren Island without sacrificing environmental benefits. By focusing the restoration efforts at Barren Island on protection of the existing island shorelines and SAV beds, and with minor habitat restoration, similar environmental benefits could be achieved at much lower costs than the James Alignment 5 plus Barren Alignment D alternative. The loss of placement capacity resulting from a decrease in size of the Barren Island component of the project could be accommodated by the James Island portion of the combined plan.

Therefore, an additional combined alignment – James Alignment 5 plus Barren Alignment E – was created. The James Alignment 5 plus Barren Alignment E alignment combined the existing James Island 5 restoration alignment (2,072 acres) with a modified Barren Island restoration with the primary goal of shoreline protection. The modified Barren Island would reduce the project footprint from 690 acres to 72 acres, significantly reducing impacts to natural resources, fisheries use and the loss of bottom fish habitat. The Barren Island E alignment would consist of 1) modifying approximately 4,900 ft of the existing sill structure, 2) constructing a near-shore sill that will be approximately 9,760 ft long, and 3) construction of an 8,200 ft long breakwater extending south of the existing island remnants. A portion of the area created behind the sill will be filled with dredged material from the Honga River navigation project to create approximately 72 acres of wetlands. Additionally, the construction of the sill and breakwater will provide protection to approximately 1,348 acres of critical SAV habitat on the eastern side of Barren Island. Therefore, the James 5/Barren E alignment was added the plan formulation process.

Although James Alignment 5 plus Barren Alignment E was not evaluated during the incremental cost analysis, based on its average annual costs of $32,500,000 (total cost is $941,658,000) and 813 average annual ICUs (total ICUs of 40,650), it would have remained in the final array of cost effective plans.

After the CE/ICA and the addition of the James Alignment 5 plus Barren Alignment E alternative by the PDT, a total of three island restoration alternatives remained:

- **Barren Island Alignment A**: This alignment would total 1,354 acres, with a habitat distribution of 45% upland and 55% wetland and an upland dike height of 25 ft. The environmental benefit from this alignment would be an average annual ICU of 668.

- **James Island Alignment 5 plus Barren Island Alignment D**: This alignment would total 2,756 acres (2,072 acres at James Island; 684 acres at Barren Island), with a habitat distribution of 40% upland and 60% wetland and an upland dike height of 25

ft. The environmental benefit from this alignment would be an average annual ICU of 937.

- **James Island Alignment 5 plus Barren Island Alignment E**: This alignment would total 2,144 acres (2,072 acres at James Island; 72 acres at Barren Island), with a habitat distribution of 45% upland and 55% wetland and an upland dike height of 20 ft. The environmental benefit from this alignment would be an average annual ICU of 813.

These three alternatives were compared to the no-action alternative based on environmental benefits, cost, and potential impacts to determine the recommended plan for the Mid-Bay Chesapeake Bay Island Restoration Study.

B.11 EVALUATION OF PROJECT OBJECTIVES

The remaining three alternatives were compared to the project objectives outlined at the beginning of the plan formulation process in February 2005. The comparison evaluated all the available data collected at both James and Barren Islands during the two years of the Mid-Chesapeake Bay Island Restoration Study, including additional information from field surveys completed during the plan formulation process, as well as input from PDT members and resource agencies. The objectives of the study were:

1) Restore and protect marsh, aquatic, and terrestrial island habitat for fish, reptiles, amphibians, birds, and mammals.
2) Protect existing island ecosystems, including sheltered embayments.
3) Optimize the capacity for placement of dredged material (3.2 mcy/yr). (Federal DMMP identified a need to place 30 to 70 million cubic yards of material over a 20 year period.)
4) Increase wetlands acreage in the Chesapeake Bay watershed.
5) Decrease local erosion and turbidity.
6) Promote conditions to establish and protect submerged aquatic vegetation.
7) Promote conditions that support oyster recolonization.

Alternatives were compared to the objectives and ranked using the following scheme:

- a minus (-) indicating that the alternative did not meet the objective;
- one plus sign (+) indicating that the plan did meet the objective; or
- two plus signs (++) indicating that the plan met the objective above and beyond the other plans.

Once all plans were compared, a total score of each alternative was calculated (Table B-26), and used in the selection of the final recommended plan. The no-action alternative was not included in the comparison to the objectives because it is the "without project" condition.

Objective 1 - Restore and protect marsh, aquatic, and terrestrial island habitat for fish, reptiles, amphibians, birds, and mammals

Each of the three alternatives met this habitat restoration objective. Barren Alignment A, James Alignment 5 plus Barren Alignment D, and James Alignment 5 plus Barren Alignment E each restore remote island ecosystem habitat, and therefore, at a minimum, were given a "+" ranking. However, based on results of existing conditions surveys at Barren Island, and the cumulative loss of shallow water and Bay bottom habitats to other dredged material beneficial use projects (most notably, the existing PIERP and its proposed expansion), the Barren A Alignment and James Alignment 5 plus Barren Alignment D alternatives would have greater adverse impacts on existing shallow water habitat. Each of these two alternatives has a larger project footprint than the James Alignment 5 plus Barren Alignment E alternative. Reducing the size of the project footprint would minimize impacts to the shallow water and Bay bottom habitat that are critical for fisheries nurseries and feeding. Because the James Alignment 5 plus Barren Alignment E alternatives would have the smallest overall project footprint it received a rank of "+ +" (Table B-26).

Objective 2 - Protect existing island ecosystems, including sheltered embayments

Each of the three alternatives met this habitat restoration objective. Each alternative would protect the existing critical island habitat at Barren Island. The James Alignment 5 plus Barren Alignment D and James Alignment 5 plus Barren Alignment E alternatives received rankings of "+ +" because these two alternatives would also provide protection to the existing island habitat at James Island (Table B-26).

Objective 3 - Optimize the capacity for placement of dredged material

Each of the three alternatives met this habitat restoration objective. Each alternative has sufficient capacity (enough to support the annual placement of 3.2 mcy) to meet the dredged placement shortfalls identified in the Federal DMMP. The James Alignment 5 plus Barren Alignment D and James Alignment 5 plus Barren Alignment E alternatives each received rankings of "+ +" (Table B-26) because each of these two alternatives would provide placement capacity beyond the 20 year planning horizon required by the DMMP. The James Alignment 5 plus Barren Alignment D alternative could accommodate the 3.2 mcy capacity requirement for 31 years, and the James 5 plus Barren E alternative for 24 years, compared to 17 years for the Barren Alignment A alternative

Objective 4 - Increase wetlands acreage in the Chesapeake Bay watershed

Each of the three alternatives met this habitat restoration objective. Each alternative would restore wetland habitat, with the Barren Alignment A alternative restoring 682 acres of wetlands, the James Alignment 5 plus Barren Alignment D alternative restoring 1,512 acres of wetlands, and the James Alignment plus /Barren Alignment E alternative restoring 1,108 acres of wetlands. Because the James Alignment 5 plus Barren Alignment D alternative would create the most wetland habitat, it received "+ +" ranking, while the other two each alternatives received a "+"(Table B-26).

Objective 5 - Decrease local erosion and turbidity
Each of the three alternatives met this habitat restoration objective. Each alternative would protect the existing islands from further erosion, as well as provide protection of the shoreline. However, based on the hydrodynamic modeling results (Appendices G and H), the James Alignment 5 plus Barren Alignment E alternative received a higher ranking of "+ +" because the proposed breakwater south of the island would afford additional protection to both Barren Island remnants and to Hoopers Island. The Barren Alignment A and James Alignment 5 plus Barren Alignment D alternatives each received a "+"(Table B-26).

Objective 6 - Promote conditions to establish and protect submerged aquatic vegetation
Each of the three alternatives met this habitat restoration objective because each alternative would provide protection to the existing SAV habitat at Barren and James Islands. The James Alignment 5 plus Barren Alignment E alternative received a higher ranking of "+ +" (Table B-26), because the extended breakwater would provide additional reduction in wave heights, which has the potential to reduce turbidity and provide quiescent conditions conducive to SAV growth.

Objective 7 - Promote conditions that support oyster recolonization
Each of the three alternatives met this habitat restoration objective because each alternative would avoid and protect existing NOBs in the vicinity of James and Barren Islands. The hydrodynamic modeling indicated that each of the alternatives has the potential to reduce local turbidity and sedimentation on the existing NOBs from local erosion. Because each alignment would provide a similar level of protection to the NOBs, each of the alignments received a ranking of "+" (Table B-26).

B.11.1 Results of Objectives Evaluation

The total score for each alternative was determined by giving zero credit for each minus and one credit for each plus. After summing the credits received by each alternative, the no-action alternative received zero; the Barren Alignment A alternative received seven credits, the James Alignment 5 plus Barren Alignment D alternative received eleven credits, and the James Alignment 5 plus Barren Alignment E alternative received 13 credits (Table B-26).

Table B-26. Comparison of Project Alternatives to Project Objectives

Alternatives		**Objectives**							
Upland/Wetland Ratio	**Upland Dike Height (ft)**	1	2	3	4	5	6	7	TOTAL
No-Action	0	--	--	--	--	--	--	--	--
Barren Alignment A (45/55)	25	+	+	+	+	+	+	+	7
James Alignment 5 / Barren Alignment D (40/60)	25	+	+ +	+ +	+ +	+	+	+	11
James Alignment 5 / Barren Alignment E (45/55)	20	+ +	+ +	+ +	+	+ +	+ +	+	13

Each of the three alignment alternatives met the seven project objectives, but the James Alignment 5 plus Barren Alignment E alternative would comparatively provide more overall environmental benefits.

B.12 NED/NER TRADEOFF ANALYSIS

The purpose of an NED/NER tradeoff analysis is to compare the NER outputs (ICUs), the NED (dredged material placement) outputs and the costs for the alternatives. For the Mid-Chesapeake Bay Island Study, NER outputs were defined as the environmental benefits of the project, as measured in ICU, and the NED outputs were defined as the dredged material placement capacity (mcy), with respect to meeting the dredged material capacity need identified in the Federal DMMP (3.2 mcy of annual capacity) to continue to safely maintain the Federal navigation channel system in the Upper Chesapeake Bay.

The formulation and plan selection for the Mid-Chesapeake Bay Island study did not involve any NED/NER tradeoffs of navigation benefits and costs, since the maintenance dredging of the Federal navigation channels will continue at the current dredging frequency to the authorized channel depths. The Mid-Chesapeake Bay Island study will not impact the NED navigation benefits for the Upper Chesapeake Bay approach channels, and the NED navigation costs will continue to be established using the base plans for dredged material placement.

However, Mid-Chesapeake Bay Island study involved the formulation of island restoration alternatives through beneficial use of dredged material, which required consideration of tradeoffs between the NED objective of providing beneficial use capacity at a reasonable incremental cost above the base plan (identified in the Federal DMMP; USACE, 2005) and the NER objective to efficiently produce ecosystem outputs through protection and restoration.

For the Mid-Chesapeake Bay Island Study, project alternatives were formulated to maximize ecosystem outputs (NER) by maximizing the wetland acreage restored by the project. The tradeoff analysis would show if selecting the alternative that maximized NER outputs had NED costs (by reducing dredged material placement capacity). The trade off analysis is meant to ensure that a balance is maintained in achieving the maximum NER benefits of the project while still cost-effectively meeting the NED objective of the project.

NER/NED tradeoffs were evaluated throughout the plan formulation process for the Mid-Chesapeake Bay Island study by 1) evaluating alignments for multiple habitat proportions (upland to wetland habitat ratios) (Section B.7.1), 2) determining the placement schedule at the project site that would provide the most efficient dewatering and consolidation to maximize placement capacity while still maintaining target elevations for successful wetland development (Section B.7.2); and 3) evaluating the timing of the costs associated with the initial construction to protect the existing island and SAV habitats, even though dredged material capacity at other placement sites may remain.

The formulation of project alternatives specifically evaluated for a range of wetland to upland ratios because the construction of wetlands provides a higher proportion of environmental benefits, while construction of uplands provides the greater dredged material placement capacity. Initially, feasible alignment alternatives were analyzed for the full range of theoretically possible upland and wetland habitat proportions to optimize the balance between maximum placement volume (100 percent uplands) and maximum habitat value (100 percent wetlands). Then, once the acceptable minimum and maximum wetland acreages were determined (50% and 70%, respectively) based on agency input and engineering constraints, proposed alignment alternatives were evaluated using suite of feasible upland/wetland ratios within the range. To accommodate the development of higher percentages of wetland habitat, increasing the height of the upland dikes was also incorporated in the plan formulation process to maintain the needed dredged material placement capacity for each alternative alignment. Through this iterative process, the Mid-Chesapeake Bay Island study evaluated multiple alternatives to maximize the NER outputs of the project while still meeting the NED objective of the project.

The dredged material placement schedule was an important tool used throughout the plan formulation process to ensure that upland and wetland cells would not be overloaded over the life of the project. Wetland cell construction requires a highly ordered and controlled sequence of dredged material placement that will assure that wetland cells are never overloaded beyond the quantities required to achieve the target wetland surface elevations. Dredged material in overloaded upland cells does not efficiently dewater and consolidate, decreasing the overall capacity of the cell, shortening the useful life of the facility and increasing the cost per cubic yard of dredged material placement. Planning for the most efficient filling of the placement site is a prudent economic consideration, which generally delays the next significant investment in a beneficial use project to provide dredged material capacity. As a placement site nears its capacity, the volume of dredged material that can efficiently be placed at the site decreases annually, resulting in either inefficient overfilling of the remaining capacity or construction of another facility (an investment in replacement capacity) that can be used concurrently to avoid overfilling. Throughout the Mid-Chesapeake Bay Island study, detailed dredged material placement analyses (over the 50 year planning period) were used to compare the quantity of dredged material that could be placed into each cell for each alternative evaluated. These analyses were used to determine the alignment footprint, upland/wetland ratio, dike height, and sequence of dredged material placement that would most efficiently meet the NER and NED objectives of the project.

Perimeter dike construction involves a high initial investment, and for the Mid-Chesapeake Bay Island study, the timing of dike construction was evaluated. The evaluation compared the average annual ecosystem outputs resulting from the protection of the existing island remnants and the adjacent habitats to the average annual ecosystem outputs that would result if the dike construction was delayed until the dredged material capacity of the site was needed. Delaying the dike construction would result in the continued loss of existing habitat by erosion.

B.13 ASSESSMENT OF PROJECT ALTERNATIVES BASED ON USACE PRINCIPLES AND GUIDELINES

Planning for Federal water resources projects constructed by the USACE is based on The Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (the Principles and Guidelines) (USWRC, 1983). The Federal objective from water resources projects is to contribute to national economic development consistent with protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements (USWRC, 1983). A plan recommending Federal action is to be the alternative plan with the greatest net economic benefit consistent with protecting the Nation's environment.

Four "accounts" were established in the Principles and Guidelines to facilitate evaluation of alternative plans: National Economic Development (NED), Environmental Quality (EQ), Regional Economic Development (RED), and Other Social Effects (OSE), as described below (USWRC, 1983):

- The national economic development (NED) account displays changes in the economic value of the national output of goods and services.
- The environmental quality (EQ) account displays non-monetary effects on significant natural and cultural resources.
- The regional economic development (RED) account registers changes in the distribution of regional economic activity that result from each alternative plan. Evaluations of regional effects are to be carried out using nationally consistent projections of income, employment, output, and population.
- The other social effects (OSE) account registers plan effect from perspectives that are relevant to the planning process, but are not reflected in the other three accounts.

To aid in the selection of the recommended plan for the Mid-Chesapeake Bay Island study, beneficial and adverse impacts of the No-Action alternative and each of the three alternatives were summarized and compared based on the four accounts (Table B-27). The impacts of each alternative are summarized below, but are discussed in more detail in Section 6.

B.13.1 No-Action Alternative

The No-Action alternative would have not increase benefits to any account. Adverse impacts from the No-Action alternative include the eventual loss of the habitats at both James and Barren Islands through continued erosion. The loss of the islands, particularly Barren Island, will most likely also result in the loss of adjacent SAV beds and increased erosion of the shoreline after the islands disappear because the existing islands currently serve as a natural wave buffer, dampening the effects of waves and storm events.

B.13.2 Barren Island Alignment A

The beneficial impacts of the Barren Island Alignment A alternative include: the restoration of 1,354 acres of remote island habitat, protection of the existing Barren Island habitats and the adjacent SAV beds; reduction of local erosion from Barren Island; improvement of some recreational species through the protection/enhancement of SAV and wetland restoration; the enhancement of habitat for species preferring the hard bottom provided by the perimeter dike; and the creation of construction jobs.

The adverse impacts of the Barren Island Alignment A alternative include: the permanent loss of 1,354 acres of benthic community, shallow water habitat, and open water habitat; the displacement of commercial fisheries; an increase in the travel time to fishing grounds and open water; an increase in light and noise impacts during construction; and a permanent change to the viewshed. Additionally, the Barren Island Alignment A alternative would provide any protection to James Island, therefore the James Island habitats would eventually be lost to erosion and shoreline erosion would increase.

B.13.3 James Island Alignment 5 plus Barren Island Alignment D

The beneficial impacts of the James Island Alignment 5 plus Barren Island Alignment D alternative include: the restoration of 2,756 acres of remote island habitat (2,072 acres at James Island and 684 acres at Barren Island); protection of the existing James and Barren Island habitats and the adjacent SAV beds; protection of the mainland shoreline, reduction of local erosion from James and Barren Islands; improvement of some recreational species through the protection/enhancement of SAV and wetland restoration; the enhancement of habitat for species preferring the hard bottom provided by the perimeter dike; and the creation of construction jobs.

The adverse impacts of the James Island Alignment 5 plus Barren Island Alignment D alternative include: the permanent loss of 2,756 acres of benthic community, shallow water habitat, and open water habitat (2,072 acres at James Island and 684 acres at Barren Island); the displacement of commercial fisheries; an increase in the travel time to fishing grounds and open water; an increase in light and noise impacts during construction; and a permanent change to the viewshed. The James Island Alignment 5 plus Barren Island Alignment D alternative would result in the greatest overall loss (in terms of acreage) of benthic community, shallow water habitat, and open water habitat.

B.13.4 James Island Alignment 5 plus Barren Island Alignment E

The beneficial impacts of the James Island Alignment 5 plus Barren Island Alignment E alternative include: the restoration of 2,144 acres of remote island habitat (2,072 acres at James Island and 72 acres at Barren Island); protection of the existing James and Barren Island habitats and the adjacent SAV beds; protection of the mainland shoreline, reduction of local erosion from James and Barren Islands; improvement of some recreational species through the protection/enhancement of SAV and wetland restoration; the enhancement of habitat for species preferring the hard bottom provided by the perimeter dike; and the creation of construction jobs.

The adverse impacts of the James Island Alignment 5 plus Barren Island Alignment E alternative include: the permanent loss of 2,144 acres of benthic community, shallow water habitat, and

open water habitat for island habitat restoration (2,072 acres at James Island and 72 acres at Barren Island); the displacement of commercial fisheries; an increase in the travel time to fishing grounds and open water; an increase in light and noise impacts during construction; and a permanent change to the viewshed. In total, approximately 100 acres would be impacted by the project at Barren Island including the possible breakwater construction south and southeast of the island.

Based on an assessment of the beneficial and adverse impacts in each of the four accounts established in the Principles and Guidelines, overall the James Alignment 5 plus Barren Alignment E alternative had the greatest net economic benefit consistent with protecting the Nation's environment by minimizing the overall project footprint.

Table B-27: Comparison of Project Alternatives Based on the USACE Principles and Guidelines Assessment (USWRC, 1983)

	BENEFICIAL IMPACTS	ADVERSE IMPACTS
National Economic Development (NED)		
No-Action	NA	NA
Barren Alignment A (45/55)	NA	NA
James Alignment 5 / Barren Alignment D (40/60)	NA	NA
James Alignment 5 / Barren Alignment E (45/55)	NA	NA
Environmental Quality (EQ)		
No-Action	None	Eventual loss of Barren and James Island habitats; continued local erosion.
Barren Alignment A (45/55)	Protect existing Barren Island, leeward mainland, and SAV beds; restore 1,354 ac; decreased local erosion.	Eventual loss of James Island habitats; continued local erosion. Loss of 1,354 ac of shallow water habitat and benthic community. Displacement of commercial fishery use at Barren and James.
James Alignment 5 / Barren Alignment D (40/60)	Protect existing Barren and James Island, leeward mainland (wave reduction provides the greatest shoreline benefit to areas in lee of Barren Island), and SAV beds; restore 2,756 ac of island habitat; decreased local erosion.	Transformation of 2,756 ac of shallow water habitat (2,072 ac at James Island and 684 ac at Barren Island). Displacement of commercial fishery use at James Island and loss of potential waterfowl foraging in open water that would be filled. Deepening and disturbance of 101 acres of shallow water habitat to create access channel.

Table B-27. (continued)

	BENEFICIAL IMPACTS	ADVERSE IMPACTS
James Alignment 5 / Barren Alignment E (45/55)	Protect existing Barren and James Island, leeward mainland, and SAV beds; restore 2,144 ac; decreased local erosion.	Transformation of 2144 ac of shallow water habitat (2072 ac of 'stressed' and 72 ac of 'healthy' benthic community*) to island habitats. Displacement of commercial fishery use at James Island and loss of potential waterfowl foraging in open water that would be filled. Deepening and disturbance of 101 acres of shallow water habitat to create access channel. Total impact of approximately 100 ac of shallow water habitat at Barren including habitat, sill, and breakwater construction.
Regional Economic Development (RED)		
No-Action	None	Eventual loss of Barren and James Islands habitats and continued erosion on mainland. Loss of recreation and commercial fisheries at James and Barren Islands.
Barren Alignment A (45/55)	Creation of construction jobs. Provide protection to Hoopers Island. Enhanced recreational and commercial fisheries from wetland and dike (reef) creation, and SAV protection.	Eventual loss of James Island and associated impacts to property owners on mainland. Loss of recreation and commercial fisheries negatively impacted by loss of James Island. Relocation/loss of fishing/crabbing grounds in restored island footprint.
James Alignment 5 / Barren Alignment D (40/60)	Creation of construction jobs. Provide protection to Hoopers Island. Enhanced recreational and commercial fisheries from wetland and dike (reef) creation, and SAV protection.	Significant displacement of fishery resources within footprint of restored islands (2,072 ac at James Island, and 684 ac at Barren Island). Significant displacement of crabbing grounds at James and Barren Islands. Displacement of pound nets at Barren Island.
James Alignment 5 / Barren Alignment E (45/55)	Creation of construction jobs. Provide protection to Hoopers Island. Enhanced recreational and commercial fisheries from wetland and dike (reef) creation, and SAV protection.	Loss of recreation and commercial fisheries negatively impacted by loss of Barren Island (2,144 ac, but only 72 ac at Barren Island). Significant displacement of crabbing grounds at James.
Other Social Effects (OSE)		
NoAction	None	Likely loss of SAV resources and associated fishery support that SAV provides following eventual loss of James and Barren Islands, degrading regional fisheries and recreational fishing. Loss of islands, primarily Barren, would lead to increased wave heights and erosion on shoreline in lee of islands. Likely large impacts to shoreline communities.
Barren Alignment A (45/55)	Enhanced fishing of species attracted to hard bottom. Protection/enhancement of SAV may improve some recreational species. Likely increase in waterfowl hunting and wildlife viewing in Barren area.	Minimal increase of travel time to fishing grounds and open water at Barren Island. Light, noise, and possibly disruption of tourism in near vicinity of Barren Island during construction. Viewshed impacts at Barren Island.

James Alignment 5 / Barren Alignment D (40/60)	Enhanced fishing of species attracted to hard bottom. Protection/enhancement of SAV may improve some recreational species. Likely increase in waterfowl hunting and wildlife viewing in James and Barren area. Reduction of wave height on mainland shoreline in lee of Barren Island would be a significant benefit to those communities.	Minimal increase of travel time to fishing grounds and open water at Barren Island. Light, noise, and possibly disruption of tourism in near vicinity of Barren and James Islands during construction. Viewshed impacts at James Island.
James Alignment 5 / Barren Alignment E (45/55)	Enhanced fishing of species attracted to hard bottom. Protection/enhancement of SAV may improve some recreational species. Likely increase in waterfowl hunting and wildlife viewing in James and Barren area. Reduction of wave height on mainland shoreline in lee of Barren Island would be a significant benefit to those communities.	Minimal increase of travel time to fishing grounds and open water at Barren Island. Light, noise, and possibly disruption of tourism in near vicinity of Barren and James Islands during construction. Viewshed impacts at James Island.

B.14 SELECTION OF THE RECOMMENDED PLAN

The recommended plan for the Mid-Chesapeake Bay Island study is the construction of James Island Alignment 5, with a habitat proportion of 45% upland to 55% wetland and an upland dike height of 20 ft MLLW, in combination with protection/restoration at Barren Island through the construction of Alignment E. The recommended plan will restore 2,144 acres of remote island habitat (2,072 acres at James Island and 72 acres at Barren Island), while also protecting approximately 1,325 acres of SAV habitat adjacent to Barren Island. The recommended plan will provide approximately 90 to 95 mcy of dredged material placement capacity which will serve the long term dredging needs of the Port of Baltimore for 28 to 30 years.

James Island Alignment 5 plus Barren Island Alignment E alternative was the feasible alternative that cost-effectively maximized both environmental benefits and dredged material placement capacity to met the NED and NER objectives of the project, while minimizing impacts to the environmental resources in the vicinity of the project sites. The selection of the recommended plan was based on recommendations in the Federal DMMP (USACE, 2005); the results of detailed engineering analyses of the site selection, design constraints, goals for habitat development, and schedule for dredged material placement; determination of the environmental benefits through the calculation of the ICUs; the cost effectiveness/incremental cost analysis; and support from the natural resource agencies.

B.15 OPTIMIZATION OF RECOMMENDED (NER) PLAN AT JAMES

During the plan formulation phase, the analysis for both the Mid-Bay study and the Poplar Island Expansion study were done concurrently and independently to maximize placement efficiency and habitat benefits at both sites. Therefore, the placement and benefit analysis of the James Island project of the recommended plan as outlined thus far did not consider any influence of the

Poplar Island expansion project on placement or development of habitat at James nor James Island's affect on the Poplar Island projects. The recommended dredged placement plan and projected benefits for Poplar Island and Poplar Island Expansion is included in Attachment D, Table D-1 and Table D-2. The James Island portion of the recommended dredged placement plan and projected benefits are combined into Table D-3. These tables are the building blocks for creating various placement scenarios and calculation of benefits.

With the selection of a recommended NER plan in this study and an approved project to expand Poplar Island (Chief's report was signed on 31 March 2007), the implementation and timing of the Mid-bay recommended plan was reviewed to optimize the economic and ecological benefits. A timing analysis on placement and the accrual of benefits in light of these other projects was conducted on the James portion of the recommended plan. The Barren Island project was not included in this analysis, as the proposed project would not affect on-going operations or the proposed expansion project at Poplar Island.

Specifically, this analysis was done to determine the effects on the schedule for implementation of Poplar Island Expansion Study (PIES) and realization of the benefits outlined in the approved Poplar Island Expansion Chief's Report (USACE, 2007), as well as to determine the optimal timing of placement at James Island, in light of concurrent operations at two sites.

B.15.1 Scenarios Evaluated

To optimize the recommended plan at James, the Baltimore District re-analyzed the dredged placement, costs, and benefits for both James and Poplar Island Expansion for three scenarios of initial placement: 2014, 2018, and 2023. The 2014 scenario is the earliest possible start date for filling at James due to the funding scenarios, completion of PED phase, and the period required for dike construction. The 2018 scenario is based on the recommendations of the DMMP to avoid overfilling of Poplar Island and Poplar Island Expansion. The 2023 scenario is included to reflect the recommended plan in the current PIERP GRR, which shows 2023 being the first year that dredged material placement needs of 3.2 mcy are not met.

B.15.2 Dredged Material Placement Analysis

The scenarios being evaluated have James Island accepting dredged material in 2014, 2018, or 2023, with dike construction 4 years in advance of those years (see Attachment D for placement scenarios). This results in overlapping operations at both Poplar and Mid-bay for four years for the 2014 and 2023 scenario, and only one year for the 2018 scenario. Overfilling is reduced by 17% at Poplar Island for the 2014 and 2023 scenario, but is reduced by 34% for the 2018 scenario. The different start dates at James also affect the operational life of the Poplar Island projects. The 2014 scenario extends the operational life of Poplar Island by 4 years, to 2029, while the 2018 scenario extends the operational life by one year to 2027. The 2023 scenario does not change the operational life at Poplar Island as presented in the Poplar Island Expansion GRR.

B.15.3 Benefit Calculations

While the island community unit method was developed during the plan formulation process in the Mid-Bay study, it was modified when applied to Poplar Island, as the PDT for Poplar Island recognized that interim benefits during construction have been observed. Therefore, the ICUs for

James Island portion of the recommended plan only (Barren Island was not included in this analysis) were recalculated to measure the interim benefits from sheltered open water habitat and mudflat habitat of the upland cells prior to planting. This allowed for both dredged material placement projects to be compared evenly, and to account for all benefits at the various start dates at both Poplar Island and James Island.

The ICU calculations of the recommended plan at Poplar are included in order to compare the changes in the benefits based on the proposed multi-site scenarios (see Attachment D, Table D-2). The actual ICU calculations for James based on the final proposed wetland and upland cells, as well as the interim open water/mudflat benefits are presented in table D.4, D.5, D.6 and D.7. The final calculation of each scenarios annual ICUs based on the timing of placement between Poplar Island and James Island are presented in tables D.8, D.9, and D.10. Total ICUs for each project are included on each table. These benefits fed into the cost/benefit analysis described in section B.15.4 below.

B.15.4 Cost/Benefit Analysis

For Poplar Island Expansion project, the costs presented in the final PIERP GRR report were used without any changes (USACE, 2006). However, in order to answer the question on timing at James Island, more detailed costs had to be calculated. To account for the delay in benefits during construction, interest during construction was calculated for all three scenarios for all costs accrued prior to first year of placement, respectively 2014, 2018, and 2023. All costs were then brought to a 2008 present value cost for each scenario and a total present value cost determined. A final comparison was made of the average annual cost per average annual ICUs for all three timing scenarios at James Island.

In order to ensure that the cost/benefit analysis was not artificially skewed towards the later start date, the period of analysis for calculating the average annual benefits was defined as the earliest and latest dates costs were accrued for all three scenarios. This resulted in a period of analysis of 52 years from 2008-2060. Since benefits for ecosystem restoration projects are not discounted, it was critical that this period of analysis truly reflect the effects on the benefits of starting at different times. The costs for each scenario are presented in Attachment D, Tables D.11, D.12 and D.13.

B.15.5 Results

For the 2014 scenario, the primary benefits are preservation of the existing island remnants and additional NED benefits which increase operational effectiveness by reducing overfilling of upland cells by 17% at Poplar Island, and extending the placement life of the overall Poplar Island/Expansion projects from 2026 to 2029. Also, overall annual ICUs are increased for the proposed Poplar Island Expansion project from 557 to 569, due to delay of upland development and extended life of mudflat habitat. In order to minimize overfilling and accommodate the 3.2 mcy of dredged material, placement operations occurred at both James and Poplar Islands four times during the construction phase in the years 2014, 2016, 2024, and 2029. The average annual costs per average annual ICUs for this scenario at James Island is $55,152.

The 2018 scenario is based on the recommendations of the DMMP to avoid overfilling of Poplar Island and Poplar Island Expansion. Benefits of this scenario include the preservation of some benefits of the existing James Island, reducing overfilling of the Poplar Island/Expansion projects by 34%, and extending the placement life at Poplar Island by one year to 2027. Also, the overall annual ICUs at Poplar Island/Expansion projects increased from 557 to 572 due to delay of upland development and extended life of mudflat habitat (see Attachment 2 for ICU calculations for each scenario). Placement at both sites for this scenario occurred only once, in 2027. In terms of timing at James Island, the average annual cost per average annual ICUs is $50,936, which is significantly better than the 2014 scenario.

For the 2023 scenario, it is predicted that the existing island remnants at James Island would be gone by 2021. The benefits of this scenario are that by having James Island on line, overfilling at Poplar Island is reduced by 17%. The annual ICUs of the Poplar Island/Expansion projects did not change from what was reported in the Chief's Report, and remained at 557. Placement occurred at both sites four times for this scenario in years 2023 through 2026, and no change was made to the operational life of Poplar Island. The average annual costs per average annual ICUs for this scenario is $49,487, which is slightly lower than the 2018 scenario.

As discussed, by placing dredged material concurrently at Poplar, Poplar Island Expansion and James Island (Mid-Bay), a net increase in both NED and NER benefits is expected at both sites for all three scenarios. Timing at James Island on its own is not significantly impacted by the change in placement start dates, with a slightly better cost per ICU ratio for the 2023 scenario versus the 2014 and 2018 scenarios (Table B-28). However, all three scenarios are cost-effective and have increasing incremental costs/ICU.

Table B-28: James Island Cost/Benefit Analysis

2014 Scenario	PV Cost	ICUs
Total	$514,393,000	26,055
AA	$27,634,000	501.1
	AAC/ICUs	$55,152
2018 Scenario	**PV Cost**	**ICUs**
Total	$434,983,000	23,856.3
AA	$23,368,000	458.8
	AAC/ICUs	$50,936
2023 Scenario	**PV Cost**	**ICUs**
Total	$ 382,676,000	21,566
AA	$ 20,558,000	414.5
	AAC/ICUs	$ 49,551

B.15.6 Conclusions of Timing Analysis of Recommended Plan

Based on the results outlined in the previous section, NAB recommends that the 2018 placement scenario be implemented at James Island, thereby increasing the overall NED benefits at all three project sites, and increasing the overall net NER benefits at Poplar Island and Poplar Island Expansion project sites.

Even though there is an insignificant increase in NER benefits achieved at James in the 2023 scenario, the 34% reduction of overfilling at James, positive NED benefits achieved, net increase in NER benefits, and the risk and uncertainty that overfilling at existing sites would not occur sooner negate choosing the 2023 scenario over the 2018 scenario at James Island.

Finally, NAB recommends that this type of analysis be conducted as part of the next update to the Dredged Material Management Plan to better reflect the recommended plan acreages outlined in the final PIERS GRR and Mid-Bay reports, and any projects that may have been authorized at the time of the update.

B.16 NET ICU ANALYSIS

In response to an EPR comment, an additional analysis was performed with the ICUs to incorporate the loss of open water habitat from island construction. An open water index was developed for the guilds that benefit from this habitat: waterfowl, benthic invertebrates, resident/forage fish, and commercial/predatory/higher trophic fish. The open water indices were utilized to quantify the impact of filling the open water during construction. The value derived for the open water habitat (defined as the Open Water ICUs) was subtracted from the Total Benefit quantified for constructing the islands as well as protecting the existing islands and SAV that is provided in Table B-22. Representatives from NOAA NMFS, EA Engineering, Science, and Technology, Inc., NOAA, USGS, and MDNR were involved in developing the indices. The open water indices are provided in Table B-29. The full evaluation tables for James and Barren open water ICUs are given in Table B-30. The results of the net ICU analyses are presented in Table B-31.

The open water ICU value at James Island is 0.18 ICU/ac while the value is 0.37 ICU/ac at Barren Island. The Barren Island open water ICU value is nearly double that of James Island due to a diverse benthic community that increases the potential impact to both benthic invertebrates and fisheries resources. At James Island, open water impacts are largest to the waterfowl community. The gem clam and dwarf surf clam densities identified in seasonal monitoring at James Island suggest that there are abundant foraging resources for wintering waterfowl in the area that would be filled by construction of any of the James Island alternatives. There is minimal impact to fisheries resources at James Island because there are not diverse benthic or planktonic communities, nor cover and structure. The recommended plan provides a total of 22, 045 net ICUs. The only alternative that provides a greater number of total net ICUs is the James 5/Barren protection alternative at 40%/60% upland/wetland ratio which provides a net of 23,275 ICU. This alternative, however, was not a ‘Best Buy’ Plan.

In conclusion, the net benefits analysis identified impacts to waterfowl foraging habitat, fisheries habitat, and benthic communities as a result of filling open water to restore remote islands, but did not result in a change in the selection of the recommended plan.

Table B-29: Definition of Open Water Indices		
Wadingbirds		N/A
Waterbirds		N/A
Shorebirds		N/A
Waterfowl		Feeding (benthics- primarily mollusks)
	1	silty and sandy substrates; diverse benthic community; abundant foraging habitat (>100,000/m2 gem clam, >150 dwarf surf clam, etc.); hard substrate (oyster bars), SAV
	0.75	silty/sandy substrate OR hard substrate/SAV present; good foraging habitat (>50,000/m2 gem clam, >100 dwarf surf clam, etc)
	0.50	silty or sandy substrate; no structure or SAV; fair benthic foraging habitat (>10,000/m2 gem clams, >40 dwarf surf clams, etc.)
	0.25	mud/clay substrate, no structure or SAV, poor foraging habitat (<9,999/m2 gem clam; <40 dwarf surf clams, etc.)
	0	mud/clay substrate, no structure or SAV; no benthic food items
Raptors		N/A
Resident/Forage Fish		
Three habitat requirements were identified for fishery resources: 1. diversity of benthic food sources (A); 2. cover from predation (B); and 3. a productive planktonic community (C). (A) diversity of benthic food sources is specified as the most important and highly desired requirement. The requirements were defined as: A - diverse benthos = B-OBO>3, sand and mud substrate; DO>5. B - presence of cover/structure = presence of oyster reef; within 2 m of SAV bed. C- for mesohaline waters, a diverse community includes copepods, cladocerans, rotifers, larval stages of barnacles, decapod crustaceans, mysid shrimp, comb jellies.		
Open Water	1	Availability of A, B, and C.
	0.75	Availability of A and B, or A and C
	0.50	Availability of only A, or of B and C
	0.25	Availability of B or C
	0	Neither A, B, or C are available.
Commercial/predatory/higher trophic fish		
Open Water	1	Availability of A, B, and C.
	0.75	Availability of A and B, or A and C
	0.50	Availability of only A, or of B and C
	0.25	Availability of B or C
	0	Neither A, B, or C are available.
Benthic invertebrates		
	1	Mature community (10 years)
	0.75	N/A
	0.50	Immature community characterized by pioneer and pollution tolerant species; exposed to erosional forces
	0.25	Newly established colony (year 1)
	0	N/A
Herptofauna		N/A

Table B-30: Open Water Index Values for James and Barren Island				
James Island assigned open water ICIs				
guild/community	**WEIGHT**	**Sum of Weights**	**Assigned Value**	**Reasons to support assigned value**
colonial nesting wading birds	12	50	0	
waterfowl	10		0.75	Benthic sampling identified sandy substrate. Gem clam and dward surf clam abundance criteria met.
colonial nesting waterbirds	12		0	
raptors	2		0	
shorebirds	14		0	
rept/herps	2	2	0	
benthic invert.	20	20	0.5	The benthos is continually affected by erosion of the island. B-IBI<2
resident/forage fish	23	28	0	No availability of A, B, nor C. James Island did not have a diverse benthos, cover, or a diverse planktonic community.
commercial/predatory/higher trophic fish	5		0	

Barren Island sssigned open water ICIs				
guild/community	**WEIGHT**	**Sum of Weights**	**Assigned Value**	**Reasons to support assigned value**
colonial nesting wading birds	12	50	0	
waterfowl	10		0.25	Barren benthic substrate was dominated by sand, but invertebrate monitoring showed a poor foraging habitat (low numbers of bivalves).
colonial nesting waterbirds	12		0	
raptors	2		0	
shorebirds	14		0	
rept/herps	2	2	0	
benthic invert.	20	20	1	Barren benthos is assumed to be mature. B-IBI>3
resident/forage fish	23	28	0.5	A is available, but not B or C. Barren benthos is diverse. Barren did not have cover, or a diverse planktonic community.
commercial/predatory/higher trophic fish	5		0.5	

Table B-31: Results of Net ICU Analysis							
	Average Annual ICUs				Cumulative ICUs (50 year project life)		
Alternative	**Benefit ICUs**	**Open Water ICUs (impact)**	**NET ICUs**		**Benefit ICUs**	**Open Water ICUs (impact)**	**NET ICUs**
James 5, 50/50	469	363	106		23,452	18,130	5,322
James 3, 50/50	388	278	110		19,396	13,878	5,519
No Action	129	0	129		6,427	0	6,427
James 5, 45/55	492	363	129		24,598	18,130	6,468
James 3, 45/55	410	278	132		20,492	13,878	6,615
James 3, 40/60	419	278	141		20,931	13,878	7,054
James 5, 40/60	516	363	153		25,797	18,130	7,667
Barren A, 50,50	649	494	155		32,467	24,711	7,757
Barren A, 45,55	668	494	173		33,385	24,711	8,675
5D, 50/50	885	582	174		44,234	29,115	8,718
5D, 45/55	913	582	331		45,641	29,115	16,526
5D, 40/60	937	582	355		46,861	29,115	17,746
J5+Bp, 50/50	790	371	419		39,509	18,575	20,934
J5+Bp, 45/55	813	371	442		40,650	18,575	22,075
J5+Bp, 40/60	837	371	466		41,850	18,575	23,275

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ATTACHMENT A

DESCRIPTION OF BAY ENHANCEMENT WORKING GROUP ENVIRONMENTAL SCORING PROCESS AND PARAMETERS

Description of BEWG Scoring Process and Parameters

Source: Federal DMMP, Appendix B (USACE 2005)

RESOURCE SCORING INDICES

Fifty-two parameters have been selected to evaluate the environmental suitability of the proposed options. These parameters are divided into 10 categories based upon similar attributes. A brief description of each resource parameter is presented below. A complete list of the parameters is provided in the table entitled Environmental Parameters to be Considered for the Site Ranking (included at the end of the "Resource Scoring Indices" text), along with the factors considered for each parameter. Each parameter is assigned a raw score of +1, -1, or 0 for each option under consideration. The scores are presented in the environmental ranking matrix, and used to calculate the total weighted normalized score for each option. A description of the raw scores is described below.

A +1 will be assigned to a given parameter if the option is expected to protect or enhance *existing* resources of that type in or immediately adjacent to the option footprint. A –1 will be assigned if the resource is present and negative impacts (or further degradation) are expected as a result of option development. This is very carefully defined as long-term negative impacts to existing resources so options will not be scored negatively for potential short-term effects. A 0 will be assigned when no negative impacts are expected to existing resources at or immediately adjacent to an option. It will also be used in cases where there is not enough conclusive evidence to make a definitive evaluation, or evidence is ambiguous. In the later cases, the 0 will be underlined so that decision–makers will be able to discern those options that have less information. If the parameter is not applicable at a particular option because it could not possibly exist in that location, the box will be shaded. Scores that are bold indicate a "caveat." These "caveats" can be assumptions that the scores were based on or disserting opinions from various BEWG voting members. These "caveats" are documented in the Supplemental Information for the Evaluation of the Preliminary Environmental Ranking of Federal Dredged Material Management Plan Options (included at the end of the "Resource Scoring Indices" text).

Raw values are assigned based upon consensus of the BEWG and are subject to change as new data or information become available. The raw evaluations are to be based upon existing data and historical information, as well as the collective experience and knowledge of the BEWG and the technical study team. It is expected that additional information will be required for some options as the process moves forward. The initial scoring and ranking will be accomplished with the information and knowledge at hand with some modifications and updates occurring over the course of the process.

Each parameter will be assigned a weighting factor based upon the consensus of the BEWG. The raw scores will be multiplied by the weighting factor and totaled in order to achieve a total weighted value for each option. The total scores will then be normalized by dividing by the number of applicable (unshaded) parameters for that option. In this way, options are not unduly (positively) weighted for resources that cannot exist at the option. The normalized scores are for relative comparison among the options, and a positive or negative score does not indicate that an option has an overall positive or negative impact. As an approach to emphasizing that the rank

of the screened options is relative, a column was added and a correlation factor was added to the normalized score. This yielded all positive scores.

CATEGORY 1: WATER QUALITY

Water quality is an important environmental parameter that can significantly influence the type of biota present at any particular option. A suite of water quality parameters will be described for each option, four of which will be considered for separate evaluation: dissolved oxygen, nutrients, turbidity, and salinity. These factors have demonstrated influences on distributions of aquatic organisms in the Bay. According to known habitat requirements for living Chesapeake Bay resources (Funderburk et al. 1991), naturally occurring TSS concentrations in the upper Bay do not exceed concentrations that would be detrimental to larval, juvenile, or adult life stages of commercially important species. Salinity will be considered separately because of its specific influence upon various life stages of aquatic organisms within the Bay.

Each option will require a Water Quality Certification that will specify the discharge limitations for that option. While the issue of TMDLs will be addressed under the certification, the evaluation of each option will be conducted using the above constituents as related to background conditions.

Dissolved Oxygen (DO)

There are areas in the Bay where DO drops below 5 ppm (sometimes even to 0) during seasonal lows. These areas are less supportive of aquatic life than areas that are well oxygenated over the entire year. If option development is not expected to have any long-term negative impacts on DO, it would receive a score of 0. If option development can impact DO positively, by decreasing depths and raising the bottom of a deep area above the pycnocline; this circumstance would receive a +1. Current changes resulting from option development could also influence water cycling/retention times in an area and negatively affect DO. Excessive nutrient inputs resulting from option development could also negatively effect DO by increasing oxygen consumption from the stimulation/extinction of algal blooms. Either of these conditions would result in a –1.

Nutrients, particularly ammonia nitrogen and phosphorous

Nutrients are natural components of any aquatic ecosystem and are typically balanced by natural processes. Increasing nutrient inputs over natural levels has been demonstrated to overstimulate plant growth and can lead to problematic fluctuations in water quality, particularly DO. Nutrient releases can result from a variety of option developments activities and those that are expected to potentially cause long-term nutrient enrichment would be scored with a –1. For example, newly excavated areas expose naturally nutrient rich sediments, allowing the nutrients to flux into the surrounding water. Also, discharges during dewatering activities after sediments are placed can be nutrient enriched. If option development is not expected to have any long-term negative impacts on nutrient enrichment, it would receive a score of 0. A score of +1 will be applied to this parameter if dewatering activities will occur at a separate site from the option placement and there is potential to remove nutrients from enriched aquatic ecosystems

Turbidity
Many areas of the Bay experience naturally elevated turbidity due to tidal currents, river discharges, and other physical processes. Although natural turbidity has been shown to be important for the survival of some life stages of aquatic organisms, most organisms that occur in these areas are tolerant of a range of turbidity. Excessive long-term turbidity, however, can be detrimental, particularly to some planktonic and benthic organisms. If option development has the potential to increase turbidity levels beyond the natural ranges for the area on more than a short-term basis, the option would receive a score of –1. If option development is not expected to have any long-term increase in turbidity, it would receive a score of 0. If it has the potential to ameliorate existing high local turbidity, a +1 would be assigned.

Salinity
Salinity has a significant influence on the distribution of aquatic organisms in estuaries. Preference for and tolerance of salinity dictates the types of organisms that can live in various areas, and therefore, dictates the structure of the aquatic community. Alterations in regional salinity ranges could influence the aquatic community structure significantly. Additionally, the saltier waters from the ocean travel up the Bay in a wedge near the bottom through deepest areas of the Bay. This salt wedge enables organisms from saltier areas of the Bay to disperse into fresher water feeding and nursery areas. The potential for significant alterations to near field and regional salinity will be evaluated at each option. A 0 will be assigned if no negative impact is expected and a –1 if the construction of the option would affect hydrodynamics such that a change in salinity or an effect to the salt wedge would likely occur. No +1 condition has been identified for this parameter.

Ground Water
Some of the proposed options may have a potential influence upon groundwater through the migration of constituents through the underlying soils and would be scored with a +1. This is a particular concern at upland options where potable water resources exist and where sulfur compounds in dredged material are oxidized and acidified by exposure to the atmosphere. The potential for groundwater contamination will be evaluated and a value of 0 will be assigned if no negative groundwater impact is anticipated. Conversely a –1 would be assigned if a negative impact is probable.

CATEGORY 2: SHALLOW WATER HABITAT

Shallow Water Habitat (Tier II and Tier III)
Shallow water habitat (SWH) is considered a high value resource in the Bay to support potential SAV re-growth, fish nursery habitat, and avian (particularly waterfowl/wading bird) feeding areas. In this case we are using the SWH descriptor to be protective of Tier II and Tier III SAV habitat (see below) and the depths considered would be 6.6 feet or less. The existing condition of SWH will be evaluated to define the potential for significant impacts related to placement option development. If SWH exists within the option or immediately adjacent and could be negatively impacted by option development, a –1 will be assigned. If no negative impact is expected, a 0 will be assigned. If development of the option will protect or enhance existing SWH, the option would receive a +1 score.

Submerged Aquatic Vegetation (SAV)

Submerged Aquatic Vegetation (SAV) has historically declined over most of the upper Bay. These declines are thought to be due, in part, to high turbidity and nutrient loading. *Myriophyllum spicatum* (Eurasian water milfoil), *Hydrilla verticillata* (hydrilla), and *Potamogeton perfoliatus* (clasping weed pondweed) are currently among the most common species of SAV in the Chesapeake Bay, while others are undergoing slow recovery.

The Chesapeake Bay Program has issued guidance for protecting SAV in the Chesapeake Bay and its tributaries (CBP 1995). The Chesapeake Bay Program's Executive Council established a SAV Policy in 1989 and committed to an implementation plan in 1990, to achieve the goal of "a net gain in SAV distribution, abundance, and species diversity in the Chesapeake Bay and its tidal tributaries"(CEC 1990). This policy is meant to protect SAV "from further losses due to increased degradation of water quality, physical damage to the plants, or disruption to the local sedimentary environment" (CBP 1995). The Chesapeake Bay Program developed a three-tiered framework of SAV restoration goals or targets:

Tier I: restoration or establishment of SAV in areas of historic (1971 - present) distribution

Tier II: restoration or establishment of SAV in potential habitat to a depth of one meter

Tier III: restoration or establishment of SAV in potential habitat to a depth of two meters

Unvegetated potential habitat areas are protected by the Chesapeake Bay Program's three-tiered SAV restoration goals.

Several state and federal agencies have SAV regulations and policies; however, many of these regulations and policies apply specifically to SAV and not necessarily to potential, unvegetated SAV habitat (CBP 1995). In order for the goals of the Chesapeake Bay Program to be attained, the policies and regulations of these agencies must be considered in all shallow water areas providing SAV habitat.

Recommended SAV protection guidance by the Chesapeake Bay Program includes avoiding dredging activities in Tier I, Tier II, and Tier III areas. Additional guidance includes avoiding dredging, filling, or construction activities that create additional turbidity in or near SAV beds during the growing season; establishing buffers around SAV beds to minimize direct and indirect impacts on SAV during activities that significantly increase turbidity; preserving natural shorelines and stabilizing shorelines when needed; and educating the public about the negative effects of recreational and commercial boating on SAV, and ways to avoid or reduce these effects (CBP 1995).

Maps of SAV distribution in recent years will be examined to determine if SAV has been present within the proposed options. Additionally, shallow water habitat is valuable for many ecological reasons, even in the absence of SAV. Both will be considered together in evaluating this parameter.

Only Tier I SAV Habitat is considered here because the SWH parameter is designed to be protective of Tier II and Tier III habitat. If no Tier I SAV habitat occurs within or immediately adjacent to an option and no permanent negative impacts to SAV are expected, the option will receive a score of 0. If option development would protect or enhance Tier I habitat, the option would score a +1. If SAV is known to occur within an option and permanent negative impacts are expected, the option would score a –1.

CATEGORY 3: WETLANDS

Tidal Wetlands

This category is limited to locations where the possibility of affecting naturally occurring tidal wetlands exists. Options containing naturally occurring functional tidal wetlands will be considered less suitable for the construction of a dredged material placement option. In addition, options that may cause erosional impacts to this resource will be also considered less suitable for construction. If option development is expected to negatively impact natural wetlands, it will be assigned a -1. A 0 will be assigned if no negative impacts to existing wetlands are anticipated and a +1 if option development will result in the protection or enhancement of existing natural tidal wetlands.

Non-tidal Wetlands

This category is limited to locations where the possibility of affecting naturally functioning non-tidal wetlands exists. Options containing such wetlands will be considered less suitable for the construction of a dredged material placement option. If option development is expected to negatively impact natural non-wetlands, it will be assigned a -1. A 0 will be assigned if no negative impacts to existing wetlands are anticipated and a +1 if option development will result in the protection or enhancement of existing natural non-tidal wetlands.

CATEGORY 4: AQUATIC BIOLOGY - FINFISH/SHELLFISH ATTRIBUTES

Benthic Community

Benthic communities are an important component of the Chesapeake Bay ecosystem. Benthic organisms provide a trophic link from phytoplankton to higher trophic levels, serve as a food source for commercially important fish and shellfish, and play a role in nutrient cycling. Salinity and substrate are natural characteristics that influence the structure of the benthic community. Sediment composition will be evaluated based on option-specific data. Benthic assemblages are often used as indicators of environmental or anthropogenic stress in aquatic systems. An estuarine Benthic Index of Biotic Integrity (B-IBI) has been developed for Chesapeake Bay benthic communities (Weisberg et al. 1997). The B-IBI is salinity- and substrate-specific and evaluates attributes of the benthic community such as diversity, abundance, biomass, proportions of pollution-sensitive and pollution-tolerant species, and trophic feeding guilds to determine the relative condition (or environmental health) of an option. Options where there is no potential for further long-term benthic degradation within or immediately adjacent to the option from option development will receive a score of 0. Options that will be permanently negatively impact the benthic community would receive a –1. In cases where the benthic habitat could be improved

from option development (ex. elevating the bottom above the pycnocline or capping contaminated material) would receive a +1.

Finfish Spawning Habitat

Portions of the upper Bay and the upper portions of the major riverine systems of the Bay are known to be crucial spawning and/or nursery areas for anadromous fish species that occur throughout the Chesapeake Bay. This is particularly the case in shallow water areas, or areas that have significant amounts of underwater structure or other cover, or that lie within critical (low) salinities. Because anadromous finfish spawning areas have received legislative protection, these spawning areas will be considered separately from other fish resource and habitat issues. Anadromous species, such as striped bass, American shad, blueback herring, and alewives migrate up-Bay to freshwater and oligohaline areas to spawn. The same areas are utilized by a variety of species resident to those salinities for spawning (including such important species as white perch). Each option will be scored based upon the presence (-1) or absence (0) of known or potential spawning within the footprint or immediate vicinity of the proposed placement area. If option development has the potential to protect or enhance existing anadromous fish spawning areas, it will receive a +1.

Finfish Rearing Habitat

Immediately downstream of the anadromous finfish spawning areas lay larger areas that are known to be critical to the success of early life stages of anadromous finfish species. These are generally termed rearing habitat and are of equal importance to year class success as the spawning grounds. Suitable rearing habitat (in terms of salinities and other water quality parameters) can occur over large areas within the Bay, but the most important areas for anadromous fish generally lie within shallow water (or the shore zone) in warmer months. (Winter refuge habitat is scored separately). These areas are also know to be utilized by the early life stages of species that spawn in much higher salinities and that are important forage for young anadromous fishes. Each option will be scored based upon the presence (-1) or absence (0) of known or potential anadromous fish (or forage) rearing habitat within the footprint or immediate vicinity of the proposed placement area. If option development has the potential to protect or enhance existing anadromous fish rearing areas, it will receive a +1.

Larval Transport

Discharge from the Susquehanna River and other upper and mid Bay rivers transports the early life stages of species that are spawned in the rivers to feeding and nursery areas further south (down-Bay). In contrast, the salt wedge and tidal currents help to transport young of fish that are spawned in saltier areas to feeding areas up-Bay. Significant alterations to the currents that influence these larval transport mechanisms could have detrimental effects on fish populations. Residence time modeling was conducted to attempt to predict significant alterations in water mass distribution and suspended particulate (e.g., larval fish) transport. The extent to which larval transport could be influenced by alterations in hydrodynamics will be examined at each option, to the extent possible. A 0 will be assigned if no negative impact is expected and a –1 assigned if negative effects are anticipated. No +1 condition has been identified for this parameter.

Essential Fish Habitat (EFH)
The Magnuson-Stevens Act provides protection to habitats designated as essential for the success of marine fish species that are managed by the NMFS as harvestable resources. The species of concern are particular to a region and the habitats essential to the success of their early life stages are defined in the EFH guidance for the region. The Chesapeake Bay generally provides EFH for seven species of regional concern, although only two species typically occur in the middle and upper portions of the Bay (bluefish and summer flounder). If the option lies within the general area designated as EFH but the species of concern are not present (or the option would otherwise not impact EFH) it will be scored with a 0. If an option is known to support the species of concern and there is a potential for negative impact, it will be assigned a – 1. EFH areas will be defined from existing information and consultation with the NMFS. If option development has the potential to protect or enhance existing EFH, it will receive a +1.

Potential EFH at the Ocean Placement Option is significantly different than that of the Chesapeake Bay and will be scored based upon assessment made during siting and permitting of the option.

Habitat of Particular Concern (HAPC)
Within areas that provide EFH for fish species protected under the Magnuson-Stevens Act, some areas are considered to be of particular concern. These are generally areas of unique habitat features that have been shown to be critical to the survival of the early life stages of particular fish species. HAPC for most regionally important species occurs within the lower Bay, the Coastal Bays, or over the continental shelf. However, SAV (particularly the SAV bed boundaries) are considered HAPC for summer flounder, particularly south of the Bay Bridge.

The presence of HAPC or proximity to HAPC will be evaluated to define the potential impacts from construction or operation of a dredged material placement option or beneficial use option. HAPC areas will be defined from existing information and consultation with the NMFS. The presence of or negative impacts to HAPC will result in the assignment of a –1. A 0 will be assigned if no HAPC occur in the area, or if no negative impact is anticipated. If option development has the potential to protect or enhance existing HAPC, it will receive a +1.

Potential HAPC at the Ocean Placement Option is significantly different than that of the Chesapeake Bay and will be scored based upon assessment made during siting and permitting of the option.

Commercial Fish and Shellfish
For the majority of options, the fish species to be used for the screening will include those typically harvested within the Bay, including: *Morone americana* (white perch), *Morone saxatilis* (striped bass), herring (*Alosa*) species, *Alosa aestivalis* (blueback herring), *Alosa mediocris* (hickory shad), *Alosa sapidissima* (American shad) and various species in the family *Sciaenidae* (spot, croaker, etc.). Shellfish considered include *Callinectes sapidus* (blue crab), *Crassostrea virginica* (oysters), and *Mya arenaria* (soft clams) and hard clams (*Mercenaria mercenaria*). These species will be selected because of their historical commercial importance, and in some cases, because of population declines that have caused the imposition of state or federal restrictions on the taking of these species. Each of these species uses the Bay during at

least one life stage and all of these species are typically used in evaluating the value of the fishery resources of the Chesapeake Bay (MES 1997b). Commercial shellfish and crabbing areas are limited (by regulations) within the Bay. Each option will be evaluated based upon current/existing commercial shellfish harvesting areas, existence of natural or historical oyster beds, presence of oyster sanctuaries, and crabbing areas within or immediately adjacent to the area. Potential negative impacts to existing harvesting areas or sanctuaries will receive a –1. If no negative impact potential exists, a 0 will be assigned. The commercial harvest potential of the Ocean Placement Option will be based upon previous assessments of commercial fish/shellfish distributions made during the permitting of the option. If option development has the potential to protect or enhance existing commercial harvesting areas, it will receive a +1.

Thermal Refuge

Within the Chesapeake Bay and its major tributaries, deeper areas provide overwintering habitat and refuge for young of the year finfish species and blue crabs. These areas can remain a few degrees warmer than the overlying (surficial) waters and provide refuge for young fish. This can be critical to the survival of some species because large percentages of some finfish populations may overwinter in the Bay and rely on these winter refugia. Also, within many areas of the Bay, deeper waters are known to be critical habitat for blue crabs, which burrow into the bottom to lie dormant for the winter. Each option will be evaluated relative to its potential to provide overwintering habitat for finfish or blue crabs. A 0 will be assigned if such areas are not present or affected by the construction of a given option, and a –1 will be assigned if negative impacts to or altering of known thermal refuges are anticipated to occur. If option development has the potential to protect or enhance existing thermal refuge areas, it will receive a +1.

Recreational Fishery

The recreational fishery in the Chesapeake Bay is among one of the most valued resources in the state of Maryland. The Bay supports a tremendous number of fish and diversity of species sought by recreational anglers. Charter boat captains favor some areas of the Bay, while individual recreational anglers favor other areas. In some areas, recreational anglers consume and subsist on their catches and the resource is highly valued locally. Options in these areas that are expected to negatively impact fishing activity will receive a –1 for this parameter. If none or only occasional use is determined, and no negative impacts are expected a 0 will be assigned. If option development has the potential to protect or enhance existing recreational fishing, it will receive a +1. The potential for each area to be utilized by recreational species and the actual use of each area by recreational anglers will be evaluated in the context of the regional fishery.

CATEGORY 5: SPECIAL REGULATORY ATTRIBUTES

Protected Species (RTE)

The distribution of both state (DNR designated SSPRA) and federally protected (i.e., Rare, Threatened, and Endangered [RTE]) species relative to the potential placement options will be determined through review of existing information and/or correspondence with both state and federal resource agencies. If option development has the potential to negatively impact RTE or SSPRA habitats, it will be assigned a –1. For this parameter, the colonial waterbird, waterfowl areas, and special non-tidal wetland habitats under SSPRA are not being considered because they are scored separately elsewhere. If no RTE or applicable SSPRA are determined to be in the

vicinity and no negative impact is expected, a 0 will be assigned. If option development has the potential to protect or enhance existing RTE habitat, it will receive a +1. The occurrence of shortnose sturgeon, the proximity to bald eagle nesting areas, and the potential occurrence of least tern, black skimmer, or piping plover nesting options will be evaluated for each option within the Bay. A positive or negative score will result for each species identified at a particular site. For example, if 3 RTE species were identified at an option and negative impacts were anticipated, a score of –3 would result.

The RTE species potentially present near the Ocean Placement option are significantly different than those that utilize the Bay (in most cases). Potential for the Ocean Placement option to support RTE will be based upon previous assessments made during the permitting of the option.

CATEGORY 6: WATERBIRD ATTRIBUTES

Waterfowl Use

The Chesapeake Bay is utilized as breeding and feeding habitat for many species of waterfowl. Shallows are used for feeding and /or rearing of young. Deeper areas are also important for resting and staging (or flocking). The Bay is used by both migratory waterfowl and residents, and serves as a significant staging area for some species along the Atlantic flyway. For this assessment, the definition of waterfowl is limited to the harvestable resources (ducks/geese). The potential impacts upon existing areas of waterfowl utilization will be evaluated, with particular attention to duck and goose habitat. Options with a potential for long-term negative impacts to waterfowl staging or concentration areas will receive a score of –1. A 0 will be assigned to options where no negative waterfowl habitat impacts are expected. If option development has the potential to protect or enhance existing waterfowl habitat, it will receive a +1.

Wading and Shorebird Use

Shore zone and shallow water areas within the Chesapeake Bay are important foraging habitats for shorebird and wading bird feeding areas. Remote forested and natural beaches have been identified as critical nesting habitats for the survival of many wading and shorebird species. Each option will be evaluated for the potential of providing these habitat functions for wading or shorebirds and will receive a –1 if any long-term negative impacts can be expected, and a 0 if negative impacts are not expected or wading and shorebirds habitat is not present. If option development has the potential to protect or enhance existing wading or shorebird habitat, it will receive a +1.

CATEGORY 7: TERRESTRIAL HABITAT ATTRIBUTES

Wildlife Habitat

This category is limited to locations where the possibility of impacting sensitive natural terrestrial (upland) habitat and wildlife or nesting/forage areas exists. It will also include the potential for impacts to sensitive upland plant communities (other than forests and wetlands, which are scored separately). Options that will be developed in upland areas, will potentially abut shorelines, or which may negatively impact existing island remnants that provide habitat may have the potential for negative impacts to this parameter. In addition, options that may

cause erosional impacts to terrestrial habitats will be also considered less suitable for construction. Any of these conditions would be assigned a -1. A 0 will be assigned if no negative impact is anticipated. If option development has the potential to protect or enhance existing terrestrial wildlife habitat, it will receive a +1.

Forests

This category includes natural forested areas that are of sufficient extent and density to provide forage and cover for sensitive terrestrial species. In general that means mature or mostly-mature forest stands of sufficient width (1000+ foot diameter) to provide habitat for species that dwell in forest interiors. Options that could potentially negatively impact such forested areas would receive a –1 and a 0 would be assigned if no potential negative impact is expected. If the option has the potential to protect or enhance existing forested areas, it will receive a +1.

Streams

Freshwater streams are an important resource for both wildlife habitat and recreation within the State of Maryland. Construction near streams, or options that could potentially alter the hydraulics of a stream have the potential to alter the physical character of the stream channel which, in turn, impacts the habitat value of the stream. Alterations in stream character can negatively impact the aquatic communities that the stream supports and can have lesser impacts on other terrestrial resources. An option that has the potential to negatively alter the physical character of a stream or stream channel will be scored –1. (Potential impacts to surface water quality are scored elsewhere). If streams existing within or immediately adjacent to an option, but there is no potential for impacts to the streams, the option would score a 0. If the option has the potential to protect or enhance existing natural streams, it will receive a +1.

Lakes & Ponds

Some of the proposed options may have a potential influence upon natural fresh surface water lakes and ponds. This potential will be evaluated and a value of -1 will be assigned if the physical character or hydraulics of the lake or pond would be potentially negatively impacted by option development. (Potential impacts to surface water quality are scored elsewhere). If no negative impact is anticipated, the site would receive a 0. If the option has the potential to protect or enhance existing natural lakes or ponds, it will receive a +1.

Other Avian Habitat

Upland areas provide habitat for a variety of avian species that differs considerably from those that are considered under the waterbird/shorebird and waterfowl categories. Specifically, uplands provide habitat for a wide variety of resident species but are also critical to sensitive groups such neotropical migrants and those that dwell in forest interiors. This category focuses on potential impacts to these habitats with particular attention to areas that would support sensitive species. Options that with a potential to negatively impact these other avian habitats would be scored with a –1. A 0 would be assigned to options that are not expected to negatively impact avian habitats. If the option has the potential to protect or enhance existing natural avian habitats, it will receive a +1.

High Quality Agriculture
Prime and unique farmland has been vanishing at a tremendous rate in some areas. Highly productive farmlands with rich soil composition that have been farmed for generations are recognized as a non-renewable resource by Executive Order. Development of or infringement upon these farmlands would be considered a negative impact and scored with a –1. A 0 would be assigned to options that are not expected to negatively impact prime or unique farmland. If the option has the potential to protect or enhance existing prime or unique farmlands, it will receive a +1.

CATEGORY 8: PHYSICAL ATTRIBUTES

Substrate Characteristics
Substrate characteristics are known to be a significant habitat feature that influences the distribution of benthic and other aquatic organisms within the Bay. The substrate composition of the benthic environment within the proposed placement option provides important information that will be used to characterize the relative condition of the option, the quality of habitat available to higher trophic levels at the option (such as fish), and the suitability of the option for construction. In the same manner, soil characteristics influence the type and productivity of terrestrial areas. Significant alterations in substrate/soil characteristics could negatively impact the habitat and biotic communities within an area particularly if a substrate is limited. This is the case with sand bottom in the Harbor. Conversion of sandy bottoms to finer-grained substrates would be considered a negative impact and assigned a value of -1. A 0 will be assigned if negative changes to substrate/soil composition are not expected from the option. If the option has the potential to enhance existing substrate or soil characteristics by adding or improving limited substrates, it will receive a +1.

Hydrodynamic Effects
Wind-driven currents and tidal currents affect the distribution of biological organisms and nutrients, sedimentation patterns, and rates of erosion. Large structures can alter the flow velocity to the point that significant changes in sedimentation, erosion, and potentially the distribution of biological organisms could occur. Hydrodynamic two-dimensional modeling will be conducted, examining the hydrodynamic effects of dredged material placement for water based options. Option-specific variations of facility size and orientation will be evaluated for hydrodynamic properties. Results of preliminary hydrodynamic modeling will be incorporated into the environmental analysis. More comprehensive hydrodynamic modeling, including use of a three-dimensional model, may be needed to more fully characterize prospective hydrodynamic effects of the selected options as they progress through the study process.

Alterations in hydrodynamics that could increase erosion potential or alter currents over critical areas such as oysters bays would be considered as –1. However, options that would have no effect will be scored as 0. Options that may decrease erosion over sensitive areas or otherwise protest/enhance resources would be assigned a +1 for a positive effect.

For this evaluation, the physical effects of hydrodynamics (erosion/sedimentation and increased currents in shallow or critical areas) are considered separately from the potential effects on larval fish distributions or navigation.

Toxic Contaminants
This category applies to the effects of toxic contaminants on flora and fauna. The effects of toxic contaminants on human health are to be considered under the Public Health category. Sediments/substrates can contain a variety of toxic contaminants introduced from both natural and anthropogenic sources. Sediment toxicants can limit the organisms that are able to utilize the area and can also be mobilized into the food chain (becoming bioavailable to other organisms and food fish). Sediment quality will be evaluated for each of the options based on known sediment quality data.

Harbor options and dredged materials within the Harbor are generally considered "contaminated" and material removed from them would remain in the Harbor or be placed in contained facilities. Generally, these facilities would be assigned a 0 for this parameter because there would be no change/impact relative to the existing conditions. Some Harbor options may include a "capping" component whereby materials of poorer quality will be buried or capped with materials of better quality. A +1 would be assigned if there were a potential for capping toxic contaminated sediments with sediments of better quality. A –1 would be assigned if there were a potential that an option could degrade the sediment quality in the area.

Hazardous, Toxic, Radioactive Substances (HTRS) and Unexploded Ordnance (UXO)
As part of its mission, the military currently tests, and has historically tested, weapons in portions of the Chesapeake Bay around Pooles Island (APG firing range), Sharps Island and at Bloodsworth Island (immediately north of Holland Island) in the central Bay (Navy firing/bombing range). This includes the firing of live rounds and stray shells are known to have landed outside the designated restricted areas. The Controlled Areas of the Bay are believed to contain shells that did not explode during testing. The presence of or potential for unexploded ordinance (UXO) could significantly complicate the construction of a dredged material placement area, and would result in the assignment of a -1. Any option without such potential would receive a 0. Also, any option that is known to have the potential for existing pollutants (HTRS) or Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) liabilities would be a poor choice for a dredged material placement area if construction would potentially remobilize contaminants into the environment. With respect to UXO, there is no approved remediation policy. There is also no specific federal policy regarding the liability of potential responsible parties. These are institutional issues, which would need to be addressed in addition to the potential environmental and safety implications associated with UXO, and in relationship to technical difficulties associated with cleanup. No +1 condition was identified for this parameter.

Fossil Shell Mining
In portions of the upper Chesapeake Bay, fossil oyster shell beds and buried shell resources are mined for MDNR to provide cultch for oyster replenishment in the middle and lower portions of the Bay. Baylor Grounds are natural oyster rocks, beds, and shoals charted within Virginia's Baylor Survey; Baylor Grounds may be a potential source for shell mining. Fossil shell mining is viewed as an important resource for the continued production of oysters from the Bay and the presence of mining areas or Baylor Grounds within or adjacent to a proposed option

footprint would be assigned a –1. The absence of such beds or grounds would result in the assignment of a 0. No +1 condition was identified for this parameter.

CATEGORY 9: OTHER NON-BIOLOGICAL ATTRIBUTES

Floodplains

In addition to providing natural flood control, floodplains are important buffer and wildlife areas. Floodplains are recognized as a non-renewable resource by Executive Order. Further development of or infringement upon natural floodplains could decrease the water storage capacity of an area and increase the potential for localized flooding. This would be considered a negative impact and scored with a –1. A 0 would be assigned to options that are not expected to negatively impact floodplain storage capacity or flood potential. If the option has the potential to protect or enhance existing floodplains (i.e. increase flood storage capacity or decrease flooding), it will receive a +1.

Recreational Value

Parts of the Chesapeake Bay watershed are heavily used as recreational areas. The diverse recreational activities include bird watching, boating, swimming, fishing, hunting, etc. For this evaluation, recreational fishing is already evaluated elsewhere, so it will not be included with this parameter. If an option is known to provide recreational resources or facilities currently and option development will permanently disrupt these activities, option development will be assigned a –1. The absence of such resources or use would result in the assignment of a 0. If the option has the potential to protect or enhance existing recreational resources, it will receive a +1.

Aesthetics

Aesthetics impacts from the construction and operation of a dredged material placement facility can be a negative impact if the option is near a neighborhood, tourist/recreation area, or natural areas where there is a potential for wildlife disturbance. If an option is located within approximately 0.5 mi of a population center, dwellings, or managed natural area and will not include mitigating a site of existing poor aesthetic value, it will be considered to have the potential to have a negative impact on aesthetics, and will be assigned a -1. Although some options lie within the city limits of Baltimore, if they lie within existing industrial areas and will not negatively impact residential or recreational areas, they will be given a score of 0. If the option has the potential to improve aesthetics, it will receive a +1.

Noise

Noise impacts from the construction and operation of a dredged material placement facility can be a negative impact if the option is near a neighborhood, tourist/recreation area, or natural areas where there is a potential for wildlife disturbance. If an option is located within approximately 0.5 mi of a population center, dwellings, or managed natural area and the project will have potential noise impacts associated with construction and operation, it will be considered to have a negative impact and will be assigned a -1. Although some options lie within the city limits of Baltimore, if they lie within existing industrial areas and will not negatively impact dwelling or recreational areas, they will be given a score of 0. If the option has the potential to reduce existing noise levels, it will receive a +1.

Cultural Resources
This parameter is used to describe the potential for archaeological and historic options at each option. The potential presence of shipwrecks and other historical features as well as any archaeological resources known to occur (from existing reports) will be assigned a value of -1. Known resources that have been deemed to have no archaeological value (due to previous disturbance) will not be considered negatively relative to option development, and will be assigned a 0. Determinations that no known resources exist will be assigned a 0 also. If the option has the potential to protect or enhance existing cultural resources, it will receive a +1.

Air Quality
This parameter refers to the current status of the local air quality: In attainment or out of attainment based the federal standards set by EPA. It also includes the health risks associated with entry of particulate material or irritant substances into the airways affecting air quality that can may be associated with dredged material placement projects. If the project area is in attainment and building the project will put it out of attainment or the project could introduce long-term particulate/irritant emissions, the parameter would be assigned a score of –1. If there will be in impact to the current air quality or increase of particulates/irritants (whether the area is in or out of attainment) the score will be 0. If the project area is not in attainment and the project will improve the air quality or particulate/irritant conditions OR if the project area is in attainment and the air quality will be further improved the project will be scored +1.

Infrastructure
This parameter refers to the current status of the local infrastructure. This includes but may not be limited to roads, railroads, gas, sewer or electrical lines, business building and employment opportunities. Existing traffic and traffic patterns are also considered as part of this parameter. If the project has the potential to damage or impede the local infrastructure or negatively impact traffic volume or patterns the score is –1. If the project will have no impact on the local infrastructure the score is 0. If the project has the potential to improve, protect or provide opportunities to expand, enhance or benefit the local infrastructure or traffic the score is +1.

Existing Land Use
The existing land use in the vicinity of proposed dredged material placement sites in the Harbor includes commercial uses, recreational facilities, residential uses, and even some open/green space. Development of a dredged material placement site has the potential to enhance or perhaps even disrupt the current land use. If a project has the potential to enhance or has high potential to cleanup existing shoreline areas (improve eroded bulk heading, remove trash, etc.), the project would receive a score of +1. If a project is consistent with the current land use but provides no benefits or enhancements to an area, it will receive a score of 0. If the project has the potential to negatively alter or impact existing land use or community development/revitalization plans, it will receive a –1.

Socioeconomics: Commercial Income & Assets
The existing commercial ventures in an area or neighborhood help to define the character of the area and contribute significantly to the economic base. Development of a dredged material placement site has the potential to either enhance or disrupt the existing commercial activities within an area. Addition/improvement of recreation facilities, improvements to infrastructure,

improvements to maritime use, or availability of more commercial space as a result of a project could bring more commercial income into an area or neighborhood. Such enhancements would be considered positive and receive a score of +1. If a project is consistent with the current commercial usage but provides no benefits or enhancements to an area, it will receive a score of 0. If the project has the potential to negatively alter or impact existing commercial ventures or income, it will receive a –1.

Socioeconomics: Community Assets

The existing community structure and economic character of an area is driven by a variety of factors. Employment potential, quality of education and recreational/commercial opportunities help to dictate property values and the average income of the families within a community. Communities that thrive economically have less turn over in residents and more improvements to individual properties, which maintains and improves the economic base. Development of a dredged material placement site has the potential to either enhance or disrupt the existing community socioeconomics of an area. Addition/improvement of recreation facilities, improvements to infrastructure, or availability of more residential land and small business ventures will tend to improve property values and average residential income within a community. Such enhancements would be considered positive and receive a score of +1. If a project is consistent with the current community usage but provides no benefits or enhancements to an area, it will receive a score of 0. If the project has the potential to negatively impact existing residential socioeconomics (e.g. decrease property values, impact economic character of the area), it will receive a –1.

Environmental Justice

Executive Order 12898 was established to protect low-income and minority populations, because it was recognized that some actions might disproportionately favor higher-income populations or put lower-income populations at higher health and safety risks. Development of a dredged material placement site could positively or negatively impact these types of populations. Addition/improvement of recreation facilities or other community amenities, improvement of property values or decreases of environmental health risks as a result of a project would be considered positive and scored as +1. If the project is consistent with EO 12898 but does not provide any improvements/enhancements, it will receive a score of 0. If the project has the potential to negatively impact or displace a minority or low-income community (e.g. increasing health risks, decreasing property values or income potential), it will receive a –1.

Public Health

Continuing good health of citizens is a paramount concern of most individuals, families and community leaders. Development of a dredged material placement site has the potential to improve public health in many ways. Capping of contaminated materials, reducing the leaching of toxic material which might enter the human food chain are considered under this category. Limiting the entry of particulate material or irritant substances into the airways affecting air quality may be one of the outcomes of a dredged material placement project are considered under air quality. Improvements to public health would be considered positive and would receive a score of +1. If a site development would not appreciably mitigate any public health concerns, it will receive a neutral score of 0. Although state and federal resource agencies would not knowingly support any project that would potentially increase the risk to public health, there

are some potential mitigation projects that could pose increased public health risks during site evaluation and cleanup. If this arises as a potential for development of any site, and the potential health risk exceeds the potential benefit, the site should receive a score of –1.

Public Safety

This category refers to those situations affecting recreational, occupational and general public safety issues concerned with dredged material placement options. Some options may include chemical processing of dredged material prior to its final disposition. These options may result in occupational safety concerns. Other options may suggest long-term safety issues such as increases in industrial accidents or significant contributions to traffic accidents (from trucking of dredged material to upland sites). Some options may also have the potential to convert current recreational fishing/boating areas for dredged material placement, which may increase recreational boat traffic in/near shipping channels. If a site has the potential to create any of these potential hazards or otherwise increases public safety concerns, it will receive a score of –1. Improvements to any of these conditions, particularly safer access to public recreation, would be considered positive and would receive a score of +1. No appreciable change to public safety would receive a score of 0.

Navigation

Safe and effective navigation is essential to the vitality of the Port of Baltimore and the commerce of the region. Due to the large volume of barge, ship, and container traffic in the Bay, the potential effects of the proposed options on local navigation will be evaluated. Options that lie partially or wholly within navigation channels could be considered hazards to navigation. Additionally, options adjacent to channels could have an impact on navigation due to increased currents from altered hydrodynamics. A structure that may hinder navigation can also pose a potential environmental threat from potential ship collisions and groundings and will be assigned a -1. If no such potential exists, a 0 will be assigned. If the option has the potential to protect or enhance existing navigation on or immediately adjacent to the site, it will receive a +1.

CATEGORY 10: BENEFICIAL ATTRIBUTES

Beneficial Use – Upland

Many of the proposed options will be converted, in part, to upland habitat to enhance regional habitat resources (particularly for bird nesting habitat). If an option is not designed to create upland habitat, then it will receive a 0 score. If upland habitat will be created, the option will receive a +1. This parameter does not specifically relate to impairment or impact evaluation, but gives a positive score for creation of habitat. No –1 condition was identified for this parameter.

Beneficial Use – Wetland

Many of the proposed options will be converted, in part, to wetland habitat to enhance regional habitat resources. If an option is not designed to create wetland habitat, then it will receive 0 raw score. If wetland habitat will be created, the option will receive a +1. This parameter does not specifically relate to impairment or impact evaluation, but gives a positive score for creation of habitat. No –1 condition was identified for this parameter.

Beneficial Use – Adjacent Habitat Enhancement
Some options may have the potential to restore or enhance adjacent habitat after construction. For example, protection of an eroding shoreline may allow for natural propagation of tidal marsh plants or SAV adjacent to an option. Stabilization of certain beaches could also improve the nesting habitat for terrapins or colonial ground nesting birds (terns/skimmers). Restoration of forested uplands could provide isolated (adjacent) fringe habitat or provide enough density of adjacent forests to support forested interior dwelling species (FIDS). Another upland example would be the potential for stream improvements from the cessation of acid mine drainage. Habitat enhancements adjacent to the proposed option will be considered as positive effects of option development and will be assigned a raw score of +1. If no benefit is to be derived a 0 will be assigned. No –1 condition was identified for this parameter.

Beneficial Use – Faunal Enhancement
Some options may have the potential to restore or enhance populations of wildlife species of concern. For example, protection of some shoreline areas or isolated islands could have a positive effect on sensitive bird species. Wildlife enhancements within or immediately adjacent to the proposed option will be considered as positive effects of option development and will be assigned a raw score of +1. If no benefit is to be derived a 0 will be assigned. No –1 condition was identified for this parameter.

Beneficial Use –Recreational Enhancement
Some options may have the potential to create recreational facilities as part of the project. Impacts and improvements to existing recreational facilities are captured under the recreational category. This parameter is established to acknowledge projects that will create recreational opportunities as an integral part of the project plan. Recreational facilities developed as part of the proposed option will be considered as positive effects of option development and will be assigned a raw score of +1. If no benefit is derived a 0 will be assigned. No –1 condition was identified for this parameter.

Shoreline Protection
Several options have the potential to provide shoreline stabilization that will protect not only wildlife habitat but also dwellings and other man-made properties/structures. These options may provide a benefit that needs to be measured separately from the protection of natural resources. Shoreline stabilization for protection of property would be considered a positive effect of option development under this parameter, and a +1 will be assigned if it is part of the site design. If the option has no designed shoreline protection value, it will receive a 0. No –1 condition was identified for this parameter Shoreline stabilization for the purpose of habitat protection and enhancement is considered separately under other parameters.

Table A-1: Bay Enhancement Workgroup's Summary of Environmental Factors, Weights and Scores for Dredged Material Placement Options (8/21/2002)

COL.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	
ROW			TECHNICAL FACTORS												WATER QUALITY					AQUATIC INV.			WETLANDS		AQUATIC BIOLOGY - FINFISH/SHELLFISH							SPECIAL		WATERBIRDS		TERRESTRIAL							PHYSICAL PARAMETERS					OTHER					BENEFICIAL ATTRIBUTES							ROW
1		Weighting Factor - Environmental Only													5	3	3	2	3	3	4	2	6	4	2	2	2	4	4		4	2	3	5	3									3	2	4		2	4	2	4	5	1	4	1					1
2		Weighting Factor													3	3	3	4	5	3	4	5	5	5	4	4	6	3	4	4	4	5	5	4	4	2	3	4	2	2	3	3	4	4	5	3	2	2	1	3	3	4	2	2	2	2					2
3	Option No.	OPTION NAME	Level of Documentation	Type	Size, acres	Annual Capacity, Mcy	Total Capacity, Mcy	Implementation Time, years planning	design	constr	total	Date Available	Useful Life, years	Capacity Reached	Dissolved Oxygen	Nutrient Enrichment	Turbidity	Salinity	Ground Water	Benthic Community	Shallow Water Habitat (Tier II & Tier III)	SAV	Tidal Wetlands	Non-tidal Wetlands	Finfish Spawning Habitat	Finfish Rearing Habitat	Larval Transport	Essential Fish Habitat (EFH)	Commercially Harvested Species and Habitat	Thermal Refuge	Recreational Fishery	Protected Species (RTE) (SSPRA)	Habitat of Particular Concern (HAPC)	Waterfowl Use	Wading and Shorebird Use	Wildlife Habitat	Forests	Streams	Lakes & Ponds	Other Natural Avian Habitat	Prime or Unique Agricultural Land	Substrate/Soil Characteristics	Hydro-dynamics effects	Toxic Contaminants	CERCLA/UXO Potential	Fossil Shell Mining	Floodplains	Recreational Value	Aesthetics and Noise	Cultural Resources	Navigation	Beneficial Use Wetlands	Beneficial Use Uplands	Beneficial Use - - Adjacent Habitat Enhancement	Beneficial Use Faunal	Shoreline Protection	Total Environmental Score	Normalized	(+) 1.9	Overall Rank	Option No.	3
4	4	Innovative Use at Cox Creek	Concept	Upland/Innovative		0.5	25	4	3	2	9	2010	50	2060	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	7	3.5000	5.4000	1	4	4
5	18	Wetland Thin Layering Enhance. / Restor.	Concept	Wetland											1	1	1	1	1	1	0	0	1	1	0	1	0	1	0	0	0	0	0	1	1	1	0	0	1	0	0	1	0	0	0	0	0	1	1	0	0	1	0	1	1	1	66	2.0625	3.9625	2	18	5
6	11	Mines and Quarries	Concept	Upland/Innovative	xx	2	100						50	2060	0	1	1	0	1	0	0	0	0	0	1	1	0	0	0	0	1	0	0	0	0	1	1	1	0	1	0	1	0	1	0	0	0	1	1	0	0	0	1	0	1	0	48	1.8462	3.7462	3	11	6
7	3	Barren Island	Reconnaissance	Upland/Wetland	2,000	2.5	60				0	2001	24	2034	0	-1	1	0	0	-1	-1	0	1	1	0	-1	0	-1	-1	0	-1	2	0	1	1	1	1	0	1	1	0	-1	0	0	0	0	0	1	0	0	0	1	1	1	1	1	26	0.6500	2.5500	4	3	7
8	17	Sparrows Point	Concept	Wetland	300	0.8	10.3						13	2020	1	-1	1	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	1	1	1	1	1	16	0.5161	2.4161	5	17	8
9	2	Agricultural	Concept	Land Application	50,000	0.5	25	4	2	1	7	2008	50	2058	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0.4000	2.3000	6	2	9
10	9	James Island	Reconnaissance	Upland/Wetland	2,200	3.5	81.6						23	2033	0	-1	1	0	0	-1	-1	0	1	1	0	-1	0	-1	-1	0	-1	0	0	1	1	1	1	0	0	1	0	-1	0	0	0	0	0	1	0	0	0	1	1	1	1	1	14	0.3684	2.2684	7	9	10
11	6	Furnace Bay	Concept	Upland/Innovative	70	0.4	13.6				0	2001	34	2041	0	0	0	0	0	0	0	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	0	0	0	1	0	1	0	6	0.3529	2.2529	8	6	11
12	10	Lower Eastern Neck Island	Reconnaissance	Upland/Wetland	862	0.5	6.9						14	2022	0	-1	1	0	0	-1	-1	0	1	0	0	-1	0	-1	-1	0	-1	1	0	1	1	1	1	0	0	1	1	-1	0	0	0	0	0	1	0	-1	0	1	0	1	1	1	12	0.3077	2.2077	9	10	12
13	8	Holland Island	Reconnaissance	Upland/Wetland	1,600	2.5	56	4	2	2	8	2009	22	2032	0	-1	1	0	0	-1	-1	-1	1	0	0	0	0	-1	-1	0	-1	0	-1	1	1	1	1	0	0	1	1	-1	0	0	0	0	0	1	0	0	0	1	1	0	1	1	1	0.0270	1.9270	10	8	13
14	1	Aberdeen Proving Grounds	Concept	Wetland	200	0.5	1	4	3	1	8	2009	2	2011	0	-1	1	0	0	-1	-1	0	0	1	-1	-1	0	0	-1	0	-1	0	-1	-1	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	-6	-0.1500	1.7500	11	1	14
15	13	Parsons Island	Reconnaissance	Upland/Wetland	290	0.75	11.5						15	2024	0	-1	1	0	0	-1	-1	-1	0	0	-1	-1	0	-1	0	0	-1	0	-1	1	1	1	1	0	0	1	1	-1	0	0	0	0	0	0	0	0	0	1	1	0	1	1	-7	-0.1842	1.7158	12	13	15
16	12	Ocean Placement	Reconnaissance	Ocean	xx	4	200						50	2057	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-4	-0.2105	1.6895	13	12	16
17	14	Poplar Island Modification (lateral expansion)	Reconnaissance	Upland/Wetland	1,506	3.5	81.6						23	2032	0	-1	0	0	0	-1	-1	0	1	0	0	-1	0	-1	-1	0	-1	0	0	1	0	0	0	0	0	0	0	-1	0	0	0	0	0	1	0	0	0	1	1	0	1	0	-9	-0.2727	1.6273	14 (tie)	14	17
18	14a	Poplar Island Modification (dike raising)													0	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-3	-0.2727	1.6273	14 (tie)	14a	18
19	26	Site 170 (Mouth of Patapsco)	Reconnaissance	Upland	1,600	4	80						20	2031	0	-1	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	-1	0	0	0	0	-1	-1	0	-1	1	1	0	1	0	-12	-0.4138	1.4862	15	26	19
20	27	MD - C&D Placement Sites (6)													0	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	0	0	-1	0	0	0	0	0	0	0	-1	0	0	0	0	0	0	0	0	-11	-0.5238	1.3762	16	27	20
21	22	3S - Swan Point West	Reconnaissance	Submerged	3,000	4	80						20	2029	1	-1	-1	0	0	1	0	0	0	0	0	-1	0	-1	-1	-1	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	0	0	1	0	0	1	0	-16	-0.5714	1.3286	17	22	21
22	15	Sollers Point	Concept	Upland	90	0.5	4						8	2017	0	-1	0	0	0	-1	-1	0	-1	0	0	0	0	0	0	0	0	0	0	-1	-1	0	0	0	0	0	0	0	0	0	0	0	-1	0	0	0	0	0	0	0	0	-25	-0.7813	1.1188	18	15	22
23	21	3 - Swan Point West	Reconnaissance	Upland	1,065	4	80						20	2031	0	-1	-1	0	0	-1	0	0	0	0	0	-1	0	-1	-1	-1	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	0	0	1	1	0	1	0	-23	-0.7931	1.1069	19	21	23
24	5	Dead Ship Anchorage	Concept	Upland	125	0.5	6.7	4	2	2	8	2009	13	2022	0	-1	0	0	0	-1	-1	0	-1	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	0	-1	0	-1	0	0	0	0	0	0	0	1	-27	-0.8182	1.0818	20	5	24
25	20	2 - Tolchester/ Brewerton Angle	Reconnaissance	Upland	1,195	4	80						20	2031	0	-1	-1	0	0	-1	0	0	0	0	0	-1	0	-1	-1	-1	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	0	0	1	1	0	1	0	-26	-0.8966	1.0034	21	20	25
26	19	1 - Tolchester West	Reconnaissance	Upland	1,060	4	80						20	2031	0	-1	-1	0	0	-1	0	0	0	0	0	-1	0	-1	-1	0	-1	-1	0	0	0	0	0	0	0	0	0	-1	0	0	0	-1	0	-1	-1	0	0	1	1	0	1	0	-30	-1.0345	0.8655	22	19	26
27	7	Hawkins Point/Thoms Cove	Concept	Upland	380	0.5	5	2	2	2	6	2007	10	2019	0	-1	0	0	0	-1	-1	0	-1	0	0	-1	0	0	0	0	0	0	0	-1	-1	0	0	0	0	0	0	-1	0	0	-1	0	-1	-1	-1	0	0	0	0	0	1	-38	-1.0857	0.8143	23	7	27
28	25	4br - Pooles Island	Reconnaissance	Upland	780	2	40						20	2031	0	-1	0	0	0	-1	0	0	0	0	-1	-1	0	0	-1	0	0	-1	0	0	0	0	0	0	0	0	0	-1	-1	0	-1	0	0	-1	0	0	-1	1	1	0	1	0	-32	-1.1034	0.7966	24	25	28
29	16	Sharps Island	Concept	Upland/Wetland											0	-1	-1	0	0	-1	-1	0	0	0	0	-1	0	-1	-1	0	-1	-1	0	0	0	0	0	0	0	0	0	-1	0	0	-1	0	0	-1	0	0	0	1	1	0	1	0	-35	-1.1290	0.7710	25	16	29
30	24	4b - Pooles Island	Reconnaissance	Upland	1,125	4	80						20	2031	0	-1	0	0	0	-1	-1	-1	-1	0	-1	-1	0	0	-1	0	-1	-1	0	-1	-1	-1	0	0	0	-1	0	-1	-1	0	-1	0	0	-1	0	-1	-1	1	1	0	1	1	-63	-1.7027	0.1973	26	24	30
31	23	4a - Pooles Island	Reconnaissance	Upland	1,475	4	80						20	2031	-1	-1	0	0	0	-1	0	0	0	0	-1	-1	0	0	-1	-1	-1	-1	0	-1	-1	0	0	0	0	0	0	-1	-1	0	-1	-1	0	-1	0	-1	-1	1	1	0	1	0	-57	-1.9000	0.0000	27	23	31

Legend:

+1 Potential protection or enhancement
0 No potential impacts expected
0 Not enough / inconclusive data

0 (shaded) Not applicable / not calculated
- 1 Potential negative impacts expected

RTE is the only parameter with a score >1 since each species impacted is counted

ATTACHMENT B

RESULTS OF THE ISLAND COMMUNITY UNIT (ICU) ANALYIS FOR PROJECT ALTERNATIVES

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Table B-1: Island Community Index (ICI) for Colonial Nesting Wading Birds (herons, egrets & ibises)

Habitat Type	*Index*	*Description*
Upland	1	2-10 ha (5-25 ac) including woody vegetation, availability of >250 (820 ft)m buffer for heronries, and freshwater ponds
(as nesting habitat)	0.75	2-10 ha (5-25 ac) including woody vegetation, <250 (820 ft)m buffer, and freshwater ponds
	0.50	<2 ha or 10-100 ha (25-250 ac) with woody vegetation, may or may not include ponds
	0.25	N/A
	0	>100 ha (250 ac); no vegetation or grass (non-woody vegetation)
High Marsh	1	N/A
(as foraging habitat)	0.75	includes intertidal pools
	0.50	N/A
	0.25	> 2 ha, marsh acreage not split 80/20, NO tidal gut or intertidal pools
	0	Year 1 followng construction
Low Marsh	1	>80 ha (200 ac) 80/20 split, upgrade from sand beach, includes tidal gut, plus tidal and intertidal pools
(as foraging habitat)	0.75	>40 ha (100 ac) 80/20 split, includes tidal gut, plus tidal and intertidal pools
	0.50	>20 ha (50 ac) 80/20 split, includes tidal gut, plus tidal and intertidal pools
	0.25	any size, marsh acreage not split 80/20, no tidal guts, no pools, and no sand beach
	0	Year 1 following construction
Intertidal	1	> 10 ha (25 ac) mudflats and sandy beach/shoreline
(as foraging habitat)	0.75	> 5 ha (12.5 ac) mudflats or sandy beach
	0.50	< 5 ha (12.5 ac) mudflats and/or sandy beach
	0.25	N/A
	0	N/A

Table B-2: Island Community Index (ICI) for Colonial Nesting Waterbirds (gulls, terns & skimmers)

Habitat Type	*Index*	*Description*
Upland (as nesting habitat)	1	1-2 ha (2.5-5 ac) open sand, soil, or shell; sparsely vegetated (< 25%)
	0.75	2- 7 ha (5-17 ac) open sand, soil, or shell; sparsely vegetated (< 25%)
	0.50	7-20 ha (17-49.5 ac); sparsely vegetated (< 25%)
	0.25	< 1 ha, > 20 ha; sparsely vegetated (< 25%)
	0	< 1 ha, > 20 ha; thicker vegetation (> 25%)
High Marsh (as foraging habitat)	1	N/A
	0.75	includes intertidal pools
	0.50	N/A
	0.25	> 2 ha, marsh acreage not split 80/20, NO tidal gut or intertidal pools
	0	Year 1 following construction
Low Marsh (as foraging habitat)	1	any size, 80/20 split, upgrade from sand beach, includes tidal gut, plus tidal and intertidal pools
	0.75	any size, 80/20 split, no tidal guts/pools or sand beach
	0.50	any size, marsh acreage not split 80/20, no tidal guts, no pools, and no sand beach
	0.25	N/A
	0	Year 1 following construction
Intertidal (as foraging habitat)	1	>40 ha (100 ac) mudflats and sandy beach/shoreline
	0.75	>20 ha (50 ac) mudflats and sandy beach/shoreline
	0.50	>10 ha (25 ac) mudflats and sandy beach/shoreline
	0.25	>5 ha (12.5 ac) mudflats and sandy beach/shoreline
	0	< 5 ha (12.5 ac)

Table B-3: Island Community Index (ICI) for Shorebirds (sandpipers & plovers)

Habitat Type	*Index*	*Description*
Upland	1	N/A
	0.75	N/A
	0.50	N/A
	0.25	N/A
	0	no benefit to shorebirds
High Marsh	1	N/A
	0.75	N/A
	0.50	contains >20 ha (50 ac) intertidal pools
	0.25	contains <20 ha (50 ac) intertidal pools
	0	No intertidal pools; year 1 following construction
Low Marsh	1	>80 ha (200 ac) 80/20 split, upgrade from sand beach, includes tidal gut, plus tidal and intertidal pools
	0.75	>40 ha (100 ac) 80/20 split, includes tidal gut, plus tidal and intertidal pools
	0.50	>20 ha (50 ac) 80/20 split, includes tidal gut, plus tidal and intertidal pools
	0.25	any size, marsh acreage not split 80/20, no tidal guts, no pools, and no sand beach
	0	Year 1 followingn construction
Intertidal	1	>80 ha (200 ac) mudflats and sandy beach/shoreline
	0.75	>40 ha (100 ac) mudflats and sandy beach/shoreline
	0.50	>20 ha (50 ac) mudflats and sandy beach/shoreline
	0.25	>10 ha (25 ac) mudflats and sandy beach/shoreline
	0	< 10 ha (25 ac)

Table B-4: Island Community Index (ICI) for Waterfowl

Habitat Type	*Index*	*Description*
Upland	1	1-2 ha (2.5-5 ac), forested edge adjacent to high marsh, ponds
	0.75	> 2 ha, forested edge adjacent to high marsh, ponds
	0.50	forested, but not adjacent to high marsh; and ponds
	0.25	forested, but not adjacent to high marsh; no ponds
	0	grassed expanses, no vegetative cover; may or may not include ponds
High Marsh	1	> 2 ha, adjacent to uplands; incorporates hummocks, woody vegetation; includes intertidal ponds, channels
	0.75	> 2 ha, most not adjacent to uplands; no hummocks; woody vegetation; includes intertidal ponds, channels
	0.50	any size, most not adjacent to uplands; woody vegetation; no ponds or channels
	0.25	N/A
	0	any aize; most not adjacent to uplands; no woody vegetation; no ponds or channels; year 1 following construction
Low Marsh	1	any size, 80/20 split, upgrade from sand beach, includes tidal gut, plus tidal and intertidal pools
	0.75	any size, 80/20 split, no tidal guts/pools or sand beach
	0.50	any size, marsh acreage not split 80/20, no tidal guts, no pools, and no sand beach
	0.25	N/A
	0	Year 1 following construction
Intertidal	1	> 3 ha (7.4 ac), 9-305 m (30-1000 ft) wide; gently sloping; on southeast side (maximize sunlight, minimize wind)
	0.75	> 3 ha (7.4 ac), 9-305 m (30-1000 ft) wide; gently sloping; NOT on southeast side (maximize sunlight, minimize wind)
	0.50	any size and width; located anywhere
	0.25	N/A
	0	N/A

Table B-5: Island Community Index (ICI) for Raptors

Habitat Type	*Index*	*Description*
Upland	1	forested with 1.5 km strip of land adjacent to water;
	0.75	forested without 1.5 km strip of land adjacent to water
	0.50	N/A
	0.25	not forested, but grass (provide some hunting area for hawks)
	0	Year 1 following construction
High Marsh	1	any size or features (high marsh provides hunting for hawks, and nesting for some hawks)
	0.75	N/A
	0.50	N/A
	0.25	N/A
	0	Year 1 following construction
Low Marsh	1	N/A
	0.75	N/A
	0.50	any size or features (will provide some use for foraging for fish in shallow water)
	0.25	N/A
	0	Year 1 following construction
Intertidal	1	N/A
	0.75	N/A
	0.50	N/A
	0.25	N/A
	0	No use to raptors regardless of features

Table B-6: Island Community Index (ICI) for Resident/Forage Fish

Habitat Type	*Index*	*Description*
Upland	1	N/A
	0.75	N/A
	0.50	N/A
	0.25	N/A
	0	no benefit to resident/forage fish
High Marsh	1	any size, cut with channels
	0.75	N/A
	0.50	N/A
	0.25	N/A
	0	any size, NO channels; year 1 following construction
Low Marsh	1	any size; upgrade from sandy beach; cut with channels; adjacent to possible SAV bed sites
	0.75	any size; cut with channels; NOT upgrade from sandy beach and/or possible SAV bed sites
	0.50	any size, NO channels
	0.25	N/A
	0	year 1 following construction
Intertidal	1	any size; sand beaches cut with channels; adjacent to possible SAV bed sites
	0.75	any size; sand beaches cut with channels; NOT upgrade from sandy beach and/or possible SAV bed sites
	0.50	any size, NO channels
	0.25	N/A
	0	year 1 following construction

Table B-7: Island Community Index (ICI) for Commercial/Predatory/Higher Trophic Fish

Habitat Type	*Index*	*Description*
Upland	1	N/A
	0.75	N/A
	0.50	N/A
	0.25	N/A
	0	no benefit to resident/forage fish
High Marsh	1	N/A
	0.75	N/A
	0.50	N/A
	0.25	N/A
	0	any size or features
Low Marsh	1	any size; upgrade from sandy beach; cut with channels; adjacent to possible SAV bed sites
	0.75	any size; cut with channels; NOT upgrade from sandy beach and/or possible SAV bed sites
	0.50	any size, NO channels
	0.25	N/A
	0	Year 1 following construction
Intertidal	1	N/A
	0.75	any size; sand beaches cut with channels; adjacent to possible SAV bed sites
	0.50	any size; sand beaches cut with channels; NOT upgrade from sandy beach and/or possible SAV bed sites
	0.25	any size, NO channels
	0	Year 1 following construction

Table B-8: Island Community Index (ICI) for Invertebrates

Habitat Type	*Index*	*Description*
Upland	1	N/A
	0.75	N/A
	0.50	N/A
	0.25	N/A
	0	N/A
High Marsh	1	Mature community (10 years old)..
	0.75	N/A
	0.50	Immature community characterized by pioneer and pollution tolerant species; exposed to erosional forces.
	0.25	newly established colony
	0	N/A
Low Marsh	1	Mature community (10 years old)
	0.75	N/A
	0.50	Immature community characterized by pioneer and pollution tolerant species; exposed to erosional forces
	0.25	newly established colony
	0	N/A
Intertidal	1	Mature community (10 years old).
	0.75	N/A
	0.50	Immature community characterized by pioneer and pollution tolerant species; exposed to erosional forces
	0.25	newly established colony
	0	N/A

Table B-9: Island Community Index (ICI) for Reptiles and Herpetofauna

Habitat Type	*Index*	*Description*
Upland	1	N/A
	0.75	N/A
	0.50	any size, vegetative cover- will get use by some herpetofaunal use, but most in guild don't require upland
	0.25	N/A
	0	any size; barren, no vegetative cover
High Marsh	1	any size; with channels and permanent pools (fishless)
	0.75	any size; with channels; no pools
	0.50	any size, no channels or pools
	0.25	N/A
	0	Year 1 following construction
Low Marsh	1	any size; with channels on Eastern side; maximize edge habitat, <20% (sparse) vegetation
	0.75	N/A
	0.50	any size; no channels; < 20% vegetated
	0.25	N/A
	0	any size; dense vegetation (>20% vegetated); year 1 following construction
Intertidal	1	sand beaches (above high water) and intertidal mudflats adjacent to channel
	0.75	sand beaches or intertidal mudflats adjacent to channel
	0.50	mudflats of any size, not adjacent to channel
	0.25	N/A
	0	N/A

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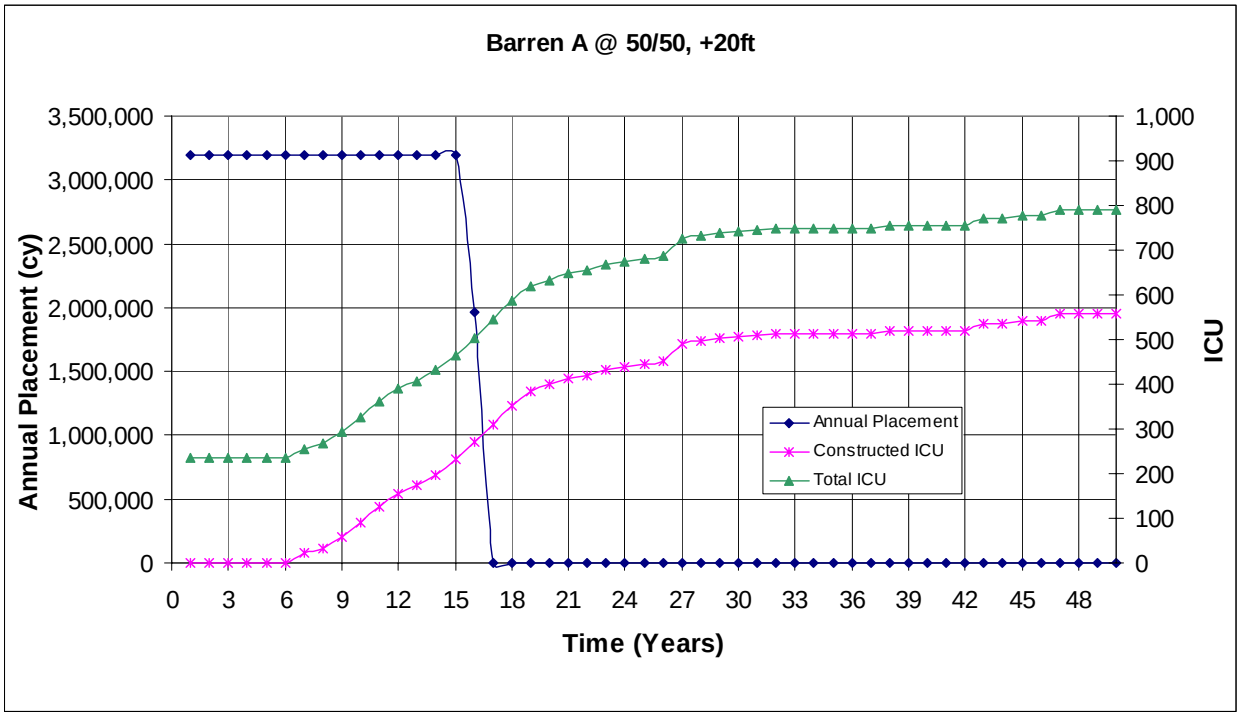

Figure B-10: ICU and Dredged Material Placement Analysis for Barren Island Alignment A Alternative (50% upland, 50% wetland, dike height +20 ft MLLW)

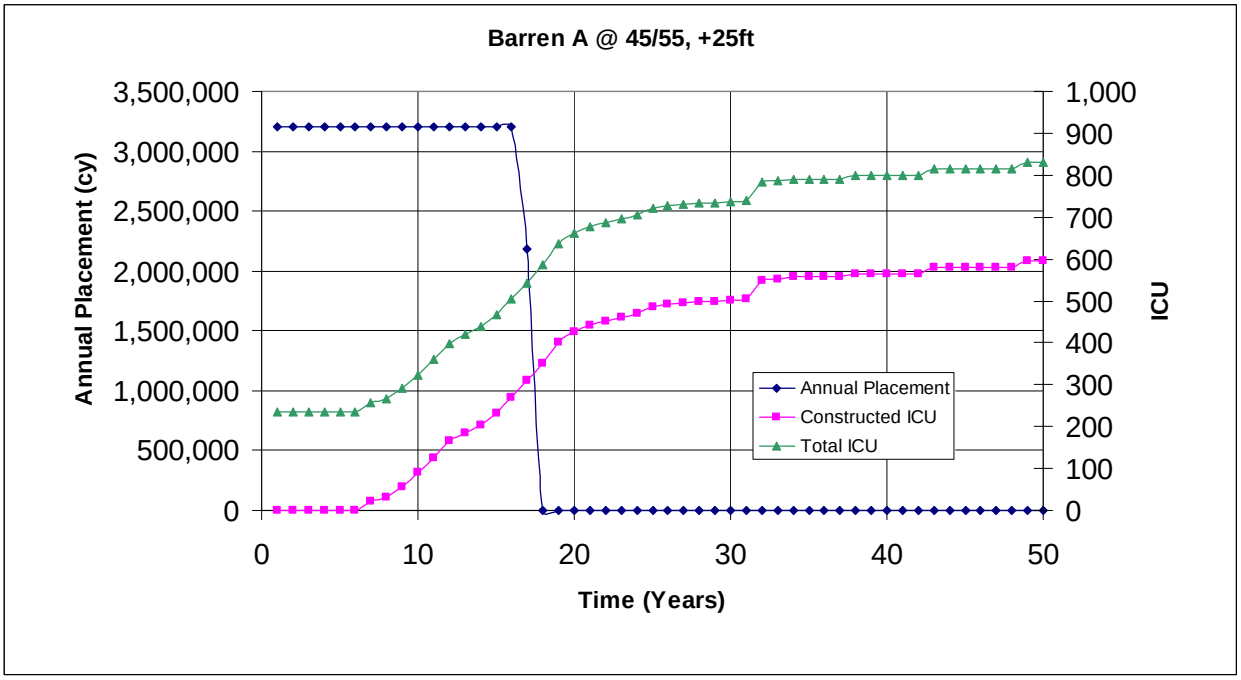

Figure B-11: ICU and Dredged Material Placement Analysis for Barren Island Alignment A Alternative (45% upland, 55% wetland, dike height +25 ft MLLW)

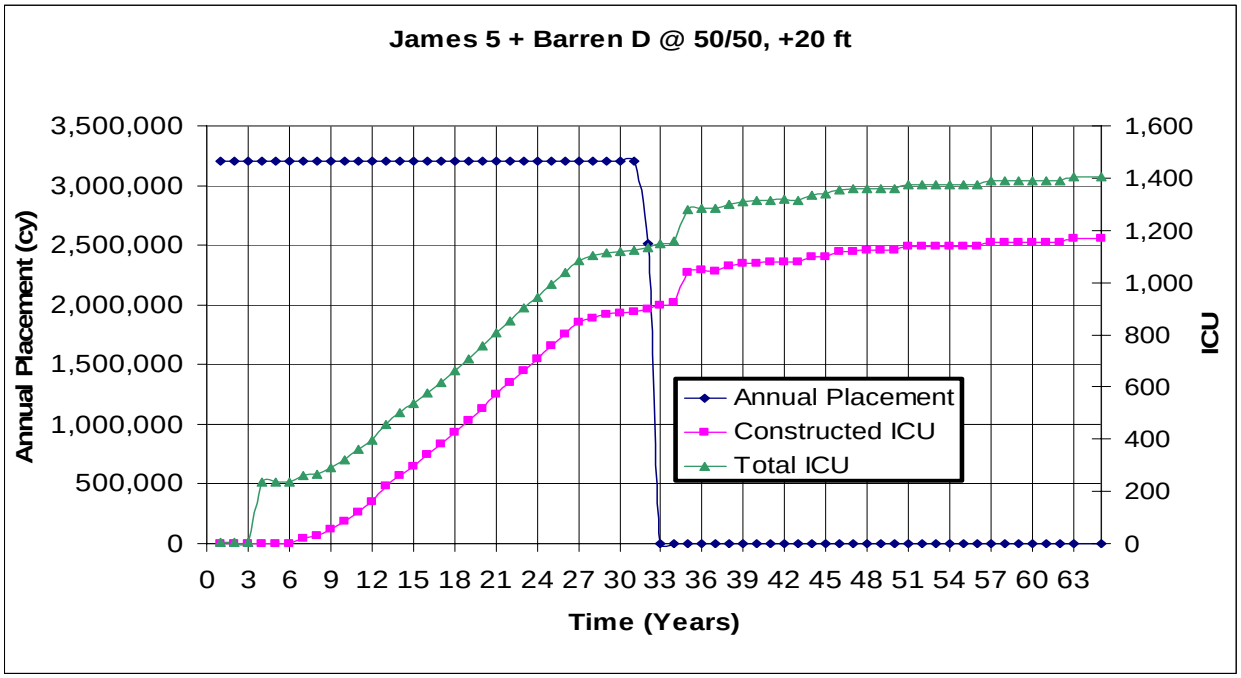

Figure B-12: ICU and Dredged Material Placement Analysis for James Alignment 5 plus Barren Alignment D Alternative (50% upland, 50% wetland, dike height +20 ft MLLW)

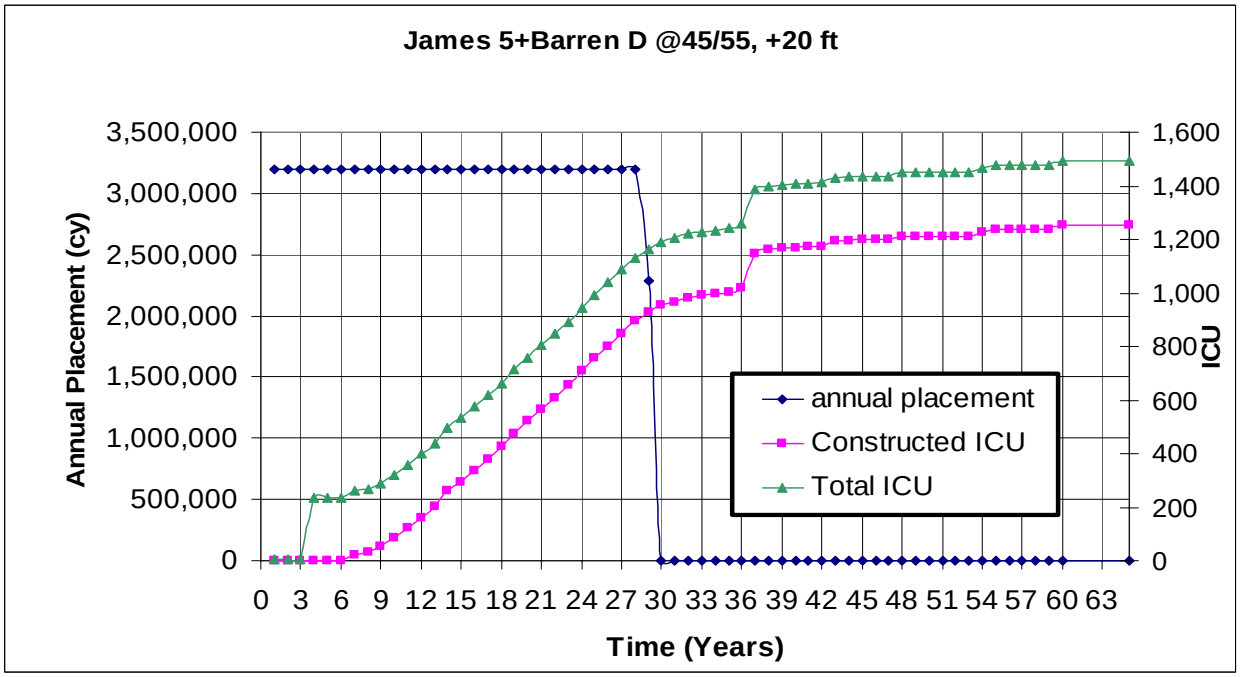

Figure B-13: ICU and Dredged Material Placement Analysis for James Alignment 5 plus Barren Alignment D Alternative (45 % upland, 55% wetland, dike height +20 ft MLLW)

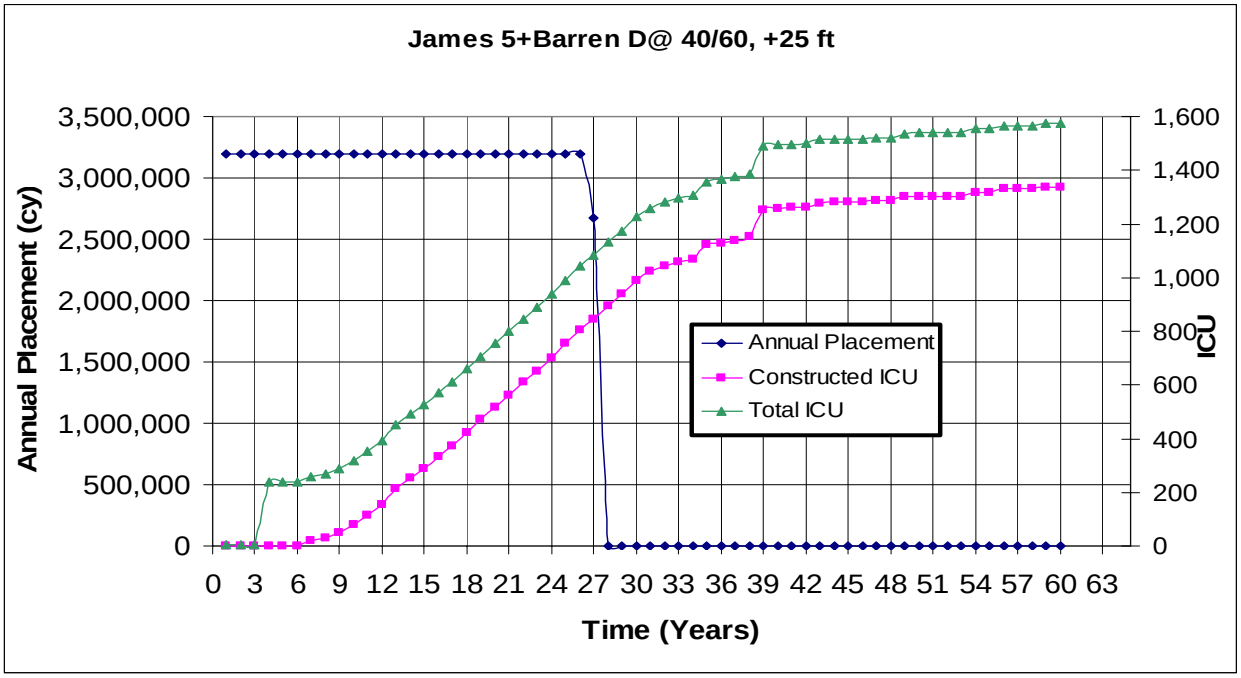

Figure B-14: ICU and Dredged Material Placement Analysis for James Alignment 5 plus Barren Island D Alternative (40 % upland, 60% wetland, dike height +25 ft MLLW)

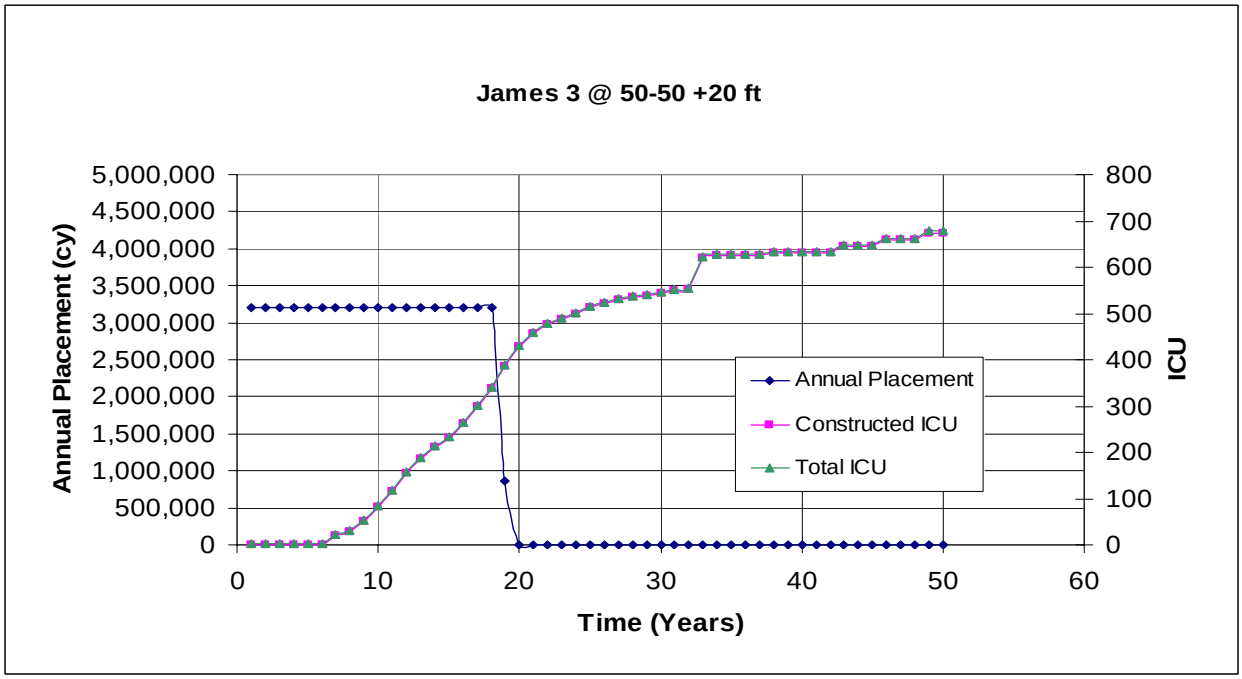

Figure B-15: ICU and Dredged Material Placement Analysis for James Alignment 3 Alternative (50 % upland, 50% wetland, dike height +20ft MLLW)

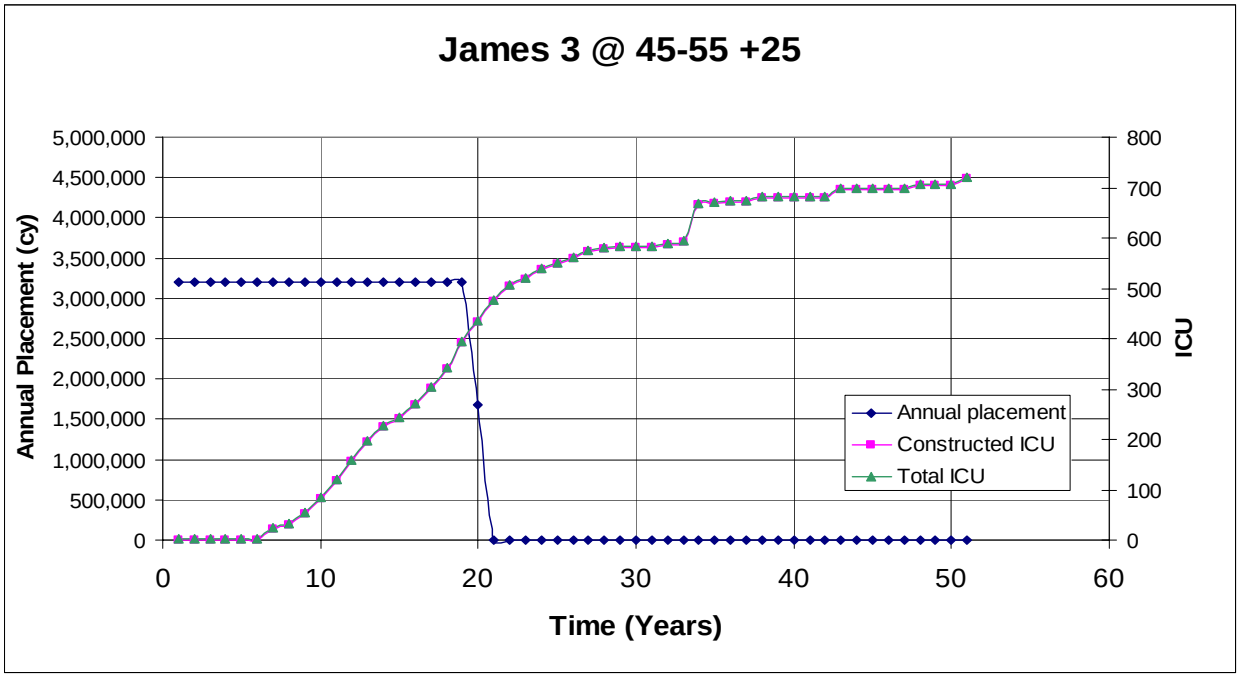

Figure B-16: ICU and Dredged Material Placement Analysis for James Alignment 3 Alternative (45% upland, 55% wetland, dike height + 25 ft MLLW)

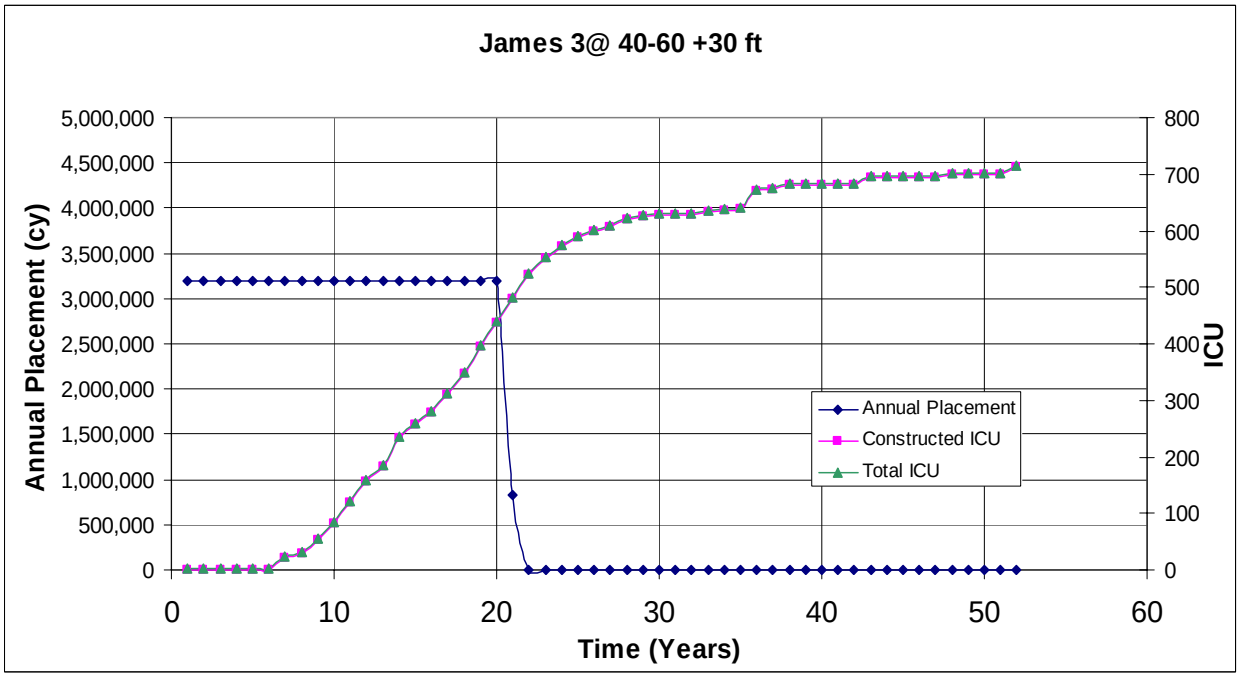

Figure B-17: ICU and Dredged Material Placement Analysis for James Alignment 3 Alternative (40 % upland, 60% wetland, dike height+30ft MLLW)

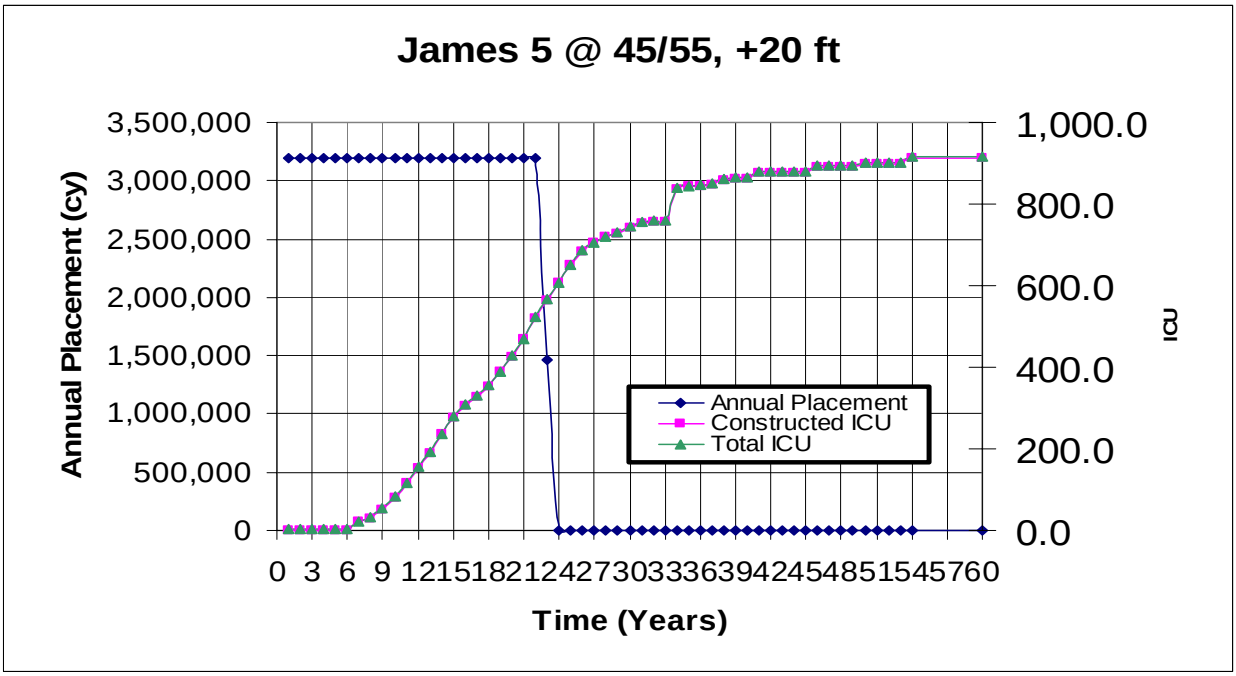

Figure B-18: ICU and Dredged Material Placement Analysis for James Alignment 5 Alternative (45% upland, 55% wetland, dike height +20 ft MLLW)

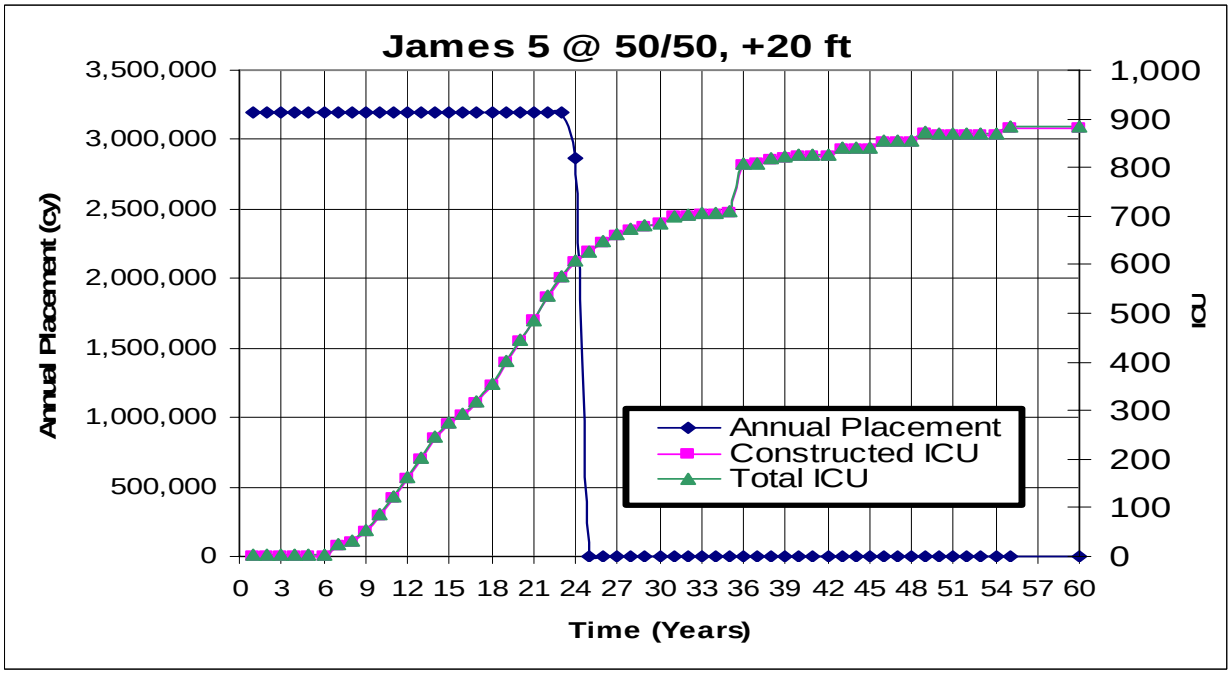

Figure B-19: ICU and Dredged Material Placement Analysis for James Alignment 5 Alternative (50 % upland, 50% wetland, dike height+20 ft MLLW)

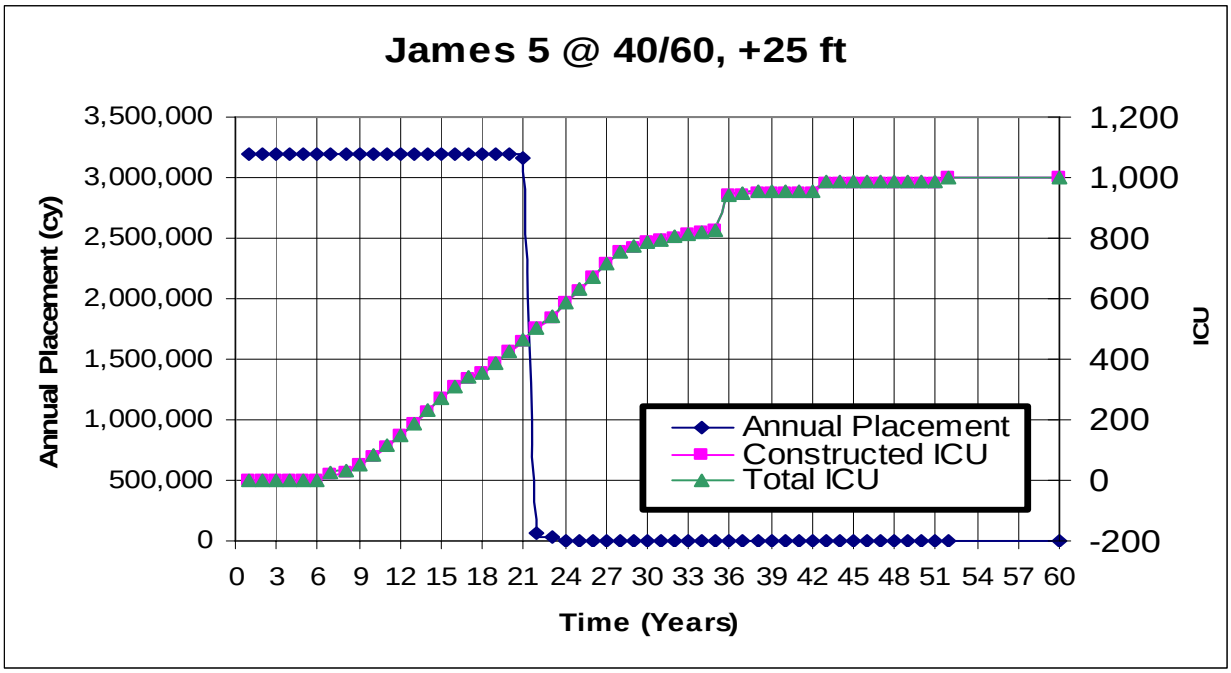

Figure B-20: ICU and Dredged Material Placement Analysis for James Alignment 5 Alternative (40 % upland, 60% wetland, dike height +25 ft MLLW)

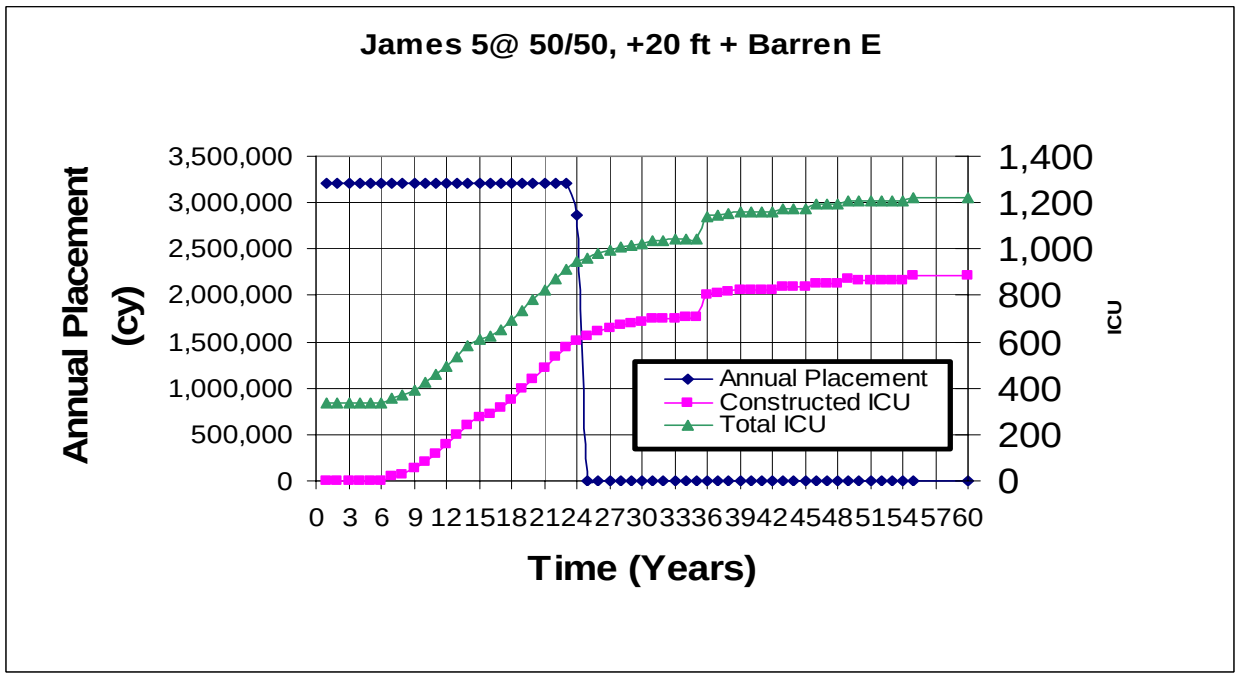

Figure B-21: ICU and Dredged Material Placement Analysis for James Alignment 5 plus Barren Alignment E Alternative (50 % upland, 50% wetland, dike height +20 ft MLLW)

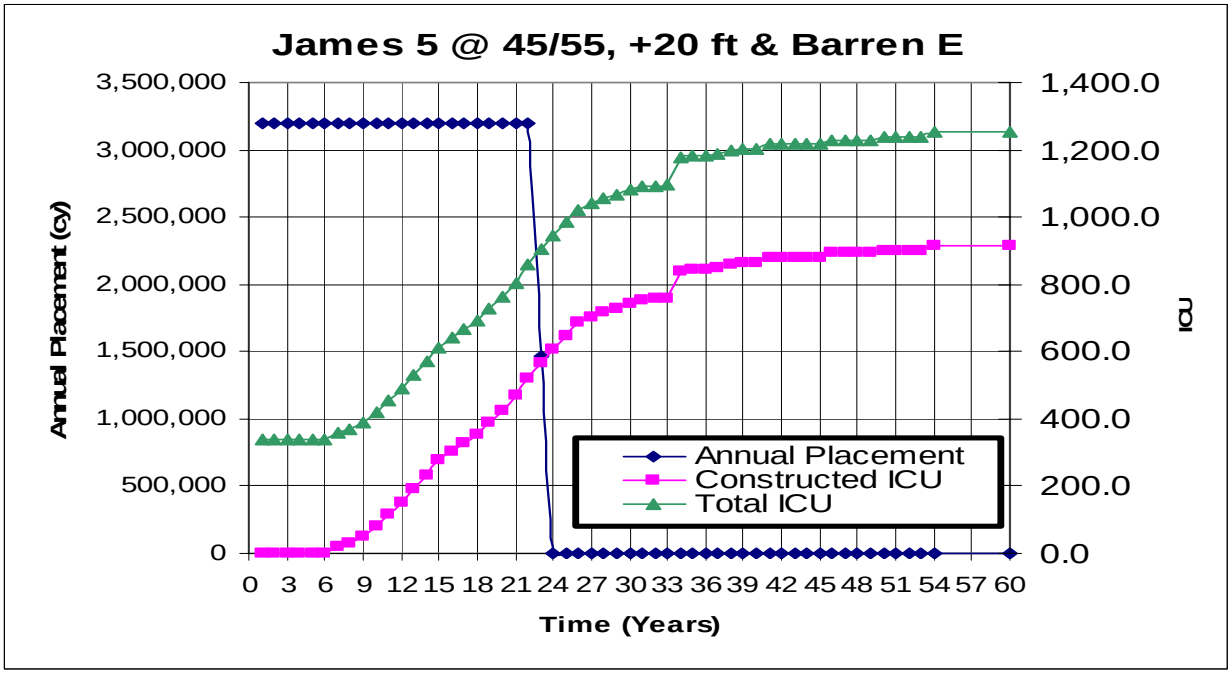

Figure B-22: ICU and Dredged Material Placement Analysis for James Alignment 5 plus Barren Alignment E (45% upland, 55% wetland, dike height +20 ft MLLW)

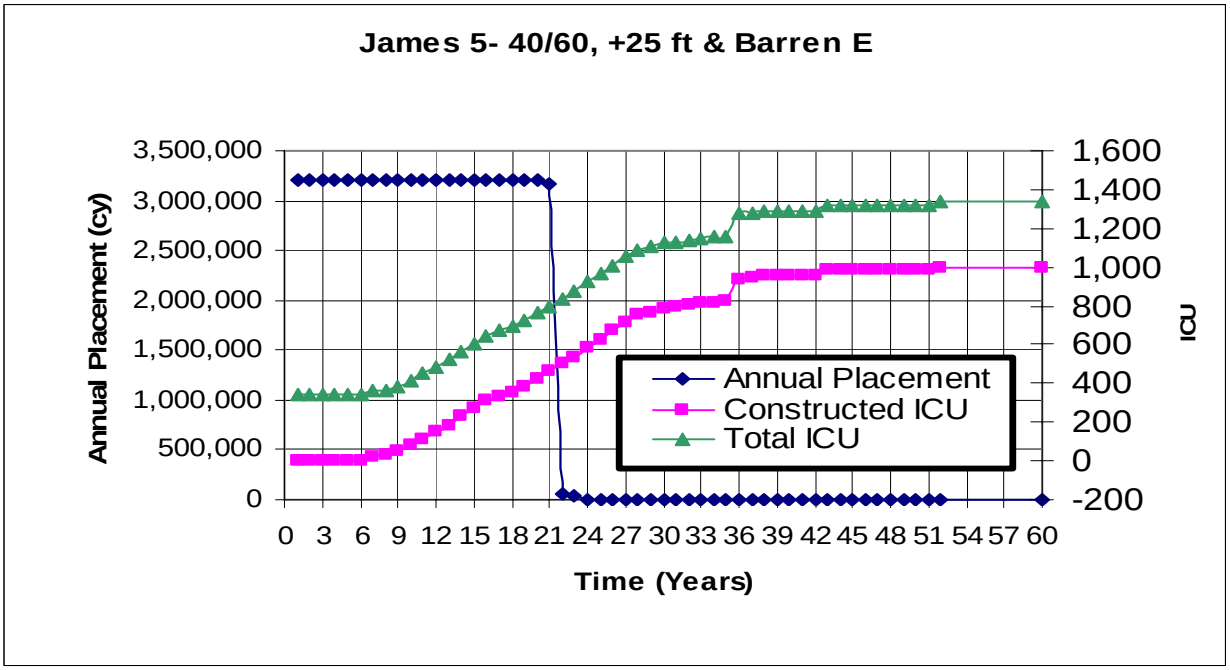

Figure B-23: ICU and Dredged Material Placement Analysis for James Alignment 5 plus Barren Alignment E (40% upland, 60% wetland, dike height +25 ft MLLW)

Table B-24: Sample ICU Calculations for Barren Island 50 % upland, 50% wetland, and dike height + 20 ft MLLW (Wetlands)

	Total=	1354	YEAR 1											
	upland =	619		Index				Community Units						
	wetland=	34.4		upland	high marsh	low marsh	intertidal							
	guild/community	**WEIGHT**	**Sum of Weights**	**619**	**6.9**	**24.8**	**2.8**	upland	high marsh	low marsh	intertidal	***sum by guild***	**weighted sum by guild**	**Wetland weighted sum by guild**
BIRDS	colonial nesting wading birds	12	50	0	0	0	0.5	0	0	0	1.376	1.376	**0.17**	**0.17**
"	waterfowl	10		0.75	0	0	0.5	464.25	0	0	1.376	465.626	**46.56**	**0.14**
"	colonial nesting waterbirds	12		0.25	0	0	0	154.75	0	0	0	154.75	**18.57**	**0.00**
"	raptors	2		0.25	0	0	0	154.75	0	0	0	154.75	**3.10**	**0.00**
"	shorebirds	14		0	0	0	0	0	0	0	0	0	**0.00**	**0.00**
	rept/herps	2	2	0.5	0	0	1	309.5	0	0	2.752	312.252	**6.25**	**0.06**
	benthic invert.	20	20	0	0	0	0.25	0	0	0	0.688	0.688	**0.14**	**0.14**
FISH	resident/forage fish	23	28	0	0	0	0	0	0	0	0	0	**0.00**	**0.00**
"	commercial/predatory/higher trophic fish	5		0	0	0	0	0	0	0	0	0	**0.00**	**0.00**
	TOTAL	**100**	**100**									Total Community Units	74.78	0.50
	50% wetlands/50%uplands		YEAR 5											
	Total=	1354												
	upland =	619		Index				Community Units						
	wetland=	34.4		upland	high marsh	low marsh	intertidal							
	guild/community	**WEIGHT**	**Sum of Weights**	**619**	**6.9**	**24.8**	**2.8**	upland	high marsh	low marsh	intertidal	***sum by guild***	**weighted sum by guild**	**Wetland weighted sum by guild**
BIRDS	colonial nesting wading birds	12	50	0	0.75	0.25	0.5	0	5.16	6.192	1.376	12.728	**1.53**	**1.53**
"	waterfowl	10		0.75	0	1	0.5	464.25	0	24.768	1.376	490.394	**49.04**	**2.61**
"	colonial nesting waterbirds	12		0.25	0.75	1	0	154.75	5.16	24.768	0	184.678	**22.16**	**3.59**
"	raptors	2		0.25	1	0.5	0	154.75	6.88	12.384	0	174.014	**3.48**	**0.39**
"	shorebirds	14		0	0.25	0.25	0	0	1.72	6.192	0	7.912	**1.11**	**1.11**
	rept/herps	2	2	0.5	1	1	1	309.5	6.88	24.768	2.752	343.9	**6.88**	**0.69**
	benthic invert.	20	20	0	0.5	0.5	0.5	0	3.44	12.384	1.376	17.2	**3.44**	**3.44**
FISH	resident/forage fish	23	28	0	0	0.75	0.75	0	0	18.576	2.064	20.64	**4.75**	**4.75**
"	commercial/predatory/higher trophic fish	5		0	0	0.75	0.5	0	0	18.576	1.376	19.952	**1.00**	**1.00**
	TOTAL	**100**	**100**									Total Community Units	93.38	19.10
	50% wetlands/50%uplands		YEAR 10											
	Total=	1354												
	upland =	619		Index				Community Units						
	wetland=	34.4		upland	high marsh	low marsh	intertidal							
	guild/community	**WEIGHT**	**Sum of Weights**	**619**	**6.9**	**24.8**	**2.8**	upland	high marsh	low marsh	intertidal	***sum by guild***	**weighted sum by guild**	**Wetland weighted sum by guild**
BIRDS	colonial nesting wading birds	12	50	0	0.75	0.25	0.5	0	5.16	6.192	1.376	12.728	**1.53**	**1.53**
"	waterfowl	10		0.75	1	1	0.5	464.25	6.88	24.768	1.376	497.274	**49.73**	**3.30**
"	colonial nesting waterbirds	12		0.25	0.75	1	0	154.75	5.16	24.768	0	184.678	**22.16**	**3.59**

Table B-24: Sample ICU Calculations for Barren Island 50 % upland, 50% wetland, and dike height + 20 ft MLLW (Wetlands)

"	raptors	2		0.25	1	0.5	0	154.75	6.88	12.384	0	174.014	**3.48**	**0.39**
"	shorebirds	14		0	0.25	0.25	0	0	1.72	6.192	0	7.912	**1.11**	**1.11**
	rept/herps	2	2	0.5	1	1	1	309.5	6.88	24.768	2.752	343.9	**6.88**	**0.69**
	benthic invert.	20	20	0	1	1	1	0	6.88	24.768	2.752	34.4	**6.88**	**6.88**
FISH	resident/forage fish	23	28	0	0	0.75	0.75	0	0	18.576	2.064	20.64	**4.75**	**4.75**
"	commercial/predatory/higher trophic fish	5		0	0	0.75	0.5	0	0	18.576	1.376	19.952	**1.00**	**1.00**
	TOTAL	**100**	**100**									Total Community Units	97.51	23.23
Single cell	50% wetlands/50%uplands		**YEAR 15+**											
	Total=	1354												
	upland =	619		Index				Community Units						
	wetland=	34.4		upland	high marsh	low marsh	intertidal							
	guild/community	**WEIGHT**	**Sum of Weights**	**619**	**6.9**	**24.8**	**2.8**	upland	high marsh	low marsh	intertidal	***sum by guild***	**weighted sum by guild**	**Wetland weighted sum by guild**
BIRDS	colonial nesting wading birds	12	50	0	0.75	0.25	0.5	0	5.16	6.192	1.376	12.728	**1.53**	**1.53**
"	waterfowl	10		0.75	1	1	0.5	464.25	6.88	24.768	1.376	497.274	**49.73**	**3.30**
"	colonial nesting waterbirds	12		0.25	0.75	1	0	154.75	5.16	24.768	0	184.678	**22.16**	**3.59**
"	raptors	2		0.25	1	0.5	0	154.75	6.88	12.384	0	174.014	**3.48**	**0.39**
"	shorebirds	14		0	0.25	0.25	0	0	1.72	6.192	0	7.912	**1.11**	**1.11**
	rept/herps	2	2	0.5	1	1	1	309.5	6.88	24.768	2.752	343.9	**6.88**	**0.69**
	benthic invert.	20	20	0	1	1	1	0	6.88	24.768	2.752	34.4	**6.88**	**6.88**
FISH	resident/forage fish	23	28	0	0	0.75	0.75	0	0	18.576	2.064	20.64	**4.75**	**4.75**
"	commercial/predatory/higher trophic fish	5		0	0	0.75	0.5	0	0	18.576	1.376	19.952	**1.00**	**1.00**
	TOTAL	**100**	**100**									Total Community Units	97.51	23.23
with int. dikes	50% wetlands/50%uplands		**YEAR 15+**		dikes knocked down to join 6 cells together									
knocked down	Total=	1354												
	upland =	619		Index				Community Units						
	wetland=	206.4		upland	high marsh	low marsh	intertidal							
	guild/community	**WEIGHT**	**Sum of Weights**	**619**	**41.3**	**148.6**	**16.5**	upland	high marsh	low marsh	intertidal	***sum by guild***	**weighted sum by guild**	**Wetland weighted sum by guild**
BIRDS	colonial nesting wading birds	12	50	0	0.75	0.5	0.5	0	30.96	74.304	8.256	113.52	**13.62**	**13.62**
"	waterfowl	10		0.75	1	1	0.5	464.25	41.28	148.608	8.256	662.394	**66.24**	**19.81**
"	colonial nesting waterbirds	12		0.25	0.75	1	0	154.75	30.96	148.608	0	334.318	**40.12**	**21.55**
"	raptors	2		0.25	1	0.5	0	154.75	41.28	74.304	0	270.334	**5.41**	**2.31**
"	shorebirds	14		0	0.25	0.5	0	0	10.32	74.304	0	84.624	**11.85**	**11.85**
	rept/herps	2	2	0.5	1	1	1	309.5	41.28	148.608	16.512	515.9	**10.32**	**4.13**
	benthic invert.	20	20	0	1	1	1	0	41.28	148.608	16.512	206.4	**41.28**	**41.28**
FISH	resident/forage fish	23	28	0	0	0.75	0.75	0	0	111.456	12.384	123.84	**28.48**	**28.48**

Table B-24: Sample ICU Calculations for Barren Island 50 % upland, 50% wetland, and dike height + 20 ft MLLW (Wetlands)

"	commercial/predatory/higher trophic fish	5		0	0	0.75	0.5	0	0	111.456	8.256	119.712	**5.99**	**5.99**
	TOTAL	**100**	**100**									Total Community Units	223.30	149.02
with int. dikes	50% wetlands/50%uplands		**YEAR 15+**		dikes knocked down to join 5 cells together									
knocked down	Total=	1354												
	upland =	619		Index				Community Units						
	wetland=	172		upland	high marsh	low marsh	intertidal							
	guild/community	**WEIGHT**	**Sum of Weights**	**619**	**34.4**	**123.8**	**13.8**	upland	high marsh	low marsh	intertidal	***sum by guild***	**weighted sum by guild**	**Wetland weighted sum by guild**
BIRDS	colonial nesting wading birds	12	50	0	0.75	0.75	0.5	0	25.8	92.88	6.88	125.56	**15.07**	**15.07**
"	waterfowl	10		0.75	1	1	0.5	464.25	34.4	123.84	6.88	629.37	**62.94**	**16.51**
"	colonial nesting waterbirds	12		0.25	0.75	1	0	154.75	25.8	123.84	0	304.39	**36.53**	**17.96**
"	raptors	2		0.25	1	0.5	0	154.75	34.4	61.92	0	251.07	**5.02**	**1.93**
"	shorebirds	14		0	0.25	0.75	0	0	8.6	92.88	0	101.48	**14.21**	**14.21**
	rept/herps	2	2	0.5	1	1	1	309.5	34.4	123.84	13.76	481.5	**9.63**	**3.44**
	benthic invert.	20	20	0	1	1	1	0	34.4	123.84	13.76	172	**34.40**	**34.40**
FISH	resident/forage fish	23	28	0	0	0.75	0.75	0	0	92.88	10.32	103.2	**23.74**	**23.74**
"	commercial/predatory/higher trophic fish	5		0	0	0.75	0.5	0	0	92.88	6.88	99.76	**4.99**	**4.99**
	TOTAL	**100**	**100**									Total Community Units	206.51	132.23
with int. dikes	50% wetlands/50%uplands		**YEAR 5**											
knocked down	Total=	1354												
	upland =	619		Index				Community Units						
	wetland=	206.4		upland	high marsh	low marsh	intertidal							
	guild/community	**WEIGHT**	**Sum of Weights**	**619**	**41.3**	**148.6**	**16.5**	upland	high marsh	low marsh	intertidal	***sum by guild***	**weighted sum by guild**	**Wetland weighted sum by guild**
BIRDS	colonial nesting wading birds	12	50	0	0.75	0.75	0.5	0	30.96	111.456	8.256	150.672	**18.08**	**18.08**
"	waterfowl	10		0.75	0	1	0.5	464.25	0	148.608	8.256	621.114	**62.11**	**15.69**
"	colonial nesting waterbirds	12		0.25	0.75	1	0	154.75	30.96	148.608	0	334.318	**40.12**	**21.55**
"	raptors	2		0.25	1	0.5	0	154.75	41.28	74.304	0	270.334	**5.41**	**2.31**
"	shorebirds	14		0	0.25	0.75	0	0	10.32	111.456	0	121.776	**17.05**	**17.05**
	rept/herps	2	2	0.5	1	1	1	309.5	41.28	148.608	16.512	515.9	**10.32**	**4.13**
	benthic invert.	20	20	0	0.5	0.5	0.5	0	20.64	74.304	8.256	103.2	**20.64**	**20.64**
FISH	resident/forage fish	23	28	0	0	0.75	0.75	0	0	111.456	12.384	123.84	**28.48**	**28.48**
"	commercial/predatory/higher trophic fish	5		0	0	0.75	0.5	0	0	111.456	8.256	119.712	**5.99**	**5.99**
	TOTAL	**100**	**100**									Total Community Units	208.19	133.91

Table B-25: Sample ICU Calculations for Barren Island 50 % upland, 50% wetland, and dike height + 20 ft MLLW (Intertidal)

	50% wetlands/50%uplands		YEAR 1											
	Total=	1354												
	upland =	619		Index				Community Units						
	wetland=	34.4		upland	high marsh	low marsh	intertidal							
	guild/community	**WEIGHT**	**Sum of Weights**	**619**	**0.0**	**0.0**	**34.4**	upland	high marsh	low marsh	intertidal	***sum by guild***	**weighted sum by guild**	**Intertidal weighted sum by guild**
BIRDS	colonial nesting wading birds	12	50	0	0	0	1	0	0	0	34.4	34.4	**4.13**	**4.13**
"	waterfowl	10		0.75	0	0	1	464.25	0	0	34.4	498.65	**49.87**	**3.44**
"	colonial nesting waterbirds	12		0.25	0	0	0.5	154.75	0	0	17.2	171.95	**20.63**	**2.06**
"	raptors	2		0.25	0	0	0	154.75	0	0	0	154.75	**3.10**	**0.00**
"	shorebirds	14		0	0	0	0.25	0	0	0	8.6	8.6	**1.20**	**1.20**
	rept/herps	2	2	0.5	0	0	1	309.5	0	0	34.4	343.9	**6.88**	**0.69**
	benthic invert.	20	20	0	0	0	0.1	0	0	0	3.44	3.44	**0.69**	**0.69**
FISH	resident/forage fish	23	28	0	0	0	1	0	0	0	34.4	34.4	**7.91**	**7.91**
"	commercial/predatory/higher trophic fish	5		0	0	0	0.75	0	0	0	25.8	25.8	**1.29**	**1.29**
	TOTAL	**100**	**100**									Total Community Units	95.69	21.41
	50% wetlands/50%uplands		YEAR 5											
	Total=	1354												
	upland =	619		Index				Community Units						
	wetland=	34.4		upland	high marsh	low marsh	intertidal							
	guild/community	**WEIGHT**	**Sum of Weights**	**619**	**0.0**	**0.0**	**34.4**	upland	high marsh	low marsh	intertidal	***sum by guild***	**weighted sum by guild**	**Intertidal weighted sum by guild**
BIRDS	colonial nesting wading birds	12	50	0	0	0	1	0	0	0	34.4	34.4	**4.13**	**4.13**
"	waterfowl	10		0.75	0	0	1	464.25	0	0	34.4	498.65	**49.87**	**3.44**
"	colonial nesting waterbirds	12		0.25	0	0	0.5	154.75	0	0	17.2	171.95	**20.63**	**2.06**
"	raptors	2		0.25	0	0	0	154.75	0	0	0	154.75	**3.10**	**0.00**
"	shorebirds	14		0	0	0	0.25	0	0	0	8.6	8.6	**1.20**	**1.20**
	rept/herps	2	2	0.5	0	0	1	309.5	0	0	34.4	343.9	**6.88**	**0.69**
	benthic invert.	20	20	0	0	0	0.5	0	0	0	17.2	17.2	**3.44**	**3.44**
FISH	resident/forage fish	23	28	0	0	0	1	0	0	0	34.4	34.4	**7.91**	**7.91**
"	commercial/predatory/higher trophic fish	5		0	0	0	0.75	0	0	0	25.8	25.8	**1.29**	**1.29**
	TOTAL	**100**	**100**									Total Community Units	98.45	24.17
	50% wetlands/50%uplands		YEAR 10											
	Total=	1354												
	upland =	619		Index				Community Units						
	wetland=	34.4		upland	high marsh	low marsh	intertidal							

Table B-25: Sample ICU Calculations for Barren Island 50 % upland, 50% wetland, and dike height + 20 ft MLLW (Intertidal)

	guild/community	WEIGHT	Sum of Weights	619	0.0	0.0	34.4	upland	high marsh	low marsh	intertidal	*sum by guild*	weighted sum by guild	Intertidal weighted sum by guild
BIRDS	colonial nesting wading birds	12	50	0	0	0	1	0	0	0	34.4	34.4	4.13	4.13
"	waterfowl	10		0.75	0	0	1	464.25	0	0	34.4	498.65	49.87	3.44
"	colonial nesting waterbirds	12		0.25	0	0	0.5	154.75	0	0	17.2	171.95	20.63	2.06
"	raptors	2		0.25	0	0	0	154.75	0	0	0	154.75	3.10	0.00
"	shorebirds	14		0	0	0	0.25	0	0	0	8.6	8.6	1.20	1.20
	rept/herps	2	2	0.5	0	0	1	309.5	0	0	34.4	343.9	6.88	0.69
	benthic invert.	20	20	0	0	0	1	0	0	0	34.4	34.4	6.88	6.88
FISH	resident/forage fish	23	28	0	0	0	1	0	0	0	34.4	34.4	7.91	7.91
"	commercial/predatory/higher trophic fish	5		0	0	0	0.75	0	0	0	25.8	25.8	1.29	1.29
	TOTAL	**100**	**100**									Total Community Units	101.89	27.61
Single cell	50% wetlands/50%uplands		YEAR 25											
	Total=	1354												
	upland =	619		Index				Community Units						
	wetland=	34.4		upland	high marsh	low marsh	intertidal							
	guild/community	**WEIGHT**	**Sum of Weights**	**619**	**0.0**	**0.0**	**34.4**	upland	high marsh	low marsh	intertidal	***sum by guild***	**weighted sum by guild**	**Intertidal weighted sum by guild**
BIRDS	colonial nesting wading birds	12	50	0	0	0	1	0	0	0	34.4	34.4	4.13	4.13
"	waterfowl	10		0.75	0	0	1	464.25	0	0	34.4	498.65	49.87	3.44
"	colonial nesting waterbirds	12		0.25	0	0	0.5	154.75	0	0	17.2	171.95	20.63	2.06
"	raptors	2		0.25	0	0	0	154.75	0	0	0	154.75	3.10	0.00
"	shorebirds	14		0	0	0	0.25	0	0	0	8.6	8.6	1.20	1.20
	rept/herps	2	2	0.5	0	0	1	309.5	0	0	34.4	343.9	6.88	0.69
	benthic invert.	20	20	0	0	0	1	0	0	0	34.4	34.4	6.88	6.88
FISH	resident/forage fish	23	28	0	0	0	1	0	0	0	34.4	34.4	7.91	7.91
"	commercial/predatory/higher trophic fish	5		0	0	0	0.75	0	0	0	25.8	25.8	1.29	1.29
	TOTAL	**100**	**100**									Total Community Units	101.89	27.61

Table B-26: Sample ICU Calculations for Barren Island 50 % upland, 50% wetland, and dike height + 20 ft MLLW (Uplands)

	Total=	1354	YEAR 1												
	upland =	103		Index				Community Units							
	wetland=	34.4		upland	high marsh	low marsh	intertidal								
	guild/community	**WEIGHT**	**Sum of Weights**	**103**	**6.9**	**24.8**	**2.8**	upland	high marsh	low marsh	intertidal	***sum by guild***	**weighted sum by guild**	**Wetland weighted sum by guild**	**Upland weighted sum by guild**
BIRDS	colonial nesting wading birds	12	50	0	0	0	1	0	0	0	2.752	2.752	**0.33**	**0.33**	**0**
"	waterfowl	10		0	0	0	0.5	0	0	0	1.376	1.376	**0.14**	**0.14**	**0**
"	colonial nesting waterbirds	12		0.25	0	0	0	25.75	0	0	0	25.75	**3.09**	**0.00**	**3.09**
"	raptors	2		0	0	0	0	0	0	0	0	0	**0.00**	**0.00**	**0**
"	shorebirds	14		0	0	0	0	0	0	0	0	0	**0.00**	**0.00**	**0**
	rept/herps	2	2	0	0	0	1	0	0	0	2.752	2.752	**0.06**	**0.06**	**0**
	benthic invert.	20	20	0	0	0	0.25	0	0	0	0.688	0.688	**0.14**	**0.14**	**0**
FISH	resident/forage fish	23	28	0	0	0	0	0	0	0	0	0	**0.00**	**0.00**	**0**
"	commercial/predatory/higher trophic fish	5		0	0	0	0	0	0	0	0	0	**0.00**	**0.00**	**0**
	TOTAL	**100**	**100**									Total Community Units	3.75	0.66	3.09
			YEAR 5	Index				Community Units							
				upland	high marsh	low marsh	intertidal								
	guild/community	**WEIGHT**	**Sum of Weights**	**103**	**6.9**	**24.8**	**2.8**	upland	high marsh	low marsh	intertidal	***sum by guild***	**weighted sum by guild**	**Wetland weighted sum by guild**	**Upland weighted sum by guild**
BIRDS	colonial nesting wading birds	12	50	0	0.75	0.25	0.5	0	5.16	6.192	1.376	12.728	**1.53**	**1.53**	**0**
"	waterfowl	10		0	0	1	0.5	0	0	24.768	1.376	26.144	**2.61**	**2.61**	**0**
"	colonial nesting waterbirds	12		0	0.75	1	0	0	5.16	24.768	0	29.928	**3.59**	**3.59**	**0.00**
"	raptors	2		0.25	1	0.5	0	25.75	6.88	12.384	0	45.014	**0.90**	**0.39**	**0.52**
"	shorebirds	14		0	0.25	0.25	0	0	1.72	6.192	0	7.912	**1.11**	**1.11**	**0**
	rept/herps	2	2	0.5	1	1	1	51.5	6.88	24.768	2.752	85.9	**1.72**	**0.69**	**1.03**
	benthic invert.	20	20	0	0.5	0.5	0.5	0	3.44	12.384	1.376	17.2	**3.44**	**3.44**	**0**
FISH	resident/forage fish	23	28	0	0	0.75	0.75	0	0	18.576	2.064	20.64	**4.75**	**4.75**	**0**
"	commercial/predatory/higher trophic fish	5		0	0	0.75	0.5	0	0	18.576	1.376	19.952	**1.00**	**1.00**	**0**
	TOTAL	**100**	**100**									Total Community Units	20.64	19.10	1.55
			YEAR 10	Index				Community Units							
				upland	high marsh	low marsh	intertidal								
	guild/community	**WEIGHT**	**Sum of Weights**	**103**	**6.9**	**24.8**	**2.8**	upland	high marsh	low marsh	intertidal	***sum by guild***	**weighted sum by guild**	**Wetland weighted sum by guild**	**Upland weighted sum by guild**
BIRDS	colonial nesting	12	50	0	0.75	0.25	0.5	0	5.16	6.192	1.376	12.728	**1.53**	**1.53**	**0**

Table B-26: Sample ICU Calculations for Barren Island 50 % upland, 50% wetland, and dike height + 20 ft MLLW (Uplands)

	wading birds														
"	waterfowl	10		0.75	0.5	1	0.5	77.25	3.44	24.768	1.376	106.834	**10.68**	**2.96**	**7.725**
"	colonial nesting waterbirds	12		0	0.75	1	0	0	5.16	24.768	0	29.928	**3.59**	**3.59**	**0.00**
"	raptors	2		0.25	1	0.5	0	25.75	6.88	12.384	0	45.014	**0.90**	**0.39**	**0.52**
"	shorebirds	14		0	0.25	0.25	0	0	1.72	6.192	0	7.912	**1.11**	**1.11**	**0**
	rept/herps	2	2	0.5	1	1	1	51.5	6.88	24.768	2.752	85.9	**1.72**	**0.69**	**1.03**
	benthic invert.	20	20	0	1	1	1	0	6.88	24.768	2.752	34.4	**6.88**	**6.88**	**0**
FISH	resident/forage fish	23	28	0	0	0.75	0.75	0	0	18.576	2.064	20.64	**4.75**	**4.75**	**0**
"	commercial/predatory/higher trophic fish	5		0	0	0.75	0.5	0	0	18.576	1.376	19.952	**1.00**	**1.00**	**0**
	TOTAL	**100**	**100**									Total Community Units	32.15	22.88	9.27
			YEAR 15	Index				Community Units							
Single cell				upland	high marsh	low marsh	intertidal								
	guild/community	**WEIGHT**	**Sum of Weights**	**103**	**6.9**	**24.8**	**2.8**	upland	high marsh	low marsh	intertidal	***sum by guild***	**weighted sum by guild**	**Wetland weighted sum by guild**	**Upland weighted sum by guild**
BIRDS	colonial nesting wading birds	12	50	0	0.75	0.25	0.5	0	5.16	6.192	1.376	12.728	**1.53**	**1.53**	**0**
"	waterfowl	10		0.75	1	1	0.5	77.25	6.88	24.768	1.376	110.274	**11.03**	**3.30**	**7.725**
"	colonial nesting waterbirds	12		0	0.75	1	0	0	5.16	24.768	0	29.928	**3.59**	**3.59**	**0.00**
"	raptors	2		0.25	1	0.5	0	25.75	6.88	12.384	0	45.014	**0.90**	**0.39**	**0.52**
"	shorebirds	14		0	0.25	0.25	0	0	1.72	6.192	0	7.912	**1.11**	**1.11**	**0**
	rept/herps	2	2	0.5	1	1	1	51.5	6.88	24.768	2.752	85.9	**1.72**	**0.69**	**1.03**
	benthic invert.	20	20	0	1	1	1	0	6.88	24.768	2.752	34.4	**6.88**	**6.88**	**0**
FISH	resident/forage fish	23	28	0	0	0.75	0.75	0	0	18.576	2.064	20.64	**4.75**	**4.75**	**0**
"	commercial/predatory/higher trophic fish	5		0	0	0.75	0.5	0	0	18.576	1.376	19.952	**1.00**	**1.00**	**0**
	TOTAL	**100**	**100**									Total Community Units	32.50	23.23	9.27
Single cell					Upland only										
	Total=	1354	**YEAR 25**												
	upland =	103		Index				Community Units							
	wetland=	34.4		upland	high marsh	low marsh	intertidal								
	guild/community	**WEIGHT**	**Sum of Weights**	**103**	**6.9**	**24.8**	**2.8**	upland	high marsh	low marsh	intertidal	***sum by guild***	**weighted sum by guild**	**Wetland weighted sum by guild**	**Upland weighted sum by guild**
BIRDS	colonial nesting wading birds	12	50	0.5	0.75	0.25	0.5	51.5	5.16	6.192	1.376	64.228	**7.71**	**1.53**	**6.18**
"	waterfowl	10		0.75	1	1	0.5	77.25	6.88	24.768	1.376	110.274	**11.03**	**3.30**	**7.725**
"	colonial nesting waterbirds	12		0	0.75	1	0	0	5.16	24.768	0	29.928	**3.59**	**3.59**	**0.00**
"	raptors	2		0.75	1	0.5	0	77.25	6.88	12.384	0	96.514	**1.93**	**0.39**	**1.55**

Table B-26: Sample ICU Calculations for Barren Island 50 % upland, 50% wetland, and dike height + 20 ft MLLW (Uplands)

"	shorebirds	14		0	0.25	0.25	0	0	1.72	6.192	0	7.912	**1.11**	**1.11**	**0**
	rept/herps	2	2	0.5	1	1	1	51.5	6.88	24.768	2.752	85.9	**1.72**	**0.69**	**1.03**
	benthic invert.	20	20	0	1	1	1	0	6.88	24.768	2.752	34.4	**6.88**	**6.88**	**0**
FISH	resident/forage fish	23	28	0	0	0.75	0.75	0	0	18.576	2.064	20.64	**4.75**	**4.75**	**0**
"	commercial/predatory/higher trophic fish	5		0	0	0.75	0.5	0	0	18.576	1.376	19.952	**1.00**	**1.00**	**0**
	TOTAL	**100**	**100**									Total Community Units	39.71	23.23	16.48

Table B-27: ICU Calculation for Barren Alignment A Alternative (50 % Uplands, 50% Wetlands, Dike Height +20 ft MLLW)

Cell No.	Cell Acreage	Placement Acreage	Volume	Capacity	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	50	Total Placed Quantity
Upland	677	619	27,982,847	**39,975,496**		2,422,722	2,189,538	2,119,583	2,089,602	2,200,642	2,289,474	2,232,844	2,178,712	2,141,652	2,662,151	2,922,401	3,061,200	3,130,600	3,165,303	3,199,997	1,969,075	0	0											**39,975,497**
W-1	37.61	34.4	388,639	**555,199**		388,639	116,592	34,978	14,990	Grade	Plant	**21.4**	22.1	22.8	23.5	**24.2**	24.9	25.5	26.2	26.9	**27.6**	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	**555,363**
W-2	37.61	34.4	388,639	**555,199**		388,639	116,592	34,978	14,990	Grade	Plant	**0.5**	9.8	14.8	17.0	**19.1**	19.9	20.8	21.6	22.4	**23.2**	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2		**555,301**
W-3	37.61	34.4	388,639	**555,199**		0	388,639	116,592	34,978	14,990	Grade	Plant	**0.5**	9.8	14.8	17.0	**19.1**	19.9	20.8	21.6	22.4	**23.2**	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2			**555,280**
W-4	37.61	34.4	388,639	**555,199**		0	388,639	116,592	34,978	14,990	Grade	Plant	**0.5**	9.8	14.8	17.0	**19.1**	19.9	20.8	21.6	22.4	**23.2**	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	**149.0**	149.0	**555,280**
W-5	37.61	34.4	388,639	**555,199**		0	0	388,639	116,592	34,978	14,990	Grade	Plant	**0.5**	9.8	14.8	17.0	**19.1**	19.9	20.8	21.6	22.4	**23.2**	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2			**555,260**
W-6	37.61	34.4	388,639	**555,199**		0	0	388,639	116,592	34,978	14,990	Grade	Plant	**0.5**	9.8	14.8	17.0	**19.1**	19.9	20.8	21.6	22.4	**23.2**	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2			**555,241**
W-7	37.61	34.4	388,639	**555,199**		0	0	0	388,639	116,592	34,978	14,990	Grade	Plant	**0.5**	9.8	14.8	17.0	**19.1**	19.9	20.8	21.6	22.4	**23.2**	23.2	23.2	23.2	23.2	23.2	23.2	23.2			**555,199**
W-8	37.61	34.4	388,639	**555,199**		0	0	0	388,639	116,592	34,978	14,990	Grade	Plant	**0.5**	9.8	14.8	17.0	**19.1**	19.9	20.8	21.6	22.4	**23.2**	23.2	23.2	23.2	23.2	23.2	23.2	23.2			**555,199**
W-9	37.61	34.4	388,639	**555,199**		0	0	0	0	388,639	116,592	34,978	14,990	Grade	Plant	**0.5**	9.8	14.8	17.0	**19.1**	19.9	20.8	21.6	22.4	**23.2**	23.2	23.2	23.2	23.2	23.2	23.2			**555,345**
W-10	37.61	34.4	388,639	**555,199**		0	0	0	0	277,599	138,800	69,400	34,700	17,350	17,350	Grade	Plant	**0.5**	9.8	14.8	17.0	**19.1**	19.9	20.8	21.6	22.4	**23.2**	23.2	23.2	23.2	23.2	**149.0**	149.0	**555,301**
W-11	37.61	34.4	388,639	**555,199**		0	0	0	0	0	277,599	138,800	69,400	34,700	17,350	17,350	Grade	Plant	**0.5**	9.8	14.8	17.0	**19.1**	19.9	20.8	21.6	**22.4**	**23.2**	23.2	23.2	23.2			**555,280**
W-12	37.61	34.4	388,639	**555,199**		0	0	0	0	0	277,599	138,800	69,400	34,700	17,350	17,350	Grade	Plant	**0.5**	9.8	14.8	17.0	**19.1**	19.9	20.8	21.6	22.4	**23.2**	23.2	23.2	23.2			**555,280**
W-13	37.61	34.4	388,639	**555,199**		0	0	0	0	0	0	277,599	138,800	69,400	34,700	17,350	17,350	Grade	Plant	**0.5**	9.8	14.8	17.0	**19.1**	19.9	20.8	21.6	22.4	**23.2**	23.2	23.2			**555,260**
W-14	37.61	34.4	388,639	**555,199**		0	0	0	0	0	0	277,599	138,800	69,400	34,700	17,350	17,350	Grade	Plant	**0.5**	9.8	14.8	17.0	**19.1**	19.9	20.8	21.6	22.4	**23.2**	23.2	23.2			**555,260**
W-15	37.61	34.4	388,639	**555,199**		0	0	0	0	0	0	0	277,599	138,800	69,400	34,700	17,350	17,350	Grade	Plant	**0.5**	9.8	14.8	17.0	**19.1**	19.9	20.8	21.6	22.4	**23.2**	23.2			**555,241**
W-16	37.61	34.4	388,639	**555,199**		0	0	0	0	0	0	0	277,599	138,800	69,400	34,700	17,350	17,350	Grade	Plant	**0.5**	9.8	14.8	17.0	**19.1**	19.9	20.8	21.6	22.4	**23.2**	23.2	**132.2**	132.2	**555,241**
W-17	37.61	34.4	388,639	**555,199**		0	0	0	0	0	0	0	0	277,599	138,800	69,400	34,700	17,350	17,350	Grade	Plant	**0.5**	9.8	14.8	17.0	**19.1**	19.9	20.8	21.6	22.4	**23.2**			**555,224**
W-18	37.61	34.4	388,639	**555,199**		0	0	0	0	0	0	0	0	277,599	138,800	69,400	34,700	17,350	17,350	Grade	Plant	**0.5**	9.8	14.8	17.0	**19.1**	19.9	20.8	21.6	22.4	**23.2**			**555,224**
Total	**1,354**			**49,969,075**		3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,003	3,199,997	1,969,278	0	0	0	0	0	0	0	0	0	0	0	**49,970,274**
				constructed ICU	**0**	0	0	0	0	0	0	22	33	58	91	127	156	174	198	231	270	311	353	384	399	412	420	433	440	446	451	490	557	
				protected (SAV) ICU	**234**	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	
				Total (Constructed and protected) ICU	234.4	234.4	234.4	234.4	234.4	234.4	234.4	256.4	267.3	292.6	325.1	361.4	390.8	408.0	432.6	465.5	504.2	545.6	587.4	618.7	633.0	646.9	654.7	667.9	674.7	680.0	685.5	724.8	791.2		

Table B-28: ICU Calculation for Barren Alignment A Alternative (45 % Uplands, 55% Wetlands, Dike Height +25 ft MLLW)

Cell No.	Cell Acreage	Placement Acreage	Volume	Capacity	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	50	Total Placed Quantity
Upland	609	557	29,667,191	**42,381,702**		2430161.7	2199210.2	2129924.8	2100231	2100231	2320184.8	2276194	2208008.4	2168966.6	2134598.8	2650115.5	2925057.8	3062528.9	3131264.4	3165632.2	3200000	2179392	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**42,381,702**
W-1	37.25	34.1	384,919	**549,885**		384,919	115,476	34,643	14,847	Grade	Plant	21.2	21.9	22.6	23.3	24.0	24.6	25.3	26.0	26.7	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	**550,047**
W-2	37.25	34.1	384,919	**549,885**		384,919	115,476	34,643	14,847	Grade	Plant	0.5	9.7	14.7	16.8	18.9	19.8	20.6	21.4	22.2	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0				**549,985**
W-3	37.25	34.1	384,919	**549,885**		0	384,919	115,476	34,643	14,847	Grade	Plant	0.5	9.7	14.7	16.8	18.9	19.8	20.6	21.4	22.2	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0				**549,965**
W-4	37.25	34.1	384,919	**549,885**		0	384,919	115,476	34,643	14,847	Grade	Plant	0.5	9.7	14.7	16.8	18.9	19.8	20.6	21.4	22.2	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	147.7	147.7	147.7	**549,965**
W-5	37.25	34.1	384,919	**549,885**		0	0	384,919	115,476	34,643	14,847	Grade	Plant	0.5	9.7	14.7	16.8	18.9	19.8	20.6	21.4	22.2	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0				**549,945**
W-6	37.25	34.1	384,919	**549,885**		0	0	384,919	115,476	34,643	14,847	Grade	Plant	0.5	9.7	14.7	16.8	18.9	19.8	20.6	21.4	22.2	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0				**549,926**
W-7	37.25	34.1	384,919	**549,885**		0	0	0	384,919	115,476	34,643	14,847	Grade	Plant	0.5	9.7	14.7	16.8	18.9	19.8	20.6	21.4	22.2	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0				**549,885**
W-8	37.25	34.1	384,919	**549,885**		0	0	0	384,919	115,476	34,643	14,847	Grade	Plant	0.5	9.7	14.7	16.8	18.9	19.8	20.6	21.4	22.2	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0				**549,885**
W-9	37.25	34.1	384,919	**549,885**		0	0	0	0	384,919	115,476	34,643	14,847	Grade	Plant	0.5	9.7	14.7	16.8	18.9	19.8	20.6	21.4	22.2	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0				**550,029**
W-10	37.25	34.1	384,919	**549,885**		0	0	0	0	384,919	115,476	34,643	14,847	Grade	Plant	0.5	9.7	14.7	16.8	18.9	19.8	20.6	21.4	22.2	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	147.7	147.7	147.7	**549,985**
W-11	37.25	34.1	384,919	**549,885**		0	0	0	0	0	274,942	137,471	68,736	34,368	17,184	17,184	Grade	Plant	0.5	9.7	14.7	16.8	18.9	19.8	20.6	21.4	22.2	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0				**549,965**
W-12	37.25	34.1	384,919	**549,885**		0	0	0	0	0	274,942	137,471	68,736	34,368	17,184	17,184	Grade	Plant	0.5	9.7	14.7	16.8	18.9	19.8	20.6	21.4	22.2	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0				**549,965**
W-13	37.25	34.1	384,919	**549,885**		0	0	0	0	0	0	274,942	137,471	68,736	34,368	17,184	17,184	Grade	Plant	0.5	9.7	14.7	16.8	18.9	19.8	20.6	21.4	22.2	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0				**549,945**
W-14	37.25	34.1	384,919	**549,885**		0	0	0	0	0	0	274,942	137,471	68,736	34,368	17,184	17,184	Grade	Plant	0.5	9.7	14.7	16.8	18.9	19.8	20.6	21.4	22.2	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0				**549,945**
W-15	37.25	34.1	384,919	**549,885**		0	0	0	0	0	0	0	274,942	137,471	68,736	34,368	17,184	17,184	Grade	Plant	0.5	9.7	14.7	16.8	18.9	19.8	20.6	21.4	22.2	23.0	23.0	23.0	23.0	23.0	23.0	23.0				**549,926**
W-16	37.25	34.1	384,919	**549,885**		0	0	0	0	0	0	0	274,942	137,471	68,736	34,368	17,184	17,184	Grade	Plant	0.5	9.7	14.7	16.8	18.9	19.8	20.6	21.4	22.2	23.0	23.0	23.0	23.0	23.0	23.0	23.0				**549,926**
W-17	37.25	34.1	384,919	**549,885**		0	0	0	0	0	0	0	274,942	137,471	68,736	34,368	17,184	17,184	Grade	Plant	0.5	9.7	14.7	16.8	18.9	19.8	20.6	21.4	22.2	23.0	23.0	23.0	23.0	23.0	23.0	23.0	183.5	183.5	183.5	**549,909**
W-18	37.25	34.1	384,919	**549,885**		0	0	0	0	0	0	0	0	274,942	137,471	68,736	34,368	17,184	17,184	Grade	Plant	0.5	9.7	14.7	16.8	18.9	19.8	20.6	21.4	22.2	23.0	23.0	23.0	23.0	23.0	23.0				**549,909**
W-19	37.25	34.1	384,919	**549,885**		0	0	0	0	0	0	0	0	0	274,942	137,471	68,736	34,368	17,184	17,184	Grade	Plant	0.5	9.7	14.7	16.8	18.9	19.8	20.6	21.4	22.2	23.0	23.0	23.0	23.0	23.0				**549,895**
W-20	37.25	34.1	384,919	**549,885**		0	0	0	0	0	0	0	0	0	274,942	137,471	68,736	34,368	17,184	17,184	Grade	Plant	0.5	9.7	14.7	16.8	18.9	19.8	20.6	21.4	22.2	23.0	23.0	23.0	23.0	23.0				**549,895**
Total	**1,354**			**53,379,392**		3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3200000	3200000	3200000	3200000	3200000	3200000	3200000	3200000	2179392	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**53,380,600**
				constructed ICU	0	0	0	0	0	0	0	22	33	58	90	126	165	186	203.8	233.5	270.5	309.3	352.6	402.7	426.9	441.1	452.8	461.8	471.7	486.6	492.3	496.5	499.0	498.2	501.5	504.8	549.6	552.9	595.4	
				protected (SAV) ICU	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	234.4	
				Total (Constructed and protected) ICU	234.4	234.4	234.4	234.4	234.4	234.4	234.4	256.2	267.1	292.1	324.3	360.7	399.1	420.7	438.3	467.9	504.9	543.7	587.1	637.2	661.4	675.6	687.2	696.2	706.1	721.1	726.8	730.9	733.4	732.6	735.9	739.2	784.1	787.4	829.9	

Table B-29: ICU Calculation for James Island Alignment 5 plus Barren Alignment D Alternative (50% Uplands, 50% Wetlands, Dike Height +20 ft MLLW)

Cell No.	Cell Acreage	Placement Acreage	Volume	Capacity	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	65	Total Placed Quantity
		James 5																																								
Upland	1036	948	42,821,610	**61,173,728**		2,435,328	2,205,927	2,137,106	2,107,612	2,107,612	2,107,612	650,876	64,166	130,525	568,251	329,448	551,111	631,031	623,334	605,652	600,444	595,235	1,141,386	1,411,853	2,558,078	3,131,166	3,165,258	3,199,350	3,199,305	3,199,260	3,199,216	3,199,180	3,199,166	3,199,156	3,199,149	3,199,144	2,510,180					**61,162,117**
W-1	37	33.9	382,336	**546,194**		382,336	114,701	34,410	14,747	Grade	Plant	**21.1**	21.8	22.5	23.1	**23.8**	24.5	25.2	25.8	26.5	**27.2**	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	**546,356**
W-2	37	33.9	382,336	**546,194**		382,336	114,701	34,410	14,747	Grade	Plant	**0.5**	7.8	14.6	16.7	**18.8**	19.6	20.4	21.3	22.1	**22.9**	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6			**546,293**
W-3	37	33.9	382,336	**546,194**		0	382,336	114,701	34,410	14,747	Grade	Plant	**0.5**	7.8	14.8	16.8	**18.8**	19.6	20.4	21.3	22.1	**22.9**	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6			**546,272**
W-4	37	33.9	382,336	**546,194**		0	382,336	114,701	34,410	14,747	Grade	Plant	**0.5**	7.8	14.8	16.8	**18.8**	19.6	20.3	21.1	21.8	**22.9**	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	**130.3**	130.3	**546,272**
W-5	37	33.9	382,336	**546,194**		0	0	382,336	114,701	34,410	14,747	Grade	Plant	**0.5**	7.8	14.8	16.8	**18.8**	19.6	20.3	21.1	21.8	**22.9**	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6			**546,253**
W-6	37	33.9	382,336	**546,194**		0	0	382,336	114,701	34,410	14,747	Grade	Plant	**0.5**	7.8	14.8	16.8	**18.8**	19.6	20.3	21.1	21.8	**22.9**	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6			**546,234**
W-7	37	33.9	382,336	**546,194**		0	0	0	382,336	114,701	34,410	14,747	Grade	Plant	**0.5**	7.8	14.8	16.8	**18.8**	19.6	20.3	21.1	21.8	**22.9**	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6			**546,194**
W-8	37	33.9	382,336	**546,194**		0	0	0	382,336	114,701	34,410	14,747	Grade	Plant	**0.5**	7.8	14.8	16.8	**18.8**	19.6	20.3	21.1	21.8	**22.9**	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	**130.3**	130.3	**546,194**
W-9	37	33.9	382,336	**546,194**		0	0	0	0	382,336	114,701	34,410	14,747	Grade	Plant	**0.5**	7.8	14.8	16.8	**18.8**	19.6	20.3	21.1	21.8	**22.9**	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6			**546,675**
W-10	37	33.9	382,336	**546,194**		0	0	0	0	382,336	114,701	34,410	14,747	Grade	Plant	**0.5**	7.8	14.8	16.8	**18.8**	19.6	20.3	21.1	21.8	**22.9**	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6			**546,675**
W-11	37	33.9	382,336	**546,194**		0	0	0	0	0	382,336	114,701	34,410	14,747	Grade	Plant	**0.5**	7.8	14.8	16.8	**18.8**	19.6	20.3	21.1	21.8	**22.9**	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6			**546,652**
W-12	37	33.0	382,336	**546,194**		0	0	0	0	0	382,336	114,701	34,410	14,747	Crodo	Plant	**0.5**	7.8	14.8	16.8	**18.8**	19.6	20.3	21.1	21.8	**22.9**	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6			**547,173**
W-13	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	382,336	114,701	34,410	14,747	Grade	Plant	**0.5**	7.8	14.8	16.8	**18.8**	20.3	21.1	21.8	22.9	**22.9**	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6			**546,610**
W-14	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	382,336	114,701	34,410	14,747	Grade	Plant	**0.5**	7.8	14.8	16.8	**18.8**	19.6	20.3	21.1	21.8	**22.9**	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	**130.3**	130.3	**546,607**
W-15	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.8	14.8	16.8	**18.8**	20.3	21.1	21.8	22.9	**22.6**	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6			**546,565**
W-16	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.8	14.8	16.8	**18.8**	19.6	20.3	21.1	21.8	**22.6**	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6			**546,561**
W-17	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.8	14.8	16.8	**18.8**	20.3	21.1	21.8	22.6	**22.6**	22.6	22.6	22.6	22.6	22.6	22.6	22.6			**546,988**
W-18	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.8	14.8	16.8	**18.8**	19.6	20.3	21.1	21.8	**22.6**	22.6	22.6	22.6	22.6	22.6	22.6	22.6			**546,516**
W-19	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.8	14.8	16.8	**18.8**	20.3	21.1	21.8	22.6	**22.6**	22.6	22.6	22.6	22.6	22.6	**156.4**	156.4	**546,474**
W-20	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.8	14.8	16.8	**18.8**	19.6	20.3	21.1	21.8	**22.6**	22.6	22.6	22.6	22.6	22.6			**546,471**
W-21	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.8	14.8	16.8	**18.8**	20.3	21.1	21.8	22.6	**22.6**	22.6	22.6	22.6			**546,429**
W-22	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.8	14.8	16.8	**18.8**	19.6	20.3	21.1	21.8	**22.6**	22.6	22.6	22.6			**546,426**
W-23	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.8	14.8	16.8	**18.8**	19.6	20.3	21.1	21.8	**22.6**	22.6	22.6			**547,029**
W-24	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.8	14.8	16.8	**18.8**	19.6	20.3	21.1	21.8	**22.6**	22.6	22.6	**156.4**	156.4	**546,403**
W-25	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.8	14.8	16.8	**18.8**	19.6	20.3	21.1	21.8	**22.6**	22.6			**546,381**
W-26	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.8	14.8	16.8	**18.8**	19.6	20.3	21.1	21.8	**22.6**	22.6			**546,381**
W-27	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.8	14.8	16.8	**18.8**	19.6	20.3	21.1	21.8	**22.6**			**546,358**
W-28	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.8	14.8	16.8	**18.8**	19.6	20.3	21.1	21.8	**22.6**			**546,358**
		Barren A																																								
Upland	342	313	14,136,091	**20,194,416**								1,514,581	1,514,581	1,514,581	1,514,581	1,514,581	1,514,581	1,514,581	1,514,581	1,514,581	1,514,581	1,514,581	1,514,581	1,514,581	504,860																	**20,194,416**
W-1	34.2	31.3	353,402	**504,860**								353,402	106,021	31,806	13,631	Grade	Plant	**19.5**	20.1	20.7	21.4	**22.0**	22.6	23.2	23.9	24.5	**25.1**	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	**505,010**
W-2	34.2	31.3	353,402	**504,860**								353,402	106,021	31,806	13,631	Grade	Plant	**0.5**	7.0	13.5	15.4	**17.4**	18.1	18.9	19.6	20.4	**21.1**	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1			**504,951**
W-3	34.2	31.3	353,402	**504,860**								0	0	353,402	106,021	31,806	13,631	Grade	Plant	**0.5**	7.0	13.5	15.4	**17.4**	18.1	18.9	19.6	20.4	**21.1**	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8			**504,932**
W-4	34.2	31.3	353,402	**504,860**								0	0	353,402	106,021	31,806	13,631	Grade	Plant	**0.5**	7.0	13.5	15.4	**17.4**	18.1	18.9	19.6	20.4	**21.1**	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	**120.3**	120.3	**504,932**
W-5	34.2	31.3	353,402	**504,860**								0	0	0	0	353,402	106,021	31,806	13,631	Grade	Plant	**0.5**	7.0	13.5	15.4	**17.4**	18.1	18.9	19.6	20.4	**21.1**	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1			**504,914**
W-6	34.2	31.3	353,402	**504,860**								0	0	252,430	126,215	63,108	31,554	15,777	15,777	Grade	Plant	**0.5**	7.0	13.5	15.4	**17.4**	18.1	18.9	19.6	20.4	**21.1**	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1			**504,881**
W-7	34.2	31.3	353,402	**504,860**								0	0	0	0	252,430	126,215	63,108	31,554	15,777	15,777	Grade	Plant	**0.5**	7.0	13.5	15.4	**17.4**	18.1	18.9	19.6	20.4	**21.1**	21.1	21.1	21.1	21.1	21.1	21.1			**504,868**
W-8	34.2	31.3	353,402	**504,860**								0	0	0	0	252,430	126,215	63,108	31,554	15,777	15,777	Grade	Plant	**0.5**	7.0	13.5	15.4	**17.4**	18.1	18.9	19.6	20.4	**21.1**	21.1	21.1	21.1	21.1	21.1	21.1	**90.4**	90.4	**504,868**
W-9	34.2	31.3	353,402	**504,860**								0	0	0	0	0	0	252,430	126,215	63,108	31,554	15,777	15,777	Grade	Plant	**0.5**	7.0	13.5	15.4	**17.4**	18.1	18.9	19.6	20.4	**21.1**	21.1	21.1	21.1	21.1			**504,861**
W-10	34.2	31.3	353,402	**504,860**								0	0	0	0	0	0	252,430	126,215	63,108	31,554	15,777	15,777	Grade	Plant	**0.5**	7.0	13.5	15.4	**17.4**	18.1	18.9	19.6	20.4	**21.1**	21.1	21.1	21.1	21.1			**504,861**
Total	**2,756**			**101,710,180**		3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	2,510,180	0	0	0	0	**101,707,411**
				constructed ICU	0	0	0	0	0	0	0	22	31	54	85.9	122	161	221	262	298	340	381	424	472	518	572	617	664	708	755	803	848	865	878	884	887	898	914	921	1,041	1,168	
				protected (SAV) ICU	2.8	2.8	2.8	2.8	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	
				Total (Constructed and protected) ICU	2.8	2.8	2.8	2.8	237.3	237.3	237.3	258.9	267.9	290.9	323.2	359.6	398.7	458.4	499.5	535.4	576.9	618.7	661.5	709.2	755.7	809.0	854.4	901.1	945.0	992.6	1,039.9	1,085.3	1,102.4	1,114.8	1,120.8	1,124.5	1,135.4	1,151.0	1,158.0	1,277.8	1,405.1	

Table B-30: ICU Calculation for James Island Alignment 5 plus Barren Alignment D Alternative (45% Uplands, 55% Wetlands, Dike Height +20 ft MLLW)

Cell No.	Cell Acreage	Placement Acreage	Volume	Capacity	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	65	Total Placed Quantity
mes Island %																																												
Upland	1036	948	42,821,610	**61,173,728**		2,435,328	2,205,927	2,137,106	2,107,612	2,107,612	2,107,612	1,459,560	1,139,361	1,617,709	1,777,506	1,598,529	1,722,035	1,620,933	1,685,072	1,839,735	1,736,730	1,851,185	1,735,198	1,865,606	2,188,602	2,238,502	2,375,050	2,431,726	2,298,149	3,200,000	3,200,000	3,200,000	3,200,000	2,291,341										**61,173,728**
W-1	37	33.9	382,336	**546,194**		382,336	114,701	34,410	14,747	Grade	Plant	**21.1**	21.8	22.5	23.1	**23.8**	24.5	25.2	25.8	26.5	**27.2**	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	**546,356**
W-2	37	33.9	382,336	**546,194**		382,336	114,701	34,410	14,747	Grade	Plant	**0.5**	7.5	14.6	16.7	**18.8**	19.6	20.4	21.3	22.1	**22.9**	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	**130.3**	130.3	**546,292**
W-3	37	33.9	382,336	**546,194**		0	382,336	114,701	34,410	14,747	Grade	Plant	**0.5**	7.5	14.6	16.7	**18.8**	19.6	20.4	21.3	22.1	**22.9**	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9			**546,272**
W-4	37	33.9	382,336	**546,194**		0	382,336	114,701	34,410	14,747	Grade	Plant	**0.5**	7.5	14.6	16.7	**18.8**	19.6	20.4	21.3	22.1	**22.9**	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9			**546,272**
W-5	37	33.9	382,336	**546,194**		0	0	382,336	114,701	34,410	14,747	Grade	Plant	**0.5**	7.5	14.6	16.7	**18.8**	19.6	20.4	21.3	22.1	**22.9**	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9			**546,252**
W-6	37	33.9	382,336	**546,194**		0	0	382,336	114,701	34,410	14,747	Grade	Plant	**0.5**	7.8	14.6	16.7	**18.8**	19.6	20.4	21.3	22.1	**22.9**	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9			**546,234**
W-7	37	33.9	382,336	**546,194**		0	0	0	382,336	114,701	34,410	14,747	Grade	Plant	**0.5**	7.8	14.6	16.7	**18.8**	19.6	20.4	21.3	22.1	**22.9**	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9			**546,194**
W-8	37	33.9	382,336	**546,194**		0	0	0	382,336	114,701	34,410	14,747	Grade	Plant	**0.5**	7.8	14.6	16.7	**18.8**	19.6	20.4	21.3	22.1	**22.9**	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9			**546,194**
W-9	37	33.9	382,336	**546,194**		0	0	0	0	382,336	114,701	34,410	14,747	Grade	Plant	**0.5**	7.8	14.6	16.7	**18.8**	19.6	20.4	21.3	22.1	**22.9**	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	**130.3**	130.3	**546,702**
W-10	37	33.9	382,336	**546,194**		0	0	0	0	382,336	114,701	34,410	14,747	Grade	Plant	**0.5**	7.8	14.6	16.7	**18.8**	19.6	20.4	21.3	22.1	**22.9**	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9			**546,702**
W-11	37	33.9	382,336	**546,194**		0	0	0	0	0	382,336	114,701	34,410	14,747	Grade	Plant	**0.5**	7.8	14.6	16.7	**18.8**	19.6	20.4	21.3	22.1	**22.9**	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9			**546,679**
W-12	37	33.9	382,336	**546,194**		0	0	0	0	0	382,336	114,701	34,410	14,747	Grade	Plant	**0.5**	7.8	14.6	16.7	**18.8**	19.6	20.4	21.3	22.1	**22.9**	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9			**546,679**
W-13	37	33.9	382,336	**546,194**		0	0	0	0	0	0	382,336	114,701	34,410	14,747	Grade	Plant	**0.5**	7.8	14.6	16.7	**18.8**	19.6	20.4	21.3	22.1	**22.9**	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	**130.3**	130.3	**546,633**
W-14	37	33.9	382,336	**546,194**		0	0	0	0	0	0	382,336	114,701	34,410	14,747	Grade	Plant	**0.5**	7.8	14.6	16.7	**18.8**	19.6	20.4	21.3	22.1	**22.9**	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9			**546,633**
W-15	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.8	14.6	16.7	**18.8**	19.6	20.4	21.3	22.1	**22.9**	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9			**546,588**
W-16	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.8	14.6	16.7	**18.8**	19.6	20.4	21.3	22.1	**22.9**	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9			**546,588**
W-17	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.8	14.6	16.7	**18.8**	19.6	20.4	21.3	22.1	**22.9**	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9			**546,542**
W-18	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.8	14.6	16.7	**18.8**	19.6	20.4	21.3	22.1	**22.9**	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9			**546,542**
W-19	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.8	14.6	16.7	**18.8**	19.6	20.4	21.3	22.1	**22.9**	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	**156.4**	156.4	**546,519**
W-20	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.8	14.6	16.7	**18.8**	19.6	20.4	21.3	22.1	**22.9**	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9			**546,519**
W-21	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.8	14.6	16.7	**18.8**	19.6	20.4	21.3	22.1	**22.9**	22.9	22.9	22.9	22.9	22.9	22.9	22.9			**546,473**
W-22	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.8	14.6	16.7	**18.8**	19.6	20.4	21.3	22.1	**22.9**	22.9	22.9	22.9	22.9	22.9	22.9			**546,473**
W-23	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.8	14.6	16.7	**18.8**	19.6	20.4	21.3	22.1	**22.9**	22.9	22.9	22.9	22.9			**550,337**
W-24	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.8	14.6	16.7	**18.8**	19.6	20.4	21.3	22.1	**22.9**	22.9	22.9	22.9	22.9			**546,427**
W-25	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.8	14.6	16.7	**18.8**	19.6	20.4	21.3	22.1	**22.9**	22.9	22.9	22.9	22.9	**156.4**	156.4	**546,382**
W-26	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.8	14.6	16.7	**18.8**	19.6	20.4	21.3	22.1	**22.9**	22.9	22.9			**546,382**
W-27	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.8	14.6	16.7	**18.8**	18.8	19.6	20.4	21.3	**22.9**			**546,355**
W-28	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.8	14.6	16.7	**18.8**	18.8	19.6	20.4	21.3	**22.9**			**546,355**
Barren Island D																																												
Upland	205	188	7,262,904	**10,375,577**								907,863	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	700,000	700,000	700,000	867,714															**10,375,577**
W-1	34.2	31.3	252,430	**360,615**								252,430	75,729	22,719	9,737	Grade	Plant	**19.5**	20.1	20.7	21.4	**22.0**	22.6	23.2	23.9	24.5	**25.1**	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	**361,164**
W-2	34.2	31.3	252,430	**360,615**								252,430	75,729	22,719	9,737	Grade	Plant	**0.5**	7.0	13.5	15.4	**17.4**	18.1	18.9	19.6	20.4	**21.1**	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	**144.4**	144.4	**361,041**
W-3	34.2	31.3	252,430	**360,615**								0	0	252,430	75,729	22,719	9,737	Grade	Plant	**0.5**	7.0	13.5	15.4	**17.4**	18.1	18.9	19.6	20.4	**21.1**	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1			**361,020**
W-4	34.2	31.3	252,430	**360,615**								0	0	252,430	75,729	22,719	9,737	Grade	Plant	**0.5**	7.0	13.5	15.4	**17.4**	18.1	18.9	19.6	20.4	**21.1**	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1			**361,020**
W-5	34.2	31.3	252,430	**360,615**								0	0	0	0	252,430	75,729	22,719	9,737	Grade	Plant	**0.5**	7.0	13.5	15.4	**17.4**	18.1	18.9	19.6	20.4	**21.1**	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1			**360,978**
W-6	34.2	31.3	252,430	**360,615**								0	0	0	0	252,430	75,729	22,719	9,737	Grade	Plant	**0.5**	7.0	13.5	15.4	**17.4**	18.1	18.9	19.6	20.4	**21.1**	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1			**360,978**
W-7	34.2	31.3	252,430	**360,615**								0	0	0	0	0	0	252,430	75,729	22,719	9,737	Grade	Plant	**0.5**	7.0	13.5	15.4	**17.4**	18.1	18.9	19.6	20.4	**21.1**	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1			**360,936**
W-8	34.2	31.3	252,430	**360,615**								0	0	0	0	180,307	90,154	45,077	22,538	11,269	11,269	Grade	Plant	**0.5**	7.0	13.5	15.4	**17.4**	18.1	18.9	19.6	20.4	**21.1**	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1			**365,146**
W-9	34.2	31.3	252,430	**360,615**								0	0	0	0	0	0	180,307	90,154	45,077	22,538	11,269	11,269	Grade	Plant	**0.5**	7.0	13.5	15.4	**17.4**	18.1	18.9	19.6	20.4	**21.1**	21.1	21.1	21.1	21.1	21.1	21.1	21.1			**360,893**
W-10	34.2	31.3	252,430	**360,615**								0	0	0	0	0	0	180,307	90,154	45,077	22,538	11,269	11,269	Grade	Plant	**0.5**	7.0	13.5	15.4	**17.4**	18.1	18.9	19.6	20.4	**21.1**	21.1	21.1	21.1	21.1	21.1	21.1	21.1			**360,893**
W-11	34.2	31.3	252,430	**360,615**								0	0	0	0	0	0	0	0	180,307	90,154	45,077	22,538	11,269	11,269	Grade	Plant	**0.5**	7.0	13.5	15.4	**17.4**	18.1	18.9	19.6	20.4	**21.1**	21.1	21.1	21.1	21.1	21.1	**168.4**	168.4	**360,851**
W-12	34.2	31.3	252,430	**360,615**								0	0	0	0	0	0	0	0	180,307	90,154	45,077	22,538	11,269	11,269	Grade	Plant	**0.5**	7.0	13.5	15.4	**17.4**	18.1	18.9	19.6	20.4	**21.1**	21.1	21.1	21.1	21.1	21.1			**360,851**
W-13	34.2	31.3	252,430	**360,615**								0	0	0	0	0	0	0	0	0	0	180,307	90,154	45,077	22,538	11,269	11,269	Grade	Plant	**0.5**	7.0	13.5	15.4	**17.4**	18.1	18.9	19.6	20.4	**21.1**	21.1	21.1			**360,809**
W-14	34.2	31.3	252,430	**360,615**								0	0	0	0	0	0	0	0	0	0	180,307	90,154	45,077	22,538	11,269	11,269	Grade	Plant	**0.5**	7.0	13.5	15.4	**17.4**	18.1	18.9	19.6	20.4	**21.1**	21.1	21.1			**360,809**
Total	**2,756**			**91,891,341**		3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	2,291,341	0	0	0	0	0	0	0	0	0	**91,911,268**
constructed ICU					**0**	0	0	0	0	0	0	22	30	53	85	122	161	201	259	296	338	381	424	476	521	566	610	655	709	755	801	848	895	928	953	968	983	992	997	1,004	1,019	1,148	1,254	
protected (SAV) ICU					2.8	2.8	2.8	2.8	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	
Total (Constructed and protected) ICU					2.8	2.8	2.8	2.8	237.3	237.3	237.3	258.9	267.6	290.4	322.6	359.0	398.2	438.0	496.1	533.0	575.2	618.1	661.5	713.8	758.2	803.3	847.5	892.8	945.8	992.6	1,038.6	1,085.5	1,132.0	1,164.8	1,190.5	1,204.9	1,219.8	1,229.3	1,234.0	1,241.1	1,256.6	1,385.5	1,491.1	

Table B-31: ICU Calculation for James Island Alignment 5 plus Barren Alignment D (40% Uplands, 60% Wetlands, Dike Height +25 ft MLLW)

Cell No.	Cell Acreage	Placement Acreage	Volume	Capacity	0	1	2	3	4	5	6	7	8	9
James Island 5														
Upland	932	853	38,522,915	55,032,736		2,463,745	2,242,869	2,176,606	2,148,208	2,148,208	2,148,208	1,843,518	1,806,778	1,961,067
W-1	35.625	32.6	368,127	525,896		368,127	110,438	33,131	14,199	Grade	Plant	20.3	20.9	21.6
W-2	35.625	32.6	368,127	525,896		368,127	110,438	33,131	14,199	Grade	Plant	0.5	7.3	14.0
W-3	35.625	32.6	368,127	525,896		0	368,127	110,438	33,131	14,199	Grade	Plant	0.5	7.3
W-4	35.625	32.6	368,127	525,896		0	368,127	110,438	33,131	14,199	Grade	Plant	0.5	7.3
W-5	35.625	32.6	368,127	525,896		0	0	368,127	110,438	33,131	14,199	Grade	Plant	0.5
W-6	35.625	32.6	368,127	525,896		0	0	368,127	110,438	33,131	14,199	Grade	Plant	0.5
W-7	35.625	32.6	368,127	525,896		0	0	0	368,127	110,438	33,131	14,199	Grade	Plant
W-8	35.625	32.6	368,127	525,896		0	0	0	368,127	110,438	33,131	14,199	Grade	Plant
W-9	35.625	32.6	368,127	525,896		0	0	0	0	368,127	110,438	33,131	14,199	Grade
W-10	35.625	32.6	368,127	525,896		0	0	0	0	368,127	110,438	33,131	14,199	Grade
W-11	35.625	32.6	368,127	525,896		0	0	0	0	0	368,127	110,438	33,131	14,199
W-12	35.625	32.6	368,127	525,896		0	0	0	0	0	368,127	110,438	33,131	14,199
W-13	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	368,127	110,438
W-14	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	368,127	110,438
W-15	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0
W-16	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0
W-17	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0
W-18	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0
W-19	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0
W-20	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0
W-21	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0
W-22	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0
W-23	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0
W-24	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0
W-25	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0
W-26	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0
W-27	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0
W-28	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0
W-29	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0
W-30	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0
W-31	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0
W-32	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0
Barren Island D														
Upland	171	156	6,058,325	8,654,750								500,000	400,000	400,000
W-1	36.64	33.5	270,462	386,374								270,462	81,139	24,342
W-2	36.64	33.5	270,462	386,374								270,462	81,139	24,342
W-3	36.64	33.5	270,462	386,374								0	0	270,462
W-4	36.64	33.5	270,462	386,374								0	0	270,462
W-5	36.64	33.5	270,462	386,374								0	0	0
W-6	36.64	33.5	270,462	386,374								0	0	0
W-7	36.64	33.5	270,462	386,374								0	0	0
W-8	36.64	33.5	270,462	386,374								0	0	0
W-9	36.64	33.5	270,462	386,374								0	0	0
W-10	36.64	33.5	270,462	386,374								0	0	0
W-11	36.64	33.5	270,462	386,374								0	0	0
W-12	36.64	33.5	270,462	386,374								0	0	0
W-13	36.64	33.5	270,462	386,374								0	0	0
W-14	36.64	33.5	270,462	386,374								0	0	0
Total	**2,756**			**85,925,405**		3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000
Total	2756.002			85925405.37		3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3200000
constructed ICU					0	0	0	0	0	0	0	21	29	51.1
protected (SAV) ICU					2.8	2.8	2.8	2.8	237.3	237.3	237.3	237.3	237.3	237.3
Total (Constructed and protected) ICU					2.8	2.8	2.8	2.8	237.3	237.3	237.3	258.1	266.4	288.4

Cell No.	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
James Island 5									James Island									
Upland	1,188,363	1,404,866	1,796,477	1,688,886	1,790,172	1,918,778	1,845,439	1,830,959	1,843,709	1,791,348	1,673,859	1,680,527	2,206,375	2,436,414	2,567,839	2,578,786	3,166,355	2,677,109
W-1	22.2	22.9	23.6	24.2	24.9	25.5	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2
W-2	16.1	18.1	18.9	19.7	20.4	21.2	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
W-3	14.0	16.1	18.1	18.9	19.7	20.4	21.2	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
W-4	14.0	16.1	18.1	18.9	19.7	20.4	21.2	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
W-5	7.3	14.0	16.1	18.1	18.9	19.7	20.4	21.2	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
W-6	7.3	14.0	16.1	18.1	18.9	19.7	20.4	21.2	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
W-7	0.5	7.3	14.0	16.1	18.1	18.9	19.7	20.4	21.2	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
W-8	0.5	7.3	14.0	16.1	18.1	18.9	19.7	20.4	21.2	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
W-9	Plant	0.5	7.3	14.0	16.1	18.1	18.9	19.7	20.4	21.2	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
W-10	Plant	0.5	7.3	14.0	16.1	18.1	18.9	19.7	20.4	21.2	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
W-11	Grade	Plant	0.5	7.3	14.0	16.1	18.1	18.9	19.7	20.4	21.2	22.0	22.0	22.0	22.0	22.0	22.0	22.0
W-12	Grade	Plant	0.5	7.3	14.0	16.1	18.1	18.9	19.7	20.4	21.2	22.0	22.0	22.0	22.0	22.0	22.0	22.0
W-13	33,131	14,199	Grade	Plant	0.5	7.3	14.0	16.1	18.1	18.9	19.7	20.4	21.2	22.0	22.0	22.0	22.0	22.0
W-14	33,131	14,199	Grade	Plant	0.5	7.3	14.0	16.1	18.1	18.9	19.7	20.4	21.2	22.0	22.0	22.0	22.0	22.0
W-15	368,127	110,438	33,131	14,199	Grade	Plant	0.5	7.3	14.0	16.1	18.1	18.9	19.7	20.4	21.2	22.0	22.0	22.0
W-16	368,127	110,438	33,131	14,199	Grade	Plant	0.5	7.3	14.0	16.1	18.1	18.9	19.7	20.4	21.2	22.0	22.0	22.0
W-17	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.3	14.0	16.1	18.1	18.9	19.7	20.4	21.2	22.0
W-18	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.3	14.0	16.1	18.1	18.9	19.7	20.4	21.2	22.0
W-19	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.3	14.0	16.1	18.1	18.9	19.7	20.4
W-20	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.3	14.0	16.1	18.1	18.9	19.7	20.4
W-21	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.3	14.0	16.1	18.1	18.9
W-22	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.3	14.0	16.1	18.1	18.9
W-23	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.3	14.0	16.1
W-24	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.3	14.0	16.1
W-25	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.3
W-26	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.3
W-27	0	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5
W-28	0	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5
W-29	0	0	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant
W-30	0	0	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant
W-31	0	0	0	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade
W-32	0	0	0	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade
Barren Island D																		
Upland	500,000	500,000	400,000	400,000	400,000	400,000	400,000	500,000	400,000	400,000	500,000	500,000	500,000	500,000	500,000	554,750		
W-1	10,432	Grade	Plant	20.9	21.5	22.2	22.9	23.5	24.2	24.9	25.5	26.2	26.9	26.9	26.9	26.9	26.9	26.9
W-2	10,432	Grade	Plant	0.5	9.5	14.4	16.5	18.6	19.4	20.2	21.0	21.8	22.6	22.6	22.6	22.6	22.6	22.6
W-3	81,139	24,342	10,432	Grade	Plant	0.5	9.5	14.4	16.5	18.6	19.4	20.2	21.0	21.8	22.6	22.6	22.6	22.6
W-4	81,139	24,342	10,432	Grade	Plant	0.5	9.5	14.4	16.5	18.6	19.4	20.2	21.0	21.8	22.6	22.6	22.6	22.6
W-5	0	270,462	81,139	24,342	10,432	Grade	Plant	0.5	9.5	14.4	16.5	18.6	19.4	20.2	21.0	21.8	22.6	22.6
W-6	0	270,462	81,139	24,342	10,432	Grade	Plant	0.5	9.5	14.4	16.5	18.6	19.4	20.2	21.0	21.8	22.6	22.6
W-7	0	0	0	270,462	81,139	24,342	10,432	Grade	Plant	0.5	9.5	14.4	16.5	18.6	19.4	20.2	21.0	21.8
W-8	0	193,187	96,594	48,297	24,148	12,074	12,074	Grade	Plant	0.5	9.5	14.4	16.5	18.6	19.4	20.2	21.0	21.8
W-9	0	0	0	193,187	96,594	48,297	24,148	12,074	12,074	Grade	Plant	0.5	9.5	14.4	16.5	18.6	19.4	20.2
W-10	0	0	0	193,187	96,594	48,297	24,148	12,074	12,074	Grade	Plant	0.5	9.5	14.4	16.5	18.6	19.4	20.2
W-11	0	0	0	0	0	193,187	96,594	48,297	24,148	12,074	12,074	Grade	Plant	0.5	9.5	14.4	16.5	18.6
W-12	0	0	0	0	0	193,187	96,594	48,297	24,148	12,074	12,074	Grade	Plant	0.5	9.5	14.4	16.5	18.6
W-13	0	0	0	0	0	0	0	193,187	96,594	48,297	24,148	12,074	12,074	Grade	Plant	0.5	9.5	14.4
W-14	0	0	0	0	0	0	0	193,187	96,594	48,297	24,148	12,074	12,074	Grade	Plant	0.5	9.5	14.4
Total	3,200,000	3,200,000	3,200,000	3,200,000	3,200,003	3,200,003	3,200,002	3,200,002	3,200,002	3,200,010	3,200,010	3,200,011	3,200,012	3,200,013	3,200,016	3,200,026	3,200,028	2,677,956
Total	3200000	3200000	3200000	3200000	3200000	3200000	3200000	3200000	3200000	3200000	3200000	3200000	3200000	3200000	3200000	3200000	3200000	2677109
constructed ICU	81.9	116.7	154.3	213.9	254.0	288.0	334.7	373.3	421.5	469.8	519.2	560.3	609.8	651.0	703.1	753.1	804.4	847.2
protected (SAV) ICU	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3
Total (Constructed and protected) ICU	319.2	354.0	391.6	451.2	491.3	525.3	572.0	610.6	658.7	707.0	756.5	797.6	847.1	888.3	940.4	990.4	1,041.7	1,084.5

Cell No.	28	29	30	31	32	33	34	35	36	37	38	39	40	60	Total Placed Quantity
James Island 5															
Upland															55,025,464
W-1	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	526,052
W-2	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0				525,991
W-3	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0				525,971
W-4	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	150.4	150.4	150.4	525,971
W-5	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0				525,952
W-6	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0				525,934
W-7	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0				525,896
W-8	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0				525,896
W-9	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0				526,363
W-10	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	150.4	150.4	150.4	526,363
W-11	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0				526,341
W-12	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0				526,341
W-13	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0				526,297
W-14	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0				526,297
W-15	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0				526,253
W-16	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	150.4	150.4	150.4	526,253
W-17	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0				526,209
W-18	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0				526,209
W-19	21.2	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0				526,164
W-20	21.2	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0				526,164
W-21	19.7	20.4	21.2	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0				526,120
W-22	19.7	20.4	21.2	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	150.4	150.4	150.4	526,120
W-23	18.1	18.9	19.7	20.4	21.2	22.0	22.0	22.0	22.0	22.0	22.0				526,076
W-24	18.1	18.9	19.7	20.4	21.2	22.0	22.0	22.0	22.0	22.0	22.0				526,076
W-25	14.0	16.1	18.1	18.9	19.7	20.4	21.2	22.0	22.0	22.0	22.0				526,032
W-26	14.0	16.1	18.1	18.9	19.7	20.4	21.2	22.0	22.0	22.0	22.0				526,032
W-27	7.3	14.0	16.1	18.1	18.9	19.7	20.4	21.2	22.0	22.0	22.0				526,011
W-28	7.3	14.0	16.1	18.1	18.9	19.7	20.4	21.2	22.0	22.0	22.0				526,011
W-29	0.5	7.3	14.0	16.1	18.1	18.9	19.7	20.4	21.2	22.0	22.0	175.44	175.44	175.44	525,991
W-30	0.5	7.3	14.0	16.1	18.1	18.9	19.7	20.4	21.2	22.0	22.0				525,991
W-31	Plant	0.5	7.3	14.0	16.1	18.1	18.9	19.7	20.4	21.2	22.0				525,971
W-32	Plant	0.5	7.3	14.0	16.1	18.1	18.9	19.7	20.4	21.2	22.0				525,971
Barren Island D															
Upland															8,654,750
W-1	26.9	26.9	26.9	26.9	26.9	26.9	26.9	26.9	26.9	26.9	26.9	26.9	26.9	26.9	386,534
W-2	22.6	22.6	22.6	22.6	22.6	22.6	22.6								386,473
W-3	22.6	22.6	22.6	22.6	22.6	22.6	22.6								386,434
W-4	22.6	22.6	22.6	22.6	22.6	22.6	22.6	154.5	154.5	154.5	154.5	154.5	154.5	154.5	386,434
W-5	22.6	22.6	22.6	22.6	22.6	22.6	22.6								386,399
W-6	22.6	22.6	22.6	22.6	22.6	22.6	22.6								386,399
W-7	22.6	22.6	22.6	22.6	22.6	22.6	22.6								386,375
W-8	22.6	22.6	22.6	22.6	22.6	22.6	22.6								386,375
W-9	21.0	21.8	22.6	22.6	22.6	22.6	22.6								386,374
W-10	21.0	21.8	22.6	22.6	22.6	22.6	22.6								386,374
W-11	19.4	20.2	21.0	21.8	22.6	22.6	22.6	180.3	180.3	180.3	180.3	180.3	180.3	180.3	386,374
W-12	19.4	20.2	21.0	21.8	22.6	22.6	22.6								386,374
W-13	16.5	18.6	19.4	20.2	21.0	21.8	22.6								386,374
W-14	16.5	18.6	19.4	20.2	21.0	21.8	22.6								386,374
Total	894	937	679	708	728	0	0	0	0	0	0	0	0	0	**85,925,201**
Total	0	0	0	0	0										85,925,406
constructed ICU	893.9	937.3	990.1	1,022.1	1,045.2	1,059.0	1,068.7	1,121.5	1,128.4	1,136.7	1,150.9	1,252.8	1,256.8	1,337.6	
protected (SAV) ICU	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	237.3	
Total (Constructed and protected) ICU	1,131.2	1,174.6	1,227.4	1,259.4	1,282.5	1,296.3	1,306.0	1,358.8	1,365.7	1,374.0	1,388.2	1,490.1	1,494.1	1,574.9	

Table B-32: ICU Calculation for Alternative James Island Alignment 3 Alternative (50% Uplands, 50% Wetlands, Dike Height +20 ft MLLW)

Cell No.	Cell Acreage	Placement Acreage	Volume	Capacity	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Upland	793	726	32,777,545	46,825,064		2,455,065	2,231,585	2,164,541	2,135,807	2,135,807	2,242,227	2,327,341	2,273,059	2,221,158	2,185,610	2,152,319	2,667,749	2,933,766	3,066,769	3,133,260	3,166,485
W-1	36.0	33.0	372,467	532,096		372,467	111,740	33,522	14,367	Grade	Plant	20.5	21.2	21.9	22.5	23.2	23.8	24.5	25.2	25.8	26.5
W-2	36.0	33.0	372,467	532,096		372,467	111,740	33,522	14,367	Grade	Plant	0.5	7.2	13.9	16.1	18.3	19.1	19.9	20.7	21.5	22.3
W-3	36.0	33.0	372,467	532,096		0	372,467	111,740	33,522	14,367	Grade	Plant	0.5	7.2	13.9	16.1	18.3	19.1	19.9	20.7	21.5
W-4	36.0	33.0	372,467	532,096		0	372,467	111,740	33,522	14,367	Grade	Plant	0.5	7.2	13.9	16.1	18.3	19.1	19.9	20.7	21.5
W-5	36.0	33.0	372,467	532,096		0	0	372,467	111,740	33,522	14,367	Grade	Plant	0.5	7.2	13.9	16.1	18.3	19.1	19.9	20.7
W-6	36.0	33.0	372,467	532,096		0	0	372,467	111,740	33,522	14,367	Grade	Plant	0.5	7.2	13.9	16.1	18.3	19.1	19.9	20.7
W-7	36.0	33.0	372,467	532,096		0	0	0	372,467	111,740	33,522	14,367	Grade	Plant	0.5	7.2	13.9	16.1	18.3	19.1	19.9
W-8	36.0	33.0	372,467	532,096		0	0	0	372,467	111,740	33,522	14,367	Grade	Plant	0.5	7.2	13.9	16.1	18.3	19.1	19.9
W-9	36.0	33.0	372,467	532,096		0	0	0	0	372,467	111,740	33,522	14,367	Grade	Plant	0.5	7.2	13.9	16.1	18.3	19.1
W-10	36.0	33.0	372,467	532,096		0	0	0	0	372,467	111,740	33,522	14,367	Grade	Plant	0.5	7.2	13.9	16.1	18.3	19.1
W-11	36.0	33.0	372,467	532,096		0	0	0	0	0	372,467	111,740	33,522	14,367	Grade	Plant	0.5	7.2	13.9	16.1	18.3
W-12	36.0	33.0	372,467	532,096		0	0	0	0	0	266,048	133,024	66,512	33,256	16,628	16,628	Grade	Plant	0.5	7.2	13.9
W-13	36.0	33.0	372,467	532,096		0	0	0	0	0	0	266,048	133,024	66,512	33,256	16,628	16,628	Grade	Plant	0.5	7.2
W-14	36.0	33.0	372,467	532,096		0	0	0	0	0	0	266,048	133,024	66,512	33,256	16,628	16,628	Grade	Plant	0.5	7.2
W-15	36.0	33.0	372,467	532,096		0	0	0	0	0	0	0	266,048	133,024	66,512	33,256	16,628	16,628	Grade	Plant	0.5
W-16	36.0	33.0	372,467	532,096		0	0	0	0	0	0	0	266,048	133,024	66,512	33,256	16,628	16,628	Grade	Plant	0.5
W-17	36.0	33.0	372,467	532,096		0	0	0	0	0	0	0	0	266,048	133,024	66,512	33,256	16,628	16,628	Grade	Plant
W-18	36.0	33.0	372,467	532,096		0	0	0	0	0	0	0	0	266,048	133,024	66,512	33,256	16,628	16,628	Grade	Plant
W-19	36.0	33.0	372,467	532,096		0	0	0	0	0	0	0	0	0	266,048	133,024	66,512	33,256	16,628	16,628	Grade
W-20	36.0	33.0	372,467	532,096		0	0	0	0	0	0	0	0	0	266,048	133,024	66,512	33,256	16,628	16,628	Grade
W-21	36.0	33.0	372,467	532,096		0	0	0	0	0	0	0	0	0	0	266,048	133,024	66,512	33,256	16,628	16,628
W-22	36.0	33.0	372,467	532,096		0	0	0	0	0	0	0	0	0	0	266,048	133,024	66,512	33,256	16,628	16,628
Total	**1,586**			**58,531,182**		3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,003	3,200,003	3,200,002
constructed ICU					0	0	0	0	0	0	0	21	29	51	81.6	116.7	154.3	186.3	210.1	230.3	261.0
protected (SAV) ICU					2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
Total (Constructed and protected) ICU					2.8	2.8	2.8	2.8	2.8	2.8	2.8	23.9	32.2	53.9	84.5	119.5	157.2	189.2	213.0	233.1	263.8

Cell No.	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	50	Total Placed Quantity
Upland	3,199,704	3,199,664	857,520																	46,749,437
W-1	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	532,254
W-2	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3				532,191
W-3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3				532,171
W-4	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3				532,171
W-5	21.5	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	177.6	177.6	177.6	532,152
W-6	21.5	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3				532,134
W-7	20.7	21.5	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3				532,096
W-8	20.7	21.5	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3				532,096
W-9	19.9	20.7	21.5	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3				532,323
W-10	19.9	20.7	21.5	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3				532,323
W-11	19.1	19.9	20.7	21.5	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3				532,300
W-12	16.1	18.3	19.1	19.9	20.7	21.5	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	177.6	177.6	177.6	532,256
W-13	13.9	16.1	18.3	19.1	19.9	20.7	21.5	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3				532,233
W-14	13.9	16.1	18.3	19.1	19.9	20.7	21.5	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3				532,233
W-15	7.2	13.9	16.1	18.3	19.1	19.9	20.7	21.5	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3				532,212
W-16	7.2	13.9	16.1	18.3	19.1	19.9	20.7	21.5	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3				532,212
W-17	0.5	7.2	13.9	16.1	18.3	19.1	19.9	20.7	21.5	22.3	22.3	22.3	22.3	22.3	22.3	22.3				532,191
W-18	0.5	7.2	13.9	16.1	18.3	19.1	19.9	20.7	21.5	22.3	22.3	22.3	22.3	22.3	22.3	22.3				532,191
W-19	Plant	0.5	7.2	13.9	16.1	18.3	19.1	19.9	20.7	21.5	22.3	22.3	22.3	22.3	22.3	22.3	177.6	177.6	177.6	532,171
W-20	Plant	0.5	7.2	13.9	16.1	18.3	19.1	19.9	20.7	21.5	22.3	22.3	22.3	22.3	22.3	22.3				532,171
W-21	Grade	Plant	0.5	7.2	13.9	16.1	18.3	19.1	19.9	20.7	21.5	22.3	22.3	22.3	22.3	22.3				532,152
W-22	Grade	Plant	0.5	7.2	13.9	16.1	18.3	19.1	19.9	20.7	21.5	22.3	22.3	22.3	22.3	22.3				532,152
Total	3,200,002	3,200,002	857,906	428	455	477	488	0	0	0	0	0	0	0	0	0	0	0	0	**58,457,824**
constructed ICU	297.7	337.2	386.3	427.6	455.4	476.8	488.4	498.6	513.5	519.8	528.3	535.3	537.7	543.8	550.0	553.1	621.1	624.2	674.6	
protected (SAV) ICU	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	
Total (Constructed and protected) ICU	300.5	340.1	389.2	430.4	458.2	479.7	491.3	501.5	516.3	522.6	531.2	538.2	540.5	546.7	552.9	556.0	623.9	627.0	677.5	

Table B-33: ICU Calculation for Alternative James Island Alignment 3 Alternative (45% Uplands, 55% Wetlands, Dike Height +25 ft MLLW)

Cell No.	Cell Acreage	Placement Acreage	Volume	Capacity	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	50	51	Total Placed Quantity
Upland	714	653	34,782,224	**49,688,892**		2449175.2	2223927.7	2156353.5	2127393.1	2127393.1	2127393.1	2341914.5	2299010.2	2232508.6	2194431	2160912	2127393.1	2663696.5	2931848.3	3065924.1	3132962.1	3166481	3200000	3200000	1679954	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**49,688,671**
W-1	36.3	33.2	375,412	**536,303**		375,412	112,624	33,787	14,480	Grade	Plant	20.7	21.3	22.0	22.7	23.3	24.0	24.7	25.3	26.0	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	**536,462**
W-2	36.3	33.2	375,412	**536,303**		375,412	112,624	33,787	14,480	Grade	Plant	0.5	7.2	13.9	16.2	18.4	19.2	20.0	20.8	21.6	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	127.6	127.6	127.6	127.6	**536,399**
W-3	36.3	33.2	375,412	**536,303**		0	375,412	112,624	33,787	14,480	Grade	Plant	0.5	7.2	13.9	16.2	18.4	19.2	20.0	20.8	21.6	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4					**536,379**
W-4	36.3	33.2	375,412	**536,303**		0	375,412	112,624	33,787	14,480	Grade	Plant	0.5	7.2	13.9	16.2	18.4	19.2	20.0	20.8	21.6	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4					**536,379**
W-5	36.3	33.2	375,412	**536,303**		0	0	375,412	112,624	33,787	14,480	Grade	Plant	0.5	7.2	13.9	16.2	18.4	19.2	20.0	20.8	21.6	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4					**536,360**
W-6	36.3	33.2	375,412	**536,303**		0	0	375,412	112,624	33,787	14,480	Grade	Plant	0.5	7.2	13.9	16.2	18.4	19.2	20.0	20.8	21.6	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4					**536,341**
W-7	36.3	33.2	375,412	**536,303**		0	0	0	375,412	112,624	33,787	14,480	Grade	Plant	0.5	7.2	13.9	16.2	18.4	19.2	20.0	20.8	21.6	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4					**536,303**
W-8	36.3	33.2	375,412	**536,303**		0	0	0	375,412	112,624	33,787	14,480	Grade	Plant	0.5	7.2	13.9	16.2	18.4	19.2	20.0	20.8	21.6	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4					**536,303**
W-9	36.3	33.2	375,412	**536,303**		0	0	0	0	375,412	112,624	33,787	14,480	Grade	Plant	0.5	7.2	13.9	16.2	18.4	19.2	20.0	20.8	21.6	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	153.1	153.1	153.1	153.1	**536,576**
W-10	36.3	33.2	375,412	**536,303**		0	0	0	0	375,412	112,624	33,787	14,480	Grade	Plant	0.5	7.2	13.9	16.2	18.4	19.2	20.0	20.8	21.6	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4					**536,576**
W-11	36.3	33.2	375,412	**536,303**		0	0	0	0	0	375,412	112,624	33,787	14,480	Grade	Plant	0.5	7.2	13.9	16.2	18.4	19.2	20.0	20.8	21.6	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4					**536,553**
W-12	36.3	33.2	375,412	**536,303**		0	0	0	0	0	375,412	112,624	33,787	14,480	Grade	Plant	0.5	7.2	13.9	16.2	18.4	19.2	20.0	20.8	21.6	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4					**536,553**
W-13	36.3	33.2	375,412	**536,303**		0	0	0	0	0	0	268,152	134,076	67,038	33,519	16,759	16,759	Grade	Plant	0.5	7.2	13.9	16.2	18.4	19.2	20.0	20.8	21.6	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4					**536,486**
W-14	36.3	33.2	375,412	**536,303**		0	0	0	0	0	0	268,152	134,076	67,038	33,519	16,759	16,759	Grade	Plant	0.5	7.2	13.9	16.2	18.4	19.2	20.0	20.8	21.6	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4					**536,486**
W-15	36.3	33.2	375,412	**536,303**		0	0	0	0	0	0	0	268,152	134,076	67,038	33,519	16,759	16,759	Grade	Plant	0.5	7.2	13.9	16.2	18.4	19.2	20.0	20.8	21.6	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	153.1	153.1	153.1	153.1	**536,464**
W-16	36.3	33.2	375,412	**536,303**		0	0	0	0	0	0	0	268,152	134,076	67,038	33,519	16,759	16,759	Grade	Plant	0.5	7.2	13.9	16.2	18.4	19.2	20.0	20.8	21.6	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4					**536,464**
W-17	36.3	33.2	375,412	**536,303**		0	0	0	0	0	0	0	0	268,152	134,076	67,038	33,519	16,759	16,759	Grade	Plant	0.5	7.2	13.9	16.2	18.4	19.2	20.0	20.8	21.6	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4					**536,441**
W-18	36.3	33.2	375,412	**536,303**		0	0	0	0	0	0	0	0	268,152	134,076	67,038	33,519	16,759	16,759	Grade	Plant	0.5	7.2	13.9	16.2	18.4	19.2	20.0	20.8	21.6	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4					**536,441**
W-19	36.3	33.2	375,412	**536,303**		0	0	0	0	0	0	0	0	0	268,152	134,076	67,038	33,519	16,759	16,759	Grade	Plant	0.5	7.2	13.9	16.2	18.4	19.2	20.0	20.8	21.6	22.4	22.4	22.4	22.4	22.4	22.4	22.4					**536,420**
W-20	36.3	33.2	375,412	**536,303**		0	0	0	0	0	0	0	0	0	268,152	134,076	67,038	33,519	16,759	16,759	Grade	Plant	0.5	7.2	13.9	16.2	18.4	19.2	20.0	20.8	21.6	22.4	22.4	22.4	22.4	22.4	22.4	22.4					**536,420**
W-21	36.3	33.2	375,412	**536,303**		0	0	0	0	0	0	0	0	0	0	268,152	134,076	67,038	33,519	16,759	16,759	Grade	Plant	0.5	7.2	13.9	16.2	18.4	19.2	20.0	20.8	21.6	22.4	22.4	22.4	22.4	22.4	22.4	153.1	153.1	153.1	153.1	**536,399**
W-22	36.3	33.2	375,412	**536,303**		0	0	0	0	0	0	0	0	0	0	268,152	134,076	67,038	33,519	16,759	16,759	Grade	Plant	0.5	7.2	13.9	16.2	18.4	19.2	20.0	20.8	21.6	22.4	22.4	22.4	22.4	22.4	22.4					**536,399**
W-23	36.3	33.2	375,412	**536,303**		0	0	0	0	0	0	0	0	0	0	0	268,152	134,076	67,038	33,519	16,759	16,759	Grade	Plant	0.5	7.2	13.9	16.2	18.4	19.2	20.0	20.8	21.6	22.4	22.4	22.4	22.4	22.4					**536,379**
W-24	36.3	33.2	375,412	**536,303**		0	0	0	0	0	0	0	0	0	0	0	268,152	134,076	67,038	33,519	16,759	16,759	Grade	Plant	0.5	7.2	13.9	16.2	18.4	19.2	20.0	20.8	21.6	22.4	22.4	22.4	22.4	22.4					**536,379**
Total	**1,586**			**62,560,175**		3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3200000	3200000	3200000	3200000	3200000	3200000	3200000	3200000	3200000	3200000	1679954	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**62,483,035**
constructed ICU					0	0	0	0	0	0	0	21	29	51	82	117	156	195	225.0	240.8	267.2	302.6	340.9	390.8	433.2	474.7	502.8	518.9	537.9	548.8	558.0	572.2	577.4	579.8	580.6	581.5	586.3	591.2	666.0	669.2	703.0	718.2	
protected (SAV) ICU					2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	
Total (Constructed and protected) ICU					2.8	2.8	2.8	2.8	2.8	2.8	2.8	24.0	32.3	54.2	85.0	120.2	158.6	197.5	227.9	243.7	270.0	305.4	343.8	393.6	436.1	477.6	505.6	521.8	540.8	551.6	560.9	575.0	580.2	582.7	583.5	584.3	589.2	594.1	668.8	672.1	705.8	721.0	

Table B-34: ICU Calculation for James Island Alignment 3 Alternative (40% Uplands, 60% Wetlands, Dike Height +30 ft MLLW)

Cell No.	Cell Acreage	Placement Acreage	Volume	Capacity	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	52
Upland	634	580	35,564,610	**50,806,586**		2,443,285	2,216,271	2,148,166	2,118,979	2,118,979	2,118,979	2,227,081	2,313,563	2,258,430	2,205,731	2,169,652	2,135,870	2,118,979	2,659,489	2,929,745	3,064,872	3,132,436	3,166,218	3,200,000	3,200,000	831,077	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W-1	36.6	33.5	378,357	**540,511**		378,357	113,507	34,052	14,594	Grade	Plant	20.9	21.5	22.2	22.9	23.5	24.2	24.9	25.5	26.2	26.9	26.9	26.9	26.9	26.9	26.9	26.9	26.9	26.9	26.9	26.9	26.9	26.9	26.9	26.9	26.9	26.9	26.9	26.9	26.9	26.9	26.9
W-2	36.6	33.5	378,357	**540,511**		378,357	113,507	34,052	14,594	Grade	Plant	0.5	7.3	14.1	16.3	18.6	19.4	20.2	21.0	21.8	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	137.9	137.9	137.9		
W-3	36.6	33.5	378,357	**540,511**		0	378,357	113,507	34,052	14,594	Grade	Plant	0.5	7.3	14.1	16.3	18.6	19.4	20.2	21.0	21.8	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6					
W-4	36.6	33.5	378,357	**540,511**		0	378,357	113,507	34,052	14,594	Grade	Plant	0.5	7.3	14.1	16.3	18.6	19.4	20.2	21.0	21.8	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6					
W-5	36.6	33.5	378,357	**540,511**		0	0	378,357	113,507	34,052	14,594	Grade	Plant	0.5	7.3	14.1	16.3	18.6	19.4	20.2	21.0	21.8	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6					
W-6	36.6	33.5	378,357	**540,511**		0	0	378,357	113,507	34,052	14,594	Grade	Plant	0.5	7.3	14.1	16.3	18.6	19.4	20.2	21.0	21.8	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6					
W-7	36.6	33.5	378,357	**540,511**		0	0	0	378,357	113,507	34,052	14,594	Grade	Plant	0.5	7.3	14.1	16.3	18.6	19.4	20.2	21.0	21.8	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6					
W-8	36.6	33.5	378,357	**540,511**		0	0	0	378,357	113,507	34,052	14,594	Grade	Plant	0.5	7.3	14.1	16.3	18.6	19.4	20.2	21.0	21.8	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	137.9	137.9	137.9		
W-9	36.6	33.5	378,357	**540,511**		0	0	0	0	378,357	113,507	34,052	14,594	Grade	Plant	0.5	7.3	14.1	16.3	18.6	19.4	20.2	21.0	21.8	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6					
W-10	36.6	33.5	378,357	**540,511**		0	0	0	0	378,357	113,507	34,052	14,594	Grade	Plant	0.5	7.3	14.1	16.3	18.6	19.4	20.2	21.0	21.8	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6					
W-11	36.6	33.5	378,357	**540,511**		0	0	0	0	0	378,357	113,507	34,052	14,594	Grade	Plant	0.5	7.3	14.1	16.3	18.6	19.4	20.2	21.0	21.8	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6					
W-12	36.6	33.5	378,357	**540,511**		0	0	0	0	0	378,357	113,507	34,052	14,594	Grade	Plant	0.5	7.3	14.1	16.3	18.6	19.4	20.2	21.0	21.8	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6					
W-13	36.6	33.5	378,357	**540,511**		0	0	0	0	0	0	378,357	113,507	34,052	14,594	Grade	Plant	0.5	7.3	14.1	16.3	18.6	19.4	20.2	21.0	21.8	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6					
W-14	36.6	33.5	378,357	**540,511**		0	0	0	0	0	0	270,255	135,128	67,564	33,782	16,891	16,891	Grade	Plant	0.5	7.3	14.1	16.3	18.6	19.4	20.2	21.0	21.8	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6					
W-15	36.6	33.5	378,357	**540,511**		0	0	0	0	0	0	0	270,255	135,128	67,564	33,782	16,891	16,891	Grade	Plant	0.5	7.3	14.1	16.3	18.6	19.4	20.2	21.0	21.8	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	137.9	137.9	137.9		
W-16	36.6	33.5	378,357	**540,511**		0	0	0	0	0	0	0	270,255	135,128	67,564	33,782	16,891	16,891	Grade	Plant	0.5	7.3	14.1	16.3	18.6	19.4	20.2	21.0	21.8	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6					
W-17	36.6	33.5	378,357	**540,511**		0	0	0	0	0	0	0	0	270,255	135,128	67,564	33,782	16,891	16,891	Grade	Plant	0.5	7.3	14.1	16.3	18.6	19.4	20.2	21.0	21.8	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6					
W-18	36.6	33.5	378,357	**540,511**		0	0	0	0	0	0	0	0	270,255	135,128	67,564	33,782	16,891	16,891	Grade	Plant	0.5	7.3	14.1	16.3	18.6	19.4	20.2	21.0	21.8	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6					
W-19	36.6	33.5	378,357	**540,511**		0	0	0	0	0	0	0	0	0	270,255	135,128	67,564	33,782	16,891	16,891	Grade	Plant	0.5	7.3	14.1	16.3	18.6	19.4	20.2	21.0	21.8	22.6	22.6	22.6	22.6	22.6	22.6	22.6					
W-20	36.6	33.5	378,357	**540,511**		0	0	0	0	0	0	0	0	0	270,255	135,128	67,564	33,782	16,891	16,891	Grade	Plant	0.5	7.3	14.1	16.3	18.6	19.4	20.2	21.0	21.8	22.6	22.6	22.6	22.6	22.6	22.6	22.6					
W-21	36.6	33.5	378,357	**540,511**		0	0	0	0	0	0	0	0	0	0	270,255	135,128	67,564	33,782	16,891	16,891	Grade	Plant	0.5	7.3	14.1	16.3	18.6	19.4	20.2	21.0	21.8	22.6	22.6	22.6	22.6	22.6	22.6	180.28	180.28	180.28		
W-22	36.6	33.5	378,357	**540,511**		0	0	0	0	0	0	0	0	0	0	270,255	135,128	67,564	33,782	16,891	16,891	Grade	Plant	0.5	7.3	14.1	16.3	18.6	19.4	20.2	21.0	21.8	22.6	22.6	22.6	22.6	22.6	22.6					
W-23	36.6	33.5	378,357	**540,511**		0	0	0	0	0	0	0	0	0	0	0	270,255	135,128	67,564	33,782	16,891	16,891	Grade	Plant	0.5	7.3	14.1	16.3	18.6	19.4	20.2	21.0	21.8	22.6	22.6	22.6	22.6	22.6					
W-24	36.6	33.5	378,357	**540,511**		0	0	0	0	0	0	0	0	0	0	0	0	270,255	135,128	67,564	33,782	16,891	16,891	Grade	Plant	0.5	7.3	14.1	16.3	18.6	19.4	20.2	21.0	21.8	22.6	22.6	22.6	22.6					
W-25	36.6	33.5	378,357	**540,511**		0	0	0	0	0	0	0	0	0	0	0	0	270,255	135,128	67,564	33,782	16,891	16,891	Grade	Plant	0.5	7.3	14.1	16.3	18.6	19.4	20.2	21.0	21.8	22.6	22.6	22.6	22.6					
W-26	36.6	33.5	378,357	**540,511**		0	0	0	0	0	0	0	0	0	0	0	0	270,255	135,128	67,564	33,782	16,891	16,891	Grade	Plant	0.5	7.3	14.1	16.3	18.6	19.4	20.2	21.0	21.8	22.6	22.6	22.6	22.6					
Total	**1,586**			**64,859,863**		3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	831,077	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
constructed ICU					0	0	0	0	0	0	0	21	30	52	83	118	156	182	234	256.2	278.3	309.6	346.9	394.6	437.4	480.1	521.9	550.9	573.0	588.0	598.6	607.6	620.7	624.6	626.9	627.6	628.4	632.7	635.6	638.4	669.9	672.8	713.1
protected (SAV) ICU					2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
Total (Constructed and protected) ICU					2.8	2.8	2.8	2.8	2.8	2.8	2.8	24.2	32.6	54.6	85.7	121.3	159.0	184.7	236.8	259.1	281.2	312.4	349.7	397.5	440.2	483.0	524.8	553.7	575.8	590.9	601.5	610.4	623.5	627.4	629.8	630.5	631.2	635.5	638.4	641.3	672.8	675.6	716.0

Table B-35: ICU Calculation for James Island Alignment 5 Alternative (50% Uplands, 50% Wetlands, Dike Height +20 ft MLLW)

Cell No.	Cell Acreage	Placement Acreage	Volume	Capacity	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	60	Total Placed Quantity
Upland	1036	948	42,821,610	61,173,728		2,435,328	2,205,927	2,137,106	2,107,612	2,107,612	2,107,612	2,107,612	2,326,090	2,282,394	2,214,666	2,175,886	2,141,749	2,107,612	2,107,612	2,653,806	2,926,903	3,063,452	3,131,726	3,165,863	3,200,000	3,200,000	3,199,956	3,199,924	2,867,160															61,173,608
U-1		105													Grade	Grade	Plant	Plant	3.2	2.8	2.4	2.0	1.6	3.2	4.7	6.3	7.9	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	16.8	
W-1	37	33.9	382,336	546,194		382,336	114,701	34,410	14,747	Grade	Plant	21.1	21.8	21.5	23.2	23.8	24.5	25.2	25.9	26.6	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	546,381
W-2	37	33.9	382,336	546,194		382,336	114,701	34,410	14,747	Grade	Plant	0.5	7.3	14.1	16.5	18.8	19.5	20.2	21.0	21.8	22.9	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6				546,291
W-3	37	33.9	382,336	546,194		0	382,336	114,701	34,410	14,747	Grade	Plant	0.5	7.3	14.1	16.5	18.8	19.5	20.2	21.0	21.8	22.9	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6				546,271
W-4	37	33.9	382,336	546,194		0	382,336	114,701	34,410	14,747	Grade	Plant	0.5	7.3	14.1	16.5	18.8	19.5	20.2	21.0	21.8	22.9	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	130.3	130.3	130.3	546,271
W-5	37	33.9	382,336	546,194		0	0	382,336	114,701	34,410	14,747	Grade	Plant	0.5	7.3	14.1	16.5	18.8	19.5	20.2	21.0	21.8	22.9	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6				546,251
W-6	37	33.9	382,336	546,194		0	0	382,336	114,701	34,410	14,747	Grade	Plant	0.5	7.3	14.1	16.5	18.8	19.5	20.2	21.0	21.8	22.9	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6				546,232
W-7	37	33.9	382,336	546,194		0	0	0	382,336	114,701	34,410	14,747	Grade	Plant	0.5	7.3	14.1	16.5	18.8	19.5	20.2	21.0	21.8	22.9	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6				546,194
W-8	37	33.9	382,336	546,194		0	0	0	382,336	114,701	34,410	14,747	Grade	Plant	0.5	7.3	14.1	16.5	18.8	19.5	20.2	21.0	21.8	22.9	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6				546,194
W-9	37	33.9	382,336	546,194		0	0	0	0	382,336	114,701	34,410	14,747	Grade	Plant	0.5	7.3	14.1	16.5	18.8	19.5	20.2	21.0	21.8	22.9	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	156.4	156.4	156.4	546,560
W-10	37	33.9	382,336	546,194		0	0	0	0	382,336	114,701	34,410	14,747	Grade	Plant	0.5	7.3	14.1	16.5	18.8	19.5	20.2	21.0	21.8	22.9	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6				546,560
W-11	37	33.9	382,336	546,194		0	0	0	0	0	382,336	114,701	34,410	14,747	Grade	Plant	0.5	7.3	14.1	16.5	18.8	19.5	20.2	21.0	21.8	22.9	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6				546,537
W-12	37	33.9	382,336	546,194		0	0	0	0	0	382,336	114,701	34,410	14,747	Grade	Plant	0.5	7.3	14.1	16.5	18.8	19.5	20.2	21.0	21.8	22.9	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6				546,537
W-13	37	33.9	382,336	546,194		0	0	0	0	0	0	382,336	114,701	34,410	14,747	Grade	Plant	0.5	7.3	14.1	16.5	18.8	19.5	20.2	21.0	21.8	22.9	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6				546,515
W-14	37	33.9	382,336	546,194		0	0	0	0	0	0	382,336	114,701	34,410	14,747	Grade	Plant	0.5	7.3	14.1	16.5	18.8	19.5	20.2	21.0	21.8	22.9	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6				546,515
W-15	37	33.9	382,336	546,194		0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	0.5	7.3	14.1	16.5	18.8	19.5	20.2	21.0	21.8	22.9	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	156.4	156.4	156.4	546,447
W-16	37	33.9	382,336	546,194		0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	0.5	7.3	14.1	16.5	18.8	19.5	20.2	21.0	21.8	22.9	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6				546,447
W-17	37	33.9	382,336	546,194		0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	0.5	7.3	14.1	16.5	18.8	19.5	20.2	21.0	21.8	22.9	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6				546,424
W-18	37	33.9	382,336	546,194		0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	0.5	7.3	14.1	16.5	18.8	19.5	20.2	21.0	21.8	22.9	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6				546,424
W-19	37	33.9	382,336	546,194		0	0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	0.5	7.3	14.1	16.5	18.8	19.5	20.2	21.0	21.8	22.9	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6				546,402
W-20	37	33.9	382,336	546,194		0	0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	0.5	7.3	14.1	16.5	18.8	19.5	20.2	21.0	21.8	22.9	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6				546,402
W-21	37	33.9	382,336	546,194		0	0	0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	0.5	7.3	14.1	16.5	18.8	19.5	20.2	21.0	21.8	22.9	22.6	22.6	22.6	22.6	22.6	22.6	22.6	156.4	156.4	156.4	546,379
W-22	37	33.9	382,336	546,194		0	0	0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	0.5	7.3	14.1	16.5	18.8	19.5	20.2	21.0	21.8	22.9	22.6	22.6	22.6	22.6	22.6	22.6	22.6				546,379
W-23	37	33.9	382,336	546,194		0	0	0	0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	0.5	7.3	14.1	16.5	18.8	19.5	20.2	21.0	21.8	22.9	22.6	22.6	22.6	22.6	22.6	22.6				546,357
W-24	37	33.9	382,336	546,194		0	0	0	0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	0.5	7.3	14.1	16.5	18.8	19.5	20.2	21.0	21.8	22.9	22.6	22.6	22.6	22.6	22.6	22.6				546,357
W-25	37	33.9	382,336	546,194		0	0	0	0	0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	0.5	7.3	14.1	16.5	18.8	19.5	20.2	21.0	21.8	22.9	22.6	22.6	22.6	22.6	22.6				546,334
W-26	37	33.9	382,336	546,194		0	0	0	0	0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	0.5	7.3	14.1	16.5	18.8	19.5	20.2	21.0	21.8	22.9	22.6	22.6	22.6	22.6	22.6	104.2	104.2	104.2	546,334
W-27	37	33.9	382,336	546,194		0	0	0	0	0	0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	0.5	7.3	14.1	16.5	18.8	19.5	20.2	21.0	21.8	22.9	22.6	22.6	22.6	22.6				546,312
W-28	37	33.9	382,336	546,194		0	0	0	0	0	0	0	0	0	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	0.5	7.3	14.1	16.5	18.8	19.5	20.2	21.0	21.8	22.9	22.6	22.6	22.6	22.6				546,312
Total	2,072			76,467,160		3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,199,956	3,199,924	2,867,160	0	0	0	0	0	0	0	0	0	0	0	0	0	0	76,472,227
constructed ICU					0	0	0	0	0	0	0.0	21.6	30.1	51.2	83.5	119.4	158.4	198.8	242.9	271.4	289.1	315.8	351.1	398.2	441.4	484.4	533.5	574.0	605.3	625.3	646.1	659.2	670.9	678.1	683.6	697.8	699.6	702.0	704.3	706.7	803.3	806.5	882.1	
protected (SAV) ICU					2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	
Total (Constructed and protected) ICU					2.8	2.8	2.8	2.8	2.8	2.8	2.8	24.4	32.9	54.0	86.3	122.3	161.3	201.7	245.7	274.2	291.9	318.6	354.0	401.1	444.3	487.3	536.4	576.8	608.2	628.1	649.0	662.0	673.8	680.9	686.5	700.7	702.5	704.8	707.2	709.5	806.2	809.3	884.9	

Table B-36: ICU Calculation for James Island Alignment 5 Alternative (45% Uplands, 55% Wetlands, Dike Height +20 ft MLLW)

Cell No.	Cell Acreage	Placement Acreage	Volume	Capacity	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	60	Total Placed Quantity
Upland	932	853	38,522,915	55,032,736		2,463,745	2,242,869	2,176,606	2,148,208	2,148,208	2,148,208	2,148,208	2,148,208	2,358,566	2,316,494	2,251,283	2,213,945	2,181,076	2,148,208	2,148,208	2,148,208	2,674,104	2,937,052	3,068,526	3,134,263	3,167,131	3,200,000	1,461,416														55,032,736
U-1		106.6													Grade	Grade	Plant	Plant	3.2	2.8	2.4	2.0	1.6	3.2	4.8	6.4	8.0	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	17.1	
W-1	35.625	32.6	368,127	525,896		368,127	110,438	33,131	14,199	Grade	Plant	20.3	20.9	21.6	22.2	22.9	23.5	24.2	24.8	25.5	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	526,052
W-2	35.625	32.6	368,127	525,896		368,127	110,438	33,131	14,199	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7				525,990
W-3	35.625	32.6	368,127	525,896		0	368,127	110,438	33,131	14,199	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7				525,970
W-4	35.625	32.6	368,127	525,896		0	368,127	110,438	33,131	14,199	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	150.4	150.4	150.4	525,970
W-5	35.625	32.6	368,127	525,896		0	0	368,127	110,438	33,131	14,199	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7				525,951
W-6	35.625	32.6	368,127	525,896		0	0	368,127	110,438	33,131	14,199	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7				525,933
W-7	35.625	32.6	368,127	525,896		0	0	0	368,127	110,438	33,131	14,199	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7				525,896
W-8	35.625	32.6	368,127	525,896		0	0	0	368,127	110,438	33,131	14,199	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7				525,896
W-9	35.625	32.6	368,127	525,896		0	0	0	0	368,127	110,438	33,131	14,199	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7				526,248
W-10	35.625	32.6	368,127	525,896		0	0	0	0	368,127	110,438	33,131	14,199	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	150.4	150.4	150.4	526,248
W-11	35.625	32.6	368,127	525,896		0	0	0	0	0	368,127	110,438	33,131	14,199	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7				526,226
W-12	35.625	32.6	368,127	525,896		0	0	0	0	0	368,127	110,438	33,131	14,199	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7				526,226
W-13	35.625	32.6	368,127	525,896		0	0	0	0	0	0	368,127	110,438	33,131	14,199	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7				526,205
W-14	35.625	32.6	368,127	525,896		0	0	0	0	0	0	368,127	110,438	33,131	14,199	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7				526,205
W-15	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	368,127	110,438	33,131	14,199	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7				526,183
W-16	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	368,127	110,438	33,131	14,199	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	150.4	150.4	150.4	526,183
W-17	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7	21.7				526,118
W-18	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7	21.7				526,118
W-19	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7				526,096
W-20	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7				526,096
W-21	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7				526,075
W-22	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	150.4	150.4	150.4	526,075
W-23	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7				526,053
W-24	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7				526,053
W-25	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7				526,031
W-26	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7				526,031
W-27	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7				526,010
W-28	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7				526,010
W-29	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	150.4	150.4	150.4	525,990
W-30	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7				525,990
W-31	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0				525,970
W-32	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0				525,970
Total	2,072			71,861,416		3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	1,461,980	0	0	0	0	0	0	0	0	0	0	0	0	0	71,866,803
constructed ICU					0	0.0	0.0	0.0	0.0	0.0	0.0	20.8	28.9	50.3	80.3	114.9	152.4	190.5	234.9	275.5	304.6	328.0	352.8	388.0	426.2	467.6	519.4	563.8	606.0	649.4	684.9	703.9	718.5	728.5	743.5	751.9	755.7	757.9	837.2	842.0	914.5	
protected (SAV) ICU					2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	
Total (Constructed and protected) ICU					2.8	2.8	2.8	2.8	2.8	2.8	2.8	23.6	31.8	53.2	83.2	117.8	155.3	193.3	237.8	278.3	307.4	330.9	355.7	390.9	429.1	470.5	522.3	566.7	608.8	652.3	687.7	706.7	721.3	731.3	746.3	754.7	758.5	760.7	840.1	844.9	917.4	

Table B-37: ICU Calculation for Alternative James Island Alignment 5 Alternative (40% Uplands, 60% Wetlands, Dike Height +25 ft MLLW)

Cell No.	Cell Acreage	Placement Acreage	Volume	Capacity	0	1	2	3	4	5	6	7	8	9
Upland	828	758	34,224,221	**48,891,744**		2,485,859	2,271,616	2,207,344	2,179,798	2,179,798	2,179,798	2,179,798	2,179,798	2,179,798
U-1		108												
W-1	34.555	31.6	357,071	**510,101**		357,071	107,121	32,136	13,773	Grade	Plant	**19.7**	20.3	21.0
W-2	34.555	31.6	357,071	**510,101**		357,071	107,121	32,136	13,773	Grade	Plant	**0.5**	6.9	13.1
W-3	34.555	31.6	357,071	**510,101**		0	357,071	107,121	32,136	13,773	Grade	Plant	**0.5**	6.9
W-4	34.555	31.6	357,071	**510,101**		0	357,071	107,121	32,136	13,773	Grade	Plant	**0.5**	6.9
W-5	34.555	31.6	357,071	**510,101**		0	0	357,071	107,121	32,136	13,773	Grade	Plant	**0.5**
W-6	34.555	31.6	357,071	**510,101**		0	0	357,071	107,121	32,136	13,773	Grade	Plant	**0.5**
W-7	34.555	31.6	357,071	**510,101**		0	0	0	357,071	107,121	32,136	13,773	Grade	Plant
W-8	34.555	31.6	357,071	**510,101**		0	0	0	357,071	107,121	32,136	13,773	Grade	Plant
W-9	34.555	31.6	357,071	**510,101**		0	0	0	0	357,071	107,121	32,136	13,773	Grade
W-10	34.555	31.6	357,071	**510,101**		0	0	0	0	357,071	107,121	32,136	13,773	Grade
W-11	34.555	31.6	357,071	**510,101**		0	0	0	0	0	357,071	107,121	32,136	13,773
W-12	34.555	31.6	357,071	**510,101**		0	0	0	0	0	357,071	107,121	32,136	13,773
W-13	34.555	31.6	357,071	**510,101**		0	0	0	0	0	0	357,071	107,121	32,136
W-14	34.555	31.6	357,071	**510,101**		0	0	0	0	0	0	357,071	107,121	32,136
W-15	34.555	31.6	357,071	**510,101**		0	0	0	0	0	0	0	357,071	107,121
W-16	34.555	31.6	357,071	**510,101**		0	0	0	0	0	0	0	357,071	107,121
W-17	34.555	31.6	357,071	**510,101**		0	0	0	0	0	0	0	0	357,071
W-18	34.555	31.6	357,071	**510,101**		0	0	0	0	0	0	0	0	357,071
W-19	34.555	31.6	357,071	**510,101**		0	0	0	0	0	0	0	0	0
W-20	34.555	31.6	357,071	**510,101**		0	0	0	0	0	0	0	0	0
W-21	34.555	31.6	357,071	**510,101**		0	0	0	0	0	0	0	0	0
W-22	34.555	31.6	357,071	**510,101**		0	0	0	0	0	0	0	0	0
W-23	34.555	31.6	357,071	**510,101**		0	0	0	0	0	0	0	0	0
W-24	34.555	31.6	357,071	**510,101**		0	0	0	0	0	0	0	0	0
W-25	34.555	31.6	357,071	**510,101**		0	0	0	0	0	0	0	0	0
W-26	34.555	31.6	357,071	**510,101**		0	0	0	0	0	0	0	0	0
W-27	34.555	31.6	357,071	**510,101**		0	0	0	0	0	0	0	0	0
W-28	34.555	31.6	357,071	**510,101**		0	0	0	0	0	0	0	0	0
W-29	34.555	31.6	357,071	**510,101**										
W-30	34.555	31.6	357,071	**510,101**										
W-31	34.555	31.6	357,071	**510,101**										
W-32	34.555	31.6	357,071	**510,101**										
W-33	34.555	31.6	357,071	**510,101**										
W-34	34.555	31.6	357,071	**510,101**										
W-35	34.555	31.6	357,071	**510,101**										
W-36	34.555	31.6	357,071	**510,101**										
Total	**2,072**			**67,255,377**		3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000
constructed ICU					0	0	0	0	0	0	0	20	28.1	48.8
protected (SAV) ICU					2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
Total (Constructed and protected) ICU					2.8	2.8	2.8	2.8	2.8	2.8	2.8	23.0	31.0	51.7

Cell No.	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Upland	2,383,839	2,343,030	2,279,778	2,243,561	2,211,679	2,179,798	2,179,798	2,179,798	2,179,798	2,689,899	2,944,950	3,032,208			
U-1	Grade	Grade	Plant	Plant	**3.2**	2.8	2.4	2.0	**1.6**	3.2	8.1	9.7	11.3	**9.7**	9.7
W-1	21.6	**22.2**	22.8	23.5	24.1	24.7	**25.4**	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4
W-2	15.3	**17.5**	18.2	18.9	19.6	20.3	**21.3**	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0
W-3	13.1	15.3	**17.5**	18.2	18.9	19.6	20.3	**21.3**	21.0	21.0	21.0	21.0	21.0	21.0	21.0
W-4	13.1	15.3	**17.5**	18.2	18.9	19.6	20.3	**21.3**	21.0	21.0	21.0	21.0	21.0	21.0	21.0
W-5	6.9	13.1	15.3	**17.5**	18.2	18.9	19.6	20.3	**21.3**	21.0	21.0	21.0	21.0	21.0	21.0
W-6	6.9	13.1	15.3	**17.5**	18.2	18.9	19.6	20.3	**21.3**	21.0	21.0	21.0	21.0	21.0	21.0
W-7	**0.5**	6.9	13.1	15.3	**17.5**	18.2	18.9	19.6	20.3	**21.3**	21.0	21.0	21.0	21.0	21.0
W-8	**0.5**	6.9	13.1	15.3	**17.5**	18.2	18.9	19.6	20.3	**21.3**	21.0	21.0	21.0	21.0	21.0
W-9	Plant	**0.5**	6.9	13.1	15.3	**17.5**	18.2	18.9	19.6	20.3	**21.3**	21.0	21.0	21.0	21.0
W-10	Plant	**0.5**	6.9	13.1	15.3	**17.5**	18.2	18.9	19.6	20.3	**21.3**	21.0	21.0	21.0	21.0
W-11	Grade	Plant	**0.5**	6.9	13.1	15.3	**17.5**	18.2	18.9	19.6	20.3	**21.3**	21.0	21.0	21.0
W-12	Grade	Plant	**0.5**	6.9	13.1	15.3	**17.5**	18.2	18.9	19.6	20.3	**21.3**	21.0	21.0	21.0
W-13	13,773	Grade	Plant	**0.5**	6.9	13.1	15.3	**17.5**	18.2	18.9	19.6	20.3	**21.3**	21.0	21.0
W-14	13,773	Grade	Plant	**0.5**	6.9	13.1	15.3	**17.5**	18.2	18.9	19.6	20.3	**21.3**	21.0	21.0
W-15	32,136	13,773	Grade	Plant	**0.5**	6.9	13.1	15.3	**17.5**	18.2	18.9	19.6	20.3	**21.3**	21.0
W-16	32,136	13,773	Grade	Plant	**0.5**	6.9	13.1	15.3	**17.5**	18.2	18.9	19.6	20.3	**21.3**	21.0
W-17	107,121	32,136	13,773	Grade	Plant	**0.5**	6.9	13.1	15.3	**17.5**	18.2	18.9	19.6	20.3	**21.3**
W-18	107,121	32,136	13,773	Grade	Plant	**0.5**	6.9	13.1	15.3	**17.5**	18.2	18.9	19.6	20.3	**21.3**
W-19	255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	**0.5**	6.9	13.1	15.3	**17.5**	18.2	18.9
W-20	255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	**0.5**	6.9	13.1	15.3	**17.5**	18.2	18.9
W-21	0	255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	**0.5**	6.9	13.1	15.3	**17.5**	18.2
W-22	0	255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	**0.5**	6.9	13.1	15.3	**17.5**	18.2
W-23	0	0	255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	**0.5**	6.9	13.1	15.3	**17.5**
W-24	0	0	255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	**0.5**	6.9	13.1	15.3	**17.5**
W-25	0	0	0	255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	**0.5**	6.9	13.1	15.3
W-26	0	0	0	255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	**0.5**	6.9	13.1	15.3
W-27	0	0	0	0	255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	**0.5**	6.9	13.1
W-28	0	0	0	0	255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	**0.5**	6.9	13.1
W-29						255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	**0.5**	6.9
W-30						255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	**0.5**	6.9
W-31							255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	**0.5**
W-32							255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	**0.5**
W-33								255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant
W-34								255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant
W-35									255,050	127,525	63,763	31,881	15,941	15,941	Grade
W-36									255,050	127,525	63,763	31,881	15,941	15,941	Grade
Total	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,159,733	63,763	31,881	0
constructed ICU	77.8	111.3	147.6	185.4	227.7	267.8	308.8	336.9	353.3	386.6	423.7	460.7	500.8	537.6	586.5
protected (SAV) ICU	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
Total (Constructed and protected) ICU	80.7	114.1	150.4	188.2	230.6	270.7	311.7	339.8	356.1	389.4	426.6	463.5	503.6	540.4	589.4

Cell No.	25	26	27	28	29	30	31	32	33	34	35	36	37	60	Total Placed Quantity
Upland															**48,891,744**
U-1	9.7	9.7	9.7	**9.7**	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	17.3	
W-1	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4	**510,252**
W-2	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0				**510,191**
W-3	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0				**510,172**
W-4	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	**121.5**	**121.5**	**121.5**	**510,172**
W-5	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0				**510,154**
W-6	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0				**510,137**
W-7	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0				**510,101**
W-8	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0				**510,101**
W-9	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	**145.8**	**145.8**	**145.8**	**510,400**
W-10	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0				**510,400**
W-11	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0				**510,379**
W-12	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0				**510,379**
W-13	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0				**510,358**
W-14	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0				**510,358**
W-15	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	**145.8**	**145.8**	**145.8**	**510,337**
W-16	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0				**510,337**
W-17	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0				**510,316**
W-18	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0				**510,316**
W-19	19.6	20.3	**21.3**	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0				**510,253**
W-20	19.6	20.3	**21.3**	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0				**510,253**
W-21	18.9	19.6	20.3	**21.3**	21.0	21.0	21.0	21.0	21.0	21.0	21.0	**145.8**	**145.8**	**145.8**	**510,231**
W-22	18.9	19.6	20.3	**21.3**	21.0	21.0	21.0	21.0	21.0	21.0	21.0				**510,231**
W-23	18.2	18.9	19.6	20.3	**21.3**	21.0	21.0	21.0	21.0	21.0	21.0				**510,211**
W-24	18.2	18.9	19.6	20.3	**21.3**	21.0	21.0	21.0	21.0	21.0	21.0				**510,211**
W-25	**17.5**	18.2	18.9	19.6	20.3	**21.3**	21.0	21.0	21.0	21.0	21.0				**510,191**
W-26	**17.5**	18.2	18.9	19.6	20.3	**21.3**	21.0	21.0	21.0	21.0	21.0				**510,191**
W-27	15.3	**17.5**	18.2	18.9	19.6	20.3	**21.3**	21.0	21.0	21.0	21.0	**145.8**	**145.8**	**145.8**	**510,172**
W-28	15.3	**17.5**	18.2	18.9	19.6	20.3	**21.3**	21.0	21.0	21.0	21.0				**510,172**
W-29	13.1	15.3	**17.5**	18.2	18.9	19.6	20.3	**21.3**	21.0	21.0	21.0				**510,154**
W-30	13.1	15.3	**17.5**	18.2	18.9	19.6	20.3	**21.3**	21.0	21.0	21.0				**510,154**
W-31	6.9	13.1	15.3	**17.5**	18.2	18.9	19.6	20.3	**21.3**	21.0	21.0				**510,137**
W-32	6.9	13.1	15.3	**17.5**	18.2	18.9	19.6	20.3	**21.3**	21.0	21.0				**510,137**
W-33	**0.5**	6.9	13.1	15.3	**17.5**	18.2	18.9	19.6	20.3	**21.3**	21.0	**145.8**	**145.8**	**145.8**	**510,121**
W-34	**0.5**	6.9	13.1	15.3	**17.5**	18.2	18.9	19.6	20.3	**21.3**	21.0				**510,121**
W-35	Plant	**0.5**	6.9	13.1	15.3	**17.5**	18.2	18.9	19.6	20.3	**21.3**				**510,108**
W-36	Plant	**0.5**	6.9	13.1	15.3	**17.5**	18.2	18.9	19.6	20.3	**21.3**				**510,108**
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**67,259,758**
constructed ICU	627.5	670.5	714.7	751.9	770.1	783.9	793.2	801.3	812.0	818.0	822.7	940.6	943.9	996.9	
protected (SAV) ICU	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	
Total (Constructed and protected) ICU	630.3	673.3	717.5	754.7	772.9	786.8	796.1	804.1	814.8	820.9	825.6	943.4	946.7	999.8	

Table B-38: ICU Calculation for Alternative James Island Alignment 5 plus Barren Protection Alternative (50% Uplands, 50% Wetlands, Dike Height +20 ft MLLW)

Cell No.	Cell Acreage	Placement Acreage	Volume	Capacity	0	1	2	3	4	5	6	7	8	9
		James Island 5												
Upland	1036	948	42,821,610	**61,173,728**		2,435,328	2,205,927	2,137,106	2,107,612	2,107,612	2,107,612	2,107,612	2,326,090	2,282,394
U-1		105												
W-1	37	33.9	382,336	**546,194**		382,336	114,701	34,410	14,747	Grade	Plant	**21.1**	21.8	22.5
W-2	37	33.9	382,336	**546,194**		382,336	114,701	34,410	14,747	Grade	Plant	**0.5**	7.4	14.2
W-3	37	33.9	382,336	**546,194**		0	382,336	114,701	34,410	14,747	Grade	Plant	**0.5**	7.4
W-4	37	33.9	382,336	**546,194**		0	382,336	114,701	34,410	14,747	Grade	Plant	**0.5**	7.4
W-5	37	33.9	382,336	**546,194**		0	0	382,336	114,701	34,410	14,747	Grade	Plant	**0.5**
W-6	37	33.9	382,336	**546,194**		0	0	382,336	114,701	34,410	14,747	Grade	Plant	**0.5**
W-7	37	33.9	382,336	**546,194**		0	0	0	382,336	114,701	34,410	14,747	Grade	Plant
W-8	37	33.9	382,336	**546,194**		0	0	0	382,336	114,701	34,410	14,747	Grade	Plant
W-9	37	33.9	382,336	**546,194**		0	0	0	0	382,336	114,701	34,410	14,747	Grade
W-10	37	33.9	382,336	**546,194**		0	0	0	0	382,336	114,701	34,410	14,747	Grade
W-11	37	33.9	382,336	**546,194**		0	0	0	0	0	382,336	114,701	34,410	14,747
W-12	37	33.9	382,336	**546,194**		0	0	0	0	0	382,336	114,701	34,410	14,747
W-13	37	33.9	382,336	**546,194**		0	0	0	0	0	0	382,336	114,701	34,410
W-14	37	33.9	382,336	**546,194**		0	0	0	0	0	0	382,336	114,701	34,410
W-15	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	273,097	136,549
W-16	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	273,097	136,549
W-17	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	273,097
W-18	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	273,097
W-19	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	0
W-20	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	0
W-21	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	0
W-22	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	0
W-23	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	0
W-24	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	0
W-25	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	0
W-26	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	0
W-27	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	0
W-28	37	33.9	382,336	**546,194**		0	0	0	0	0	0	0	0	0
		Barren- Protection/Wetlands												
W-1	26.4	25.0								Grade	Plant	**0.4**	5.4	10.5
Total	**2,098**			**76,467,160**		3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000
constructed ICU					0	0	0	0	0	0	0	21.6	30.1	52.4
protected (SAV) ICU					338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5
Total (Constructed and protected) ICU					338.5	338.5	338.5	338.5	338.5	338.5	338.5	360.0	368.6	390.9

Cell No.	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Upland	2,214,666	2,175,886	2,141,749	2,107,612	2,107,612	2,653,806	2,926,903	3,063,452	3,131,726	3,165,863	3,200,000	3,200,000	3,199,956	3,199,924	2,867,160
U-1	Grade	Grade	Plant	Plant	**3.2**	2.8	2.4	2.0	**1.6**	3.2	4.7	6.3	7.9	**9.5**	9.5
W-1	23.1	**23.8**	24.5	25.2	25.9	26.6	**27.2**	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2
W-2	16.5	**18.8**	19.5	20.2	21.0	21.8	**22.9**	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6
W-3	14.2	16.5	**18.8**	19.5	20.2	21.0	21.8	**22.9**	22.6	22.6	22.6	22.6	22.6	22.6	22.6
W-4	14.2	16.5	**18.8**	19.5	20.2	21.0	21.8	**22.9**	22.6	22.6	22.6	22.6	22.6	22.6	22.6
W-5	7.4	14.2	16.5	**18.8**	19.5	20.2	21.0	21.8	**22.9**	22.6	22.6	22.6	22.6	22.6	22.6
W-6	7.4	14.2	16.5	**18.8**	19.5	20.2	21.0	21.8	**22.9**	22.6	22.6	22.6	22.6	22.6	22.6
W-7	**0.5**	7.4	14.2	16.5	**18.8**	19.5	20.2	21.0	21.8	**22.9**	22.6	22.6	22.6	22.6	22.6
W-8	**0.5**	7.4	14.2	16.5	**18.8**	19.5	20.2	21.0	21.8	**22.9**	22.6	22.6	22.6	22.6	22.6
W-9	Plant	**0.5**	7.4	14.2	16.5	**18.8**	19.5	20.2	21.0	21.8	**22.9**	22.6	22.6	22.6	22.6
W-10	Plant	**0.5**	7.4	14.2	16.5	**18.8**	19.5	20.2	21.0	21.8	**22.9**	22.6	22.6	22.6	22.6
W-11	Grade	Plant	**0.5**	7.4	14.2	16.5	**18.8**	19.5	20.2	21.0	21.8	**22.9**	22.6	22.6	22.6
W-12	Grade	Plant	**0.5**	7.4	14.2	16.5	**18.8**	19.5	20.2	21.0	21.8	**22.9**	22.6	22.6	22.6
W-13	14,747	Grade	Plant	**0.5**	7.4	14.2	16.5	**18.8**	19.5	20.2	21.0	21.8	**22.9**	22.6	22.6
W-14	14,747	Grade	Plant	**0.5**	7.4	14.2	16.5	**18.8**	19.5	20.2	21.0	21.8	**22.9**	22.6	22.6
W-15	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.4	14.2	16.5	**18.8**	19.5	20.2	21.0	21.8
W-16	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.4	14.2	16.5	**18.8**	19.5	20.2	21.0	21.8
W-17	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.4	14.2	16.5	**18.8**	19.5	20.2	21.0
W-18	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.4	14.2	16.5	**18.8**	19.5	20.2	21.0
W-19	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.4	14.2	16.5	**18.8**	19.5	20.2
W-20	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.4	14.2	16.5	**18.8**	19.5	20.2
W-21	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.4	14.2	16.5	**18.8**	19.5
W-22	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.4	14.2	16.5	**18.8**	19.5
W-23	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.4	14.2	16.5	**18.8**
W-24	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.4	14.2	16.5	**18.8**
W-25	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.4	14.2	16.5
W-26	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.4	14.2	16.5
W-27	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.4	14.2
W-28	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.4	14.2
W-1	12.2	**13.9**	14.4	15.0	15.5	16.1	**16.6**	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6
Total	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,199,956	3,199,924	2,867,160
constructed ICU	83.8	119.8	158.8	199.2	243.3	271.7	289.1	315.9	351.5	398.6	441.8	484.8	533.9	574.4	605.6
protected (SAV) ICU	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5
Total (Constructed and protected) ICU	422.3	458.3	497.3	537.7	581.8	610.1	627.5	654.3	690.0	737.1	780.3	823.3	872.4	912.8	944.0

Cell No.	25	26	27	28	29	30	31	32	33	34	35	36	37	60	Total Placed Quantity
Upland															**61,173,608**
U-1	9.5	9.5	9.5	**9.5**	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	16.8	
W-1	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	**546,382**
W-2	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6				**546,291**
W-3	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6				**546,271**
W-4	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	**130.3**	130.3	130.3	**546,271**
W-5	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6				**546,251**
W-6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6				**546,233**
W-7	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6				**546,194**
W-8	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6				**546,194**
W-9	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	**156.4**	156.4	156.4	**546,560**
W-10	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6				**546,560**
W-11	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6				**546,538**
W-12	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6				**546,538**
W-13	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6				**546,515**
W-14	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6				**546,515**
W-15	**22.9**	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	**156.4**	156.4	156.4	**546,447**
W-16	**22.9**	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6				**546,447**
W-17	21.8	**22.9**	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6				**546,425**
W-18	21.8	**22.9**	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6				**546,425**
W-19	21.0	21.8	**22.9**	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6				**546,402**
W-20	21.0	21.8	**22.9**	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6				**546,402**
W-21	20.2	21.0	21.8	**22.9**	22.6	22.6	22.6	22.6	22.6	22.6	22.6	**156.4**	156.4	156.4	**546,379**
W-22	20.2	21.0	21.8	**22.9**	22.6	22.6	22.6	22.6	22.6	22.6	22.6				**546,379**
W-23	19.5	20.2	21.0	21.8	**22.9**	22.6	22.6	22.6	22.6	22.6	22.6				**546,357**
W-24	19.5	20.2	21.0	21.8	**22.9**	22.6	22.6	22.6	22.6	22.6	22.6				**546,357**
W-25	**18.8**	19.5	20.2	21.0	21.8	**22.9**	22.6	22.6	22.6	22.6	22.6				**546,334**
W-26	**18.8**	19.5	20.2	21.0	21.8	**22.9**	22.6	22.6	22.6	22.6	22.6	**104.2**	104.2	104.2	**546,334**
W-27	16.5	**18.8**	19.5	20.2	21.0	21.8	**22.9**	22.6	22.6	22.6	22.6				**546,312**
W-28	16.5	**18.8**	19.5	20.2	21.0	21.8	**22.9**	22.6	22.6	22.6	22.6				**546,312**
W-1	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**76,472,232**
constructed ICU	625.3	646.1	659.2	670.9	678.1	683.6	697.8	699.6	702.0	704.3	706.7	803.3	806.5	882.1	
protected (SAV) ICU	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	
Total (Constructed and protected) ICU	963.7	984.6	997.6	1009.4	1016.5	1022.1	1036.3	1038.1	1040.4	1042.8	1045.2	1141.8	1144.9	1220.5	

Table B-39: ICU Calculation for Alternative James Island Alignment 5 plus Barren Protection Alternative (45% Uplands, 55% Wetlands, Dike Height +20 ft MLLW)

Cell No.	Cell Acreage	Placement Acreage	Volume	Capacity	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	60	Total Placed Quantity
James Island 5																																										
Upland	932	853	38,522,915	55,032,736		2,463,745	2,242,869	2,176,606	2,148,208	2,148,208	2,148,208	2,148,208	2,148,208	2,358,566	2,316,494	2,251,283	2,213,945	2,181,076	2,148,208	2,148,208	2,148,208	2,674,104	2,937,052	3,068,526	3,134,263	3,167,131	3,200,000	1,461,416														55,032,736
U-1		106.6													Grade	Grade	Plant	Plant	3.2	2.8	2.4	2.0	1.6	3.2	4.8	6.4	8.0	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	17.1	
W-1	35.625	32.6	368,127	525,896		368,127	110,438	33,131	14,199	Grade	Plant	20.3	20.9	21.6	22.2	22.9	23.5	24.2	24.8	25.5	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	526,052
W-2	35.625	32.6	368,127	525,896		368,127	110,438	33,131	14,199	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	150.4	150.4	150.4	525,990
W-3	35.625	32.6	368,127	525,896		0	368,127	110,438	33,131	14,199	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7				525,970
W-4	35.625	32.6	368,127	525,896		0	368,127	110,438	33,131	14,199	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7				525,970
W-5	35.625	32.6	368,127	525,896		0	0	368,127	110,438	33,131	14,199	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7				525,951
W-6	35.625	32.6	368,127	525,896		0	0	368,127	110,438	33,131	14,199	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7				525,933
W-7	35.625	32.6	368,127	525,896		0	0	0	368,127	110,438	33,131	14,199	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7				525,896
W-8	35.625	32.6	368,127	525,896		0	0	0	368,127	110,438	33,131	14,199	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	150.4	150.4	150.4	525,896
W-9	35.625	32.6	368,127	525,896		0	0	0	0	368,127	110,438	33,131	14,199	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7				526,248
W-10	35.625	32.6	368,127	525,896		0	0	0	0	368,127	110,438	33,131	14,199	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7				526,248
W-11	35.625	32.6	368,127	525,896		0	0	0	0	0	368,127	110,438	33,131	14,199	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7				526,226
W-12	35.625	32.6	368,127	525,896		0	0	0	0	0	368,127	110,438	33,131	14,199	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7				526,226
W-13	35.625	32.6	368,127	525,896		0	0	0	0	0	0	368,127	110,438	33,131	14,199	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7				526,205
W-14	35.625	32.6	368,127	525,896		0	0	0	0	0	0	368,127	110,438	33,131	14,199	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	150.4	150.4	150.4	526,205
W-15	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	368,127	110,438	33,131	14,199	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7				526,183
W-16	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	368,127	110,438	33,131	14,199	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7				526,183
W-17	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7	21.7				526,118
W-18	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7	21.7				526,118
W-19	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7				526,096
W-20	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7	21.7	150.4	150.4	150.4	526,096
W-21	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7				526,075
W-22	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7	21.7				526,075
W-23	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7				526,053
W-24	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	21.7				526,053
W-25	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7				526,031
W-26	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7	21.7	150.4	150.4	150.4	526,031
W-27	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7				526,010
W-28	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7	21.7				526,010
W-29	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7				525,990
W-30	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0	21.7				525,990
W-31	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0				525,970
W-32	35.625	32.6	368,127	525,896		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	0.5	7.1	13.6	15.8	18.1	18.8	19.5	20.2	21.0	22.0				525,970
Barren Protection/Wetlands																																										
W-1	26.4	25.0								Grade	Plant	0.4	5.4	10.5	12.2	13.9	14.4	15.0	15.5	16.1	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	
Total	2,098			71,861,416		3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,011	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	1,461,980	0	0	0	0	0	0	0	0	0	0	0	0	0	71,866,803
constructed ICU					0	0.0	0.0	0.0	0.0	0.0	0.0	20.8	28.9	50.3	80.3	114.9	152.4	190.5	234.9	275.5	304.6	328.0	352.8	388.0	426.2	467.6	519.4	563.8	606.0	649.4	684.9	703.9	718.5	728.5	743.5	751.9	755.7	757.9	837.2	842.0	914.5	
protected (SAV) ICU					338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	
Total (Constructed and protected) ICU					338.5	338.5	338.5	338.5	338.5	338.5	338.5	359.2	367.4	388.8	418.8	453.4	490.9	529.0	573.4	614.0	643.0	666.5	691.3	726.5	764.7	806.1	857.9	902.3	944.4	987.9	1023.3	1042.3	1056.9	1066.9	1081.9	1090.3	1094.1	1096.3	1175.7	1180.5	1253.0	

Table B-40: ICU Calculation for Alternative James Island Alignment 5 plus Barren Protection Alternative (40% Uplands, 60% Wetlands, Dike Height +25 ft MLLW)

Cell No.	Cell Acreage	Placement Acreage	Volume	Capacity	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	60	Total Placed Quantity
James Island 5																																											
Upland	828	758	34,224,221	48,891,744		2,485,859	2,271,616	2,207,344	2,179,798	2,179,798	2,179,798	2,179,798	2,179,798	2,179,798	2,383,839	2,343,030	2,279,778	2,243,561	2,211,679	2,179,798	2,179,798	2,179,798	2,179,798	2,689,899	2,944,950	3,032,208																	48,891,744
U-1		108													Grade	Grade	Plant	Plant	3.2	2.8	2.4	2.0	1.6	3.2	8.1	9.7	11.3	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	17.3	
W-1	34.555	31.6	357,071	510,101		357,071	107,121	32,136	13,773	Grade	Plant	19.7	20.3	21.0	21.6	22.2	22.8	23.5	24.1	24.7	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4	510,252
W-2	34.555	31.6	357,071	510,101		357,071	107,121	32,136	13,773	Grade	Plant	0.5	6.9	13.1	15.3	17.5	18.2	18.9	19.6	20.3	21.3	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	121.5	121.5	510,191
W-3	34.555	31.6	357,071	510,101		0	357,071	107,121	32,136	13,773	Grade	Plant	0.5	6.9	13.1	15.3	17.5	18.2	18.9	19.6	20.3	21.3	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0			510,172
W-4	34.555	31.6	357,071	510,101		0	357,071	107,121	32,136	13,773	Grade	Plant	0.5	6.9	13.1	15.3	17.5	18.2	18.9	19.6	20.3	21.3	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0			510,172
W-5	34.555	31.6	357,071	510,101		0	0	357,071	107,121	32,136	13,773	Grade	Plant	0.5	6.9	13.1	15.3	17.5	18.2	18.9	19.6	20.3	21.3	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0			510,154
W-6	34.555	31.6	357,071	510,101		0	0	357,071	107,121	32,136	13,773	Grade	Plant	0.5	6.9	13.1	15.3	17.5	18.2	18.9	19.6	20.3	21.3	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0			510,137
W-7	34.555	31.6	357,071	510,101		0	0	0	357,071	107,121	32,136	13,773	Grade	Plant	0.5	6.9	13.1	15.3	17.5	18.2	18.9	19.6	20.3	21.3	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	145.8	145.8	510,101
W-8	34.555	31.6	357,071	510,101		0	0	0	357,071	107,121	32,136	13,773	Grade	Plant	0.5	6.9	13.1	15.3	17.5	18.2	18.9	19.6	20.3	21.3	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0			510,101
W-9	34.555	31.6	357,071	510,101		0	0	0	0	357,071	107,121	32,136	13,773	Grade	Plant	0.5	6.9	13.1	15.3	17.5	18.2	18.9	19.6	20.3	21.3	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0			510,400
W-10	34.555	31.6	357,071	510,101		0	0	0	0	357,071	107,121	32,136	13,773	Grade	Plant	0.5	6.9	13.1	15.3	17.5	18.2	18.9	19.6	20.3	21.3	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0			510,400
W-11	34.555	31.6	357,071	510,101		0	0	0	0	0	357,071	107,121	32,136	13,773	Grade	Plant	0.5	6.9	13.1	15.3	17.5	18.2	18.9	19.6	20.3	21.3	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0			510,379
W-12	34.555	31.6	357,071	510,101		0	0	0	0	0	357,071	107,121	32,136	13,773	Grade	Plant	0.5	6.9	13.1	15.3	17.5	18.2	18.9	19.6	20.3	21.3	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0			510,379
W-13	34.555	31.6	357,071	510,101		0	0	0	0	0	0	357,071	107,121	32,136	13,773	Grade	Plant	0.5	6.9	13.1	15.3	17.5	18.2	18.9	19.6	20.3	21.3	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	145.8	145.8	510,358
W-14	34.555	31.6	357,071	510,101		0	0	0	0	0	0	357,071	107,121	32,136	13,773	Grade	Plant	0.5	6.9	13.1	15.3	17.5	18.2	18.9	19.6	20.3	21.3	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0			510,358
W-15	34.555	31.6	357,071	510,101		0	0	0	0	0	0	0	357,071	107,121	32,136	13,773	Grade	Plant	0.5	6.9	13.1	15.3	17.5	18.2	18.9	19.6	20.3	21.3	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0			510,337
W-16	34.555	31.6	357,071	510,101		0	0	0	0	0	0	0	357,071	107,121	32,136	13,773	Grade	Plant	0.5	6.9	13.1	15.3	17.5	18.2	18.9	19.6	20.3	21.3	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0			510,337
W-17	34.555	31.6	357,071	510,101		0	0	0	0	0	0	0	0	357,071	107,121	32,136	13,773	Grade	Plant	0.5	6.9	13.1	15.3	17.5	18.2	18.9	19.6	20.3	21.3	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0			510,316
W-18	34.555	31.6	357,071	510,101		0	0	0	0	0	0	0	0	357,071	107,121	32,136	13,773	Grade	Plant	0.5	6.9	13.1	15.3	17.5	18.2	18.9	19.6	20.3	21.3	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0			510,316
W-19	34.555	31.6	357,071	510,101		0	0	0	0	0	0	0	0	0	255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	0.5	6.9	13.1	15.3	17.5	18.2	18.9	19.6	20.3	21.3	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	145.8	145.8	510,253
W-20	34.555	31.6	357,071	510,101		0	0	0	0	0	0	0	0	0	255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	0.5	6.9	13.1	15.3	17.5	18.2	18.9	19.6	20.3	21.3	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0			510,253
W-21	34.555	31.6	357,071	510,101		0	0	0	0	0	0	0	0	0	0	255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	0.5	6.9	13.1	15.3	17.5	18.2	18.9	19.6	20.3	21.3	21.0	21.0	21.0	21.0	21.0	21.0	21.0			510,231
W-22	34.555	31.6	357,071	510,101		0	0	0	0	0	0	0	0	0	0	255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	0.5	6.9	13.1	15.3	17.5	18.2	18.9	19.6	20.3	21.3	21.0	21.0	21.0	21.0	21.0	21.0	21.0			510,231
W-23	34.555	31.6	357,071	510,101		0	0	0	0	0	0	0	0	0	0	0	255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	0.5	6.9	13.1	15.3	17.5	18.2	18.9	19.6	20.3	21.3	21.0	21.0	21.0	21.0	21.0	21.0			510,211
W-24	34.555	31.6	357,071	510,101		0	0	0	0	0	0	0	0	0	0	0	255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	0.5	6.9	13.1	15.3	17.5	18.2	18.9	19.6	20.3	21.3	21.0	21.0	21.0	21.0	21.0	21.0			510,211
W-25	34.555	31.6	357,071	510,101		0	0	0	0	0	0	0	0	0	0	0	0	255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	0.5	6.9	13.1	15.3	17.5	18.2	18.9	19.6	20.3	21.3	21.0	21.0	21.0	21.0	21.0	145.8	145.8	510,191
W-26	34.555	31.6	357,071	510,101		0	0	0	0	0	0	0	0	0	0	0	0	255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	0.5	6.9	13.1	15.3	17.5	18.2	18.9	19.6	20.3	21.3	21.0	21.0	21.0	21.0	21.0			510,191
W-27	34.555	31.6	357,071	510,101		0	0	0	0	0	0	0	0	0	0	0	0	0	255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	0.5	6.9	13.1	15.3	17.5	18.2	18.9	19.6	20.3	21.3	21.0	21.0	21.0	21.0			510,172
W-28	34.555	31.6	357,071	510,101		0	0	0	0	0	0	0	0	0	0	0	0	0	255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	0.5	6.9	13.1	15.3	17.5	18.2	18.9	19.6	20.3	21.3	21.0	21.0	21.0	21.0			510,172
W-29	34.555	31.6	357,071	510,101																255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	0.5	6.9	13.1	15.3	17.5	18.2	18.9	19.6	20.3	21.3	21.0	21.0	21.0			510,154
W-30	34.555	31.6	357,071	510,101																255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	0.5	6.9	13.1	15.3	17.5	18.2	18.9	19.6	20.3	21.3	21.0	21.0	21.0			510,154
W-31	34.555	31.6	357,071	510,101																	255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	0.5	6.9	13.1	15.3	17.5	18.2	18.9	19.6	20.3	21.3	21.0	21.0	145.8	145.8	510,137
W-32	34.555	31.6	357,071	510,101																	255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	0.5	6.9	13.1	15.3	17.5	18.2	18.9	19.6	20.3	21.3	21.0	21.0			510,137
W-33	34.555	31.6	357,071	510,101																		255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	0.5	6.9	13.1	15.3	17.5	18.2	18.9	19.6	20.3	21.3	21.0			510,121
W-34	34.555	31.6	357,071	510,101																		255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	0.5	6.9	13.1	15.3	17.5	18.2	18.9	19.6	20.3	21.3	21.0			510,121
W-35	34.555	31.6	357,071	510,101																			255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	0.5	6.9	13.1	15.3	17.5	18.2	18.9	19.6	20.3	21.3			510,108
W-36	34.555	31.6	357,071	510,101																			255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	0.5	6.9	13.1	15.3	17.5	18.2	18.9	19.6	20.3	21.3			510,108
Barren Protection/Wetlands																																											
W-1	26.4	25.0								Grade	Plant	0.4	5.4	10.5	12.2	13.9	14.4	15.0	15.5	16.1	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	
Total	2,098			67,255,377		3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,159,733	63,763	31,881	0	0	0	0	0	0	0	0	0	0	0	0	0	0	67,259,758
constructed ICU					0	0	0	0	0	0	0	20	28.1	48.8	77.8	111.3	147.6	185.4	227.7	267.8	308.8	336.9	353.3	386.6	423.7	460.7	500.8	537.6	586.5	627.5	670.5	714.7	751.9	770.1	783.9	793.2	801.3	812.0	818.0	822.7	940.6	996.9	
protected (SAV) ICU					338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	338.5	
Total (Constructed and protected) ICU					338.5	338.5	338.5	338.5	338.5	338.5	338.5	358.6	366.6	387.3	416.3	449.7	486.1	523.9	566.2	606.3	647.3	675.4	691.7	725.0	762.2	799.2	839.2	876.0	925.0	965.9	1009.0	1053.1	1090.3	1108.5	1122.4	1131.7	1139.7	1150.4	1156.5	1161.2	1279.1	1335.4	

ATTACHMENT C

COST EFFECTIVE ANALYSIS FOR MID-CHESAPEAKE BAY ISLAND RESTORATION PROJECT ALTERNATIVES

COST EFFECTIVE ANALYSIS FOR PROJECT ALTERNATIVES

The following tables present the results of the cost effective analysis for the no-action alternative for Barren Island, the no-action alternative for James Island, the no-action alternative for Barren and James Islands combined, and for each of the 14 proposed project alternatives.

Assumptions used to conduct this analysis were: construction would start in 2010, the project base year was 2010, the interest rate was 5.625 percent, and the period of analysis was 40 years (2010 through 2050). See text in Appendix B, Section B.8 for additional details.

Key: ICU = Island Community Unit SAV= submerged aquatic vegetation

Table	Alignment	Upland (%)	Wetland (%)	Dike Height (ft)
Table C-1	No-Action – Barren Island	NA		
Table C-2	No-Action – James Island	NA		
Table C-3	No-Action – Barren and James Islands Combined	NA		
Table C-4	Barren Alignment A	50	50	20
Table C-5	Barren Alignment A	45	55	25
Table C-6	James Alignment 5 / Barren Alignment D	50	50	20
Table C-7	James Alignment 5 / Barren Alignment D	45	55	20
Table C-8	James Alignment 5 / Barren Alignment D	40	60	25
Table C-9	James Alignment 3	50	50	20
Table C-10	James Alignment 3	45	55	25
Table C-11	James Alignment 3	40	60	30
Table C-12	James Alignment 5	50	50	20
Table C-13	James Alignment 5	45	55	20
Table C-14	James Alignment 5	40	60	25
Table C-15	James Alignment 5 / Barren Protection (E)	50	50	20
Table C-16	James Alignment 5 / Barren Protection (E)	45	55	20
Table C-17	James Alignment 5 / Barren Protection (E)	40	60	25

Table C-1. Cost Effective Incremental Analysis for the Barren Island No-Action Alternative

Project Year	Year	Remaining Acreage	Remaining Island ICUs	SAV ICUs	Total ICUs
0	2010	172.7	88.6	205.2	293.8
1	2011	168.6	86.5	200.3	286.8
2	2012	164.5	84.4	195.5	279.9
3	2013	160.4	82.3	190.6	272.9
4	2014	156.3	80.2	185.7	265.9
5	2015	152.2	78.1	180.8	258.9
6	2016	148.1	76.0	176.0	252.0
7	2017	144.0	73.9	171.1	245.0
8	2018	139.9	71.8	166.2	238.0
9	2019	135.8	69.7	161.4	231.0
10	2020	131.7	67.6	156.5	224.1
11	2021	127.6	65.5	151.6	217.1
12	2022	123.5	63.4	146.7	210.1
13	2023	119.4	61.3	141.9	203.1
14	2024	115.3	59.2	137.0	196.2
15	2025	111.2	57.0	132.1	189.2
16	2026	107.1	54.9	127.3	182.2
17	2027	103.0	52.8	122.4	175.2
18	2028	98.9	50.7	117.5	168.3
19	2029	94.8	48.6	112.6	161.3
20	2030	90.7	46.5	107.8	154.3
21	2031	86.6	44.4	102.9	147.3
22	2032	82.5	42.3	98.0	140.4
23	2033	78.4	40.2	93.2	133.4
24	2034	74.3	38.1	88.3	126.4
25	2035	70.2	36.0	83.4	119.4
26	2036	66.1	33.9	78.5	112.5
27	2037	62.0	31.8	73.7	105.5
28	2038	57.9	29.7	68.8	98.5
29	2039	53.8	27.6	63.9	91.5
30	2040	49.7	25.5	59.1	84.6
31	2041	45.6	23.4	54.2	77.6
32	2042	41.5	21.3	49.3	70.6
33	2043	37.4	19.2	44.4	63.6
34	2044	33.3	17.1	39.6	56.7
35	2045	29.2	15.0	34.7	49.7
36	2046	25.1	12.9	29.8	42.7
37	2047	21.0	10.8	25.0	35.7
38	2048	16.9	8.7	20.1	28.8
39	2049	12.8	6.6	15.2	21.8
40	2050	8.7	4.5	10.3	14.8
41	2051	4.6	2.4	5.5	7.8

Table C-1. (continued)

Project Year	Year	Remaining Acreage	Remaining Island ICUs	SAV ICUs	Total ICUs
42	2052	0.5	0.3	0.6	0.9
43	2053	0	0	0	0
44	2054	0	0	0	0
45	2055	0	0	0	0
46	2056	0	0	0	0
47	2057	0	0	0	0
48	2058	0	0	0	0
49	2059	0	0	0	0
			1,910.4	**4,424.6**	**6,335.0**
		Annual ICUs	**126.7**		

Assumptions/Constants: 2004 Acreage=197.3 ac; Annual Erosion Rate=4.1 ac;
Base Year=2010; Period of Analysis=50 years

Table C-2: Cost Effective Incremental Analysis for the James Island No-Action Alternative

Project Year	Year	Remaining Acreage	Remaining Island ICUs	SAV ICUs	Total ICUs
0	2010	49.9	14.6	1.8	16.4
1	2011	45	13.2	1.6	14.8
2	2012	40.1	11.7	1.4	13.2
3	2013	35.2	10.3	1.3	11.6
4	2014	30.3	8.9	1.1	10.0
5	2015	25.4	7.4	0.9	8.3
6	2016	20.5	6.0	0.7	6.7
7	2017	15.6	4.6	0.6	5.1
8	2018	10.7	3.1	0.4	3.5
9	2019	5.8	1.7	0.2	1.9
10	2020	0.9	0.3	0.0	0.3
11	2021	0	0.0	0.0	0.0
12	2022	0	0.0	0.0	0.0
13	2023	0	0.0	0.0	0.0
14	2024	0	0.0	0.0	0.0
15	2025	0	0.0	0.0	0.0
16	2026	0	0.0	0.0	0.0
17	2027	0	0.0	0.0	0.0
18	2028	0	0.0	0.0	0.0
19	2029	0	0.0	0.0	0.0
20	2030	0	0.0	0.0	0.0
21	2031	0	0.0	0.0	0.0
22	2032	0	0.0	0.0	0.0
23	2033	0	0.0	0.0	0.0
24	2034	0	0.0	0.0	0.0
25	2035	0	0.0	0.0	0.0
26	2036	0	0.0	0.0	0.0
27	2037	0	0.0	0.0	0.0
28	2038	0	0.0	0.0	0.0
29	2039	0	0.0	0.0	0.0
30	2040	0	0.0	0.0	0.0
31	2041	0	0.0	0.0	0.0
32	2042	0	0.0	0.0	0.0
33	2043	0	0.0	0.0	0.0
34	2044	0	0.0	0.0	0.0
35	2045	0	0.0	0.0	0.0
36	2046	0	0.0	0.0	0.0
37	2047	0	0.0	0.0	0.0
38	2048	0	0.0	0.0	0.0
39	2049	0	0.0	0.0	0.0
40	2050	0	0.0	0.0	0.0
41	2051	0	0.0	0.0	0.0
42	2052	0	0.0	0.0	0.0

Table C-2. (continued)

Project Year	Year	Remaining Acreage	Remaining Island ICUs	SAV ICUs	Total ICUs
43	2053	0	0.0	0.0	0.0
44	2054	0	0.0	0.0	0.0
45	2055	0	0.0	0.0	0.0
46	2056	0	0.0	0.0	0.0
47	2057	0	0.0	0.0	0.0
48	2058	0	0.0	0.0	0.0
49	2059	0	0.0	0.0	0.0
			81.7	**10.1**	**91.8**
		Annual ICUs	**1.8**		

Assumptions/Constants: 2004 Acreage=79.3 ac; Annual Erosion Rate=4.9 ac;
Base Year=2010; Period of Analysis=50 years

Table C-3. Cost Effective Incremental Analysis for the James and Barren Islands Combined No-Action Alternative

Project Year	Year	Remaining Acreage	Remaining Island ICUs	SAV ICUs	Total ICUs
0	2010	222.6	103.2	207.0	310.2
1	2011	213.6	99.7	202.0	301.6
2	2012	204.6	96.1	196.9	293.0
3	2013	195.6	92.6	191.9	284.4
4	2014	186.6	89.1	186.8	275.9
5	2015	177.6	85.5	181.8	267.3
6	2016	168.6	82.0	176.7	258.7
7	2017	159.6	78.4	171.7	250.1
8	2018	150.6	74.9	166.6	241.5
9	2019	141.6	71.4	161.6	232.9
10	2020	132.6	67.8	156.5	224.3
11	2021	127.6	65.5	151.6	217.1
12	2022	123.5	63.4	146.7	210.1
13	2023	119.4	61.3	141.9	203.1
14	2024	115.3	59.2	137.0	196.2
15	2025	111.2	57.0	132.1	189.2
16	2026	107.1	54.9	127.3	182.2
17	2027	103.0	52.8	122.4	175.2
18	2028	98.9	50.7	117.5	168.3
19	2029	94.8	48.6	112.6	161.3
20	2030	90.7	46.5	107.8	154.3
21	2031	86.6	44.4	102.9	147.3
22	2032	82.5	42.3	98.0	140.4
23	2033	78.4	40.2	93.2	133.4
24	2034	74.3	38.1	88.3	126.4
25	2035	70.2	36.0	83.4	119.4
26	2036	66.1	33.9	78.5	112.5
27	2037	62.0	31.8	73.7	105.5
28	2038	57.9	29.7	68.8	98.5
29	2039	53.8	27.6	63.9	91.5
30	2040	49.7	25.5	59.1	84.6
31	2041	45.6	23.4	54.2	77.6
32	2042	41.5	21.3	49.3	70.6
33	2043	37.4	19.2	44.4	63.6
34	2044	33.3	17.1	39.6	56.7
35	2045	29.2	15.0	34.7	49.7
36	2046	25.1	12.9	29.8	42.7
37	2047	21.0	10.8	25.0	35.7
38	2048	16.9	8.7	20.1	28.8
39	2049	12.8	6.6	15.2	21.8
40	2050	8.7	4.5	10.3	14.8
41	2051	4.6	2.4	5.5	7.8

Table C-3. (continued)

Project Year	Year	Remaining Acreage	Remaining Island ICUs	SAV ICUs	Total ICUs
42	2052	0.5	0.3	0.6	0.9
43	2053	0	0	0	0
44	2054	0	0	0	0
45	2055	0	0	0	0
46	2056	0	0	0	0
47	2057	0	0	0	0
48	2058	0	0	0	0
49	2059	0	0	0	0
			1,992.2	**4,434.7**	**6,426.8**
		Annual ICUs	**128.5**		

Assumptions/Constants: 2004 Acreage=276.6 ac; Base Year=2010; Period of Analysis=50 years

Table C-4. Cost Effective Incremental Analysis for Barren Alignment A (50% Upland, 50% Wetland, Dike Height +20 ft MLLW)

Project Year	Year	Existing ICUs Gained	Existing SAV ICUs	Constructed ICUs	Total ICUs	Project Cost ($000s)	Present Value Cost ($000s)
0	2010	88.6	234.4	0	323.0	$15,300	$15,300
1	2011	88.6	234.4	0	323.0	$53,549	$50,818
2	2012	88.6	234.4	0	323.0	$30,600	$27,557
3	2013	88.6	234.4	0	323.0	$81,299	$69,482
4	2014	88.6	234.4	0	323.0	$55,289	$44,843
5	2015	88.6	234.4	0	323.0	$19,016	$14,636
6	2016	88.6	234.4	0	323.0	$19,016	$13,890
7	2017	88.6	234.4	0	323.0	$19,016	$13,181
8	2018	88.6	234.4	0	323.0	$19,016	$12,509
9	2019	88.6	234.4	21.9	345.0	$19,016	$11,871
10	2020	88.6	234.4	32.9	355.9	$19,016	$11,265
11	2021	88.6	234.4	58.2	381.2	$19,016	$10,691
12	2022	88.6	234.4	90.7	413.7	$19,016	$10,145
13	2023	88.6	234.4	126.9	450.0	$19,016	$9,628
14	2024	88.6	234.4	156.3	479.4	$19,016	$9,137
15	2025	88.6	234.4	173.6	496.6	$19,016	$8,671
16	2026	88.6	234.4	198.2	521.2	$19,016	$8,228
17	2027	88.6	234.4	231.0	554.1	$19,016	$7,809
18	2028	88.6	234.4	269.7	592.8	$17,170	$6,691
19	2029	88.6	234.4	311.2	634.2	$14,216	$5,257
20	2030	88.6	234.4	352.9	676.0	$14,216	$4,989
21	2031	88.6	234.4	384.2	707.3	$14,216	$4,735
22	2032	88.6	234.4	398.5	721.6	$14,216	$4,493
23	2033	88.6	234.4	412.4	735.5	$14,216	$4,264
24	2034	88.6	234.4	420.2	743.3	$14,216	$4,046
25	2035	88.6	234.4	433.4	756.5	$14,216	$3,840
26	2036	88.6	234.4	440.3	763.3	$14,216	$3,644
27	2037	88.6	234.4	445.5	768.6	$14,216	$3,458
28	2038	88.6	234.4	451.0	774.1	$14,216	$3,282
29	2039	88.6	234.4	490.3	813.4	$7,396	$1,620
30	2040	88.6	234.4	498.1	821.1	$7,396	$1,538
31	2041	88.6	234.4	502.7	825.7	$7,396	$1,459
32	2042	88.6	234.4	507.3	830.4	$7,395	$1,385
33	2043	88.6	234.4	510.4	833.5	$7,395	$1,314
34	2044	88.6	234.4	513.5	836.5	$7,395	$1,247
35	2045	88.6	234.4	513.5	836.5	$0	$0
36	2046	88.6	234.4	513.5	836.5	$0	$0
37	2047	88.6	234.4	513.5	836.5	$0	$0
38	2048	88.6	234.4	513.5	836.5	$0	$0
39	2049	88.6	234.4	513.5	836.5	$0	$0
40	2050	88.6	234.4	520.7	843.8	$0	$0
41	2051	88.6	234.4	520.7	843.8	$0	$0

Table C-4. (continued)

Project Year	Year	Existing ICUs Gained	Existing SAV ICUs	Constructed ICUs	Total ICUs	Project Cost ($000s)	Present Value Cost ($000s)
42	2052	88.6	234.4	520.7	843.8	$0	$0
43	2053	88.6	234.4	520.7	843.8	$0	$0
44	2054	88.6	234.4	520.7	843.8	$0	$0
45	2055	88.6	234.4	535.1	858.2	$0	$0
46	2056	88.6	234.4	535.1	858.2	$0	$0
47	2057	88.6	234.4	542.3	865.4	$0	$0
48	2058	88.6	234.4	542.3	865.4	$0	$0
49	2059	88.6	234.4	556.8	879.8	$0	$0
					32,466.7	**$686,946**	**$406,923**
					1,882		**$23,594**

Table C-5. Cost Effective Incremental Analysis for Barren Alignment A (45% Upland, 55% Wetland, Dike Height +25 ft MLLW)

Project Year	Year	Existing ICUs Gained	Existing SAV ICUs	Constructed ICUs	Total ICUs	Project Cost ($000s)	Present Value Cost ($000s)
0	2010	88.6	234.4	0	323.0	$15,439	$15,439
1	2011	88.6	234.4	0	323.0	$54,035	$51,279
2	2012	88.6	234.4	0	323.0	$30,877	$27,807
3	2013	88.6	234.4	0	323.0	$81,993	$70,075
4	2014	88.6	234.4	0	323.0	$55,750	$45,216
5	2015	88.6	234.4	0	323.0	$19,145	$14,736
6	2016	88.6	234.4	0	323.0	$19,145	$13,984
7	2017	88.6	234.4	0	323.0	$19,145	$13,271
8	2018	88.6	234.4	0	323.0	$19,145	$12,594
9	2019	88.6	234.4	21.8	344.8	$19,145	$11,951
10	2020	88.6	234.4	32.7	355.7	$19,145	$11,342
11	2021	88.6	234.4	57.7	380.7	$19,145	$10,763
12	2022	88.6	234.4	89.9	412.9	$19,145	$10,214
13	2023	88.6	234.4	126.3	449.3	$19,145	$9,693
14	2024	88.6	234.4	164.7	487.7	$19,145	$9,199
15	2025	88.6	234.4	186.3	509.3	$19,145	$8,730
16	2026	88.6	234.4	203.9	526.9	$19,145	$8,284
17	2027	88.6	234.4	233.5	556.5	$19,145	$7,862
18	2028	88.6	234.4	270.5	593.5	$19,145	$7,461
19	2029	88.6	234.4	309.3	632.3	$17,614	$6,514
20	2030	88.6	234.4	352.7	675.7	$14,345	$5,034
21	2031	88.6	234.4	402.8	725.8	$14,345	$4,778
22	2032	88.6	234.4	427.0	750.0	$14,345	$4,534
23	2033	88.6	234.4	441.2	764.2	$14,345	$4,303
24	2034	88.6	234.4	452.8	775.8	$14,345	$4,083
25	2035	88.6	234.4	461.8	784.8	$14,345	$3,875
26	2036	88.6	234.4	471.7	794.7	$14,345	$3,677
27	2037	88.6	234.4	486.7	809.7	$14,345	$3,490
28	2038	88.6	234.4	492.4	815.4	$14,345	$3,312
29	2039	88.6	234.4	496.5	819.5	$7,462	$1,635
30	2040	88.6	234.4	499.0	822.0	$7,462	$1,551
31	2041	88.6	234.4	498.2	821.2	$7,462	$1,472
32	2042	88.6	234.4	501.5	824.5	$7,462	$1,397
33	2043	88.6	234.4	504.8	827.8	$7,462	$1,326
34	2044	88.6	234.4	549.7	872.7	$7,462	$1,258
35	2045	88.6	234.4	553.0	876.0	$0	$0
36	2046	88.6	234.4	556.5	879.5	$0	$0
37	2047	88.6	234.4	556.5	879.5	$0	$0
38	2048	88.6	234.4	556.5	879.5	$0	$0
39	2049	88.6	234.4	556.5	879.5	$0	$0
40	2050	88.6	234.4	564.3	887.3	$0	$0
41	2051	88.6	234.4	564.3	887.3	$0	$0

Table C-5. (continued)

Project Year	Year	Existing ICUs Gained	Existing SAV ICUs	Constructed ICUs	Total ICUs	Project Cost ($000s)	Present Value Cost ($000s)
42	2052	88.6	234.4	564.3	887.3	$0	$0
43	2053	88.6	234.4	564.3	887.3	$0	$0
44	2054	88.6	234.4	564.3	887.3	$0	$0
45	2055	88.6	234.4	579.8	902.8	$0	$0
46	2056	88.6	234.4	579.8	902.8	$0	$0
47	2057	88.6	234.4	579.8	902.8	$0	$0
48	2058	88.6	234.4	579.8	902.8	$0	$0
49	2059	88.6	234.4	579.8	902.8	$0	$0
					33,384.8	**$697,615**	**$412,138**
					1,936		**$23,896**

Table C-6. Cost Effective Incremental Analysis for James Alignment 5 plus Barren Alignment D (50% Upland, 50% Wetland, Dike Height +20 ft MLLW)

Project Year	Year	Existing ICUs Gained	Existing SAV ICUs	Constructed ICUs	Total ICUs	Project Cost ($000s)	Present Value Cost ($000s)
0	2010	103.2	2.8	0.0	106.0	$31,319	$31,319
1	2011	103.2	2.8	0.0	106.0	$109,616	$104,025
2	2012	103.2	2.8	0.0	106.0	$62,638	$56,411
3	2013	103.2	2.8	0.0	106.0	$156,595	$133,833
4	2014	103.2	2.8	0.0	106.0	$103,353	$83,825
5	2015	103.2	2.8	0.0	106.0	$29,100	$22,398
6	2016	103.2	237.3	0.0	340.5	$29,100	$21,256
7	2017	103.2	237.3	0.0	340.5	$29,100	$20,171
8	2018	103.2	237.3	0.0	340.5	$29,100	$19,142
9	2019	103.2	237.3	21.6	362.1	$29,100	$18,166
10	2020	103.2	237.3	30.6	371.1	$29,100	$17,239
11	2021	103.2	237.3	53.6	394.1	$29,100	$16,360
12	2022	103.2	237.3	85.9	426.4	$29,100	$15,526
13	2023	103.2	237.3	122.3	462.8	$29,100	$14,734
14	2024	103.2	237.3	161.4	501.9	$29,100	$13,982
15	2025	103.2	237.3	221.1	561.6	$29,100	$13,269
16	2026	103.2	237.3	262.2	602.7	$29,100	$12,592
17	2027	103.2	237.3	298.1	638.6	$29,100	$11,950
18	2028	103.2	237.3	339.6	680.1	$29,100	$11,340
19	2029	103.2	237.3	381.4	721.9	$29,100	$10,762
20	2030	103.2	237.3	424.2	764.7	$29,100	$10,213
21	2031	103.2	237.3	471.9	812.4	$29,100	$9,692
22	2032	103.2	237.3	518.4	858.9	$29,100	$9,198
23	2033	103.2	237.3	571.7	912.2	$29,100	$8,728
24	2034	103.2	237.3	617.1	957.6	$29,100	$8,283
25	2035	103.2	237.3	663.8	1,004.3	$29,100	$7,861
26	2036	103.2	237.3	707.7	1,048.2	$29,100	$7,460
27	2037	103.2	237.3	755.3	1,095.8	$29,100	$7,079
28	2038	103.2	237.3	802.6	1,143.1	$29,100	$6,718
29	2039	103.2	237.3	848.0	1,188.5	$15,139	$3,317
30	2040	103.2	237.3	865.1	1,205.6	$15,139	$3,148
31	2041	103.2	237.3	877.5	1,218.0	$15,139	$2,987
32	2042	103.2	237.3	883.5	1,224.0	$15,138	$2,834
33	2043	103.2	237.3	887.2	1,227.7	$15,138	$2,690
34	2044	103.2	237.3	898.1	1,238.6	$15,138	$2,553
35	2045	103.2	237.3	913.7	1,254.2	$0	$0
36	2046	103.2	237.3	920.7	1,261.2	$0	$0
37	2047	103.2	237.3	1,040.5	1,381.0	$0	$0
38	2048	103.2	237.3	1,046.0	1,386.5	$0	$0
39	2049	103.2	237.3	1,045.2	1,385.7	$0	$0
40	2050	103.2	237.3	1,063.0	1,403.5	$0	$0
41	2051	103.2	237.3	1,072.4	1,412.9	$0	$0

Table C-6. (continued)

Project Year	Year	Existing ICUs Gained	Existing SAV ICUs	Constructed ICUs	Total ICUs	Project Cost ($000s)	Present Value Cost ($000s)
42	2052	103.2	237.3	1,074.8	1,415.3	$0	$0
43	2053	103.2	237.3	1,077.1	1,417.6	$0	$0
44	2054	103.2	237.3	1,079.5	1,420.0	$0	$0
45	2055	103.2	237.3	1,078.7	1,419.2	$0	$0
46	2056	103.2	237.3	1,096.6	1,437.1	$0	$0
47	2057	103.2	237.3	1,099.7	1,440.2	$0	$0
48	2058	103.2	237.3	1,117.4	1,457.9	$0	$0
49	2059	103.2	237.3	1,120.6	1,461.1	$0	$0
				28,615.8	**44,233.8**	**$1,252,759**	**$741,058**
				1,659		**Annual Cost**	**$42,967**

Table C-7. Cost Effective Incremental Analysis for James Alignment 5 plus Barren Alignment D (45% Upland, 55% Wetland, Dike Height +20 ft MLLW)

Project Year	Year	Existing ICUs Gained	Existing SAV ICUs	Constructed ICUs	Total ICUs	Project Cost ($000s)	Present Value Cost ($000s)
0	2010	103.2	2.8	0	106.0	$32,034	$32,034
1	2011	103.2	2.8	0	106.0	$112,120	$106,401
2	2012	103.2	2.8	0	106.0	$64,069	$57,699
3	2013	103.2	2.8	0	106.0	$160,172	$136,890
4	2014	103.2	2.8	0	106.0	$105,714	$85,739
5	2015	103.2	2.8	0	106.0	$29,765	$22,910
6	2016	103.2	237.3	0	340.5	$29,765	$21,741
7	2017	103.2	237.3	0	340.5	$29,765	$20,632
8	2018	103.2	237.3	0	340.5	$29,765	$19,580
9	2019	103.2	237.3	21.6	362.1	$29,765	$18,581
10	2020	103.2	237.3	30.3	370.8	$29,765	$17,633
11	2021	103.2	237.3	53.1	393.6	$29,765	$16,734
12	2022	103.2	237.3	85.3	425.8	$29,765	$15,880
13	2023	103.2	237.3	121.7	462.2	$29,765	$15,070
14	2024	103.2	237.3	160.9	501.4	$29,765	$14,301
15	2025	103.2	237.3	200.7	541.2	$29,765	$13,572
16	2026	103.2	237.3	258.8	599.3	$29,765	$12,880
17	2027	103.2	237.3	295.7	636.2	$29,765	$12,223
18	2028	103.2	237.3	337.9	678.4	$29,765	$11,599
19	2029	103.2	237.3	380.8	721.3	$29,765	$11,008
20	2030	103.2	237.3	424.2	764.7	$29,765	$10,446
21	2031	103.2	237.3	476.5	817.0	$29,765	$9,913
22	2032	103.2	237.3	520.9	861.4	$29,765	$9,408
23	2033	103.2	237.3	566.0	906.5	$29,765	$8,928
24	2034	103.2	237.3	610.2	950.7	$29,765	$8,472
25	2035	103.2	237.3	655.5	996.0	$29,765	$8,040
26	2036	103.2	237.3	708.5	1,049.0	$29,765	$7,630
27	2037	103.2	237.3	755.3	1,095.8	$29,765	$7,241
28	2038	103.2	237.3	801.3	1,141.8	$29,765	$6,872
29	2039	103.2	237.3	848.2	1,188.7	$15,485	$3,393
30	2040	103.2	237.3	894.7	1,235.2	$15,485	$3,220
31	2041	103.2	237.3	927.5	1,268.0	$15,485	$3,055
32	2042	103.2	237.3	953.2	1,293.7	$15,484	$2,899
33	2043	103.2	237.3	967.6	1,308.1	$15,484	$2,751
34	2044	103.2	237.3	982.5	1,323.0	$15,484	$2,611
35	2045	103.2	237.3	992.0	1,332.5	$0	$0
36	2046	103.2	237.3	996.7	1,337.2	$0	$0
37	2047	103.2	237.3	1003.8	1,344.3	$0	$0
38	2048	103.2	237.3	1019.3	1,359.8	$0	$0
39	2049	103.2	237.3	1148.2	1,488.7	$0	$0
40	2050	103.2	237.3	1160.8	1,501.3	$0	$0
41	2051	103.2	237.3	1166.0	1,506.5	$0	$0

Table C-7. (continued)

Project Year	Year	Existing ICUs Gained	Existing SAV ICUs	Constructed ICUs	Total ICUs	Project Cost ($000s)	Present Value Cost ($000s)
42	2052	103.2	237.3	1168.1	1,508.6	$0	$0
43	2053	103.2	237.3	1171.2	1,511.7	$0	$0
44	2054	103.2	237.3	1174.4	1,514.9	$0	$0
45	2055	103.2	237.3	1192.2	1,532.7	$0	$0
46	2056	103.2	237.3	1195.4	1,535.9	$0	$0
47	2057	103.2	237.3	1198.5	1,539.0	$0	$0
48	2058	103.2	237.3	1198.5	1,539.0	$0	$0
49	2059	103.2	237.3	1198.5	1,539.0	$0	$0
		5,160.0		**30,022.3**	**45,640.6**	**$1,281,376**	**$757,986**
					2,646		**$43,949**

Table C-8. Cost Effective Incremental Analysis for James Alignment 5 plus Barren Alignment D (40% Upland, 60% Wetland, Dike Height +25 ft MLLW)

Project Year	Year	Existing ICUs Gained	Existing SAV ICUs	Constructed ICUs	Total ICUs	Project Cost ($000s)	Present Value Cost ($000s)
0	2010	103.2	1.8	0	105.0	$31,992	$31,992
1	2011	103.2	1.8	0	105.0	$111,971	$106,260
2	2012	103.2	1.8	0	105.0	$63,984	$57,623
3	2013	103.2	1.8	0	105.0	$159,959	$136,709
4	2014	103.2	1.8	0	105.0	$105,573	$85,626
5	2015	103.2	1.8	0	105.0	$29,726	$22,879
6	2016	103.2	237.3	0	340.5	$29,726	$21,712
7	2017	103.2	237.3	0	340.5	$29,726	$20,605
8	2018	103.2	237.3	0	340.5	$29,726	$19,554
9	2019	103.2	237.3	20.8	361.3	$29,726	$18,556
10	2020	103.2	237.3	29.1	369.6	$29,726	$17,610
11	2021	103.2	237.3	51.1	391.6	$29,726	$16,712
12	2022	103.2	237.3	81.9	422.4	$29,726	$15,859
13	2023	103.2	237.3	116.7	457.2	$29,726	$15,050
14	2024	103.2	237.3	154.3	494.8	$29,726	$14,282
15	2025	103.2	237.3	213.9	554.4	$29,726	$13,554
16	2026	103.2	237.3	254.0	594.5	$29,726	$12,863
17	2027	103.2	237.3	288.0	628.5	$29,726	$12,206
18	2028	103.2	237.3	334.7	675.2	$29,726	$11,584
19	2029	103.2	237.3	373.3	713.8	$29,726	$10,993
20	2030	103.2	237.3	421.4	761.9	$29,726	$10,432
21	2031	103.2	237.3	469.7	810.2	$29,726	$9,900
22	2032	103.2	237.3	519.2	859.7	$29,726	$9,395
23	2033	103.2	237.3	560.3	900.8	$29,726	$8,916
24	2034	103.2	237.3	609.8	950.3	$29,726	$8,461
25	2035	103.2	237.3	651.0	991.5	$29,726	$8,030
26	2036	103.2	237.3	703.1	1,043.6	$29,726	$7,620
27	2037	103.2	237.3	753.1	1,093.6	$29,726	$7,231
28	2038	103.2	237.3	804.4	1,144.9	$29,726	$6,862
29	2039	103.2	237.3	847.2	1,187.7	$15,465	$3,388
30	2040	103.2	237.3	893.9	1,234.4	$15,465	$3,215
31	2041	103.2	237.3	937.3	1,277.8	$15,465	$3,051
32	2042	103.2	237.3	990.1	1,330.6	$15,463	$2,895
33	2043	103.2	237.3	1022.1	1,362.6	$15,463	$2,748
34	2044	103.2	237.3	1045.2	1,385.7	$15,463	$2,608
35	2045	103.2	237.3	1059.0	1,399.5	$0	$0
36	2046	103.2	237.3	1068.7	1,409.2	$0	$0
37	2047	103.2	237.3	1121.5	1,462.0	$0	$0
38	2048	103.2	237.3	1128.4	1,468.9	$0	$0
39	2049	103.2	237.3	1136.7	1,477.2	$0	$0
40	2050	103.2	237.3	1150.9	1,491.4	$0	$0
41	2051	103.2	237.3	1252.8	1,593.3	$0	$0

Table C-8. (continued)

Project Year	Year	Existing ICUs Gained	Existing SAV ICUs	Constructed ICUs	Total ICUs	Project Cost ($000s)	Present Value Cost ($000s)
43	2053	103.2	237.3	1260.7	1,601.2	$0	$0
44	2054	103.2	237.3	1262.3	1,602.8	$0	$0
45	2055	103.2	237.3	1278.9	1,619.4	$0	$0
46	2056	103.2	237.3	1280.5	1,621.0	$0	$0
47	2057	103.2	237.3	1280.5	1,621.0	$0	$0
48	2058	103.2	237.3	1280.5	1,621.0	$0	$0
49	2059	103.2	237.3	1284.9	1,625.4	$0	$0
				31,248.8	**46,860.8**	**$1,279,677**	**$756,981**
					2,717		**$43,890**

Table C-9. Cost Effective Incremental Analysis for James Alignment 3 (50% Upland, 50% Wetland, Dike Height +20 ft MLLW)

Project Year	Year	Existing ICUs Gained	Existing SAV ICUs	Constructed ICUs	Total ICUs	Project Cost ($000s)	Present Value Cost ($000s)
0	2010	14.6	2.8	0.0	17.4	$18,102	$18,102
1	2011	14.6	2.8	0.0	17.4	$63,356	$60,125
2	2012	14.6	2.8	0.0	17.4	$36,204	$32,604
3	2013	14.6	2.8	0.0	17.4	$90,509	$77,353
4	2014	14.6	2.8	0.0	17.4	$59,736	$48,449
5	2015	14.6	2.8	0.0	17.4	$16,819	$12,946
6	2016	14.6	2.8	0.0	17.4	$16,819	$12,285
7	2017	14.6	2.8	0.0	17.4	$16,819	$11,659
8	2018	14.6	2.8	0.0	17.4	$16,819	$11,064
9	2019	14.6	2.8	21.1	38.5	$16,819	$10,500
10	2020	14.6	2.8	29.4	46.8	$16,819	$9,964
11	2021	14.6	2.8	51.1	68.5	$16,819	$9,456
12	2022	14.6	2.8	81.7	99.1	$16,819	$8,973
13	2023	14.6	2.8	116.7	134.1	$16,819	$8,516
14	2024	14.6	2.8	154.4	171.8	$16,819	$8,081
15	2025	14.6	2.8	186.4	203.8	$16,819	$7,669
16	2026	14.6	2.8	210.2	227.6	$16,819	$7,278
17	2027	14.6	2.8	230.3	247.7	$16,819	$6,907
18	2028	14.6	2.8	261.0	278.4	$16,819	$6,554
19	2029	14.6	2.8	297.7	315.1	$16,819	$6,220
20	2030	14.6	2.8	337.3	354.7	$16,819	$5,903
21	2031	14.6	2.8	386.4	403.8	$16,819	$5,602
22	2032	14.6	2.8	427.6	445.0	$16,819	$5,316
23	2033	14.6	2.8	455.4	472.8	$16,819	$5,045
24	2034	14.6	2.8	476.9	494.3	$16,819	$4,788
25	2035	14.6	2.8	488.5	505.9	$16,819	$4,543
26	2036	14.6	2.8	498.7	516.1	$16,819	$4,312
27	2037	14.6	2.8	513.5	530.9	$16,819	$4,092
28	2038	14.6	2.8	519.8	537.2	$16,819	$3,883
29	2039	14.6	2.8	528.4	545.8	$8,750	$1,917
30	2040	14.6	2.8	535.4	552.8	$8,750	$1,819
31	2041	14.6	2.8	537.7	555.1	$8,750	$1,726
32	2042	14.6	2.8	543.9	561.3	$8,750	$1,638
33	2043	14.6	2.8	550.1	567.5	$8,750	$1,555
34	2044	14.6	2.8	553.2	570.6	$8,750	$1,475
35	2045	14.6	2.8	621.1	638.5	$0	$0
36	2046	14.6	2.8	624.2	641.6	$0	$0
37	2047	14.6	2.8	624.2	641.6	$0	$0
38	2048	14.6	2.8	624.2	641.6	$0	$0
39	2049	14.6	2.8	624.2	641.6	$0	$0
40	2050	14.6	2.8	631.4	648.8	$0	$0
41	2051	14.6	2.8	631.4	648.8	$0	$0

Table C-9. (continued)

Project Year	Year	Existing ICUs Gained	Existing SAV ICUs	Constructed ICUs	Total ICUs	Project Cost ($000s)	Present Value Cost ($000s)
43	2053	14.6	2.8	631.4	648.8	$0	$0
44	2054	14.6	2.8	631.4	648.8	$0	$0
45	2055	14.6	2.8	645.8	663.2	$0	$0
46	2056	14.6	2.8	645.8	663.2	$0	$0
47	2057	14.6	2.8	645.8	663.2	$0	$0
48	2058	14.6	2.8	660.2	677.6	$0	$0
49	2059	14.6	2.8	660.2	677.6	$0	$0
				18,525.5	**19,395.5**	**$724,074**	**$428,319**
					1,125		**$24,834**

Table C-10. Cost Effective Incremental Analysis for James Alignment 3 (45% Upland, 55% Wetland, Dike Height +25 ft MLLW)

Project Year	Year	Existing ICUs Gained	Existing SAV ICUs	Constructed ICUs	Total ICUs	Project Cost ($000s)	Present Value Cost ($000s)
0	2010	14.6	2.8	0.0	17.4	$18,198	$18,198
1	2011	14.6	2.8	0.0	17.4	$63,691	$60,443
2	2012	14.6	2.8	0.0	17.4	$36,395	$32,777
3	2013	14.6	2.8	0.0	17.4	$90,988	$77,763
4	2014	14.6	2.8	0.0	17.4	$60,052	$48,705
5	2015	14.6	2.8	0.0	17.4	$16,908	$13,014
6	2016	14.6	2.8	0.0	17.4	$16,908	$12,350
7	2017	14.6	2.8	0.0	17.4	$16,908	$11,720
8	2018	14.6	2.8	0.0	17.4	$16,908	$11,123
9	2019	14.6	2.8	21.2	38.6	$16,908	$10,555
10	2020	14.6	2.8	29.5	46.9	$16,908	$10,017
11	2021	14.6	2.8	51.4	68.8	$16,908	$9,506
12	2022	14.6	2.8	82.2	99.6	$16,908	$9,021
13	2023	14.6	2.8	117.4	134.8	$16,908	$8,561
14	2024	14.6	2.8	155.8	173.2	$16,908	$8,124
15	2025	14.6	2.8	194.7	212.1	$16,908	$7,710
16	2026	14.6	2.8	225.1	242.5	$16,908	$7,316
17	2027	14.6	2.8	240.9	258.3	$16,908	$6,943
18	2028	14.6	2.8	267.2	284.6	$16,908	$6,589
19	2029	14.6	2.8	302.6	320.0	$16,908	$6,253
20	2030	14.6	2.8	341.0	358.4	$16,908	$5,934
21	2031	14.6	2.8	390.8	408.2	$16,908	$5,631
22	2032	14.6	2.8	433.3	450.7	$16,908	$5,344
23	2033	14.6	2.8	474.8	492.2	$16,908	$5,072
24	2034	14.6	2.8	502.8	520.2	$16,908	$4,813
25	2035	14.6	2.8	519.0	536.4	$16,908	$4,567
26	2036	14.6	2.8	538.0	555.4	$16,908	$4,334
27	2037	14.6	2.8	548.8	566.2	$16,908	$4,113
28	2038	14.6	2.8	558.1	575.5	$16,908	$3,903
29	2039	14.6	2.8	572.2	589.6	$8,797	$1,927
30	2040	14.6	2.8	577.4	594.8	$8,797	$1,829
31	2041	14.6	2.8	579.9	597.3	$8,797	$1,736
32	2042	14.6	2.8	580.7	598.1	$8,796	$1,647
33	2043	14.6	2.8	581.5	598.9	$8,796	$1,563
34	2044	14.6	2.8	586.4	603.8	$8,796	$1,483
35	2045	14.6	2.8	591.3	608.7	$0	$0
36	2046	14.6	2.8	666.0	683.4	$0	$0
37	2047	14.6	2.8	669.3	686.7	$0	$0
38	2048	14.6	2.8	672.5	689.9	$0	$0
39	2049	14.6	2.8	672.5	689.9	$0	$0
40	2050	14.6	2.8	680.1	697.5	$0	$0
41	2051	14.6	2.8	680.1	697.5	$0	$0

Table C-10. (continued)

Project Year	Year	Existing ICUs Gained	Existing SAV ICUs	Constructed ICUs	Total ICUs	Project Cost ($000s)	Present Value Cost ($000s)
43	2053	14.6	2.8	680.1	697.5	$0	$0
44	2054	14.6	2.8	680.1	697.5	$0	$0
45	2055	14.6	2.8	695.4	712.8	$0	$0
46	2056	14.6	2.8	695.4	712.8	$0	$0
47	2057	14.6	2.8	695.4	712.8	$0	$0
48	2058	14.6	2.8	695.4	712.8	$0	$0
49	2059	14.6	2.8	695.4	712.8	$0	$0
				19,622.0	**20,492.0**	**$727,904**	**$430,585**
					1,188		**$24,966**

Table C-11. Cost Effective Incremental Analysis for James Alignment 3 (40% Upland, 60% Wetland, Dike Height +30 ft MLLW)

Project Year	Year	Existing ICUs Gained	Existing SAV ICUs	Constructed ICUs	Total ICUs	Project Cost ($000s)	Present Value Cost ($000s)
0	2010	14.6	2.8	0.0	17.4	$18,174	$18,174
1	2011	14.6	2.8	0.0	17.4	$63,610	$60,366
2	2012	14.6	2.8	0.0	17.4	$36,349	$32,735
3	2013	14.6	2.8	0.0	17.4	$90,872	$77,664
4	2014	14.6	2.8	0.0	17.4	$59,976	$48,643
5	2015	14.6	2.8	0.0	17.4	$16,887	$12,998
6	2016	14.6	2.8	0.0	17.4	$16,887	$12,335
7	2017	14.6	2.8	0.0	17.4	$16,887	$11,705
8	2018	14.6	2.8	0.0	17.4	$16,887	$11,108
9	2019	14.6	2.8	21.4	38.8	$16,887	$10,542
10	2020	14.6	2.8	29.8	47.2	$16,887	$10,004
11	2021	14.6	2.8	51.8	69.2	$16,887	$9,494
12	2022	14.6	2.8	82.9	100.3	$16,887	$9,009
13	2023	14.6	2.8	118.5	135.9	$16,887	$8,550
14	2024	14.6	2.8	156.2	173.6	$16,887	$8,114
15	2025	14.6	2.8	181.9	199.3	$16,887	$7,700
16	2026	14.6	2.8	234.0	251.4	$16,887	$7,307
17	2027	14.6	2.8	256.3	273.7	$16,887	$6,934
18	2028	14.6	2.8	278.4	295.8	$16,887	$6,581
19	2029	14.6	2.8	309.6	327.0	$16,887	$6,245
20	2030	14.6	2.8	346.9	364.3	$16,887	$5,927
21	2031	14.6	2.8	394.7	412.1	$16,887	$5,624
22	2032	14.6	2.8	437.4	454.8	$16,887	$5,337
23	2033	14.6	2.8	480.2	497.6	$16,887	$5,065
24	2034	14.6	2.8	522.0	539.4	$16,887	$4,807
25	2035	14.6	2.8	550.9	568.3	$16,887	$4,562
26	2036	14.6	2.8	573.0	590.4	$16,887	$4,329
27	2037	14.6	2.8	588.1	605.5	$16,887	$4,108
28	2038	14.6	2.8	598.7	616.1	$16,887	$3,899
29	2039	14.6	2.8	607.6	625.0	$8,785	$1,925
30	2040	14.6	2.8	620.7	638.1	$8,785	$1,827
31	2041	14.6	2.8	624.6	642.0	$8,785	$1,733
32	2042	14.6	2.8	627.0	644.4	$8,785	$1,645
33	2043	14.6	2.8	627.7	645.1	$8,785	$1,561
34	2044	14.6	2.8	628.4	645.8	$8,785	$1,481
35	2045	14.6	2.8	632.7	650.1	$0	$0
36	2046	14.6	2.8	635.6	653.0	$0	$0
37	2047	14.6	2.8	638.5	655.9	$0	$0
38	2048	14.6	2.8	670.0	687.4	$0	$0
39	2049	14.6	2.8	672.8	690.2	$0	$0
40	2050	14.6	2.8	679.6	697.0	$0	$0

Table C-11. (continued)

Project Year	Year	Existing ICUs Gained	Existing SAV ICUs	Constructed ICUs	Total ICUs	Project Cost ($000s)	Present Value Cost ($000s)
42	2052	14.6	2.8	679.6	697.0	$0	$0
43	2053	14.6	2.8	679.6	697.0	$0	$0
44	2054	14.6	2.8	679.6	697.0	$0	$0
45	2055	14.6	2.8	693.0	710.4	$0	$0
46	2056	14.6	2.8	693.0	710.4	$0	$0
47	2057	14.6	2.8	693.0	710.4	$0	$0
48	2058	14.6	2.8	693.0	710.4	$0	$0
49	2059	14.6	2.8	693.0	710.4	$0	$0
				20,061.1	**20,931.1**	**$726,977**	**$430,037**
					1,214		**$24,934**

Table C-12. Cost Effective Incremental Analysis for James Alignment 5 (50% Upland, 50% Wetland, Dike Height +20 ft MLLW)

Project Year	Year	Existing ICUs Gained	Existing SAV ICUs	Constructed ICUs	Total ICUs	Project Cost ($000s)	Present Value Cost ($000s)
0	2010	14.6	2.8	0.0	17.4	$23,546	$23,546
1	2011	14.6	2.8	0.0	17.4	$82,411	$78,207
2	2012	14.6	2.8	0.0	17.4	$47,092	$42,410
3	2013	14.6	2.8	0.0	17.4	$117,730	$100,618
4	2014	14.6	2.8	0.0	17.4	$77,702	$63,021
5	2015	14.6	2.8	0.0	17.4	$21,878	$16,839
6	2016	14.6	2.8	0.0	17.4	$21,878	$15,980
7	2017	14.6	2.8	0.0	17.4	$21,878	$15,165
8	2018	14.6	2.8	0.0	17.4	$21,878	$14,392
9	2019	14.6	2.8	21.2	38.6	$21,878	$13,657
10	2020	14.6	2.8	22.3	39.7	$21,878	$12,961
11	2021	14.6	2.8	29.8	47.2	$21,878	$12,300
12	2022	14.6	2.8	52.9	70.3	$21,878	$11,672
13	2023	14.6	2.8	84.1	101.5	$21,878	$11,077
14	2024	14.6	2.8	120.1	137.5	$21,878	$10,512
15	2025	14.6	2.8	159.2	176.6	$21,878	$9,976
16	2026	14.6	2.8	199.6	217.0	$21,878	$9,467
17	2027	14.6	2.8	243.6	261.0	$21,878	$8,984
18	2028	14.6	2.8	272.1	289.5	$21,878	$8,526
19	2029	14.6	2.8	289.1	306.5	$21,878	$8,091
20	2030	14.6	2.8	315.8	333.2	$21,878	$7,678
21	2031	14.6	2.8	351.2	368.6	$21,878	$7,286
22	2032	14.6	2.8	398.3	415.7	$21,878	$6,915
23	2033	14.6	2.8	441.5	458.9	$21,878	$6,562
24	2034	14.6	2.8	484.5	501.9	$21,878	$6,227
25	2035	14.6	2.8	533.6	551.0	$21,878	$5,910
26	2036	14.6	2.8	574.0	591.4	$21,878	$5,608
27	2037	14.6	2.8	605.4	622.8	$21,878	$5,322
28	2038	14.6	2.8	625.3	642.7	$21,878	$5,051
29	2039	14.6	2.8	646.2	663.6	$11,382	$2,494
30	2040	14.6	2.8	659.2	676.6	$11,382	$2,366
31	2041	14.6	2.8	671.0	688.4	$11,382	$2,246
32	2042	14.6	2.8	678.1	695.5	$11,381	$2,131
33	2043	14.6	2.8	683.7	701.1	$11,381	$2,022
34	2044	14.6	2.8	697.9	715.3	$11,381	$1,919
35	2045	14.6	2.8	699.7	717.1	$0	$0
36	2046	14.6	2.8	702.0	719.4	$0	$0
37	2047	14.6	2.8	704.4	721.8	$0	$0
38	2048	14.6	2.8	706.7	724.1	$0	$0
39	2049	14.6	2.8	803.4	820.8	$0	$0
40	2050	14.6	2.8	806.5	823.9	$0	$0
41	2051	14.6	2.8	817.0	834.4	$0	$0

Table C-12. (continued)

Project Year	Year	Existing ICUs Gained	Existing SAV ICUs	Constructed ICUs	Total ICUs	Project Cost ($000s)	Present Value Cost ($000s)
43	2053	14.6	2.8	823.3	840.7	$0	$0
44	2054	14.6	2.8	823.3	840.7	$0	$0
45	2055	14.6	2.8	823.3	840.7	$0	$0
46	2056	14.6	2.8	838.0	855.4	$0	$0
47	2057	14.6	2.8	838.0	855.4	$0	$0
48	2058	14.6	2.8	838.0	855.4	$0	$0
49	2059	14.6	2.8	852.7	870.1	$0	$0
				21,756.3	**22,626.3**	**$941,842**	**$557,138**
					1,312		**$32,303**

Table C-13. Cost Effective Incremental Analysis for James Alignment 5 (45% Upland, 55% Wetland, Dike Height +20 ft MLLW)

Project Year	Year	Existing ICUs Gained	Existing SAV ICUs	Constructed ICUs	Total ICUs	Project Cost ($000s)	Present Value Cost ($000s)
0	2010	14.6	2.8	0.0	17.4	$23,177	$23,177
1	2011	14.6	2.8	0.0	17.4	$81,121	$76,983
2	2012	14.6	2.8	0.0	17.4	$46,355	$41,746
3	2013	14.6	2.8	0.0	17.4	$115,887	$99,042
4	2014	14.6	2.8	0.0	17.4	$76,486	$62,034
5	2015	14.6	2.8	0.0	17.4	$21,535	$16,576
6	2016	14.6	2.8	0.0	17.4	$21,535	$15,730
7	2017	14.6	2.8	0.0	17.4	$21,535	$14,928
8	2018	14.6	2.8	0.0	17.4	$21,535	$14,166
9	2019	14.6	2.8	20.8	38.2	$21,535	$13,444
10	2020	14.6	2.8	29.0	46.4	$21,535	$12,758
11	2021	14.6	2.8	50.4	67.8	$21,535	$12,107
12	2022	14.6	2.8	80.4	97.8	$21,535	$11,490
13	2023	14.6	2.8	115.0	132.4	$21,535	$10,904
14	2024	14.6	2.8	152.5	169.9	$21,535	$10,347
15	2025	14.6	2.8	190.5	207.9	$21,535	$9,820
16	2026	14.6	2.8	235.0	252.4	$21,535	$9,319
17	2027	14.6	2.8	275.5	292.9	$21,535	$8,843
18	2028	14.6	2.8	304.6	322.0	$21,535	$8,392
19	2029	14.6	2.8	328.1	345.5	$21,535	$7,964
20	2030	14.6	2.8	352.9	370.3	$21,535	$7,558
21	2031	14.6	2.8	388.1	405.5	$21,535	$7,172
22	2032	14.6	2.8	426.3	443.7	$21,535	$6,807
23	2033	14.6	2.8	467.7	485.1	$21,535	$6,459
24	2034	14.6	2.8	519.5	536.9	$21,535	$6,130
25	2035	14.6	2.8	563.9	581.3	$21,535	$5,817
26	2036	14.6	2.8	606.0	623.4	$21,535	$5,520
27	2037	14.6	2.8	649.5	666.9	$21,535	$5,239
28	2038	14.6	2.8	684.9	702.3	$21,535	$4,972
29	2039	14.6	2.8	703.9	721.3	$11,204	$2,455
30	2040	14.6	2.8	718.5	735.9	$11,204	$2,329
31	2041	14.6	2.8	728.5	745.9	$11,204	$2,211
32	2042	14.6	2.8	743.5	760.9	$11,203	$2,098
33	2043	14.6	2.8	751.9	769.3	$11,203	$1,991
34	2044	14.6	2.8	755.7	773.1	$11,203	$1,889
35	2045	14.6	2.8	757.9	775.3	$0	$0
36	2046	14.6	2.8	837.3	854.7	$0	$0
37	2047	14.6	2.8	842.1	859.5	$0	$0
38	2048	14.6	2.8	845.3	862.7	$0	$0
39	2049	14.6	2.8	848.5	865.9	$0	$0
40	2050	14.6	2.8	859.1	876.5	$0	$0
41	2051	14.6	2.8	862.3	879.7	$0	$0

Table C-13. (continued)

Project Year	Year	Existing ICUs Gained	Existing SAV ICUs	Constructed ICUs	Total ICUs	Project Cost ($000s)	Present Value Cost ($000s)
43	2053	14.6	2.8	877.3	894.7	$0	$0
44	2054	14.6	2.8	877.3	894.7	$0	$0
45	2055	14.6	2.8	877.3	894.7	$0	$0
46	2056	14.6	2.8	877.3	894.7	$0	$0
47	2057	14.6	2.8	877.3	894.7	$0	$0
48	2058	14.6	2.8	892.2	909.6	$0	$0
49	2059	14.6	2.8	892.2	909.6	$0	$0
				23,727.8	**24,597.8**	**$927,097**	**$548,416**
					1,426		**$31,797**

Table C-14. Cost Effective Incremental Analysis for James Alignment 5 (40% Upland, 60% Wetland, Dike Height +25 ft MLLW)

Project Year	Year	Existing ICUs Gained	Existing SAV ICUs	Constructed ICUs	Total ICUs	Project Cost ($000s)	Present Value Cost ($000s)
0	2010	14.6	2.8	0.0	17.4	$23,347	$23,347
1	2011	14.6	2.8	0.0	17.4	$81,716	$77,548
2	2012	14.6	2.8	0.0	17.4	$46,695	$42,053
3	2013	14.6	2.8	0.0	17.4	$116,737	$99,769
4	2014	14.6	2.8	0.0	17.4	$79,373	$64,376
5	2015	14.6	2.8	0.0	17.4	$21,694	$16,697
6	2016	14.6	2.8	0.0	17.4	$21,694	$15,845
7	2017	14.6	2.8	0.0	17.4	$21,694	$15,037
8	2018	14.6	2.8	0.0	17.4	$21,694	$14,270
9	2019	14.6	2.8	20.2	37.6	$21,694	$13,542
10	2020	14.6	2.8	28.2	45.6	$21,694	$12,852
11	2021	14.6	2.8	48.9	66.3	$21,694	$12,196
12	2022	14.6	2.8	77.9	95.3	$21,694	$11,574
13	2023	14.6	2.8	111.3	128.7	$21,694	$10,984
14	2024	14.6	2.8	147.6	165.0	$21,694	$10,423
15	2025	14.6	2.8	185.4	202.8	$21,694	$9,892
16	2026	14.6	2.8	227.8	245.2	$21,694	$9,387
17	2027	14.6	2.8	267.9	285.3	$21,694	$8,908
18	2028	14.6	2.8	308.9	326.3	$21,694	$8,454
19	2029	14.6	2.8	337.0	354.4	$21,694	$8,023
20	2030	14.6	2.8	353.3	370.7	$21,694	$7,613
21	2031	14.6	2.8	386.6	404.0	$21,694	$7,225
22	2032	14.6	2.8	423.8	441.2	$21,694	$6,857
23	2033	14.6	2.8	460.7	478.1	$21,694	$6,507
24	2034	14.6	2.8	500.8	518.2	$21,694	$6,175
25	2035	14.6	2.8	537.6	555.0	$21,694	$5,860
26	2036	14.6	2.8	586.6	604.0	$21,694	$5,561
27	2037	14.6	2.8	627.5	644.9	$21,694	$5,277
28	2038	14.6	2.8	670.5	687.9	$21,694	$5,008
29	2039	14.6	2.8	714.7	732.1	$11,286	$2,473
30	2040	14.6	2.8	751.9	769.3	$11,286	$2,346
31	2041	14.6	2.8	770.1	787.5	$11,286	$2,227
32	2042	14.6	2.8	784.0	801.4	$11,285	$2,113
33	2043	14.6	2.8	793.3	810.7	$11,285	$2,005
34	2044	14.6	2.8	801.3	818.7	$11,285	$1,903
35	2045	14.6	2.8	812.0	829.4	$0	$0
36	2046	14.6	2.8	818.1	835.5	$0	$0
37	2047	14.6	2.8	822.8	840.2	$0	$0
38	2048	14.6	2.8	940.6	958.0	$0	$0
39	2049	14.6	2.8	943.9	961.3	$0	$0
40	2050	14.6	2.8	951.5	968.9	$0	$0
41	2051	14.6	2.8	951.5	968.9	$0	$0

Table C-14. (continued)

Project Year	Year	Existing ICUs Gained	Existing SAV ICUs	Constructed ICUs	Total ICUs	Project Cost ($000s)	Present Value Cost ($000s)
43	2053	14.6	2.8	951.5	968.9	$0	$0
44	2054	14.6	2.8	951.5	968.9	$0	$0
45	2055	14.6	2.8	981.7	999.1	$0	$0
46	2056	14.6	2.8	981.7	999.1	$0	$0
47	2057	14.6	2.8	981.7	999.1	$0	$0
48	2058	14.6	2.8	981.7	999.1	$0	$0
49	2059	14.6	2.8	981.7	999.1	$0	$0
				24,927.2	**25,797.2**	**$936,228**	**$554,328**
					1,496		**$32,140**

Table C-15. Cost Effective Incremental Analysis for James Alignment 5 plus Barren Protection (Alignment E) (50% Upland, 50% Wetland, Dike Height +20 ft MLLW)

Project Year	Year	Existing ICUs Gained	Constructed ICUs	Total ICUs	James Project Cost ($000s)	Barren Project Cost ($000s)	Total Project Cost ($000s)	Present Value Cost ($000s)
0	2010	338.5	0.0	338.5	$23,546	$810	$24,356	$24,356
1	2011	338.5	0.0	338.5	$82,411	$2,835	$85,246	$80,898
2	2012	338.5	0.0	338.5	$47,092	$1,620	$48,712	$43,869
3	2013	338.5	0.0	338.5	$117,730	$4,050	$121,780	$104,079
4	2014	338.5	0.0	338.5	$77,702	$2,673	$80,375	$65,189
5	2015	338.5	0.0	338.5	$21,878	$753	$22,631	$17,418
6	2016	338.5	0.0	338.5	$21,878	$753	$22,631	$16,530
7	2017	338.5	0.0	338.5	$21,878	$753	$22,631	$15,687
8	2018	338.5	0.0	338.5	$21,878	$753	$22,631	$14,887
9	2019	338.5	21.1	359.6	$21,878	$0	$21,878	$13,657
10	2020	338.5	22.3	360.8	$21,878	$0	$21,878	$12,961
11	2021	338.5	30.8	369.3	$21,878	$0	$21,878	$12,300
12	2022	338.5	53.1	391.6	$21,878	$0	$21,878	$11,672
13	2023	338.5	84.5	423.0	$21,878	$0	$21,878	$11,077
14	2024	338.5	120.5	459.0	$21,878	$0	$21,878	$10,512
15	2025	338.5	159.5	498.0	$21,878	$0	$21,878	$9,976
16	2026	338.5	199.9	538.4	$21,878	$0	$21,878	$9,467
17	2027	338.5	244.0	582.5	$21,878	$0	$21,878	$8,984
18	2028	338.5	272.3	610.8	$21,878	$0	$21,878	$8,526
19	2029	338.5	289.1	627.6	$21,878	$0	$21,878	$8,091
20	2030	338.5	315.9	654.4	$21,878	$0	$21,878	$7,678
21	2031	338.5	351.5	690.0	$21,878	$0	$21,878	$7,286
22	2032	338.5	398.6	737.1	$21,878	$0	$21,878	$6,915
23	2033	338.5	441.8	780.3	$21,878	$0	$21,878	$6,562
24	2034	338.5	484.8	823.3	$21,878	$0	$21,878	$6,227
25	2035	338.5	533.9	872.4	$21,878	$0	$21,878	$5,910
26	2036	338.5	574.4	912.9	$21,878	$0	$21,878	$5,608
27	2037	338.5	605.6	944.1	$21,878	$0	$21,878	$5,322
28	2038	338.5	625.3	963.8	$21,878	$0	$21,878	$5,051
29	2039	338.5	646.1	984.6	$11,382	$0	$11,382	$2,494
30	2040	338.5	659.2	997.7	$11,382	$0	$11,382	$2,366
31	2041	338.5	670.9	1,009.4	$11,382	$0	$11,382	$2,246
32	2042	338.5	678.1	1,016.6	$11,381	$0	$11,381	$2,131
33	2043	338.5	683.6	1,022.1	$11,381	$0	$11,381	$2,022
34	2044	338.5	697.8	1,036.3	$11,381	$0	$11,381	$1,919
35	2045	338.5	699.6	1,038.1	$0	$0	$0	$0
36	2046	338.5	702.0	1,040.5	$0	$0	$0	$0
37	2047	338.5	704.3	1,042.8	$0	$0	$0	$0
38	2048	338.5	706.7	1,045.2	$0	$0	$0	$0
39	2049	338.5	803.3	1,141.8	$0	$0	$0	$0
40	2050	338.5	806.5	1,145.0	$0	$0	$0	$0

Table C-15. (continued)

Project Year	Year	Existing ICUs Gained	Constructed ICUs	Total ICUs	James Project Cost ($000s)	Barren Project Cost ($000s)	Total Project Cost ($000s)	Present Value Cost ($000s)
42	2052	338.5	820.1	1,158.6	$0	$0	$0	$0
43	2053	338.5	823.3	1,161.8	$0	$0	$0	$0
44	2054	338.5	823.3	1,161.8	$0	$0	$0	$0
45	2055	338.5	823.3	1,161.8	$0	$0	$0	$0
46	2056	338.5	838.0	1,176.5	$0	$0	$0	$0
47	2057	338.5	838.0	1,176.5	$0	$0	$0	$0
48	2058	338.5	838.0	1,176.5	$0	$0	$0	$0
49	2059	338.5	852.7	1,191.2	$0	$0	$0	$0
			21,760.7	**38,685.7**	**$941,842**	**$15,000**	**$956,842**	**$569,874**
				2,243				**$33,042**

Table C-16. Cost Effective Incremental Analysis for James Alignment 5 plus Barren Protection (Alignment E) (45% Upland, 55% Wetland, Dike Height +20 ft MLLW)

Project Year	Year	Existing ICUs Gained	Constructed ICUs	Total ICUs	James Project Cost ($000s)	Barren Project Cost ($000s)	Total Project Cost ($000s)	Present Value Cost ($000s)
0	2010	338.5	0.0	338.5	$23,177	$786	$23,964	$23,964
1	2011	338.5	0.0	338.5	$81,121	$2,752	$83,873	$79,595
2	2012	338.5	0.0	338.5	$46,355	$1,573	$47,927	$43,163
3	2013	338.5	0.0	338.5	$115,887	$3,932	$119,819	$102,403
4	2014	338.5	0.0	338.5	$76,486	$2,595	$79,081	$64,139
5	2015	338.5	0.0	338.5	$21,535	$731	$22,266	$17,138
6	2016	338.5	0.0	338.5	$21,535	$731	$22,266	$16,264
7	2017	338.5	0.0	338.5	$21,535	$731	$22,266	$15,434
8	2018	338.5	0.0	338.5	$21,535	$731	$22,266	$14,647
9	2019	338.5	20.8	359.3	$21,535	$0	$21,535	$13,444
10	2020	338.5	28.9	367.4	$21,535	$0	$21,535	$12,758
11	2021	338.5	50.3	388.8	$21,535	$0	$21,535	$12,107
12	2022	338.5	80.3	418.8	$21,535	$0	$21,535	$11,490
13	2023	338.5	114.9	453.4	$21,535	$0	$21,535	$10,904
14	2024	338.5	152.4	490.9	$21,535	$0	$21,535	$10,347
15	2025	338.5	190.5	529.0	$21,535	$0	$21,535	$9,820
16	2026	338.5	234.5	573.0	$21,535	$0	$21,535	$9,319
17	2027	338.5	275.5	614.0	$21,535	$0	$21,535	$8,843
18	2028	338.5	304.6	643.1	$21,535	$0	$21,535	$8,392
19	2029	338.5	328.0	666.5	$21,535	$0	$21,535	$7,964
20	2030	338.5	352.8	691.3	$21,535	$0	$21,535	$7,558
21	2031	338.5	388.0	726.5	$21,535	$0	$21,535	$7,172
22	2032	338.5	426.2	764.7	$21,535	$0	$21,535	$6,807
23	2033	338.5	467.6	806.1	$21,535	$0	$21,535	$6,459
24	2034	338.5	519.4	857.9	$21,535	$0	$21,535	$6,130
25	2035	338.5	563.8	902.3	$21,535	$0	$21,535	$5,817
26	2036	338.5	606.0	944.5	$21,535	$0	$21,535	$5,520
27	2037	338.5	649.4	987.9	$21,535	$0	$21,535	$5,239
28	2038	338.5	684.9	1,023.4	$21,535	$0	$21,535	$4,972
29	2039	338.5	703.9	1,042.4	$11,204	$0	$11,204	$2,455
30	2040	338.5	718.5	1,057.0	$11,204	$0	$11,204	$2,329
31	2041	338.5	728.5	1,067.0	$11,204	$0	$11,204	$2,211
32	2042	338.5	743.5	1,082.0	$11,203	$0	$11,203	$2,098
33	2043	338.5	751.9	1,090.4	$11,203	$0	$11,203	$1,991
34	2044	338.5	755.7	1,094.2	$11,203	$0	$11,203	$1,889
35	2045	338.5	757.9	1,096.4	$0	$0	$0	$0
36	2046	338.5	837.2	1,175.7	$0	$0	$0	$0
37	2047	338.5	842.0	1,180.5	$0	$0	$0	$0
38	2048	338.5	845.2	1,183.7	$0	$0	$0	$0
39	2049	338.5	848.4	1,186.9	$0	$0	$0	$0
40	2050	338.5	859.1	1,197.6	$0	$0	$0	$0

Table C-16. (continued)

Project Year	Year	Existing ICUs Gained	Constructed ICUs	Total ICUs	James Project Cost ($000s)	Barren Project Cost ($000s)	Total Project Cost ($000s)	Present Value Cost ($000s)
42	2052	338.5	862.3	1,200.8	$0	$0	$0	$0
43	2053	338.5	877.2	1,215.7	$0	$0	$0	$0
44	2054	338.5	877.2	1,215.7	$0	$0	$0	$0
45	2055	338.5	877.2	1,215.7	$0	$0	$0	$0
46	2056	338.5	877.2	1,215.7	$0	$0	$0	$0
47	2057	338.5	877.2	1,215.7	$0	$0	$0	$0
48	2058	338.5	892.1	1,230.6	$0	$0	$0	$0
49	2059	338.5	892.1	1,230.6	$0	$0	$0	$0
			23,725.4	**40,650.4**	**$927,097**	**$14,561**	**$941,658**	**$560,778**
				2,357				**$32,514**

Table C-17. Cost Effective Incremental Analysis for James Alignment 5 plus Barren Protection (Alignment E) (40% Upland, 60% Wetland, Dike Height +25 ft MLLW)

Project Year	Year	Existing ICUs Gained	Constructed ICUs	Total ICUs	James Project Cost ($000s)	Barren Project Cost ($000s)	Total Project Cost ($000s)	Present Value Cost ($000s)
0	2010	338.5	0.0	338.5	$24,052	$810	$24,862	$24,862
1	2011	338.5	0.0	338.5	$84,183	$2,835	$87,019	$82,580
2	2012	338.5	0.0	338.5	$48,105	$1,620	$49,725	$44,782
3	2013	338.5	0.0	338.5	$120,262	$4,050	$124,312	$106,243
4	2014	338.5	0.0	338.5	$79,373	$2,673	$82,046	$66,544
5	2015	338.5	0.0	338.5	$22,349	$753	$23,101	$17,781
6	2016	338.5	0.0	338.5	$22,349	$753	$23,101	$16,874
7	2017	338.5	0.0	338.5	$22,349	$753	$23,101	$16,013
8	2018	338.5	0.0	338.5	$22,349	$753	$23,101	$15,196
9	2019	338.5	20.0	358.5	$22,349	$0	$22,349	$13,951
10	2020	338.5	28.1	366.6	$22,349	$0	$22,349	$13,240
11	2021	338.5	48.8	387.3	$22,349	$0	$22,349	$12,564
12	2022	338.5	77.8	416.3	$22,349	$0	$22,349	$11,923
13	2023	338.5	111.3	449.8	$22,349	$0	$22,349	$11,315
14	2024	338.5	147.6	486.1	$22,349	$0	$22,349	$10,738
15	2025	338.5	185.4	523.9	$22,349	$0	$22,349	$10,190
16	2026	338.5	227.7	566.2	$22,349	$0	$22,349	$9,670
17	2027	338.5	267.8	606.3	$22,349	$0	$22,349	$9,177
18	2028	338.5	308.8	647.3	$22,349	$0	$22,349	$8,709
19	2029	338.5	336.9	675.4	$22,349	$0	$22,349	$8,265
20	2030	338.5	353.3	691.8	$22,349	$0	$22,349	$7,843
21	2031	338.5	386.6	725.1	$22,349	$0	$22,349	$7,443
22	2032	338.5	423.7	762.2	$22,349	$0	$22,349	$7,064
23	2033	338.5	460.7	799.2	$22,349	$0	$22,349	$6,703
24	2034	338.5	500.8	839.3	$22,349	$0	$22,349	$6,361
25	2035	338.5	537.6	876.1	$22,349	$0	$22,349	$6,037
26	2036	338.5	586.5	925.0	$22,349	$0	$22,349	$5,729
27	2037	338.5	627.5	966.0	$22,349	$0	$22,349	$5,437
28	2038	338.5	670.5	1,009.0	$22,349	$0	$22,349	$5,159
29	2039	338.5	714.7	1,053.2	$11,627	$0	$11,627	$2,547
30	2040	338.5	751.9	1,090.4	$11,627	$0	$11,627	$2,417
31	2041	338.5	770.1	1,108.6	$11,627	$0	$11,627	$2,294
32	2042	338.5	783.9	1,122.4	$11,626	$0	$11,626	$2,177
33	2043	338.5	793.2	1,131.7	$11,626	$0	$11,626	$2,066
34	2044	338.5	801.3	1,139.8	$11,626	$0	$11,626	$1,960
35	2045	338.5	812.0	1,150.5	$0	$0	$0	$0
36	2046	338.5	818.0	1,156.5	$0	$0	$0	$0
37	2047	338.5	822.7	1,161.2	$0	$0	$0	$0
38	2048	338.5	940.6	1,279.1	$0	$0	$0	$0
39	2049	338.5	943.9	1,282.4	$0	$0	$0	$0
40	2050	338.5	951.4	1,289.9	$0	$0	$0	$0

Table C-17. (continued)

Project Year	Year	Existing ICUs Gained	Constructed ICUs	Total ICUs	James Project Cost ($000s)	Barren Project Cost ($000s)	Total Project Cost ($000s)	Present Value Cost ($000s)
42	2052	338.5	951.4	1,289.9	$0	$0	$0	$0
43	2053	338.5	951.4	1,289.9	$0	$0	$0	$0
44	2054	338.5	951.4	1,289.9	$0	$0	$0	$0
45	2055	338.5	981.7	1,320.2	$0	$0	$0	$0
46	2056	338.5	981.7	1,320.2	$0	$0	$0	$0
47	2057	338.5	981.7	1,320.2	$0	$0	$0	$0
48	2058	338.5	981.7	1,320.2	$0	$0	$0	$0
49	2059	338.5	981.7	1,320.2	$0	$0	$0	$0
			24,925.2	**41,850.2**	**$962,098**	**$15,000**	**$977,098**	**$581,856**
				2,426				**$33,736**

Attachment D- Optimization of NER Plan Calculations and Analysis

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EXISTING 1140-ACRE SITE WITH NORTHERN EXPANSION and 5-FOOT RAISING OF EXISTING UPLAND CELLS REFLECTING NMFS PROPOSAL (as modified by USACE)
(Open Water Area = Approximately 130 acres)

Cell No.	Cell Acreage (Nominal)	Cell Acreage (Actual)	Cell Volume	Cell Capacity	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
U-2	326	298	2,406,206	3,437,437	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-6	243	222	1,793,583	2,562,261	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Up-10	270	247.1	11,359,359	16,227,656	0	0	0	0	0	0	0	0	0	0	1,434,866	1,434,866	1,434,866	1,434,866	1,434,866	1,434,866
U-2	326	298	10,913,555	**15,590,792**	**6,399,848**	1,038,000	0	1,111,000	535,347	894,394	0	700,000	1,500,000	1,450,000	0	0	0	0	500,000	600,000
U-6	243	222	11,926,728	**17,038,183**	0	0	0	0	0	400,000	**1,700,000**	1,120,114	1,075,000	1,280,028	1,219,723	1,460,710	982,614	895,534	949,649	1,045,435
W-1A	38	35	265,393	**379,133**	139,480	0	160,000	60,000	19,653	Grade	Plant									
W-1B	38	35	378,327	**540,467**	195,000	0	170,000	110,000	40,000	15,467	0	0	0	10,000	Grade	Plant				
W-1C	44	40	367,840	**525,486**	195,000	0	200,000	80,000	40,000	10,486	Grade	Plant								
W-1D	49	45	486,420	**694,886**	235,000	0	220,000	170,000	40,000	20,000	0	9,886	Grade	Plant						
W-3A	35	32	366,549	**523,642**	220,000	0	0	210,000	55000	21,000	0	10,000	0	7,642	Grade	Plant				
W-3B	30	28	275,557	**393,653**	290,000	0	0	75,000	20000	8,653	Grade	Plant								
W-3C	39	35	400,913	**572,733**	225,403	0	66,000	184,000	50000	30,000	0	10,000	0	7,330	0	Grade	Plant			
W-3D	31	26	251,680	**359,543**	284,500	62,000	12,000	Grade	Plant											
W-4A&B	34	31	150,040	**214,343**	0	0	0	0	0	0	0	0	0	0	0	130,000	65,000	19,343	Grade	Plant
W-4C	38	34	7,000	**10,000**	0	0	0	0	0	0	0	0	0	0	0	0	10,000	0	Grade	Plant
W-4DX	25	23	0	**0**	0	0	Plant													
W-5A	33	30	242,000	**345,714**	0	0	0	0	0	0	0	0	250,000	60000	25,000	10,714	Grade	Plant		
W-5B	33	30	266,200	**380,286**	0	0	0	0	0	0	0	0	0	275,000	65000	30,000	10,286	Grade	Plant	
W-5C	33	30	290,400	**414,857**	0	0	0	0	0	0	0	0	300,000	70000	30,000	14,857	Grade	Plant		
W-5D	57	53	1,710,133	**2,443,048**	0	0	0	0	1,200,000	600,000	300,000	150,000	75,000	40,000	30,000	20,000	20,000	8,048	0	0
W-1	25.0	22.9	369,050	527,214	0	0	0	0	0	0	0	0	0	0	395,411	98,853	23,066	9,885	Grade	Plant
W-2	43.3	39.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
W-3	43.3	39.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W-4	43.3	39.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W-5	47.0	43.0	763,195	1,090,279	0	0	0	0	0	0	0	0	0	0	0	0	654,167	261,667	87,222	43,611
W-6	41.0	37.5	665,766	951,095	0	0	0	0	0	0	0	0	0	0	0	0	0	570,657	228,263	76,088
W-7	52.0	47.6	2,072,585	2,960,835	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W-8	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Grade
Water	130.0	130.0	0	0											Embayment completed as part of initial expansion construction with no...					
	1,691	**1,544**		**68,183,543**	8,184,231	1,100,000	828,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000

D-1: POPLAR ISLAND DREDGED MATERIAL PLACEMENT AND CELL DEVELOPMENT PLAN

Cell No.	Cell Acreage	Cell Acreage	Cell Volume	Cell Capacity	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	Total Placed Quantity
	(Nominal)	(Actual)																			
U-2	326	298	2,406,206	3,437,437	0	0	0	0	**1,490,265**	631,332	500,000	300,000	400,000	115,840	0	0	Grade	Grade	Plant	Plant	**3,437,437**
U-6	243	222	1,793,583	2,562,261	0	0	0	0	1,000,000	200,000	350,000	350,000	300,000	362,261	0	0	Grade	Grade	Plant	Plant	**2,562,261**
																					0
Up-10	270	247.1	11,359,359	16,227,656	1,434,866	1,434,866	1,434,866	**2,604,123**	709,735	0	0	Grade	Grade	Plant	Plant						**16,227,656**
U-2	326	298	10,913,555	**15,590,792**	611268	250935	0	0		See above for final grading and planting of raised Cell 2											**15,590,792**
U-6	243	222	11,926,728	**17,038,183**	1,094,016	**1,473,371**	**1,746,112**	595,877	0	0		See above for final grading and planting of raised Cell 2									**17,038,182**
W-1A	38	35	265,393	**379,133**																	**379,133**
W-1B	38	35	378,327	**540,467**																	**540,467**
W-1C	44	40	367,840	**525,486**																	**525,486**
W-1D	49	45	486,420	**694,886**																	**694,886**
W-3A	35	32	366,549	**523,642**																	**523,642**
W-3B	30	28	275,557	**393,653**																	**393,653**
W-3C	39	35	400,913	**572,733**																	**572,733**
W-3D	31	26	251,680	**359,543**																	**358,500**
W-4A&B	34	31	150,040	**214,343**																	**214,343**
W-4C	38	34	7,000	**10,000**																	**10,000**
W-4DX	25	23	0	**0**																	**0**
W-5A	33	30	242,000	**345,714**																	**345,714**
W-5B	33	30	266,200	**380,286**																	**380,286**
W-5C	33	30	290,400	**414,857**																	**414,857**
W-5D	57	53	1,710,133	**2,443,048**	Grade	Plant															**2,443,048**
W-1	25.0	22.9	369,050	527,214																	**527,214**
W-2	43.3	39.6	0	0																	**0**
W-3	43.3	39.6	0	0																	**0**
W-4	43.3	39.6	0	0	0																**0**
W-5	47.0	43.0	763,195	1,090,279	21,806	21,806	Grade	Plant													**1,090,279**
W-6	41.0	37.5	665,766	951,095	38,044	19,022	19,022	Grade	Plant												**951,095**
W-7	52.0	47.6	2,072,585	2,960,835	0	0	0	0		2,368,668	414,517	106,590	35,530	35,530	0	0	Grade	Plant			**2,960,835**
W-8	0.0	0.0	0	0	Plant																**0**
Water	130.0	130.0	0	0	...subsequent placement of materials																
	1,691	**1,544**		**68,183,543**	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	1,264,517	756,590	735,530	513,631	0	0	0	0	0	0	**68,182,499**

Table D-2: POPLAR ISLAND DREDGED MATERIAL PLACEMENT AND CELL DEVELOPMENT PLAN

EXISTING 1140-ACRE SITE WITH NORTHERN EXPANSION and 5-FOOT RAISING OF EXISTING UPLAND CELLS REFLECTING NMFS PROPOSAL (as modified by USACE)
(Open Water Area = Approximately 130 acres)

Cell No.	Cell Acreage (Nominal)	Cell Acreage (Actual)	Cell Volume	Cell Capacity	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
U-2	326	298	2,406,206	3,437,437		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		99			144.1	144.1	144.1	144.1	144.1	144.1	144.1	144.1	144.1	144.1	144.1	144.1	144.1	144.1	144.1	Grade	Grade	Plant	Plant	3.0
		99																		90.5	90.5	90.5	90.5	90.5
		100																						
U-6	243	222	1,793,583	2,562,261		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		111			2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	75.9	75.9	75.9	75.9	75.9	75.9	75.9
		111																						
Up-10	270	247.1	11,359,359	16,227,656	0	0	0	0	0	0	0	0	0	0	1,434,866	1,434,866	1,434,866	1,434,866	1,434,866	1,434,866	1,434,866	1,434,866	1,434,866	1,272,406
A		123.5												2.5	2.5	2.5	2.5	2.5	90.4	90.4	90.4	90.4	90.4	90.4
B		123.5																						
U-2	326	298	10,913,555	15,590,792	6,399,848	1,038,000	0	1,999,940	1,999,936	1,599,933	0	700,000	1,500,000	1,450,000	0	0	0	0	500,000	600,000	611268	250935	0	0
U-6	243	222	11,926,728	17,038,183	0	0	0	0	0	400,000	1,999,943	1,299,938	1,699,925	1,749,902	1,219,723	1,460,710	982,614	895,534	949,649	1,045,435	1,094,016	1,473,371	1,746,112	595,877
W-1A	38	35	265,393	379,133	2.1	2.1	2.1	2.1	2.1	2.1	Grade	Plant	0.5	7.6	14.7	17.1	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6
W-1B	38	35	378,327	540,467	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	Grade	Plant	0.7	7.4	14.0	16.3	18.5	19.3	20.1
W-1C	44	40	367,840	525,486	5.5	5.5	5.5	5.5	5.5	5.5	5.5	Grade	Plant	0.7	8.6	16.5	19.1	21.7	22.7	23.6	24.6	25.5	26.4	26.4
W-1D	49	45	486,420	694,886	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	Grade	Plant	0.8	9.7	18.6	21.5	24.5	25.6	26.6	27.7	28.8
W-3A	35	32	366,549	523,642	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	Grade	Plant	0.5	7.0	13.4	15.6	17.8	18.5	19.3
W-3B	30	28	275,557	393,653	0.5	0.5	0.5	0.5	0.5	0.5	0.5	Grade	Plant	0.4	6.1	11.8	13.7	15.5	16.2	16.9	17.6	18.2	18.9	18.9
W-3C	39	35	400,913	572,733	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	Grade	Plant	0.6	7.5	14.4	16.7	19.0	19.8
W-3D	31	26	251,680	359,543	9.6	9.6	9.6	9.6	Grade	Plant	0.5	5.5	10.6	12.3	14.0	14.6	15.2	15.8	16.4	17.0	17.0	17.0	17.0	17.0
W-4A&B	34	31	150,040	214,343	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	10.1	10.1	Grade	Plant	0.7	6.5	12.4
W-4C	38	34	7,000	10,000	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	6.8	6.8	Grade	Plant	0.5	7.4	14.3
W-4DX	25	23	0	0	3.4	3.4	3.4	Plant	0.5	4.8	9.2	10.6	12.0	12.6	13.1	13.6	14.2	14.7	14.7	14.7	14.7	14.7	14.7	14.7
W-5A	33	30	242,000	345,714	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	Grade	Plant	0.4	6.5	12.6	14.6	16.7
W-5B	33	30	266,200	380,286	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	Grade	Plant	0.4	6.5	12.6	14.6
W-5C	33	30	290,400	414,857	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	Grade	Plant	0.4	6.5	12.6	14.6	16.7
W-5D	57	53	1,710,133	2,443,048	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	Grade	Plant	0.8
EXISTING EXTERIOR DIKES					0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
W-1	25.0	22.9	369,050	527,214	0	0	0	0	0	0	0	0	0	0.2	0.2	0.2	0.2	5.3	Grade	Plant	0.7	4.2	7.7	8.9
W-5	47.0	43.0	763,195	1,090,279	0	0	0	0	0	0	0	0	0	0.4	0.4	0.4	0.4	0.4	0.4	14.0	14.0	14.0	Grade	Plant
W-6	41.0	37.5	665,766	951,095	0	0	0	0	0	0	0	0	0	0.4	0.4	0.4	0.4	0.4	0.4	0.4	12.2	12.2	12.2	Grade
W-7	52.0	47.6	2,072,585	2,960,835	0	0	0	0	0	0	0	0	0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
W-8	0.0	0.0	0	0																				
W-2	43.3	39.6	0	0																				
W-3	43.3	39.6	0	0																				
W-4	43.3	39.6	0	0																				
embayment		130.0												1.3	1.3	1.3	1.3	1.3	1.3	1.3	54.6	54.6	54.6	54.6
EXPANSION EXTERIOR DIKES														0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	1,509	1,624		68183543.43	8,184,231	1,100,000	828,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	3200000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000

Table D-2: POPLAR ISLAND DREDGED MATERIAL PLACEMENT AND CELL DEVELOPMENT PLAN

Cell No.	Cell Acreage (Nominal)	Cell Acreage (Actual)	Cell Volume	Cell Capacity	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
U-2	326	298	2,406,206	3,437,437	0	750,000	750,000	0	750,000	750,000	437,437															
		99			2.6	2.2	1.9	1.5	3.0	4.5	5.9	7.4	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9
		99			90.5	Grade	Grade	Plant	Plant	3.0	2.6	2.2	1.9	1.5	3.0	4.5	5.9	7.4	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9
		100				39.0	39.0	39.0	39.0	39.0	39.0	Grade	Grade	Plant	Plant	3.0	2.6	2.3	1.9	1.5	3.0	4.5	6.0	7.5	9.0	9.0
U-6	243	222	1,793,583	2,562,261	0	500,000	500,000	0	500,000	500,000	562,261															
		111			75.9	Grade	Grade	Plant	Plant	3.3	2.9	2.5	2.1	1.7	3.3	5.0	6.7	8.3	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
		111				47.3	47.3	47.3	47.3	47.3	47.3	Grade	Grade	Plant	Plant	3.3	2.9	2.5	2.1	1.7	3.3	5.0	6.7	8.3	10.0	10.0
Up-10	270	247.1	11,359,359	16,227,656	709,735	0	0																			
A		123.5			90.4	90.4	90.4	Grade	Grade	Plant	Plant	3.7	3.2	2.8	2.3	1.9	3.7	5.6	7.4	9.3	11.1	11.1	11.1	11.1	11.1	11.1
B		123.5						56.2	56.2	56.2	56.2	56.2	Grade	Grade	Plant	Plant	3.7	3.2	2.8	2.3	1.9	3.7	5.6	7.4	9.3	11.1
U-2	326	298	10,913,555	**15,590,792**	0	0	0	0	0	0	DEFER TO GRADING AND PLANTING SHOWN															
U-6	243	222	11,926,728	**17,038,183**	796,726	0	0	0	0	0	ABOVE FOR RAISED CELLS 2 & 6															
W-1A	38	35	265,393	**379,133**	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
W-1B	38	35	378,327	**540,467**	20.9	21.7	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
W-1C	44	40	367,840	**525,486**	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4
W-1D	49	45	486,420	**694,886**	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8
W-3A	35	32	366,549	**523,642**	20.1	20.8	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6
W-3B	30	28	275,557	**393,653**	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9
W-3C	39	35	400,913	**572,733**	20.6	21.4	22.2	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1
W-3D	31	26	251,680	**359,543**	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
W-4A&B	34	31	150,040	**214,343**	14.3	16.3	17.0	17.7	18.4	19.1	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8
W-4C	38	34	7,000	**10,000**	16.6	18.9	19.7	20.5	21.3	22.1	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
W-4DX	25	23	0	**0**	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
W-5A	33	30	242,000	**345,714**	17.4	18.1	18.8	19.5	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3
W-5B	33	30	266,200	**380,286**	16.7	17.4	18.1	18.8	19.5	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3
W-5C	33	30	290,400	**414,857**	17.4	18.1	18.8	19.5	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3
W-5D	57	53	1,710,133	**2,443,048**	11.5	22.3	25.8	29.4	30.7	32.0	33.2	34.5	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8
EXISTING EXTERIOR DIKES					0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
W-1	25.0	22.9	369,050	527,214	10	10.5	11.0	11.4	11.9	12.39	12.39	12.39	12.39	12.39	12.39	12.39	12.39	12.39	12.39	12.39	12.39	12.39	12.39	12.39	12.39	12.39
W-5	47.0	43.0	763,195	1,090,279	1.0	8.1	15.2	17.6	19.95	20.9	21.8	22.7	23.6	24.56	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6
W-6	41.0	37.5	665,766	951,095	Plant	0.9	7.0	13.1	15.2	17.23	18.0	18.8	19.6	20.4	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2
W-7	52.0	47.6	2,072,585	2,960,835	0.5	0.5	0.5	0.5	15.5	15.5	15.5	15.5	Grade	Plant	1.0	9.0	16.9	19.6	22.2	23.2	24.3	25.3	26.3	27.3	27.3	27.3
W-8	0.0	0.0	0	0																						
W-2	43.3	39.6	0	0																						
W-3	43.3	39.6	0	0																						
W-4	43.3	39.6	0	0																						
embayment		130.0			96.2	96.2	96.2	96.2	96.2	96.2	96.2	96.2	96.2	96.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2
EXPANSION EXTERIOR DIKES					0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	1,509	**1,624**		68183543.43	3,200,000	3,200,000	1,264,517	756,590	735,530	513,631	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table D-2: POPLAR ISLAND DREDGED MATERIAL PLACEMENT AND CELL DEVELOPMENT PLAN

Cell No.	Cell Acreage	Cell Acreage	Cell Volume	Cell Capacity	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2060	2060
	(Nominal)	(Actual)																		
U-2	326	298	2,406,206	3,437,437																
		99			8.9	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
		99			8.9	8.9	8.9	8.9	8.9	8.9	8.9	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
		100			9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	16.0	16.0	16.0
U-6	243	222	1,793,583	2,562,261																
		111			10.0	10.0	10.0	10.0	10.0	10.0	10.0	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8
		111			10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	17.8	17.8	17.8
Up-10	270	247.1	11,359,359	16,227,656																
A		123.5			11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	19.8	19.8	19.8	19.8	19.8	19.8	19.8
B		123.5			11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	19.8	19.8
U-2	326	298	10,913,555	**15,590,792**																
U-6	243	222	11,926,728	**17,038,183**																
W-1A	38	35	265,393	**379,133**	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
W-1B	38	35	378,327	**540,467**	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
W-1C	44	40	367,840	**525,486**	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4
W-1D	49	45	486,420	**694,886**	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8
W-3A	35	32	366,549	**523,642**	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6
W-3B	30	28	275,557	**393,653**	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9
W-3C	39	35	400,913	**572,733**	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1
W-3D	31	26	251,680	**359,543**	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
W-4A&B	34	31	150,040	**214,343**	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8
W-4C	38	34	7,000	**10,000**	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
W-4DX	25	23	0	**0**	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
W-5A	33	30	242,000	**345,714**	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3
W-5B	33	30	266,200	**380,286**	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3
W-5C	33	30	290,400	**414,857**	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3
W-5D	57	53	1,710,133	**2,443,048**	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8
EXISTING EXTERIOR DIKES					0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
W-1	25.0	22.9	369,050	527,214	12.39	12.39	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	PI	97.5	97.5	97.5	97.5
W-5	47.0	43.0	763,195	1,090,279	24.6	24.6														
W-6	41.0	37.5	665,766	951,095	21.2	21.2														
W-7	52.0	47.6	2,072,585	2,960,835	27.3	27.3														
W-8	0.0	0.0	0	0																
W-2	43.3	39.6	0	0																
W-3	43.3	39.6	0	0																
W-4	43.3	39.6	0	0																
embayment		130.0			109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2
EXPANSION EXTERIOR DIKES					0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	1,509	**1,624**		68183543.43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table D-3: Annual Placement - 2072 Acres -50% Upland and 50% Wetland

Cell No.	Cell Acreage	Placement Acreage	Volume	Capacity	Construction of Dikes -4	-3	-2	-1	0	Year 1 1	Year 2 2	Year 3 3	Year 4 4	Year 5 5	Year 6 6	Year 7 7	Year 8 8	Year 9 9	Year 10 10	Year 11 11	Year 12 12	Year 13 13
Upland	932	853	52,281,099	**74,687,285**						2,148,769	1,833,400	1,738,789	1,698,241	1,698,241	1,698,241	1,698,241	1,998,593	1,938,523	1,845,414	1,792,101	1,745,171	1,721,706
U-1		105																	Grade	Grade	Plant	Plant
U-2		105																				
U-3		105																				
U-4		105																				
U-5		105																				
U-6		105																				
U-7		105																				
U-8		105																				
U-9		105																				
W-1	38.286	35.0	525,615	**750,879**			Mudflat			525,615	157,685	47,305	20,274	Grade	Plant	**21.8**	22.5	23.2	23.9	**24.6**	25.3	26.0
W-2	38.286	35.0	525,615	**750,879**						525,615	157,685	47,305	20,274	Grade	Plant	**0.5**	10.0	15.1	17.3	**19.4**	20.3	21.1
W-3	38.286	35.0	525,615	**750,879**						0	525,615	157,685	47,305	20,274	Grade	Plant	**0.5**	10.0	15.1	17.3	**19.4**	20.3
W-4	38.286	35.0	525,615	**750,879**						0	525,615	157,685	47,305	20,274	Grade	Plant	**0.5**	10.0	15.1	17.3	**19.4**	20.3
W-5	38.286	35.0	525,615	**750,879**						0	0	525,615	157,685	47,305	20,274	Grade	Plant	**0.5**	10.0	15.1	17.3	**19.4**
W-6	38.286	35.0	525,615	**750,879**						0	0	525,615	157,685	47,305	20,274	Grade	Plant	**0.5**	10.0	15.1	17.3	**19.4**
W-7	38.286	35.0	525,615	**750,879**						0	0	0	525,615	157,685	47,305	20,274	Grade	Plant	**0.5**	10.0	15.1	17.3
W-8	38.286	35.0	525,615	**750,879**						0	0	0	525,615	157,685	47,305	20,274	Grade	Plant	**0.5**	10.0	15.1	17.3
W-9	38.286	35.0	525,615	**750,879**						0	0	0	0	525,615	157,685	47,305	20,274	Grade	Plant	**0.5**	10.0	15.1
W-10	38.286	35.0	525,615	**750,879**						0	0	0	0	525,615	157,685	47,305	20,274	Grade	Plant	**0.5**	10.0	15.1
W-11	38.286	35.0	525,615	**750,879**						0	0	0	0	0	525,615	157,685	47,305	20,274	Grade	Plant	**0.5**	10.0
W-12	38.286	35.0	525,615	**750,879**						0	0	0	0	0	525,615	157,685	47,305	20,274	Grade	Plant	**0.5**	10.0
W-13	38.286	35.0	525,615	**750,879**						0	0	0	0	0	0	525,615	157,685	47,305	20,274	Grade	Plant	**0.5**
W-14	38.286	35.0	525,615	**750,879**						0	0	0	0	0	0	525,615	157,685	47,305	20,274	Grade	Plant	**0.5**
W-15	38.286	35.0	525,615	**750,879**						0	0	0	0	0	0	0	375,440	187,720	93,860	46,930	23,465	11,732
W-16	38.286	35.0	525,615	**750,879**						0	0	0	0	0	0	0	375,440	187,720	93,860	46,930	23,465	11,732
W-17	38.286	35.0	525,615	**750,879**						0	0	0	0	0	0	0	0	375,440	187,720	93,860	46,930	23,465
W-18	38.286	35.0	525,615	**750,879**						0	0	0	0	0	0	0	0	375,440	187,720	93,860	46,930	23,465
W-19	38.286	35.0	525,615	**750,879**						0	0	0	0	0	0	0	0	0	375,440	187,720	93,860	46,930
W-20	38.286	35.0	525,615	**750,879**						0	0	0	0	0	0	0	0	0	375,440	187,720	93,860	46,930
W-21	38.286	35.0	525,615	**750,879**						0	0	0	0	0	0	0	0	0	0	375,440	187,720	93,860
W-22	38.286	35.0	525,615	**750,879**						0	0	0	0	0	0	0	0	0	0	375,440	187,720	93,860
W-23	38.286	35.0	525,615	**750,879**						0	0	0	0	0	0	0	0	0	0	0	375,440	187,720
W-24	38.286	35.0	525,615	**750,879**						0	0	0	0	0	0	0	0	0	0	0	375,440	187,720
W-25	38.286	35.0	525,615	**750,879**						0	0	0	0	0	0	0	0	0	0	0	0	375,440
W-26	38.286	35.0	525,615	**750,879**						0	0	0	0	0	0	0	0	0	0	0	0	375,440
W-27	38.286	35.0	525,615	**750,879**						0	0	0	0	0	0	0	0	0	0	0	0	0
W-28	38.286	35.0	525,615	**750,879**						0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**2,004**			**95,711,904**						3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000

Table D-3: Annual Placement - 2072 Acres -50% Upland and 50% Wetland

Cell No.	Cell Acreage	Placement Acreage	Volume	Capacity	Year 14 14	Year 15 15	Year 16 16	Year 17 17	Year 18 18	Year 19 19	Year 20 20	Year 21 21	Year 22 22	Year 23 23	Year 24 24	Year 25 25	Year 26 26	Year 27 27	Year 28 28
Upland	932	853	52,281,099	**74,687,285**	1,698,241	2,449,121	2,824,560	3,012,280	3,106,140	3,153,070	3,200,000	3,200,000	3,199,949	3,199,915	2,867,160				
U-1		105			**3.2**	2.8	2.4	2.0	**1.6**	3.2	4.8	6.4	8.0	**9.6**	9.6	9.6	9.6	9.6	**9.6**
U-2		105				Grade	Grade	Plant	Plant	**3.2**	2.8	2.4	2.0	**1.6**	3.2	4.8	6.4	8.0	**9.6**
U-3		105				Grade	Grade	Plant	Plant	**3.2**	2.8	2.4	2.0	**1.6**	3.2	4.8	6.4	8.0	**9.6**
U-4		105							Grade	Grade	Plant	Plant	**3.2**	2.8	2.4	2.0	**1.6**	3.2	4.8
U-5		105							Grade	Grade	Plant	Plant	**3.2**	2.8	2.4	2.0	**1.6**	3.2	4.8
U-6		105											Grade	Grade	Plant	Plant	**3.2**	2.8	2.4
U-7		105											Grade	Grade	Plant	Plant	**3.2**	2.8	2.4
U-8		105																Grade	Grade
U-9		105																Grade	Grade
W-1	38.286	35.0	525,615	**750,879**	26.7	27.4	**28.1**	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1
W-2	38.286	35.0	525,615	**750,879**	22.0	22.8	**23.6**	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
W-3	38.286	35.0	525,615	**750,879**	21.1	22.0	22.8	**23.6**	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
W-4	38.286	35.0	525,615	**750,879**	21.1	22.0	22.8	**23.6**	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
W-5	38.286	35.0	525,615	**750,879**	20.3	21.1	22.0	22.8	**23.6**	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
W-6	38.286	35.0	525,615	**750,879**	20.3	21.1	22.0	22.8	**23.6**	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
W-7	38.286	35.0	525,615	**750,879**	**19.4**	20.3	21.1	22.0	22.8	**23.6**	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
W-8	38.286	35.0	525,615	**750,879**	**19.4**	20.3	21.1	22.0	22.8	**23.6**	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
W-9	38.286	35.0	525,615	**750,879**	17.3	**19.4**	20.3	21.1	22.0	22.8	**23.6**	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
W-10	38.286	35.0	525,615	**750,879**	17.3	**19.4**	20.3	21.1	22.0	22.8	**23.6**	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
W-11	38.286	35.0	525,615	**750,879**	15.1	17.3	**19.4**	20.3	21.1	22.0	22.8	**23.6**	23.6	23.6	23.6	23.6	23.6	23.6	23.6
W-12	38.286	35.0	525,615	**750,879**	15.1	17.3	**19.4**	20.3	21.1	22.0	22.8	**23.6**	23.6	23.6	23.6	23.6	23.6	23.6	23.6
W-13	38.286	35.0	525,615	**750,879**	10.0	15.1	17.3	**19.4**	20.3	21.1	22.0	22.8	**23.6**	23.6	23.6	23.6	23.6	23.6	23.6
W-14	38.286	35.0	525,615	**750,879**	10.0	15.1	17.3	**19.4**	20.3	21.1	22.0	22.8	**23.6**	23.6	23.6	23.6	23.6	23.6	23.6
W-15	38.286	35.0	525,615	**750,879**	11,732	Grade	Plant	**0.5**	10.0	15.1	17.3	**19.4**	20.3	21.1	22.0	22.8	**23.6**	23.6	23.6
W-16	38.286	35.0	525,615	**750,879**	11,732	Grade	Plant	**0.5**	10.0	15.1	17.3	**19.4**	20.3	21.1	22.0	22.8	**23.6**	23.6	23.6
W-17	38.286	35.0	525,615	**750,879**	11,732	23,465	Grade	Plant	**0.5**	10.0	15.1	17.3	**19.4**	20.3	21.1	22.0	22.8	**23.6**	23.6
W-18	38.286	35.0	525,615	**750,879**	11,732	23,465	Grade	Plant	**0.5**	10.0	15.1	17.3	**19.4**	20.3	21.1	22.0	22.8	**23.6**	23.6
W-19	38.286	35.0	525,615	**750,879**	23,465	23,465	23,465	Grade	Plant	**0.5**	10.0	15.1	17.3	**19.4**	20.3	21.1	22.0	22.8	**23.6**
W-20	38.286	35.0	525,615	**750,879**	23,465	23,465	23,465	Grade	Plant	**0.5**	10.0	15.1	17.3	**19.4**	20.3	21.1	22.0	22.8	**23.6**
W-21	38.286	35.0	525,615	**750,879**	46,930	46,930	23,465	23,465	Grade	Plant	**0.5**	10.0	15.1	17.3	**19.4**	20.3	21.1	22.0	22.8
W-22	38.286	35.0	525,615	**750,879**	46,930	46,930	23,465	23,465	Grade	Plant	**0.5**	10.0	15.1	17.3	**19.4**	20.3	21.1	22.0	22.8
W-23	38.286	35.0	525,615	**750,879**	93,860	93,860	46,930	23,465	23,465	Grade	Plant	**0.5**	10.0	15.1	17.3	**19.4**	20.3	21.1	22.0
W-24	38.286	35.0	525,615	**750,879**	93,860	93,860	46,930	23,465	23,465	Grade	Plant	**0.5**	10.0	15.1	17.3	**19.4**	20.3	21.1	22.0
W-25	38.286	35.0	525,615	**750,879**	187,720	187,720	93,860	46,930	23,465	23,465	Grade	Plant	**0.5**	10.0	15.1	17.3	**19.4**	20.3	21.1
W-26	38.286	35.0	525,615	**750,879**	187,720	187,720	93,860	46,930	23,465	23,465	Grade	Plant	**0.5**	10.0	15.1	17.3	**19.4**	20.3	21.1
W-27	38.286	35.0	525,615	**750,879**	375,440	375,440	187,720	93,860	46,930	23,465	23,465	Grade	Plant	**0.5**	10.0	15.1	17.3	**19.4**	20.3
W-28	38.286	35.0	525,615	**750,879**	375,440	375,440	187,720	93,860	46,930	23,465	23,465	Grade	Plant	**0.5**	10.0	15.1	17.3	**19.4**	20.3
Total	**2,004**			**95,711,904**	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,199,949	3,199,915	2,867,160	0	0	0	0

Table D-3: Annual Placement - 2072 Acres -50% Upland and 50% Wetland

Cell No.	Cell Acreage	Placement Acreage	Volume	Capacity	Year 29 29	Year 30 30	Year 31 31	Year 32 32	Year 33 33	Year 34 34	Year 35 35	Year 36 36	Year 37 37	Year 38 38	Year 39 39	Year 40 40	Year 41 41	Year 42 42	Year 43 43
Upland	932	853	52,281,099	**74,687,285**															
U-1		105			9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	**17.1**	17.1	17.1	17.1	17.1	17.1
U-2		105			9.6	9.6	9.6	9.6	**9.6**	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	**17.1**
U-3		105			9.6	9.6	9.6	9.6	**9.6**	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	**17.1**
U-4		105			6.4	8.0	**9.6**	9.6	9.6	9.6	9.6	**9.6**	9.6	9.6	9.6	9.6	9.6	9.6	9.6
U-5		105			6.4	8.0	**9.6**	9.6	9.6	9.6	9.6	**9.6**	9.6	9.6	9.6	9.6	9.6	9.6	9.6
U-6		105			2.0	**1.6**	3.2	4.8	6.4	8.0	**9.6**	9.6	9.6	9.6	9.6	**9.6**	9.6	9.6	9.6
U-7		105			2.0	**1.6**	3.2	4.8	6.4	8.0	**9.6**	9.6	9.6	9.6	9.6	**9.6**	9.6	9.6	9.6
U-8		105			Plant	Plant	**3.2**	2.8	2.4	2.0	**1.6**	3.2	4.8	6.4	8.0	**9.6**	9.6	9.6	9.6
U-9		105			Plant	Plant	**3.2**	2.8	2.4	2.0	**1.6**	3.2	4.8	6.4	8.0	**9.6**	9.6	9.6	9.6
W-1	38.286	35.0	525,615	**750,879**	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1
W-2	38.286	35.0	525,615	**750,879**	23.6	23.6	23.6	23.6	23.6	23.6	23.6								
W-3	38.286	35.0	525,615	**750,879**	23.6	23.6	23.6	23.6	23.6	23.6	23.6								
W-4	38.286	35.0	525,615	**750,879**	23.6	23.6	23.6	23.6	23.6	23.6	23.6	**134.5**	134.5	134.5	134.5	134.5	134.5	134.5	134.5
W-5	38.286	35.0	525,615	**750,879**	23.6	23.6	23.6	23.6	23.6	23.6	23.6								
W-6	38.286	35.0	525,615	**750,879**	23.6	23.6	23.6	23.6	23.6	23.6	23.6								
W-7	38.286	35.0	525,615	**750,879**	23.6	23.6	23.6	23.6	23.6	23.6	23.6								
W-8	38.286	35.0	525,615	**750,879**	23.6	23.6	23.6	23.6	23.6	23.6	23.6								
W-9	38.286	35.0	525,615	**750,879**	23.6	23.6	23.6	23.6	23.6	23.6	23.6								
W-10	38.286	35.0	525,615	**750,879**	23.6	23.6	23.6	23.6	23.6	23.6	23.6	**161.4**	161.4	161.4	161.4	161.4	161.4	161.4	161.4
W-11	38.286	35.0	525,615	**750,879**	23.6	23.6	23.6	23.6	23.6	23.6	23.6								
W-12	38.286	35.0	525,615	**750,879**	23.6	23.6	23.6	23.6	23.6	23.6	23.6								
W-13	38.286	35.0	525,615	**750,879**	23.6	23.6	23.6	23.6	23.6	23.6	23.6								
W-14	38.286	35.0	525,615	**750,879**	23.6	23.6	23.6	23.6	23.6	23.6	23.6								
W-15	38.286	35.0	525,615	**750,879**	23.6	23.6	23.6	23.6	23.6	23.6	23.6								
W-16	38.286	35.0	525,615	**750,879**	23.6	23.6	23.6	23.6	23.6	23.6	23.6	**161.4**	161.4	161.4	161.4	161.4	161.4	161.4	161.4
W-17	38.286	35.0	525,615	**750,879**	23.6	23.6	23.6	23.6	23.6	23.6	23.6								
W-18	38.286	35.0	525,615	**750,879**	23.6	23.6	23.6	23.6	23.6	23.6	23.6								
W-19	38.286	35.0	525,615	**750,879**	23.6	23.6	23.6	23.6	23.6	23.6	23.6								
W-20	38.286	35.0	525,615	**750,879**	23.6	23.6	23.6	23.6	23.6	23.6	23.6								
W-21	38.286	35.0	525,615	**750,879**	**23.6**	23.6	23.6	23.6	23.6	23.6	23.6								
W-22	38.286	35.0	525,615	**750,879**	**23.6**	23.6	23.6	23.6	23.6	23.6	23.6	**161.4**	161.4	161.4	161.4	161.4	161.4	161.4	161.4
W-23	38.286	35.0	525,615	**750,879**	22.8	**23.6**	23.6	23.6	23.6	23.6	23.6								
W-24	38.286	35.0	525,615	**750,879**	22.8	**23.6**	23.6	23.6	23.6	23.6	23.6								
W-25	38.286	35.0	525,615	**750,879**	22.0	22.8	**23.6**	23.6	23.6	23.6	23.6								
W-26	38.286	35.0	525,615	**750,879**	22.0	22.8	**23.6**	23.6	23.6	23.6	23.6	**107.6**	107.6	107.6	107.6	107.6	107.6	107.6	107.6
W-27	38.286	35.0	525,615	**750,879**	21.1	22.0	22.8	**23.6**	23.6	23.6	23.6								
W-28	38.286	35.0	525,615	**750,879**	21.1	22.0	22.8	**23.6**	23.6	23.6	23.6								
Total	**2,004**			**95,711,904**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table D-3: Annual Placement - 2072 Acres -50% Upland and 50% Wetland

Cell No.	Cell Acreage	Placement Acreage	Volume	Capacity	Year 44 44	Year 45 45	Year 46 46	Year 47 47	Year 48 48	Year 49 49	Year 50 50	Year 51 51	Year 52 52	Year 53 53	Year 54 54	Year 55 55	Year 56 60	Total Placed Quantity	
Upland	932	853	52,281,099	**74,687,285**														**55,465,870**	
U-1		105			17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1		
U-2		105			17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1		
U-3		105			17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1		
U-4		105			9.6	9.6	**17.1**	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1		
U-5		105			9.6	9.6	**17.1**	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1		
U-6		105			9.6	9.6	9.6	9.6	9.6	18.0	**17.1**	17.1	17.1	17.1	17.1	17.1	17.1		
U-7		105			9.6	9.6	9.6	9.6	9.6	18.0	**17.1**	17.1	17.1	17.1	17.1	17.1	17.1		
U-8		105			9.6	**9.6**	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	**17.1**	17.1		
U-9		105			9.6	**9.6**	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	**17.1**	17.1		
W-1	38.286	35.0	525,615	**750,879**	28.1	28.1	28.1	28.1	28.1	28.1	28.1	27.2	27.2	27.2	27.2	27.2	27.2	27.2	**751,073**
W-2	38.286	35.0	525,615	**750,879**															**750,983**
W-3	38.286	35.0	525,615	**750,879**															**750,962**
W-4	38.286	35.0	525,615	**750,879**	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	**750,962**
W-5	38.286	35.0	525,615	**750,879**															**750,941**
W-6	38.286	35.0	525,615	**750,879**															**750,922**
W-7	38.286	35.0	525,615	**750,879**															**750,879**
W-8	38.286	35.0	525,615	**750,879**															**750,879**
W-9	38.286	35.0	525,615	**750,879**	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	**751,264**
W-10	38.286	35.0	525,615	**750,879**															**751,264**
W-11	38.286	35.0	525,615	**750,879**															**751,240**
W-12	38.286	35.0	525,615	**750,879**															**751,240**
W-13	38.286	35.0	525,615	**750,879**															**751,217**
W-14	38.286	35.0	525,615	**750,879**															**751,217**
W-15	38.286	35.0	525,615	**750,879**	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	**751,146**
W-16	38.286	35.0	525,615	**750,879**															**751,146**
W-17	38.286	35.0	525,615	**750,879**															**762,855**
W-18	38.286	35.0	525,615	**750,879**															**762,855**
W-19	38.286	35.0	525,615	**750,879**															**774,563**
W-20	38.286	35.0	525,615	**750,879**															**774,563**
W-21	38.286	35.0	525,615	**750,879**	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	**798,005**
W-22	38.286	35.0	525,615	**750,879**															**798,005**
W-23	38.286	35.0	525,615	**750,879**															**844,911**
W-24	38.286	35.0	525,615	**750,879**															**844,911**
W-25	38.286	35.0	525,615	**750,879**															**938,747**
W-26	38.286	35.0	525,615	**750,879**	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	**938,747**
W-27	38.286	35.0	525,615	**750,879**															**1,126,444**
W-28	38.286	35.0	525,615	**750,879**															**1,126,444**
Total	**2,004**			**95,711,904**	0	0	0	0	0	0	0	0	0	0	0	0	0	**55,466,624**	

Table D-4: James Island Wetland ICUs

Index - evaluation criteria---- optimum/maximum use = 1
use probable, but not optimum = 0.75
use possible, some use = 0.5
minimum use = 0.25
no use/habitat value = 0

55%wetlands/45%uplands YEAR 1 13.56
Total= 2072
upland cell = 106.6
wetland cell= 35

	guild/community	WEIGHT	Sum of Weights	Index: upland 106.6	high marsh 7.0	low marsh 25.2	intertidal 2.8	Community Units: upland	high marsh	low marsh	intertidal	sum by guild	weighted sum by guild	Wetland weighted sum by guild
BIRDS	colonial nesting	12		0	0	0	0.5	0	0	0	1.4	1.4	0.17	0.17
"	waterfowl	10		0.75	0	0	0.5	79.95	0	0	1.4	81.35	8.14	0.14
"	colonial nesting	12	50	0.25	0	0	0	26.65	0	0	0	26.65	3.20	0.00
"	raptors	2		0.25	0	0	0	26.65	0	0	0	26.65	0.53	0.00
"	shorebirds	14		0	0	0	0	0	0	0	0	0	0.00	0.00
	rept/herps	2	2	0.5	0	0	1	53.3	0	0	2.8	56.1	1.12	0.06
	benthic invert.	20	20	0	0	0	0.25	0	0	0	0.7	0.7	0.14	0.14
FISH	resident/forage	23	28	0	0	0	0	0	0	0	0	0	0.00	0.00
"	commercial/pre	5		0	0	0	0	0	0	0	0	0	0.00	0.00
	TOTAL	100	100									Total Community Units	13.30	0.50

55%wetlands/45%uplands YEAR 5
Total= 2072
upland cell = 106.6
wetland cell= 35

	guild/community	WEIGHT	Sum of Weights	Index: upland 106.6	high marsh 7.0	low marsh 25.2	intertidal 2.8	Community Units: upland	high marsh	low marsh	intertidal	sum by guild	weighted sum by guild	Wetland weighted sum by guild
BIRDS	colonial nesting	12		0	0.75	0.25	0.5	0	5.25	6.3	1.4	12.95	1.55	1.55
"	waterfowl	10		0.75	0	1	0.5	79.95	0	25.2	1.4	106.55	10.66	2.66
"	colonial nesting	12	50	0.25	0.75	1	0	26.65	5.25	25.2	0	57.1	6.85	3.65
"	raptors	2		0.25	1	0.5	0	26.65	7	12.6	0	46.25	0.93	0.39
"	shorebirds	14		0	0.25	0.25	0	0	1.75	6.3	0	8.05	1.13	1.13
	rept/herps	2	2	0.5	1	1	1	53.3	7	25.2	2.8	88.3	1.77	0.70
	benthic invert.	20	20	0	0.5	0.5	0.5	0	3.5	12.6	1.4	17.5	3.50	3.50
FISH	resident/forage	23	28	0	0	0.75	0.75	0	0	18.9	2.1	21	4.83	4.83
"	commercial/pre	5		0	0	0.75	0.5	0	0	18.9	1.4	20.3	1.02	1.02
	TOTAL	100	100									Total Community Units	32.22	19.43

55%wetlands/45%uplands YEAR 10
Total= 2072
upland cell = 106.6
wetland cell= 35

	guild/community	WEIGHT	Sum of Weights	Index: upland 106.6	high marsh 7.0	low marsh 25.2	intertidal 2.8	Community Units: upland	high marsh	low marsh	intertidal	sum by guild	weighted sum by guild	Wetland weighted sum by guild
BIRDS	colonial nesting	12		0	0.75	0.25	0.5	0	5.25	6.3	1.4	12.95	1.55	1.55
"	waterfowl	10		0.75	1	1	0.5	79.95	7	25.2	1.4	113.55	11.36	3.36
"	colonial nesting	12	50	0.25	0.75	1	0	26.65	5.25	25.2	0	57.1	6.85	3.65
"	raptors	2		0.25	1	0.5	0	26.65	7	12.6	0	46.25	0.93	0.39
"	shorebirds	14		0	0.25	0.25	0	0	1.75	6.3	0	8.05	1.13	1.13
	rept/herps	2	2	0.5	1	1	1	53.3	7	25.2	2.8	88.3	1.77	0.70
	benthic invert.	20	20	0	1	1	1	0	7	25.2	2.8	35	7.00	7.00
FISH	resident/forage	23	28	0	0	0.75	0.75	0	0	18.9	2.1	21	4.83	4.83
"	commercial/pre	5		0	0	0.75	0.5	0	0	18.9	1.4	20.3	1.02	1.02
	TOTAL	100	100									Total Community Units	36.42	23.63

Table D-4: James Island Wetland ICUs

Single cell — 55%wetlands/45%uplands — YEAR 15+

Total= 2072
upland cell = 106.6
wetland cell= 35

	guild/community	WEIGHT	Sum of Weights	Index: upland 106.6	high marsh 7.0	low marsh 25.2	intertidal 2.8	Community Units: upland	high marsh	low marsh	intertidal	sum by guild	weighted sum by guild	Wetland weighted sum by guild
BIRDS	colonial nesting	12		0	0.75	0.25	0.5	0	5.25	6.3	1.4	12.95	1.55	1.55
"	waterfowl	10		0.75	1	1	0.5	79.95	7	25.2	1.4	113.55	11.36	3.36
"	colonial nesting	12	50	0.25	0.75	1	0	26.65	5.25	25.2	0	57.1	6.85	3.65
"	raptors	2		0.25	1	0.5	0	26.65	7	12.6	0	46.25	0.93	0.39
"	shorebirds	14		0	0.25	0.25	0	0	1.75	6.3	0	8.05	1.13	1.13
	rept/herps	2	2	0.5	1	1	1	53.3	7	25.2	2.8	88.3	1.77	0.70
	benthic invert.	20	20	0	1	1	1	0	7	25.2	2.8	35	7.00	7.00
FISH	resident/forage	23	28	0	0	0.75	0.75	0	0	18.9	2.1	21	4.83	4.83
"	commercial/pre	5		0	0	0.75	0.5	0	0	18.9	1.4	20.3	1.02	1.02
	TOTAL	100	100									Total Community Units	36.42	23.63

with int. dikes knocked down — 55%wetlands/45%uplands — YEAR 15+ — dikes knocked down to join 6 cells together

Total= 2072
upland cell = 106.6
wetland cell= 210

	guild/community	WEIGHT	Sum of Weights	Index: upland 106.6	high marsh 42.0	low marsh 151.2	intertidal 16.8	Community Units: upland	high marsh	low marsh	intertidal	sum by guild	weighted sum by guild	Wetland weighted sum by guild
BIRDS	colonial nesting	12		0	0.75	0.75	0.5	0	31.5	113.4	8.4	153.3	18.40	18.40
"	waterfowl	10		0.75	1	1	0.5	79.95	42	151.2	8.4	281.55	28.16	20.16
"	colonial nesting	12	50	0.25	0.75	1	0	26.65	31.5	151.2	0	209.35	25.12	21.92
"	raptors	2		0.25	1	0.5	0	26.65	42	75.6	0	144.25	2.89	2.35
"	shorebirds	14		0	0.25	0.75	0	0	10.5	113.4	0	123.9	17.35	17.35
	rept/herps	2	2	0.5	1	1	1	53.3	42	151.2	16.8	263.3	5.27	4.20
	benthic invert.	20	20	0	1	1	1	0	42	151.2	16.8	210	42.00	42.00
FISH	resident/forage	23	28	0	0	0.75	0.75	0	0	113.4	12.6	126	28.98	28.98
"	commercial/pre	5		0	0	0.75	0.5	0	0	113.4	8.4	121.8	6.09	6.09
	TOTAL	100	100									Total Community Units	174.24	161.45

with int. dikes knocked down — 55%wetlands/45%uplands — YEAR 15+ — dikes knocked down to join 5 cells together

Total= 2072
upland cell = 106.6
wetland cell= 175

	guild/community	WEIGHT	Sum of Weights	Index: upland 106.6	high marsh 35.0	low marsh 126.0	intertidal 14.0	Community Units: upland	high marsh	low marsh	intertidal	sum by guild	weighted sum by guild	Wetland weighted sum by guild
BIRDS	colonial nesting	12		0	0.75	0.75	0.5	0	26.25	94.5	7	127.75	15.33	15.33
"	waterfowl	10		0.75	1	1	0.5	79.95	35	126	7	247.95	24.80	16.80
"	colonial nesting	12	50	0.25	0.75	1	0	26.65	26.25	126	0	178.9	21.47	18.27
"	raptors	2		0.25	1	0.5	0	26.65	35	63	0	124.65	2.49	1.96
"	shorebirds	14		0	0.25	0.75	0	0	8.75	94.5	0	103.25	14.46	14.46
	rept/herps	2	2	0.5	1	1	1	53.3	35	126	14	228.3	4.57	3.50
	benthic invert.	20	20	0	1	1	1	0	35	126	14	175	35.00	35.00
FISH	resident/forage	23	28	0	0	0.75	0.75	0	0	94.5	10.5	105	24.15	24.15
"	commercial/pre	5		0	0	0.75	0.5	0	0	94.5	7	101.5	5.08	5.08
	TOTAL	100	100									Total Community Units	147.33	134.54

Table D-4: James Island Wetland ICUs

with int. dikes knocked down | 55%wetlands/45%uplands | YEAR 15+ | dikes knocked down to join 4 cells together

Total= 2072

upland cell = 106.6

wetland cell= 140

	guild/community	WEIGHT	Sum of Weights	Index: upland	Index: high marsh	Index: low marsh	Index: intertidal	Community Units: upland	Community Units: high marsh	Community Units: low marsh	Community Units: intertidal	sum by guild	weighted sum by guild	Wetland weighted sum by guild
				106.6	28.0	100.8	11.2	11363.56	784	10160.64	125.44			
BIRDS	colonial nesting	12		0	0.75	0.75	0.5	0	21	75.6	5.6	102.2	12.26	12.26
"	waterfowl	10		0.75	1	1	0.5	79.95	28	100.8	5.6	214.35	21.44	13.44
"	colonial nesting	12	50	0.25	0.75	1	0	26.65	21	100.8	0	148.45	17.81	14.62
"	raptors	2		0.25	1	0.5	0	26.65	28	50.4	0	105.05	2.10	1.57
"	shorebirds	14		0	0.25	0.75	0	0	7	75.6	0	82.6	11.56	11.56
	rept/herps	2	2	0.5	1	1	1	53.3	28	100.8	11.2	193.3	3.87	2.80
	benthic invert.	20	20	0	1	1	1	0	28	100.8	11.2	140	28.00	28.00
FISH	resident/forage	23	28	0	0	0.75	0.75	0	0	75.6	8.4	84	19.32	19.32
"	commercial/pre	5		0	0	0.75	0.5	0	0	75.6	5.6	81.2	4.06	4.06
	TOTAL	100	100									Total Community Units	120.42	107.63

with int. dikes knocked down | 55%wetlands/45%uplands | YEAR 5

Total= 2072

upland cell = 106.6

wetland cell= 35

	guild/community	WEIGHT	Sum of Weights	Index: upland	Index: high marsh	Index: low marsh	Index: intertidal	Community Units: upland	Community Units: high marsh	Community Units: low marsh	Community Units: intertidal	sum by guild	weighted sum by guild	Wetland weighted sum by guild
				106.6	7.0	25.2	2.8							
BIRDS	colonial nesting	12		0	0.75	0.75	0.5	0	5.25	18.9	1.4	25.55	3.07	3.07
"	waterfowl	10		0.75	0	1	0.5	79.95	0	25.2	1.4	106.55	10.66	2.66
"	colonial nesting	12	50	0.25	0.75	1	0	26.65	5.25	25.2	0	57.1	6.85	3.65
"	raptors	2		0.25	1	0.5	0	26.65	7	12.6	0	46.25	0.93	0.39
"	shorebirds	14		0	0.25	0.75	0	0	1.75	18.9	0	20.65	2.89	2.89
	rept/herps	2	2	0.5	1	1	1	53.3	7	25.2	2.8	88.3	1.77	0.70
	benthic invert.	20	20	0	0.5	0.5	0.5	0	3.5	12.6	1.4	17.5	3.50	3.50
FISH	resident/forage	23	28	0	0	0.75	0.75	0	0	18.9	2.1	21	4.83	4.83
"	commercial/pre	5		0	0	0.75	0.5	0	0	18.9	1.4	20.3	1.02	1.02
	TOTAL	100	100									Total Community Units	35.50	22.71

Table D-5: James Island Intertidal ICUs

Index - evaluation criteria----	optimum/maximum use = 1
	use probable, but not optimum = 0.75
	use possible, some use = 0.5
	minimum use = 0.25
	no use/habitat value = 0

55%wetlands/45%uplands **YEAR 1** 13.56

Total= 2072

upland cell = 106.6

wetland cell= 35

	guild/community	WEIGHT	Sum of Weights	Index: upland 106.6	Index: high marsh 0.0	Index: low marsh 0.0	Index: intertidal 35.0	Community Units: upland	Community Units: high marsh	Community Units: low marsh	Community Units: intertidal	*sum by guild*	weighted sum by guild	Intertidal weighted sum by guild
BIRDS	colonial nesting	12		0	0	0	1	0	0	0	35	35	4.20	4.20
"	waterfowl	10		0.75	0	0	1	79.95	0	0	35	114.95	11.50	3.50
"	colonial nesting	12	50	0.25	0	0	0.5	26.65	0	0	17.5	44.15	5.30	2.10
"	raptors	2		0.25	0	0	0	26.65	0	0	0	26.65	0.53	0.00
"	shorebirds	14		0	0	0	0.25	0	0	0	8.75	8.75	1.23	1.23
	rept/herps	2	2	0.5	0	0	1	53.3	0	0	35	88.3	1.77	0.70
	benthic invert.	20	20	0	0	0	0.1	0	0	0	3.5	3.5	0.70	0.70
FISH	resident/forage	23	28	0	0	0	1	0	0	0	35	35	8.05	8.05
"	commercial/pre	5		0	0	0	0.75	0	0	0	26.25	26.25	1.31	1.31
	TOTAL	100	100									Total Community Units	34.58	21.79

55%wetlands/45%uplands **YEAR 5**

Total= 2072

upland cell = 106.6

wetland cell= 35

	guild/community	WEIGHT	Sum of Weights	Index: upland 106.6	Index: high marsh 0.0	Index: low marsh 0.0	Index: intertidal 35.0	Community Units: upland	Community Units: high marsh	Community Units: low marsh	Community Units: intertidal	*sum by guild*	weighted sum by guild	Wetland weighted sum by guild
BIRDS	colonial nesting	12		0	0	0	1	0	0	0	35	35	4.20	4.20
"	waterfowl	10		0.75	0	0	1	79.95	0	0	35	114.95	11.50	3.50
"	colonial nesting	12	50	0.25	0	0	0.5	26.65	0	0	17.5	44.15	5.30	2.10
"	raptors	2		0.25	0	0	0	26.65	0	0	0	26.65	0.53	0.00
"	shorebirds	14		0	0	0	0.25	0	0	0	8.75	8.75	1.23	1.23
	rept/herps	2	2	0.5	0	0	1	53.3	0	0	35	88.3	1.77	0.70
	benthic invert.	20	20	0	0	0	0.5	0	0	0	17.5	17.5	3.50	3.50
FISH	resident/forage	23	28	0	0	0	1	0	0	0	35	35	8.05	8.05
"	commercial/pre	5		0	0	0	0.75	0	0	0	26.25	26.25	1.31	1.31
	TOTAL	100	100									Total Community Units	37.38	24.59

Table D-5: James Island Intertidal ICUs

55%wetlands/45%uplands YEAR 10
Total= 2072
upland cell = 106.6
wetland cell= 35

	guild/community	WEIGHT	Sum of Weights	Index: upland 106.6	Index: high marsh 0.0	Index: low marsh 0.0	Index: intertidal 35.0	Community Units: upland	Community Units: high marsh	Community Units: low marsh	Community Units: intertidal	Community Units: *sum by guild*	weighted sum by guild	Wetland weighted sum by guild
BIRDS	colonial nesting	12		0	0	0	1	0	0	0	35	35	4.20	4.20
"	waterfowl	10		0.75	0	0	1	79.95	0	0	35	114.95	11.50	3.50
"	colonial nesting	12	50	0.25	0	0	0.5	26.65	0	0	17.5	44.15	5.30	2.10
"	raptors	2		0.25	0	0	0	26.65	0	0	0	26.65	0.53	0.00
"	shorebirds	14		0	0	0	0.25	0	0	0	8.75	8.75	1.23	1.23
	rept/herps	2	2	0.5	0	0	1	53.3	0	0	35	88.3	1.77	0.70
	benthic invert.	20	20	0	0	0	1	0	0	0	35	35	7.00	7.00
FISH	resident/forage	23	28	0	0	0	1	0	0	0	35	35	8.05	8.05
"	commercial/pre	5		0	0	0	0.75	0	0	0	26.25	26.25	1.31	1.31
	TOTAL	100	100									Total Community Units	40.88	28.09

Single cell

55%wetlands/45%uplands YEAR 25
Total= 2072
upland cell = 106.6
wetland cell= 35

	guild/community	WEIGHT	Sum of Weights	Index: upland 106.6	Index: high marsh 0.0	Index: low marsh 0.0	Index: intertidal 35.0	Community Units: upland	Community Units: high marsh	Community Units: low marsh	Community Units: intertidal	Community Units: *sum by guild*	weighted sum by guild	Wetland weighted sum by guild
BIRDS	colonial nesting	12		0	0	0	1	0	0	0	35	35	4.20	4.20
"	waterfowl	10		0.75	0	0	1	79.95	0	0	35	114.95	11.50	3.50
"	colonial nesting	12	50	0.25	0	0	0.5	26.65	0	0	17.5	44.15	5.30	2.10
"	raptors	2		0.25	0	0	0	26.65	0	0	0	26.65	0.53	0.00
"	shorebirds	14		0	0	0	0.25	0	0	0	8.75	8.75	1.23	1.23
	rept/herps	2	2	0.5	0	0	1	53.3	0	0	35	88.3	1.77	0.70
	benthic invert.	20	20	0	0	0	1	0	0	0	35	35	7.00	7.00
FISH	resident/forage	23	28	0	0	0	1	0	0	0	35	35	8.05	8.05
"	commercial/pre	5		0	0	0	0.75	0	0	0	26.25	26.25	1.31	1.31
	TOTAL	100	100									Total Community Units	40.88	28.09

Table D-6: James Island Upland ICUs

Index - evaluation criteria----	optimum/maximum use = 1
	use probable, but not optimum = 0.75
	use possible, some use = 0.5
	minimum use = 0.25
	no use/habitat value = 0

50% wetlands/50%uplands — YEAR 1 — 13.56

Total= 2072

upland cell = 106.6

wetland cell= 35

	guild/community	WEIGHT	Sum of Weights	Index: upland 106.6	Index: high marsh 7.0	Index: low marsh 25.2	Index: intertidal 2.8	Community Units: upland	Community Units: high marsh	Community Units: low marsh	Community Units: intertidal	Community Units: *sum by guild*	weighted sum by guild	Wetland weighted sum by guild	Upland weighted sum by guild
BIRDS	colonial nesting	12		0	0	0	1	0	0	0	2.8	2.8	0.34	0.34	0
"	waterfowl	10		0	0	0	0.5	0	0	0	1.4	1.4	0.14	0.14	0
"	colonial nesting	12	50	0.25	0	0	0	26.65	0	0	0	26.65	3.20	0.00	3.198
"	raptors	2		0	0	0	0	0	0	0	0	0	0.00	0.00	0
"	shorebirds	14		0	0	0	0	0	0	0	0	0	0.00	0.00	0
	rept/herps	2	2	0	0	0	1	0	0	0	2.8	2.8	0.06	0.06	0
	benthic invert.	20	20	0	0	0	0.25	0	0	0	0.7	0.7	0.14	0.14	0
FISH	resident/forage	23	28	0	0	0	0	0	0	0	0	0	0.00	0.00	0
"	commercial/pre	5		0	0	0	0	0	0	0	0	0	0.00	0.00	0
	TOTAL	100	100									Total Community Units	3.87	0.67	3.198

50% wetlands/50%uplands — YEAR 5

Total= 2072

upland cell = 106.6

wetland cell= 35

	guild/community	WEIGHT	Sum of Weights	Index: upland 106.6	Index: high marsh 7.0	Index: low marsh 25.2	Index: intertidal 2.8	Community Units: upland	Community Units: high marsh	Community Units: low marsh	Community Units: intertidal	Community Units: *sum by guild*	weighted sum by guild	Wetland weighted sum by guild	Upland weighted sum by guild
BIRDS	colonial nesting	12		0	0.75	0.25	0.5	0	5.25	6.3	1.4	12.95	1.55	1.55	0
"	waterfowl	10		0	0	1	0.5	0	0	25.2	1.4	26.6	2.66	2.66	0
"	colonial nesting	12	50	0	0.75	1	0	0	5.25	25.2	0	30.45	3.65	3.65	0.00
"	raptors	2		0.25	1	0.5	0	26.65	7	12.6	0	46.25	0.93	0.39	0.53
"	shorebirds	14		0	0.25	0.25	0	0	1.75	6.3	0	8.05	1.13	1.13	0
	rept/herps	2	2	0.5	1	1	1	53.3	7	25.2	2.8	88.3	1.77	0.70	1.066
	benthic invert.	20	20	0	0.5	0.5	0.5	0	3.5	12.6	1.4	17.5	3.50	3.50	0
FISH	resident/forage	23	28	0	0	0.75	0.75	0	0	18.9	2.1	21	4.83	4.83	0
"	commercial/pre	5		0	0	0.75	0.5	0	0	18.9	1.4	20.3	1.02	1.02	0
	TOTAL	100	100									Total Community Units	21.03	19.43	1.60

50% wetlands/50%uplands — YEAR 10

Total= 2072

upland cell = 106.6

wetland cell= 35

	guild/community	WEIGHT	Sum of Weights	Index: upland 106.6	Index: high marsh 7.0	Index: low marsh 25.2	Index: intertidal 2.8	Community Units: upland	Community Units: high marsh	Community Units: low marsh	Community Units: intertidal	Community Units: *sum by guild*	weighted sum by guild	Wetland weighted sum by guild	Upland weighted sum by guild
BIRDS	colonial nesting	12		0	0.75	0.25	0.5	0	5.25	6.3	1.4	12.95	1.55	1.55	0
"	waterfowl	10		0.75	0.5	1	0.5	79.95	3.5	25.2	1.4	110.05	11.01	3.01	7.995
"	colonial nesting	12	50	0	0.75	1	0	0	5.25	25.2	0	30.45	3.65	3.65	0.00
"	raptors	2		0.25	1	0.5	0	26.65	7	12.6	0	46.25	0.93	0.39	0.53
"	shorebirds	14		0	0.25	0.25	0	0	1.75	6.3	0	8.05	1.13	1.13	0
	rept/herps	2	2	0.5	1	1	1	53.3	7	25.2	2.8	88.3	1.77	0.70	1.066
	benthic invert.	20	20	0	1	1	1	0	7	25.2	2.8	35	7.00	7.00	0
FISH	resident/forage	23	28	0	0	0.75	0.75	0	0	18.9	2.1	21	4.83	4.83	0
"	commercial/pre	5		0	0	0.75	0.5	0	0	18.9	1.4	20.3	1.02	1.02	0
	TOTAL	100	100									Total Community Units	32.88	23.28	9.59

Table D-6: James Island Upland ICUs

Single cell | 50% wetlands/50%uplands | YEAR 15

Total= 2072

upland cell = 106.6

wetland cell= 35

	guild/community	WEIGHT	Sum of Weights	Index: upland 106.6	high marsh 7.0	low marsh 25.2	intertidal 2.8	Community Units: upland	high marsh	low marsh	intertidal	sum by guild	weighted sum by guild	Wetland weighted sum by guild	Upland weighted sum by guild
BIRDS	colonial nesting	12		0	0.75	0.25	0.5	0	5.25	6.3	1.4	12.95	1.55	1.55	0
"	waterfowl	10		0.75	1	1	0.5	79.95	7	25.2	1.4	113.55	11.36	3.36	7.995
"	colonial nesting	12	50	0	0.75	1	0	0	5.25	25.2	0	30.45	3.65	3.65	0.00
"	raptors	2		0.25	1	0.5	0	26.65	7	12.6	0	46.25	0.93	0.39	0.53
"	shorebirds	14		0	0.25	0.25	0	0	1.75	6.3	0	8.05	1.13	1.13	0
	rept/herps	2	2	0.5	1	1	1	53.3	7	25.2	2.8	88.3	1.77	0.70	1.066
	benthic invert.	20	20	0	1	1	1	0	7	25.2	2.8	35	7.00	7.00	0
FISH	resident/forage	23	28	0	0	0.75	0.75	0	0	18.9	2.1	21	4.83	4.83	0
"	commercial/pre	5		0	0	0.75	0.5	0	0	18.9	1.4	20.3	1.02	1.02	0
	TOTAL	100	100									Total Community Units	33.23	23.63	9.59

Single cell | 50% wetlands/50%uplands | YEAR 25 | Upland only

Total= 2072

upland cell = 106.6

wetland cell= 35

	guild/community	WEIGHT	Sum of Weights	Index: upland 106.6	high marsh 7.0	low marsh 25.2	intertidal 2.8	Community Units: upland	high marsh	low marsh	intertidal	sum by guild	weighted sum by guild	Wetland weighted sum by guild	Upland weighted sum by guild
BIRDS	colonial nesting	12		0.5	0.75	0.25	0.5	53.3	5.25	6.3	1.4	66.25	7.95	1.55	6.396
"	waterfowl	10		0.75	1	1	0.5	79.95	7	25.2	1.4	113.55	11.36	3.36	7.995
"	colonial nesting	12	50	0	0.75	1	0	0	5.25	25.2	0	30.45	3.65	3.65	0.00
"	raptors	2		0.75	1	0.5	0	79.95	7	12.6	0	99.55	1.99	0.39	1.60
"	shorebirds	14		0	0.25	0.25	0	0	1.75	6.3	0	8.05	1.13	1.13	0
	rept/herps	2	2	0.5	1	1	1	53.3	7	25.2	2.8	88.3	1.77	0.70	1.066
	benthic invert.	20	20	0	1	1	1	0	7	25.2	2.8	35	7.00	7.00	0
FISH	resident/forage	23	28	0	0	0.75	0.75	0	0	18.9	2.1	21	4.83	4.83	0
"	commercial/pre	5		0	0	0.75	0.5	0	0	18.9	1.4	20.3	1.02	1.02	0
	TOTAL	100	100									Total Community Units	40.69	23.63	17.06

Table D-7: James Island – interim ICUs

YEAR 1

Total mudflat= 35

				Index					Community Units					
				bird island	high marsh	low marsh	intertidal	embayment						
	guild/community	**WEIGHT**	**Sum of Weights**	**0**	**0.0**	**0.0**	**35.0**	**0**	bird island	high marsh	low marsh	intertidal	embayment	**Wetland weighted sum by guild**
BIRDS	colonial nesting wading birds	12		0	0	0	1	0	0	0	0	35	0	**4.20**
"	waterfowl	10		0	0	0	0.5	0	0	0	0	17.5	0	**1.75**
"	colonial nesting waterbirds	12	50	0	0	0	0.5	0	0	0	0	17.5	0	**2.10**
"	raptors	2		0	0	0	0	0	0	0	0	0	0	**0.00**
"	shorebirds	14		0	0	0	0.25	0	0	0	0	8.75	0	**1.23**
	rept/herps	2	2	0	0	0	0.5	0	0	0	0	17.5	0	**0.35**
	benthic invert.	20	20	0	0	0	0.25	0	0	0	0	8.75	0	**1.75**
FISH	bottom feeders	12		0	0	0	0	0	0	0	0	0	0	**0.00**
	pelagic feeders	8	28	0	0	0	0	0	0	0	0	0	0	**0.00**
"	shallow water and marsh fee	8		0	0	0	0	0	0	0	0	0	0	**0.00**
	TOTAL	**100**	**100**											11.38

Upland cell- all water

YEAR 1

224.4

water 853

intertidal/mudflats

				Index				Community Units						
				upland	high marsh	low marsh	intertidal							
	guild/community	**WEIGHT**	**Sum of Weights**		**0.0**	**0.0**	**0.0**	upland	high marsh	low marsh	rtidal/mudf	***sum by guild***	**Intertidal weighted sum by guild**	**Impounded water ICU**
BIRDS	colonial nesting wading birds	12		0	0	0	1	0	0	0	0	0	**0.00**	
"	waterfowl	10		0.75	0	0	0.5	0	0	0	0	0	**0.00**	
"	colonial nesting waterbirds	12	50	0.25	0	0	0.5	0	0	0	0	0	**0.00**	
"	raptors	2		0.25	0	0	0	0	0	0	0	0	**0.00**	
"	shorebirds	14		0	0	0	0.25	0	0	0	0	0	**0.00**	
	rept/herps	2	2	0.5	0	0	0.5	0	0	0	0	0	**0.00**	
	benthic invert.	20	20	0	0	0	0.25	0	0	0	0	0	**0.00**	
FISH	resident/forage fish	23	28	0	0	0	0	0	0	0	0	0	**0.00**	
"	commercial/predatory/higher	5		0	0	0	0	0	0	0	0	0	**0.00**	
	TOTAL	**100**	**100**									Total Community Units	0.00	8.53

Table D-7: James Island – interim ICUs

Uplands- 20% open water/80% mudflat before dike YEAR 1

total 853
water 170.6
intertidal/mudflats 682.4

	guild/community	WEIGHT	Sum of Weights	Index: upland	Index: high marsh	Index: low marsh	Index: intertidal	Community Units: upland	Community Units: high marsh	Community Units: low marsh	Community Units: ertidal/mudf	sum by guild	Intertidal weighted sum by guild	Impounded water ICU
					0.0	0.0	682.4							
BIRDS	colonial nesting wading birds	12		0	0	0	1	0	0	0	682.4	682.4	81.89	
"	waterfowl	10		0.75	0	0	0.5	0	0	0	341.2	341.2	34.12	
"	colonial nesting waterbirds	12	50	0.25	0	0	0.75	0	0	0	511.8	511.8	61.42	
"	raptors	2		0.25	0	0	0	0	0	0	0	0	0.00	
"	shorebirds	14		0	0	0	0.75	0	0	0	511.8	511.8	71.65	
	rept/herps	2	2	0.5	0	0	0.5	0	0	0	341.2	341.2	6.82	
	benthic invert.	20	20	0	0	0	0.25	0	0	0	170.6	170.6	34.12	
FISH	resident/forage fish	23	28	0	0	0	0	0	0	0	0	0	0.00	
"	commercial/predatory/higher	5		0	0	0	0	0	0	0	0	0	0.00	
	TOTAL	100	100									mudflat	290.02	
												open wate	1.706	
											Total Community Units		291.7	

U-3 to U-8 YEAR 1

Total = 639.6
mudflat= 511.7
open water = 127.9

	guild/community	WEIGHT	Sum of Weights	Index: bird island	Index: high marsh	Index: low marsh	Index: intertidal	Index: embayment	Community Units: bird island	Community Units: high marsh	Community Units: low marsh	Community Units: intertidal	Community Units: embayment	Wetland weighted sum by guild
				0	0.0	0.0	511.7	0						
BIRDS	colonial nesting wading birds	12		0	0	0	1	0	0	0	0	511.68	0	61.40
"	waterfowl	10		0	0	0	0.5	0	0	0	0	255.84	0	25.58
"	colonial nesting waterbirds	12	50	0	0	0	1	0	0	0	0	511.68	0	61.40
"	raptors	2		0	0	0	0	0	0	0	0	0	0	0.00
"	shorebirds	14		0	0	0	1	0	0	0	0	511.68	0	71.64
	rept/herps	2	2	0	0	0	0.5	0	0	0	0	255.84	0	5.12
	benthic invert.	20	20	0	0	0	0.25	0	0	0	0	127.92	0	25.58
FISH	bottom feeders	12		0	0	0	0	0	0	0	0	0	0	0.00
	pelagic feeders	8	28	0	0	0	0	0	0	0	0	0	0	0.00
"	shallow water and marsh fee	8		0	0	0	0	0	0	0	0	0	0	0.00
	TOTAL	100	100										mudflat	250.72
													open water	1.28
													TOTAL	252.00

Table D-7: James Island – interim ICUs

U-5 to U-8

YEAR 1

Total = 426.4
mudflat= 341.1
open water = 85.3

				Index					Community Units					
				bird island	high marsh	low marsh	intertidal	embayment						
	guild/community	**WEIGHT**	**Sum of Weights**	**0**	**0.0**	**0.0**	**341.1**	**0**	bird island	high marsh	low marsh	intertidal	embayment	**Wetland weighted sum by guild**
BIRDS	colonial nesting wading birds	12		0	0	0	1	0	0	0	0	341.12	0	**40.93**
"	waterfowl	10		0	0	0	0.5	0	0	0	0	170.56	0	**17.06**
"	colonial nesting waterbirds	12	50	0	0	0	1	0	0	0	0	341.12	0	**40.93**
"	raptors	2		0	0	0	0	0	0	0	0	0	0	**0.00**
"	shorebirds	14		0	0	0	1	0	0	0	0	341.12	0	**47.76**
	rept/herps	2	2	0	0	0	0.5	0	0	0	0	170.56	0	**3.41**
	benthic invert.	20	20	0	0	0	0.25	0	0	0	0	85.28	0	**17.06**
FISH	bottom feeders	12		0	0	0	0	0	0	0	0	0	0	**0.00**
	pelagic feeders	8	28	0	0	0	0	0	0	0	0	0	0	**0.00**
"	shallow water and marsh fee	8		0	0	0	0	0	0	0	0	0	0	**0.00**
	TOTAL	**100**	**100**										mudflat	167.15
													open water	0.85
													TOTAL	168.00

U-7 to U-8

YEAR 1

Total = 213.4
mudflat= 170.7
open water = 42.7

				Index					Community Units					
				bird island	high marsh	low marsh	intertidal	embayment						
	guild/community	**WEIGHT**	**Sum of Weights**	**0**	**0.0**	**0.0**	**170.7**	**0**	bird island	high marsh	low marsh	intertidal	embayment	**Wetland weighted sum by guild**
BIRDS	colonial nesting wading birds	12		0	0	0	1	0	0	0	0	170.72	0	**20.49**
"	waterfowl	10		0	0	0	0.5	0	0	0	0	85.36	0	**8.54**
"	colonial nesting waterbirds	12	50	0	0	0	1	0	0	0	0	170.72	0	**20.49**
"	raptors	2		0	0	0	0	0	0	0	0	0	0	**0.00**
"	shorebirds	14		0	0	0	0.75	0	0	0	0	128.04	0	**17.93**
	rept/herps	2	2	0	0	0	0.5	0	0	0	0	85.36	0	**1.71**
	benthic invert.	20	20	0	0	0	0.25	0	0	0	0	42.68	0	**8.54**
FISH	bottom feeders	12		0	0	0	0	0	0	0	0	0	0	**0.00**
	pelagic feeders	8	28	0	0	0	0	0	0	0	0	0	0	**0.00**
"	shallow water and marsh fee	8		0	0	0	0	0	0	0	0	0	0	**0.00**
	TOTAL	**100**	**100**										mudflat	77.68
													open water	0.43
													TOTAL	78.10

Table D-7: James Island – interim ICUs

individual U

Total = 106.6

YEAR 1

				Index					Community Units					
				bird island	high marsh	low marsh	intertidal	embayment						
	guild/community	**WEIGHT**	**Sum of Weights**	**0**	**0.0**	**0.0**	**106.6**	**0**	bird island	high marsh	low marsh	intertidal	embayment	**Wetland weighted sum by guild**
BIRDS	colonial nesting wading birds	12		0	0	0	1	0	0	0	0	106.6	0	**12.79**
"	waterfowl	10		0	0	0	0.5	0	0	0	0	53.3	0	**5.33**
"	colonial nesting waterbirds	12	50	0	0	0	1	0	0	0	0	106.6	0	**12.79**
"	raptors	2		0	0	0	0	0	0	0	0	0	0	**0.00**
"	shorebirds	14		0	0	0	0.75	0	0	0	0	79.95	0	**11.19**
	rept/herps	2	2	0	0	0	0.5	0	0	0	0	53.3	0	**1.07**
	benthic invert.	20	20	0	0	0	0.25	0	0	0	0	26.65	0	**5.33**
FISH	bottom feeders	12		0	0	0	0	0	0	0	0	0	0	**0.00**
	pelagic feeders	8	28	0	0	0	0	0	0	0	0	0	0	**0.00**
"	shallow water and marsh fee	8		0	0	0	0	0	0	0	0	0	0	**0.00**
	TOTAL	**100**	**100**										mudflat	48.50
													open water	0.00
													TOTAL	48.50

Table D-8: MidBay 2014 Start Date Scenario

Key:
- Construction period
- Period of Analysis
- Dredge placement
- Open water interim benefits
- Grading
- Planting
- Existing island remnants

POPLAR ISLAND DREDGED MATERIAL PLACEMENT AND CELL DEVELOPMENT PLAN
EXISTING 1140-ACRE SITE WITH 550-ACRE EXPANSION WITH A NORTHERN ORIENTATION AT
50% WETLAND & 50% UPLAND PLUS 5-FOOT RAISING OF EXISTING CELLS 2 & 6 REFLECTING NMFS PROPOSAL

With Mid-Bay Placement and Normal Upland/Wetland Development Beginning in Year 2014

Note placement at both Poplar Island and MidBay in 2014 & 2016

ICU calculations Notes:
Interim Benefits for Poplar Island: Begin as of 2001, since dikes and cells are already existing
Interim benefits for PIES being in 2010, date for completion of the new dikes and initial construction of cells.
Existing Island preservation benefits begin 1 year after dike construction initiated in 2010
Interim benefits begin in 2014, once dredged placement begins and dikes are complete.

Note placement at both Poplar Island and MidBay in 2024

	Cell No.	Cell Acreage (Nominal)	Cell Acreage (Actual)	Cell Volume	Cell Capacity	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
POPLAR EXPANSION UPLANDS	U-2	326	296	2,406,206	3,437,437																												
			99																		Grade	Grade	Plant	Plant	3.0	2.6	2.2	1.9	1.5	3.0	4.5	5.9	7.4
			99			144.1	144.1	144.1	144.1	144.1	144.1	144.1	144.1	144.1	144.1	144.1	144.1	144.1	144.1	144.1	90.5	90.5	90.5	90.5	90.5	90.5	Grade	Grade	Plant	Plant	3.0	2.6	2.2
			100																								39.0	39.0	39.0	39.0	39.0	39.0	39.0
	U-6	243	222	1,793,583	2,562,261																												
			111			2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	75.9	75.9	75.9	75.9	75.9	75.9	75.9	75.9	75.9	75.9	Grade	Grade	Plant	Plant	3.3
			111																										47.3	47.3	47.3	47.3	47.3
	Up-10	270	247.1	11,359,359	16,227,656																												
	A		123.5												2.5	2.5	2.5	2.5	2.5	90.4	90.4	90.4	90.4	90.4	90.4	90.4	90.4	90.4	90.4	90.4	90.4	90.4	90.4
	B		123.5																														
EXISTING POPLAR ISLAND	U-2	326	296	10,913,555	15,590,792	overfill																					See above for final grading and planting of raised Cell 2						
	U-6	243	222	11,926,728	17,038,183							overfill							overfill							overfill							See above...
	(ICUs captured above with dike raising)																																
	W-1A	38	35	265,393	379,133	2.1	2.1	2.1	2.1	2.1	Grade	Plant	0.5	7.6	14.7	17.1	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-1B	38	35	378,327	540,467	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	Grade	Plant	0.7	7.4	14.0	16.3	18.5	19.3	20.1	20.9	21.7	22.5	22.5	22.5	22.5	22.5	22.5	22.5
	W-1C	44	40	367,840	525,486	5.5	5.5	5.5	5.5	5.5	5.5	Grade	Plant	0.7	8.6	16.5	19.1	21.7	22.7	23.6	24.6	25.5	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4
	W-1D	49	45	486,420	694,886	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	Grade	Plant	0.8	9.7	18.6	21.5	24.5	25.6	26.6	27.7	28.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8
	W-3A	35	32	366,549	523,642	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	Grade	Plant	0.5	7.0	13.4	15.6	17.8	18.5	19.3	20.1	20.8	21.6	21.6	21.6	21.6	21.6	21.6	21.6
	W-3B	30	28	275,557	393,653	0.5	0.5	0.5	0.5	0.5	0.5	Grade	Plant	0.4	6.1	11.8	13.7	15.5	16.2	16.9	17.6	18.2	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9
	W-3C	39	35	400,913	572,733	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	Grade	Plant	0.6	7.5	14.4	16.7	19.0	19.8	20.6	21.4	22.2	23.1	23.1	23.1	23.1	23.1	23.1
	W-3D	31	26	251,660	359,543	9.6	9.6	9.6	Grade	Plant	0.5	5.5	10.6	12.3	14.0	14.6	15.2	15.8	16.4	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
	W-4A&B	34	31	150,040	214,343	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	10.1	Grade	Plant	0.7	6.5	12.4	14.3	16.3	17.0	17.7	18.4	19.1	19.8	19.8	19.8
	W-4C	38	34	7,000	10,000	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	6.8	Grade	Plant	0.5	7.4	14.3	16.6	18.9	19.7	20.5	21.3	22.1	23.0	23.0	23.0
	W-4DX	25	23	0	0	3.4	3.4	Grade	Plant	0.5	4.8	9.2	10.6	12.0	12.6	13.1	13.6	14.2	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
	W-5A	33	30	242,000	345,714	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	Grade	Plant	0.4	6.5	12.6	14.6	16.7	17.4	18.1	18.8	19.5	20.3	20.3	20.3	20.3	20.3
	W-5B	33	30	266,200	380,286	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	Grade	Plant	0.4	6.5	12.6	14.6	16.7	17.4	18.1	18.8	19.5	20.3	20.3	20.3	20.3
	W-5C	33	30	290,400	414,857	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	Grade	Plant	0.4	6.5	12.6	14.6	16.7	17.4	18.1	18.8	19.5	20.3	20.3	20.3	20.3	20.3
	W-5D	57	53	1,710,133	2,443,048	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	Grade	Plant	0.8	11.5	22.3	25.8	29.4	30.7	32.0	33.2	34.5	35.8
	Existing Dikes					0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	ICUs at Poplar Island					72.7	72.7	69.2	59.6	60.1	62.8	66.2	73.2	74.8	97.7	106.9	113.6	109.7	146.0	156.0	183.4	211.8	241.2	264.2	286.2	305.7	315.4	323.5	328.4	332.0	334.8	336.0	337.3
POPLAR EXPANSION WETLANDS	W-1	25.0	22.9	369,050	527,214										0.2	0.2	0.2	0.2	0.2	5.3	Grade	Plant	0.7	4.2	7.7	8.9	10	10.5	11.0	11.4	11.9	12.39	12.39
	W-5	47.0	43.0	763,195	1,090,279										0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	14.0	14.0	14.0	Grade	Plant	1.0	8.1	15.2	17.6	19.95
	W-6	42.0	38.4	682,004	974,292										0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	14.0	14.0	14.0	Grade	Plant	0.9	7.0	13.1	15.2	17.23
	W-7	60.0	54.9	2,391,444	3,416,349										0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	15.5	15.5
	Embayment (consists of W-2,3,4)														1.3	1.3	1.3	1.3	1.3	1.3	1.3	54.6	54.6	54.6	54.6	96.2	96.2	96.2	96.2	96.2	96.2	96.2	96.2
	W-2	43.3	39.6	0	0																												
	W-3	43.3	39.6	0	0																												
	W-4	43.3	39.6	0	0																												
	Exterior dikes expansion														0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Total Dredged Placement at Poplar Island Sites:					8,184,231	1,100,000	828,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	1,648,769	3,200,000	1,333,400	3,200,000	0	3,200,000	0	3,200,000	0	3,200,000	1,698,241	3,200,000	3,200,000	3,200,000	0
	Total ICUs at Poplar Island Expansion					146.3	146.3	146.3	146.3	146.3	146.3	146.3	146.3	146.3	152.1	152.1	152.1	152.1	225.8	318.8	260.0	313.3	313.9	344.6	351.1	393.5	314.7	314.8	288.1	303.4	321.6	342.6	261.0
	Total Poplar Island and PIES ICUs					219.0	219.0	215.5	205.9	206.4	209.2	212.5	219.5	221.1	249.8	259.0	265.7	261.7	371.8	474.8	443.4	525.0	555.1	608.8	637.2	699.2	630.1	638.3	616.6	635.3	656.3	678.6	598.3
															Placement Years at Mid-Bay Site ⇒				Year 1		Year 2		Year 3		Year 4		Year 5		Year 6				Year 7
MID-BAY (JAMES ISLAND PLACEMENT)	Upland	932	853	52,281,099	74,687,285														500,000		500,000		1,738,789		1,698,241		1,698,241		0				1,698,241
	U-1		106.6										DIKE CONSTRUCTION BEGINS																				
	U-2		106.6																														
	U-3		106.6																8.5	8.5	8.5	8.5	291.7	291.7	291.7	291.7	291.7	291.7	291.7	291.7	291.7	291.7	291.7
	U-4		106.6																														
	U-5		106.6																														
	U-6		106.6																														
	U-7		106.6																														
	U-8		106.6																														
	W-1	38.286	35.0	525,615	750,879														0.3	0.3	0.3	0.3	0.3	11.4	11.4	11.4	Grade	Plant	21.8	22.5	23.2	23.9	24.6
	W-2	38.286	35.0	525,615	750,879														0.3	0.3	0.3	0.3	0.3	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4
	W-3	38.286	35.0	525,615	750,879														0.3	0.3	0.3	0.3	0.3	0.3	0.3	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1
	W-4	38.286	35.0	525,615	750,879														0.3	0.3	0.3	0.3	0.3	0.3	0.3	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1
	W-5	38.286	35.0	525,615	750,879														0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	11.4	11.4	11.4	Grade
	W-6	38.286	35.0	525,615	750,879														0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	11.4	11.4	11.4	Grade
	W-7	38.286	35.0	525,615	750,879														0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	11.4	11.4
	W-8	38.286	35.0	525,615	750,879														0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	11.4	11.4
	W-9	38.286	35.0	525,615	750,879														0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	11.4
	W-10	38.286	35.0	525,615	750,879														0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	11.4
	W-11	38.286	35.0	525,615	750,879														0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-12	38.286	35.0	525,615	750,879														0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-13	38.286	35.0	525,615	750,879														0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-14	38.286	35.0	525,615	750,879														0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-15	38.286	35.0	525,615	750,879														0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-16	38.286	35.0	525,615	750,879														0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-17	38.286	35.0	525,615	750,879														0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-18	38.286	35.0	525,615	750,879														0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-19	38.286	35.0	525,615	750,879														0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-20	38.286	35.0	525,615	750,879														0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-21	38.286	35.0	525,615	750,879														0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-22	38.286	35.0	525,615	750,879														0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-23	38.286	35.0	525,615	750,879														0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-24	38.286	35.0	525,615	750,879														0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-25	38.286	35.0	525,615	750,879														0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-26	38.286	35.0	525,615	750,879														0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-27	38.286	35.0	525,615	750,879														0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-28	38.286	35.0	525,615	750,879														0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	Existing Island Remnants													10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
	ICUs at James Island											0.0	0.0	10.0	10.0	10.0	10.0	10.0	26.9	26.9	26.9	26.9	310.1	332.3	332.3	354.5	331.7	331.7	331.2	363.6	370.4	414.4	426.9
		2,004	1,834		68,662,254	219.0	219.0	215.5	205.9	206.4	209.2	212.5	219.5	231.1	259.8	269.0	275.7	271.7	398.7	501.7	470.3	551.9	865.2	941.2	969.6	1,053.7	961.9	970.1	947.8	998.9	1,026.7	1,093.0	1,025.2

Table D-8: MidBay 2014 Start Date Scenario

Key:
- Construction period
- Period of Analysis
- Dredge placement
- Open water interim benefits
- Grading
- Planting
- Existing island remnants

Note placement at both Poplar Island and MidBay in 2030

	Cell No.	Cell Acreage (Nominal)	Cell Acreage (Actual)	Cell Volume	Cell Capacity	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056
POPLAR EXPANSION UPLANDS	U-2	326	298	2,406,206	3,437,437																												
			99			8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
			99			1.9	1.5	3.0	4.5	5.9	7.4	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	15.8	15.8	15.8	15.8	15.8	15.8	15.8
			100			39.0	Grade	Grade	Plant	Plant	3.0	2.6	2.3	1.9	1.5	3.0	4.5	6.0	7.5	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	16.0
	U-6	243	222	1,793,583	2,562,261																												
			111			2.9	2.5	2.1	1.7	3.3	5.0	6.7	8.3	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	17.8	17.8	17.8	17.8	17.8	17.8	17.8
			111			47.3	Grade	Grade	Plant	Plant	3.3	2.9	2.5	2.1	1.7	3.3	5.0	6.7	8.3	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	17.8
	Up-10	270	247.1	11,359,359	16,227,656																												
	A		123.5			90.4	90.4	Grade	Grade	Plant	Plant	3.7	3.2	2.8	2.3	1.9	3.7	5.6	7.4	9.3	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1
	B		123.5					56.2	56.2	Grade	Grade	Plant	Plant	3.7	3.2	2.8	2.3	1.9	3.7	5.6	7.4	9.3	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1
EXISTING POPLAR ISLAND	U-2	326	298	10,913,555	15,590,792																												
	U-6	243	222	11,926,728	17,038,183	...for final grading and planting of raised Cell 6																											
	(ICUs captured above with dike raising)																																
	W-1A	38	35	265,393	379,133	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-1B	38	35	378,327	540,467	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
	W-1C	44	40	367,840	525,486	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4
	W-1D	49	45	486,420	694,886	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8
	W-3A	35	32	366,549	523,642	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6
	W-3B	30	28	275,557	393,653	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9
	W-3C	39	35	400,913	572,733	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1
	W-3D	31	26	251,680	359,543	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
	W-4A&B	34	31	150,040	214,343	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8
	W-4C	38	34	7,000	10,000	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
	W-4DX	25	23	0	0	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
	W-5A	33	30	242,000	345,714	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3
	W-5B	33	30	266,200	380,286	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3
	W-5C	33	30	290,400	414,857	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3
	W-5D	57	53	1,710,133	2,443,048	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8
	Existing Dikes					0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	ICUs at Poplar Island					337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3
POPLAR EXPANSION WETLANDS	W-1	25.0	22.9	369,050	527,214	12.39	12.39	12.39	12.39	12.39	12.39	12.39	12.39	12.39	12.39	12.39	12.39	12.39	12.39	12.39	12.39	12.39	12.4										
	W-5	47.0	43.0	763,195	1,090,279	20.9	21.8	22.7	23.6	24.56	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6										
	W-6	42.0	38.4	682,004	974,292	18.0	18.8	19.6	20.4	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2										
	W-7	60.0	54.9	2,391,444	3,416,349	15.5	15.5	Grade	Plant	1.0	9.0	16.9	19.6	22.2	23.2	24.3	25.3	26.3	27.3	27.3	27.3	27.3	27.3	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5
	Embayment (consists of W-2,3,4)					96.2	96.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2
	W-2	43.3	39.6	0	0																												
	W-3	43.3	39.6	0	0																												
	W-4	43.3	39.6	0	0																												
	Exterior dikes expansion					0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Total Dredged Placement at Poplar Island Sites:					2,268,570	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total ICUs at Poplar Island Expansion					353.9	268.5	234.6	237.3	187.0	204.5	218.5	221.5	228.3	227.6	230.9	236.5	242.0	249.9	256.8	267.5	269.3	271.2	283.2	283.2	283.2	297.9	297.9	297.8	297.8	297.8	297.8	312.6
	Total Poplar Island and PIES ICUs					691.1	605.8	571.9	574.6	524.3	541.8	555.8	558.8	565.6	564.9	568.2	573.8	579.3	587.2	594.1	604.7	606.6	608.5	620.5	620.5	620.5	635.2	635.2	635.1	635.1	635.1	635.1	649.9
							Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	Year 31	Year 32	Year 33	Year 34
	Upland	932	853	52,281,099	74,687,285		1,698,241	1,698,241	1,998,593	1,938,523	1,845,414	1,792,101	1,745,171	2,472,586	2,824,560	3,012,280	3,106,140	3,153,070	3,176,535	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	260,884	0	0
MID-BAY (JAMES ISLAND PLACEMENT)	U-1		106.6			291.7	291.7	48.5	48.5	48.5	48.5	Grade	Grade	Plant	Plant	3.2	2.8	2.4	2.0	1.6	3.2	4.8	6.4	8.0	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6
	U-2		106.6					48.5	48.5	48.5	48.5	Grade	Grade	Plant	Plant	3.2	2.8	2.4	2.0	1.6	3.2	4.8	6.4	8.0	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6
	U-3		106.6					252.0	252.0	252.0	252.0	252.0	252.0	252.0	252.0	252.0	252.0	252.0	Grade	Grade	Plant	Plant	3.2	2.8	2.4	2.0	1.6	3.2	4.8	6.4	8.0	9.6	9.6
	U-4		106.6																Grade	Grade	Plant	Plant	3.2	2.8	2.4	2.0	1.6	3.2	4.8	6.4	8.0	9.6	9.6
	U-5		106.6																168.0	168.0	168.0	168.0	168.0	168.0	Grade	Grade	Plant	Plant	3.2	2.8	2.4	2.0	1.6
	U-6		106.6																						Grade	Grade	Plant	Plant	3.2	2.8	2.4	2.0	1.6
	U-7		106.6																						78.1	78.1	78.1	78.1	78.1	78.1	78.1	78.1	78.1
	U-8		106.8																														
	W-1	38.286	35.0	525,615	750,879	25.3	26.0	26.7	27.4	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1
	W-2	38.286	35.0	525,615	750,879	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-3	38.286	35.0	525,615	750,879	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-4	38.286	35.0	525,615	750,879	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-5	38.286	35.0	525,615	750,879	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-6	38.286	35.0	525,615	750,879	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-7	38.286	35.0	525,615	750,879	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-8	38.286	35.0	525,615	750,879	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-9	38.286	35.0	525,615	750,879	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-10	38.286	35.0	525,615	750,879	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-11	38.286	35.0	525,615	750,879	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-12	38.286	35.0	525,615	750,879	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-13	38.286	35.0	525,615	750,879	0.3	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-14	38.286	35.0	525,615	750,879	0.3	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-15	38.286	35.0	525,615	750,879	0.3	0.3	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-16	38.286	35.0	525,615	750,879	0.3	0.3	0.3	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-17	38.286	35.0	525,615	750,879	0.3	0.3	0.3	0.3	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-18	38.286	35.0	525,615	750,879	0.3	0.3	0.3	0.3	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-19	38.286	35.0	525,615	750,879	0.3	0.3	0.3	0.3	0.3	0.3	0.3	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-20	38.286	35.0	525,615	750,879	0.3	0.3	0.3	0.3	0.3	0.3	0.3	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-21	38.286	35.0	525,615	750,879	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6
	W-22	38.286	35.0	525,615	750,879	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6
	W-23	38.286	35.0	525,615	750,879	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6
	W-24	38.286	35.0	525,615	750,879	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6
	W-25	38.286	35.0	525,615	750,879	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6
	W-26	38.286	35.0	525,615	750,879	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6
	W-27	38.286	35.0	525,615	750,879	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6
	W-28	38.286	35.0	525,615	750,879	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6
	Existing Island Remnants					10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
	ICUs at James Island					455.0	461.3	529.0	531.8	558.7	572.1	490.1	552.9	617.3	682.4	713.8	727.9	718.0	638.8	652.1	694.8	740.2	791.0	815.7	742.0	752.2	759.8	769.8	784.4	790.2	794.3	796.6	795.8
		2,004	1,834		68,662,254	1,146.1	1,067.1	1,100.9	1,106.4	1,083.0	1,113.8	1,045.9	1,111.7	1,182.9	1,247.3	1,282.0	1,301.6	1,297.4	1,226.0	1,246.2	1,299.5	1,346.9	1,399.5	1,436.2	1,362.4	1,372.7	1,395.0	1,404.9	1,419.5	1,425.3	1,429.4	1,431.8	1,445.7
																		Total ICUs for all projects:	474	517	562	613	638	654	664	672	682	696	702	706	709	708

Table D-8: MidBay 2014 Start Date Scenario

Key:
- Construction period
- Period of Analysis
- Dredge placement
- Open water interim benefits
- Grading
- Planting
- Existing island remnants

	Cell No.	Cell Acreage (Nominal)	Cell Acreage (Actual)	Cell Volume	Cell Capacity	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085
POPLAR EXPANSION UPLANDS	U-2	326	298	2,406,206	3,437,437																													
			99			15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
			99			15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
			100			16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0
	U-6	243	222	1,793,583	2,562,261																													
			111			17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8
			111			17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8
	Up-10	270	247.1	11,359,359	16,227,656																													
	A		123.5			11.1	11.1	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8
	B		123.5			11.1	11.1	11.1	11.1	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8
EXISTING POPLAR ISLAND	U-2	326	298	10,913,555	**15,590,792**																													
	U-6	243	222	11,926,728	**17,038,183**																													
	(ICUs captured above with dike raising)																																	
	W-1A	38	35	265,393	**379,133**	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-1B	38	35	378,327	**540,467**	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
	W-1C	44	40	367,840	**525,486**	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4
	W-1D	49	45	486,420	**694,886**	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8
	W-3A	35	32	366,549	**523,642**	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6
	W-3B	30	28	275,557	**393,653**	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9
	W-3C	39	35	400,913	**572,733**	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1
	W-3D	31	26	251,680	**359,543**	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
	W-4A&B	34	31	150,040	**214,343**	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8
	W-4C	38	34	7,000	**10,000**	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
	W-4DX	25	23	0	**0**	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
	W-5A	33	30	242,000	**345,714**	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3
	W-5B	33	30	266,200	**380,286**	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3
	W-5C	33	30	290,400	**414,857**	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3
	W-5D	57	53	1,710,133	**2,443,048**	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8
	Existing Dikes					0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	ICUs at Poplar Island					337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3
POPLAR EXPANSION WETLANDS	W-1	25.0	22.9	369,050	527,214																													
	W-5	47.0	43.0	763,195	1,090,279																													
	W-6	42.0	38.4	682,004	974,292																													
	W-7	60.0	54.9	2,391,444	3,416,349	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5
	Embayment (consists of W-2,3,4)					109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2
	W-2	43.3	39.6	0	0																													
	W-3	43.3	39.6	0	0																													
	W-4	43.3	39.6	0	0																													
	Exterior dikes expansion					0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Total Dredged Placement at Poplar Island Sites:					68,661,211																												
	Total ICUs at Poplar Island Expansion					312.6	312.6	321.3	321.3	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0
	Total Poplar Island and PIES ICUs					649.9	649.9	658.6	658.6	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3
						Year 35	Year 36	Year 37	Year 38	Year 39	Year 40	Year 41	Year 42	Year 43	Year 44	Year 45	Year 46								Year 47									
MID-BAY (JAMES ISLAND PLACEMENT)	Upland	932	853	52,281,099	**74,687,285**																				0									
	U-1		106.6			9.6	9.6	9.6	9.6	9.6	9.6	**17.1**	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1
	U-2		106.6			9.6	9.6	9.6	9.6	9.6	9.6	**17.1**	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1
	U-3		106.6			9.6	9.6	9.6	**9.6**	9.6	9.6	9.6	9.6	**17.1**	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1
	U-4		106.6			9.6	9.6	9.6	**9.6**	9.6	9.6	9.6	9.6	**17.1**	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1
	U-5		106.6			3.2	4.8	6.4	8.0	**9.6**	9.6	9.6	9.6	9.6	**9.6**	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	**17.1**	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1
	U-6		106.6			3.2	4.8	6.4	8.0	**9.6**	9.6	9.6	9.6	9.6	**9.6**	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	**17.1**	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1
	U-7		106.6			Grade	Grade	Plant	Plant	**3.2**	2.8	2.4	2.0	**1.6**	3.2	4.8	6.4	8.0	**9.6**	9.6	9.6	9.6	9.6	**9.6**	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	**17.1**
	U-8		106.8			Grade	Grade	Plant	Plant	**3.2**	2.8	2.4	2.0	**1.6**	3.2	4.8	6.4	8.0	**9.6**	9.6	9.6	9.6	9.6	**9.6**	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	**17.1**
	W-1	38.286	35.0	525,615	**750,879**	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1
	W-2	38.286	35.0	525,615	**750,879**	23.6	23.6																											
	W-3	38.286	35.0	525,615	**750,879**	23.6	23.6																											
	W-4	38.286	35.0	525,615	**750,879**	23.6	23.6																											
	W-5	38.286	35.0	525,615	**750,879**	23.6	23.6																											
	W-6	38.286	35.0	525,615	**750,879**	23.6	23.6	134.5	134.5	134.5	134.5	23.6	23.6	23.6	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5
	W-7	38.286	35.0	525,615	**750,879**	23.6	23.6																											
	W-8	38.286	35.0	525,615	**750,879**	23.6	23.6																											
	W-9	38.286	35.0	525,615	**750,879**	23.6	23.6																											
	W-10	38.286	35.0	525,615	**750,879**	23.6	23.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6
	W-11	38.286	35.0	525,615	**750,879**	23.6	23.6																											
	W-12	38.286	35.0	525,615	**750,879**	23.6	23.6																											
	W-13	38.286	35.0	525,615	**750,879**	23.6	23.6																											
	W-14	38.286	35.0	525,615	**750,879**	23.6	23.6																											
	W-15	38.286	35.0	525,615	**750,879**	23.6	23.6																											
	W-16	38.286	35.0	525,615	**750,879**	23.6	23.6	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4
	W-17	38.286	35.0	525,615	**750,879**	23.6	23.6																											
	W-18	38.286	35.0	525,615	**750,879**	23.6	23.6																											
	W-19	38.286	35.0	525,615	**750,879**	23.6	23.6																											
	W-20	38.286	35.0	525,615	**750,879**	23.6	23.6																											
	W-21	38.286	35.0	525,615	**750,879**	23.6	23.6																											
	W-22	38.286	35.0	525,615	**750,879**	23.6	23.6	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4
	W-23	38.286	35.0	525,615	**750,879**	23.6	23.6																											
	W-24	38.286	35.0	525,615	**750,879**	23.6	23.6																											
	W-25	38.286	35.0	525,615	**750,879**	23.6	23.6																											
	W-26	38.286	35.0	525,615	**750,879**	23.6	23.6																											
	W-27	38.286	35.0	525,615	**750,879**	23.6	23.6																											
	W-28	38.286	35.0	525,615	**750,879**	23.6	23.6	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4
	Existing Island Remnants					10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
	ICUs at James Island					720.9	724.1	815.8	819.0	828.6	827.8	731.0	730.2	744.3	858.4	861.6	864.8	868.0	871.2	871.2	871.2	871.2	871.2	871.2	871.2	886.2	886.2	886.2	886.2	886.2	886.2	886.2	886.2	901.2
		2,004	1,834		**68,662,254**	**1,370.8**	**1,374.0**	**1,474.4**	**1,477.6**	**1,495.9**	**1,495.1**	**1,398.3**	**1,397.5**	**1,411.6**	**1,525.7**	**1,528.9**	**1,532.1**	**1,535.3**	**1,538.5**	**1,538.5**	**1,538.5**	**1,538.5**	**1,538.5**	**1,538.5**	**1,538.5**	**1,553.4**	**1,553.4**	**1,553.4**	**1,553.4**	**1,553.4**	**1,553.4**	**1,553.4**	**1,553.4**	**1,553.4**	**1,568.4**
						711	714	806	809	819	818	721	720	734	848	852	855	858	861	861	861	861	861	861	861	876	876	876	876	876	876	876	876	876	891

Table D-9: MidBay 2018 Start Date Scenario

Key:
- Construction period
- Period of Analysis
- Dredge placement
- 3.1 Open water interim benefits
- Grading
- Planting
- Existing island remnants

POPLAR ISLAND DREDGED MATERIAL PLACEMENT AND CELL DEVELOPMENT PLAN
EXISTING 1140-ACRE SITE WITH 550-ACRE EXPANSION WITH A NORTHERN ORIENTATION AT
50% WETLAND & 50% UPLAND PLUS 5-FOOT RAISING OF EXISTING CELLS 2 & 6 REFLECTING NMFS PROPOSAL

With Mid-Bay Placement and Normal Upland/Wetland Development Beginning in Year 2018

Note placement at both Poplar Island and MidBay in 2027

	Cell No.	Cell Acreage (Nominal)	Cell Acreage (Actual)	Cell Volume	Cell Capacity	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
POPLAR EXPANSION UPLANDS	U-2	326	298	2,406,206	3,437,437																														
			99.0																		Grade	Grade	Plant	Plant	3.0	2.6	2.2	1.9	1.5	3.0	4.5	5.9	7.4	8.9	8.9
			99.0																								Grade	Grade	Plant	Plant	3.0	2.6	2.2	1.9	1.5
			100.0			144.1	144.1	144.1	144.1	144.1	144.1	144.1	144.1	144.1	144.1	144.1	144.1	144.1	144.1	144.1	90.5	90.5	90.5	90.5	90.5	90.5	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	Grade
	U-6	243	222	1,793,583	2,582,261																										overfill				
			111.0			2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	75.9	75.9	75.9	75.9	75.9	75.9	75.9	75.9	75.9	75.9	Grade	Grade	Plant	Plant	3.3	2.9	2.5
			111.0																										47.3	47.3	47.3	47.3	47.3	47.3	47.3
	Up-10	270	247.1	11,359,359	16,227,656																														
	A		123.5												2.5	2.5	2.5	2.5	2.5	90.4	90.4	90.4	90.4	90.4	90.4	90.4	90.4	90.4	90.4	90.4	90.4	90.4	90.4	90.4	Grade
	B		123.5																																56.2
EXISTING POPLAR ISLAND	U-2	326	298	10,913,555	15,590,792	overfill																	See above for final grading and planting of raised Cell 2												
	U-6	243	222	11,926,728	17,038,183							overfill														overfill				See above for final grading and planting of raised Cell 6					
	ICUs captured above with dike raising																																		
	W-1A	38	35	265,393	379,133	2.1	2.1	2.1	2.1	2.1	Grade	Plant	0.5	7.6	14.7	17.1	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-1B	38	35	378,327	540,467	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	Grade	Plant	0.7	7.4	14.0	16.3	18.5	19.3	20.1	20.9	21.7	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
	W-1C	44	40	367,840	525,486	5.5	5.5	5.5	5.5	5.5	5.5	Grade	Plant	0.7	8.6	16.5	19.1	21.7	22.7	23.6	24.6	25.5	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4
	W-1D	49	45	486,420	694,886	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	Grade	Plant	0.8	9.7	18.6	21.5	24.5	25.6	26.6	27.7	28.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8
	W-3A	35	32	366,549	523,642	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	Grade	Plant	0.5	7.0	13.4	15.6	17.8	18.5	19.3	20.1	20.8	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6
	W-3B	30	28	275,557	393,653	0.5	0.5	0.5	0.5	0.5	0.5	Grade	Plant	0.4	6.1	11.8	13.7	15.5	16.2	16.9	17.6	18.2	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9
	W-3C	39	35	400,913	572,733	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	Grade	Plant	0.6	7.5	14.4	16.7	19.0	19.8	20.6	21.4	22.2	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1
	W-3D	31	28	251,680	359,543	9.6	9.6	9.6	Grade	Plant	0.5	5.5	10.6	12.3	14.0	14.6	15.2	15.8	16.4	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
	W-4A&B	34	31	150,040	214,343	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	10.1	Grade	Plant	0.7	6.5	12.4	14.3	16.3	17.0	17.7	18.4	19.1	19.8	19.8	19.8	19.8	19.8
	W-4C	38	34	7,000	10,000	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	6.8	Grade	Plant	0.5	7.4	14.3	16.6	18.9	19.7	20.5	21.3	22.1	23.0	23.0	23.0	23.0	23.0
	W-4DX	25	23	0	0	3.4	3.4	Grade	Plant	0.5	4.8	9.2	10.6	12.0	12.6	13.1	13.6	14.2	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
	W-5A	33	30	242,000	345,714	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	Grade	Plant	0.4	6.5	12.6	14.6	16.7	17.4	18.1	18.8	19.5	20.3	20.3	20.3	20.3	20.3	20.3	20.3
	W-5B	33	30	266,200	380,286	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	Grade	Plant	0.4	6.5	12.6	14.6	16.7	17.4	18.1	18.8	19.5	20.3	20.3	20.3	20.3	20.3	20.3
	W-5C	33	30	290,400	414,857	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	Grade	Plant	0.4	6.5	12.6	14.6	16.7	17.4	18.1	18.8	19.5	20.3	20.3	20.3	20.3	20.3	20.3	20.3
	W-5D	57	53	1,710,133	2,443,048	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	Grade	Plant	0.8	11.5	22.3	25.8	29.4	30.7	32.0	33.2	34.5	35.8	35.8	35.8
					Existing Poplar Dikes ICUs	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
					ICUs at Poplar Island	72.7	72.7	69.2	69.6	60.1	62.8	66.2	73.2	74.8	97.7	108.9	113.6	109.7	146.0	156.0	183.4	211.8	241.2	264.2	286.2	305.7	315.4	323.5	328.4	332.0	334.8	336.0	337.3	337.3	337.3	337.3
POPLAR EXPANSION WETLANDS	W-1	25.0	22.9	369,050	527,214	0	0	0	0	0	0	0	0	0	0.2	0.2	0.2	0.2	5.3	Grade	Plant	0.7	4.2	7.7	8.9	10	10.5	11.0	11.4	11.9	12.4	12.4	12.4	12.4	12.4
	W-5	47.0	43.0	763,195	1,090,279	0	0	0	0	0	0	0	0	0	0.4	0.4	0.4	0.4	0.4	0.4	14.0	14.0	14.0	14.0	Grade	Plant	1.0	8.1	15.2	17.6	19.9	20.9	21.8	22.7	23.6
	W-6	42.0	38.4	682,004	974,292	0	0	0	0	0	0	0	0	0	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	Grade	Plant	0.9	7.0	13.1	15.2	17.2	18.0	18.8	19.6	20.4
	W-7	60.0	54.9	2,391,444	3,416,349	0	0	0	0	0	0	0	0	0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	15.5	15.5	15.5	15.5
	Embayment (consists of W-2,3,4)						0	0	0	0	0	0	0	0	1.3	1.3	1.3	1.3	1.3	1.3	1.3	54.6	54.6	54.6	54.6	96.2	96.2	96.2	96.2	96.2	96.2	96.2	96.2	96.2	96.2
	W-2	43.3	39.6	0	0																														
	W-3	43.3	39.6	0	0																														
	W-4	43.3	39.6	0	0																														
	Exterior dikes expansion														0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
					Total ICUs at Poplar Island Expansion	146.3	146.3	146.3	146.3	146.3	146.3	146.3	146.3	146.3	152.1	152.1	152.1	152.1	230.8	313.5	273.6	327.5	331.0	334.5	324.3	366.7	317.1	330.4	315.1	321.5	330.9	348.7	354.9	357.3	285.0
					Total Poplar Island and PIES ICUs	219.0	219.0	215.5	205.9	206.4	209.2	212.5	219.5	221.1	249.8	259.0	265.7	261.7	376.8	469.5	457.0	539.3	572.2	598.8	610.5	672.4	632.5	653.9	643.6	653.5	665.6	684.7	692.2	694.6	622.3
																			Placement Years at Mid-Bay Site ⇒				Year 1		Year 2		Year 3					Year 4	Year 5	Year 6	Year 7
MID-BAY (JAMES ISLAND PLACEMENT)	Upland	932	853	52,281,099	74,687,285																		2,148,769		1,833,400		1,739,789					1,149,262	1,698,241	1,698,241	1,698,241
	U-1		106.6													DIKE CONSTRUCTION BEGINS																				48.5
	U-2		106.6																																48.5
	U-3		106.6																				8.5	8.5	8.5	8.5	291.7	291.7	291.7	291.7	291.7	291.7	291.7	291.7	252.0
	U-4		106.6																																
	U-5		106.6																																
	U-6		106.6																																
	U-7		106.6																																
	U-8		106.6																																
	W-1	38.286	35.0	525,615	750,879																		0.3	0.3	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	Grade	Plant	21.8
	W-2	38.286	35.0	525,615	750,879																		0.3	0.3	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	Grade	Plant	0.5
	W-3	38.286	35.0	525,615	750,879																		0.3	0.3	0.3	0.3	11.4	11.4	11.4	11.4	11.4	11.4	11.4	Grade	Plant
	W-4	38.286	35.0	525,615	750,879																		0.3	0.3	0.3	0.3	11.4	11.4	11.4	11.4	11.4	11.4	11.4	Grade	Plant
	W-5	38.286	35.0	525,615	750,879																		0.3	0.3	0.3	0.3	0.3	0.3	11.4	11.4	11.4	11.4	11.4	11.4	Grade
	W-6	38.286	35.0	525,615	750,879																		0.3	0.3	0.3	0.3	0.3	0.3	11.4	11.4	11.4	11.4	11.4	11.4	Grade
	W-7	38.286	35.0	525,615	750,879																		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	11.4	11.4
	W-8	38.286	35.0	525,615	750,879																		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	11.4	11.4
	W-9	38.286	35.0	525,615	750,879																		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	11.4	11.4
	W-10	38.286	35.0	525,615	750,879																		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	11.4	11.4
	W-11	38.286	35.0	525,615	750,879																		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-12	38.286	35.0	525,615	750,879																		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-13	38.286	35.0	525,615	750,879																		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-14	38.286	35.0	525,615	750,879																		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-15	38.286	35.0	525,615	750,879																		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-16	38.286	35.0	525,615	750,879																		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-17	38.286	35.0	525,615	750,879																		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-18	38.286	35.0	525,615	750,879																		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-19	38.286	35.0	525,615	750,879																		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-20	38.286	35.0	525,615	750,879																		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-21	38.286	35.0	525,615	750,879																		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-22	38.286	35.0	525,615	750,879																		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-23	38.286	35.0	525,615	750,879																		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-24	38.286	35.0	525,615	750,879																		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-25	38.286	35.0	525,615	750,879																		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-26	38.286	35.0	525,615	750,879																		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-27	38.286	35.0	525,615	750,879																		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-28	38.286	35.0	525,615	750,879																		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
					Existing Island Remnants												3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
					ICUs at James Island								0.0	0.0	0.0	0.0	3.5	3.5	3.5	3.5	3.5	3.5	20.4	20.4	42.6	42.6	348.0	348.0	370.2	370.2	370.2	370.2	347.4	369.0	425.8
					Total ICUs for all islands	**219.0**	**219.0**	**215.5**	**205.9**	**206.4**	**209.2**	**212.5**	**219.5**	**221.1**	**249.8**	**259.0**	**269.2**	**265.2**	**380.3**	**473.0**	**460.5**	**542.8**	**592.6**	**619.2**	**653.1**	**715.0**	**980.5**	**1001.9**	**1013.8**	**1023.7**	**1035.9**	**1055.0**	**1039.6**	**1063.6**	**1048.1**

Table D-9: MidBay 2018 Start Date Scenario

Key:
- Construction period
- Period of Analysis
- Dredge placement
- 3.1 Open water interim benefits
- Grading
- Planting
- Existing island remnants

	Cell No.	Cell Acreage (Nominal)	Cell Acreage (Actual)	Cell Volume	Cell Capacity	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058
POPLAR EXPANSION UPLANDS	U-2	326	298	2,408,206	3,437,437																												
			99.0			8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
			99.0			3.0	4.5	5.9	7.4	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
			100.0			Grade	Plant	Plant	3.0	2.6	2.3	1.9	1.5	3.0	4.5	6.0	7.5	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	16.0	16.0
	U-6	243	222	1,793,583	2,562,261																												
			111.0			2.1	1.7	3.3	5.0	6.7	8.3	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8
			111.0			Grade	Grade	Plant	Plant	3.3	2.9	2.5	2.1	1.7	3.3	5.0	6.7	8.3	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	17.8	17.8
	Up-10	270	247.1	11,359,359	16,227,656																												
	A		123.5			Grade	Plant	Plant	3.7	3.2	2.8	2.3	1.9	3.7	5.6	7.4	9.3	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	19.8
	B		123.5			56.2	Grade	Grade	Plant	Plant	3.7	3.2	2.8	2.3	1.9	3.7	5.6	7.4	9.3	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1
EXISTING POPLAR ISLAND	U-2	326	298	10,913,555	15,590,792																												
	U-6	243	222	11,926,728	17,038,183																												
	ICUs captured above with dike raising																																
	W-1A	38	35	265,393	379,133	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-1B	38	35	378,327	540,467	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
	W-1C	44	40	367,840	525,486	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4
	W-1D	49	45	486,420	694,886	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8
	W-3A	35	32	366,549	523,642	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6
	W-3B	30	28	275,557	393,653	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9
	W-3C	39	35	400,913	572,733	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1
	W-3D	31	26	251,680	359,543	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
	W-4A&B	34	31	150,040	214,343	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8
	W-4C	38	34	7,000	10,000	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
	W-4DX	25	23	0	0	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
	W-5A	33	30	242,000	345,714	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3
	W-5B	33	30	266,200	380,286	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3
	W-5C	33	30	290,400	414,857	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3
	W-5D	57	53	1,710,133	2,443,048	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8
					Existing Poplar Dikes ICUs	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
					ICUs at Poplar Island	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3
POPLAR EXPANSION WETLANDS	W-1	25.0	22.9	369,050	527,214	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4												
	W-5	47.0	43.0	763,195	1,090,279	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6												
	W-6	42.0	38.4	682,004	974,292	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2												
	W-7	60.0	54.9	2,391,444	3,416,349	Grade	Plant	1.0	9.0	16.9	19.6	22.2	23.2	24.3	25.3	26.3	27.3	27.3	27.3	27.3	27.3	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5
	Embayment (consists of W-2,3,4)					109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2
	W-2	43.3	39.6	0	0																												
	W-3	43.3	39.6	0	0																												
	W-4	43.3	39.6	0	0																												
	Exterior dikes expansion					Plant	0.7	7.4	14.0	16.3	18.5	19.3	20.1	20.9	21.7	22.5	22.5	22.5	22.5	22.5	22.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
					Total ICUs at Poplar Island Expansion	237.5	183.1	194.0	215.4	234.2	243.2	246.6	246.7	251.0	257.4	266.1	274.0	280.9	291.3	293.2	293.2	283.2	283.2	283.2	297.9	297.9	297.9	297.9	297.9	297.9	297.9	297.9	312.6	321.3
					Total Poplar Island and PIES ICUs	574.8	520.4	531.3	552.7	571.5	580.5	583.9	584.0	588.3	594.7	603.4	611.3	618.2	628.6	630.5	630.5	620.5	620.5	620.5	635.2	635.2	635.2	635.2	635.2	635.2	635.2	635.2	649.9	658.6
						Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 27	Year 28	Year 29	Year 30	Year 31	Year 32				
MID-BAY (JAMES ISLAND PLACEMENT)	Upland	932	853	52,281,099	74,687,285	1,698,241	1,698,241	1,998,593	1,938,523	1,845,414	1,792,101	1,745,171	2,472,586	2,824,560	3,012,280	3,106,140	3,153,070	3,176,535	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	260,863	0	0		
	U-1		106.6			48.5	48.5	48.5	grade	Plant	3.2	2.8	2.4	2.0	1.6	3.2	4.8	6.4	8.0	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6
	U-2		106.6			48.5	48.5	48.5	grade	Plant	3.2	2.8	2.4	2.0	1.6	3.2	4.8	6.4	8.0	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6
	U-3		106.6										48.5	48.5	48.5	48.5	Grade	Plant	3.2	2.8	2.4	2.0	1.6	3.2	4.8	6.4	8.0	9.6	9.6	9.6	9.6	9.6	9.6
	U-4		106.6										48.5	48.5	48.5	48.5	Grade	Plant	3.2	2.8	2.4	2.0	1.6	3.2	4.8	6.4	8.0	9.6	9.6	9.6	9.6	9.6	9.6
	U-5		106.6			252.0	252.0	252.0	252.0	252.0	252.0	252.0								48.5	48.5	48.5	48.5	grade	plant	3.2	2.8	2.4	2.0	1.6	3.2	4.8	6.4
	U-6		106.6										168.0	168.0	168.0	168.0	168.0	168.0	168.0	48.5	48.5	48.5	48.5	grade	plant	3.2	2.8	2.4	2.0	1.6	3.2	4.8	6.4
	U-7		106.6																	78.1	78.1	78.1	78.1	78.1	48.5	48.5	48.5	48.5	grade	Plant	3.2	2.8	2.4
	U-8		106.6																						48.5	48.5	48.5	48.5	grade	Plant	3.2	2.8	2.4
	W-1	38.286	35.0	525,615	750,879	22.5	23.2	23.9	24.6	25.3	26.0	26.7	27.4	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1
	W-2	38.286	35.0	525,615	750,879	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-3	38.286	35.0	525,615	750,879	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-4	38.286	35.0	525,615	750,879	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-5	38.286	35.0	525,615	750,879	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-6	38.286	35.0	525,615	750,879	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-7	38.286	35.0	525,615	750,879	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-8	38.286	35.0	525,615	750,879	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-9	38.286	35.0	525,615	750,879	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-10	38.286	35.0	525,615	750,879	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-11	38.286	35.0	525,615	750,879	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-12	38.286	35.0	525,615	750,879	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-13	38.286	35.0	525,615	750,879	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-14	38.286	35.0	525,615	750,879	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-15	38.286	35.0	525,615	750,879	0.3	0.3	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-16	38.286	35.0	525,615	750,879	0.3	0.3	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-17	38.286	35.0	525,615	750,879	0.3	0.3	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-18	38.286	35.0	525,615	750,879	0.3	0.3	0.3	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-19	38.286	35.0	525,615	750,879	0.3	0.3	0.3	0.3	11.4	11.4	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-20	38.286	35.0	525,615	750,879	0.3	0.3	0.3	0.3	11.4	11.4	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-21	38.286	35.0	525,615	750,879	0.3	0.3	0.3	0.3	11.4	11.4	11.4	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-22	38.286	35.0	525,615	750,879	0.3	0.3	0.3	0.3	0.3	11.4	11.4	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-23	38.286	35.0	525,615	750,879	0.3	0.3	0.3	0.3	0.3	0.3	11.4	11.4	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6
	W-24	38.286	35.0	525,615	750,879	0.3	0.3	0.3	0.3	0.3	0.3	11.4	11.4	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6
	W-25	38.286	35.0	525,615	750,879	0.3	0.3	0.3	0.3	0.3	0.3	0.3	11.4	11.4	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6
	W-26	38.286	35.0	525,615	750,879	0.3	0.3	0.3	0.3	0.3	0.3	0.3	11.4	11.4	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6
	W-27	38.286	35.0	525,615	750,879	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	11.4	11.4	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	22.8	23.6	23.6	23.6
	W-28	38.286	35.0	525,615	750,879	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	11.4	11.4	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	22.8	23.6	23.6	23.6
					Existing Island Remnants	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
					ICUs at James Island	458.6	461.5	505.1	433.7	484.6	521.4	586.6	666.4	733.9	737.7	735.2	832.3	841.1	864.7	713.8	755.2	795.6	817.1	737.1	770.2	788.2	797.4	804.8	710.3	709.5	720.8	723.2	725.6
					Total ICUs for all islands	1033.4	981.9	1036.3	986.4	1056.2	1101.9	1170.5	1250.5	1322.3	1332.4	1338.6	1243.7	1259.3	1293.4	1344.3	1385.7	1416.1	1437.6	1357.5	1405.4	1423.4	1432.5	1439.9	1345.5	1344.7	1355.9	1373.1	1384.2

Table D-9: MidBay 2018 Start Date Scenario

Key:
- Construction period
- Period of Analysis
- Dredge placement
- 3.1 Open water interim benefits
- Grading
- Planting
- Existing island remnants

	Cell No.	Cell Acreage (Nominal)	Cell Acreage (Actual)	Cell Volume	Cell Capacity	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085
POPLAR EXPANSION UPLANDS	U-2	326	298	2,406,206	3,437,437																											
			99.0			15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
			99.0			15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
			100.0			16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0
	U-6	243	222	1,793,583	2,562,261																											
			111.0			17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8
			111.0			17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8
	Up-10	270	247.1	11,359,359	16,227,656																											
	A		123.5			19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8
	B		123.5			11.1	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8
EXISTING POPLAR ISLAND	U-2	326	298	10,913,555	15,590,792																											
	U-6	243	222	11,926,729	17,038,183																											
	ICUs captured above with dike raising																															
	W-1A	38	35	265,393	379,133	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-1B	38	35	378,327	540,467	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
	W-1C	44	40	367,840	525,486	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4
	W-1D	49	45	486,420	694,886	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8
	W-3A	35	32	366,549	523,642	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6
	W-3B	30	28	275,557	393,653	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9
	W-3C	39	35	400,913	572,733	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1
	W-3D	31	26	251,680	359,543	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
	W-4A&B	34	31	150,040	214,343	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8
	W-4C	38	34	7,000	10,000	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
	W-4DX	25	23	0	0	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
	W-5A	33	30	242,000	345,714	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3
	W-5B	33	30	266,200	380,286	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3
	W-5C	33	30	290,400	414,857	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3
	W-5D	57	53	1,710,133	2,443,048	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8
					Existing Poplar Dikes ICUs	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
					ICUs at Poplar Island	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3
POPLAR EXPANSION WETLANDS	W-1	25.0	22.9	369,050	527,214																											
	W-5	47.0	43.0	763,195	1,090,279																											
	W-6	42.0	38.4	682,004	974,292																											
	W-7	60.0	54.9	2,391,444	3,416,349	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5
	Embayment (consists of W-2,3,4)					109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2
	W-2	43.3	39.6	0	0																											
	W-3	43.3	39.6	0	0																											
	W-4	43.3	39.6	0	0																											
	Exterior dikes expansion					0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
					Total ICUs at Poplar Island Expansion	321.3	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0
					Total Poplar Island and PIES ICUs	658.6	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3
MID-BAY (JAMES ISLAND PLACEMENT)	Upland	932	853	52,281,099	74,687,285				0																							0
	U-1		106.6			9.6	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1
	U-2		106.6			9.6	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1
	U-3		106.6			9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1
	U-4		106.6			9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1
	U-5		106.6			8.0	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1
	U-6		106.6			8.0	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1
	U-7		106.6			2.0	1.6	3.2	4.8	6.4	8.0	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	17.1	17.1	17.1	17.1	17.1	17.1	17.1
	U-8		106.6			2.0	1.6	3.2	4.8	6.4	8.0	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	17.1	17.1	17.1	17.1	17.1	17.1	17.1
	W-1	38.286	35.0	525,615	750,879	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1
	W-2	38.286	35.0	525,615	750,879	23.6																										
	W-3	38.286	35.0	525,615	750,879	23.6																										
	W-4	38.286	35.0	525,615	750,879	23.6																										
	W-5	38.286	35.0	525,615	750,879	23.6																										
	W-6	38.286	35.0	525,615	750,879	23.6	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5
	W-7	38.286	35.0	525,615	750,879	23.6																										
	W-8	38.286	35.0	525,615	750,879	23.6																										
	W-9	38.286	35.0	525,615	750,879	23.6																										
	W-10	38.286	35.0	525,615	750,879	23.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6	107.6
	W-11	38.286	35.0	525,615	750,879	23.6																										
	W-12	38.286	35.0	525,615	750,879	23.6																										
	W-13	38.286	35.0	525,615	750,879	23.6																										
	W-14	38.286	35.0	525,615	750,879	23.6																										
	W-15	38.286	35.0	525,615	750,879	23.6																										
	W-16	38.286	35.0	525,615	750,879	23.6	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4
	W-17	38.286	35.0	525,615	750,879	23.6																										
	W-18	38.286	35.0	525,615	750,879	23.6																										
	W-19	38.286	35.0	525,615	750,879	23.6																										
	W-20	38.286	35.0	525,615	750,879	23.6																										
	W-21	38.286	35.0	525,615	750,879	23.6																										
	W-22	38.286	35.0	525,615	750,879	23.6	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4
	W-23	38.286	35.0	525,615	750,879	23.6																										
	W-24	38.286	35.0	525,615	750,879	23.6																										
	W-25	38.286	35.0	525,615	750,879	23.6																										
	W-26	38.286	35.0	525,615	750,879	23.6																										
	W-27	38.286	35.0	525,615	750,879	23.6																										
	W-28	38.286	35.0	525,615	750,879	23.6	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4
					Existing Island Remnants	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
					ICUs at James Island	728.0	833.9	837.1	840.3	843.5	846.7	849.9	849.9	849.9	864.9	864.9	864.9	864.9	864.9	864.9	864.9	879.9	879.9	879.9	879.9	879.9	894.9	894.9	894.9	894.9	894.9	894.9
					Total ICUs for all islands	1386.6	1501.2	1504.4	1507.6	1510.8	1514.0	1517.2	1517.2	1517.2	1532.2	1532.2	1532.2	1532.2	1532.2	1532.2	1532.2	1547.2	1547.2	1547.2	1547.2	1547.2	1562.2	1562.2	1562.2	1562.2	1562.2	1562.2

Table D-10: MidBay 2023 Start Date Scenario

Key:
- Construction period
- Period of Analysis
- Dredge placement
- 3.1 Open water interim benefits
- Grading
- Planting
- Existing island remnants

POPLAR ISLAND DEREDGED MATERIAL PLACEMENT AND CELL DEVELOPMENT PLAN

EXISTING 1140-ACRE SITE WITH NORTHERN EXPANSION and 5-FOOT RAISING OF EXISTING UPLAND CELLS REFLECTING NMFS PROPOSAL (as modified by USACE)

(Open Water Area = Approximately 130 acres)

Note placement at both Poplar Island and MidBay in the four years 2023 through 2026

	Cell No.	Cell Acreage (Nominal)	Cell Acreage (Actual)	Cell Volume	Cell Capacity	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
POPLAR EXPANSION UPLANDS	U-2	326	296	2,406,206	3,437,437																																
			99.0																		Grade	Grade	Plant	Plant	3.0	2.6	2.2	1.9	1.5	3.0	4.5	5.9	7.4	8.9	8.9	8.9	8.9
			99.0																								Grade	Grade	Plant	Plant	3.0	2.6	2.2	1.9	1.5	3.0	4.5
			100.0			144.1	144.1	144.1	144.1	144.1	144.1	144.1	144.1	144.1	144.1	144.1	144.1	144.1	144.1	144.1	90.5	90.5	90.5	90.5	90.5	90.5	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	Grade	Grade	Plant	Plant
	U-6	243	222	1,793,583	2,562,261																					1,250,000	200,000	350,000	350,000	300,000	112,261						
		111																										Grade	Grade	Plant	Plant	3.3	2.9	2.5	2.1	1.7	3.3
		111				2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	75.9	75.9	75.9	75.9	75.9	75.9	75.9	75.9	75.9	75.9	47.3	47.3	47.3	47.3	47.3	47.3	Grade	Grade	Plant	Plant
	Up-10	270	247.1	11,359,359	16,227,656																				overfill												
			123.5																										Grade	Grade	Plant	Plant	3.7	3.2	2.8	2.3	1.9
			123.5												2.5	2.5	2.5	2.5	2.5	90.4	90.4	90.4	90.4	90.4	90.4	90.4	90.4	90.4	56.2	56.2	Grade	Grade	Plant	Plant	3.7	3.2	2.8
EXISTING POPLAR ISLAND	U-2	326	296	10,913,555	15,590,792	overfill																		See above for final grading and planting of raised Cell 2													
	U-6	243	222	11,926,728	17,038,183							overfill											overfill	overfill		See above for final grading and planting of raised Cell 6											
	W-1A	38	35	265,393	379,133	2.1	2.1	2.1	2.1	2.1	Grade	Plant	0.5	7.6	14.7	17.1	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-1B	38	35	378,327	540,467	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	Grade	Grade	Plant	0.7	7.4	14.0	16.3	18.5	19.3	20.1	20.9	21.7	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
	W-1C	44	40	367,840	525,486	5.5	5.5	5.5	5.5	5.5	5.5	Grade	Plant	0.7	8.6	16.5	19.1	21.7	22.7	23.6	24.6	25.5	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4
	W-1D	49	45	486,420	694,886	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	Grade	Plant	0.8	9.7	18.6	21.5	24.5	25.6	26.6	27.7	28.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8
	W-3A	35	32	366,549	523,642	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	Grade	Grade	Plant	0.5	7.0	13.4	15.6	17.8	18.5	19.3	20.1	20.8	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6
	W-3B	30	28	275,557	393,653	0.5	0.5	0.5	0.5	0.5	0.5	Grade	Plant	0.4	6.1	11.8	13.7	15.5	16.2	16.9	17.6	18.2	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9
	W-3C	39	35	400,913	572,733	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	Grade	Plant	0.6	7.5	14.4	16.7	19.0	19.8	20.6	21.4	22.2	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1
	W-3D	31	26	251,680	359,543	9.6	9.6	9.6	Grade	Plant	0.5	5.5	10.6	12.3	14.0	14.6	15.2	15.8	16.4	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
	W-4A&B	34	31	150,040	214,343	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	10.1	Grade	Plant	0.7	6.5	12.4	14.3	16.3	17.0	17.7	18.4	19.1	19.8	19.8	19.8	19.8	19.8	19.8	19.8
	W-4C	38	34	7,000	10,000	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	6.8	Grade	Plant	0.5	7.4	14.3	16.6	18.9	19.7	20.5	21.3	22.1	23.0	23.0	23.0	23.0	23.0	23.0	23.0
	W-4DX	25	23	0	0	3.4	3.4	Grade	Plant	0.5	4.8	9.2	10.6	12.0	12.6	13.1	13.6	14.2	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
	W-5A	33	30	242,000	345,714	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	Grade	Plant	0.4	6.5	12.6	14.6	16.7	17.4	18.1	18.8	19.5	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3
	W-5B	33	30	266,200	380,286	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	Grade	Plant	0.4	6.5	12.6	14.6	16.7	17.4	18.1	18.8	19.5	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3
	W-5C	33	30	290,400	414,857	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	Grade	Plant	0.4	6.5	12.6	14.6	16.7	17.4	18.1	18.8	19.5	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3
	W-5D	57	53	1,710,133	2,443,048	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	Grade	Plant	0.8	11.5	22.3	25.8	29.4	30.7	32.0	33.2	34.5	35.8	35.8	35.8	35.8	35.8
					Existing Poplar Dikes ICUs	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
					ICUs at Poplar Island	72.7	72.7	69.2	59.6	60.1	62.8	66.2	73.2	74.8	97.7	106.9	113.6	108.5	132.8	142.9	178.7	207.4	239.6	262.7	284.6	304.1	313.8	323.5	328.4	332.0	334.6	336.0	337.3	337.3	337.3	337.3	337.3	337.3
POPLAR EXPANSION WETLANDS	W-1	25.0	22.9	369050.0	527214.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2	5.3	Grade	Plant	0.7	4.2	7.7	8.9	10.0	10.5	11.0	11.4	11.9	12.4	12.4	12.4	12.4	12.4	12.4	12.4
	W-5	47.0	43.0	763195.4	1092279.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.4	0.4	0.4	0.4	0.4	14.0	14.0	14.0	Grade	plant	1.0	8.1	15.2	17.6	19.9	20.9	21.8	22.7	23.6	24.6	24.6	24.6
	W-6	42.0	38.4	682004.4	974292.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.4	0.4	0.4	0.4	0.4	0.4	12.2	12.2	12.2	Grade	plant	0.9	7.0	13.1	15.2	17.2	18.0	18.8	19.6	20.4	21.2	21.2
	W-7	60.0	54.9	2391444.0	3416348.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	15.5	15.5	15.5	15.5	Grade	Plant	1.0	9.0
	Embayment (consists of W-2,3,4)						0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	1.3	1.3	1.3	1.3	1.3	1.3	54.6	54.6	54.6	54.6	96.2	96.2	96.2	96.2	96.2	96.2	96.2	96.2	96.2	96.2	109.2	109.2
	W-2	43.3	39.6	0.0	0.0																																
	W-3	43.3	39.6	0.0	0.0																																
	W-4	43.3	39.6	0.0	0.0																																
					Exterior dikes expansion										0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
					Total ICUs at Poplar Island Expansion	146.3	146.3	146.3	146.3	146.3	146.3	146.3	146.3	146.3	152.1	152.1	152.1	225.8	230.8	313.5	273.6	339.3	342.8	332.3	324.3	367.6	324.2	308.9	283.3	304.7	253.4	259.2	268.6	168.8	173.0	188.0	198.1
					Total Poplar Island and PIES ICUs	219.0	219.0	215.5	205.9	206.4	209.2	212.5	219.5	221.1	249.8	259.0	265.7	334.3	363.7	456.4	452.3	546.7	582.5	595.0	608.9	671.8	638.0	632.4	611.7	636.6	588.1	595.2	605.9	506.1	510.3	525.3	535.4
MID-BAY (JAMES ISLAND PLACEMENT)	Upland	932	853	52,281,099	74,687,285																							Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
																												Placement Years at Mid-Bay Site ⇒									
	U-1		106.6																									2,849,999	2,849,999	2,899,970	3,087,687	3,199,930	3,199,953	3,199,952	3,199,953	3,199,952	3,199,953
	U-2		106.6																													48.5	48.5	48.5	grade	Plant	3.2
	U-3		106.6																													48.5	48.5	48.5	grade	Plant	3.2
	U-4		106.6																									8.5	8.5	8.5	8.5						
	U-5		106.6																													252.0	252.0	252.0	252.0	252.0	252.0
	U-6		106.6																																		
	U-7		106.6																																		
	U-8		106.6																																		
	W-1	38,286	35.0	525,615	750,879																							0.3	0.3	11.4	11.4	Grade	Plant	21.8	22.5	23.2	23.9
	W-2	38,286	35.0	525,615	750,879																							0.3	0.3	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3
	W-3	38,286	35.0	525,615	750,879																							0.3	0.3	0.3	11.4	11.4	Grade	Plant	0.5	10.0	15.1
	W-4	38,286	35.0	525,615	750,879																							0.3	0.3	0.3	11.4	11.4	Grade	Plant	0.5	10.0	15.1
	W-5	38,286	35.0	525,615	750,879																							0.3	0.3	0.3	0.3	11.4	11.4	Grade	Plant	0.5	10.0
	W-6	38,286	35.0	525,615	750,879																							0.3	0.3	0.3	0.3	11.4	11.4	Grade	Plant	0.5	10.0
	W-7	38,286	35.0	525,615	750,879																							0.3	0.3	0.3	0.3	11.4	11.4	11.4	Grade	Plant	0.5
	W-8	38,286	35.0	525,615	750,879																							0.3	0.3	0.3	0.3	11.4	11.4	11.4	Grade	Plant	0.5
	W-9	38,286	35.0	525,615	750,879																							0.3	0.3	0.3	0.3	0.3	0.3	11.4	11.4	Grade	Plant
	W-10	38,286	35.0	525,615	750,879																							0.3	0.3	0.3	0.3	0.3	0.3	11.4	11.4	Grade	Plant
	W-11	38,286	35.0	525,615	750,879																							0.3	0.3	0.3	0.3	0.3	0.3	0.3	11.4	11.4	Grade
	W-12	38,286	35.0	525,615	750,879																							0.3	0.3	0.3	0.3	0.3	0.3	0.3	11.4	11.4	Grade
	W-13	38,286	35.0	525,615	750,879																							0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	11.4	11.4
	W-14	38,286	35.0	525,615	750,879																							0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	11.4	11.4
	W-15	38,286	35.0	525,615	750,879																							0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	11.4
	W-16	38,286	35.0	525,615	750,879																							0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	11.4
	W-17	38,286	35.0	525,615	750,879																							0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-18	38,286	35.0	525,615	750,879																							0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-19	38,286	35.0	525,615	750,879																							0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-20	38,286	35.0	525,615	750,879																							0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-21	38,286	35.0	525,615	750,879																							0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-22	38,286	35.0	525,615	750,879																							0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-23	38,286	35.0	525,615	750,879																							0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-24	38,286	35.0	525,615	750,879																							0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-25	38,286	35.0	525,615	750,879																							0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-26	38,286	35.0	525,615	750,879																							0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-27	38,286	35.0	525,615	750,879																							0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	W-28	38,286	35.0	525,615	750,879																							0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
		1965.7			95,711,904																																
					Existing Island Remnants																																
					ICUs at James Island																0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.9	16.9	39.1	61.3	423.4	400.6	422.3	336.9	361.0	399.8
					Total ICUs for all islands	219.0	219.0	215.5	205.9	206.4	209.2	212.5	219.5	221.1	249.8	259.0	265.7	334.3	363.7	456.4	452.3	546.7	582.5	595.0	608.9	671.8	638.0	649.3	628.6	675.7	649.5	1018.6	1006.6	928.4	846.2	886.3	935.3

DIKE CONSTRUCTION BEGINS

Table D-10: MidBay 2023 Start Date Scenario

Key:
- Construction period
- Period of Analysis
- Dredge placement
- 3.1 Open water interim benefits
- Grading
- Planting
- Existing island remnants

	Cell No.	Cell Acreage (Nominal)	Cell Acreage (Actual)	Cell Volume	Cell Capacity	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055
POPLAR EXPANSION UPLANDS	U-2	326	298	2,406,206	3,437,437																							
			99.0			8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
			99.0			5.9	7.4	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	15.8	15.8	15.8	15.8	15.8	15.8
			100.0			3.0	2.6	2.3	1.9	1.5	3.0	4.5	6.0	7.5	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
	U-6	243	222	1,793,583	2,562,261																							
		111				5.0	6.7	8.3	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	17.8	17.8	17.8	17.8	17.8	17.8	17.8
		111				3.3	2.9	2.5	2.1	1.7	3.3	5.0	6.7	8.3	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	17.8	17.8
	Up-10	270	247.1	11,359,359	16,227,656																							
			123.5			3.7	5.6	7.4	9.3	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	19.8	19.8	19.8	19.8
			123.5			2.3	1.9	3.7	5.6	7.4	9.3	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	19.8	19.8
EXISTING POPLAR ISLAND	U-2	326	298	10,913,555	15,590,792																							
	U-6	243	222	11,926,728	17,038,183																							
	W-1A	38	35	265,393	379,133	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-1B	38	35	378,327	540,467	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
	W-1C	44	40	367,840	525,486	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4
	W-1D	49	45	486,420	694,886	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8
	W-3A	35	32	366,549	523,642	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6
	W-3B	30	28	275,557	393,653	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9
	W-3C	39	35	400,913	572,733	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1
	W-3D	31	26	251,680	359,543	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
	W-4A&B	34	31	150,040	214,343	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8
	W-4C	38	34	7,000	10,000	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
	W-4DX	25	23	0	0	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
	W-5A	33	30	242,000	345,714	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3
	W-5B	33	30	266,200	380,286	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3
	W-5C	33	30	290,400	414,857	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3
	W-5D	57	53	1,710,133	2,443,048	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8
					Existing Poplar Dikes ICUs	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
					ICUs at Poplar Island	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3
POPLAR EXPANSION WETLANDS	W-1	25.0	22.9	369050.0	527214.3	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4									
	W-5	47.0	43.0	763195.4	1090279.1	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6									
	W-6	42.0	38.4	682004.4	974292.0	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2									
	W-7	60.0	54.9	2391444.0	3416348.6	16.9	19.6	22.2	23.2	24.3	25.3	26.3	27.3	27.3	27.3	27.3	27.3	27.3	27.3	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5
	Embayment (consists of W-2,3,4)					109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2
	W-2	43.3	39.6	0.0	0.0																							
	W-3	43.3	39.6	0.0	0.0																							
	W-4	43.3	39.6	0.0	0.0																							
					Exterior dikes expansion	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
					Total ICUs at Poplar Island Expansion	217.0	223.4	232.1	237.7	241.6	247.7	253.7	257.9	261.1	264.2	264.2	271.1	271.2	271.2	283.1	283.1	290.9	297.8	297.8	306.5	306.5	323.0	323.0
					Total Poplar Island and PIES ICUs	554.3	560.7	569.4	575.0	578.9	585.0	591.0	595.2	598.4	601.5	601.5	608.4	608.5	608.5	620.4	620.4	628.2	635.1	635.1	643.8	643.8	660.3	660.3
						Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	Year 31	Year 32	Year 33
MID-BAY (JAMES ISLAND PLACEMENT)	Upland	932	853	52,281,099	74,687,285	3,199,953	3,199,953	3,199,953	3,199,930	3,199,908	3,199,886	3,199,909	3,199,932	3,199,954	3,199,977	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000	2,982,172		
	U-1		106.6			2.8	2.4	2.0	1.6	3.2	4.8	6.4	8.0	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6
	U-2		106.6			2.8	2.4	2.0	1.6	3.2	4.8	6.4	8.0	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6
	U-3		106.6				48.5	48.5	48.5	48.5	Grade	Plant	3.2	2.8	2.4	2.0	1.6	3.2	4.8	6.4	8.0	9.6	9.6	9.6	9.6	9.6	9.6	9.6
	U-4		106.6				48.5	48.5	48.5	48.5	Grade	Plant	3.2	2.8	2.4	2.0	1.6	3.2	4.8	6.4	8.0	9.6	9.6	9.6	9.6	9.6	9.6	9.6
	U-5		106.6			252.0								48.5	48.5	48.5	48.5	grade	plant	3.2	2.8	2.4	2.0	1.6	3.2	4.8	6.4	8.0
	U-6		106.6				168.0	168.0	168.0	168.0	168.0	168.0	168.0	48.5	48.5	48.5	48.5	grade	plant	3.2	2.8	2.4	2.0	1.6	3.2	4.8	6.4	8.0
	U-7		106.6											78.1	78.1	78.1	78.1	78.1	48.5	48.5	48.5	48.5	grade	Plant	3.2	2.8	2.4	2.0
	U-8		106.6																48.5	48.5	48.5	48.5	grade	Plant	3.2	2.8	2.4	2.0
	W-1	38.286	35.0	525,615	750,879	24.6	25.3	26.0	26.7	27.4	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1
	W-2	38.286	35.0	525,615	750,879	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-3	38.286	35.0	525,615	750,879	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-4	38.286	35.0	525,615	750,879	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-5	38.286	35.0	525,615	750,879	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-6	38.286	35.0	525,615	750,879	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-7	38.286	35.0	525,615	750,879	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-8	38.286	35.0	525,615	750,879	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-9	38.286	35.0	525,615	750,879	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-10	38.286	35.0	525,615	750,879	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-11	38.286	35.0	525,615	750,879	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-12	38.286	35.0	525,615	750,879	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-13	38.286	35.0	525,615	750,879	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-14	38.286	35.0	525,615	750,879	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-15	38.286	35.0	525,615	750,879	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-16	38.286	35.0	525,615	750,879	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-17	38.286	35.0	525,615	750,879	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-18	38.286	35.0	525,615	750,879	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-19	38.286	35.0	525,615	750,879	0.3	11.4	11.4	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6
	W-20	38.286	35.0	525,615	750,879	0.3	11.4	11.4	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6	23.6
	W-21	38.286	35.0	525,615	750,879	0.3	0.3	11.4	11.4	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6
	W-22	38.286	35.0	525,615	750,879	0.3	0.3	11.4	11.4	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6	23.6
	W-23	38.286	35.0	525,615	750,879	0.3	0.3	0.3	11.4	11.4	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6
	W-24	38.286	35.0	525,615	750,879	0.3	0.3	0.3	11.4	11.4	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6	23.6
	W-25	38.286	35.0	525,615	750,879	0.3	0.3	0.3	0.3	11.4	11.4	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6
	W-26	38.286	35.0	525,615	750,879	0.3	0.3	0.3	0.3	11.4	11.4	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	23.6	23.6	23.6
	W-27	38.286	35.0	525,615	750,879	0.3	0.3	0.3	0.3	0.3	11.4	11.4	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	22.8	23.6
	W-28	38.286	35.0	525,615	750,879	0.3	0.3	0.3	0.3	0.3	11.4	11.4	11.4	11.4	11.4	Grade	Plant	0.5	10.0	15.1	17.3	19.4	20.3	21.1	22.0	22.8	22.8	23.6
		1965.7			95,711,904																							
					Existing Island Remnants																							
					ICUs at James Island	435.8	487.8	528.5	593.7	664.5	639.0	646.8	650.7	651.1	655.9	669.1	707.9	656.3	719.6	751.5	767.7	781.1	691.7	697.6	689.9	718.0	720.4	724.5
					Total ICUs for all islands	990.1	1048.5	1097.9	1168.7	1243.4	1224.0	1237.8	1245.9	1249.5	1257.4	1270.7	1316.3	1264.8	1328.1	1372.0	1388.1	1409.4	1326.8	1332.8	1333.7	1361.8	1380.7	1384.7

Table D-10: MidBay 2023 Start Date Scenario

Key:
- Construction period
- Period of Analysis
- Dredge placement
- 3.1 Open water interim benefits
- Grading
- Planting
- Existing island remnants

	Cell No.	Cell Acreage (Nominal)	Cell Acreage (Actual)	Cell Volume	Cell Capacity	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085
POPLAR EXPANSION UPLANDS	U-2	326	298	2,406,206	3,437,437																														
			99.0			15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
			99.0			15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
			100.0			9.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0
	U-6	243	222	1,793,583	2,562,261																														
		111				17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8
		111				17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8
	Up-10	270	247.1	11,359,359	16,227,656																														
			123.5			19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8
			123.5			19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8
EXISTING POPLAR ISLAND	U-2	326	298	10,913,555	15,590,792																														
	U-6	243	222	11,926,728	17,038,183																														
	W-1A	38	35	265,393	379,133	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	W-1B	38	35	378,327	540,467	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
	W-1C	44	40	367,840	525,486	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4
	W-1D	49	45	486,420	694,886	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8
	W-3A	35	32	366,549	523,642	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6
	W-3B	30	28	275,557	393,653	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9
	W-3C	39	35	400,913	572,733	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1
	W-3D	31	28	251,680	359,543	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
	W-4A&B	34	31	150,040	214,343	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8
	W-4C	38	34	7,000	10,000	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
	W-4DX	25	23	0	0	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
	W-5A	33	30	242,000	345,714	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3
	W-5B	33	30	266,200	380,286	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3
	W-5C	33	30	290,400	414,857	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3
	W-5D	57	53	1,710,133	2,443,048	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8
					Existing Poplar Dikes ICUs	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
					ICUs at Poplar Island	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3	337.3
POPLAR EXPANSION WETLANDS	W-1	25.0	22.9	369050.0	527214.3																														
	W-5	47.0	43.0	763195.4	1090279.1																														
	W-6	42.0	38.4	682004.4	974292.0																														
	W-7	60.0	54.9	2391444.0	3416348.6	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5
	Embayment (consists of W-2,3,4)					109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2	109.2
	W-2	43.3	39.6	0.0	0.0																														
	W-3	43.3	39.6	0.0	0.0																														
	W-4	43.3	39.6	0.0	0.0																														
					Exterior dikes expansion	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
					Total ICUs at Poplar Island Expansion	323.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0	330.0
					Total Poplar Island and PIES ICUs	660.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3	667.3
						Year 34	Year 35	Year 36	Year 37	Year 38	Year 39	Year 40																							Year 41
MID-BAY (JAMES ISLAND PLACEMENT)	Upland	932	853	52,281,099	74,687,285							0																							0
	U-1		106.6			17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1
	U-2		106.6			17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1
	U-3		106.6			9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1
	U-4		106.6			9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1
	U-5		106.6			9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1
	U-6		106.6			9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1
	U-7		106.6			1.6	3.2	4.8	6.4	8.0	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1
	U-8		106.6			1.6	3.2	4.8	6.4	8.0	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1
	W-1	38.286	35.0	525,615	750,879	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1
	W-2	38.286	35.0	525,615	750,879	23.6	23.6	23.6	23.6																										
	W-3	38.286	35.0	525,615	750,879	23.6	23.6	23.6	23.6																										
	W-4	38.286	35.0	525,615	750,879	23.6	23.6	23.6	23.6																										
	W-5	38.286	35.0	525,615	750,879	23.6	23.6	23.6	23.6																										
	W-6	38.286	35.0	525,615	750,879	23.6	23.6	23.6	23.6	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5
	W-7	38.286	35.0	525,615	750,879	23.6	23.6	23.6	23.6																										
	W-8	38.286	35.0	525,615	750,879	23.6	23.6	23.6	23.6																										
	W-9	38.286	35.0	525,615	750,879	23.6	23.6	23.6	23.6																										
	W-10	38.286	35.0	525,615	750,879	23.6	23.6	23.6	23.6																										
	W-11	38.286	35.0	525,615	750,879	23.6	23.6	23.6	23.6	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5
	W-12	38.286	35.0	525,615	750,879	23.6	23.6	23.6	23.6																										
	W-13	38.286	35.0	525,615	750,879	23.6	23.6	23.6	23.6																										
	W-14	38.286	35.0	525,615	750,879	23.6	23.6	23.6	23.6																										
	W-15	38.286	35.0	525,615	750,879	23.6	23.6	23.6	23.6																										
	W-16	38.286	35.0	525,615	750,879	23.6	23.6	23.6	23.6	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5
	W-17	38.286	35.0	525,615	750,879	23.6	23.6	23.6	23.6																										
	W-18	38.286	35.0	525,615	750,879	23.6	23.6	23.6	23.6																										
	W-19	38.286	35.0	525,615	750,879	23.6	23.6	23.6	23.6																										
	W-20	38.286	35.0	525,615	750,879	23.6	23.6	23.6	23.6																										
	W-21	38.286	35.0	525,615	750,879	23.6	23.6	23.6	23.6																										
	W-22	38.286	35.0	525,615	750,879	23.6	23.6	23.6	23.6	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4
	W-23	38.286	35.0	525,615	750,879	23.6	23.6	23.6	23.6																										
	W-24	38.286	35.0	525,615	750,879	23.6	23.6	23.6	23.6																										
	W-25	38.286	35.0	525,615	750,879	23.6	23.6	23.6	23.6																										
	W-26	38.286	35.0	525,615	750,879	23.6	23.6	23.6	23.6																										
	W-27	38.286	35.0	525,615	750,879	23.6	23.6	23.6	23.6																										
	W-28	38.286	35.0	525,615	750,879	23.6	23.6	23.6	23.6	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4	161.4
		1965.7			95,711,904																														
					Existing Island Remnants																														
					ICUs at James Island	741.9	745.1	748.3	751.5	843.2	846.4	846.4	846.4	846.4	861.4	861.4	861.4	861.4	861.4	861.4	876.4	876.4	876.4	876.4	876.4	891.4	891.4	891.4	891.4	891.4	891.4	891.4	891.4	891.4	891.4
					Total ICUs for all islands	1402.1	1412.3	1415.5	1418.7	1510.4	1513.6	1513.6	1513.6	1513.6	1528.6	1528.6	1528.6	1528.6	1528.6	1528.6	1543.6	1543.6	1543.6	1543.6	1543.6	1558.7	1558.7	1558.7	1558.7	1558.7	1558.7	1558.7	1558.7	1558.7	1558.7

Table D-11: James Island Cost Analysis 2014 Initial Fill Year (PL 10.06), Base Year **2008**

Project Year	FY	Project Contract Cost		Project Cost Contingency	Project Cost (10.06 PL)	OMRR&R Contract Cost	OMRR&R Contingency	OMRR&R Cost (10.06 PL)	Total Project Cost w/inflation	Total Project Cost	Interest During Construction	Total Invesment Cost w/inflation	Total Investment Cost	Present Value (2008 w/inflation)	Present Value (2008 B.Y.)	ICUs
0	2008	$773,000	$773,000	$193,250	$966,250	$0	$0	$0	$966,250	$966,250	$289,277	$1,255,527	$1,255,527	$1,255,527	$1,255,527	0.0
1	2009	$773,000	$792,325	$175,000	$948,000	$0	$0	$0	$967,325	$948,000	$226,554	$1,193,879	$1,174,554	$1,138,383	$1,119,956	0.0
2	2010	$38,880,654	$40,848,987	$9,616,879	$48,497,533	$0	$0	$390,958	$50,856,824	$48,888,491	$8,867,794	$59,724,619	$57,756,285	$54,301,201	$52,511,607	10.0
3	2011	$85,071,785	$91,613,008	$21,164,662	$106,236,447	$0	$0	$444,270	$113,221,940	$106,680,717	$13,492,192	$126,714,132	$120,172,909	$109,852,294	$104,181,511	10.0
4	2012	$78,496,576	$86,645,532	$19,520,860	$98,017,436	$0	$0	$444,270	$106,610,662	$98,461,706	$7,296,976	$113,907,639	$105,758,682	$94,159,675	$87,423,489	10.0
5	2013	$35,069,873	$39,678,342	$8,664,184	$43,734,057	$0	$0	$444,270	$48,786,796	$44,178,327	$1,068,275	$49,855,071	$45,246,602	$39,296,102	$35,663,675	10.0
6	2014	$19,593,887	$22,722,902	$1,959,389	$21,553,276	$355,416	$35,542	$390,958	$25,073,249	$21,944,234		$25,073,249	$21,944,234	$18,844,246	$16,492,579	26.9
7	2015	$2,189,399	$2,602,507	$218,940	$2,408,339	$355,416	$88,854	$390,958	$3,212,405	$2,799,297		$3,212,405	$2,799,297	$2,302,112	$2,006,066	26.9
8	2016	$19,675,161	$23,972,273	$1,967,516	$21,642,677	$355,416	$88,854	$390,958	$26,330,747	$22,033,635		$26,330,747	$22,033,635	$17,992,329	$15,056,026	26.9
9	2017	$2,270,673	$2,835,759	$227,067	$2,497,740	$355,416	$88,854	$390,958	$3,453,784	$2,888,698		$3,453,784	$2,888,698	$2,250,336	$1,882,151	26.9
10	2018	$19,741,869	$25,271,261	$1,974,187	$21,716,056	$355,416	$35,542	$390,958	$27,636,406	$22,107,014		$27,636,406	$22,107,014	$17,169,665	$13,734,421	310.1
11	2019	$2,337,381	$3,066,846	$233,738	$2,571,119	$355,416	$35,542	$390,958	$3,691,542	$2,962,077		$3,691,542	$2,962,077	$2,186,836	$1,754,707	332.3
12	2020	$17,389,322	$23,386,705	$1,738,932	$19,128,254	$355,416	$35,542	$390,958	$25,516,595	$19,519,212		$25,516,595	$19,519,212	$14,413,154	$11,025,508	332.3
13	2021	$2,036,661	$2,807,560	$203,666	$2,240,327	$355,416	$35,542	$390,958	$3,402,184	$2,631,285		$3,402,184	$2,631,285	$1,832,408	$1,417,204	354.5
14	2022	$19,943,799	$28,180,066	$1,994,380	$21,938,179	$355,416	$35,542	$390,958	$30,565,404	$22,329,137		$30,565,404	$22,329,137	$15,697,211	$11,467,383	331.7
15	2023	$1,886,382	$2,732,044	$1,738,932	$3,625,314	$355,416	$35,542	$390,958	$4,861,934	$4,016,272		$4,861,934	$4,016,272	$2,380,836	$1,966,724	331.7
16	2024	$22,397,629	$33,249,406	$2,239,763	$24,637,392	$355,416	$35,542	$390,958	$35,880,127	$25,028,350		$35,880,127	$25,028,350	$16,753,378	$11,686,397	331.2
17	2025	$1,886,382	$2,870,353	$188,638	$2,075,020	$355,416	$35,542	$390,958	$3,449,949	$2,465,978		$3,449,949	$2,465,978	$1,535,993	$1,097,907	363.6
18	2026	$1,886,382	$2,942,112	$188,638	$2,075,020	$355,416	$35,542	$390,958	$3,521,708	$2,465,978		$3,521,708	$2,465,978	$1,495,057	$1,046,872	370.4
19	2027	$1,886,382	$3,015,665	$188,638	$2,075,020	$355,416	$35,542	$390,958	$3,595,261	$2,465,978		$3,595,261	$2,465,978	$1,455,335	$998,209	414.4
20	2028	$22,725,142	$37,237,791	$2,272,514	$24,997,656	$355,416	$35,542	$390,958	$39,901,263	$25,388,614		$39,901,263	$25,388,614	$15,400,938	$9,799,401	426.9
21	2029	$1,886,382	$3,168,333	$188,638	$2,075,020	$355,416	$35,542	$390,958	$3,747,929	$2,465,978		$3,747,929	$2,465,978	$1,379,367	$907,565	455.0
22	2030	$22,725,142	$39,122,954	$2,272,514	$24,997,656	$355,416	$35,542	$390,958	$41,786,426	$25,388,614		$41,786,426	$25,388,614	$14,663,978	$8,909,546	461.3
23	2031	$22,725,142	$40,101,028	$2,272,514	$24,997,656	$355,416	$35,542	$390,958	$42,764,500	$25,388,614		$42,764,500	$25,388,614	$14,309,617	$8,495,395	529.0
24	2032	$22,725,142	$41,103,554	$2,272,514	$24,997,656	$355,416	$35,542	$390,958	$43,767,026	$25,388,614		$43,767,026	$25,388,614	$13,964,316	$8,100,496	531.8
25	2033	$22,725,142	$42,131,143	$2,272,514	$24,997,656	$355,416	$35,542	$390,958	$44,794,615	$25,388,614		$44,794,615	$25,388,614	$13,627,822	$7,723,953	558.7
26	2034	$22,393,047	$42,553,344	$2,239,305	$24,632,352	$355,416	$35,542	$390,958	$45,183,607	$25,023,310		$45,183,607	$25,023,310	$13,107,189	$7,258,944	572.1
27	2035	$20,016,293	$38,987,736	$2,001,629	$22,017,922	$355,416	$35,542	$390,958	$41,380,323	$22,408,880		$41,380,323	$22,408,880	$11,445,917	$6,198,361	490.1
28	2036	$20,409,098	$40,746,662	$2,040,910	$22,450,008	$355,416	$35,542	$390,958	$43,178,530	$22,840,966		$43,178,530	$22,840,966	$11,388,135	$6,024,197	552.9
29	2037	$20,433,837	$41,815,955	$2,043,384	$22,477,221	$355,416	$35,542	$390,958	$44,250,297	$22,868,179		$44,250,297	$22,868,179	$11,128,303	$5,751,013	617.3
30	2038	$23,106,393	$48,467,221	$2,310,639	$25,417,032	$355,416	$35,542	$390,958	$51,168,818	$25,807,990		$51,168,818	$25,807,990	$12,270,045	$6,188,636	682.4
31	2039	$23,025,142	$49,504,211	$2,302,514	$25,327,656	$355,416	$35,542	$390,958	$52,197,683	$25,718,614		$52,197,683	$25,718,614	$11,934,934	$5,880,529	713.8
32	2040	$22,929,244	$50,530,481	$2,292,924	$25,222,168	$355,416	$35,542	$390,958	$53,214,363	$25,613,126		$53,214,363	$25,613,126	$11,601,809	$5,584,180	727.9
33	2041	$22,862,535	$51,643,057	$2,286,254	$25,148,789	$355,416	$35,542	$390,958	$54,320,269	$25,539,747		$54,320,269	$25,539,747	$11,292,414	$5,309,351	718.0
34	2042	$22,781,261	$52,745,958	$2,278,126	$25,059,387	$355,416	$35,542	$390,958	$55,415,042	$25,450,345		$55,415,042	$25,450,345	$10,984,507	$5,044,830	638.8
35	2043	$22,700,041	$53,871,855	$2,270,004	$24,970,045	$355,416	$35,542	$390,958	$56,532,817	$25,361,003		$56,532,817	$25,361,003	$10,685,173	$4,793,441	652.1
36	2044	$22,700,041	$55,218,651	$2,270,004	$24,970,045	$355,416	$35,542	$390,958	$57,879,613	$25,361,003		$57,879,613	$25,361,003	$10,431,207	$4,570,623	694.8
37	2045	$19,840,179	$49,468,484	$1,984,018	$21,824,197	$355,416	$35,542	$390,958	$51,843,460	$22,215,155		$51,843,460	$22,215,155	$8,909,041	$3,817,564	740.2
38	2046	$19,840,179	$50,705,197	$1,984,018	$21,824,197	$355,416	$35,542	$390,958	$53,080,173	$22,215,155		$53,080,173	$22,215,155	$8,697,558	$3,640,109	791.0
39	2047	$19,840,179	$51,972,827	$1,984,018	$21,824,197	$355,416	$35,542	$390,958	$54,347,803	$22,215,155		$54,347,803	$22,215,155	$8,491,316	$3,470,902	815.7
40	2048	$19,840,179	$53,272,147	$1,984,018	$21,824,197	$355,416	$35,542	$390,958	$55,647,123	$22,215,155		$55,647,123	$22,215,155	$8,290,176	$3,309,561	742.0
41	2049	$19,512,666	$53,702,573	$1,951,267	$21,463,933	$355,416	$35,542	$390,958	$56,044,798	$21,854,891		$56,044,798	$21,854,891	$7,961,307	$3,104,543	752.2
42	2050	$19,512,666	$55,045,137	$1,951,267	$21,463,933	$355,416	$35,542	$390,958	$57,387,362	$21,854,891		$57,387,362	$21,854,891	$7,773,084	$2,960,232	759.8
43	2051	$19,512,666	$56,421,265	$1,951,267	$21,463,933	$355,416	$35,542	$390,958	$58,763,490	$21,854,891		$58,763,490	$21,854,891	$7,589,492	$2,822,629	769.8
44	2052	$19,512,666	$57,831,797	$1,951,267	$21,463,933	$355,416	$35,542	$390,958	$60,174,022	$21,854,891		$60,174,022	$21,854,891	$7,410,409	$2,691,422	784.4
45	2053	$18,227,758	$55,374,166	$1,822,776	$20,050,534	$355,416	$35,542	$390,958	$57,587,900	$20,441,492		$57,587,900	$20,441,492	$6,762,269	$2,400,346	790.2
46	2054	$4,826,172	$15,027,980	$482,617	$5,308,789	$355,416	$35,542	$374,370	$15,884,967	$5,683,159		$15,884,967	$5,683,159	$1,778,589	$636,325	794.3
47	2055	$4,826,172	$15,403,679	$482,617	$5,308,789	$355,416	$35,542	$374,370	$16,260,666	$5,683,159		$16,260,666	$5,683,159	$1,736,023	$606,746	796.6

Table D-11: James Island Cost Analysis 2014 Initial Fill Year (PL 10.06), Base Year **2008**																
48	2056	$18,224,021	$59,619,694	$1,822,402	$20,046,423	$355,416	$35,542	$374,370	$61,816,466	$20,420,793		$61,816,466	$20,420,793	$6,292,880	$2,078,825	795.8
49	2057	$18,224,021	$61,110,187	$1,822,402	$20,046,423	$355,416	$35,542	$374,370	$63,306,959	$20,420,793		$63,306,959	$20,420,793	$6,145,040	$1,982,193	720.9
50	2058	$1,524,830	$5,241,006	$152,483	$1,677,313	$340,336	$34,034	$374,370	$5,767,859	$2,051,683		$5,767,859	$2,051,683	$533,846	$189,894	724.1
51	2059	$1,524,830	$5,372,032	$152,483	$1,677,313	$340,336	$34,034	$374,370	$5,898,885	$2,051,683		$5,898,885	$2,051,683	$520,594	$181,067	815.8
52	2060	$1,524,830	$5,506,332	$152,483	$1,677,313	$340,336	$34,034	$374,370	$6,033,185	$2,051,683		$6,033,185	$2,051,683	$507,696	$172,650	819.0
53	2061															828.6
54	2062															827.8
55	2063															731.0
Totals:		$959,369,235	$1,820,031,093	$132,915,563	$1,092,284,798	$16,659,312	$1,825,886	$19,982,678	$1,972,929,334	$1,112,267,476	$31,241,068	$2,004,170,402	$1,143,508,544	$705,327,070	$514,393,388	27,711
													Total PV Cost	$514,393,388	26,055	864.8
													AAC	$27,634,396	501.1	868.0
													52 period of analysis	**$/ICUs**	**$55,152**	871.2

Table D-12: James Island Cost Analysis 2018 Initial Fill Year (PL 10.06), Base Year 2008

Project Year	FY	Project Contract Cost		Project Cost Contingency	Project Cost (10.06 PL)	OMRR&R Contract Cost	OMRR&R Contingency	OMRR&R Cost (10.06 PL)	Total Project Cost w/inflation	Total Project Cost	Interest During Construction	Total Invesment Cost w/inflation	Total Investment Cost	Present Value (2008 w/inflation)	Present Value (2008 B.Y.)	ICUs
0	2008															0.0
1	2009															0.0
2	2010															0.0
3	2011															0.0
4	2012	$773,000	$853,247	$193,250	$966,250	$0	$0	$0	$1,046,497	$966,250	$289,277	$1,335,774	$1,255,527	$1,104,194	$1,037,859	0.0
5	2013	$773,000	$874,579	$175,000	$948,000	$0	$0	$0	$1,049,579	$948,000	$226,554	$1,276,132	$1,174,554	$1,005,856	$925,791	3.5
6	2014	$38,880,654	$45,089,639	$9,616,879	$48,497,533	355416	$35,542	$390,958	$55,097,476	$48,888,491	$8,867,794	$63,965,270	$57,756,285	$48,074,236	$43,407,764	3.5
7	2015	$85,071,785	$101,123,619	$21,164,662	$106,236,447	355416	$88,854	$444,270	$122,732,551	$106,680,717	$13,492,192	$136,224,743	$120,172,909	$97,623,007	$86,119,749	3.5
8	2016	$78,496,576	$95,640,456	$19,520,860	$98,017,436	355416	$88,854	$444,270	$115,605,586	$98,461,706	$7,296,976	$122,902,562	$105,758,682	$83,981,793	$72,267,035	3.5
9	2017	$35,069,873	$43,797,466	$8,664,184	$43,734,057	355416	$88,854	$444,270	$52,905,920	$44,178,327	$1,068,275	$53,974,194	$45,246,602	$35,167,250	$29,480,728	3.5
10	2018	$19,593,887	$25,081,832	$1,959,389	$21,553,276	355416	$35,542	$390,958	$27,432,179	$21,944,234		$27,432,179	$21,944,234	$17,042,785	$13,633,290	20.4
11	2019	$2,189,399	$2,872,681	$218,940	$2,408,339	355416	$35,542	$390,958	$3,482,579	$2,799,297		$3,482,579	$2,799,297	$2,063,048	$1,658,278	20.4
12	2020	$19,675,161	$26,460,904	$1,967,516	$21,642,677	355416	$35,542	$390,958	$28,819,378	$22,033,635		$28,819,378	$22,033,635	$16,278,745	$12,445,790	42.6
13	2021	$2,270,673	$3,130,148	$227,067	$2,497,740	355416	$35,542	$390,958	$3,748,173	$2,888,698		$3,748,173	$2,888,698	$2,018,757	$1,555,846	42.6
14	2022	$19,741,869	$27,894,744	$1,974,187	$21,716,056	355416	$35,542	$390,958	$30,259,889	$22,107,014		$30,259,889	$22,107,014	$15,540,311	$11,353,309	348.0
15	2023	$2,337,381	$3,385,225	$233,738	$2,571,119	355416	$35,542	$390,958	$4,009,921	$2,962,077		$4,009,921	$2,962,077	$1,963,614	$1,450,497	348.0
16	2024	$2,036,661	$3,023,435	$203,666	$2,240,327	355416	$35,542	$390,958	$3,618,059	$2,631,285		$3,618,059	$2,631,285	$1,689,367	$1,228,616	370.2
17	2025	$1,886,382	$2,870,353	$188,638	$2,075,020	355416	$35,542	$390,958	$3,449,949	$2,465,978		$3,449,949	$2,465,978	$1,535,993	$1,097,907	370.2
18	2026	$1,886,382	$2,942,112	$188,638	$2,075,020	355416	$35,542	$390,958	$3,521,708	$2,465,978		$3,521,708	$2,465,978	$1,495,057	$1,046,872	370.2
19	2027	$17,389,322	$27,799,443	$1,738,932	$19,128,254	355416	$35,542	$390,958	$29,929,333	$19,519,212		$29,929,333	$19,519,212	$12,115,171	$7,901,231	370.2
20	2028	$19,943,799	$32,680,237	$1,994,380	$21,938,179	355416	$35,542	$390,958	$35,065,575	$22,329,137		$35,065,575	$22,329,137	$13,534,477	$8,618,515	347.4
21	2029	$22,397,629	$37,618,651	$2,239,763	$24,637,392	355416	$35,542	$390,958	$40,249,372	$25,028,350		$40,249,372	$25,028,350	$14,813,158	$9,211,297	369.0
22	2030	$22,725,142	$39,122,954	$2,272,514	$24,997,656	355416	$35,542	$390,958	$41,786,426	$25,388,614		$41,786,426	$25,388,614	$14,663,978	$8,909,546	425.8
23	2031	$22,725,142	$40,101,028	$2,272,514	$24,997,656	355416	$35,542	$390,958	$42,764,500	$25,388,614		$42,764,500	$25,388,614	$14,309,617	$8,495,395	458.6
24	2032	$22,725,142	$41,103,554	$2,272,514	$24,997,656	355416	$35,542	$390,958	$43,767,026	$25,388,614		$43,767,026	$25,388,614	$13,964,316	$8,100,496	461.5
25	2033	$22,725,142	$42,131,143	$2,272,514	$24,997,656	355416	$35,542	$390,958	$44,794,615	$25,388,614		$44,794,615	$25,388,614	$13,627,822	$7,723,953	505.1
26	2034	$22,725,142	$43,184,421	$2,272,514	$24,997,656	355416	$35,542	$390,958	$45,847,893	$25,388,614		$45,847,893	$25,388,614	$13,299,891	$7,364,914	433.7
27	2035	$22,393,047	$43,617,177	$2,239,305	$24,632,352	355416	$35,542	$390,958	$46,247,440	$25,023,310		$46,247,440	$25,023,310	$12,792,175	$6,921,520	484.6
28	2036	$20,016,293	$39,962,429	$2,001,629	$22,017,922	355416	$35,542	$390,958	$42,355,016	$22,408,880		$42,355,016	$22,408,880	$11,170,937	$5,910,237	521.4
29	2037	$20,409,098	$41,765,329	$2,040,910	$22,450,008	355416	$35,542	$390,958	$44,197,197	$22,840,966		$44,197,197	$22,840,966	$11,114,949	$5,744,169	586.6
30	2038	$20,433,837	$42,861,354	$2,043,384	$22,477,221	355416	$35,542	$390,958	$45,295,696	$22,868,179		$45,295,696	$22,868,179	$10,861,698	$5,483,683	666.4
31	2039	$23,106,393	$49,678,901	$2,310,639	$25,417,032	355416	$35,542	$390,958	$52,380,498	$25,807,990		$52,380,498	$25,807,990	$11,976,735	$5,900,964	733.9
32	2040	$23,025,142	$50,741,816	$2,302,514	$25,327,656	355416	$35,542	$390,958	$53,435,288	$25,718,614		$53,435,288	$25,718,614	$11,649,975	$5,607,179	737.7
33	2041	$22,929,244	$51,793,743	$2,292,924	$25,222,168	355416	$35,542	$390,958	$54,477,625	$25,613,126		$54,477,625	$25,613,126	$11,325,126	$5,324,606	735.2
34	2042	$22,862,535	$52,934,133	$2,286,254	$25,148,789	355416	$35,542	$390,958	$55,611,345	$25,539,747		$55,611,345	$25,539,747	$11,023,418	$5,062,552	632.3
35	2043	$22,781,261	$54,064,607	$2,278,126	$25,059,387	355416	$35,542	$390,958	$56,733,691	$25,450,345		$56,733,691	$25,450,345	$10,723,139	$4,810,327	641.1
36	2044	$22,700,041	$55,218,651	$2,270,004	$24,970,045	355416	$35,542	$390,958	$57,879,613	$25,361,003		$57,879,613	$25,361,003	$10,431,207	$4,570,623	664.7
37	2045	$22,700,041	$56,599,118	$2,270,004	$24,970,045	355416	$35,542	$390,958	$59,260,080	$25,361,003		$59,260,080	$25,361,003	$10,183,550	$4,358,162	713.8
38	2046	$19,840,179	$50,705,197	$1,984,018	$21,824,197	355416	$35,542	$390,958	$53,080,173	$22,215,155		$53,080,173	$22,215,155	$8,697,558	$3,640,109	755.2
39	2047	$19,840,179	$51,972,827	$1,984,018	$21,824,197	355416	$35,542	$390,958	$54,347,803	$22,215,155		$54,347,803	$22,215,155	$8,491,316	$3,470,902	795.6
40	2048	$19,840,179	$53,272,147	$1,984,018	$21,824,197	355416	$35,542	$390,958	$55,647,123	$22,215,155		$55,647,123	$22,215,155	$8,290,176	$3,309,561	817.1
41	2049	$19,512,666	$53,702,573	$1,951,267	$21,463,933	355416	$35,542	$390,958	$56,044,798	$21,854,891		$56,044,798	$21,854,891	$7,961,307	$3,104,543	737.1
42	2050	$19,512,666	$55,045,137	$1,951,267	$21,463,933	355416	$35,542	$390,958	$57,387,362	$21,854,891		$57,387,362	$21,854,891	$7,773,084	$2,960,232	770.2
43	2051	$19,512,666	$56,421,265	$1,951,267	$21,463,933	355416	$35,542	$390,958	$58,763,490	$21,854,891		$58,763,490	$21,854,891	$7,589,492	$2,822,629	788.2
44	2052	$19,512,666	$57,831,797	$1,951,267	$21,463,933	355416	$35,542	$390,958	$60,174,022	$21,854,891		$60,174,022	$21,854,891	$7,410,409	$2,691,422	797.4
45	2053	$18,227,758	$55,374,166	$1,822,776	$20,050,534	355416	$35,542	$390,958	$57,587,900	$20,441,492		$57,587,900	$20,441,492	$6,762,269	$2,400,346	804.8

Table D-12: James Island Cost Analysis 2018 Initial Fill Year (PL 10.06), Base Year 2008																
46	2054	$4,826,172	$15,027,980	$482,617	$5,308,789	355416	$35,542	$390,958	$15,901,555	$5,699,747		$15,901,555	$5,699,747	$1,780,446	$638,182	710.3
47	2055	$4,826,172	$15,403,679	$482,617	$5,308,789	355416	$35,542	$390,958	$16,277,254	$5,699,747		$16,277,254	$5,699,747	$1,737,794	$608,517	709.5
48	2056	$18,224,021	$59,619,694	$1,822,402	$20,046,423	355416	$35,542	$390,958	$61,833,054	$20,437,381		$61,833,054	$20,437,381	$6,294,568	$2,080,513	720.8
49	2057	$18,224,021	$61,110,187	$1,822,402	$20,046,423	355416	$35,542	$390,958	$63,323,547	$20,437,381		$63,323,547	$20,437,381	$6,146,650	$1,983,803	723.2
50	2058	$1,524,830	$5,241,006	$152,483	$1,677,313	340336	$34,034	$374,370	$5,767,859	$2,051,683		$5,767,859	$2,051,683	$533,846	$189,894	725.6
51	2059	$1,524,830	$5,372,032	$152,483	$1,677,313	340336	$34,034	$374,370	$5,898,885	$2,051,683		$5,898,885	$2,051,683	$520,594	$181,067	728.0
52	2060	$1,524,830	$5,506,332	$152,483	$1,677,313	340336	$34,034	$374,370	$6,033,185	$2,051,683		$6,033,185	$2,051,683	$507,696	$172,650	833.9
													Total PV Cost	$434,983,071	23,856.3	
													AAC	$23,368,291	458.8	
													52 period of analysis:	**$/ICUs**	**$50,936**	

Table D-13: James Island Cost Analysis 2023 Initial Fill Year (PL 10.06), Base Year 2008

Project Year	FY	Project Contract Cost	Project Contract Cost w/inflation	Project Cost Contingency	Project Cost (10.06 PL)	OMRR&R Contract Cost	OMRR&R Contingency	OMRR&R Cost (10.06 PL)	Total Project Cost w/inflation	Total Project Cost	Interest During Construction	Total Invesment Cost w/inflation	Total Investment Cost	Present Value (2008 w/inflation)	Present Value (2008 B.Y.)	ICUs
0	2008															
1	2009															
2	2010															
3	2011															
4	2012															
5	2013															
6	2014															
7	2015															
8	2016															0.0
9	2017	$773,000	$965,371	$193,250	$966,250	$0	$0	$0	$1,158,621	$966,250	$289,277	$1,447,898	$1,255,527	$943,388	$818,047	0.0
10	2018	$773,000	$989,505	$175,000	$948,000	$0	$0	$0	$1,164,505	$948,000	$226,554	$1,391,059	$1,174,554	$864,223	$729,715	0.0
11	2019	$38,880,654	$51,014,787	$9,616,879	$48,497,533	$355,416	$35,542	$390,958	$61,022,624	$48,888,491	$8,867,794	$69,890,419	$57,756,285	$41,402,439	$34,214,291	0.0
12	2020	$85,071,785	$114,412,093	$21,164,662	$106,236,447	$355,416	$88,854	$444,270	$136,021,025	$106,680,717	$13,492,192	$149,513,217	$120,172,909	$84,453,159	$67,880,165	0.0
13	2021	$78,496,576	$108,208,397	$19,520,860	$98,017,436	$355,416	$88,854	$444,270	$128,173,527	$98,461,706	$7,296,976	$135,470,503	$105,758,682	$72,964,075	$56,961,363	0.0
14	2022	$35,069,873	$49,552,812	$8,664,184	$43,734,057	$355,416	$88,854	$444,270	$58,661,266	$44,178,327	$1,068,275	$59,729,541	$45,246,602	$30,674,786	$23,236,908	0.0
15	2023	$19,593,887	$28,377,791	$1,959,389	$21,553,276	$355,416	$35,542	$390,958	$30,728,138	$21,944,234		$30,728,138	$21,944,234	$15,047,233	$10,745,851	16.9
16	2024	$19,675,161	$29,207,887	$1,967,516	$21,642,677	$355,416	$35,542	$390,958	$31,566,361	$22,033,635		$31,566,361	$22,033,635	$14,739,167	$10,288,086	16.9
17	2025	$19,741,869	$30,039,588	$1,974,187	$21,716,056	$355,416	$35,542	$390,958	$32,404,733	$22,107,014		$32,404,733	$22,107,014	$14,427,295	$9,842,525	39.1
18	2026	$17,389,322	$27,121,408	$1,738,932	$19,128,254	$355,416	$35,542	$390,958	$29,251,298	$19,519,212		$29,251,298	$19,519,212	$12,417,941	$8,286,416	61.3
19	2027	$19,943,799	$31,883,158	$1,974,187	$21,917,986	$355,416	$35,542	$390,958	$34,248,303	$22,308,944		$34,248,303	$22,308,944	$13,863,457	$9,030,494	423.4
20	2028	$22,397,629	$36,701,123	$1,738,932	$24,136,561	$355,416	$35,542	$390,958	$38,831,013	$24,527,519		$38,831,013	$24,527,519	$14,987,847	$9,467,039	400.6
21	2029	$22,725,142	$38,168,736	$1,994,380	$21,938,179	$355,416	$35,542	$390,958	$40,554,074	$22,329,137		$40,554,074	$22,329,137	$14,925,299	$8,217,893	422.3
22	2030	$22,725,142	$39,122,954	$2,239,763	$24,637,392	$355,416	$35,542	$390,958	$41,753,675	$25,028,350		$41,753,675	$25,028,350	$14,652,485	$8,783,120	335.9
23	2031	$22,725,142	$40,101,028	$2,272,514	$24,997,656	$355,416	$35,542	$390,958	$42,764,500	$25,388,614		$42,764,500	$25,388,614	$14,309,617	$8,495,395	361.0
24	2032	$22,725,142	$41,103,554	$2,272,514	$24,997,656	$355,416	$35,542	$390,958	$43,767,026	$25,388,614		$43,767,026	$25,388,614	$13,964,316	$8,100,496	399.8
25	2033	$22,725,142	$42,131,143	$2,272,514	$24,997,656	$355,416	$35,542	$390,958	$44,794,615	$25,388,614		$44,794,615	$25,388,614	$13,627,822	$7,723,953	435.8
26	2034	$22,393,047	$42,553,344	$2,272,514	$24,997,656	$355,416	$35,542	$390,958	$45,216,816	$25,388,614		$45,216,816	$25,388,614	$13,116,823	$7,364,914	487.8
27	2035	$20,016,293	$38,987,736	$2,272,514	$24,997,656	$355,416	$35,542	$390,958	$41,651,208	$25,388,614		$41,651,208	$25,388,614	$11,520,844	$7,022,564	528.5
28	2036	$20,409,098	$40,746,662	$2,239,305	$24,632,352	$355,416	$35,542	$390,958	$43,376,925	$25,023,310		$43,376,925	$25,023,310	$11,440,460	$6,599,780	593.7
29	2037	$20,433,837	$41,815,955	$2,001,629	$22,017,922	$355,416	$35,542	$390,958	$44,208,542	$22,408,880		$44,208,542	$22,408,880	$11,117,802	$5,635,506	664.5
30	2038	$23,106,393	$48,467,221	$2,040,910	$22,450,008	$355,416	$35,542	$390,958	$50,899,089	$22,840,966		$50,899,089	$22,840,966	$12,205,366	$5,477,158	639.0
31	2039	$23,025,142	$49,504,211	$2,043,384	$22,477,221	$355,416	$35,542	$390,958	$51,938,553	$22,868,179		$51,938,553	$22,868,179	$11,875,685	$5,228,780	646.8
32	2040	$22,929,244	$50,530,481	$2,310,639	$25,417,032	$355,416	$35,542	$390,958	$53,232,078	$25,807,990		$53,232,078	$25,807,990	$11,605,671	$5,626,664	650.7
33	2041	$22,862,535	$51,643,057	$2,302,514	$25,327,656	$355,416	$35,542	$390,958	$54,336,529	$25,718,614		$54,336,529	$25,718,614	$11,295,794	$5,346,535	651.1
34	2042	$22,781,261	$52,745,958	$2,292,924	$25,222,168	$355,416	$35,542	$390,958	$55,429,840	$25,613,126		$55,429,840	$25,613,126	$10,987,440	$5,077,097	655.9
35	2043	$22,700,041	$53,871,855	$2,286,254	$25,148,789	$355,416	$35,542	$390,958	$56,549,067	$25,539,747		$56,549,067	$25,539,747	$10,688,244	$4,827,225	669.1
36	2044	$22,700,041	$55,218,651	$2,278,126	$25,059,387	$355,416	$35,542	$390,958	$57,887,735	$25,450,345		$57,887,735	$25,450,345	$10,432,671	$4,586,724	707.9
37	2045	$19,840,179	$49,468,484	$2,270,004	$24,970,045	$355,416	$35,542	$390,958	$52,129,446	$25,361,003		$52,129,446	$25,361,003	$8,958,186	$4,358,162	656.3
38	2046	$19,840,179	$50,705,197	$2,270,004	$24,970,045	$355,416	$35,542	$390,958	$53,366,159	$25,361,003		$53,366,159	$25,361,003	$8,744,419	$4,155,578	719.6
39	2047	$19,840,179	$51,972,827	$1,984,018	$21,824,197	$355,416	$35,542	$390,958	$54,347,803	$22,215,155		$54,347,803	$22,215,155	$8,491,316	$3,470,902	751.5
40	2048	$19,512,666	$52,392,754	$1,984,018	$21,824,197	$355,416	$35,542	$390,958	$54,767,730	$22,215,155		$54,767,730	$22,215,155	$8,159,166	$3,309,561	767.7
41	2049	$19,512,666	$53,702,573	$1,984,018	$21,824,197	$355,416	$35,542	$390,958	$56,077,549	$22,215,155		$56,077,549	$22,215,155	$7,965,959	$3,155,720	781.1
42	2050	$19,512,666	$55,045,137	$1,951,267	$21,463,933	$355,416	$35,542	$390,958	$57,387,362	$21,854,891		$57,387,362	$21,854,891	$7,773,084	$2,960,232	691.7
43	2051	$19,512,666	$56,421,265	$1,951,267	$21,463,933	$355,416	$35,542	$390,958	$58,763,490	$21,854,891		$58,763,490	$21,854,891	$7,589,492	$2,822,629	697.6
44	2052	$18,227,758	$54,023,576	$1,951,267	$21,463,933	$355,416	$35,542	$390,958	$56,365,801	$21,854,891		$56,365,801	$21,854,891	$6,941,428	$2,691,422	689.9
45	2053	$4,826,172	$14,661,444	$1,951,267	$21,463,933	$355,416	$35,542	$390,958	$17,003,669	$21,854,891		$17,003,669	$21,854,891	$1,996,659	$2,566,314	718.0
46	2054	$4,826,172	$15,027,980	$1,822,776	$20,050,534	$355,416	$35,542	$390,958	$17,241,714	$20,441,492		$17,241,714	$20,441,492	$1,930,499	$2,288,768	720.4

Table D-13: James Island Cost Analysis 2023 Initial Fill Year (PL 10.06), Base Year 2008																
47	2055	$18,224,021	$58,165,556	$482,617	$5,308,789	$355,416	$35,542	$390,958	$59,039,131	$5,699,747		$59,039,131	$5,699,747	$6,303,143	$608,517	724.5
48	2056	$18,224,021	$59,619,694	$482,617	$5,308,789	$355,416	$35,542	$390,958	$60,493,269	$5,699,747		$60,493,269	$5,699,747	$6,158,179	$580,231	741.9
49	2057	$1,524,830	$5,113,177	$1,822,402	$20,046,423	$355,416	$35,542	$390,958	$7,326,537	$20,437,381		$7,326,537	$20,437,381	$711,168	$1,983,803	745.1
50	2058	$1,524,830	$5,241,006	$1,822,402	$20,046,423	$355,416	$35,542	$390,958	$7,454,366	$20,437,381		$7,454,366	$20,437,381	$689,941	$1,891,588	748.3
51	2059	$1,524,830	$5,372,032	$152,483	$1,677,313	$355,416	$35,542	$390,958	$5,915,473	$2,068,271		$5,915,473	$2,068,271	$522,058	$182,531	751.5
52	2060															843.2
53	2061												$1,138,947,885			846.4
54	2062															846.4
55	2063															846.4
56	2064															846.4
57	2065	$921,263,032	$1,822,119,170	$152,483	$152,483	$340,336	$34,034	$374,370		$526,853						
													Total PV Cost	$382,640,662	21556.6	
TOTALS													**AAC**	$20,556,336	414.5	
													52 year period of analysis	**$/ICU**	**$49,587**	

Table D-14: James Island IDC Calculations

James Island Cost Analysis 2018 Initial Fill Year

Base Year: 2008

Project Year	FY	Project Contract Cost	Project Cost Contingency	Project Cost	OMRR&R Contract Cost	OMRR&R Contingency	OMRR&R Cost	Total Project Cost	Interest During Construction	Total Investment Cost	Present Value (2008 B.Y.)	Present value O&M
0	2008											
1	2009											
2	2010											
3	2011											
4	2012	$780,680	$156,136	$936,816	$0	$0	$0	$936,816	$280,465	$1,217,281	$1,006,243	$0
5	2013	$707,680	$141,536	$849,216	$0	$0	$0	$849,216	$202,946	$1,052,162	$829,321	$0
6	2014	$79,442,723	$15,888,545	$95,331,268	$424,020	$76,324	$500,344	$95,831,612	$17,382,722	$113,214,334	$85,088,246	$376,042
7	2015	$119,773,229	$23,954,646	$143,727,875	$424,020	$76,324	$500,344	$144,228,219	$18,240,924	$162,469,143	$116,430,583	$358,563
8	2016	$78,831,712	$15,766,342	$94,598,054	$424,020	$76,324	$500,344	$95,098,398	$7,047,722	$102,146,120	$69,798,499	$341,895
9	2017	$38,656,966	$7,731,393	$46,388,359	$424,020	$76,324	$500,344	$46,888,703	$1,133,814	$48,022,517	$31,289,394	$326,003
10	2018	$27,307,646	$5,461,529	$32,769,175	$424,020	$76,324	$500,344	$33,269,519		$33,269,519	$20,669,348	$310,849
11	2019	$2,436,748	$487,350	$2,924,098	$424,020	$76,324	$500,344	$3,424,442		$3,424,442	$2,028,608	$296,399
12	2020	$27,398,663	$5,479,733	$32,878,396	$424,020	$76,324	$500,344	$33,378,740		$33,378,740	$18,854,119	$282,621
13	2021	$2,528,145	$505,629	$3,033,774	$424,020	$76,324	$500,344	$3,534,118		$3,534,118	$1,903,467	$269,484
14	2022	$27,476,174	$5,495,235	$32,971,409	$424,020	$76,324	$500,344	$33,471,753		$33,471,753	$17,189,800	$256,957
15	2023	$2,605,656	$521,131	$3,126,787	$424,020	$76,324	$500,344	$3,627,131		$3,627,131	$1,776,166	$245,013
16	2024	$2,267,891	$453,578	$2,721,469	$424,020	$76,324	$500,344	$3,221,813		$3,221,813	$1,504,350	$233,624
17	2025	$2,099,119	$419,824	$2,518,943	$424,020	$76,324	$500,344	$3,019,287		$3,019,287	$1,344,252	$222,764
18	2026	$2,099,119	$419,824	$2,518,943	$424,020	$76,324	$500,344	$3,019,287		$3,019,287	$1,281,766	$212,409
19	2027	$23,963,752	$4,792,750	$28,756,502	$424,020	$76,324	$500,344	$29,256,846		$29,256,846	$11,842,953	$202,536
20	2028	$27,711,110	$5,542,222	$33,253,332	$424,020	$76,324	$500,344	$33,753,676		$33,753,676	$13,028,116	$193,121
21	2029	$30,233,450	$6,046,690	$36,280,140	$424,020	$76,324	$500,344	$36,780,484		$36,780,484	$13,536,488	$184,144
22	2030	$30,577,787	$6,115,557	$36,693,344	$424,020	$76,324	$500,344	$37,193,688		$37,193,688	$13,052,263	$175,584
23	2031	$30,577,787	$6,115,557	$36,693,344	$424,020	$76,324	$500,344	$37,193,688		$37,193,688	$12,445,543	$167,422
24	2032	$30,577,787	$6,115,557	$36,693,344	$424,020	$76,324	$500,344	$37,193,688		$37,193,688	$11,867,025	$159,640
25	2033	$30,577,787	$6,115,557	$36,693,344	$424,020	$76,324	$500,344	$37,193,688		$37,193,688	$11,315,400	$152,219
26	2034	$30,577,787	$6,115,557	$36,693,344	$424,020	$76,324	$500,344	$37,193,688		$37,193,688	$10,789,416	$145,143
27	2035	$30,539,564	$6,107,913	$36,647,477	$424,020	$76,324	$500,344	$37,147,821		$37,147,821	$10,275,194	$138,397
28	2036	$27,780,283	$5,556,057	$33,336,340	$424,020	$76,324	$500,344	$33,836,684		$33,836,684	$8,924,266	$131,963
29	2037	$28,201,634	$5,640,327	$33,841,961	$424,020	$76,324	$500,344	$34,342,305		$34,342,305	$8,636,588	$125,829
30	2038	$28,239,807	$5,647,961	$33,887,768	$424,020	$76,324	$500,344	$34,388,112		$34,388,112	$8,246,110	$119,980
31	2039	$30,970,750	$6,194,150	$37,164,900	$424,020	$76,324	$500,344	$37,665,244		$37,665,244	$8,612,111	$114,403
32	2040	$30,879,387	$6,175,877	$37,055,264	$424,020	$76,324	$500,344	$37,555,608		$37,555,608	$8,187,883	$109,085
33	2041	$30,774,037	$6,154,807	$36,928,844	$424,020	$76,324	$500,344	$37,429,188		$37,429,188	$7,780,997	$104,014
34	2042	$30,696,526	$6,139,305	$36,835,831	$424,020	$76,324	$500,344	$37,336,175		$37,336,175	$7,400,869	$99,179
35	2043	$30,605,129	$6,121,026	$36,726,155	$424,020	$76,324	$500,344	$37,226,499		$37,226,499	$7,036,118	$94,569
36	2044	$30,513,805	$6,102,761	$36,616,566	$424,020	$76,324	$500,344	$37,116,910		$37,116,910	$6,689,301	$90,173
37	2045	$30,513,805	$6,102,761	$36,616,566	$424,020	$76,324	$500,344	$37,116,910		$37,116,910	$6,378,356	$85,982
38	2046	$27,561,879	$5,512,376	$33,074,255	$424,020	$76,324	$500,344	$33,574,599		$33,574,599	$5,501,433	$81,985
39	2047	$27,561,879	$5,512,376	$33,074,255	$424,020	$76,324	$500,344	$33,574,599		$33,574,599	$5,245,705	$78,174
40	2048	$27,561,879	$5,512,376	$33,074,255	$424,020	$76,324	$500,344	$33,574,599		$33,574,599	$5,001,864	$74,540
41	2049	$27,215,942	$5,443,188	$32,659,130	$424,020	$76,324	$500,344	$33,159,474		$33,159,474	$4,710,388	$71,075
42	2050	$27,215,942	$5,443,188	$32,659,130	$424,020	$76,324	$500,344	$33,159,474		$33,159,474	$4,491,431	$67,771
43	2051	$27,215,942	$5,443,188	$32,659,130	$424,020	$76,324	$500,344	$33,159,474		$33,159,474	$4,282,652	$64,621
44	2052	$27,215,942	$5,443,188	$32,659,130	$424,020	$76,324	$500,344	$33,159,474		$33,159,474	$4,083,577	$61,617
45	2053	$25,317,389	$5,063,478	$30,380,867	$424,020	$76,324	$500,344	$30,881,211		$30,881,211	$3,626,231	$58,753
46	2054	$5,395,525	$1,079,105	$6,474,630	$424,020	$76,324	$500,344	$6,974,974		$6,974,974	$780,965	$56,022
47	2055	$5,395,525	$1,079,105	$6,474,630	$424,020	$76,324	$500,344	$6,974,974		$6,974,974	$744,663	$53,418
48	2056	$18,222,306	$3,644,461	$21,866,767	$424,020	$76,324	$500,344	$22,367,111		$22,367,111	$2,276,959	$50,935
49	2057	$18,222,306	$3,644,461	$21,866,767	$424,020	$76,324	$500,344	$22,367,111		$22,367,111	$2,171,117	$48,567
50	2058	$1,549,397	$309,879	$1,859,276	$424,020	$76,324	$500,344	$2,359,620		$2,359,620	$218,395	$46,309
51	2059	$1,549,397	$309,879	$1,859,276	$424,020	$76,324	$500,344	$2,359,620		$2,359,620	$208,243	$44,157
52	2060	$1,549,397	$309,879	$1,859,276	$424,020	$76,324	$500,344	$2,359,620		$2,359,620	$198,564	$42,104
		$1,247,674,772	$249,534,950	$1,497,209,722			$23,516,168		$44,288,593	$67,804,761	$600,581,349	$7,226,056

Total PV Cost	$600,581,349	24,597.8
AAC	$31,968,507	492.0
52 period of analysis:	**$/ICUs**	**$64,982**

Table D-15: Barren Island IDC Calculations

Barren Island Cost Analysis

Base Year: 2008

Project Year	FY	Project Contract Cost	Project Cost Contingency	Project Cost	OMRR&R Contract Cost	OMRR&R Contingency	OMRR&R Cost	Total Project Cost	Interest During Construction	Total Investment Cost	Present Value O&M	Present Value (2008 B.Y.)
0	2008											$0
1	2009	$248,250	$49,650	$297,900	$0	$0	$0	$297,900	$71,192	$369,092	$0	$351,936
2	2010	$15,714,135	$3,142,827	$18,856,962	$0	$0	$0	$18,856,962	$3,420,430	$22,277,392	$0	$20,254,447
3	2011	$16,221,723	$3,244,351	$19,466,074	$0	$0	$0	$19,466,074	$2,461,926	$21,928,000	$0	$19,010,043
4	2012	$4,599,119	$552,614	$5,151,733	$139,211	$25,058	$164,269	$5,316,002	$393,968	$5,709,970	$117,720	$4,720,043
5	2013											
6	2014											
7	2015											
8	2016											
9	2017											
10	2018											
11	2019											
12	2020											
13	2021											
14	2022											
15	2023											
16	2024											
17	2025											
18	2026											
19	2027											
20	2028											
21	2029											
22	2030											
23	2031											
24	2032											
25	2033											
26	2034											
27	2035											
28	2036											
29	2037											
30	2038											
31	2039											
32	2040											
33	2041											
34	2042											
35	2043											
36	2044											
37	2045											
38	2046											
39	2047											
40	2048											
41	2049											
42	2050											
43	2051											
44	2052											
45	2053											
46	2054											
47	2055											
48	2056											
49	2057											
50	2058											
51	2059											
52	2060											
53	2061											
54	2062											
55	2063											
Totals:		$36,783,227	$6,989,442	$43,772,669	$139,211	$25,058	$164,269	$43,936,938	$6,347,516	$50,284,454	$117,720	$44,336,468

Total PV Cost	$44,336,468	16,053
AAC	$2,359,998	321.1
52 period of analysis	**$/ICUs**	**$7,351**

ATTACHMENT E

BIOGRAPHICAL INFORMATION OF EXPERTS PARTICIPATING IN DELPHI METHOD AND PLAN FORMULATION

NAME	AGENCY	TITLE	CURRICULUM VITAE
Court Stevenson, PhD.	UMCES	Professor	Professor, University of Maryland Center for Environmental Science, Horn Point Laboratory since 1988. Areas of professional expertise: coastal zone resources and water quality management issues, ecology of marsh and sea grass systems, effects of sea-level rise on wetlands and coastal shorelines, environmental history of Chesapeake Bay and its watershed. He has published numerous articles in professional journals and has been the principle investigator or Co-PI on a number of grants and contracts for both federal and state agencies, such as the National Oceanic & Atmospheric Administration, the Environmental Protection Agency, Region III, the State of Maryland Department of Natural Resources, etc. Holds a Ph.D. in Botany from the University of North Carolina at Chapel Hill. Is a member of numerous professional societies including the Coastal Education and Research Foundation and the Society for Wetland Scientists. Has been involved with a wide-range of government funded activities such as the Chesapeake Bay Program and the Maryland Governor's Task Force on Clamming and Submersed Aquatic Vegetation. He was selected to serve as Island Ecologist for this project.
Larry Hindman	DNR	Waterfowl Project Manager	Represents Maryland on the Atlantic Flyway Council Migratory Game Bird Technical Section where he currently chairs the Canada Goose Technical Committee. Responsible for planning and conducting research and surveys used in the management of resident and wintering waterfowl in Maryland. Holds a B.S. and M.S. degrees from Eastern Kentucky University. He was selected to serve as one of several waterfowl experts on this project.
Mike Erwin	USGS	Research Wildlife Biologist	Research duties include investigations of coastal wetlands and their associated waterbird populations, assessing potential effects of sea-level rise on coastal wetlands and bird habitats, evaluating the ecological effects of marsh management techniques on federal refuges and parks, monitoring island restoration methods and wildlife responses, investigating the role of migratory waterbirds in the avian influenza threat, and providing technical assistance to land managers on decisions involving wetland habitat manipulations, restoration, or enhancement. Current projects include: (1) assessing the long-term changes along the Virginia Coast Reserve and the implications to waterbird populations and habitats (co-PI with the University of Virginia's Long Term Ecological Research Project); (2) evaluating island restoration techniques in Chesapeake Bay with respect to waterbird population dynamics (with focus on Poplar Island Environmental Restoration Project); (3) research and monitoring of open marsh water management on USFWS national wildlife refuges in the Northeast; (4) conducting research on the role of

Mike Erwin *(cont'd)*			migratory birds in transmission of avian influenza in China (SCEP student involvement); (5) monitoring effects of sea-level rise in coastal Virginia and potential impacts on waterbird habitat (6) senior editor of symposium proceedings on "Waterbirds of the Chesapeake Bay and Vicinity: Harbingers of Change" (expected late 2007). Technical and Professional Assistance: Serves on National Science Panel for San Francisco Bay Restoration (since 2003), USGS representative on the Habitat Subgroup of the Poplar Island Environmental Restoration Project (since 1994), Chair of International Grants Committee of The Waterbird Society, Committee member for International Awards of Waterbird Society, Charter Member of the Virginia Coastal Avian Partnership, Committee member of the Western Hemisphere Shorebird Reserve Network. Holds a M.S., University of Rhode Island, 1969; Zoology, and a Ph.D., University of Maryland, 1975; Zoology. He was selected to serve as one of several waterfowl experts for this project.
Dave Brinker	DNR	Central Regional Ecologist	Central Region Ecologist, Natural Heritage Program, Maryland Department of Natural Resources. Has been with the Wildlife & Heritage Service in MD DNR since 1989. Areas of professional expertise: wildlife ecology, raptors, and waterbirds. Accomplishments: was responsible for monitoring breeding populations of colonial nesting waterbirds in Maryland since 1985, organized and directed the first Maryland survey of marsh breeding birds (primarily rails) in 1990-92 and a resurvey in 2005-06. He has provided DNR input relating to colonial nesting waterbirds issues for the Hart-Miller Island and Poplar Island USACE projects and is a member of the multi-agency Bay Enhancement Working Group. Has published articles in professional journals on raptors and colonial nesting waterbirds. Prior to joining the MD DNR he worked in the consulting industry on a number of large site selection studies for power plants and other industries in the eastern U.S. Is a member of numerous professional societies including the American Ornithologist's Union, Waterbird Society, Wilson Ornithological Society and the Raptor Research Foundation. Holds a B.S. 1977 University of Wisconsin Green Bay in Ecosystems Analysis. He was selected to serve as a waterfowl expert for this project.
Dave Meyer	NMFS	Research Fishery Biologist	NOAA Center for Coastal Fisheries and Habitat Research, Beaufort Laboratory in North Carolina. Areas of expertise are fisheries and wetland habitats. Project leader for various multi-agency collaborative studies, including: the examination of created marsh and oyster habitat use by fisheries; changes in vegetation dominance as created marshes develop; influence of oyster cultch in combination with created marsh to increase the long term integrity of marsh restorations; oyster reef creation using geotextile material; macro algal biomass on faunal abundance and composition in

Dave Myer *(cont'd)*			seagrass beds; live bait shrimp trawling impacts on seagrass habitat and fish by-catch mortality; examination of geographical and ecological gradients on fisheries use of near-key, bank and basin seagrass habitat in Florida Bay; and comparison of fisheries use of *Phragmites australis* and *Spartina alterniflora* marsh. Current projects include: evaluation of the effects of the 1,100 acre, Poplar Island Restoration Project, Chesapeake Bay, on nearby fisheries; the examination of fisheries function of isolated compared to non-isolated marshes and influence of marsh morphology; and military activity impacts on estuarine functions at Camp Lejeune. Serves as a science advisor to the NOAA Restoration Center on issues pertaining to the restoration and creation of wetland habitat and habitat manipulation. Recipient of numerous honors and awards including being selected for the National Marine Fisheries Service, Advanced Studies Program, April 2001- Studies scheduled during January, 2002 -May, 2003; and the 2003 Costal America Presidential Partnership Award (along with other members of the Poplar Island Environmental Restoration Team). Widely published in a variety of professional journals including the Marine Ecology Progress Series, Estuaries and Coasts, and the Virginia Institute of Marine Science Press. Holds a M.S. in Coastal Biology and a Ph.D. in Marine Biology from the University of North Carolina, Wilmington. He was selected to serves as a fish expert on this project.
Harley Speir	DNR	Program Leader	Has 36 years of experience with MD DNR. Her area of expertise is in fisheries research, management and policy development. She is responsible for administration of the Regulatory and Compliance Program and supervision of the staff that prepares fisheries management regulations for the freshwater and tidewater fisheries of Maryland, tracks progress of the fisheries for quota managed species and maintains the commercial catch record system. She also supervises the project that distributes, receives, compiles and archives commercial catch report forms from the 6,000 Maryland fishermen and crabbers. A member of the ASMFC Management and Science Committee and Northeast Area Monitoring and Assessment Program Board. She holds a B.S. Wildlife Management and a M.S. in Biology from Tennessee Technological University. She was selected to serve as one of the fish experts on this project.
Peter Bergstrom	NOAA	Fishery Biologist	Fishery biologist at the NOAA Chesapeake Bay Office. Areas of expertise include habitat assessment, protection, and restoration of tidal fish habitats, especially Submerged Aquatic Vegetation (SAV). Has planned and carried out several small-scale SAV restoration projects, funded several large-scale SAV restoration projects, and advised others on doing SAV restoration. Co-chair of the Living Resources Analysis Workgroup of the

			Chesapeake Bay Program (CBP), and chaired the SAV Workgroup of the CBP from 1994-2000. Has a BA in biology from Bennington College and an MS and PhD in evolutionary biology from the University of Chicago. Co-author of 'Underwater Grasses in Chesapeake Bay and Mid-Atlantic Coastal Water'. He was selected to serve as the expert on submerged aquatic vegetation.
Mike Naylor	DNR	Aquatic Biologist	Aquatic biologist for the Maryland Department of Natural Resources (DNR) Resource Assessment Service. Work is focused on conservation and restoration of submerged aquatic vegetation (SAV) habitat in the Chesapeake Bay watershed. Part of team that established 'Grasses in Classes' Program, a national model. Used historic photographs to document, for the first time, the extent of SAV distributions prior to their dramatic declines in the late 1960s and following the ravaging impacts of Hurricane Agnes on the watershed in 1972 (The results led to a new SAV goal for the Chesapeake Bay and became the mechanism through which bay-wide water clarity standards are set). Chair of the SAV Workgroup in the Chesapeake Bay Program since 1999. Developed and led an eradication program aimed at eliminating the non-native water chestnut from Maryland's waters. Recipient of 2007 Conservation Award From American Fisheries Society. Co-author of 'Underwater Grasses in Chesapeake Bay and Mid-Atlantic Coastal Water'. Work has been published in peer reviewed journals. He was selected to serve as the expert on submerged aquatic vegetation.
Bob Orth	VIMS	Professor of Marine Science	Area of expertise is the biology and ecology of seagrasses, principally in the Chesapeake Bay. Currently involved in a number of projects / studies including global trajectories of seagrasses, and establishing a quantitative basis for seagrass conservation and restoration for the National Center for Ecological Analysis and Synthesis. Has conducted annual mapping of the distribution of SAV in the Chesapeake Bay and Coastal Bays since 1994. for the US EPA, Maryland Dept. of Natural Resources, NOAA, Virginia's Coastal Program, VA DEQ. Has been published in numerous professional journals such as *Aquatic Botany* and *Estuaries*. Holds a M.S., University of Virginia, 1971 and a Ph.D., University of Maryland, 1975. He was selected to serve as the expert on submerged aquatic vegetation.
Chris Judy	DNR	Shellfish Program Director	Shellfish staff since 1986 involved with oyster restoration and field projects. Areas of professional expertise: oyster restoration and management, oyster sampling and population trends, oyster fishery, permits for conducting oyster projects. Frequent speaker at scientific and management conferences on these topics. Has lead the design and implementation of numerous oyster field projects involving habitat restoration, seed planting, sanctuary

			development, fishery enhancement and permits. Assisted in the writing of the Oyster Management Plan and a variety of internal white papers and management papers. Advises Maryland's oyster restoration non-governmental organizations regarding the design and implementation of their projects. Holds a B.S. Degree from the University of Maryland in Conservation and Resource Development, completed M.S. graduate coursework in Chesapeake Bay studies, Marine and Estuarine Sciences Program. He was selected to serve as an expert on oysters.
Bill Goldsborough	CBF	Senior Scientist	Senior Scientist at the Chesapeake Bay Foundation. Began his work with CBF in 1978 in the education department, managing the Smith Island and the Baltimore Education Centers. Developed the Environmental Protection and Restoration Department within CBF. Member of the former Oyster Roundtable that became the Oyster Recovery Partnership. Holds a Masters degree from the University of Maryland. He was selected to serve as an expert on oysters.
Paula Henry	USGS	Research Physiologist	Research Physiologist at the USGS Patuxent Wildlife Research Center. Areas of expertise include: avian wildlife physiology and behavior; environmental contaminants; neurotransmitter and endocrinology; herpetology. Primary research responsibilities are: population monitoring of turtles; effects of chronic and sublethal exposure of environmental contaminants on avian, amphibian and reptilian wildlife species; urbanization effects on wildlife populations; physiological and behavioral biomarkers of exposure and effects. Holds a M.S. from the University of Maryland in Zoology/Endocrinology, 1985, and a Ph.D. from the University of Maryland in Marine Estuarine Environmental Sciences, 2002. She was selected to serve as an expert on reptiles.
Tom Pluto	COE	Biologist	Regulatory Program Manager, Corps of Engineers, Baltimore District. Area of expertise is herpetology, with turtles being his favorite. Initially did enforcement concerning unpermitted work in wetlands or streams pursuant to Section 404 of the Clean Water Act. Since about 1988, he has been primarily doing permitting of work in wetlands/streams. During this period while conducting site inspections, he discovered four new locations of the (now) Federally threatened Bog Turtle. He is considered by the USFWS and the PA Fish & Boat Commission as a "qualified Bog Turtle Surveyor." Has conducted required Phase 2 Bog Turtle Surveys, as a Corps employee, for the Baltimore District at the Letterkenny Army Depot (two separate surveys) and at a PA DOT highway project (Rt. 222, Warren Street). Between 1996 and 2003 he was a Regional Coordinator for the PA Herpetological Atlas Project. Currently a member of the PA Biological Survey, Amphibian

			and Reptile Technical Committee. He is also a member of the professional societies, The Herpetologists' League and The Society for the Study of Amphibians and Reptiles, since 1978. He has six refereed publications concerning reptiles and amphibians and/or wetlands. Currently, has five other publications concerning reptiles and amphibians in press. He holds a M.S. in Veterinary Science and a Ph.D., Ecology from Pennsylvania State University; Ph.D. He was selected to serve as an expert on reptiles for this project.
Anson (Tuck) Hines	SERC	Director	Director of the Smithsonian Environmental Research Center (SERC). Has served as a marine ecologist and principle investigator of SERC's Fish and Invertebrate Ecology Laboratory for the past 26 years and is the co-principle investigator in the SERC Invasions Biology Program. Areas of study include the effects of thermal discharges of coastal power plants; long-term ecological changes in the Chesapeake Bay; and impacts of fisheries, aquaculture and fishery restoration. Has published over a 100 articles in professional journals and books. Serves as an adjunct professor at four major institutions (University of Maryland, University of North Carolina State University, College of William and Mary, and the Maryland Biotechnology Institute. Holds a Ph.D. in Zoology from the University of California, Berkeley. He was selected to serve as an expert on invertebrates – blue crabs.
Roberto Llanso	Versar	Senior Benthic Ecologist	Senior Benthic Ecologist with Versar. Areas of expertise include: marine sediment quality assessment and monitoring; evaluating pollution effects on benthos; evaluating changes to water quality and the links to benthos; and developing biocriteria. Has conducted studies on low dissolved oxygen and eutrophication effects on benthos, marine benthic ecology, habitat restoration, population dynamics of marine invertebrates, and taxonomy of marine invertebrates. Responsible for the Long-Term Benthic Monitoring component of the Chesapeake Bay Program conducted for the Maryland Department of Natural Resources. Before joining Versar, was the project lead for the benthic component of the Puget Sound Assessment and Monitoring Program (PSAMP). Has published articles in a large number of professional journals including Journal of the Experimental Marine Biology, and Ecology and Coastal and Shelf Science. Current member of the American Society of Limnology and Oceanography, the Atlantic Estuarine Research Society, the Estuarine Research Federation, the Northern Association of Marine Invertebrate Taxonomists (Founder and Incorporator), the Pacific Estuarine Research Society (Newsletter Editor, 1996-1998; Secretary, 1998-2000) and the Society of Environmental Toxicology & Chemistry. Holds a M.A., Marine Science, School of Marine Science, The College of

			William and Mary, 1985; Ph.D., Marine Science, School of Marine Science, The College of William and Mary, 1990. He was selected to serve as an expert on Invertebrates – Benthic.

APPENDIX D - REAL ESTATE PLAN (REP)
MID-CHESAPEAKE BAY ISLAND ECOSYSTEM RESTORATION PROJECT
DORCHESTER COUNTY, MARYLAND

1. GENERAL

2. REAL ESTATE REQUIREMENTS

   a. Description of Land, Easements, Rights-of-Way, Relocations, and Disposal Areas (LERRD's) for the Project
   b. Standard Estates
   c. Non-Standard Estates
   d. Current Ownership
   e. Real Estate Mapping

3. FEDERALLY-OWNED LANDS AND EXISTING FEDERAL PROJECTS

4. LANDS OWNED BY THE NON-FEDERAL SPONSOR

5. NAVIGATIONAL SERVITUDE

6. INDUCED FLOODING

7. BASELINE COST ESTIMATE FOR REAL ESTATE

8. PUBLIC LAW 91-646 RELOCATIONS

9. TIMBER RIGHTS AND MINERAL ACTIVITY

10. ASSESSMENT OF NON-FEDERAL SPONSOR ACQUISITION CAPABILITY

11. ZONING

12. REAL ESTATE ACQUISITION SCHEDULE

13. UTILITY AND FACILITY RELOCATIONS

14. ENVIRONMENTAL CONCERNS

15. ATTITUDES OF THE LANDOWNERS

16. NOTIFICATION TO NON-FEDERAL SPONSOR

17. RISK ANALYSIS

REAL ESTATE PLAN (REP)

1. GENERAL

This REP supports the Mid-Chesapeake Bay Island Ecosystem Restoration Feasibility Report, the study area being located on those middle portions of the Bay within Maryland. This study is authorized under a resolution of the Senate Committee on Environment and Public Works, dated June 5, 1997. The purpose of the Feasibility Report is to determine the technical, economic, and environmental feasibility of protecting, restoring, and creating aquatic, intertidal wetland, and upland habitat for fish and wildlife at various mid-Chesapeake Bay islands using clean dredged material from the Baltimore Harbor and Channels Federal Navigation Project. The Non-Federal Sponsor (NFS) will be the Maryland Department of Transportation (MDDOT). The MDDOT is an umbrella organization that includes the Maryland Port Administration (MPA). The MPA will be the primary point-of-contact for work conducted under the Project Cooperation Agreement (PCA).

2. REAL ESTATE REQUIREMENTS

a. Description of Land, Easements, Rights-of-Way, Relocations, and Disposal Areas (LERRD's) for the Project:

The recommended plan in the Feasibility report consists of two sites. One site will be a combination upland and wetland island ecosystem west and north of James Island, of approximately 2,072 acres. The other site is located at Barren Island and entails constructing and upgrading shore protective works and creating approximately 72 wetland acres with an impact of approximately 100 acres around the adjacent edge of portions of the island by backfilling behind part of these protective structures. The construction at both the James Island and Barren Island sites will be located primarily on open waters of the Chesapeake Bay in Dorchester County, Maryland. The Government will exercise its right of navigational servitude for construction of the project on lands below the mean high water line. However, it is noted that the State of Maryland owns the bay bottom in fee simple. Barren Island is owned by the federal government and is managed by the U.S. Fish and Wildlife Service (USFWS) as part of the Chesapeake Island Wildlife Refuge Complex. Since there will be construction on the shoreline of Barren Island, possibly overlapping the mean high water line, a Special Use Permit, will be obtained from the U.S. Fish and Wildlife Service for project purposes for an area near the shore.

The navigation channels from which the dredged material will come to fill the sites will be from several navigation projects around the Chesapeake Bay. No additional real estate will have to be acquired in conjunction with the Project, other than a yet to be determined temporary leased staging and harbor areas on the mainland. Due to construction not being anticipated for many years, the high variability of lease price, and availability and use of waterfront property, there is no way to determine what specific site or sites would be acquired at that time. A general lease rent value has been added to the estimate, but the availability of specific sites and estimated rentals cannot be determined until it is known when construction will proceed.

b. Standard Estates

(1) A standard Fee estate would be required for construction, operation and maintenance of the ecosystem sites. However, because the navigational servitude is being invoked, and because the NFS owns the Bay bottom lands in fee, no fee acquisition is necessary.

(2) Staging and harbor areas for the project may be necessary and will be determined as necessary and appropriate. We have chosen the lease estate in this instance, rather than the more common temporary work area easement, because a lease is more flexible and will better meet the potential changing situation at prospective staging and harbor areas. These areas are generally privately owned with multiple use and business utilization involved. Also, depending on the various project phases and contractors over the course of the long term project, duration of use, staging requirements, and harbor locations may be revised. A lease can be more easily crafted to make adjustments to accommodate the lessor's other property uses and can be more readily amended as to the term and needs for the specific phase and duration of the particular phase of the project. Temporary Work Area Easements, being more rigid in wording and exclusive in use, are acquired by Deed and cannot be readily adjusted or changed without a formal Deed revision and closing. So, in such instances we are requiring a leasehold interest as the minimum estate, as provided in EC 405-1-11, Real Estate - Acquisition, Exhibit 29, as follows:

LEASEHOLD ESTATE (No. 17.)

A term for years ending _____, 20____, extendible for yearly periods thereafter, at the election of the United States, until _____, 20___, notice of which election shall be filed in the proceeding at least thirty (30) days prior to the end of the term hereby taken, or subsequent extensions thereof, together with the right to remove, within a reasonable time after the expiration of the term taken, or any extension thereof, any and all improvements and structures heretofore or hereafter placed thereon by or for the United States; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

c. Non-Standard Estates:

All areas above the mean high water mark on Barren Island are owned by the United States under management of the USFWS as part of the Chesapeake Island Wildlife Refuge Complex. The USFWS does not dispose of permanent property interests as a common practice, but may issue Special Use Permits for access on Barren Island for both construction of the project. The USFWS Special Use Permit, example for project survey is shown as Exhibit "A", is being treated as a non-standard estate. A new Permit will be granted for construction. As provided in ER 405-1-12, Chapter 12, Section VI. 12-29b., where another Federal agency is authorized to allow use of Federal land it manages without transfer of interest, the non-Federal sponsor is not required to acquire an interest in such land. Also, ER 405-1-12, Chapter 8, Paragraph 8-210, further supports this where it states, "...Federal agencies and Secretaries of military departments have long issued permits granting use of real property under their control to

other Federal agencies, with the tacit approval of Congress, where such use would not interfere with the purpose for which the property was originally acquired or is being retained". The USFWS will grant Special Use Permits for the specific areas, activities and terms necessary to cover construction by the Corps. It is anticipated that future operation and maintenance of the project by the NFS can be conducted on the NFS property below the mean high water line. However, if access should become necessary for such purposes on USFWS administered property, it is anticipated there will be no problem obtaining Permits, since the goal of protecting the island and habitat are the same for both USFWS and the NFS. The Permits will be obtained from the USFWS by the Corps, since it is more efficient for the Federal agencies to coordinate directly without NFS involvement. Special Use Permits, non-standard estates, are considered fully adequate to carry out the purposes of the project.

d. Current Ownership:

There is 1 tract of approximately 2,072 acres near James Island, and 1 tract of approximately 72 wetland acres with an impact of approximately 100 acres adjacent to Barren Island, most of which is Chesapeake Bay bottom necessary for construction of the project, currently owned by the State of Maryland. Any land utilized above mean high water around the shoreline of Barren Island is owned by the United States.

e. Real Estate Mapping:

Maps showing the general location of the project sites as well as the selected alignments and structures in relation to both James Island and Barren Island are shown in Exhibits "B", "C", and "D" respectively.

3. FEDERALLY-OWNED LANDS AND EXISTING FEDERAL PROJECTS

The Government currently owns Barren Island above the mean high water mark as part of the Chesapeake Island Wildlife Refuge Complex. Dredged material utilized for the Project will be utilized primarily from maintenance of the federal Baltimore Harbor and Channels Project, Maryland.

4. LANDS OWNED BY THE NON-FEDERAL SPONSOR

The State of Maryland owns the Chesapeake Bay bottom anywhere below the mean high water mark. Once new project lands have been created above mean high water and the project is completed, ownership of the Bay bottom and the new land will remain under the ownership of the State of Maryland, which will be responsible for operation and maintenance of the areas.

5. NAVIGATIONAL SERVITUDE

The entirety of both sites below the mean high water mark is available under navigational servitude. The Chesapeake Bay is a navigable water course. The dredging and placement of material for this project will directly improve and protect navigation in this waterway.

6. INDUCED FLOODING

The proposed project features will not cause induced flooding.

7. BASELINE COST ESTIMATE FOR REAL ESTATE

A detailed cost estimate for the project, in MCACES format, is included in the Cost Estimates, Exhibit "E". The total estimated administrative and estate costs for lands, easements, rights-of-way, relocations, and disposal areas (LERRD) is $66,528 for acquiring a lease and Special Use Permit. No credit will be provided to the NFS for costs or value associated with the Special Use Permit, since this will be obtained by the Corps of Engineers. The lease rental value is strictly a broad estimate based on similar projects of approximately $1,500 rent per month for an approximate acre for staging including harbor access and docking for an initial construction period of 36 months.

8. PUBLIC LAW 91-646 RELOCATIONS

There will be no project features that will require relocations of any persons, farms or businesses in the subject area as would be required under Public Law 91-646, as amended.

9. TIMBER RIGHTS AND MINERAL ACTIVITY

There are no known timber rights or mineral activity in the area that will impact the project site.

10. ASSESSMENT OF NON-FEDERAL SPONSOR ACQUISITION CAPABILITY

As previously stated, the NFS is the MDDOT. The MDDOT is an umbrella organization that includes the Maryland Port Administration (MPA). The MPA will be the primary point-of-contact for work conducted under the Project Cooperation Agreement (PCA), which will be responsible for the acquisition of any necessary real estate interests required for this project. The NFS is fully capable of acquiring any property interests that may be necessary. An Assessment of Non-Federal Sponsor's Real Estate Acquisition Capability is included as Exhibit "F" to this plan.

11. ZONING

The enactment of zoning ordinances is not proposed to facilitate acquisition at project sites.

12. REAL ESTATE ACQUISITION SCHEDULE

Since authorization will have to be passed by Congress for this Project to proceed, it is not yet known if or when a Project Cooperation Agreement (PCA) may be signed. No major real estate acquisition is necessary at the Project sites, and it is anticipated it will only take a month or less to obtain a Special Use Permit for Barren Island from the U.S. Fish and Wildlife Service. The size and location for leasing of a staging and harbor access site, or sites, on the mainland will depend on a number of factors that will not be known until we are closer to contract acquisition. It is anticipated that lease acquisition will take from 2 to 4 months.

13. UTILITY AND FACILITY RELOCATIONS

There are no utility or facility relocations required in connection with this project.

14. ENVIRONMENTAL CONCERNS

Hazardous, toxic, and radioactive waste (HTRW) investigations have been performed at the project site. Neither site has been identified as a known or potential HTRW site. We do not normally perform HTRW investigations at prospective leased sites temporary work areas, since no permanent interest or use is being acquired.

15. ATTITUDES OF THE LANDOWNERS

Local public agencies and organizations have been advised of the plan and are very supportive of the project and the environmental benefits it will produce. Both the owners of James Island and the U.S. Fish and Wildlife Service, which manages Barren Island, are very supportive of the project due to the erosion protection it will provide the islands.

16. NOTIFICATION TO NON-FEDERAL SPONSOR

The NFS are very aware of their responsibility for cost sharing, real estate acquisition, and operations and maintenance for the project through their involvement with previous and ongoing navigation projects such as the Poplar Island Ecosystem Restoration Project.

17. RISK ANALYSIS

Due to navigational servitude, the NFS owning the Bay bottom, and strong support from the U.S. Fish and Wildlife Service, there is little to no risk of any real estate issues holding up the project.

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Chesapeake Island Refuges
Chesapeake Marshlands National Wildlife Refuge Complex
2145 Key Wallace Drive
Cambridge, Maryland 21613

SPECIAL USE PERMIT

Station No. to be Credited Permit No.
51540 - 5-0001

Date November 17, 2004

Period of Use (inclusive)
From November 22, 2004
To June 30, 2005

Permittee Name
James S. Turkel

Permittee Address
US Army Corps of Engineers
Real Estate Div.
Baltimore, MD 21203-1715
410-962-4944

Purpose (specify in detail privilege requested, or units of products involved)

Temporarily access Barren Island to locate existing survey benchmarks and set up GPS base station for Bathemetric survey of surrounding waters relating to future restoration of the Island through the beneficial use of dredge material.
See attached memos.

Description (specify unit numbers: metes and bounds, or other recognizable designations)

Permit allows for temporary and limited access to Barren Island by the permitee and designated sub-contractors, as specified in the attached memos during the dates specifies on the permit.
See attached memos and map.

Amount of fee $0.00 if not a fixed payment, specify rate and unit of charge:

☐ Payment Exempt - Justification:
☐ Full Payment
☐ Partial Payment - Balance of payments to be made as follows:

Record of Payments

Special Conditions

This permit is issued by the U.S. Fish and Wildlife Service and accepted by the undersigned, subject to the terms, covenants, obligations, and reservations, expressed or implied herein, and to the conditions and requirements appearing on the reverse side.

Permittee Signature

Issuing Officer Signature and Title
Thomas R Eaff Deputy Project Leader

Form 3-1383 (Rev. 5/97)

EXHIBIT A

General Conditions

1. Payments
All payments shall be made on or before the due date to the local representative of the U.S. Fish and Wildlife Service (Service) by a postal money order or check made payable to the U.S. Fish and Wildlife Service.
2. Use limitations
The permittee's use of the described premises is limited to the purposes herein specified; does not unless provided for in this permit allow the permittee to restrict other authorized entry on to the permittee's area; and permits the Service to carry on whatever activities are necessary for (1) protection and maintenance of the premises and adjacent lands administered by the Service and (2) the management of wildlife and fish using the premises and other Service lands.
3. Damages
The United States shall not be responsible for any loss or damage to property including but not limited to growing crops, animals, and machinery; or injury to the permittee, or the permittee's relatives, or to the officers, agents, employees, or any others who are on the premises from instructions or by the sufferance of wildlife or employees or representatives of the Government carrying out their official responsibilities. The permittee agrees to save the United States or any of its agencies harmless from any and all claims for damages or losses that may arise or be incident to the flooding of the premises resulting from any associated Government river and harbor, flood control, reclamation, or Tennessee Valley Authority activity.
4. Operating Rules and Laws
The permittee shall keep the premises in a neat and orderly condition at all times, and shall comply with all municipal, county and State laws applicable to the operations under the permit as well as all Federal laws, rules and regulations governing Service lands and the area described in this permit. The permittee shall comply with all instructions applicable to this permit issued by the Service officer in charge. The permittee shall take all reasonable precautions to prevent the escape of fires and to suppress fires and shall render all reasonable assistance in the suppression of fires.
5. Responsibility of Permittee
The permittee, by operating on the premises, shall be considered to have accepted these premises with all facilities, fixtures, or improvements in their existing condition as of the date of this permit. At the end of the period specified or upon earlier termination, the permittee shall give up the premises in as good an order and condition as when received except for reasonable wear, tear, or damage occurring without fault or negligence. The permittee will fully repay the Service for any and all damage directly or indirectly resulting from negligence or failure on his/her part, or the part of anyone of the permittee's associates.
7. Compliance
Failure of the Service to insist upon a strict compliance with any of this permit's terms, conditions, and requirements shall not constitute a waiver or be considered as a giving up of the Service's right to thereafter enforce any of the permit's terms, conditions, or requirements.
8. Termination Policy
At the termination of this permit the permittee shall immediately give up possession to the Service representative, reserving, however, the rights specified in paragraph 9. If the permittee fails to do so, the permittee will pay the Government, as liquidated damages, an amount double the rate specified in this permit for the entire time possession is withheld. Upon yielding possession, the permittee will still be allowed to reenter as needed to remove his/her property as stated in paragraph 9. The acceptance of any fee for liquidated damages or any other act of administration relating to the continued tenancy is not to be considered as an affirmation of the permittees action nor shall it operate as a waiver of the Government's right to terminate or cancel the permit for the breach of any specified condition or requirement.
9. Removal of Permittee's Property
Upon the expiration or termination of this permit, if all rental charges and/or damage claims due to the Government have been paid, the permittee may, within a reasonable period as stated in the permit or as determined by the Service officer in charge but not to exceed 60 days, remove all structures, machinery, and/or other equipment, etc., from the premises for which the permittee is responsible. Within this period the permittee must also remove any other of the permittee's property including his/her acknowledged share of products or crops grown, cut, harvested, stored, or stacked on the premises. Upon failure to remove any of the above items within the aforesaid period, they shall become the property of the United States.
10. Transfer of Privileges
This permit is not transferable, and no privileges herein mentioned may be sublet or made available to any person or interest not mentioned in this permit. No interest hereunder may accrue through lien or be transferred to a third party without the approval of a Service Regional Director and the permit shall not be used for speculative purposes.
11. Conditions of Permit not Fulfilled
If the permittee fails to fulfill any of the conditions and requirements set forth herein, all money paid under this permit shall be retained by the Government

Privacy Act Statement - Special Use Permit

NOTICE: In accordance with the Privacy Act of 1974, 5 U.S.C. 552a, please be advised that:

1. The issuance of a permit and collection of fees on lands of the National Wildlife Refuge System is authorized by the National Wildlife Refuge System Administration Act (16 U.S.C. 668dd - 668ee), and the Refuge Recreation Act, (16 U.S. C. 460k-3); implemented by regulations in 50 CFR 25-36.

2. Information collected in issuing a permit may be used to evaluate and conclude the eligibility of , or merely document, permit applicants.

3. Routine use disclosures may also be made (1) to the U.S. Department of Justice when related to litigation or anticipated litigation; (2) of information indicating a violation or potential violation of a statute, regulation, rule, order or license, to appropriate Federal, State, local or foreign agencies responsible for investigating or prosecuting the violation or for enforcing or implementing the statute, rule, regulation, order, or license; (3) from the record of the individual in response to an inquiry from a Congressional office made at the request of that individual; (4) to provide addresses obtained from the Internal Revenue Service to debt collection agencies for purposes of locating a debtor to collect or compromise a Federal Claim against the debtor, or to consumer reporting agencies to prepare a commercial credit report for use by the Department (48FR 54716; December 6, 1983).

4. Any information requested is required to receive this permit. Failure to answer questions may jeopardize the eligibility of individuals to receive permits.

Special Conditions (continued) - Permit # 51540-5-0001

1. Permittee shall notify at least one of the following staff (noted in priority order) a minimum of twenty-four hours in advance of any intended visit. The office phone number is (410)-639-7056 or (410)-228-2692, and the respective extensions are noted by the staff's name and position. Preferably notification should be made by e-mail copying all listed staff.

   a. Tom Eagle, Deputy Project Leader; email Tom_Eagle@fws.gov
   b. Marty Kaehny, Project Leader, email, marty_kaehny@fws.gov
   c. Beth Folsum, LE Officer (x119); email Beth_folsum@fws.gov

2. Permittee shall provide the issuing officer with a list of all persons (with phone numbers) who will be representing or accompanying the permittee prior to exercising any conditions of this permit.

3. In addition to complying with the Operating Rules and Laws referenced in the General Conditions, the permittee should familiarize themselves with Refuge Specific Regulations found in Title 50, Code of Federal Regulations governing National Wildlife Refuges and the area described in this permit.

4. Permittee shall remove all materials, equipment, supplies, etc. from the refuge immediately upon completion of the use.

5. Keys for access to refuge areas will be issued upon request. Permittees supplied with keys are required to return keys within 10 days after conclusion of the authorized use. Permittee may not duplicate or loan keys. Permittee is responsible for closing and locking refuge gates upon entering and exiting refuge, and will be held liable for replacement of keys or lock cores if keys are lost.

6. Parking areas and access routes will be designated by the refuge manager, and areas and periods of access may be restricted depending upon other ongoing management activities and/or wildlife disturbance criteria.

7. This permit is not transferable, and no privilege hereunder may be sublet or made available to any person or interest, not a party hereto, without the approval of the Refuge Manager.

8. Failure by the Permittee or authorized assistant(s) to comply with any of the provisions or violation of any refuge regulation or any State law or regulation applicable to the described use, not only shall render Permittee subject to prosecution under said laws and regulations, but shall constitute cased for revocation of this permit. This permit may be terminated at any time by the issuing officer.

9. The Refuge Manager reserves the right to restrict traffic on any refuge access road due to weather, wet conditions, wildlife activity, etc. Permittee is responsible for repairing any damage caused to refuge roads during bad weather, wet conditions, etc.

10. Permittee agrees and acknowledges that if the permit is issued to collect or obtain scientific research information that any information generated will be made available to the Service in a completion report, data summary, and/or published materials when project is completed.

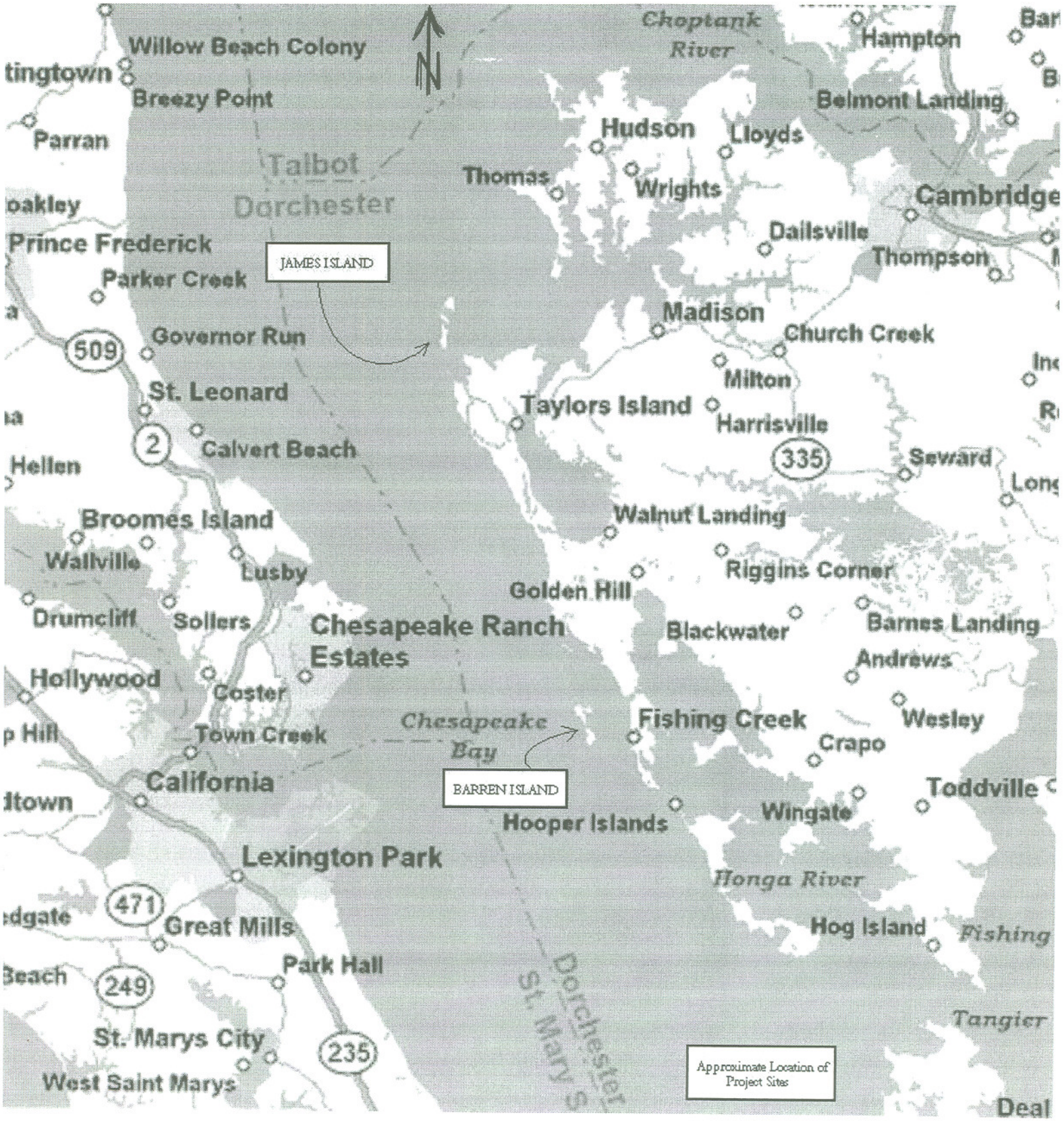
Choptank River
Willow Beach Colony
Hampton
Breezy Point
Belmont Landing
Parran
Hudson
Lloyds
Talbot
Thomas
Wrights
Dorchester
Cambridge
Prince Frederick
Dailsville
Thompson
JAMES ISLAND
Parker Creek
Madison
Governor Run
Church Creek
509
Milton
St. Leonard
Taylors Island
Harrisville
2
Calvert Beach
335
Seward
Broomes Island
Walnut Landing
Wallville
Lusby
Riggins Corner
Golden Hill
Drumcliff
Sollers
Chesapeake Ranch Estates
Blackwater
Barnes Landing
Andrews
Hollywood
Coster
Chesapeake Bay
Fishing Creek
Wesley
Town Creek
Crapo
California
BARREN ISLAND
Toddville
Wingate
Hooper Islands
Lexington Park
Honga River
471
Great Mills
Hog Island
Fishing
Park Hall
249
Tangier
St. Marys City
235
Dorchester
St. Mary's
Approximate Location of Project Sites
West Saint Marys
Deal

EXHIBIT B

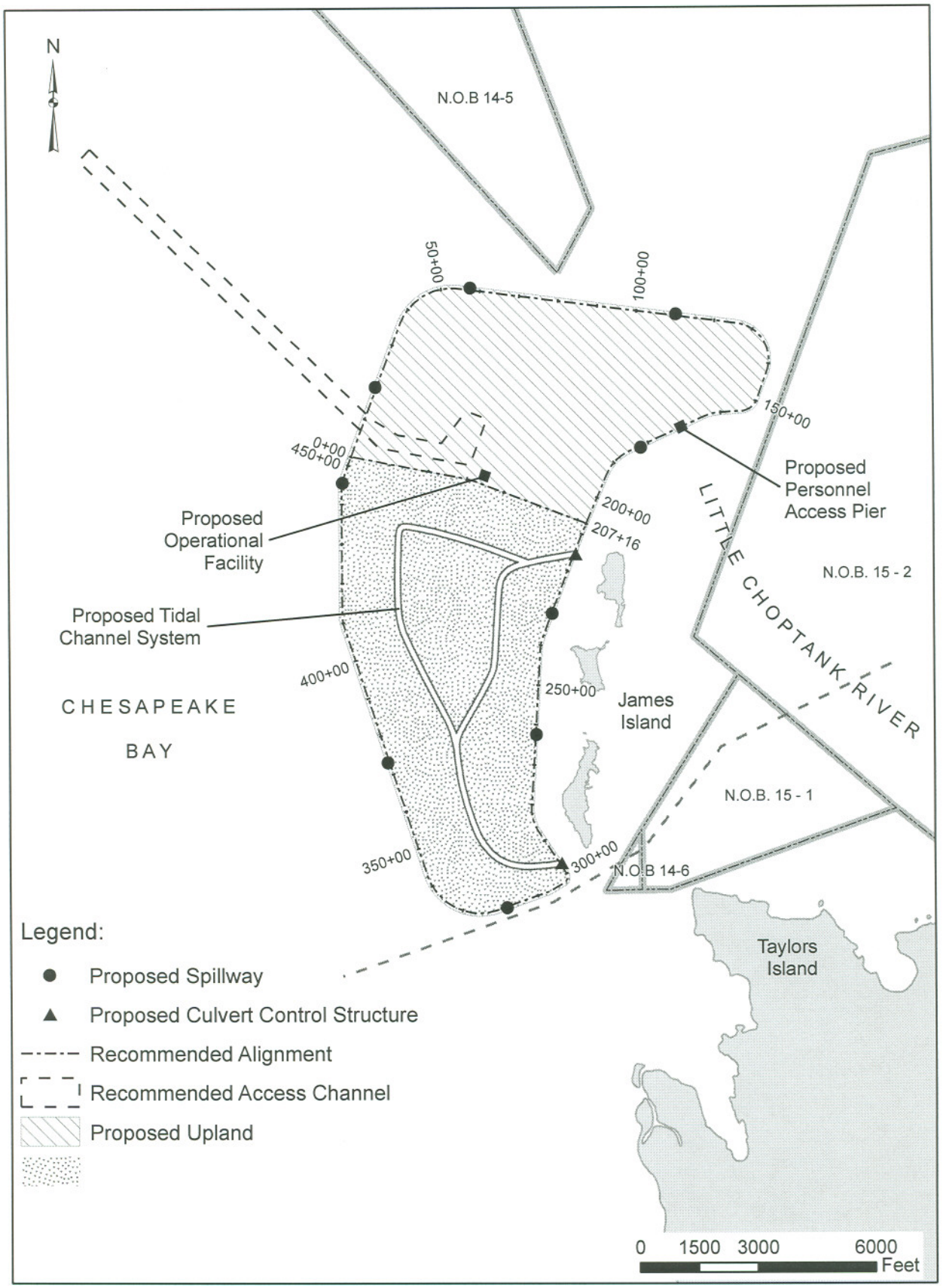

Figure 10. James Island Recommended Plan.

EXHIBIT C

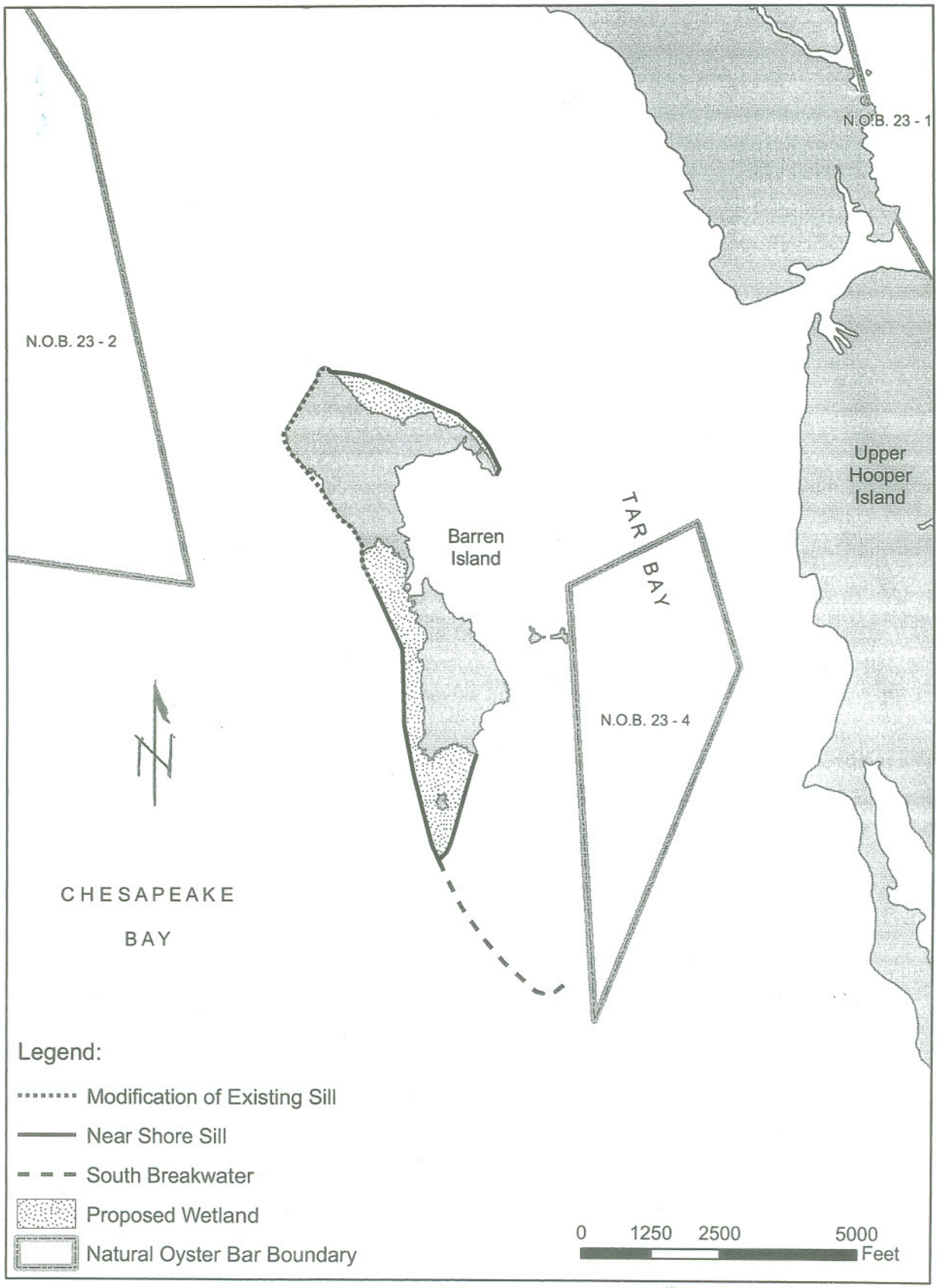

Figure 19. Barren Island Recommended Plan.

EXHIBIT D

Feasibility Study Cost Estimate-MCACES Format
Real Estate Acquisition Requirements
Mid Chesapeake Bay Island Ecosystem Restoration Project
Dorchester County, Maryland

	Private			Commercial			Public			Requirement		
	#	$ each	req	#	$ each	req	#	$ each	req	Base	Contingency	Total
0102------- ACQUISITIONS												
010201--- By Government												
010202--- By Non-Federal Sponsor (NFS)												
01020201 Survey and Legal Descriptions	0	0	0	0		0	0		0	0	0	0
01020102 Title Evidence	0	0	0	0		0	0		0	0	0	0
01020203 Negotiations	0	0	0	1	2,000	2,000	0		0	2,000	300	2,300
010203--- By Government on Behalf of NFS												
010204--- Review of NFS												
01020401 Survey and Legal Descriptions	0	0	0	0		0	0		0	0	0	0
01020402 Title Evidence	0	0	0	0		0	0		0	0	0	0
01020403 Negotiations	0	0	0	1	150	150	0		0	150	23	173
SUBTOTAL										2,150	323	2,473
0103------- CONDEMNATIONS												
010301--- By Government												
010302--- By Non-Federal Sponsor (NFS)	0	0	0	0		0	0		0	0	0	0
010303--- By Government on Behalf of NFS												
010304--- Review of NFS	0	0	0	0		0	0		0	0	0	0
SUBTOTAL										0	0	0
0105------- APPRAISALS												
010501--- By Government												
010502--- By Non-Federal Sponsor (NFS)	0	0	0	1	500	500	0		0	500	75	575
010503--- By Government on Behalf of NFS												
010504--- Review of NFS	0	0	0	1	400	400	0		0	400	60	460
SUBTOTAL										900	135	1,035
0106------- PL 91-646 ASSISTANCE												
010601--- By Government												
010602--- By Non-Federal Sponsor (NFS)			0			0			0	0	0	0
010603--- By Government on Behalf of NFS												
010604--- Review of NFS	0		0	0		0	0		0	0	0	0
SUBTOTAL										0	0	0
0107------- TEMPORARY PERMITS/LICENSES/RIGHTS-OF-WAY												
010701--- By Government			0			0			0	0	0	0
010702--- By Non-Federal Sponsor (NFS)			0			0			0	0	0	0
010703--- By Government on Behalf of NFS			0			0	1	500	500	500	75	575
010704--- Review of NFS	0		0	0		0	0		0	0	0	0
010705--- Other			0			0			0	0	0	0
010706--- Damage Claims			0			0			0	0	0	0
SUBTOTAL										500	75	575
0115------ REAL ESTATE PAYMENTS												
011501--- Land Payments												
01150101 By Government										0	0	0
01150102 By Non-Federal Sponsor (NFS)				1	54,000	54,000				54,000	8,100	62,100
01150103 By Government on Behalf of NFS										0	0	0
01150104 Review of NFS				1	300	300				300	45	345
011502--- PL 91-646 Assistance Payments										0	0	0
01150201 By Government										0	0	0
01150202 By Non-Federal Sponsor (NFS)										0	0	0
01150203 By Government on Behalf of NFS										0	0	0
01150204 Review of NFS										0	0	0
011503--- Damage Payments										0	0	0
01150301 By Government										0	0	0
01150302 By Non-Federal Sponsor (NFS)										0	0	0
01150303 By Government on Behalf of NFS										0	0	0
01150304 Review of NFS										0	0	0
SUBTOTAL										54,300	8,145	62,445
Account 02 Facility/Utility Relocations (Construction cost only)											0	0
REAL ESTATE ACQUISITION TOTAL										**$57,850**	**$8,678**	**$66,528**

EXHIBIT E

ASSESSMENT OF NON-FEDERAL SPONSOR'S
REAL ESTATE ACQUISITION CAPABILITY

Project: Poplar Island Expansion Project, Maryland

Non-Federal Sponsor: Maryland Department of Transportation under the administration of the Maryland Port Administration

I. Legal Authority:

a. Does the sponsor have legal authority to acquire and hold title to real property for project purposes? Yes

b. Does the sponsor have the power of eminent domain for this project? Yes

c. Does the sponsor have "quick-take" authority for this project? No

d. Are any of the lands/interests in land required for the project located outside the sponsor's political boundary? No

e. Are any of the lands/interests in land required for the project owned by an entity whose property the sponsor cannot condemn? Yes The State of Maryland cannot condemn any lands on Barren Island, since it is owned by the United States and managed by the U.S. Fish and Wildlife Service.

II. Human Resource Requirements:

a. Will the sponsor's in-house staff require training to become familiar with the real estate requirements of Federal projects including P.L. 91-646, as amended? No

b. If the answer to II.a. is "yes", has a reasonable plan been developed to provide such training?

c. Does the sponsor's in-house staff have sufficient real estate acquisition experience to meet its responsibilities for the project? Yes

d. Is the sponsor's projected in-house staffing level sufficient considering its other work load, if any, and the project schedule? Yes

e. Can the sponsor obtain contractor support, if required, in a timely fashion? Yes

f. Will the sponsor likely request USACE assistance in acquiring real estate? Yes USACE shall assist in obtaining a Special Use Permit from the U.S. Fish and Wildlife Service for construction on the shoreline of Barren Island.

III. Other Project Variables:

a. Will the sponsor's staff be located within reasonable proximity to the project site? Yes

b. Has the sponsor approved the project/real estate schedule/milestones? Yes

IV. Overall Assessment:

a. Has the sponsor performed satisfactorily on other USACE projects? Yes

b. With regard to this project, the sponsor is anticipated to be fully capable.

V. Coordination:

a. Has this assessment been coordinated with the sponsor? Yes

b. Does the sponsor concur with this assessment? Yes

Prepared by:

CRAIG R. HOMESLEY
Realty Specialist

Reviewed and approved by:

NINA P. KELLEY
Chief, Civil Projects Support Branch
Real Estate Division

EXHIBIT F

Appendix E

Environmental Compliance

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Appendix E: Environmental Compliance

During the feasibility phase, a variety of regulations and statutes need to be met as part of the feasibility study process. Those that were considered and reviewed to determine if they are applicable to the study are listed below. As this report is an integrated feasibility report/environmental impact statement, detailed information to meet the NEPA process is included throughout the report. This appendix includes specific documentation to fulfill environmental compliance requirements. Additional compliance documentation is provided in the following attachments:

- Attachment A: Essential Fish Habitat Evaluation
- Attachment B: Clean Water Act Section 404(b)(1) Evaluation
- Attachment C: Endangered Species Act Section 7 Evaluation
- Attachment D: Agency Coordination

E.1 The National Environmental Policy Act of 1969

Public Law 91-190 establishes a broad national policy to improve the relationship between humans and their environment, and sets out policies and goals to ensure that environmental considerations are given careful attention and appropriate weight in all decisions of the Federal Government.

NEPA requires Federal agencies to analyze and consider the direct and indirect environmental and socioeconomic impacts associated with proposed Federal projects, including when a Federal agency takes an action, when a Federal permit or authorization is needed, and/or when Federal funding is used. Compliance with NEPA requires that projects undergo a rigorous process of stakeholder input, alternatives and impact analysis, and review by Federal and State agencies– this process is generally termed the "NEPA Process." For larger projects with anticipated significant impacts, the NEPA process is documented in the form of an EIS or SEIS.

E.2 Federal Statutes

- The American Indian Religious Freedom Act
- Antiquities Act of 1906, as amended
- Archaeological and Historic Preservation Act of 1974, as amended
- Archaeological Resource Protection Act of 1979, as amended
- Bald Eagle Act of 1972
- Barrier Resources Act of 1982
- Clean Air Act of 1972, as amended
- Clean Water Act of 1972, as amended
- Coastal Zone Management Act of 1972, as amended
- Comprehensive Environmental Response, Compensation, and Liability Act of 1980
- Endangered Species Act of 1973
- Estuary Protection Act of 1968
- Farmland Protection Policy Act
- Federal Environmental Pesticide Act of 1972

- Federal Water Project Recreation Act of 1965, as amended
- Fish and Wildlife Coordination Act of 1958, as amended
- Fishery Conservation and Management Act
- Historic Sites Act of 1935
- Land and Water Conservation Fund Act of 1965
- Magnuson-Stevens Fishery Conservation and Management Act
- Marine Mammal Protection Act of 1972, as amended
- Marine Protection, Research, and Sanctuaries Act of 1972
- Migratory Bird Conservation Act of 1928, as amended
- Migratory Bird Treaty Act of 1918, as amended
- National Historic Preservation Act of 1966, as amended
- National Historic Preservation Act Amendments of 1980
- Native American Graves Protection and Repatriation Act
- Noise Control Act of 1972, as amended
- North American Wetlands Conservation Act
- Occupational Health and Safety Act
- Resource Conservation and Recovery Act of 1976
- River and Harbor Act of 1899
- River and Harbor and Flood Control Act of 1962, Section 207
- Safe Drinking Water Act of 1974, as amended
- Solid Waste Disposal
- Superfund Amendments and Reauthorization Act of 1986
- Toxic Substances Control Act of 1976
- Water Resources Development Acts of 1986, 1988, 1990, 1992, and 1996
- Water Resources Planning Act
- Watershed Protection and Flood Prevention Act of 1954, as amended
- Wild and Scenic Rivers Act of 1968, as amended
- Wilderness Act

E.2.1 Executive Orders (EO)

- Protection and Enhancement of Environmental Quality (EO 11514)
- Protection and Enhancement of Cultural Environment (EO 11593)
- Floodplain Management (EO 11988)
- Protection of Wetlands (EO 11990)
- Compliance with Pollution Control Standards (EO 12088)
- Prime and Unique Farmlands (Memorandum, Council on Environmental Quality, 11 August 1980)
- Environmental Justice (EO 12898)
- Protection of Children from Health and Safety Risks (EO 13045)
- Recreational Fisheries (EO 12962)
- Environmental Effects of Major Federal Actions (EO 12114)
- Responsibilities of Federal Agencies to Protect Migratory Birds (EO 13186)
- Facilitation of Cooperative Conservation (EO 13352)

E.2.2 Other Federal Policies

- Council on Environmental Quality Memorandum of August 11, 1980: Analysis of Impacts on Prime and Unique Agricultural Lands in Implementing the National Environmental Policy Act

- Council on Environmental Quality Memorandum of August 10, 1980: Interagency Consultation to Avoid or Mitigate Adverse Effects on Rivers in the Nationwide Inventory

- Migratory Bird Act Treaties and other international agreements listed in the Endangered Species Act of 1973, as amended, Section 2 (a)(4)

E.3 United States Army Corps of Engineers Regulations and Guidance

- Engineering Regulation 1105-2-100 *Planning Guidance Notebook* (22 April 2000)
- Engineering Regulation 200-2-2 *Procedures for Implementing NEPA* (33 CFR 230)
- Engineering Regulation 1110-2-1302 *Engineering and Design - Civil Works Cost Engineering* (31 March 1994)
- Engineering Regulation 1110-2-1806 *Engineering and Design - Earthquake Design and Evaluation for Civil Works Projects* (1995)
- USACE Policy Guidance Letter No. 40 *Development and Financing of Dredged Material Management Studies*
- USACE Policy Guidance Letter No. 56 *Section 207 of the Water Resources Development Act of 1996, Beneficial Use of Dredged Material*
- USACE Policy Guidance Letter No. 59 *Recreational Development at Ecosystem Restoration Projects*
- Engineering Manual 1110-2-1100 *Coastal Engineering Manual – Part 1 through Part V* (30 April 2002)
- Engineering Manual 1110-2-5027 *Engineering and Design - Confined Disposal of Dredged Material* (1987)
- Engineering Manual 1110-2-1902 *Slope Stability* (2003)
- Engineering Manual 1110-1-1904 *Settlement Analysis* (1990)
- Engineering Manual 1110-2-1906 *Laboratory Soils Testing* (1986)
- Engineering Circular 1105-2-210 *Ecosystem Restoration in Civil Works Programs*

E.4 State of Maryland Compliance

- Maryland Environment Act
- Water Quality Certification (COMAR 26.08.02.10)
- Tidal Wetlands License (COMAR 26.24)
- Sediment and Erosion Control (COMAR 26.17.01)
- Stormwater Management (COMAR 26.17.02)
- Water Appropriation and Use (COMAR 26.17.06)
- Oil Control Program (COMAR 26.10)
- Maryland Coastal Zone Management Program

- Critical Area Act
- Chesapeake Bay Critical Area Program (COMAR 27.02)
- Nongame and Endangered Species Conservation Act
- Natural Heritage Program (COMAR 08.02.12, 08.03.08)
- Maryland Historical Trust (MHT) / State Historic Preservation Officer (SHPO) (COMAR 05.08)
- Water Quality Improvement Act of 1998
- Maryland's Conservation Reserve Enhancement Program
- Economic Growth, Resource Protection, and Planning Act
- Maryland Environmental Policy Act
- Maryland Environmental Trust
- Dredged Material Management Act of 2001

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Attachment A: Essential Fish Habitat Evaluation

Mid-Chesapeake Bay Islands Restoration Project

Dorchester County, Maryland

Essential Fish Habitat Assessment
April 2005

Prepared by U.S. Army Corps of Engineers

Pursuant to Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation & Management Act, the Corps of Engineers is required to prepare an Essential Fish Habitat [EFH] Assessment for all proposed actions that occur within coastal waters of the United States. Based on the prescribed protocol for preparation of an EFH Assessment, the assessment is comprised of the following components:

1. A description of the proposed action;
2. A listing of the life stages of all species with EFH designated in the project area;
3. An analysis of the effects of the proposed action;
4. The Federal agency's opinions regarding the effects of the proposed action; and,
5. Proposed mitigation, if applicable.

I. DESCRIPTION OF THE PROPOSED ACTION

The Baltimore District, U.S. Army Corps of Engineers (Corps) in partnership with the State of Maryland Department of Transportation, Maryland Port Administration (MPA) has initiated an environmental restoration feasibility study for the restoration of island habitat in the Mid-Chesapeake Bay region. This study focuses on restoring hundreds of acres of aquatic and wildlife island habitat in the Mid-Chesapeake Bay region through the beneficial use of dredged materials from the Port of Baltimore channel system.

The Mid-Chesapeake Bay Islands Restoration Feasibility Study stemmed from the Eastern Shore, MD and DE Section 905(b) Analysis, in accordance with Section 905(b) of the Water Resources Development Act of 1996. The Mid-Chesapeake Bay study area includes the eastern half of the Chesapeake Bay, from the Chester River to the MD/VA state line. This feasibility study addresses the recommendation to replace habitats lost through development and erosion activities within the study area through the beneficial use of dredged material.

The Mid-Chesapeake Islands Restoration Project recommends island restoration at James Island and Barren Island (Figure 1, 2, and 3 enclosed, respectively), both in Dorchester County, MD. James Island is 16 miles north of Barren Island on the Eastern Shore of Maryland. James Island is situated at the mouth of the Little Choptank River, 3,100' north of Taylors Island. Once at least 1,350 acres in the 17th century, James Island now amounts to 3 small remnants totaling roughly 100 acres (Maryland, 1949; Kearney, 1991). Presently, James Island is privately owned. Barren Island lies immediately west of Hoopers Island. Barren Island currently totals nearly 200 acres, but was recorded at 754 acres in 1848 (Wray, 1995). Barren Island is federally owned and managed by the U.S. Fish

and Wildlife Service (USFWS) as a satellite refuge area to Blackwater National Wildlife Refuge.

The James Island portion of the project involves constructing armored dikes, breakwaters, and/or other structures approximating the island's historical footprint and filling the enclosed area with clean dredged material from Federal navigation channels in Chesapeake Bay. The 2,072-acre fill area will be subdivided to provide approximately 55% tidal wetland habitats and 45% upland island habitats. Construction at James Island would necessitate the dredging of an access channel on the northwest. The access channel would be approximately 12,720' in length, and 400' in width at base with 3:1 side slopes. Of the total length, 3,070' would lie within the island footprint with 9,650' extending outside the footprint. The total footprint of the access channel is roughly 153.5 ac, with 52.7 ac within and 100.8 acres outside the island footprint. The project limit is highlighted in Figure 2. The project limit identifies the project impact boundaries and provides for minor changes to the location of the proposed island alignment. Approximately 40,000' of perimeter dikes would be constructed. The sand for dike construction would be hydraulically dredged from within the island footprint or from the access channel. The sediment to construct the proposed wetland and upland habitat area at James Island would be dredged from the following Federal navigation channels in the Chesapeake Bay leading to Baltimore Harbor: the Craighill Entrance Channel; the Craighill Channel; the Craighill Angle, the Craighill Upper Range; the Cutoff Angle; the Brewerton Channel Eastern Extension; the Tolchester Channel, the Swan Point Channel, Inland Waterway from Delaware River to Chesapeake Bay, and potentially, other non-federal projects.

Plans for Barren Island incorporate the use of sills to protect the current acreage of the island and the submerged aquatic vegetation (SAV)/shallow water habitat off the eastern shore of Barren Island. Sills constructed along the current shoreline would be backfilled with dredged material to create wetland habitat. Phase I Barren restoration would involve the modification of 4900' of existing rock sill, construction of 3,840' of new rock sill on the north shore, 4,620' along the western shore, and a back-up containment of 1,300'. Sills would be built to an elevation of 4' MLLW. Modification of the existing sill would slightly expand its footprint, consuming an additional 1.1 acre footprint. The near-shore sill would consume 5 acres of shallow water habitat. Approximately, 23 and 49 acres of island habitat (72 acres total) will be created by backfilling on the north and west, respectively. The material that would be used to backfill behind the breakwaters at Barren Island will be from authorized maintenance of local Honga River channels and is characterized as silt and sand. Also, as part of Phase I, monitoring would be carried out to evaluate the need for constructing breakwaters off the southern tip of Barren Island following the historic shoreline in order to protect the SAV habitat to the south and southeast of Barren Island. If it is determined that the SAV habitat to the south and southeast require further protection, a maximum 8,200' of structure is proposed at a maximum height of 6' MLLW. If built to maximum length, the southern breakwater would have a 9.5 acre footprint. In total, preliminary designs identify that Barren Island restoration measures would directly impact 92 acres of near-shore habitat. Therefore, it is projected that with refinement during final design no more than 100 acres of bottom would be impacted at Barren Island. The project limit is identified in Figure 3.

II. PROJECT AREA BACKGROUND

Island habitats are being lost in Chesapeake Bay as a consequence of erosion and inundation accompanying rising sea level occurring at a rate more rapidly than new islands are being created (Wray et al., 1995). Approximately 10,500 acres of island habitat have been lost in the middle eastern portion of the Chesapeake Bay alone. Alternatively, the Chesapeake Bay is growing by up to several hundred acres per year as a consequence of the impacts of rising sea level. This is continuously producing new open water habitat, including shallow water habitat. Land losses occur Bay-wide but are concentrated in the low-lying lower Eastern Shore (USACE, 1990).

Seasonal finfish monitoring including trawl, popnet, gillnet, and beach seine studies, has been conducted in the waters surrounding James and Barren Islands in preparation for this project from summer 2002 through summer 2003. A total of five seasons were sampled. Maps identifying sampling stations are available in Figures 4 to 7. Table 1 and 2 summarize the sampling results at James and Barren Islands, respectively.

Water quality in the vicinity of James and Barren Islands has been monitored by Maryland Department of Natural Resources (MDNR, 2005a) Water Quality Monitoring Program since 1985. The two closest monitoring stations to James Island are a mainstem station, CB4.3C, and a Little Choptank River station, EE2.2. CB4.3C is located over the main channel to the north and west of James Island while EE2.2 is off the northeast corner of James Island. The mainstem station 5.1 is directly west of Barren Island. Table 3 presents water surface water temperature recorded at these stations for the period 1985-2003 (MDNR, 2005).

The pycnocline, the mixing zone at the boundary between the upper fresher layer of the water column and the lower saltier layer of the water column during times when the water column is stratified, occurs at roughly 9.7 to 39.4 ft (6 to 12 m) depth in mid Bay waters (Kemp et al., 1999). Subpycnocline waters are prone to hypoxic and anoxic conditions during warm weather months (Chesapeake Bay Program, 2004).

Surficial sediments surrounding James and Barren Island are characterized as primarily sand with some silt and clay, consistent with the character of much of the middle and lower Bay bottom in Maryland along both the Eastern and Western Shore out to about 30 feet depth (Kerhin et al., 1988). In sediment studies conducted for this study, four of five James Island sediment samples were predominantly sand (Harms 2005; BBL 2005). One sample was largely silt/clay. 80% of sediment samples (n=10) taken surrounding Barren consisted of 57.6 to 98.7% sand. The remaining portion was predominantly silt/clay with a small percentage of gravel. For example, two samples were 86.3 and 84.1% silt/clay with the remainder sand.

Virginia Institute of Marine Science (VIMS) annual surveys from 1994 to 2003 were reviewed to understand the presence of SAV in the James and Barren Island vicinities. SAV beds have made a resurgence since 1999 in the waters on the eastern side of Barren Island. An average of 695 acres of SAV beds was present between 1999-2003, peaking at 1,325 acres in 2001. Minimal beds of SAV were found between 1994 and 1999. No

SAV was documented by the VIMS maps off the western or northern shoreline of Barren where the project would be constructed. James Island had very little SAV compared with Barren Island. Two small beds periodically occur along the eastern shore of the remnants, averaging 10 acres between 1999 and 2003. SAV beds at James Island peaked in 2001 at 22.6 acres. SAV monitoring was additionally conducted as part of the existing conditions evaluation during summer 2002, spring 2003, and August 2003 (Harms, 2005). Widgeon grass (*Ruppia martina*) was the dominant SAV recorded during the Summer 2002 survey. Three separate beds were recorded along the eastern shoreline of each of the island remnants. All SAV found by spring 2003 monitoring was identified as horned pondweed (*Zannichellia palustris*). SAV beds were most dense along the middle remnant. SAV beds along the southern remnant were patchy at best. Weather conditions did not permit sampling at the northern remnant. SAV surveys conducted in the supplemental survey, August 2003, produced one blade of horned pondweed (Harms, 2004c). A diver entered the water to survey the vicinity and confirmed the absence of SAV adjacent to James Island at that time. No SAV was documented within the footprint of the proposed island alignment or impact area. Barren Island SAV investigations were made during summer 2002 and spring and summer 2003 (BBL 2004a,b). Aquatic species observed at Barren Island include eelgrass (*Zostera marina*), horned pondweed, and widgeon grass. The presence of SAV appears to be dependent on the location around the island. SAV crown densities were highest along the eastern shoreline of Barren Island. SAV was also present along the northern shoreline and southeastern island tip. SAV was absent along the western shoreline. The likely reasons for the absence of SAV along the western shorelines are the steep slopes of the shoreline, lower water clarity, and a higher exposure to wave action. The more extensive VIMS monitoring showed no historical SAV within the proposed Barren Island project area. However, the existing conditions evaluation identified recent low density SAV beds along the northern and southern proposed project areas. Additional monitoring would be completed during the Design Phase of the project to avoid impacting viable SAV beds.

The Chesapeake Bay Program has defined Tier I, II, and III SAV recovery zones. The Tier I SAV distribution restoration target is the restoration of SAV to areas currently or previously inhabited by SAV as mapped through regional and baywide aerial surveys from 1971 through 1990 (Batuik *et al.* 1992; Dennison *et al.* 1993). The Tier II and Tier III distribution restoration targets are the restoration of SAV to all shallow water areas identified as existing or potential SAV habitat, down to the 1- and 2-meter (3.3 and 6.6 foot) depth contours, respectively. There is no Tier 1 area in the vicinity of James Island. Tier I areas have been delineated to the northeast, east, and southeast of Barren Island. Tier II and Tier III zones surround both islands. It is estimated that 298.8 acres of bottom less than 2 m in depth exist within the project footprint at James Island. All of the Barren project area, approximately 100 acres, is less than 2 m in depth.

III. SPECIES WITH EFH DESIGNATED IN THE PROJECT AREA

James and Barren Islands lie on the Eastern Shore of Maryland, south of the Choptank River. Coordination with John Nichols, NMFS, identified the Choptank River as the appropriate geographic area upon which to base the Mid-Chesapeake Bay Islands EFH

analysis. With review of EFH designations for the Choptank River estuary, it was determined that the proposed project at Barren and James Island lies within waters designated as EFH for the following species and their life stages: windowpane flounder (*Scopthalmus aquosos*), juvenile and adult stages; bluefish (*Pomatomus saltatrix*), juvenile and adult stages; summer flounder (*Paralicthys dentatus*), juvenile and adult stages; king mackerel (S*comberomorus cavalla*), eggs, larvae juvenile, and adult stages; Spanish mackerel (*Scomberomorus maculatus*), eggs, larvae, juvenile, and adult stages; cobia (*Rachycentron canadum*), eggs, larvae, juvenile, and adult stages; and red drum (*Sciaenops occelatus*), eggs, larvae, juvenile, and adult stages.

Through further District coordination with John Nichols, National Marine Fisheries Service (NMFS), Oxford, Maryland Habitat Office, it was concluded that of species with EFH designated in the Choptank River, only juvenile and adult summer flounder, adult and juvenile bluefish, and juvenile red drum were likely to occur at the proposed expansion site. Windowpane flounder, cobia, and king mackerel are generally restricted to the lower Chesapeake Bay, while Spanish mackerel is restricted to portions of the Bay south of U.S. 50 bridge (Murdy et al., 1997) and is generally transient north of the Choptank River (Nichols, 2003, pers. comm.). Further, bluefish, red drum, and summer flounder were the only species of concern identified in sampling efforts (Table 1 and 2). These species were present in three seasons: spring, summer, and fall, but none were found in winter.

III. IMPACTS TO SPECIES WITH EFH DESIGNATED IN THE PROJECT AREA

The following provides a brief overview of pertinent natural history information of summer flounder, bluefish, and red drum to serve as a basis for assessing impacts of the proposed action to these species. This natural history information is followed with an analysis of impacts to individuals, habitat, and prey of these species of the proposed action as well as cumulative impacts of other dredging and dredged material placement actions.

Discharge from the existing placement site and newly constructed cells during placement operations must comply with state (Maryland Department of the Environment) water quality standards, and should result in only short term, minor perturbations to local water quality, and minimal impacts to individuals of all three species.

A. SUMMER FLOUNDER (juvenile and adult life stages)

1. Natural History

Adult and older juvenile summer flounder enter the Chesapeake Bay during spring and early summer, and exit the Bay in fall (Murdy et al. 1997). Adult summer flounder overwinter in the ocean and only enter the Bay in late spring. Larvae and young juveniles migrate into the Bay in October and prefer shallower waters; they typically overwinter and grow in the southern portion of the Bay. Older juveniles are generally

distributed inshore and in estuarine areas throughout their range during the spring, summer, and fall. During colder months they move into deeper (oceanic) waters and can be found offshore with adults (Murdy et al. 1997, Fahay et al. 1999). Table 4 provides information on general occurrence and habitat preferences of summer flounder in estuaries.

Both adults and juveniles exhibit a marked preference for sandy bottom and/or SAV beds, particularly areas near shorelines (NMFS 2000). SAV has been identified as a Habitat of Particular Concern (HAPC) for both juvenile and adult summer flounder under the tenets of the Magnuson-Stevens Act. Previous consultations with NMFS have indicated that summer flounder are more prevalent in the lower Bay than in the project area (Nichols, pers. communication, 2003).

Summer flounder feed on a variety of small fish, shrimp, and crabs that occur in the Chesapeake Bay. Prey include species such as grass shrimp (*Palaemonetes pugio*), Atlantic silversides (*Menidia menidia*), and bay anchovy (*Anchoa mitchilli*). Grass shrimp prefers sand bottom and/or SAV, similar to summer flounder preferences, while forage finfish are generally widespread in occurrence in shallow waters. Each of these food items occurs in the vicinity of the study area (Harms 2005; BBL 2005).

2. Impacts Assessment

a. Impacts to Individuals

Direct impacts to summer flounder individuals are unlikely, even if construction occurs during warmer months, because flounder are strong swimmers and would be able to avoid dredging and construction disturbances. During cooler weather months no direct physical impacts to individuals are expected because they are unlikely to be present. MDNR monitoring data for the Barren and James Island areas indicate that water temperatures are below the optimum temperature for summer flounder (52°F, Table 3) from November through April (Table 3).

b. Habitat Impacts

The sediments at James and Barren Island are typical of lowland sedimentary deposits and consist primarily of sand, plus silt, and clay, with some gravel. Construction of a restored James Island would thus cause the loss of 2,072 acres of preferred habitat for summer flounder when this area is converted to marsh and upland island habitat. Dredging actions for the northwestern access channel would likely leave the majority of the area retaining a sandy substrate, however clays may be exposed locally. Restoration measures at Barren Island would transform eroding shoreline into 72 acres of wetland habitat. Restoration structures including sills and breakwaters would consume a maximum of 20 acres of bottom (10.5 acres of sill in Phase I plus, if determined necessary, 9.5 acres of breakwaters in Phase II). Sandy substrates are predominant along the shoreline in much of this reach of the Bay, and the proposed actions at James and Barren Islands are negligible relative to the overall acreages of sand bottom in the Bay.

Thus, this loss of preferred habitat is not expected to impact summer flounder populations. Site filling (i.e. dredged material placement operations) would result in no additional alterations to or displacement of summer flounder habitat (post construction).

Project construction is not expected to directly impact SAV at James Island, since SAV is absent from the proposed project area. Therefore, there should be no direct impact to summer flounder HAPC. The proposed restoration at Barren Island is expected to contribute significantly to further protection of SAV beds documented over the last several years in the waters to the east of Barren Island. SAV surveys performed as part of this study identified low density SAV beds within the project footprint that were never recorded in the VIMS surveys. Due to the variability in SAV bed location, additional monitoring would be completed during the Design Phase of the project to minimize impacting viable SAV beds. Phase I monitoring, would provide information to evaluate the need for and the design of breakwaters specifically to protect and benefit SAV habitat to the south and east of Barren Island. Thus, indirect impacts of the project should benefit SAV, and thus increase summer flounder HAPC. The shallow (< 2m) bottom area surrounding James and Barren Islands are Tier II and III SAV recovery zones. Construction of the proposed projects at James and Barren would convert approximately 298.9 and 100 acres, respectively, of shallow water habitat (SWH) less than 2 m deep to marsh or upland island habitat. Thus the project would cause the permanent loss of up to 398.9 acres of Tier III SAV recovery habitat. However, whether SAV would reoccupy this area in the foreseeable future even if no project were constructed is highly uncertain, given trends in the project area since VIMS has been surveying it.

Parts of the northwestern access channel at James Island that are dredged to –25 feet or greater have the potential to become hypoxic or anoxic in warmer months of years when impaired water quality problems are pervasive below the pycnocline in the Bay. Under these conditions, the bottom in the access channel would be unsuitable as habitat for summer flounder and they would be expected to avoid this area. This potential loss of habitat would not be expected to impact summer flounder populations because of the abundance of suitable habitat still remaining elsewhere in the Bay.

Summer flounder utilize salt marsh creeks (Table 4), which will be created as part of the proposed James Island activities. This habitat enhancement is expected to compensate somewhat for proposed conversion of open water and benthic habitats to island habitat.

c. Impacts to Prey

Up to 2,072 acres of open water habitat at James Island and 100 acres of shoreline habitat at Barren Island that supports summer flounder prey would be lost to accommodate the proposed project. Prey individuals will be destroyed or displaced as a result of project expansion and borrow actions in both locations. The reduction of benthic macroinvertebrate communities as a result of island expansion would reduce biomass available for consumption by summer flounder that may use these areas as feeding grounds. However, forage fish and invertebrates consumed by summer flounder occur over a broad area of the Bay. And although the project will cause loss of open water and

benthic habitat for summer flounder prey species, population levels of prey species are expected to remain regionally healthy because of ready availability of these lost habitats elsewhere in region. Restoration of salt marsh at James and Barren plus expected protection of SAV at Barren will support a wide variety of summer flounder forage species and partially compensate for the loss of open water habitat and disturbance to bottom habitats. The James Island access channel will likely recover a benthic community comparable to pre-project conditions within several years following cessation of dredging, as is typical of benthos occurring on sands and fine mobile estuarine deposits (Newel et al. 1998). However, channel depths below the pycnocline following dredging have the potential to lose their benthic macroinvertebrate communities in the future if hypoxic or anoxic conditions occur for prolonged periods of time.

d. Cumulative Impacts

Other dredging and placement actions occur in the immediate vicinity of the project area. Periodic maintenance dredging is conducted in small navigation channels including: Knapps Narrows, the Honga River, and the Chester River. Maintenance dredging of the federal channels in these locations would result in displacement of flounder and forage resources immediately after dredging. Knapps Narrows was last dredged 4 to 5 years ago, and it is expected that maintenance dredging will occur in either 2005 or 2006. The Chester River has been maintained within the past 3 years and would not require dredging for several years. The Honga River dredging and channel realignment was conducted and completed earlier in 2004. However, Honga River channels will require periodic future dredging that will provide material for the proposed wetland creation at Barren Island. These dredging projects will cause only temporary bottom disturbance and loss of benthos that could serve as forage for summer flounder. There is also periodic maintenance dredging and placement activities associated with other portions of the Baltimore Harbor and Channels federal project in the Patapsco River, the Swan Point Channel, Tolchester Channel, and the approach channels to the Chesapeake & Delaware Canal. Activities north of the Bay Bridge, however, should have little additional impact on the species because summer flounder are typically very rare or absent in these regions.

Privately-owned commercial fishing gear, such as hydraulic escalator dredges used to harvest soft clams (*Mya arenaria*), can also impact bottom habitat used by summer flounder. Escalator dredges produce short-term modifications to bottom topography, which are generally not detrimental to flounder if occurring on non-vegetated bottoms. Operation of escalator dredges in SAV beds has been restricted within Maryland waters so minimal impact to SAV is occurring from these clamming activities.

The State of Maryland and Baltimore District are presently evaluating expansion of the Poplar Island Environmental Restoration Project (PIERP). PIERP is currently restoring 1,100 acres of open water to island habitat, half uplands and half tidal wetlands. If Poplar Island Expansion moves forward, up to approximately 600 acres of additional EFH may be converted to uplands/wetlands within 16 to 26 nautical miles of James and Barren Islands in areas that are known to support summer flounder. The expansion also

proposes dredging sand for dike construction from an open water area west/southwest of the current project, potentially impacting between 49 and 230 acres.

The largest direct impact to summer flounder populations regionally is recreational and commercial fishing pressure (Murdy 1997). Proper management of fishing is the most critical measure to ensure stable summer flounder populations at this time, unless other environmental conditions change substantially.

B. BLUEFISH

1. Natural History

Juvenile and adult bluefish enter the Chesapeake Bay during spring through summer, leaving the Bay in late fall. Adults are uncommon north of Annapolis, and generally do not occur above the U.S. 50 bridge, except during years of greater up-Bay salt wedge encroachment. Juveniles tolerate lower salinities than adults, and are therefore common in the upper Bay above the U.S. 50 Bridge, occurring as far north of Susquehanna Flats and the lower Elk River (Lippson, 1973). MDNR monitoring data for the James and Barren Island areas (Table 3) indicate that the area reaches the optimum temperature for bluefish immigration (>68°F, Table 3) in late May/early June and falls to the out migration temperature (<59°F, Table 3) in late October/early November. Both adult and juvenile bluefish were collected in the vicinity of Barren Island during summer sampling in Summer 2002 and Spring 2003 (BBL 2005). Bluefish were identified in sampling at James Island in Fall 2003, and Spring and Summer 2003 (Harms, 2005). No length measurements were provided with the James Island monitoring to allow a life stage determination. Bluefish do not begin their migration into the mesohaline reaches of the Bay until May in most years. Previous consultations with NMFS have indicated that bluefish are ubiquitous within the Bay and transients to the site (Nichols, pers. comm., 2003) therefore they are not expected to be more prevalent within the project area than elsewhere within the Bay.

Adults are pelagic and not typically bottom feeders and are strong swimmers that can easily avoid turbid conditions. Juveniles prefer shallower waters but are expected to be able to avoid dredging and construction activities. Juveniles tend to concentrate in shoal waters, and are opportunistic feeders, foraging on a wide variety of estuarine life in the pelagic zone and over a variety of bottom types (Lippson, 1973). Table 4 provides information on general occurrence and habitat preferences of bluefish in estuaries.

2. Impacts Assessment

a. Impacts to Individuals

Any adults or young that may be in the area during construction would be displaced. However because of the comparatively small size of the project area in comparison with open waters of the Bay suitable for bluefish, no detrimental impacts to bluefish are expected. Direct impacts to bluefish are unlikely, even if construction occurs during

warmer months, because bluefish are good swimmers and can easily avoid construction activities. During cooler weather months no direct physical impacts to individuals are expected because they are unlikely to be present. Bluefish are unlikely to be present around the project from late October through early May due to their temperature preferences (Packer et al. 1999; Table 3).

b. Habitat Impacts

Island restoration at James Island would lead to the transformation of 2,072 acres of shallow water habitat to island habitat. Restoration at Barren Island would transform a maximum of 100 acres (92 ac defined by preliminary designs) of eroding shoreline into wetland habitat. Restoration structures including sills and breakwaters would consume 20 acres of bottom, as determined by preliminary designs (10.5 acres of sill in Phase I plus, if determined necessary, 9.5 acres of breakwaters in Phase II). These areas would be lost to bluefish. However, because of the great abundance of this habitat type in the Bay, no detrimental impacts to bluefish populations are expected. Although dredging activities for the northwest access channel at James Island would disturb bottom, open water habitat would remain, thus no long-term impacts to bluefish habitat are expected. The marshes and tidal creeks created as part of island restoration at James and Barren and protection of SAV at Barren will support juvenile bluefish (Table 4). These changes would compensate somewhat for loss of open water habitat.

c. Impacts to Prey

The permanent reduction of open water and benthic communities as a result of island restoration at James and Barren plus temporary loss of benthic communities in the James access channel would reduce biomass available for consumption by finfish. However, due to bluefish being opportunistic feeders, their prey can be found over a broad area of the Bay and impacts to individual prey species is expected to be minimal. Further, development of open water habitat regionally in association with erosion and rising sea level would be expected to contribute habitat that supports benthic biomass in the Bay. The marshes and tidal creeks created as part of the expansion project will support a wide variety of forage species consumed by bluefish. This would be expected to compensate somewhat for conversion of open water and benthic habitats and ultimately be a habitat enhancement for this species.

d. Cumulative Impacts

Cumulative effects from other projects discussed in the section on summer flounder impacts should not be significant relative to juvenile or adult bluefish because of the ubiquitous distribution and opportunistic feeding habits of this species within the Bay.

C. RED DRUM

1. Natural History

Red Drum occur over a wide range of water depths and variety of bottom types, consequently the EFH designation for this species is broad including most benthic habitats less than 50 m ranging from tidal freshwater to high salinity surf zones (Table 4). Juvenile red drum utilize the shallow backwaters of estuaries as nursery areas. Seagrass beds (SAV) have been identified as HAPC for the species within Chesapeake Bay. Within estuaries, juveniles utilize a variety of habitats including: inlet mouths, tidal creeks/channels, inter- and subtidal flats, river mouths, oyster reefs and SAV beds over a variety of substrates (Table 4). Of the preferred habitat types, the project area includes intertidal flats and tidal creeks/channels. Table 4 provides information on general occurrence and habitat preferences of red drum in estuaries.

Red drum spawn offshore in late summer through early fall and the juveniles enter the Bay in August or September (Murdy et al.1997). Although their temperature preferences are fairly broad (32°F to 86°F, Table 3), they generally do not occur in the Bay after November, when they move into deeper areas of estuaries or the ocean in late fall and winter (Murdy 1997). Red drum were recorded in beach seine sampling at James and Barren Island in summer and fall 2002 (Harms 2005; BBL 2005). Red drum prey varies with life stage. Small individuals consume small crustaceans. Juveniles eat mostly fish, although larger juveniles and adults consume fish, crustaceans, and plant material. Commercial red drum landings have declined along the mid-Atlantic coast, with none being reported north of Chesapeake Bay since 1950 (South Atlantic Fishery Management Council, 1998).

The commercial red drum fishery is not important in the Chesapeake Bay, but a modest recreational fishery does exist (NOAA, 2005). The recreational fishery for red drum is a near-shore fishery, targeting small, "puppy drum" and large trophy fish. Trophy size fish are caught along the Mid- and South Atlantic barrier islands while smaller red drum are taken in shallow estuarine waters (NOAA, 2005). Maryland regulations limit commercial taking to a maximum of 25’’(635 mm) while recreational takes span 18’’ (457 mm) to 27’’(656 mm) (DNR, 2005b). Barren Island monitoring identified red drum ranging from 22 to 86 mm, suggesting a juvenile life stage. Length information was not provided for samples taken at James Island.

2. Impacts Assessment

a. Impacts to Individuals

Juveniles are strong swimmers and should easily be able to avoid dredging and construction activities. Therefore, direct impacts are not expected. Construction taking place during colder weather months would be unlikely to impact juveniles because they would be absent from the project area. No red drum were identified during fall or winter sampling periods.

b. Habitat Impacts

Because the project is expected to create wetlands and tidal creeks and protect SAV habitat, the indirect impacts are expected to be largely beneficial. Most red drum taken at Barren Island during recent surveys were collected by beach seine in near-shore areas. Similarly, red drum were captured in beach seine sampling along the eastern edge of James Island. Loss of open shallow water habitat within the project site is in itself expected to have little direct impact on the red drum population due to the abundance of this habitat within the region. The marshes and tidal creeks created as part of the project will likely support juvenile red drum (Table 4). These habitat enhancements are expected to compensate somewhat for conversion of open water and benthic habitats and ultimately be a habitat enhancement for this species.

c. Impacts to Prey

The reduction of benthic macroinvertebrate communities as a result of the project would reduce biomass available for consumption by finfish. However, red drum are not obligate bottom feeders and the forage fish and invertebrates they consume occur over a broad area of the Bay so impact is expected to be minimal. Further, development of open water habitat regionally in association with erosion and rising sea level would be expected to aid in replacing benthic habitat and biomass in the Bay. The marshes and tidal creeks created as part of the expansion project would support a wide variety of forage species consumed by red drum. This would be expected to compensate somewhat for conversion of open water and benthic habitats and ultimately be a habitat enhancement for this species.

d. Cumulative Impacts

Cumulative effects from other projects discussed in the section on summer flounder impacts should not be substantial relative to juvenile red drum because red drum are mobile relative to these dredging activities and have opportunistic feeding habits. Red drum are present within the Bay for only a short period of the year, so interactions with any dredging activities would be relatively low.

IV. FEDERAL AGENCY'S OPINION ON PROJECT IMPACTS TO EFH

In summary:

1. Adult and juvenile bluefish and summer flounder and juvenile red drum are known to occur near the project area and to utilize the SWH around James and Barren Islands. The proposed project would convert up to 2,072 acres of EFH at James Island (including 298.9 acres maximum of SWH) and 100 acres of EFH at Barren Island (entire project acre is SWH) to tidal wetlands and uplands island habitat, which would result in a net loss of EFH for summer flounder, red drum and bluefish. Up to an additional 110.8 acres of bottom will be disturbed in the dredging of the proposed James Island access channel.

This will result in a temporary loss of benthic habitat for summer flounder until such time as bottom conditions recover.

2. The marshes and tidal creeks created as part of island restoration at James and Barren will support juveniles of summer flounder, bluefish, red drum as well as a wide variety of their forage species. The creation of this habitat is expected to compensate somewhat for loss of open water and benthic habitats.

3. No HAPC (designated for summer flounder and red drum) will be negatively impacted because SAV is rare adjacent to the project area at James Island and the proposed alignments would avoid known SAV beds to the extent practicable. Proposed activities at Barren Island are intended to protect or enhance potential SAV habitat east of Barren.

4. Discharges from the new placement cells will be subject to compliance with state water quality standards, resulting in only short term, minor perturbation to water quality.

5. Although other federal, state and private sponsored projects occur in the project vicinity that cause the disturbance of bottom habitat, these projects are periodic and should not significantly affect summer flounder, bluefish, or red drum, and their associated EFH. Proposed large-scale island restoration projects would cause a loss of bottom and open water habitat for these species, however, regionally this habitat is abundant. Therefore, no significant cumulative impacts to habitat or populations of these species are expected to result from this project.

6. Other species with EFH designated in the project area (i.e., cobia, Spanish mackerel, king mackerel, windowpane flounder) are rare and transient to the site (Nichols, pers. comm., 2004 and 2005, Murdy 1997) and have not been documented in the project area in site-specific studies (Harms 2005; BBL 2005).

In conclusion, the Baltimore District, after reviewing relevant fisheries information and analyzing potential project impacts, has determined that the proposed action will not have a substantial adverse affect on EFH, or on species with designated EFH in the project area. Overall, direct, secondary, and cumulative impacts to EFH and associated species will be minimal and, in the long term, the current project and proposed expansion will enhance some habitat features for species managed under the Magnuson-Stevens Act.

V. MITIGATION

Because this proposal will result in minimal impacts to summer flounder, red drum and bluefish and is designed to protect and enhance EFH and HAPC, no mitigation specific to protection of populations of these species or their habitat has been proposed. It should also be noted that the proposed project incorporates numerous mitigation measures designed to maximize the environmental benefits of the project, while minimizing adverse impacts. Dredging activities would be constrained by spatial and temporal restrictions to protect mapped oyster and SAV beds in the project area. Additional

monitoring would be undertaken at Barren Island during Phase I to avoid impacting viable SAV beds.

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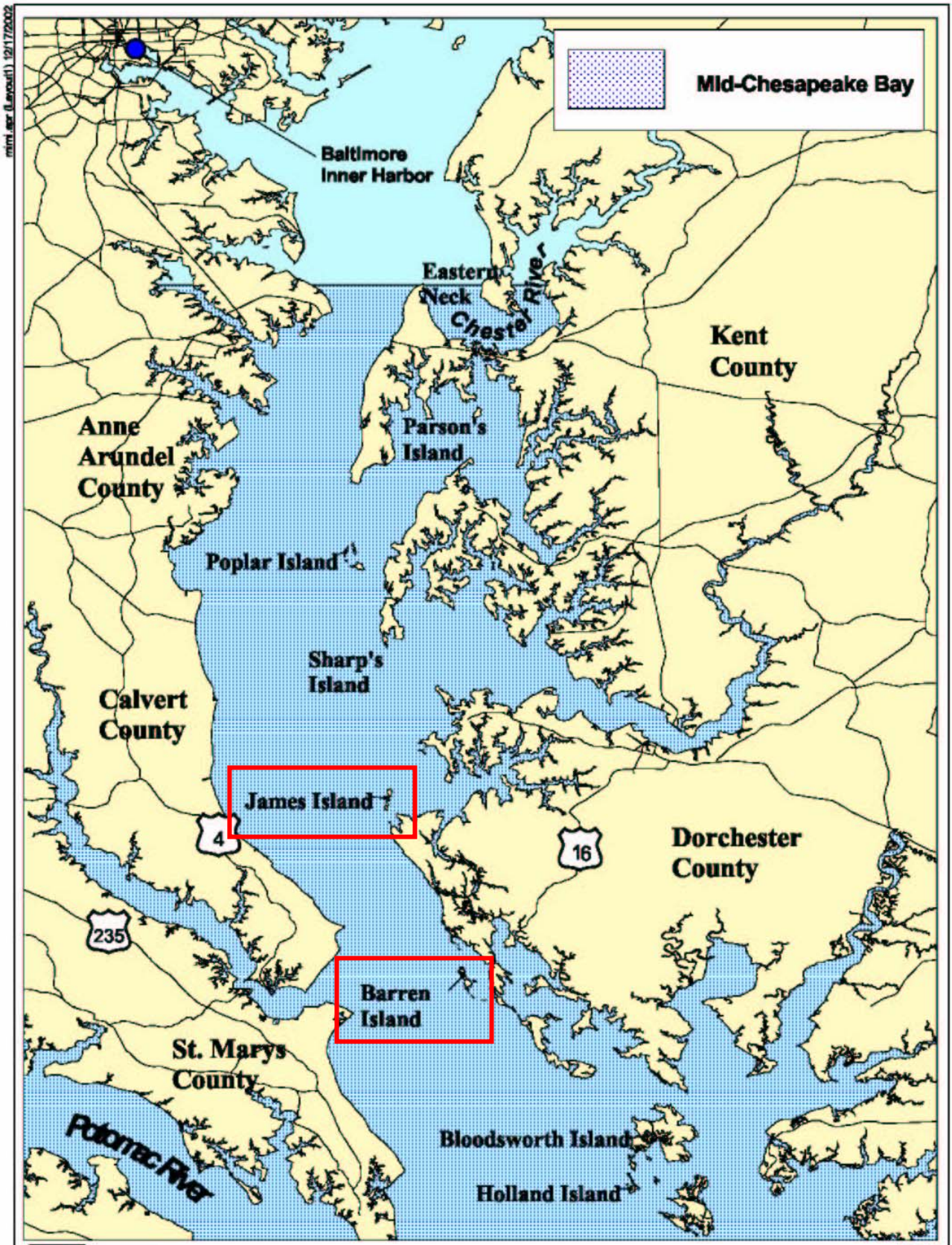

US Army Corps of Engineers
Baltimore District

Figure 1: Mid-Chesapeake Bay Island Restoration Feasibility Study Project Area

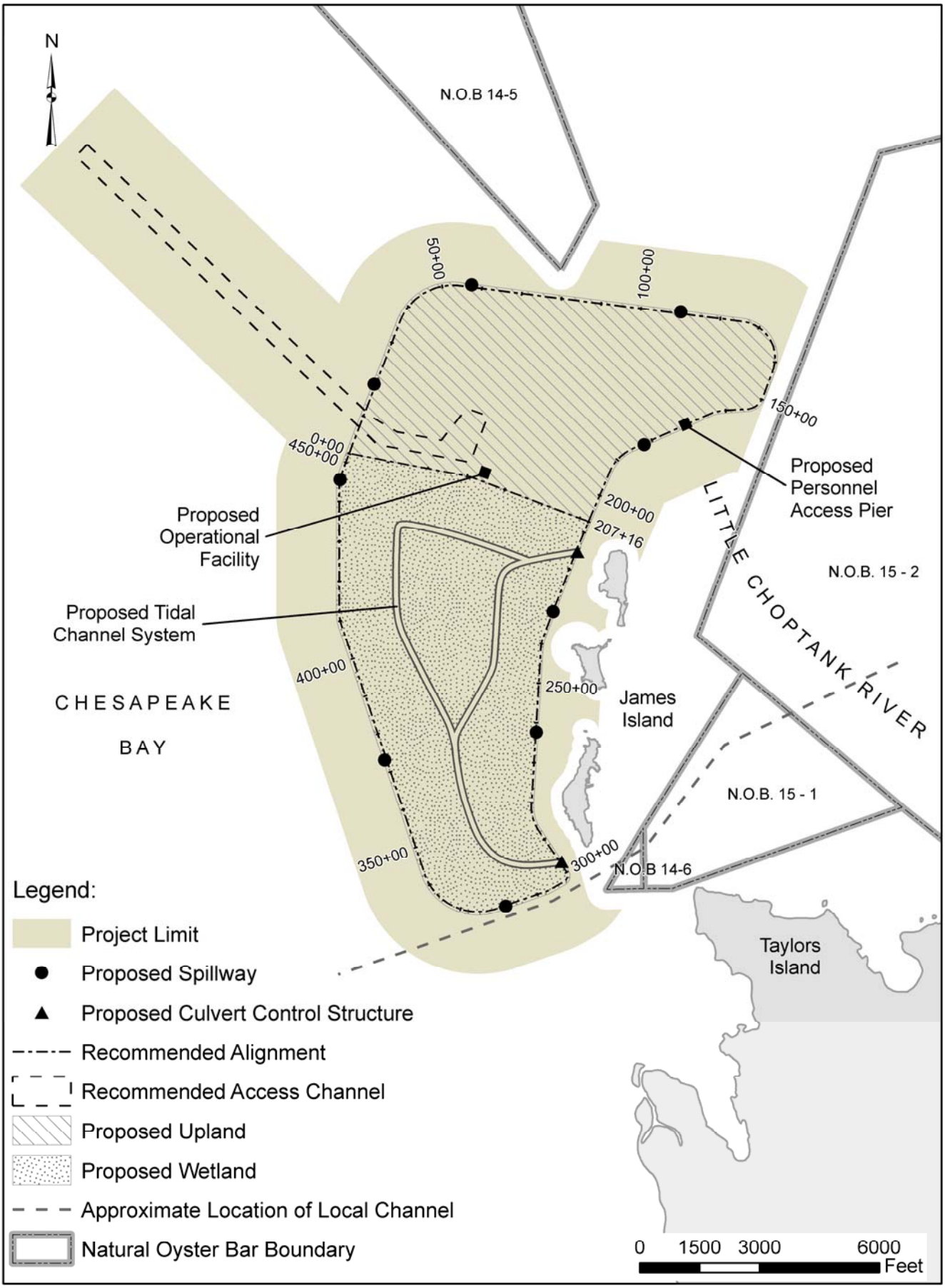

Figure 2: James Island Recommended Plan.

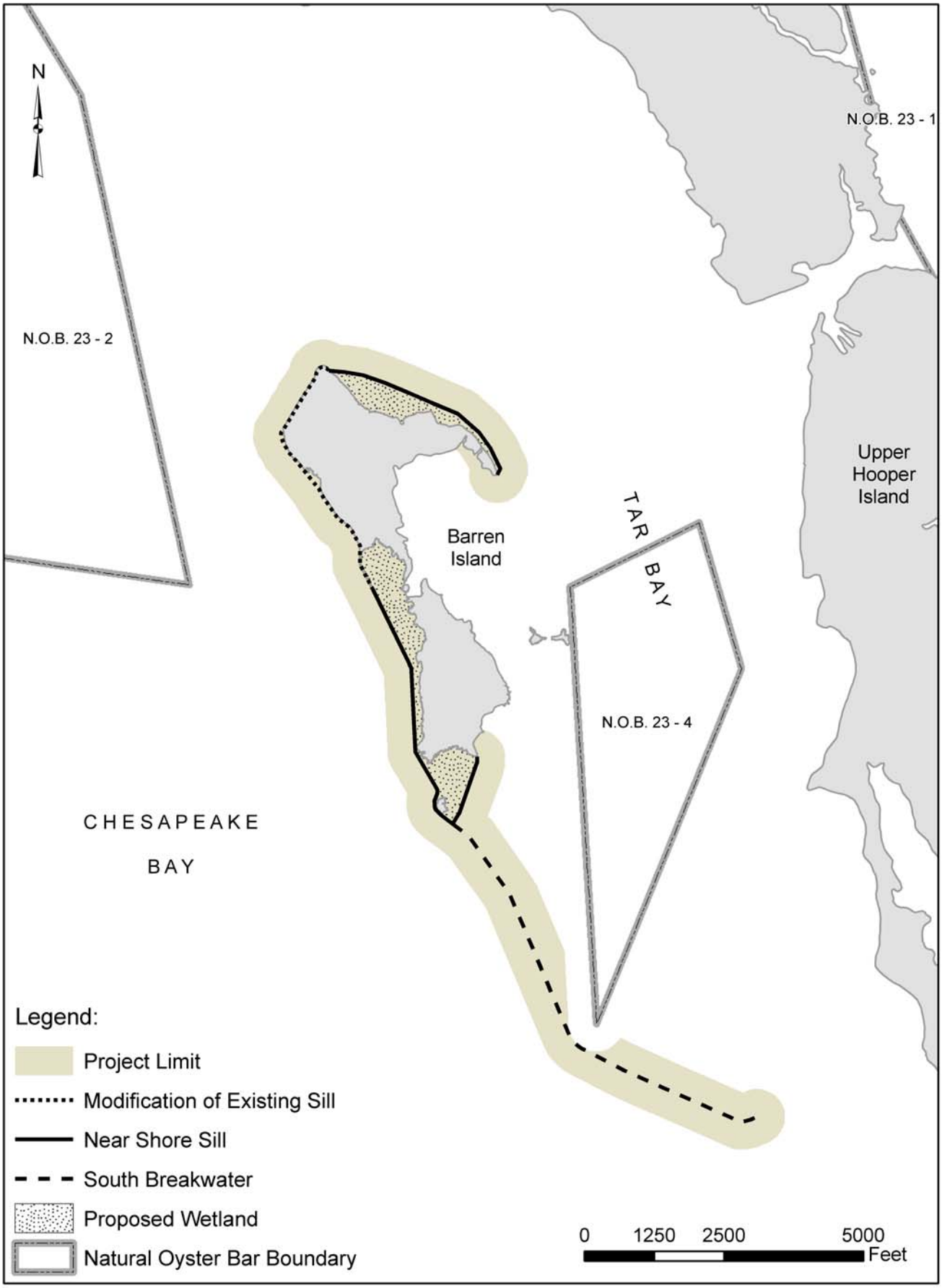

Figure 3: Barren Island Recommended Plan.

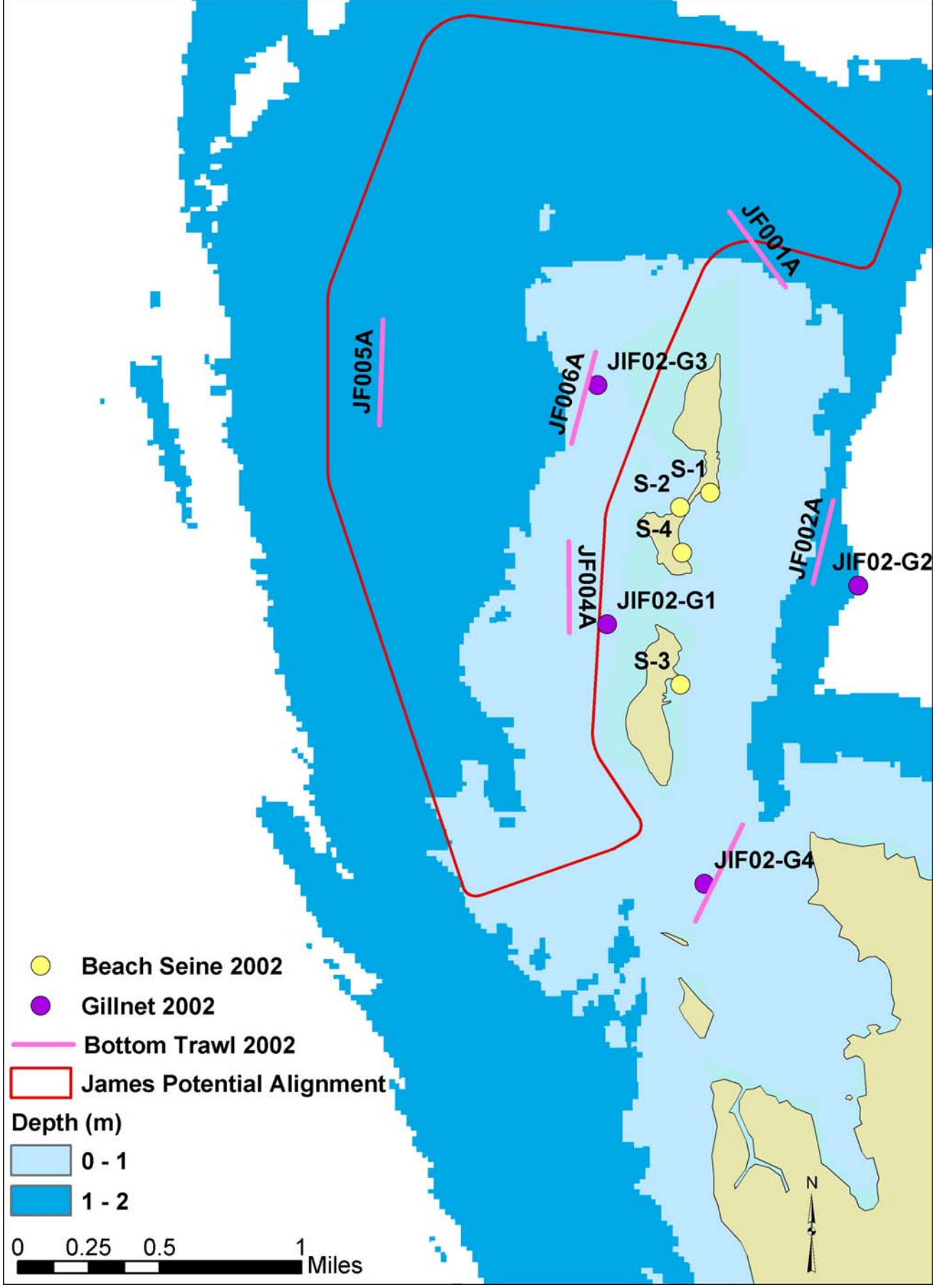

Figure 4: 2002 James Island Finfish Sampling Stations

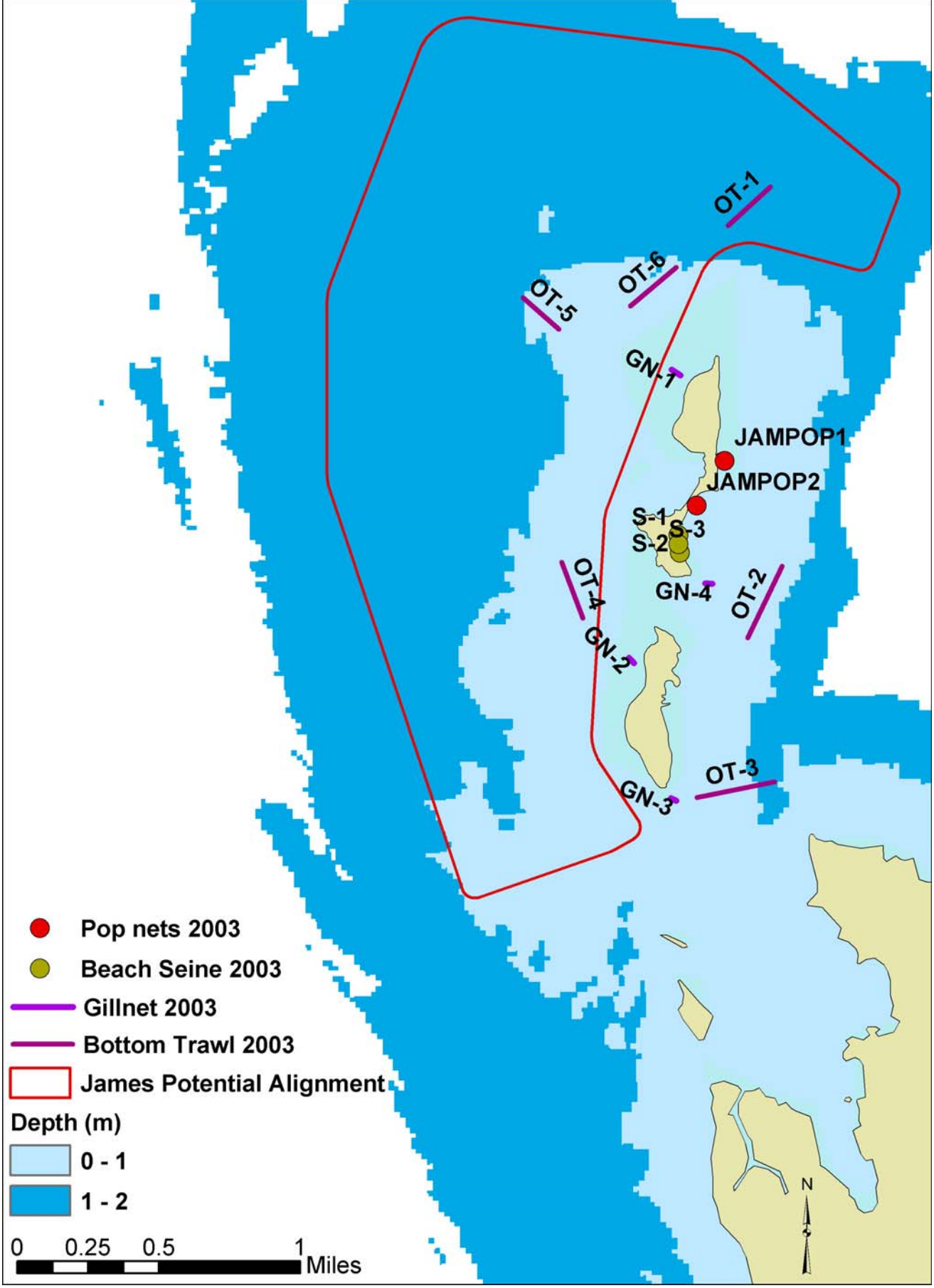

Figure 5: 2003 James Island Finfish Sampling Stations

Table 1: James Island Finfish Monitoring Results (BBL, 2005)

Combined 2002-2003

		Bottom Trawl	Beach Seine														Gillnet				Popnet*			
Species of Concern	**TOTAL**		1	2	3	4	S1	S2	S3	S4	001	002	003	001 night	002 night	003 night	G1	G2	G3	G4	1-1	1-2	2-1	2-2
bluefish	**29**											1	1				3	12	7	5				
windowpane flounder																								
cobia		no specimens found in any bottow trawl sampling																						
red drum	**85**				2		4	23	55	1														
king mackerel																								
spanish mackerel																								
summer flounder	**12**							2	7								1		1	1				

Summer 2002

		Bottom Trawl						Beach Seine				Gillnet*				Popnet*			
Species of Concern	**TOTAL**	JF-001A	JF-002A	JF-003A	JF-004A	JF-005A	JF-006A	S1	S2	S3	S4								
bluefish																			
windowpane flounder																			
cobia																			
red drum	**2**									2									
king mackerel																			
spanish mackerel																			
summer flounder	**7**								2	5									

no eggs or larvae of species of concern were detected in sampling

Fall 2002

		Bottom Trawl						Beach Seine				Gillnet				Popnet*			
Species of Concern	**TOTAL**	JF-001A	JF-002A	JF-003A	JF-004A	JF-005A	JF-006A	S1	S2	S3	S4	G1	G2	G3	G4				
bluefish	**27**											3	12	7	5				
windowpane flounder																			
cobia																			
red drum	**83**							4	23	55	1								
king mackerel																			
spanish mackerel																			
summer flounder	**2**									2									

no eggs or larvae of species of concern were detected in sampling

Winter 2003

		Bottom Trawl						Beach Seine						Gillnet				Popnet*			
Species of Concern	**TOTAL**	OT-1	OT-2	OT-3	OT-4	OT-5	OT-6	S1	S2	S3	S1 night	S2 night	S3 night	GN1	GN2	GN3	GN4				
bluefish																					
windowpane flounder																					
cobia																					
red drum																					
king mackerel																					
spanish mackerel																					
summer flounder																					

--no eggs or larvae found in sampling

Table 1 (con't): James Island Finfish Monitoring Results (MES, 2004)

Summer 2003																					
		Bottom Trawl*						Beach Seine						Gillnet*				Popnet			
Species of Concern	**TOTAL**							S1	S2	S3	S1 night	S2 night	S3 night					1-1	1-2	2-1	2-2
bluefish	**1**								1												
windowpane flounder																					
cobia																					
red drum																					
king mackerel																					
spanish mackerel																					
summer flounder																					

Spring 2003																					
		Bottom Trawl						Beach Seine						Gillnet				Popnet			
Species of Concern	**TOTAL**	OT-1	OT-2	OT-3	OT-4	OT-5	OT-6	S1	S2	S3	S1 night	S2 night	S3 night	GN1	GN2	GN3	GN4	1-1	1-2	2-1	2-2
bluefish	**1**									1											
windowpane flounder																					
cobia																					
red drum																					
king mackerel																					
spanish mackerel																					
summer flounder	**3**													1		1	1				

* No sampling of this type done in sampling period.

Table 2 (con't): Barren Island Finfish Monitoring Results

Spring 2003																								
		Bottom Trawl						Beach Seine										Gillnet				Popnet			
	Total	T-1	T-2	T-3	T-4	T-5	T-6	S1	S2	S3	S4	S5	S1 night	S2 night	S3 night	S4 night	S5 night	G1	G2	G3	G4	2	3	4	5
Species of Concern																									
bluefish	5						1											2		2					
windowpane flounder																									
cobia																									
red drum																									
king mackerel																									
spanish mackerel																									
summer flounder	5							1					2				2								

Summer 2003																									
		Bottom Trawl*						Beach Seine*										Gillnet*				Popnet			
	Total																					2	3	4	5
Species of Concern																									
bluefish																									
windowpane flounder																									
cobia																									
red drum																									
king mackerel																									
spanish mackerel																									
summer flounder																									

* No sampling of this type done in sampling period.

Table 3: Surface water temperature record for monitoring stations in vicinity of James and Barren Island (CBP, 2005)

Surface Water Temperature (°F) Chesapeake Bay Mainstem / Cedar Point				Surface Water Temperature (°F) Choptank River / Little Choptank (EE2.2)				Surface Water Temperature (°F) Chesapeake Bay Mainstem / Dares Beach			
Month	**Minimum**	**Mean**	**Maximum**	**Month**	**Minimum**	**Mean**	**Maximum**	**Month**	**Minimum**	**Mean**	**Maximum**
January	33.08	38.02	43.52	January	31.28	35.94	42.44	January	32.36	37.41	42.26
February	33.08	35.5	41.9	February	31.1	35.04	41.72	February	32	34.74	41.36
March	35.96	40.19	47.84	March	35.24	41.32	47.48	March	35.6	39.34	45.5
April	47.12	50.55	58.46	April	47.66	54.42	60.26	April	46.94	50.11	54.86
May	59	61.24	67.19	May	59.18	61.56	66.83	May	58.46	60.51	65.93
June	65.66	73.84	79.7	June	71.06	73.31	78.26	June	64.76	71.82	77.09
July	77.99	80.83	83.21	July	76.46	81.06	83.57	July	76.64	79.47	81.5
August	78.44	80.61	83.75	August	74.66	79.97	83.48	August	76.28	79.5	81.5
September	72.68	76.03	80.24	September	63.86	73.48	77.99	September	71.78	74.53	79.88
October	63.5	67.25	70.7	October	53.24	61.71	67.1	October	62.78	65.77	69.26
November	48.74	55.42	61.7	November	44.96	51.19	59.72	November	48.92	53.89	60.8
December	40.82	44.91	54.14	December	37.76	42.39	52.16	December	38.3	44.04	53.06

Table 2: Barren Island Finfish Monitoring Results (Harms, 2005)

Combined 2002-2003																								
		Bottom Trawl						Beach Seine										Gillnet				Popnet			
	Total	1	2	3	4	5	6	S1	S2	S3	S4	S5	S1 night	S2 night	S3 night	S4 night	S5 night	G1	G2	G3	G4	2	3	4	5
Species of Concern																									
bluefish	49	1					1											6	15	16	10				
windowpane flounder																									
cobia																									
red drum	195								7	56	125	4							3						
king mackerel																									
spanish mackerel																									
summer flounder	10	1	1					1	1	1			2				2			1					

Summer 2002																									
		Bottom Trawl						Beach Seine										Gillnet				Popnet*			
	Total	001	002	003	004	005	006	S1	S2	S3	S4	S5						G1	G2	G3	G4				
Species of Concern																									
bluefish	44	1																4	15	14	10				
windowpane flounder																									
cobia																									
red drum	140								7	1	125	4							3						
king mackerel																									
spanish mackerel																									
summer flounder	5	1	1						1	1										1					

Fall 2002																									
		Bottom Trawl						Beach Seine										Gillnet				Popnet*			
	Total	001	002	003	004	005	006	S1	S2	S3	S4	S5						G1	G2	G3	G4				
Species of Concern																									
bluefish																									
windowpane flounder																									
cobia																									
red drum	55									55															
king mackerel																									
spanish mackerel																									
summer flounder																									

Winter 2003																									
		Bottom Trawl						Beach Seine										Gillnet				Popnet*			
	Total	T-1	T-2	T-3	T-4	T-5	T-6	S1	S2	S3	S4	S5						G1	G2	G3	G4				
Species of Concern																									
bluefish																									
windowpane flounder																									
cobia																									
red drum																									
king mackerel																									
spanish mackerel																									
summer flounder																									

Table 4: Occurrence and habitat preferences of bony fish with EFH designated for region by life-stage in the mid-Atlantic, with focus on preferences applicable or potentially applicable to estuaries.

Species Common Name	Regulated EFH Life Stages	Geomorphic Features	Substrate	Depth (m)	Depth (ft)	Water Temperature (C)	Water Temperature (F)	Time of Year	Reference
Bluefish	juvenile	Day: shorelines, tidal creeks; night: open waters, channels	Sand, mud, sea lettuce patches, eelgrass beds, salt marshes			>20 immigrate into estuaries; 15 emigrate from estuaries	>68 immigrate into estuaries; 59 emigrate from estuaries	May - October	Fahay et al., 1999
	adult					>14 to 16	>57 to 61		"
Red drum	larvae	Inter- and subtidal flats, estuarine wetlands, tidal creeks, SAV	Mud, sand, SAV	0 to 10	0 to 30	16 to > 30	61 to >86		South Atlantic Fishery Management Council, 1998; NMFS 2000 (Summary Tables)
	juvenile	Inlet mouth, tidal creeks/channels, inter- and subtidal flats, river mouths, oyster reefs	Mud, sand, shell, SAV	0 to 10	0 to 30	0 to > 30	32 to >86		"
	adult	Inlet mouth, channels, inter- and subtidal flats, oyster reefs	Mud, sand, shell	1 to 100	3 to 330	0 to >30	32 to >86		"
Summer flounder	juvenile	Lower estuary flats, channels, salt marsh creeks, eelgrass beds.	Mud and sand	0.5 to 5	1.5 to 15	>11	>52		NMFS 2000 (Summary Tables); Packer et al., 1999
	adult			0 to 25	0 to 80			Warmer months	"

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Attachment B: Clean Water Act Section 404(b)(1) Evaluation

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Mid-Bay Chesapeake Islands Environmental Restoration Project
Chesapeake Bay and Dorchester County, Maryland

Clean Water Act
Section 404(b)(1) Evaluation

Prepared By: Baltimore District, U.S. Army Corps of Engineers

2006

I. INTRODUCTION

Dredged or fill material should not be discharged into the aquatic ecosystem unless it can be demonstrated that such a discharge would not have an unacceptable adverse impact, either individually or in combination with known and/or probable impacts of other activities affecting the ecosystems of concern.

The *Guidelines for Specification of Disposal Sites for Dredged or Fill Material* were developed by the Administrator for the United States Environmental Protection Agency (EPA) in conjunction with the Secretary of the Army acting through the Chief of Engineers under Section 404(b)(1) of the Clean Water Act (33 U.S.C. 1344). The Guidelines are applicable to the specification of disposal sites for discharges of dredged or fill material into waters of the United States (U.S.).

In evaluating whether a particular discharge site may be specified, the following steps should generally be followed: (a) review the restriction on discharge, the measures to minimize adverse impacts, and the required factual determinations; (b) examine practicable alternatives to the proposed discharge; (c) delineate the candidate disposal site; (d) evaluate the various physical and chemical components; (e) identify and evaluate any special or critical characteristics of the candidate disposal site and surrounding areas; (f) review factual determinations to determine whether the information is sufficient to provide the required documentation or to perform pre-testing evaluation; (g) evaluate the material to be discharged to determine the possibility of chemical contamination or physical incompatibility; (h) conduct the appropriate tests if there is a reasonable probability of chemical contamination; (i) identify appropriate and practicable changes in the project plan to minimize the impact; and (j) make and document factual determinations and findings of compliance.

II. PROJECT DESCRIPTION

A. Location

The Mid-Chesapeake Bay Islands Restoration Project focuses on James and Barren Islands, both in Dorchester County in Chesapeake Bay. James Island is 16 miles north of Barren Island on the Eastern Shore of Maryland. James Island is situated at the mouth of the Little Choptank River, north of Taylors Island. Barren Island lies immediately west of Hoopers Island, across the Bay from the mouth of the Patuxent River.

B. General Description

The Mid-Chesapeake Islands Restoration Project recommends island restoration at James

Island and island restoration/ protection at Barren Island. The James Island portion of the project involves constructing 45,000 ft of perimeter dikes, breakwaters, and/or other structures approximating the island's historical footprint and filling the enclosed area with clean dredged material from Federal navigation channels in Chesapeake Bay (Figure 1). The 2,072-acre fill area would be subdivided to provide approximately 55% tidal wetland habitats and 45% upland island habitats. Construction at James Island would necessitate the dredging of an access channel on the northwest. Dredging the access channel would provide sand for dike construction. The access channel would be approximately 12,720 ft in length, 400 ft in width at base with 3:1 side slopes. Of the total length, 3,070 ft would lie within the island footprint with 9,650 ft extending outside the footprint. The total footprint of the access channel is roughly 153.5 ac, with 52.7 acres within and 100.8 acres outside the island footprint. The potential impact area highlighted on Figure 1 is 4,100 acres.

Barren Island recommendations are for a phased construction of sills and breakwaters (Figure 2). Phase I incorporates the use of sills to protect the current acreage of the island and the SAV/shallow water habitat off the eastern shore of Barren Island. Phase I Barren restoration/protection would involve the modification of 4,900 ft of existing sill, construction of 3,840 ft on the north shore, 4,620' along the western shore, and a southern shore sill of 1,300 ft. Sills would be built to an elevation of 4 ft MLLW (mean low low water). Modification of the existing sill would require a 1.1 acre footprint. The near-shore sill would consume 5 acres of shallow water habitat. Approximately, 23 and 49 acres of island habitat (72 acres total) will be created by backfilling on the north and west, respectively. Monitoring of the SAV habitat to the south and southeast of Barren is also included in the Phase I plans and would be used to determine if a breakwater extending off the southern tip of Barren is needed. The purpose of the breakwaters would be to protect SAV habitat in the waters to the south and southeast of Barren and provide suitable conditions for these SAV beds. If it is determined that the SAV habitat to the south and southeast require further protection, a maximum 8,200 ft of structure is proposed at a maximum of 6 ft MLLW. If built to maximum length, the southern breakwater would have a 9.5 acre footprint. In total, preliminary designs have identified that Barren Island restoration and protection measures would impact 92 acres of near-shore habitat. Given refinements with final designs, it is projected that a maximum of 100 ac of near-shore habitat would be impacted by the project at Barren Island. A more detailed description of the project is provided in the *Mid-Chesapeake Bay Islands Environmental Restoration Project Draft Feasibility Report and Environmental Impact Statement.*

C. Purpose

The purpose of the proposed project is to recreate and restore important regional island habitat that has been lost to land subsidence, rising sea level, and erosion in the Chesapeake Bay, plus provide protection to prevent future loss. At the same time, the project would provide for the beneficial use of sediments that are dredged from Bay channels.

D. Authority

The Baltimore District received the authority to pursue the study under the resolution of the Senate Committee on Environment and Public Works on June 5, 1997. Using the criteria defined by this resolution, the Eastern Shore, Maryland and Delaware Section 905(b) Analysis identified and recommended for further detailed feasibility-level study several projects that were within the Federal interest such as the beneficial use of dredged material to replace habitats lost from development and erosion activities and the restoration and creation of hundreds to thousands of acres of wetlands, terrestrial and riparian habitat.

E. General Description of Dredged Material

1. Characteristics of Fill Material

The sediment to construct the dikes at James Island would be excavated from borrow areas within the project site and/or dredged from the proposed access channel. These sediments are expected to consist of sand with some silt and clay lenses. Most project sediments would be excavated during periodic episodes of maintenance dredging. Accordingly, the fill sediment is expected to consist of relatively low cohesion silts and clays with some fine sands. Armor stone would be placed to stabilize 45,000 ft of perimeter dikes at James Island. The material to be placed at Barren Island is characterized as silts and sands. Barren Island sill construction would incorporate modification to the existing 4,900 ft of existing sill, and construction of 9,760 ft of new sills, plus 8,200 ft of breakwaters (Phase II). Because the channels are removed from known point sources, anthropogenic contaminant concentrations are likely to be consistent with background levels in the Chesapeake Bay sediments.

2. Fill Material Quantities

78 to 95 million cubic yards (mcy) of dredged material would be placed at James Island over the project life. 13.2 mcy of sand would be dredged from within the project footprint to be used for dike construction. An additional 2.7 mcy of sand would be dredged from the access channel for use in dike construction. 843,800 cy of rock would be needed to construct the perimeter dikes. Approximately, 380,000 cy of dredged material would be placed at Barren Island. 189,150 cy of rock would be placed at Barren Island to construct sills and breakwaters.

3. Source of Material

The sediment to construct the proposed wetland and upland habitat area at James Island would be dredged from the following Federal navigation channels in the Chesapeake Bay leading to Baltimore Harbor: the Craighill Entrance Channel; the Craighill Channel; the Craighill Angle, the Craighill Upper Range; the Cutoff Angle; the Brewerton Channel Eastern Extension; the Tolchester Channel, the Swan Point Channel, Inland Waterway from Delaware River to Chesapeake Bay, and other non-federal projects as determined by the Project Delivery Team (PDT). The sand for dike construction would be hydraulically dredged from within the island footprint or from the access channel. The material that would be used to backfill behind the breakwaters at Barren Island would be from local Honga River channels. All dredging of Federal navigation channels and local Honga River channels are Operations and Maintenance activities that have received authorization and will be carried out regardless of the approval of the Mid-

Chesapeake Bay Islands Restoration Project. Rock would be obtained from commercial quarries.

F. Description of the Proposed Discharge Sites

The James Island and Barren Island Project sites are rapidly eroding islands located in the Chesapeake Bay. James Island lies at latitude 38° 31' 00'' N, and longitude 76° 20' 15'' W. Barren Island, south of James, is at latitude 38° 20' 00'' N, and longitude 76° 15' 30'' W. James Island, once at least 1,350 acres in the 17th century, now amounts to 3 small remnants totaling 100 acres (Maryland, 1949; Kearney, 1991). The closest point of mainland is Taylors Island on the Eastern Shore of Maryland, 3100' south of the site. James Island is privately owned. The proposed containment dikes would enclose approximately 2,072 acres of shallow water habitat and would abut, but not tie directly into the island remnants. (See the attached figure). Barren Island currently totals nearly 200 acres, but was recorded at 754 acres in 1848 (Wray, 1995). Hoopers Island is immediately east of Barren. Two additional island remnants, Opossum Island and an unnamed island, are located due east and south of Barren Island, respectively. Barren Island is federally owned and managed by the U.S. Fish and Wildlife Service (USFWS) as a satellite refuge area to Blackwater National Wildlife Refuge. 19.7 acres of fringe wetlands have been created behind containment structures using dredged material along the northwestern shoreline of Barren Island between 1998 and 2004.

G. Description of Discharge Method

James Island: It is expected that fine grained sand to be used in constructing the proposed dikes would be dredged hydraulically from either within the alignment footprint or the access channel and pumped to the dike alignment. Some mechanical shaping of the sand would be required before armor stone can be placed on the exterior slopes. Some small amount of fine grained sediment unsuitable for dike construction may be sidecast near the borrow site within the proposed dike alignment. Rock to construct sills and breakwaters would be placed first using a crane from a barge. The material from the Federal channels would most likely be dredged mechanically and placed in barges. The barges would be towed or pushed to the proposed placement sites where the sediments would be pumped into the containment cells. The dredged material would be allowed to settle and consolidate. Supernatant water would be returned to the Bay through weirs or similar control structures in the eastern perimeter dike.

Barren Island: Rock to construct sills and breakwaters would be placed first using a crane from a barge. Dredged material would be hydraulically pumped directly from local channels to create habitat behind the sills.

III. ALTERNATIVES CONSIDERED

Large island restoration addresses two problems plaguing Chesapeake Bay: 1) the rapid loss of island habitat over the past 200 years and 2) the need to accommodate large amounts of dredged material. Large island restoration is inherently water-dependent because of their dependency upon isolation by open Bay waters. Support for large island restoration stems from the recommendations of the Baltimore Harbor and Channels Dredged Material Management Plan (DMMP) and Tiered Environmental Impact Statement (EIS) that was completed in December 2005.

Initially 105 islands were considered for restoration. The initial screening eliminated 84 islands, leaving 21 islands to be carried into the plan formulation process. These 21

islands were grouped into island complexes based on their vicinity and functioning as an island ecosystem. The resulting 8 island/island complexes were evaluated and ranked using 10 engineering criteria including possible restoration size, capacity, and foundation material plus an environmental suitability analysis from the State Bay Enhancement Work Group (BEWG). Public scoping meetings identified that there was public support for selecting the two highest ranking islands, Barren and James, for concept plan formulation.

A range of alternatives were developed for James and Barren Islands by the PDT. Four alignments for Barren and five alignments for James were delineated. For these alignments, a variety of wetland to upland ratios was considered ranging from all upland to all wetland configurations. A total of 20 different alignment combinations were considered that resulted in 170 alternatives.

The 170 alternatives were screened down to 14 alternatives using engineering suitability criteria and environmental considerations. Benefits and costs were developed for the 14 alternatives and a cost effective/incremental cost analysis was performed. The cost effective alternatives were evaluated against the 11 objectives identified by the PDT. From this final, screening, the recommended plan was determined.

The island restoration sites were carefully selected and projects were configured to minimize detrimental environmental impacts and maximize benefits to the aquatic ecosystem. A more detailed description of the plan formulation and alternative analysis process including figures of all alignments considered is in the *Mid-Chesapeake Bay Islands Environmental Restoration Project Draft Feasibility Report and Environmental Impact Statement*.

IV. Factual Determinations

A. Physical Substrate Determinations

1. Substrate Elevation and Slope

James Island: Upland dike elevations along the proposed eastern, northern, and western perimeter would initially be 25’ MLLW. Once habitat development is complete these dikes would be reduced to 20’ MLLW. Substrate elevation would be 20’ MLLW. Wetland dike elevations along the proposed western and southern perimeter dikes are 10’MLLW. Wetland dike elevations along the proposed eastern perimeter dikes are 8’ MLLW. The average depth of water within the project area is approximately 8.5’ MLLW, with depths ranging from 4’ to 13.2’ MLLW. The depth of sand mining within the island footprint would range between 5 and 30’, with a mean of 12’. The depth of sand mining for the access channel would extend to 25’. The water depth where the access channel would be dredged is currently 8.7’ to 26.5’, with a mean of 14.8’.

Barren Island: Elevations along the proposed western sills would be 4’ MLLW. Elevations of the breakwaters that would be constructed in Phase II are a maximum of 6’ MLLW. The average depth of water within the project area is approximately 3.5’.

2. Sediment Type

The sediments at James and Barren Island are typical of lowland sedimentary deposits and consist mainly of sand, silt, and clay, with some gravel. Four of five James Island sediment samples were predominantly sand. One sample was largely silt/clay. 80% of sediment samples (n=10) taken surrounding Barren consisted of 57.6 to 98.7% sand. The remaining portion was predominantly silt/clay with a small percentage of gravel. Two samples were 86.3 and 84.1% silt/clay with the remainder sand. The sediment to be used to construct the containment dikes at James Island is fine grained sand with some silt and clay lenses. The dredged materials proposed for filling at James Island are likely to be silt, with some clay and some fine sand. Barren Island would likely receive dredge materials consisting of silts and sand.

3. Discharge Material Movement

James Island: The fine-grained sand used to construct the perimeter dikes would be excavated, placed, and shaped to avoid unnecessary loss of materials. When completed, the containment dikes would control movement of the dredged material placed in the site. Discharge spillways would be managed to minimize movement of dredged material beyond the containment dikes.

Barren Island: Dredged material would be placed behind sills to avoid unnecessary loss of materials. Sills would control the movement of dredged material placed in the site.

4. Physical Effects on Benthos

Benthos in the alignment of the containment dike at James and sills and breakwaters at Barren would be buried permanently. Benthos in the containment cells at James Island and along the Barren shoreline that would be converted to wetlands would be buried permanently with dredged material as the cells are filled. Shallow water habitat that will be converted to upland or dikes will be permanently lost to the current benthic assemblages. Benthic species, although different from the original shallow water assemblage, are expected to recolonize the wetland cells at both islands and the tidal gut at James Island. Epibenthic communities are expected to colonize the exterior perimeter dike face once construction is complete. The long term, overall impact on regional benthic populations is not expected to be significant.

5. Other Effects

None expected.

6. Actions Taken to Minimize Impacts

During perimeter dike construction at James, the toe dike would be constructed first to minimize turbidity plumes resulting from dredging associated with the sand borrow activities and placement of sand to construct the dikes. Dredged material transported to the James Island site would be contained within the armored dikes. Discharges through the spillways would be monitored, and must meet State water quality standards. A Water Quality Certification and Wetlands License would be obtained.

Turbidity and TSS limits would be prescribed in these documents. Dredged material transported to the Barren Island site would be contained behind sills.

B. Suspended Particulate/Turbidity Determinations

1. Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Placement Site

Minor and temporary increase of suspended sediment and turbidity is expected in the immediate vicinity of the dredging operations and in the immediate vicinity of dike, sill, and breakwater construction operations. Suspended sediment and turbidity in the vicinity of James and Barren Island are likely to be reduced after the proposed construction compared to current conditions.

2. Effects (degree and duration) on Chemical and Physical Properties of the Water Column

(a) Light Penetration - Minor, temporary, and localized reduction in light penetration due to turbidity would occur in the immediate vicinity of the dredge plant during dredging and in the vicinity of sand placement during the construction of the proposed containment dike.

(b) Dissolved Oxygen – Minor, temporary, and localized reduction in dissolved oxygen in conjunction with elevated turbidity levels may occur in the immediate vicinity of dredging and construction operations. Parts of the northwestern access channel at James Island that are dredged to -25 feet or greater have the potential to become hypoxic or anoxic in warmer months of years when impaired water quality problems are pervasive below the pycnocline in the Bay. Under these conditions, the bottom in the access channel would be unsuitable as habitat for benthic dwelling organisms such as summer flounder. These species would be expected to avoid this area during low oxygen periods. This temporary loss of habitat would not be expected to impact species populations because of the abundance of suitable habitat still remaining elsewhere in the Bay.

(c) Toxic Metals and Organics – Dredging operations and construction operations are not expected to result in the release of any measurable amounts of contaminants into the water column. Dredged materials that are placed in containment cells at the James Island Project site at elevations above mean high water would be exposed to the atmosphere and weathering. Exposure of sulfitic marine sediments sets off a chemical reaction that tends to lower sediment/soil pH. This reaction and the exposure to rainfall (which also has a low pH) will cause some naturally occurring metals that are bound to the sediment to dissolve into the water. If present in sufficient concentrations, dissolved metals can be toxic to aquatic organisms, and could constitute a negative impact to the local biota in the immediate vicinity of the discharge of runoff water into the waters surrounding the restored island mass. After high marsh and upland soils have been conditioned, amended, and planted, the potential release of metals would abate and the pH of runoff water would increase.

The channels that would provide the material for placement at Barren Island are removed from known point sources. Therefore, anthropogenic contaminant concentrations are likely to be consistent with background levels in the Chesapeake Bay sediments.

(d) *Pathogens* – No pathogens are expected to be released into the water column.

(e) *Aesthetics – James Island*: Temporary changes during construction would constitute a decrease in aesthetic values that would exist throughout the 50 year construction period, but would be reduced after all cells have been planted in year 30. Upon completion of the project, aesthetic values are expected to increase above current values.
Barren Island: Temporary changes during construction may constitute a short-term decrease in aesthetic values. Upon completion of the project, aesthetic values are expected to increase above current values.

(f) *Temperature* – No change expected.

3. Actions Taken to Minimize Impacts

Dredged material transported to the James Island site would be contained within armored dikes. Dredged material transported to the Barren Island site would be contained behind sills. To address the potential for toxic metal production upland soil/sediment at James and Barren Island project sites would be managed and conditioned periodically if necessary to maintain the pH near neutral. Where determined necessary, time of year restrictions, best management practices (BMPs), turbidity curtains, and silt fences would be used to minimize impacts. To minimize the potential for development of toxic concentrations of dissolved metals, upland soil or sediment at the site would be managed and conditioned periodically to maintain the pH near neutral. This would keep the naturally occurring metals bound to the soil or sediment. Water quality at the weirs would also be monitored so incidence of low pH and high metals can be identified and controlled to minimize impacts to local water quality. An extensive monitoring plan, such as the one used at Poplar Island Environmental Restoration Project (PIERP), would be followed. It is expected that a State of Maryland water quality certification would be obtained.

C. Water Circulation, Fluctuation, and Salinity Determinations

1. Water Quality

Temporary, localized changes are expected in clarity, color, and quality of Bay waters in the immediate vicinity during perimeter dike construction. Turbidity monitoring of similar construction activities at Poplar Island (Phase I and Phase II construction of Poplar Island Environmental Restoration Project) indicated the turbidity levels quickly diminished to background levels. Turbidity monitoring would be conducted during James and Barren Island construction. Water discharged through the spillways during dredged material placement may have slightly elevated turbidity, but would be monitored to ensure compliance with State water quality standards.

(a) *Salinity* – No change expected in existing tidal waters.

(b) *Chemistry* – Very slight and temporary changes are possible in the immediate vicinity of sand dredging and placement activities necessary for dike construction at James Island, dredged material placement at James and Barren Islands, and rock placement at Barren. Minor and temporary fluctuations in nutrient, pH, and some metal concentrations are possible in the immediate vicinity of the placement site spillways during dewatering operations at James Island. Discharges from the existing PIERP have been monitored, and no significant changes to the water quality have been identified (EA, 2004a; 2002d).

(c) *Clarity* – Minor and temporary changes are possible in the immediate vicinity of sand dredging and placement activities necessary for dike construction at James Island, dredged material placement at James and Barren Islands, rock placement at Barren Island, and in the vicinity of the placement site spillways at James Island due to elevated turbidity.

(d) *Color* – Very slight and temporary changes are possible in the immediate vicinity of sand dredging and placement activities necessary for dike construction at James Island, dredged material placement at James and Barren Islands, rock placement at Barren Island, and in the vicinity of the placement site spillways at James Island due to elevated turbidity.

(e) *Odor* – No change expected.

(f) *Taste* – Not applicable.

(g) *Dissolved Gas Levels* – Localized reductions may occur in the immediate vicinity of the dredging operations, in the immediate vicinity of perimeter dike construction operations at James Island, and sill and breakwater construction at Barren Island. Due to mixing at the study area, the impact is not expected to be significant. DO levels may be negatively impacted in areas of the constructed access channel at James Island. Parts of the northwestern access channel that are dredged to depths of 25 feet or greater have the potential to become hypoxic or anoxic in warmer months of years when impaired water quality problems are pervasive below the pycnocline in the Chesapeake Bay.

(h) *Eutrophication (Nutrients)* – The release of nutrients from the sediments during dredging is expected to be short term, temporary, and localized during the construction of island habitat at James Island, dredging of the northern access channel, and placement of rock and dredged material at Barren Island. Minimal releases of phosphorus and nitrogen (ammonium) are expected during construction and dredging, but are not expected to be significant. Discharges from the existing PIERP, including nutrient concentrations, have been monitored. No significant changes to the water quality have been identified (MES, 2005; 2003; 2002). Discharges from the dredged material

placement at James and Barren Islands will also be monitored. Eutrophication is not expected to result from project activities because nutrient releases would be short-lived and would dissipate quickly.

2. Current Patterns and Water Circulation

(a) *Current Patterns and Flow*- It is anticipated that the proposed restoration at James Island would have minimal impacts on local tidal elevations in areas adjacent to James and Barren Island projects. Following construction (long-term impacts), current velocities would be impacted with maximum increase or decrease in current velocity of about 0.4 ft/sec with a lesser change (0.1 ft/sec) predicted in the Little Choptank River. Peak ebb and flood currents in the main Bay are not predicted to change with the proposed restoration. Flow is expected to be displaced northward and southward and current velocity is expected to increase north and south of James Island. Current velocity is predicted to decrease primarily around the existing James Island to the east where flow is impeded by the proposed project. Velocity decreases are also expected to the west of the restoration project but to a lesser extent. The greatest velocity increases are forecast at the southeast dike between the restoration project and the existing southern part of the Island, and where flow is trained along the northwest dike as it enters the Little Choptank River (MNE, 2002b). Open water areas converted to upland at James Island would experience a complete cessation of tides and currents.

For Barren Island, it is expected that there would be no impacts on local tidal elevations. Following construction (long-term impacts), local current velocities would be impacted with typical maximum changes in current velocity of about 0.6 ft/sec, which occurs in the channel north of the project. Peak ebb currents are predicted to be trained along the western edge of the proposed project which would cause a slight shifting and focusing of current to the west of Barren Island. To the east of the island, ebb current velocity is expected to be reduced following construction because the southern tip of the protective breakwater is in close proximity to Upper Hooper Island. This is projected to act as a constriction and reduce overall flow between Barren Island and Hooper Island. In addition, the gap between the proposed breakwater and the existing Barren Island would also create an increase in velocity. The long length of the breakwater would also provide shoreline protection to Upper Hooper Island (MNE, 2004).

No effects are expected from the required maintenance dredging of the channels or from the placement of dredged material in the proposed site.

(b) *Velocity*- See preceding discussion of flow.

(c) *Stratification*- No change expected.

(d) *Hydrologic Regime*- No significant changes are expected.

3. Normal Water Level Fluctuation

Water level fluctuations would cease in open water areas converted to upland island habitat. No change expected in remainder of project area.

4. Salinity Gradients

Open water areas converted to upland island habitat would cease to have salinity gradients. No change expected in remainder of project area.

5. Actions That Will Be Taken to Minimize Impacts

Hydrodynamic modeling will be completed to understand and minimize the impacts island restoration at James Island and protection measures at Barren Island would have on currents, flows, and sediment transport in the vicinity of the project.

D. Contaminant Determinations

Fine grained sand used to construct the proposed containment dikes would be taken from within the project site itself. The site is far removed from known sources of anthropogenic contamination and there is no logical reason to believe that fine grained sand could contain higher level of contaminants than the surface sediment on which it would be placed. Therefore, the fine grained sand is determined to satisfy the contaminant determination requirements of 40 CFR 230.11. The rock used to construct the breakwaters is not expected to contain contaminants.

Similarly, the sediments likely to be dredged from the Federal channels in the Chesapeake Bay leading to Baltimore Harbor are removed from known sources of anthropogenic contaminants (EA, 2003; 2000a; 2000b). Sediments from the Federal navigation channels are currently tested for priority pollutant concentrations every three years according to Inland Testing Manual (USEPA/USACE, 1998) methods and guidance. Overall, tested analytes were detected at low concentrations. Because the material will be contained in a placement site, and the spillways are monitored and managed, the release of significant contaminants is unlikely. Therefore, the placement of the dredged material from the Bay channels at the James Island site cannot be expected to result in a measurable release of contaminants. Testing of channel material is underway and would be repeated at intervals not exceeding 3 years during the life of the project.

The channels that would provide the material for placement at Barren Island are removed from known point sources. As a result, anthropogenic contaminant concentrations are likely to be consistent with background levels in the Chesapeake Bay sediments.

E. Aquatic Ecosystem and Organism Determinations

1. Effects on Plankton

Open water areas converted to upland island habitat at James Island would be permanently lost as plankton habitat. This impact is expected to be minor as there is no shortage of plankton habitat in the Mid-Chesapeake Bay. Short-term increases in turbidity associated with perimeter dike construction and dredging in the sand borrow areas could temporarily and locally depress phytoplankton communities. Long-term effects are expected to be negligible. Minor, localized increases in nutrient

concentrations could potentially stimulate phytoplankton growth, but is not expected to be significant because of low concentrations of nutrients released (MES 2002, 2004, 2005).

The winter flounder (3 individuals) identified in the James Island winter 2003 ichthyoplankton survey is the only fish species found solely in the plankton study. That is, winter flounder was not identified in any other fish surveys at James Island except the plankton surveys. Although great numbers were not found, winter flounder presence is not unlikely as the Choptank River is winter spawning ground for this species. It is not anticipated that there would be population level effects to winter flounder as a result of project construction.

There were two fish species identified solely in the Barren Island plankton surveys, but no other fisheries surveys: rough silverside (*Membras martinica)* and Northern pipefish (Sygnathus fuscus). Both species were limited to the spring 2003 ichthyoplankton survey at low densities. Rough silverside eggs were identified in the surface (1/100m^3) and combined samples (0.5/100m^3). Rough silverside post yolk sac larvae were present in bottom (0.3/100m^3), surface (3.8/100 m^3), and combined samples (2.1/100m^3). Northern pipefish post yolk sac larvae were identified in bottom (0.5/100m^3), surface (0.2/100 m^3), and combined samples (0.3/100m^3). Northern pipefish juveniles were identified in bottom (6.2/100m^3), surface (1.3/100 m^3), and combined samples (3.8/100m^3). The numbers of these ichthyoplankton are low. No population level effects to these species are expected as a result of project construction.

There are members of the macrozooplankton community, such as copepods and some amphipods, that have entirely planktonic lifecycles. These organisms are important food sources for higher trophic level species. Project construction impacts, such as increased turbidity, may produce localized depressions in the populations of these macrozooplankton. Impacts are expected to be temporary and are not expected to have a Chesapeake-wide affect on the populations of these organisms.

2. Effects on Benthos

Benthos in the immediate vicinity of the borrow sites would be displaced and/or entrained with the fine grained sand used for containment dike construction. Benthos in the path of dike, sill, and breakwater construction would be permanently buried as would the benthos within the placement sites. Sessile benthic dwellers may be able to avoid burial, but non-sessile species could be buried. Benthic recolonization of disturbed areas outside the containment dikes, sills, and breakwaters should occur within a few months. Benthos are expected to recolonize within the tidal gut and wetland cells, and epibenthic communities are expected to colonize the exterior perimeter dike face once construction is completed. In years when anoxia is extensive in the Bay, the benthos that recolonize the access channel may experience depressed oxygen which could further limit benthic utilization. Monitoring of the benthic and epibenthic communities in the vicinity of PIERP have not indicated any significant effects (EA, 2004b,c; 2002a, b). The loss of this bottom habitat is not expected to have a major, long term, overall impact on regional benthic communities.

3. Effects on Nekton

Short-term and indirect effects on the early life stages of some species, specifically during egg and larval stages, are expected as a result of the increased turbidity associated with perimeter dike construction and dredging in the access channel. Suspended particles readily adhere to many of the fish eggs, making them less buoyant (in the case of pelagic eggs) or smothering them (in the case of demersal eggs). Short-term, localized impacts could also result from the entrainment of fish eggs and larvae during hydraulic dredging. Nekton in the immediate vicinity of the borrow site may be displaced or entrained with the dredged and/or borrow material. Suspended sediments could also indirectly affect finfish by impairing the ability to feed (by limiting sight and ability to detect prey) of some larval and juvenile fish. Striped bass and other sight predators may be particularly affected due to their dependence on vision to detect prey. Short-term increases in turbidity are expected to have a negligible effect on larger, more mobile members of the fish community that would likely avoid the areas of highest turbidity. Nekton would permanently lose access to 2,072-acres of shallow water habitat at James Island. Impacts to displaced species are expected to be temporary as similar habitat is plentiful in the adjacent area. Part of this loss would be compensated for by the creation of 1,043 acres of wetland at James Island. Nekton would have access to the created wetlands via a tidal gut. Construction of all project phases, including wetlands, sills, and breakwaters would result in the permanent loss of a maximum of 100 ac (92 acres with preliminary designs) of shallow water habitat at Barren Island. However, 72 acres of wetlands would be created behind the sills.

4. Effects on Food Web

No adverse, long term effects are expected. The long-term project effects are expected to be positive by providing habitat for a wider variety of organisms than is currently available at the site. In the short term, the removal of benthic forage could limit food availability for some species, particularly obligate bottom feeders, in the local area. Although many will be able to utilize similar food sources in adjacent areas, there would be a temporary net loss of this food source. Once benthos recover and the epibenthic community is established on the dikes, adverse food web effects are expected to be negligible.

5. Effects on Special Aquatic Sites

Limited wetlands can be found on the smaller remnant islands of James Island. Without the proposed project or other intervention, these wetlands are expected to completely disappear in a few years. The project would create 1,043 acres of wetland habitat in the vicinity of the remnant islands. Hence, short term without project effects would be local and severe due to expected further loss of island remnants. With the project, long-term effects would be positive and encompass a larger area. Similar impacts are expected for the fringing wetlands along the western and southern shoreline of Barren Island.

SAV was not found on the western side of James Island and therefore will not be impacted by construction of the preferred alignment. The James Island alignment is expected to protect the existing SAV beds by reducing high wave energy on the eastern side of the Island and potentially promote SAV bed expansion. Tier I, II, and III acreage (as defined by the Chesapeake Bay Program) surrounds all James Island

remnants. It is estimated that 298.8 ac of bottom less than 2 m in depth (Tier III) exist within the project footprint at James Island. This area will be permanently lost as potential SAV habitat by Island construction activities. Restoration of James Island is expected to positively benefit 10s to a few 100s of acres of potential SAV habitat (based on a historical picture from 1952 provided by Maryland DNR).

No impacts to SAV are expected with the construction of the western breakwater/sill. The northern breakwater/sill plans will be adjusted to minimize and if possible avoid SAV impacts. Additionally, restoration efforts on the south end of Barren are not expected to impact SAV resources. There could be potential beneficial impacts to construction of shoreline restoration/protection at Barren Island, as the wave protection shadow created by the reconstruction of the island promotes additional SAV growth in the quiescent conditions created in the lee of the island. This has been observed at Poplar Island. Tier I areas have been delineated to the northeast, east, and southeast of Barren Island. Tier II and Tier III zones surround Barren. All of the Barren project area, approximately 92 ac (72 ac of wetlands restoration and 20 ac of breakwater and sill footprint), is less than 2 m in depth . Consequently, 92 acres of otherwise Tier II/III SAV habitat would permanently be lost as potential SAV habitat by island construction activities if all phases are constructed. Restoration measures at Barren Island can be projected to benefit over 1000 ac of current SAV beds and add the potential for 100s more acres.

6. Threatened and Endangered Species

The presence of RTE species was coordinated with MDNR, USFWS, and NMFS. Initial coordination letters describing the presences of Federally listed species were received from USFWS on 1 December 2004 and from NMFS on 20 July 2004; and a letter describing the presence of State listed species from MDNR on 26 November 2004.

The response letter from NMFS (Colligan, 2004; Appendix E) provided a list of endangered and threatened aquatic species within this agency's purview. The list included the shortnose sturgeon (SNS) *(Acipenser brevirostrum)* and several species of sea turtles including leatherback (*Dermochelys coriacea*), loggerhead (*Caretta caretta*), Kemp's ridley (*Lepidochelys kempi*), and green sea turtles (*Chelonia mydas*). The letter (Colligan, 2004) pointed out that these species are likely to be present in the vicinity of the project area, and may be affected by the project. Consequently, the project must undergo Section 7 consultation and USACE is responsible for initiating this consultation when the project details are developed.

The response letter from USFWS (Moser, 2004; Appendix E) provided information regarding Federally listed endangered or threatened species within the project areas at James and Barren Islands. This information includes reference to the Federally listed threatened American bald eagle nesting on the northern remnant of James Island and the southern end of Barren Island near Whitewood Cove. The USFWS letter (Moser, 2004) stated that any construction or forest clearing activities within one-quarter mile of an active nest may impact American bald eagles, and if such impacts may occur, further Section 7 consultation with USFWS may be required. The summary

statement provided by the USFWS indicates that, except for occasional transient individuals, James and Barren Islands are not known to support any other Federally proposed or listed threatened or endangered species.

Additional communication with Glenn Therres of MDNR Heritage Program in March 2005 provided further information on the status of the American bald eagle nests on James Island and Barren Island. Mr. Therres stated that one active nest remained on James Island, located on the middle remnant. Mr. Therres also noted that the American bald eagle nest formerly located on the southern end of Barren Island was blown down in 2004, and it is not known whether the nest will be rebuilt in 2005.

The response letter from MDNR (Byrne, 2004; Appendix E) referenced the American bald eagle nests on James and Barren Islands. There is also a record of the state-listed endangered eastern narrow-mouthed toad occurring on Barren Island.

A full list of Federally and State listed species observed during seasonal surveys at James and Barren Island is provided in Tables 3-41 and 3-42 of the Mid-Chesapeake Bay Island Ecosystem Restoration Study- Integrated Feasibility Report and EIS. No State or Federal threatened or endangered species are expected to be adversely impacted by the restoration at James Island or the protection at Barren Island. Although endangered species are present on the James Island remnants, negative impacts are not expected since no encroachment to the existing remnants is anticipated. The recommended plan for Barren Island involves encroachment to the shoreline though encroachment to the interior of the island is not expected. The single nesting pair of bald eagles on the northern remnant of James Island, and the potential nesting site at the southern end of Barren Island is not likely to be adversely impacted by the proposed action. Any effects on the eagles would be manifested by localized short-term disturbances during construction of the dike segments closest to the nests. Precautions may need to be taken during construction and dredged material placement to avoid working within the area one-quarter mile from the eagle's nest during the restricted periods. This distance would be expected to provide sufficient buffer to prevent abandonment of the nest. Coordination with USFWS has indicated that as long as time-of-year restrictions are observed, no impacts to the American bald eagle are likely to occur (Appendix E).

In addition, there is record of the state-listed endangered Eastern narrow-mouthed toad (*Gastrophryne carolinensis*) known to occur on Barren Island. This species was observed on Barren Island during the spring 2003 existing conditions survey. Consultation with MDNR is ongoing to determine how to avoid potential impacts to the Eastern narrow-mouthed toad. The island that currently provides habitat for the Eastern narrow-mouthed toad will be protected by the proposed project.

Short-nose sturgeon are suspected to be transient to the project area surrounding James Island and Barren Island. The closest short-nose sturgeon catches were documented from pound nets set eight miles from James and Barren Islands. Seasonal fisheries surveys conducted to characterize the existing finfish communities

surrounding the James and Barren Islands during 2002 and 2003 did not identify any short-nose sturgeon within the study area. Because short-nose sturgeon are expected to be transient to the project area, coordination with NMFS indicate that adverse impacts are not anticipated (Appendix E).

Leatherback sea turtles, green sea turtles, Kemp's ridley turtles, and loggerhead turtles are State and Federally listed endangered species and have been recognized as being transient to areas surrounding James Island and Barren Island. Based on collected data, Kemp's ridley and loggerhead turtles are the most frequent visitors to the Chesapeake Bay. Leatherback sea turtles typically continue migrating north past the Chesapeake Bay and prefer nesting on the high wave energy beaches of the eastern seaboard. No nesting by sea turtle species has yet been recorded in the Chesapeake Bay (Evans et al. 1997).

Although direct monitoring was not performed as part of the feasibility study, there were no sea turtles identified in any of the finfish surveys or wildlife monitoring at James or Barren Island (Harms 2004, BBL 2005). Sea turtles are migratory individuals that are seasonal transients to the project area and NMFS expects no impacts to these turtles (Appendix E). During cooler weather months, particularly, sea turtles are unlikely to be present.

An Endangered Species Act Section 7 Evaluation was prepared by USACE and submitted to NMFS and USFWS on 17 May 2005 (available in Appendix E, Attachment C). A letter dated 17 June 2005 communicates that USFWS concurs with USACE's determination that the proposed actions will have no adverse effect on Federally listed RTE. A similar letter was received from NMFS on 22 August 2005. Further, a Fish and Wildlife Coordination Act report was received from USFWS on 24 May 2005. The report summarizes the main environmental issues on the project and states that the USFWS enthusiastically supports the proposed plans for James and Barren Islands. A full record of all RTE agency correspondence is listed in Section 9.5 of the Mid-Chesapeake Bay Island Ecosystem Restoration Study- Integrated Feasibility Report and EIS.

USACE-Baltimore and MPA will continue consultation with the Federal and State resource agencies regarding time of year restrictions for construction and operations at James and Barren Islands as needed, since conditions could change prior to the start of construction.

7. Other Wildlife

No negative, long term impacts are expected. Negative impacts to wildlife are not expected to be significant during perimeter dike and sill construction, and dredging of the access channel, although temporary displacement of some wildlife will occur. Completed project would increase island and beach/shoreline habitat that will benefit a wide range of terrestrial and aquatic species, particularly diamondback terrapins (*Malaclemys terrapin*) and horseshoe crabs (*Limulus polyphemus*). Diamondback terrapins and horseshoe crabs have experienced a significant decrease in beach habitat necessary for nesting and spawning.

8. Actions to Minimize Impacts

The dredged material placed at James and Barren Islands would be confined by perimeter dikes and sills, respectively. At James Island, the stone toe of the armored section of the dike will be constructed before the sand dike section to minimize turbidity impacts and turbidity monitoring will be conducted during construction. Discharges through the spillways would be monitored, and must meet State water quality standards. A Water Quality Certification and Wetlands License would be obtained. Turbidity and TSS limits would be prescribed in these documents. Best management practices would be employed to manage the sites, to maximize environmental benefits, and to minimize potential adverse impacts. Necessary time of year restrictions would be upheld to further minimize impacts to nesting birds and terrapins.

Adaptive management will be a large part of project management. The project partners will manage the proposed projects at James and Barren Island to achieve their island restoration and protection goals by utilizing adaptive management and traditional task management methods. Recurring environmental monitoring studies will also be conducted to measure the achievement of the project goals and to assure that the project is complying with environmental standards. Tasks related to island restoration or island restoration and protection goals will be managed using adaptive management methods. Tasks such as general design, construction, and maintenance will be managed using more traditional task management methods. An Adaptive Management Plan (AMP), based on that developed for PIERP, is provided in Section 8 and Appendix F of the Mid-Chesapeake Bay Island Ecosystem Restoration Study-Integrated Feasibility Report and EIS.

F. Proposed Placement Site Determinations

1. Mixing Zone Determinations

None.

2. Determination of Compliance with Applicable Water Quality Standards

The proposed work would be performed in accordance with all applicable State of Maryland water quality standards.

3. Potential Effects on Human Use Characteristics

(a) *Municipal and Private Water Supply* - No effect is expected.

(b) *Recreational and Commercial Fisheries* – The project is not expected to have a significant effect on the abundance or catch of clams, oysters, or finfish, but a minimal effect on crabbing and soft clam fisheries is expected. The James Island project site would be lost permanently to recreational and commercial fisheries. It is anticipated that the project will not have a significant effect on spawning or critical habitat areas (i.e. SAV beds (HAPC), unique forage areas, or overwintering areas). The armor stone perimeter dikes are expected to provide reef habitat for structure oriented fish species such as striped bass. However, the placement of the rock, an artificial substrate, may have additional ecological

consequences associated with it. James and Barren Islands lie in shallow water. The project would not affect any typical commercial boat navigation routes. Some shallow-water recreational fishing areas will be lost, but because the number of recreational fishermen who seek out these soft-bottom areas is small, they should be able to shift to the abundant shallow areas adjacent to or near the site with no significant effect on congestion levels or catch rates. An access channel used by watermen to the south of James Island should remain usable. The location of this channel will be verified during the next phase of the project.

(c) *Water Related Recreation* - The construction site and the project footprint would be lost to recreational boating. Areas near the rock face of the containment dike and sills would attract recreational boaters and recreation fishing when the project is completed. The project should not interfere with typical travel routes used by recreational fisherman and boaters and would not prevent access to popular boating destinations in the area.

(d) *Aesthetics* – A temporary reduction in aesthetic values is expected during construction. Large island restoration at James Island would be a significant element in the landscape for some sensitive viewpoints (i.e., selected residential areas), but from the majority of vantage points, it is anticipated that the island, once completed, would blend into the existing landscape.

(e) *Parks, National and Historical Monuments, National Seashore, Wilderness Areas, Research Sites, and Similar Preserves* – As a satellite refuge area to Blackwater National Wildlife Refuge, the proposed wetland restoration and island protection actions would have a significant positive and long-term impact on a Federally managed refuge. If no actions are taken to stabilize Barren Island, the resources of the refuge and the SAV habitat in the eastern shadow of Barren would be permanently lost.

G. Determination of Cumulative Effects on the Aquatic Ecosystem

2,072 acres of shallow water habitat in the vicinity of James Island and 100 acres bordering Barren Island would be transformed to island habitat. Protection of the remaining 100 acres of James Island and 200 acres of Barren Island would be a long term, beneficial cumulative impact. Additional benefits would be realized by providing for the protection of the productive SAV beds to the east of Barren Island. It is anticipated that the adjacent shorelines to the east of the James and Barren Islands would receive some protection from erosion as a result of project. The long term cumulative effect of creating more remote island habitat including wetlands, bird islands, and upland using dredged material is beneficial.

Impacts of the proposed James and Barren projects would act cumulatively with the existing 1,140 acre PIERP, proposed 575 acre expansion of Poplar Island, and proposed SAV and wetlands protection and restoration measures at Smith, Tangier, and Taylors Islands that would collectively, fill approximately 500 acres of Chesapeake Bay shallow water habitat. The tidal wetlands, SAV beds, and upland island habitat that these projects

will restore is anticipated to cause a cumulative positive impact on the aquatic ecosystem that outweighs the consequences of open water habitat losses.

H. Determination of Secondary Effects on the Aquatic Ecosystem

The secondary impacts of the project would be largely beneficial. Wetlands creation in the area would have secondary positive impacts by increasing the net ecosystem energy output available in the immediate area. This is expected to have positive impacts throughout the food chain and to recreational and commercial landings.

The only secondary negative impacts identified are associated with displaced harvesting pressure to adjacent areas. Because most of the associated resources (crabs, finfish, etc.) would also be displaced, these secondary impacts are not expected to be significant on a population level.

V. FINDING OF COMPLIANCE

No adaptations of the Section 404(b)(l) Guidelines were made relative to this evaluation.

A. The proposed construction of containment dikes and the subsequent filling of the dikes with dredged material to form wetland and upland habitats at James Island plus protection of Barren Island using breakwaters and habitat creation behind the portion of dikes adjacent to Barren Island has been selected as the result of an alternatives analysis undertaken in accordance with the Guidelines given at 40 CFR 230.10(a). This alternative would provide the greatest environmental benefit to the Chesapeake Bay Islands system, minimize negative impacts such as those to fisheries, and provide necessary dredged material placement capacity. The DMMP has performed an exhaustive evaluation of dredged material placement sites to meet the dredging needs of the Port of Baltimore into the next century. Large island restoration has been recommended as one alternative. This beneficial project represents the most practical, least environmental impact alternative identified that can accommodate the volume of dredged material needed to maintain navigability of the approach channels to the Port of Baltimore. Accordingly, the alternatives analysis test is passed.

B. The proposed construction and fill with dredged material is not contrary to other state and Federal laws for the protection of water quality, aquatic species, or habitat; as follows:

1. The proposed construction, dredging, and placement of dredged material would be in compliance with State water quality standards.

2. The proposed construction, dredging, and placement of dredged material is not expected to violate the Toxic Effluent Standard of Section 307 of the Clean Water Act.

3. The proposed project would not negatively affect any endangered species.

4. No Marine Sanctuaries, as designated in the Marine Protection, Research, and Sanctuaries Act of 1972, are in the project area.

5. The proposed construction, dredging, and placement of dredged material would not result in permanent, significant, adverse effects on human health and welfare, including municipal and private water supplies, recreation and commercial fishing, plankton, fish, wildlife, and special aquatic sites. No contaminants would be discharged in toxic concentration in violation of Section 307 of the Clean Water Act.

Thus, the proposed construction, dredging, and placement of dredged material satisfy the requirements test at 40 CFR 230.10(b).

C. Parts II and IV of the analysis show that the proposed construction, dredging, and placement of the dredged material do not contribute to the significant degradation of waters of the United States and as such, the proposed project and proposed use of the placement sites comply with the requirements of 40 CFR 230.10(C).

D. Appropriate steps to minimize potential impacts of the placement of the material in aquatic systems would be followed.

The mandatory sequence of the Section 404(b)(l) Guidelines has been applied in evaluation of the proposed action. The proposed construction, dredging, and placement of the dredged material at Poplar Island is in compliance with the Section 404(b)(l) Guidelines.

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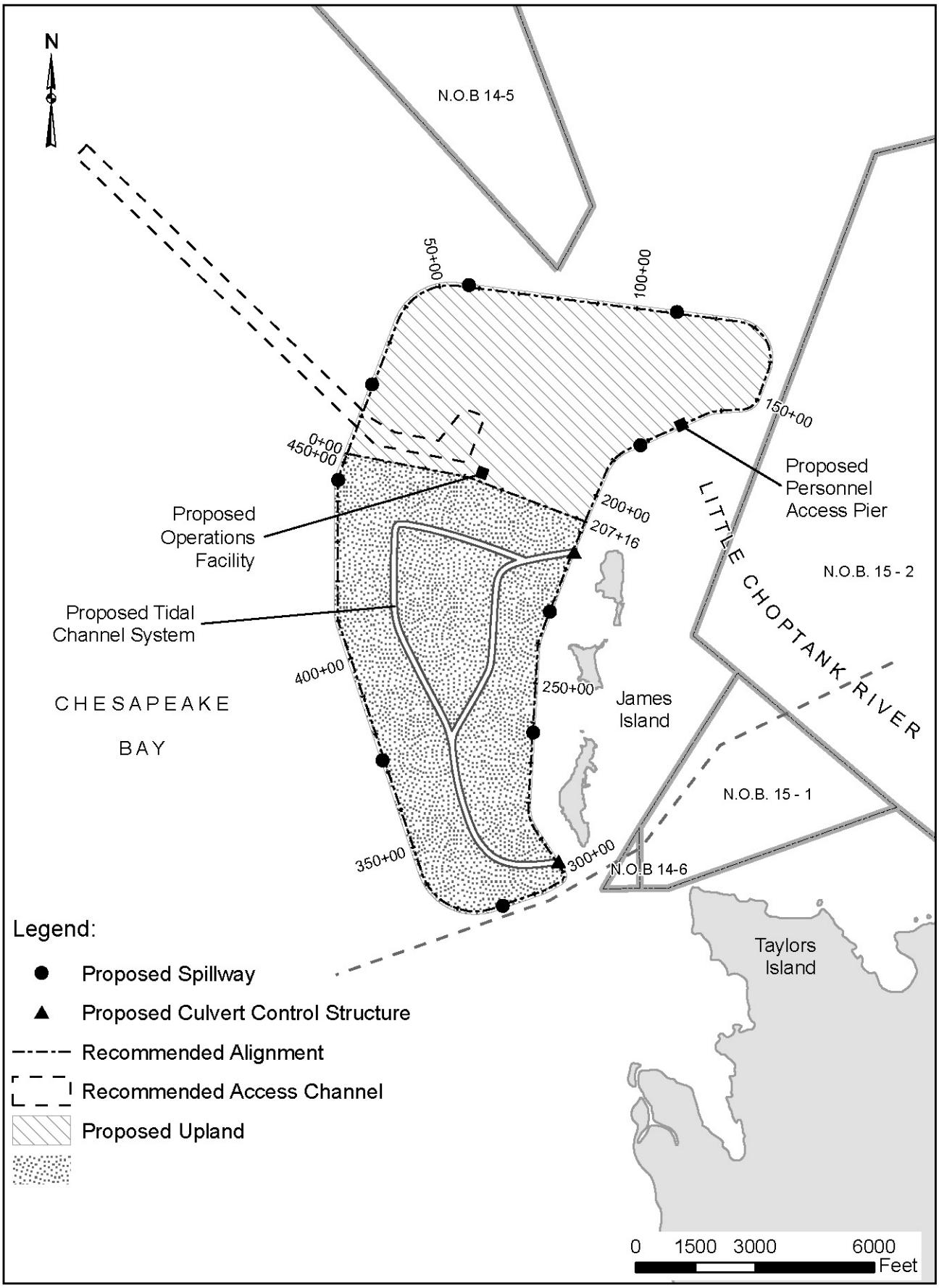

Figure 1: James Island Recommended Plan.

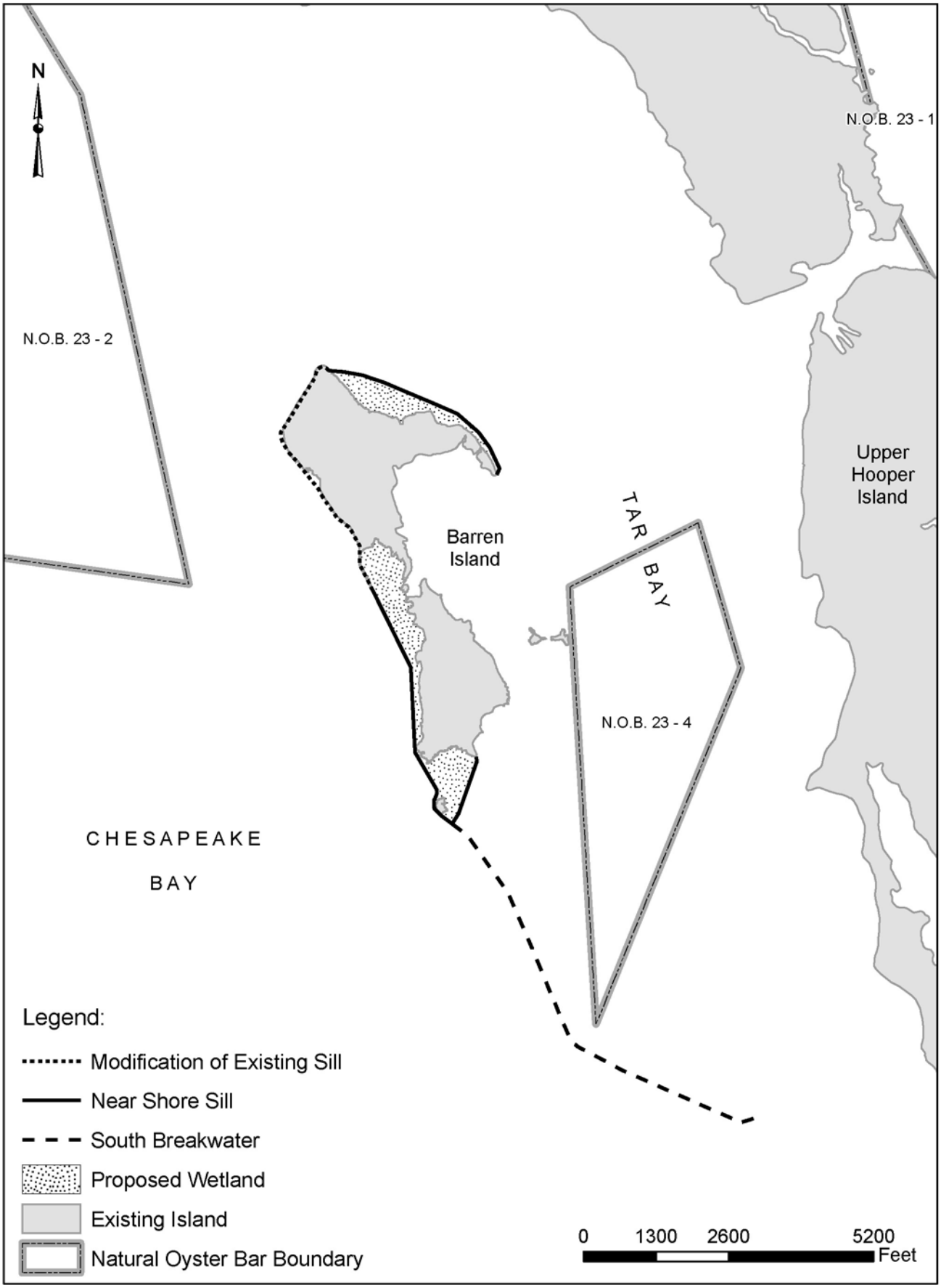

Figure 2: Barren Island Recommended Plan.

Attachment C: Endangered Species Act Section 7 Evaluation

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Mid-Chesapeake Bay Islands Restoration Project
Dorchester County, Maryland

Endangered Species Act- Section 7 Consultation
May 2005

Prepared By U.S. Army Corps of Engineers

Section 7(a)(2) of the Endangered Species Act (ESA) (16 U.S.C. 1531 et. seq.) requires every Federal agency, in consultation with and with the assistance of the United States Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS), to ensure that any action it authorizes, funds, or carries out, in the United States or upon the high seas, is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. In pursuant with Section 7(a)(2), the following information is provided to NMFS and USFWS in order to initiate Section 7(a)(2) consultation. This assessment includes:

1. A description of the proposed action;
2. A listing of the species of concern;
3. An analysis of the effects of the proposed action; and,
4. The Federal agency's opinions regarding the effects of the proposed action.

I. PURPOSE

The purpose of the proposed project is to restore important regional island habitat that has been lost to land subsidence, rising sea level, and erosion in the Chesapeake Bay. In the last 150 years, it has been estimated that 10,500 acres have been lost in the middle-eastern portion of Chesapeake Bay due to erosion and sea-level rise. It is predicted that if no actions are taken most island habitats will be completely eroded and lost to the Bay in the next 10 to 20 years. At the same time, the project will provide for the beneficial use of sediments that are dredged from Bay navigation channels. There currently is a dredged material placement shortfall that will be realized in the next 8 to 10 years. The Baltimore District's Draft Baltimore Harbor and Channels Dredged Material Management Plan (DMMP) identifies, evaluates, screens, prioritizes, and ultimately optimizes placement alternatives resulting in the recommendation of a specific viable plan of action for the placement of dredged materials over the next 20 years. Large island restoration is one of the recommended alternatives of the Draft Baltimore Harbor and Channels Dredged Material Management Plan (DMMP) and Tiered Environmental Impact Statement (EIS).

II. DESCRIPTION OF PROPOSED ACTION

The Baltimore District, U.S. Army Corps of Engineers (Corps) in partnership with the State of Maryland Department of Transportation, Maryland Port Administration (MPA) has initiated an environmental restoration feasibility study for the restoration of island habitat in the Mid-Chesapeake Bay region (Figure 1). This study focuses on restoring hundreds of acres of aquatic and wildlife island habitat in the Mid-Chesapeake Bay

region through the beneficial use of dredged material from the Port of Baltimore channel system.

The Mid-Chesapeake Bay Islands Restoration Feasibility Study stemmed from the Eastern Shore, MD and DE Section 905(b) Analysis, in accordance with Section 905(b) of the Water Resources Development Act of 1996. The Mid-Chesapeake Bay study area includes the eastern half of the Chesapeake Bay, from the Chester River to the MD/VA state line. This feasibility study addresses the recommendation to replace habitats lost through development and erosion activities within the study area through the beneficial use of dredged material.

The Mid-Chesapeake Islands Restoration Project recommends island restoration at James Island and Barren Island (Figures 2 and 3, respectively), both on the Eastern Shore of Maryland and in Dorchester County, MD. James Island is 16 miles north of Barren Island and is situated at the mouth of the Little Choptank River, 3,100' north of Taylors Island. James Island, once at least 1,350 acres in the 17th century, now amounts to 3 small remnants totaling approximately 100 acres (State of Maryland 1949, Kearney 1991). Presently, James Island is privately owned. Barren Island lies immediately west of Hoopers Island. Barren Island currently totals nearly 200 acres, but was recorded at 754 acres in 1848 (Wray 1995). Barren Island is federally owned and managed by the U.S. Fish and Wildlife Service (USFWS) as a satellite refuge area to Blackwater National Wildlife Refuge.

A. Alternatives Considered

Large island restoration addresses two problems plaguing Chesapeake Bay: 1) the rapid loss of island habitat over the past 200 years and 2) the need to accommodate large amounts of dredged material. Additional support for large island restoration stems from the recommendations of the Draft Baltimore Harbor and Channels DMMP and EIS.

Initially 105 islands were considered for restoration. The initial screening eliminated 84 islands, leaving 21 islands to be carried into the plan formulation process. These 21 islands were grouped into island complexes based on their vicinity and functioning as an island ecosystem. The resulting 8 island/island complexes were evaluated and ranked using 10 engineering criteria including potential restoration size, capacity, and foundation material. Public scoping meetings identified that there was public support for selecting the two highest ranking islands, Barren and James, for concept plan formulation.

A range of alternatives were developed for James and Barren Islands by the project delivery team (PDT). Four alignments for Barren and five alignments for James were delineated. For these alignments, a variety of wetland to upland ratios was considered ranging from all upland to all wetland configurations. A total of 20 different alignment combinations were considered that resulted in 170 alternatives.

The 170 alternatives were screened down to 14 alternatives using engineering suitability criteria and environmental considerations. Benefits and costs were developed for the 14 alternatives and a cost effective/incremental cost analysis was performed. The cost

effective alternatives were evaluated against the 11 objectives identified by the PDT. From this final, screening, the recommended plan was determined.

A more detailed description of the plan formulation and alternative analysis process including figures of all alignments considered will be available in the *Mid-Chesapeake Bay Islands Environmental Restoration Project Draft Feasibility Report and Environmental Impact Statement* that is scheduled for public review in the summer of 2005.

B. James Island

The James Island portion of the project involves constructing armored dikes, breakwaters, and/or other structures approximating the island's historical footprint and filling the enclosed area with clean dredged material from Federal navigation channels in Chesapeake Bay. The 2,072-acre fill area would be subdivided to provide approximately 55% tidal wetland habitats and 45% upland island habitats. The proposed alignment would provide capacity for 78 to 90 million cubic yards (Mcy) of dredged material consisting of relatively low cohesion silts and clays with some fine sands. Construction at James Island would necessitate the dredging of an access channel on the northwest. The access channel would be approximately 12,720' in length, and 400' in width at base with 3:1 side slopes. Of the total length, 3,070' would lie within the island footprint, with 9,650' extending outside the footprint. The total footprint of the access channel is roughly 153.5 ac, with 52.7 ac within and 100.8 ac outside the island footprint. The project limit is highlighted in Figure 2. The project limit identifies the project impact boundaries and provides for minor adjustments to the location of the proposed island alignment.

Approximately 40,000' of perimeter dikes would be constructed using sand hydraulically dredged from within the island footprint or from the access channel. The sediment to construct the proposed wetland and upland habitat area at James Island would be dredged from the following Federal navigation channels in the Chesapeake Bay leading to Baltimore Harbor: the Craighill Entrance Channel; the Craighill Channel; the Craighill Angle, the Craighill Upper Range; the Cutoff Angle; the Brewerton Channel Eastern Extension; the Tolchester Channel, the Swan Point Channel, Inland Waterway from Delaware River to Chesapeake Bay, and potentially other non-federal projects.

C. Barren Island

Plans for Barren Island incorporate the use of sills to protect the current acreage of the island and the SAV (submerged aquatic vegetation)/shallow water habitat off the eastern shore of Barren Island. Sills constructed along the current shoreline would be backfilled with dredged material to create wetland habitat. Phase I Barren restoration would involve the modification of 4900' of existing rock sill, construction of 3,840' of new rock sill on the north shore, 4,620' along the western and southern shore, and a back-up containment of 1,300'. Sills would be built to an elevation of 4' MLLW. Modification of the existing sill and construction of new sills would consume roughly 20 ac of shallow water habitat. Approximately, 23 and 49 ac of island habitat (72 ac total) would be created by backfilling on the north, and west and south, respectively. The material that would be used

to backfill behind the breakwaters at Barren Island would be from authorized maintenance of local Honga River channels and is characterized as silt and sand.

Also, as part of Phase I, monitoring would be carried out to evaluate the need for constructing breakwaters off the southern tip of Barren Island following the historic shoreline in order to protect the SAV habitat to the south and southeast of Barren Island. If it is determined that the SAV habitat to the south and southeast requires further protection, a maximum 8,200' of structure is proposed at a maximum height of 6' MLLW. If built to maximum length, the southern breakwater would have a 9.5 ac footprint. A total of 92 ac has been identified as the impact area at Barren Island through preliminary designs. However, with refinement during final designs, it is expected that no more than approximately 100 acres of near-shore habitat would be impacted by the total project at Barren Island. The project limit is identified in Figure 3.

III. PRESENCE OF FEDERALLY LISTED SPECIES IN THE PROJECT AREA

In a letter dated July 20, 2004, the NMFS identified the presence of the following federally listed species in the Mid-Chesapeake Bay region: shortnose sturgeon (*Acipenser brevirostrum*) and several species of sea turtles, leatherback (*Dermochelys coriacea*), loggerhead (*Caretta caretta*), Kemp's ridley (*Lepidochelys kempi*), and green (*Chelonia mydas*). In a letter dated December 1, 2004, USFWS noted the presence of the federally threatened bald eagle (*Haliaeetus leucocephalus)* at James and Barren Islands.

A. Project area description

In addition to on-going Chesapeake Bay monitoring efforts, surveys in the vicinity of James and Barren Island were performed as part of the feasibility study to identify existing conditions. Following is a characterization of resources that have the potential to affect the use of the project area by identified federally-listed species.

Water quality in the vicinity of James and Barren Islands has been monitored by Maryland Department of Natural Resources (MDNR) (MDNR 2005a) Water Quality Monitoring Program since 1985. The two stations closest to James Island are a mainstem station, CB4.3C, and a Little Choptank River station, EE2.2. CB4.3C is located to the north and west of James Island while EE2.2 is off the northeast corner. The mainstem station 5.1 is directly west of Barren Island. Table 1 presents water surface water temperature recorded at these stations for the period 1985 to 2003 (MDNR 2005a).

Mollusks are a potential food source of loggerheads, Kemp's ridleys and shortnose sturgeon. Clam surveys were completed at James and Barren Island in March 2004. At James Island, no hard shell clams were found. Harvesting rates of soft-shell (*Mya arenaria*) and razor (*Tagelus plebius*) clams were not sufficient to be considered productive natural clam bars, suggesting that mollusk populations are minimal in the vicinity of the islands (Harms 2005). Barren Island surveys identified few soft-shell clams and no hard shell clams. Although a minor amount of sub-legal razor clams were present, numbers were not high enough to qualify as a productive bar for razor clams (MES 2004).

SAV can provide a valuable foraging habitat for Kemp's ridleys and green turtles. Virginia Institute of Marine Science (VIMS) annual surveys from 1994 to 2003 were reviewed to understand the presence of SAV in the James and Barren Island vicinities.

Table 1: Surface Water Temperatures for monitoring stations in the vicinity of James (A) and Barren (B and C) Islands

(A) Surface Water Temperature (°F) Chesapeake Bay Mainstem / Cedar Point (CB5.1)			
Month	**Minimum**	**Mean**	**Maximum**
January	33.08	38.02	43.52
February	33.08	35.5	41.9
March	35.96	40.19	47.84
April	47.12	50.55	58.46
May	59	61.24	67.19
June	65.66	73.84	79.7
July	77.99	80.83	83.21
August	78.44	80.61	83.75
September	72.68	76.03	80.24
October	63.5	67.25	70.7
November	48.74	55.42	61.7
December	40.82	44.91	54.14

(B) Surface Water Temperature (°F) Choptank River / Little Choptank (EE2.2)				(C) Surface Water Temperature (°F) Chesapeake Bay Mainstem / Dares Beach (CB4.3C)			
Month	**Minimum**	**Mean**	**Maximum**	**Month**	**Minimum**	**Mean**	**Maximum**
January	31.28	35.94	42.44	January	32.36	37.41	42.26
February	31.1	35.04	41.72	February	32	34.74	41.36
March	35.24	41.32	47.48	March	35.6	39.34	45.5
April	47.66	54.42	60.26	April	46.94	50.11	54.86
May	59.18	61.56	66.83	May	58.46	60.51	65.93
June	71.06	73.31	78.26	June	64.76	71.82	77.09
July	76.46	81.06	83.57	July	76.64	79.47	81.5
August	74.66	79.97	83.48	August	76.28	79.5	81.5
September	63.86	73.48	77.99	September	71.78	74.53	79.88
October	53.24	61.71	67.1	October	62.78	65.77	69.26
November	44.96	51.19	59.72	November	48.92	53.89	60.8
December	37.76	42.39	52.16	December	38.3	44.04	53.06

SAV beds have made a resurgence since 1999 in the waters on the eastern side of Barren Island. An average of 695 ac of SAV beds was present between 1999 to 2003, peaking at 1,325 ac in 2001. Minimal beds of SAV were found prior to 1999. No SAV was documented by the VIMS maps off the western or northern shoreline of Barren where the project would be constructed. James Island had very little SAV compared with Barren

Island. Two small beds periodically occur along the eastern shore of the James Island remnants, averaging 10 ac between 1999 and 2003. SAV beds at James Island peaked in 2001 at 22.6 ac.

Additional SAV surveys were conducted as part of the existing conditions evaluation at James and Barren Island (MES 2004, BBL 2004). Widgeon grass (*Ruppia martina*) was the dominant SAV recorded during the summer 2002 survey. Three separate beds were recorded along the eastern shoreline of each of the James Island remnants. All SAV found by spring 2003 monitoring was identified as horned pondweed (*Zannichellia palustris*). SAV beds were most dense along the middle remnant. SAV beds along the southern remnant were patchy at best. Weather conditions did not permit sampling at the northern remnant. SAV surveys conducted in the supplemental survey, August 2003, failed to produce any SAV except for a single blade of horned pondweed. No SAV was documented within the footprint of the proposed James Island alignment or impact area. Barren Island SAV investigations were made during summer 2002 and spring and summer 2003 (BBL 2004). Aquatic species observed at Barren Island include eelgrass (*Zostera marina*), horned pondweed, and widgeon grass. The presence of SAV appears to be dependent on the location around the island. SAV crown densities were highest along the eastern shoreline of Barren Island. SAV was also present along the northern shoreline and southeastern island tip. SAV was not identified along the western shoreline. The likely reasons for the absence of SAV along the western shorelines are the steep slopes of the shoreline, lower water clarity, and a higher exposure to wave action. The more extensive VIMS monitoring showed no SAV within the proposed Barren Island project area. However, the existing conditions evaluation identified low density SAV beds along the northern and southern proposed project areas. Additional monitoring would be completed during the Design Phase of the project to minimize any impacts to SAV beds.

The Chesapeake Bay Program has defined Tier I, II, and III SAV recovery zones. The Tier I SAV distribution restoration target is the restoration of SAV to areas currently or previously inhabited by SAV as mapped through regional and baywide aerial surveys from 1971 through 1990 (Batuik *et al.* 1992; Dennison *et al.* 1993). The Tier II and Tier III distribution restoration targets are the restoration of SAV to all shallow water areas identified as existing or potential SAV habitat, down to the 1- and 2-meter (3.3 and 6.6 foot) depth contours, respectively. There is no Tier 1 area in the vicinity of James Island. Tier I areas have been delineated to the northeast, east, and southeast of Barren Island. Tier II and Tier III zones surround both islands. It is estimated that 298.8 ac of bottom less than 2 m in depth exist within the project footprint at James Island. All of the Barren project area, approximately 100 ac, is less than 2 m in depth.

B. Shortnose sturgeon (*Acipenser brevirostrum*)

SNS have been documented in the Chesapeake Bay since the 1600s, when settlers first colonized America. Historical records indicate that SNS were commonly found to inhabit the Potomac River in Maryland in the 1800s (Uhler and Lugger 1876). Few SNS have been reported in the Chesapeake Bay since the last known resident populations were

considered extirpated in the 1970s (Dadswell et al. 1984). There is, however, a documented resident population in the Delaware River (Hastings et al. 1987).

When SNS were found in the bay over the last 20 years, it was generally believed that they were infrequent transients, non-resident adults that had traveled through the Inland Waterway, or C&D Canal, from the Delaware Bay into the Chesapeake Bay. Suitable and/or critical habitat for SNS in the Chesapeake Bay is currently unknown, due to their infrequent detection in the Bay. Spawning occurs in upper, freshwater areas, while feeding and overwintering activities may occur in both fresh and saltwater habitats. Spawning habitat has not been identified in the Chesapeake Bay. Prior to 1998, no juveniles or spawning activity had been observed in the Chesapeake Bay for decades, leading to the assumption that a distinct population segment, or resident population, did not exist in the Chesapeake Bay. Speculation has been that overfishing, loss of habitat, and spawning impediments such as the Conowingo Dam have contributed to their decline or extirpation. At present, the continued existence of SNS in the Chesapeake Bay remains uncertain. However, genetic assessments of the SNS in the Chesapeake Bay have indicated that those specimens analyzed are genetically similar to the Delaware River population that is currently stable (Wirgin et al., 2002).

SNS usually occur in the Chesapeake Bay at depths between 3.3 and 39.4 ft (1 and 12 m) (Kieffer and Kynard 1993, Savoy and Shake 2000, Welsh et al. 2000) although captures have been made at depths up to 60 ft. Due to the stress caused by high temperatures of summer surface waters SNS seek deep, cooler waters during warm seasons.

NMFS has been reviewing SNS catches in the Chesapeake Bay as a result of the USFWS Reward Program that was initiated in 1996. This program has resulted in the reporting and documentation of SNS as incidental bycatch in gillnets, pound nets, catfish traps, fyke nets, hoop nets, and eel traps of watermen in the Chesapeake Bay. The Reward Program has documented 61 SNS caught (of which 55 are non-multiple captures) as of January 13, 2005. SNS caught in the mid-Bay region below the Bay Bridge are depicted by catch method in Figure 4.

Nine SNS were captured in the Susquehanna River and two from the Susquehanna Flats. SNS have been captured in upper Bay tributaries: two in the Bohemia River, one in the Sassafras River, and one in the Elk River. Thirty SNS captures were made north of the Bay Bridge, of which all, but three were north of Hart-Miller Island. The remaining 16 shortnose sturgeon were captured south of the Bay Bridge in the vicinity of Kent Island, Holland Point (near Herring Bay), north of Barren Island, Fishing Bay (near the Nanticoke River), and the Potomac River (7). It is important to note that all but one SNS captures south of the Bay Bridge (latitude 39˚00’00’’) occurred in March, April, May, or June (spring and early summer). SNS prefer lower salinity waters. The spring/early summer presence of SNS below the Bay Bridge may be associated with the southern extension of lower salinity waters in the Bay from spring freshwater discharge. The one exception was a December 2004 capture at the mouth of the Potomac River in Ophelia, VA.

Length data from the Reward Program captures indicates that the largest SNS were generally captured in the middle Chesapeake Bay around the Potomac River mouth through the Barren Island area. 'Possible juveniles' have all been captured in the upper Chesapeake Bay.

The majority of the SNS found in the Chesapeake Bay through the USFWS Reward Program have been captured in relatively shallow water [<25 ft (<7.6 m)], consistent with the gear type of the commercial watermen (primarily gillnets and pound nets). This is also consistent with some studies which have found that sturgeon tend to stay in the top 6.6 ft (2 m) of the water column when traveling, and come into shallow waters to feed (Moser and Ross 1993). While it is probable that the gear type in which the SNS were captured influences both the location and depth of the recorded capture locations in the USFWS Reward Program data, it can be deduced from this information that sturgeon are using waters of 4 to 60 ft (1.2 to 18.3 m) in at least the months of December through June each year. SNS are known to overwinter in deep, channel sections of rivers (NMFS 1999). Thus, it is probable that the Howell to Grove Point section of the upper Chesapeake Bay provides overwintering habitat for SNS due to the water depth. The extent to which SNS use the shipping channel in this region is unknown. Four of the SNS were captured in the general vicinity of the southern approach channels to the C&D Canal and one was captured near the Tolchester Channel. However, many more have been captured in shallower waters.

No SNS were captured in the waters immediately surrounding James or Barren Island in the Reward Program as of January 13, 2005. Although, the waters around James and Barren are actively fished, the nearest SNS catch was approximately 8 nautical miles to the northwest of Barren Island and to the south of James Island where three SNS were captured by way of pound nets (Figure 4). Seasonal fisheries surveys were conducted in 2002 and 2003 at James and Barren Island to characterize existing finfish communities surrounding the islands for the Mid-Chesapeake Bay Feasibility Study. Several fisheries gear types were used during the various fisheries surveys: bottom trawl, popnet, gillnet, and beach seine. There were no SNS identified in any of the surveys at James or Barren Island. SNS are probably transient to the area.

C. Sea turtles

Of the four sea turtle species found in Chesapeake Bay, loggerheads and Kemp's ridleys are the most common visitors and are most likely to be found in the project area. Leatherbacks typically continue north on their migration past the Chesapeake Bay, while loggerheads and Kemp's ridleys will enter the Bay once water temperatures reach 18 to 20˚C (64.4 to 68˚F) (Lutcavage and Muscik 1985, Byles 1988, CBP 2005). Loggerheads and Kemp's ridleys immigrate into Chesapeake Bay in late May or early June once water temperatures warm and emigrate in September and October (Lutcavage and Musick 1985, Byles 1988, Keinath et al. 1994) (See Table 1). Loggerheads account for nearly 90% of the summer sea turtle population in the Chesapeake Bay (CBP 2005). The greatest threats to sea turtles in the Chesapeake Bay are injury and death from boat propellers, accidental capture in pound nets, and ingestion of plastic refuse.

Sea turtles generally nest on high energy sand beaches along the eastern seaboard, south of the State of Maryland. No nesting is known to occur within the Chesapeake Bay (Evans et al. 1997).

The Chesapeake Bay is an important developmental and foraging habitat for sea turtles in the summer months. After overwintering in southern waters, sea turtles migrate north along the Atlantic coast to feed during the summer months. Loggerheads feed mostly on shellfish such as horseshoe crabs, clams, mussels, and other invertebrates. Kemp's ridleys prefer horseshoe crabs, but will consume other crustaceans, sea grasses, sponges, fish, mollusks, and snails. Loggerheads typically use channel edges (mean water depth of 9.4 m) whereas ridleys occupy shallower areas (mean water depth of 4.6 m) (Byles 1988). Kemp's ridleys distribution may be closely related to the location of seagrass beds where they can find a plentiful supply of crustaceans (Lutcavage and Musick 1985). Leatherbacks have been reported in the upper Bay (Hardy 1969 cited by Byles 1988*)* but are most frequently found at the Bay mouth. Leatherbacks are most likely drawn to the mouth to feed on jellyfish; the main constituent of their diet (Keinath et al. 1987). Young green turtles feed on worms, young crustaceans, aquatic insects, grasses and algae, but become strictly herbivorous as adults. Green turtles were historically recorded in the Chesapeake, but are now rarely found (Keinath et al. 1987).

There are two sources of information on the current presence of sea turtles in Maryland waters of the Chesapeake Bay: the Marine Mammal and Sea Turtle Stranding Program, 1990 through present, and the Sea Turtle Tagging and Health Assessment Study, operated from 2001 through 2003.

The Marine Mammal and Sea Turtle Stranding Program was established by the Maryland Department of Natural Resources (MDNR) at the Cooperative Oxford Laboratory (COL) in the fall of 1990. The network is responsible for the retrieval and examination of all dead stranded marine mammals and sea turtles in Maryland. The stranding network collects species identification, stranding location, and life history (morphometric) data in addition to investigating causes of death, and assessing human interaction from boat strikes, fisheries interactions, and entanglement or ingestion of marine debris.

308 dead stranded sea turtles were reported in Maryland (Chesapeake Bay and Atlantic Coast) between 1991 and 2003 (Kimmel 2004). Of the 308 reported, 123 were found in the Chesapeake Bay (Figure 5). The remaining 185 were reported from the Maryland portion of the Atlantic Coast and the coastal bays. Strandings of all four federally listed species have been reported in Maryland. Strandings have occurred throughout the Chesapeake Bay from Tangier Sound to the mouth of Back River (Figure 5), but strandings were most heavily concentrated in Calvert and Saint Mary's counties along the western shore. Table 2 contains the Chesapeake Bay strandings by year and species. Focusing only on the Chesapeake Bay strandings, loggerhead accounted for 91% of all stranding (n=112 turtles). Of the remaining strandings, 6% were leatherback (n=6), 3% were Kemp's ridley (n=3), and less than 1% (n=1) were unknown. No green sea turtles have been reported in Chesapeake Bay (Kimmel 2004), although one was found along the

Table 2: Sea Turtle Strandings in Chesapeake Bay, 1991-2003 (reproduced from Kimmel, 2004)

Species	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	TOTAL
Loggerhead	4	5	12	6	17	14	7	19	3	8	7	5	5	**112**
Leatherback	-	1	-	-	3	-	1	-	-	1	-	-	1	**7**
Kemp's ridley	1	-	-	-	-	-	-	-	-	1	-	-	1	**3**
Green	-	-	-	-	-	-	-	-	-	-	-	-	-	**0**
Unknown	-	-	-	-	-	-	-	-	-	-	1	-	-	**1**
TOTAL	5	6	12	6	20	14	8	19	3	10	8	5	7	**123**

Maryland Atlantic Coast in 2000. Monthly strandings data characterizes sea turtle use of the Chesapeake Bay during warm months. Sea turtle strandings occurred from May to November with a small number (2) being recorded in January (Table 3). The highest concentration of strandings was in June (81), followed by July.

Table 3: Monthly distribution of sea turtle strandings by species in Maryland's Chesapeake Bay. (Kimmel, pers. comm.)

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Leatherback	0	0	0	0	0	3	2	0	1	0	0	0
Kemp's ridley	1	0	0	0	1	3	0	0	0	0	0	0
Loggerhead	1	0	0	0	5	74	14	7	6	6	2	0
Green	0	0	0	0	0	0	0	0	0	0	0	0
unknown	0	0	0	0	0	1	1	0	0	0	0	0
TOTAL	**2**	**0**	**0**	**0**	**6**	**81**	**17**	**7**	**7**	**6**	**2**	**0**

A second source of knowledge about sea turtle presence in Chesapeake Bay is available from the "Sea Turtle Health Assessment and Tagging Study" initiated in September 2000 by MDNR's COL. This study established a cooperative agreement with pound net fishermen in Maryland to obtain information such as weight, size, and blood samples from incidentally captured sea turtles. Two commercial watermen participated in 2001 and reported 7 turtles. Three commercial watermen participated in 2002, resulting in a report of 12 turtles. In 2003, participation increased to five pound netters and the reporting of 23 incidentally captured sea turtles. Figure 6 identifies the location of participating pound nets from 2001 through 2003. Table 4 summarizes the location and identification of the 23 sea turtles captured in 2003.

Incidental takes occurred between May and September in 2001, 2002, and 2003 with the greatest number of captures occurring in June and July. Captures were concentrated northwest of Hooper's Island and near the mouth of Fishing Bay due to a higher reporting of incidental captures by watermen in those areas. Although, the spatial distribution of turtle captures can not conclusively characterize sea turtle use in Chesapeake Bay, it does identify areas definitively used by sea turtles.

This study has examined a total of 42 sea turtles since the summer of 2001, of which 3 were recaptures. As reported by Kimmel (2004), seventeen of the remaining 39 turtles were Kemp's ridleys and 22 were loggerheads. Kemp's ridleys were typically 30 to 40 cm subadults.

Table 4: Distribution of incidental captures of sea turtles among 2003 net sites. Numbers in parentheses indicate recaptures. (reproduced from Kimmel, 2004)

Net Site	# of nets	Loggerhead	Kemp's ridley	Total
NW of Hoopers Island	3	8 (1)	5 (1)	13
Pocomoke Sound	1	2		2
Fishing Bay	1		1	1
Choptank River	1	1	1	2
Kent Island	2	2 (1)		2
Totals	**8**	**13 (2)**	**7 (1)**	**20 (3)**

Recaptured individuals provide insight on the use of Chesapeake Bay waters by sea turtles and demonstrate the diversity of sea turtle movements. A Maryland loggerhead sea turtle captured in a pound net near Kent Island in July 2001 was recaptured in the same pound net on September 15, 2003 indicating site fidelity by a subadult loggerhead over multiple, although not necessarily consecutive years (Kimmel 2004). A Kemp's ridley tagged in the mouth of the Choptank River on June 21, 2003 was recaptured a week later about 10 miles from the initial capture location in a pound net northwest of Hoopers Island. A loggerhead found in one of the three pound nets northwest of Hoopers Island was recaptured in a different net in the same general location several days after the original capture. These two recaptures suggest restricted turtle movements within the Bay during the summer (Kimmel 2004). Conversely, two captures in waters outside the Chesapeake Bay demonstrate migrations of greater distance. A loggerhead, was tagged on May 23, 2002 and recaptured in a pound net in Virginia waters of the Potomac River on August 15, 2002. A fifth turtle, a loggerhead, incidentally captured near Hoopers Island in 2001, had originally been tagged on July 23, 1992, on Melbourne Beach, Brevard County, Florida, a distance of roughly 1500 km, by the University of Central Florida (Kimmel 2004).

D. Bald eagle

Bald eagle numbers dropped from a historic national estimate of 25,000 to 75,000 nesting birds to fewer than 450 nesting pairs by the early 1960s. U.S. population decline was due to habitat destruction and degradation, illegal shooting, contamination of its food source and reproductive impairment from pesticides (notably DDT) and heavy metals. Bald eagles have made a dramatic comeback over the past three decades following the ban on the use of DDT and other organochlorine pesticides by the U.S. Environmental Protection Agency in 1972. Nationwide, there are now more than 6,000 adult bald eagle nesting pairs in the continental U.S. More than 2,000 bald eagles call the Chesapeake Bay area their home. The bald eagle has been recently delisted to threatened and will require five years of monitoring before it can be completely delisted. Once this occurs, protections will continue under the Bald and Golden Eagle Protection Act, the Migratory Bird Treaty Act, and the Lacey Act.

Bald eagles can be found in Maryland year round, primarily along the Chesapeake Bay and its tributaries with numbers increasing in colder months when bald eagles from Canada and northeastern United States overwinter in Maryland. Migratory populations are concentrated at Blackwater National Wildlife Refuge, Aberdeen Proving Ground, and

the Susquehanna River below the Conowingo Dam. Bald eagles build platform nests in the upper limbs of tall trees, preferably within one mile of open water, along a shoreline or marsh. Nesting in Maryland is limited to tidal portions of state waters and along the Potomac River. MDNR monitors bald eagle populations in Maryland through the Maryland Mid-Winter Bald Eagle Survey (since 1979), the Maryland Bald Eagle Nest Success and Productivity Survey (since 1977), and the Maryland Bald Eagle Nesting Pair Survey (MDNR, 2005b). Currently, there are 383 nesting pairs spread across 20 counties compared to 41 regional pairs in 1977 (MDNR, 2005b). Dorchester County has the greatest number of nesting pairs, 84; followed by Charles County with 53 nesting pairs, mainly along the Potomac River. In 2001, 315 nesting pairs produced 432 young (MDNR, 2005b; most recent data available). Bald eagles primarily eat fish, but their diet may also include waterfowl, mammals, muskrats, and turtles, both live and carrion, when fish are scarce.

Responding to a USACE request for information on federally listed or proposed for listing species within the Mid-Chesapeake Islands project area, USFWS listed a nest at both Barren (DO-82-04) and James (DO-99-11) Island in a letter dated December 1, 2004. First noted in 1982, DO-82-04 was located at the southern end of Barren Island. Further consultation with Glenn Therres (phone conversations, March 3, 2005 and April 5, 2005) of the MDNR National Heritage Program identified the recent loss of the Barren Island nest. As recently as the late 1990s James Island was home to two nests, DO-99-11 and DO-02-02 (Therres, personal communication). Only one nest, DO-02-02, remains on the northeastern tip of the middle remnant. DO-99-11, situated on the northern island remnant, was blown down in 2003. Figures 7 shows the location of the only existing James Island nest, DO-02-02.

Time of year restrictions established by MDNR and USFWS for PIERP delineated three zones of activity limitation. Zone 1 extends 330 feet from the nest. There are year-round restrictions within Zone 1 that include any habitat changes, land clearing, building, and road construction. No human activities are permitted in Zone 1 between December 15 and June 15. Limited activity is permitted between June 16 and December 14. Zone 2 extends 660 feet from a nest. Restrictions include major habitat changes such as clear cutting, land clearing, building, and road construction. No human activities are permitted between December 15 and June 15, but exceptions may be made if research finds that the nesting eagles are tolerant of the activity. Activities such as hunting, fishing, hiking, and farming are possible between June 16 and December 14. Zone 3 extends ¼ mile around the nest. Most activities are possible, but management should include protection of roosts and feeding sites within the area. There are restrictions on timber cutting, land clearing, building, and road and trail construction between December 15 and June 15 (USACE, 1996).

IV. IMPACTS TO FEDERALLY LISTED SPECIES IN PROJECT AREA

A. Shortnose sturgeon

1. Impacts to individuals

Any SNS that may be in the area during construction would be displaced. Adult, juvenile, larval, and young-of-the-year sturgeon feed primarily on zoobenthos and appear to remain close to the substrate providing the potential for entrainment. Although the risk of entrainment of SNS that might be in the construction area during construction and hydraulic dredging for dike creation exists, this is a minor risk as no SNS have been reported in the project area. Further, construction of the sand dikes for the 1,100 acre Poplar Island Environmental Restoration Project (PIERP) to the north of James and Barren Islands did not encounter or impact any SNS.

SNS use Chesapeake Bay waters of 4 to 60 ft depth primarily between December and June. No SNS were captured in the waters immediately surrounding James or Barren Island in the Reward Program as of January 13, 2005. Although, the waters around James and Barren are actively fished, the nearest SNS catch was approximately 8 nautical miles to the northwest of Barren Island and to the south of James Island where three SNS were captured by way of pound nets. There were no SNS identified in any of the surveys at James or Barren Island. The sparse collections of SNS in this area of the Bay indicate that SNS are likely to be transient to the area. Therefore, no impacts are expected directly to individuals from this project.

2. Impacts to habitat

Restoration of James Island would result in the permanent transformation of 2,072 ac of open water habitat to island habitat. Restoration measures at Barren Island would transform eroding shoreline into 72 ac of wetland habitat. Additionally, restoration structures at Barren, including sills and breakwaters, would consume a maximum of 20 ac of bottom (12.5 ac of sill in Phase I plus, if determined necessary, 9.5 ac of breakwaters in Phase II). Of the total project area, 298.8 and 100 ac at James and Barren, respectively, are less than 2 meters in depth. Additionally, 100.8 acres of shallow water habitat would be deepened to 25' at James Island to establish the access channel on the northwest of the restored island.

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SNS have separate foraging, overwintering, spawning, and larval/juvenile habitat. The loss of open water habitat is not expected to have a significant impact on the various habitats used by shortnose sturgeon populations. Consistent with nearby East Coast populations, feeding habitat would be most important during April to October. Productive reaches of the upper Chesapeake Bay (e.g. near the saltwater/freshwater interface and channel areas bordering mud flats or emergent macrophyte bed) are potential feeding areas (NMFS, 1999). Based on foraging patterns exhibited by SNS in other northeast river systems, SNS in this system are likely to be widely dispersed and actively feeding during the summer. Feeding is generally thought to be most important

when water temperatures range from 45 to 82˚F (7 and 28˚C). This temperature range occurs from April to August in waters surrounding James and Barren Island (Table 1). Maximum water depths within the proposed James Island footprint are 13.2' with a mean of 8.5'. The maximum depth within the access channel footprint is 26.5' with a mean of 14.8'. The area surrounding James and Barren Islands may serve as foraging habitat, but similar habitat is available in the adjacent vicinity. Fisheries studies in the vicinity of the James and Barren have not collected any species that would be indicative of unique habitats relative to those available within the middle reach of the Chesapeake Bay. Therefore, the project area is not likely to be unique or critical habitat for SNS (or other fish species).

Spawning, overwintering, and larval/juvenile habitat are not expected to be impacted. SNS spawning and early life history typically takes place in the freshwater reaches of fast-flowing river systems. No SNS spawning habitat has been identified in the Chesapeake Bay. Additionally, salinities near the project area are not within the range typical of spawning habitat: approximately 9 to 18.7 ppt at Barren Island, and 9.8 to 19.5 ppt at James Island. Most mainstem areas north of the Bay Bridge are considered potential overwintering habitat and as such, the James and Barren Island region is not expected to be overwintering habitat for SNS. Habitat important to the larval and juvenile stages of SNS would be found above the saltwater/freshwater interface, on gravel/sand/mud substrate, and deeper channel areas [32.8' to 65.6' (10 to 20 m) deep] in freshwater rivers (Pottle and Dadswell 1979).

Water quality impacts due to construction are expected to be short-term and minor. During perimeter dike construction at James, the toe dike would be constructed first to minimize turbidity plumes resulting from dredging associated with the sand borrow activities and placement of sand to construct the dikes. Dredged material transported to the James Island site would be contained within the armored dikes. Discharges through the spillways would be monitored, and must meet State water quality standards. It is expected that a State of Maryland water quality certification and a wetlands license would be obtained. Turbidity and total suspended solids (TSS) limits would be prescribed in these documents. Dredged material transported to the Barren Island site would be contained behind sills. To address the potential for toxic metal production materials placed at the James and Barren Island, project sites would be managed and conditioned periodically if necessary to maintain the pH near neutral. Where determined necessary, time of year restrictions, best management practices (BMPs), turbidity curtains, and silt fences would be used to minimize impacts. An extensive monitoring plan, such as the one used at PIERP, would be established.

3. Impacts to prey

Juvenile SNS feed mostly on benthic crustaceans and insect larvae, while adults feed largely on mollusks, polychaetes, and small benthic fish (Gilbert 1989). Up to 2,072 ac of open water habitat at James Island and approximately 100 ac of shoreline habitat at Barren Island that supports SNS prey would be lost to accommodate the proposed project. Prey individuals would be destroyed or displaced as a result of project expansion and borrow actions in both locations. The reduction of benthic communities as a result of island expansion would reduce biomass available for consumption by SNS that may use

these areas as feeding grounds. However, SNS prey occur over a broad area of the Bay. And although the project will cause loss of open water and benthic habitat for SNS prey species, population levels of prey species are expected to remain regionally healthy because of the ready availability of these lost habitats elsewhere in the mid-Chesapeake Bay region. Further, development of open water habitat regionally in association with erosion and rising sea level would be expected to contribute habitat that supports benthic biomass in the Bay. Creation of salt marsh at James and Barren plus expected protection of SAV at Barren will support a wide variety of SNS forage species and partially compensate for the loss of open water habitat and disturbance to bottom habitats. The James Island access channel will likely recover a benthic community comparable to pre-project conditions within several years following cessation of dredging, as is typical of benthos occurring on sands and fine mobile estuarine deposits (Newell et al. 1998). However, access channel depths below the pycnocline following dredging have the potential to lose their benthic macroinvertebrate communities in the future if hypoxic or anoxic conditions occur for prolonged periods of time.

4. Cumulative impacts

Other dredging and placement actions occur in the immediate vicinity of the project area. Periodic maintenance dredging is conducted in small navigation channels including: Knapps Narrows, the Honga River, and the Chester River. Maintenance dredging of the federal channels in these locations would result in displacement of SNS and forage resources immediately after dredging. Knapps Narrows was last dredged 4 to 5 years ago, and it is expected that maintenance dredging will occur in either 2005 or 2006. The Chester River has been maintained within the past 3 years and would not require dredging for several years. The Honga River dredging and channel realignment was conducted and completed earlier in 2004. However, Honga River channels will require periodic future dredging that will provide material for the proposed wetland creation at Barren Island. These dredging projects will cause temporary bottom disturbance and loss of benthos that could serve as forage for SNS. The magnitude of the impacts of these dredging projects will depend on the speed of benthic recolonization of the area and the frequency of maintenance dredging. There is also periodic maintenance dredging and placement activities associated with other portions of the Baltimore Harbor and Channels federal project in the Patapsco River, the Swan Point Channel, Tolchester Channel, and the approach channels to the Chesapeake & Delaware Canal. Activities north of the Bay Bridge should have the potential to have a larger impact on the species because SNS are more common in northern regions.

The State of Maryland and Baltimore District are currently evaluating expansion of PIERP. PIERP is restoring 1,100 acres of open water to island habitat, half uplands and half tidal wetlands. If Poplar Island Expansion moves forward, up to 600 acres of additional open water may be converted to uplands/wetlands within 16 to 26 nautical miles of James and Barren Islands. The expansion also proposes dredging sand for dike construction from an open water area west/southwest of the current project, potentially impacting between 49 and 230 acres.

B. Sea turtles

1. Impacts to individuals

A hydraulic dredge would be used to mine the sand needed for dike construction at James Island. There is potential for entrainment of sea turtles that might be in the construction area during use of hydraulic dredges for dike creation, specifically Kemp's ridleys and loggerheads that feed on mollusks and crustaceans. Entrainment risk during construction is the same type of risk that exists during hydraulic dredging. Construction of the sand dikes for the 1,100 acre PIERP did not encounter or impact any sea turtles. Additionally, no dredging activities in Maryland Chesapeake Bay waters have resulted in a sea turtle incidental take. Sea turtles are more prevalent in Virginia portions of the Chesapeake Bay. Fifty-five sea turtle incidental takes, mostly loggerheads, have been reported in Virginia waters since 1994. (The period of record is 1980 to the present.) Incidental takes in Virginia occurred between April and November.

Although direct monitoring was not performed, there were no sea turtles identified in any of the finfish surveys or wildlife monitoring at James or Barren Island (MES 2004, BBL 2004). Sea turtles are migratory individuals that are seasonal transients to the project area and no impacts are expected directly to individuals. During cooler weather months, particularly, no direct physical impacts to individuals are expected because sea turtles are unlikely to be present.

2. Impacts to habitat

No nesting is known to occur within the Maryland portions of Chesapeake Bay (Evans et al. 1997). The Chesapeake Bay is used only as developmental and foraging habitat by sea turtles in the summer months. Open water habitat at James and Barren Islands that is to be transformed into island habitat would be permanently loss to sea turtles. However, because of the great abundance of this habitat type in the Bay, no detrimental impacts to sea turtle populations are expected. Although dredging activities for the northwest access channel at James Island would disturb bottom, open water habitat would remain, thus no long-term impacts to sea turtle habitat are expected. It is anticipated that the project would have a positive benefit on sea turtle foraging habitat by providing protection to the abundant SAV beds to the east of Barren.

Measures discussed to minimize construction impacts to SNS habitat apply for sea turtles also.

3. Impacts to prey

Impacts to sea turtle prey are similar to those SNS prey would experience although sea turtles typically prey on larger prey items than SNS. Overall, prey would be displaced, but no significant negative impact is expected to regional populations. These areas are not expected to be particularly abundant with respect to mollusk resources. Clam surveys identified minimal or no hard shell clam, soft-shell clam, and razor clam population in the

waters surrounding James and Barren Islands. Sea turtles may be drawn to the abundant SAV beds to the east of Barren Island to forage. Proposed restoration measures at Barren would protect these beds and thus provide habitat for many sea turtle prey species. The likely loss of SAV beds without the proposed restoration measures would negatively impact sea turtle prey habitat.

4. Cumulative impacts

Cumulative effects from other projects discussed in the section on shortnose sturgeon impacts should not be significant relative to sea turtles because sea turtles are mobile, seasonal transients, and have opportunistic feeding habits. Their seasonally limited presence in Maryland Chesapeake Bay waters minimizes sea turtle exposure to proposed project activities.

D. Bald eagles

1. Impacts to individuals

With appropriate management efforts, negative impacts to individual bald eagles are not expected. There are no eagle nests at Barren Island. A portion of the proposed project at James Island for restoration and dredged material placement would be located approximately 940 ft (500 yd) west of the remaining island remnants and nest DO-02-02. The nest at James is outside the limits for Zone 1 (330 ft) and 2 (660 ft) restrictions, but within Zone 3 (1329 ft) (See Figure 7). Management would need to include protection of roosts and feeding sites. There may be construction restrictions between December 15 and June 15.

2. Impacts to habitat

With compliance to Zone 3 restrictions, no impact to current nesting habitat is expected at James Island. No nesting habitat currently exists at Barren Island. It is anticipated that the project would increase bald eagle habitat on James and Barren Islands. Activities at Barren and James would stabilize the island by preventing further shoreline erosion and loss of mature trees bald eagles favor for nesting. Long-term impacts of construction at James Island would be creation of new nesting habitat. The footprint of James Island restoration cells (2,072 ac) and Barren (approximately 100 ac = maximum impact if all phases are constructed) would be permanently loss as aquatic foraging habitat. However, there is an abundance of similar habitat in the region. Construction activities may temporarily impact foraging activity in the vicinity of James and Barren Islands. However, this disruption is expected to be minor and temporary. It is anticipated that over the long-term, the restoration of James and Barren Islands will enhance foraging habitat and prey species.

3. Impacts to prey

Fish species that bald eagles prey on would permanently lose 2,072 ac of shallow water habitat at James Island and approximately 100 ac at Barren Island. However, this habitat is regionally abundant. Additionally, 1,043 ac of wetland habitat at James Island and 72 ac at Barren Island would be created, and abundant SAV beds protected that would provide nursery habitat for many prey species. Other prey species including mammals and waterfowl are expected to benefit from the creation of island habitat at James and Barren Islands. No long-term significant impact is expected to bald eagle prey species.

4. Cumulative impacts

The regional dredging activities discussed in the shortnose sturgeon cumulative impacts section should have no impacts on bald eagles. PIERP and its potential expansion (Poplar Island Expansion Study- PIES) would provide potential nesting habitats as well as hunting acreage for bald eagles. Wetland creation and SAV protection associated with the two projects is expected to benefit prey species. Dredging for borrow sand to construct dikes at PIES is not expected to impact bald eagles or their habitat. PIES would result in a loss of approximately 600 ac of shallow water that serves as open water foraging habitat.

IV. FEDERAL AGENCY'S OPINION ON PROJECT IMPACTS TO ESA

In summary:

1. Shortnose sturgeon, and Kemp's ridleys, loggerhead, green and leatherback sea turtles are known to occur near the project area, but have not been shown to utilize the open water immediately around James and Barren Islands. Kemp's ridleys and loggerheads are the two species most frequently identified in Maryland Chesapeake Bay waters. The proposed project would convert up to 2,072 acres of open water habitat at James Island (including 298.9 acres maximum of shallow water habitat less than 2 m) and no more than approximately 100 acres of open water habitat at Barren Island (entire project acre is less than 2 m) to island habitat, resulting in a net loss of potential habitat for shortnose sturgeon and sea turtles. Up to an additional 100.8 acres of bottom will be disturbed in the dredging of the proposed James Island access channel.

2. There is the potential for sea turtles and shortnose sturgeon to be in the project area and be directly impacted by construction operations because these species have been identified in similar habitats in the region. However, the potential for direct impacts are anticipated to be minimal due to the fact that no SNS or sea turtles have been recorded in the project area by recent monitoring efforts and they are likely to only be transient to the project area. Additionally, both SNS and sea turtle regional presence is greatest in the spring and summer and much reduced in winter months.

3. Fisheries investigations in the vicinity of James and Barren Islands have not identified rare or unique aquatic habitats or critical habitat for SNS or sea turtles. Conversely, the

open waters of the project area that would be impacted by the proposed action are regionally abundant within the middle reaches of the Chesapeake Bay.

4. There is a potential for bald eagles to be in the project area. A nest at James Island is within approximately 940' of the project. No nests currently exist at Barren Island. Construction at James Island may temporally interrupt foraging in the project area. Zone 3 time of year restrictions would be followed to minimize the potential for impacts during nesting season. Restoration of James Island and Barren Island is anticipated to provide additional nesting habitat and positive, long-term benefits. No negative, long-term impacts are expected to bald eagles, their habitat, or prey.

5. The marshes created as part of island creation at James and Barren Islands will support a wide variety of forage species for sea turtles and SNS. The creation of this habitat is expected to compensate somewhat for loss of open water and benthic habitats.

6. By benefiting SAV beds, restoration actions at Barren Island are expected to enhance sea turtle foraging habitat and preserve habitat used by prey species of SNS, sea turtles, and bald eagles.

7. Discharges from the new placement cells would be subject to compliance with state water quality standards, resulting in only short term, minor perturbation to water quality.

8. Although other federal, state and private sponsored projects occur in the project vicinity that cause the disturbance of bottom habitat, these projects are periodic and should not substantially affect SNS, sea turtles, bald eagles, and their respective habitat. Proposed large-scale island restoration projects would cause a loss of bottom and open water habitat for these species, however, regionally this habitat is abundant. Therefore, no substantial cumulative impacts to habitat or populations of these species are expected to result from this project.

In conclusion, the Baltimore District, after reviewing relevant fisheries and wildlife information and analyzing potential project impacts, has determined that the proposed action is not likely to adversely affect shortnose sturgeon, sea turtles, bald eagles, their habitat, or prey in the project area.

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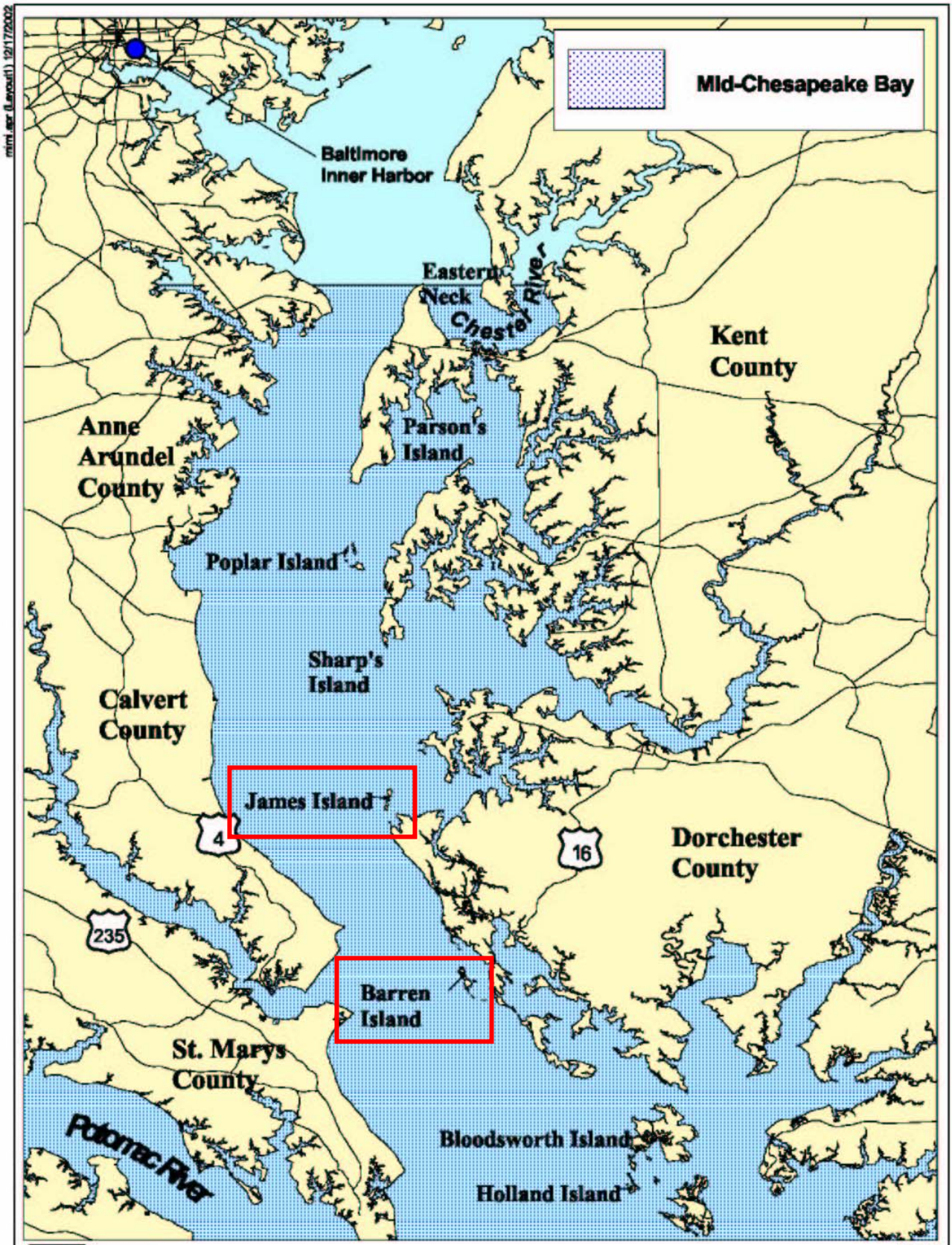
Virginia Department of Game and Inland Fisheries. 2005b. Virginia Wildlife Information. Loggerhead Sea Turtle (*Caretta caretta*). *www.dgif.state.va.us/wildlife/species/display.asp?id=030075*



US Army Corps of Engineers
Baltimore District

Figure 1: Mid-Chesapeake Bay Island Restoration Feasibility Study Project Area

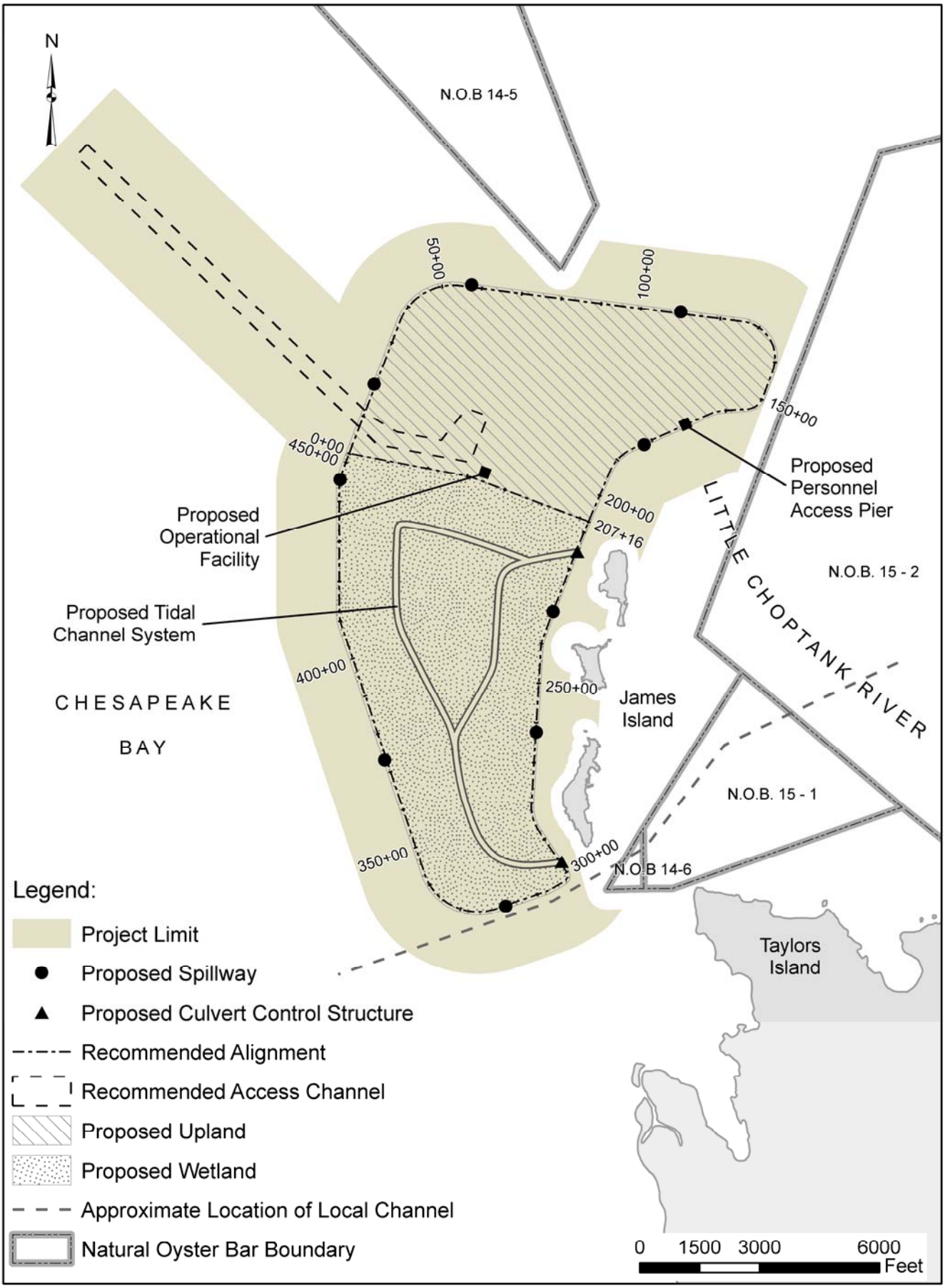


Figure 2: James Island Recommended Plan.

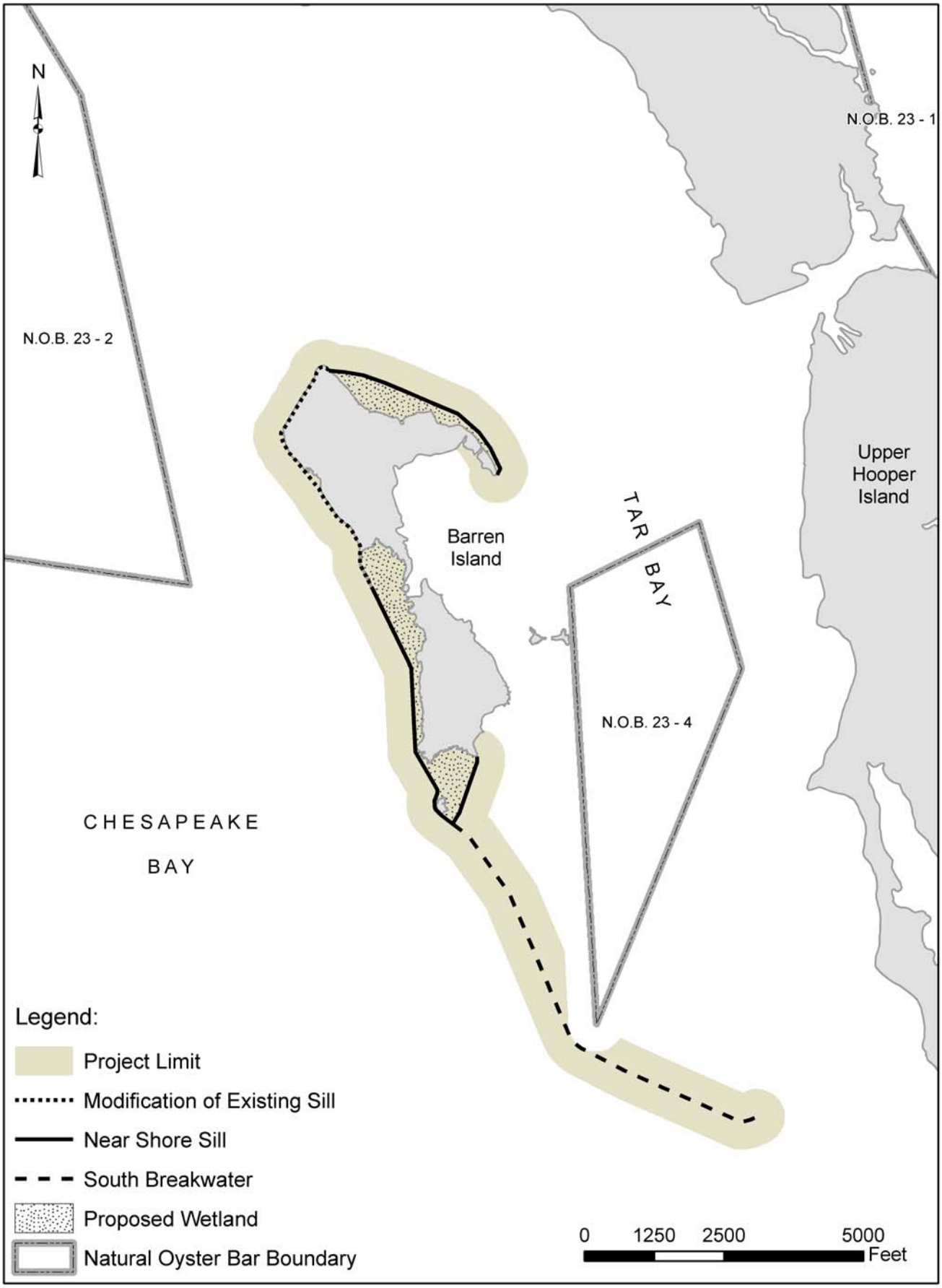
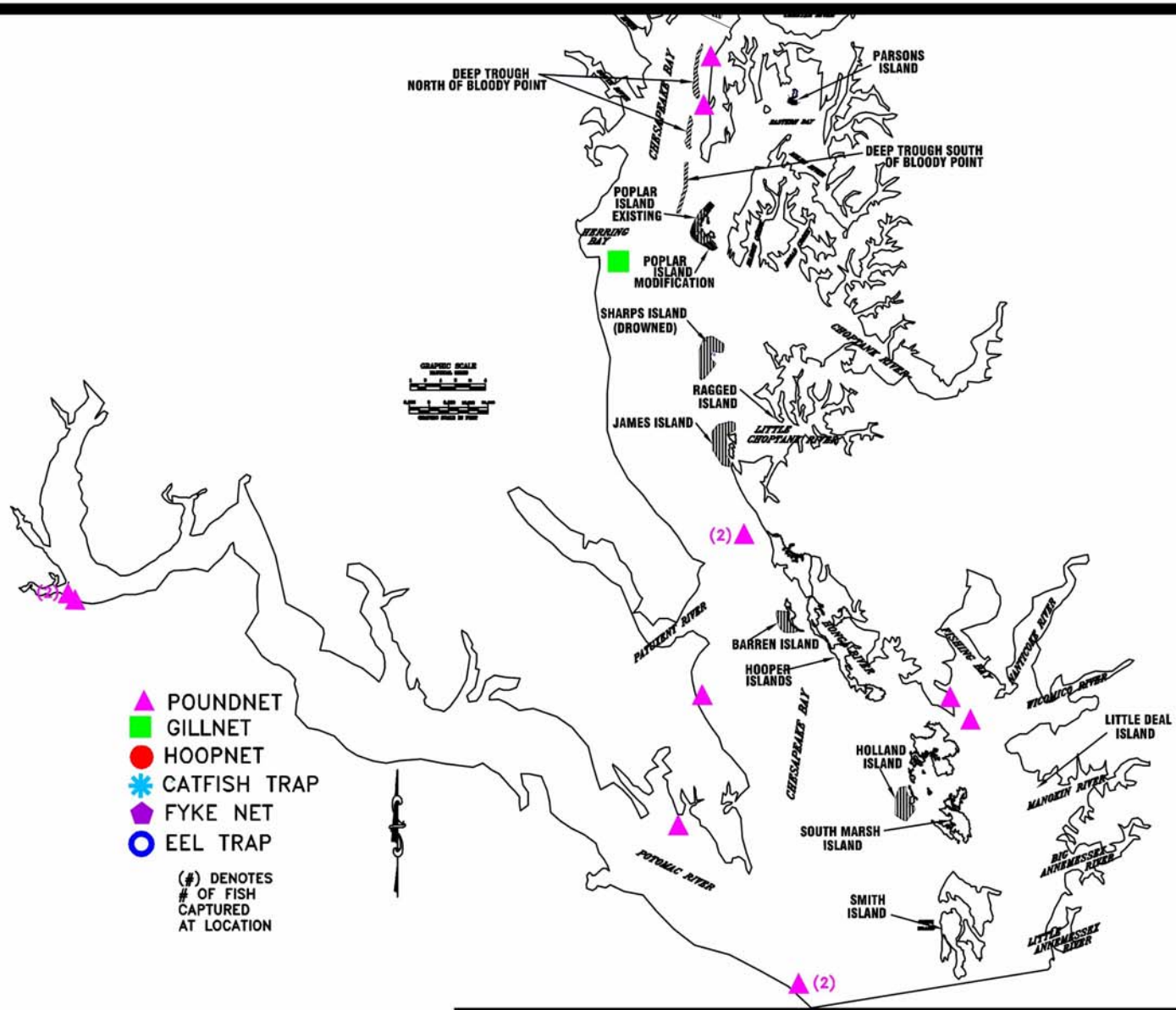


Figure 3: Barren Island Recommended Plan.



Updated January 13, 2005

MARYLAND
ENVIRONMENTAL
SERVICE

SNS REWARD PROGRAM CATCHES
IN THE MID BAY SOUTH OF
BAY BRIDGE
FIGURE 4

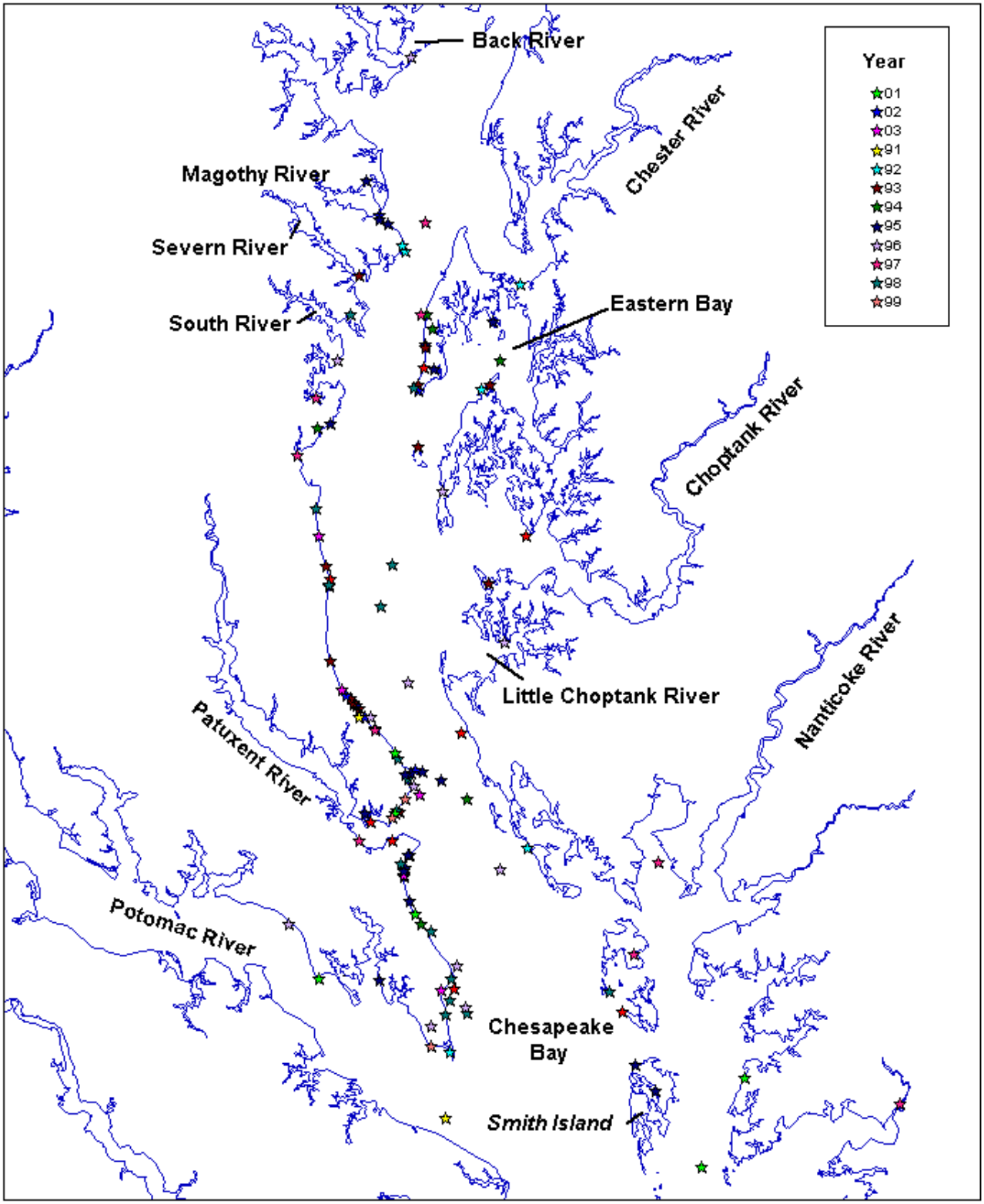


Figure 5. Locations of sea turtle strandings in Maryland portion of the Chesapeake Bay, 1991 to 2003. See text for details. (reproduced from Kimmel, 2004)

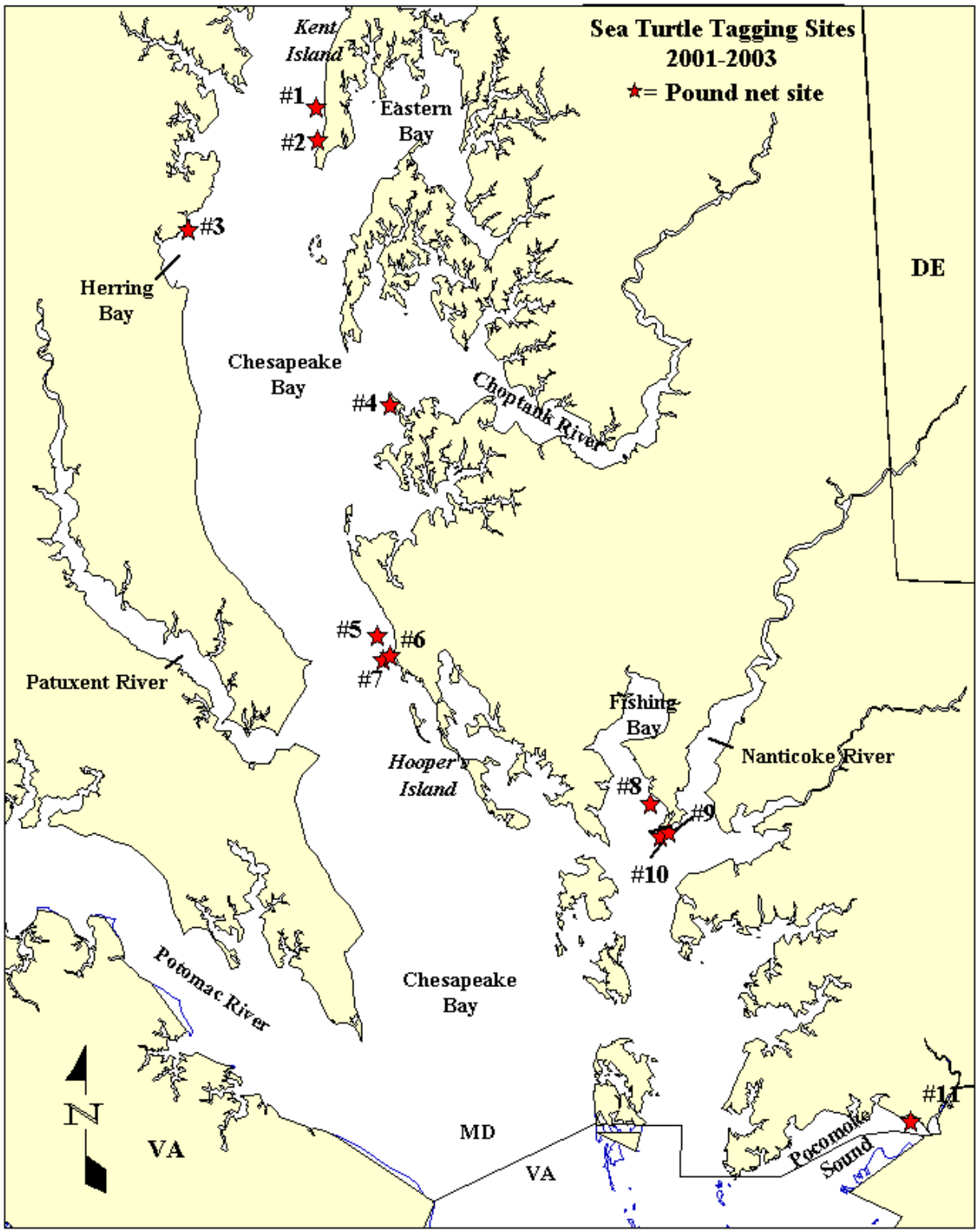


Figure 6. Pound net sites in Chesapeake Bay in which incidentally captured sea turtles were examined and tagged, 2001-2003. Refer to Table 2 for data on sea turtles at each net site. (Kimmel, 2004)

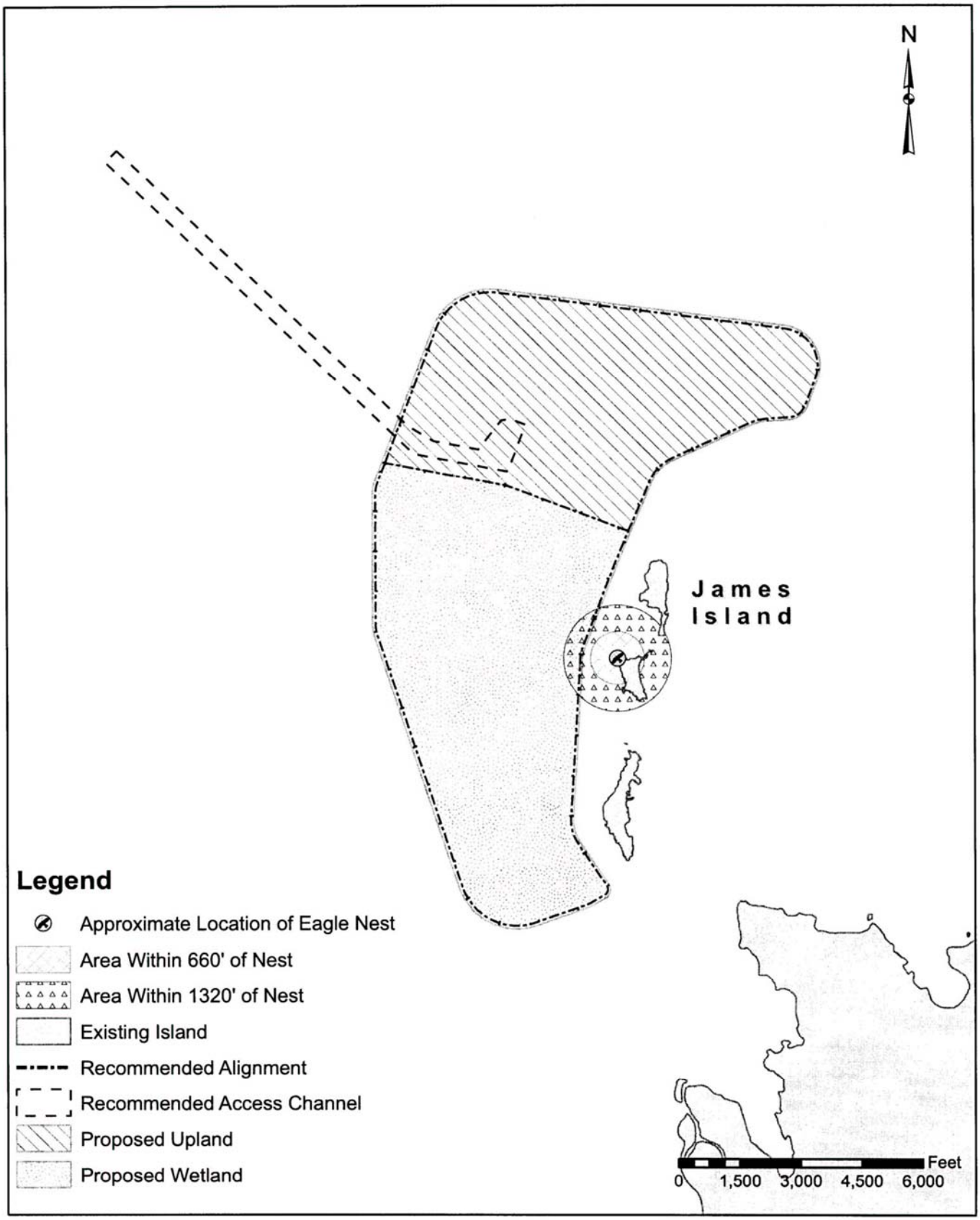


Figure 7: Location of Bald Eagle nest at James Island. Zones 2 (660') and 3 (1320') of activity limitation are identified.

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Attachment D: Agency Coordination

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Robert L. Ehrlich, Jr.
Governor
Michael S. Steele
Lt. Governor
Victor L. Hoskins
Secretary
Shawn S. Karimian
Deputy Secretary

D·H·C·D
MARYLAND DEPARTMENT OF HOUSING
& COMMUNITY DEVELOPMENT

June 24, 2004

Tom Humbles
MES
259 Najoles Road
Millersville, MD 21108

RECEIVED
JUN 28 2004

Dear Mr. Humbles,

I have reviewed the two volumes, *Underwater Archaeological Surveys in the vicinity of James and Barren Islands in the Chesapeake Bay, Maryland.* While I believe the net results are accurate, these could easily be combined into one report as they contain a great deal of redundant material.

In general, the volumes do not address the State's *Standards and Guidelines for Archeological Investigations in Maryland* (G. Shaffer and E. Cole, 1994) especially in format, and discussion of specific contexts; it also frowns on use of "boilerplate" in background sections. This volume is available on the Trust's web site (www.marylandhistoricaltrust.net). No environmental background is provided, such as a discussion of geology that would support their determination that the magnetic clusters adjacent to James Island are geologic in origin, or the hydrology of the Bay addressing tides, currents, storm patterns and erosion. The historical section focuses almost exclusively on Virginia, ignoring important sources of information about Maryland. The chapter on Chesapeake vessels is extremely interesting but is never applied or otherwise related to the vessels they located. This may be premature since they did not dive on, or further investigate the sites, but then this chapter could be reserved for use in a Phase II project if one is undertaken. If the volumes are combined into one report it should be included.

I have marked the Barren Island volume extensively and since the typographical and grammatical errors are mirrored in the James Island volume I have only marked pages where my comments differ from the other report. As mentioned previously, the net assessment probably accurate, the reports could be tightened up.

.../2

I am happy to discuss this with you or to work with PCI in order to produce the best possible report. I may be reached at 1-800-756-0119 x7662, or 410-514-7662 or via email: Langley@dhcd.state.md.us.

Sincerely,

Susan B.M. Langley, Ph.D.
State Underwater Archaeologist

Encl.
/sl

cc. B. Cole, MHT
S. Bilicki, MHT

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, U.S. ARMY CORPS OF ENGINEERS
P. O. BOX 1715
BALTIMORE, MARYLAND 21203-1715

REPLY TO
ATTENTION OF

July 2, 2004

Planning Division

Mr. Mike Johnson
Department of the Navy
Commanding Officer
Naval Air Warfare Center: Aircraft Division
Attn: Test Range, Bldg 2118
23013 Cedar Point Road
Patuxent River, MD 20670

Dear Mr. Johnson:

This letter is in reference to the U.S. Army Corps of Engineers, Baltimore District's (Corps) study to determine the potential for restoring island habitat in the Mid-Chesapeake Bay region. The Congressional study authority defines the study area as the Eastern Shore of the Chesapeake Bay, Maryland, from the confluence of the Chester River south to the State of Maryland border.

The Mid-Chesapeake Island Environmental Restoration Feasibility Study focuses on restoring hundreds of acres of aquatic and wildlife island habitat in the Mid-Chesapeake Bay region through the beneficial use of clean dredged materials from the Port of Baltimore channel system. Material from Baltimore Harbor within the Patapsco River will not be considered for placement at any restored islands. Restoration of island habitat is necessary and valuable to the Chesapeake Bay ecosystem. In the last 150 years, roughly 10,500 acres have been lost in the middle-eastern portion of Chesapeake Bay. It is estimated that most island habitats will be completely eroded and lost to the Bay within the next 10 to 20 years.

The feasibility study looked at the State of Maryland's island database and determined that about 100 islands could be used for potential restoration. That information was used to develop a screening criteria to prioritize the islands for restoration. Through the screening criteria process, James and Barren Islands were ranked as the top two candidates for restoration. James Island is located in Dorchester County at the mouth of the Little Choptank River in the Chesapeake Bay (see attached map of project area). In 1680, James Island was approximately 1350 acres. Today only three remnants remain totaling 79 acres. Barren Island is located in Dorchester County, off the western shore of Hooper Islands (see attached map of project area). Barren Island is an United States Fish and Wildlife Service wildlife management area that also serves as a satellite refuge of the Blackwater National Wildlife Refuge. Currently 197 acres, Barren Island has lost approximately 500 acres in the past 325 years. Alternatives are being explored that would restore both James and Barren Islands as well as alternatives to restore either James or Barren. Examples of potential dike alignments being considered are shown in the attached figures. Once the exterior dikes are constructed, dredged material is pumped into interior cells. Depending on the height of the interior dikes either uplands or wetlands are created. Cells are drained and pumped with more dredged material until the cell is full. After final draining and grading, cells are planted.

The Mid-Chesapeake Island Environmental Restoration Feasibility Study received authorization from a resolution by the Senate Committee on Environment and Public Works dated June 5, 1997. An environmental impact statement (EIS) is also being prepared to comply with the National Environmental Policy Act of 1969.

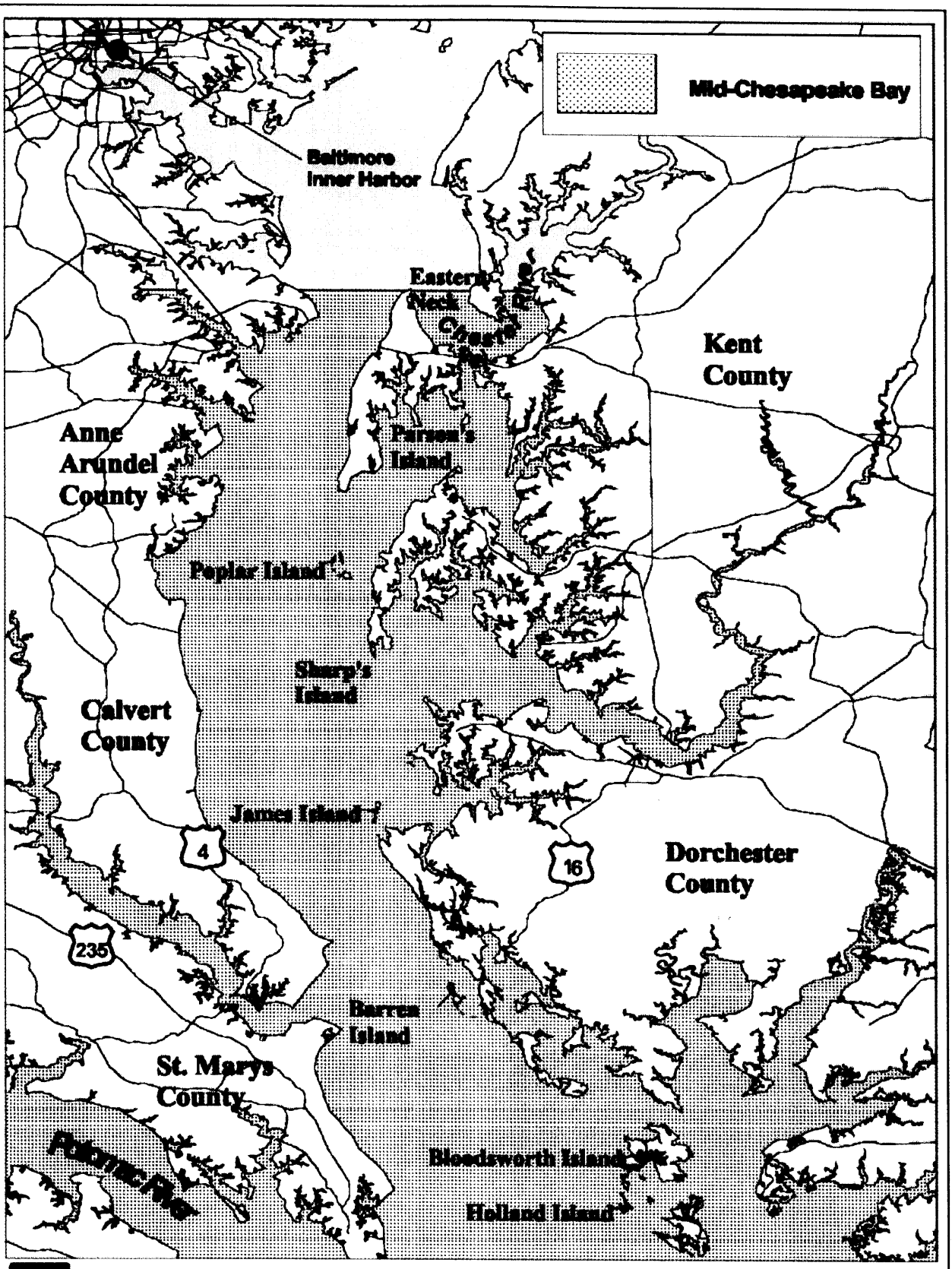
The area south and southwest of Barren Island is designated Restricted Area 334.200. The Corps is requesting information on the activities and use that is restricted in this area. If permitted, the southern tip of the constructed island could potentially extend into the restricted area (please note dike alignments in Figure 2). In the least, barges would be anchored in the restricted area adjacent to Barren Island in order to facilitate pumping of dredged material during construction.

If you have any questions regarding this matter, please contact Ms. Angie Sowers, Ph.D., at (410) 962-7440.

Sincerely,

Wesley E. Coleman, Jr.
Chief, Civil Project Development Branch

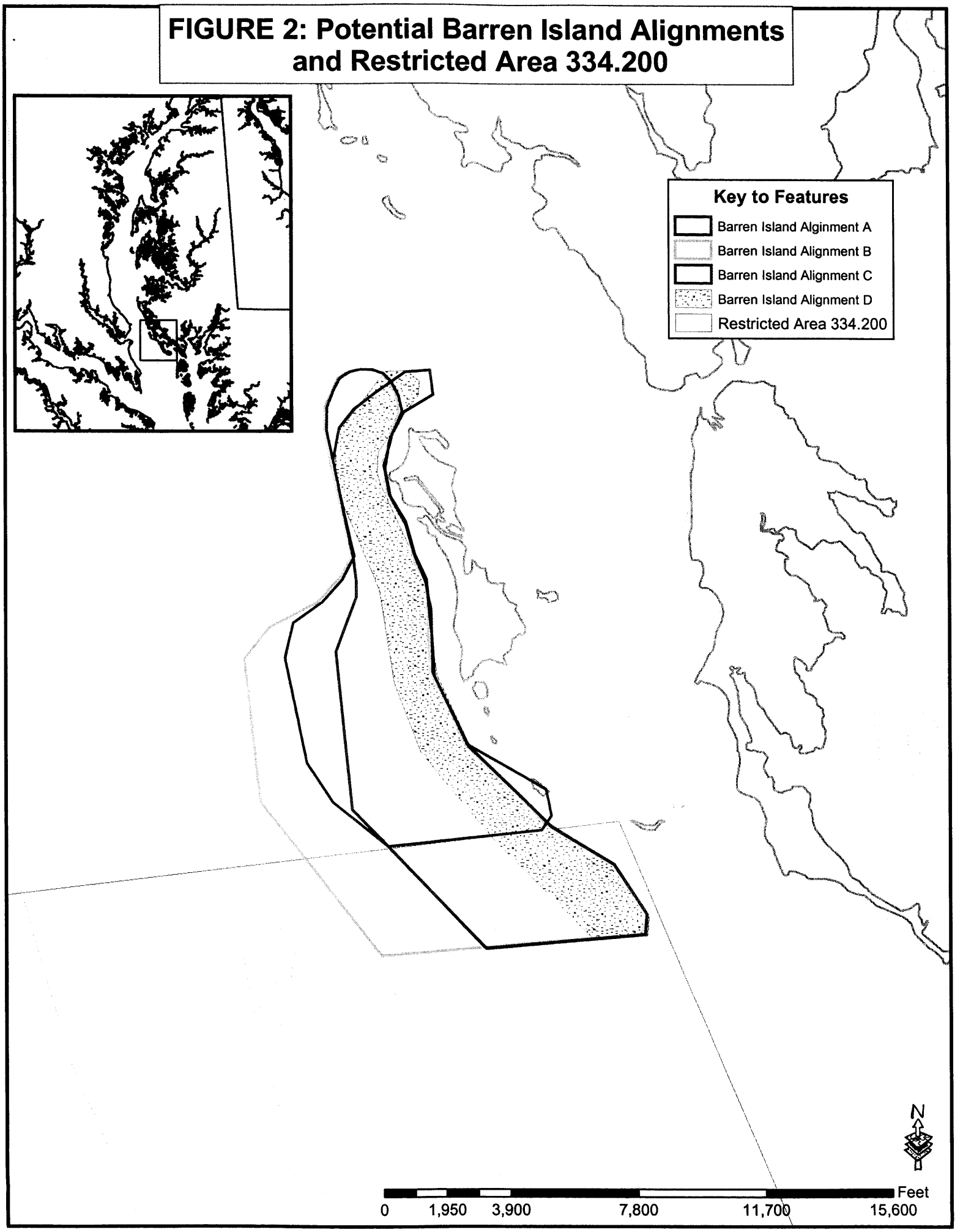
Enclosures



US Army Corps of Engineers Baltimore District

Mid-Chesapeake Bay Island Environmental Restoration Feasibility Study

FIGURE 2: Potential Barren Island Alignments and Restricted Area 334.200



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
One Blackburn Drive
Gloucester, MA 01930-2298

JUL 20

Wesley E. Coleman, Jr.
Chief, Civil Project Development Branch
Department of the Army
Baltimore District, US Army Corps of Engineers
PO Box 1715
Baltimore, Maryland 21203

Attention: Planning Division

Dear Mr. Coleman,

This is in response to your letter received July 6, 2004 requesting information on the presence of species listed under the jurisdiction of the National Marine Fisheries Service (NOAA Fisheries) in the Mid-Chesapeake Bay region. The Army Corps of Engineers (ACOE) is conducting a study to determine the potential for restoring island habitat in this region.

The federally endangered shortnose sturgeon (*Acipenser brevirostrum*) has been documented in the Chesapeake Bay. The NOAA Fisheries recovery plan (1998) indicates that shortnose sturgeon found in the Chesapeake Bay and its tributaries are considered part of the Chesapeake Bay population. Welsh *et al.* (1999) summarizes historical and recent evidence of shortnose sturgeon presence in the Chesapeake Bay. The first published account of shortnose sturgeon in the Chesapeake system was an 1876 record from the Potomac River reported in a general list of fishes of Maryland (Uhler and Lugger 1876). Other historical records of shortnose sturgeon in the Chesapeake include: the Potomac River (Smith and Bean 1899), the upper Bay near the mouth of the Susquehanna River in the early 1980's, and the lower Bay near the mouths of the James and Rappahannock rivers in the late 1970's (Dadswell *et al.* 1984). The US Fish and Wildlife Service Reward Program for Atlantic Sturgeon began in 1996. Shortnose sturgeon have been incidentally captured via this program. As of May 2003, fifty-four shortnose sturgeon were captured via the reward program in the Chesapeake Bay and its tributaries – two from the Susquehanna Flats, eight from the Susquehanna River, two in the Bohemia River, six in the Potomac River, one in the Sassafras River, one in the Elk River, two south of the Bay Bridge near Kent Island, one near Howell Point, one just north of Hoopers Island, and two in Fishing Bay. The remaining shortnose sturgeon were captured in the upper Bay north of Hart-Miller Island. These fish were captured alive in either commercial gillnets, poundnets, fykenets, eel pots, hoop nets, or catfish traps.

Several species of sea turtles are known to be present in the Chesapeake Bay. Leatherback sea turtles (*Dermochelys coriacea*) are present off the Maryland coast but are predominantly pelagic. Loggerhead (*Caretta caretta*), Kemp's ridley (*Lepidochelys kempi*), and green sea turtles

(*Chelonia mydas*) are present in the Chesapeake Bay mainly during late spring, summer and early fall when water temperatures are relatively warm. Aerial surveys of loggerhead turtles north of Cape Hatteras indicate that they are most common in waters from 22 to 49m deep, although they range from beaches to waters beyond the continental shelf. In the Chesapeake Bay area, Kemp's ridleys frequently forage in shallow embayments, particularly in areas supporting submerged aquatic vegetation. Green sea turtles are known to occur in estuarine and oceanic waters along the East Coast from Long Island to the tropics. Recent data from sightings and incidental captures in fishing gear indicate that Loggerhead and Kemp's ridley are the species of sea turtles most likely to be found in the waters of Chesapeake Bay while Leatherback and Green sea turtles may be also in the area.

Section 7(a)(2) of the ESA states that each Federal agency shall, in consultation with the Secretary, insure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. Because shortnose sturgeon and listed sea turtles are likely to be present in the vicinity of the project area and may be affected by the project, the proposed action must undergo Section 7 consultation. The federal action agency, in this case the Army Corps of Engineers, is responsible for initiating Section 7 consultation. When project details are developed, please submit a description of the project along with an assessment of the projects impacts on shortnose sturgeon and sea turtles to the attention of the Endangered Species Coordinator, NOAA Fisheries, Northeast Regional Office, One Blackburn Drive, Gloucester, MA 01930. After reviewing this information, NOAA Fisheries will then be able to conduct a consultation under Section 7 of the ESA.

Thank you for your cooperation in this matter. If you have any questions or concerns about these comments or about the consultation process in general, please contact Julie Crocker of my staff at (978) 281-9328 ext. 6530.

Sincerely,

Mary A. Colligan
Assistant Regional Administrator
for Protected Resources

File Code: Sec. 7 – spp. presence MD

File Copy

DEPARTMENT OF THE NAVY

NAVAL AIR STATION
22268 CEDAR POINT ROAD
PATUXENT RIVER, MARYLAND 20670-1154

5090
Ser 87/836
SEP 21 2004

From: Commanding Officer, Naval Air Station, 22268 Cedar Point Road, Unit NASAD, Patuxent River, Maryland 20670

To: Chief, Civil Project Development Branch, Mr. Wesley E. Coleman Jr., Department of the Army, Baltimore District, P.O.Box 1715, Baltimore, Maryland 21203-1715

Subj: U.S. ARMY CORPS OF ENGINEERS HABIT RESTORATION PROJECT FOR THE MID-CHESAPEAKE BAY REGION

1. Thank you for the opportunity to comment on the U.S. Army Corps of Engineers habit restoration project for the Mid-Chesapeake Bay region discussed in your letter dated 2 July 04. The project appears to be very similar to the Poplar Island restoration project which members of my staff visited about a year ago. Based on the Barren Island alignments that you provided, the retaining dikes would extend approximately 3500 feet into the Restricted Areas of the Chesapeake Test Range.

2. The type of flight operations we conduct in that area are compatible with the expansion of Barren Island for use as a wildlife management area, and therefore, I have no objections to the plan, provided that current or planned future flight operations will not be restricted due to the possible arrival of nesting colonial waterbirds (which have shown the ability to readily adapt to our operations at Bloodsworth Island). Please include such a provision in the waterways construction permit for this project.

3. If your intended use should change to include recreational or residential development; that could threaten the long term sustainability of flight operations in the Chesapeake Test Range and would be of significant concern to the Commanding Officer, Naval Air Warfare Center, Aircraft Division.

4. I would appreciate an opportunity to review and comment on the Draft EIS when it becomes available. If you have any questions regarding this matter, please contact Mike Johnston on 301-342-1179 or our Natural Resources manager, Mr. Kyle Rambo, on 301-757-0005.

Zachary A. Henry, Jr.

ZACHARY A. HENRY

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, U.S. ARMY CORPS OF ENGINEERS
P. O. BOX 1715
BALTIMORE, MARYLAND 21203-1715

REPLY TO
ATTENTION OF

October 26, 2004

Planning Division

Mr. Glenn Therres
Wildlife and Natural Heritage
Maryland Department of Natural Resources
582 Taylor Avenue
Annapolis, MD 21401

Dear Mr. Therres:

This letter is in reference to the U.S. Army Corps of Engineers, Baltimore District's (Corps) study to determine the potential for restoring island habitat in the Mid-Chesapeake Bay region. The Congressional study authority defines the study area as the Eastern Shore of the Chesapeake Bay, Maryland, from the confluence of the Chester River south to the State of Maryland border.

The Mid-Chesapeake Island Environmental Restoration Feasibility Study focuses on restoring hundreds of acres of aquatic and wildlife island habitat in the Mid-Chesapeake Bay region through the beneficial use of clean dredged materials from the Port of Baltimore channel system. Material from Baltimore Harbor within the Patapsco River will not be considered for placement at any restored islands. Restoration of island habitat is necessary and valuable to the Chesapeake Bay ecosystem. In the last 150 years, roughly 10,500 acres have been lost in the middle-eastern portion of Chesapeake Bay. It is estimated that most island habitats will be completely eroded and lost to the Bay within the next 10 to 20 years.

The feasibility study has looked at the State of Maryland's island database and has determined that about 100 islands could be used for potential restoration. That information was used to develop a screening criteria to prioritize the islands for restoration. Through the screening criteria process, James and Barren Islands were ranked as the top two candidates for restoration. James Island is located in Dorchester County at the mouth of the Little Choptank River in the Chesapeake Bay (see attached map of project area). In 1680, James Island was approximately 1350 acres. Today only three remnants remain totaling 79 acres. Barren Island is located in Dorchester County, off the western shore of Hooper Islands (see attached map of project area). Barren Island is an United States Fish and Wildlife Service wildlife management area that also serves as a satellite refuge of the Blackwater National Wildlife Refuge. Currently 197 acres, Barren Island has lost approximately 500 acres in the past 325 years. Alternatives were explored to restore both James and Barren Islands as well as alternatives to restore either James or Barren. Protection of Barren Island using breakwaters and similar means was also considered. Evaluation of the alternatives by the project delivery team identified the recommended plan to be the creation of an approximately 2000 acre island at James Island and protection of Barren Island (see enclosed figures). Based on the objectives, the recommended

plan best protects the existing resources at Barren and James while providing adequate capacity for dredged material.

The Mid-Chesapeake Island Environmental Restoration Feasibility Study received authorization from a resolution of the Senate Committee on Environment and Public Works dated June 5, 1997. An environmental impact statement (EIS) is also being prepared to comply with the National Environmental Policy Act of 1969.

The Corps is requesting any information your office may have on the presence of state listed rare, threatened, and endangered species. This request is for the project areas shown in the enclosed figures. Please provide this office with any comments regarding protected plant and animal species within 30 days of the date of this letter so that we may address these concerns in our plan formulation phase. A coordination letter has also been sent to the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service for information concerning federally protected species listed by Section 7 of the Endangered Species Act (ESA).

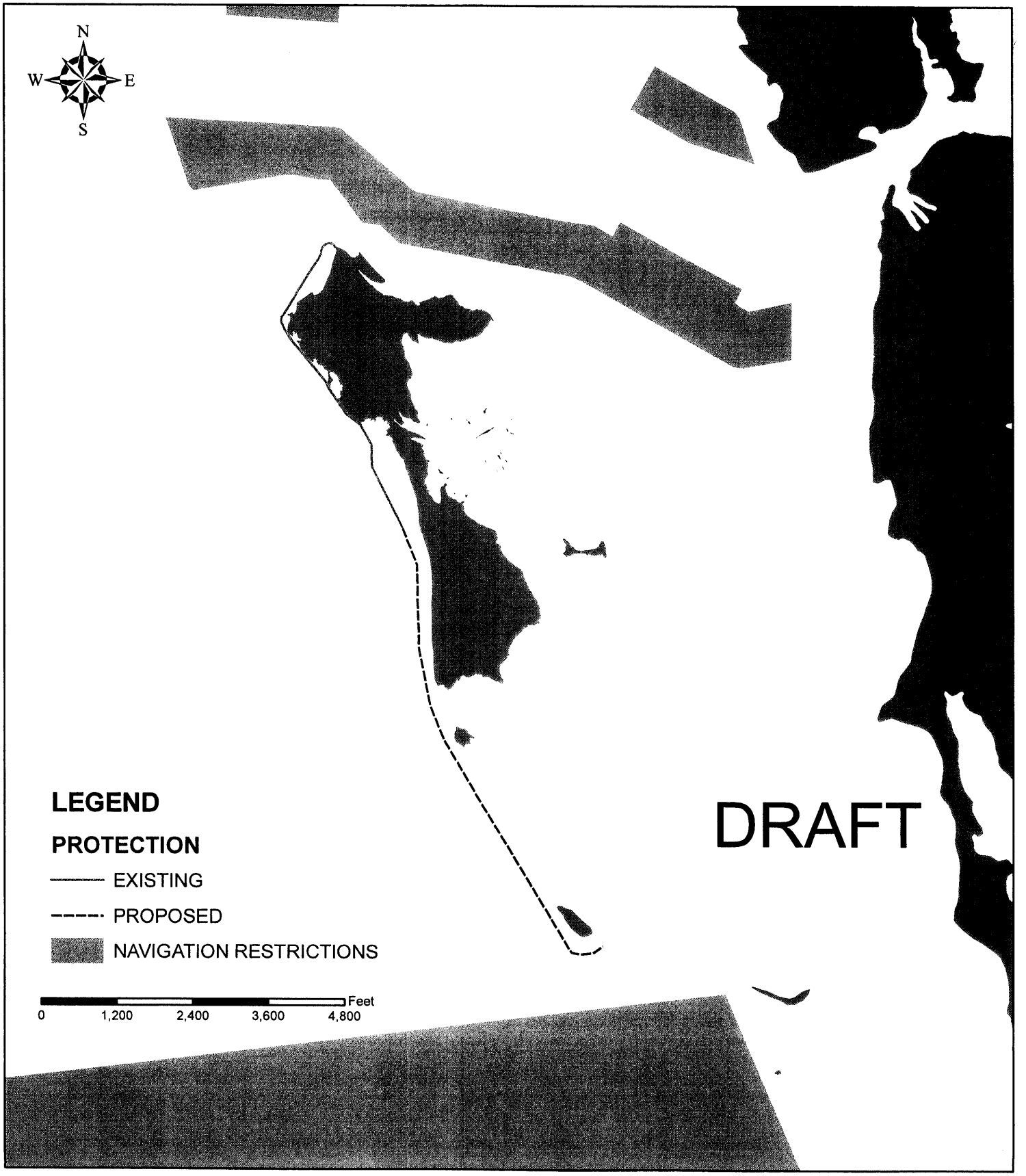
If you have any questions regarding this matter, please contact Ms. Angie Sowers, Ph.D., at (410) 962-7440.

Sincerely,

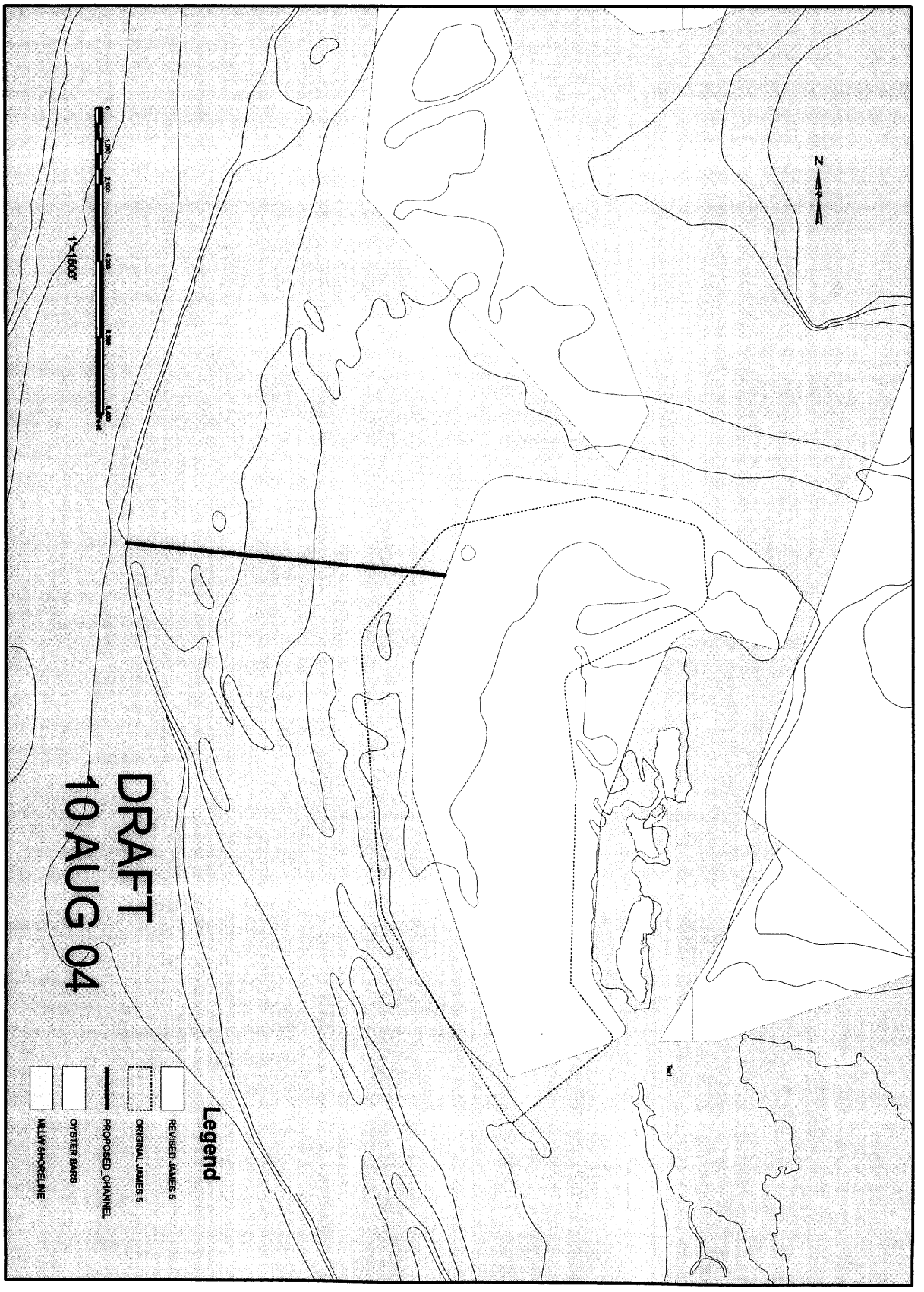
Wesley E. Coleman, Jr.
Chief, Civil Project Development Branch

Enclosures

BARREN ISLAND
PROPOSED PROTECTION ONLY
AUG 04



JAMES ISLAND
REVISED ALIGNMENT 5
& PROPOSED ACCESS CHANNEL PLAN



MARYLAND
DEPARTMENT OF
NATURAL RESOURCES

Robert L. Ehrlich, Jr., *Governor*
Michael S. Steele, *Lt. Governor*
C. Ronald Franks, *Secretary*

November 26, 2004

Mr. Wesley E. Coleman, Jr.
Baltimore District, US Army Corps of Engineers
P.O. Box 1715
Baltimore, MD 21203-1715

RE: Environmental Review for James Island and Barren Island, Feasibility Study for Mid-Chesapeake Island Environmental Restoration, Talbot and Dorchester Counties, Maryland.

Dear Mr. Coleman:

The Wildlife and Heritage Service has determined that there are nest records for the state and federally threatened Bald Eagle (*Haliaaetus leucocephalus*) known to occur on both James Island and Barren Island. There are also historic waterfowl concentration and staging areas known to occur along the open water that is part of or adjacent to the shorelines of both James Island and Barren Island.

Barren Island also supports a breeding colony of waterbirds, and has potential Forest Interior Dwelling Birds (FIDS) habitat. In addition, there is a record for the state-listed endangered Eastern Narrow-mouthed Toad (*Gastrophryne carolinensis*) known to occur on Barren Island.

Thank you for allowing us the opportunity to review this project. If you should have any further questions regarding this information, please contact me at (410) 260-8573.

Sincerely,

Lori A. Byrne

Lori A. Byrne,
Environmental Review Coordinator
Wildlife and Heritage Service
MD Dept. of Natural Resources

ER #2004.2584.tado
Cc: S.A. Smith, DNR
R. Dintaman, DNR

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, MD 21401

December 1, 2004

Mr. Wesley E. Coleman, Jr., Chief
Civil Project Development Branch
Department of the Army
Baltimore District, US Army Corps of Engineers
P.O. Box 1715
Baltimore, Maryland 21203-1715

RE: James and Barren Island Restoration Projects, Dorchester County, MD

Dear Mr. Coleman:

This responds to your letter, received October 22, 2004, requesting information on the presence of species which are federally listed or proposed for listing as endangered or threatened within the above referenced project area. We have reviewed the information you enclosed and are providing comments in accordance with section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*).

The federally threatened bald eagle *(Haliaeetus leucocephalus)* nests within the above referenced project area. One nest, identified as DO-99-11, is located on the northern remnant of James Island. A second nest, identified as DO-82-04, is located at the southern end of Barren Island near Whitewood Cove. For further information regarding activity at these nests, Glenn Therres of the Maryland Wildlife and Heritage Division should be contacted at (410) 260-8572. Any construction or forest clearing activities within one-quarter mile of an active nest may impact bald eagles. If such impacts may occur, further section 7 consultation with the U.S. Fish and Wildlife Service may be required.

Except for occasional transient individuals, no other federally proposed or listed endangered or threatened species are known to exist within the area. Should additional information on the distribution of listed or proposed species become available, this determination may be reconsidered.

This response relates only to federally protected threatened or endangered species under our jurisdiction. For information on the presence of other rare species, you should contact Lori Byrne of the Maryland Wildlife and Heritage Division at (410) 260-8573.

We appreciate the opportunity to provide information relative to fish and wildlife issues, and thank you for your interest in these resources. If you have any questions or need further assistance, please contact Craig Koppie (410) 573-4534.

Sincerely,

G. A. Moser

G. Andrew Moser
Acting Program Supervisor, Threatened and Endangered Species

cc: Glenn Therres, Maryland Wildlife and Heritage Division, Annapolis, MD

COUNTY COUNCIL OF DORCHESTER COUNTY

COUNTY OFFICE BUILDING
P. O. BOX 26
CAMBRIDGE, MARYLAND 21613
PHONE: (410) 228-1700
FAX: (410) 228-9641

GLENN L. BRAMBLE, PRESIDENT
DAVID B. YOCKEY, VICE PRESIDENT
EFFIE M. ELZEY
THOMAS A. FLOWERS
WILLIAM V. NICHOLS

JANE BAYNARD
COUNTY MANAGER

E. THOMAS MERRYWEATHER
COUNTY ATTORNEY

April 13, 2005

Scott Johnson, Project Manager
United States Army Corps of Engineers
P.O. Box 1715
Baltimore, Maryland 21203-1715

Dear Mr. Johnson:

I am writing on behalf of the Dorchester County Council to thank you for providing the Council with an update regarding the status of the James and Barren Island dredge spoil restoration projects at the County Council's meeting on Tuesday, April 12, 2005.

While the County Council is pleased that the James and Barren island restoration projects are slated for completion after the Poplar Island enhancement project is completed, the County Council is concerned that James and Barren islands are eroding at a very fast pace. We encourage you to take whatever steps possible to help expedite the completion of these important island restoration projects.

Thank you.

Sincerely,

DORCHESTER COUNTY COUNCIL

Glenn L. Bramble

Glenn L. Bramble, President

GLB:mmf

http://www.docogonet.com
e-mail: info@council.docogonet.com

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, U.S. ARMY CORPS OF ENGINEERS
P. O. BOX 1715
BALTIMORE, MARYLAND 21203-1715

REPLY TO
ATTENTION OF

May 5, 2005

Planning Division

Mr. John Nichols
National Marine Fisheries Service
Habitat Conservation Division
904 South Morris Street
Oxford, Maryland 21654

Dear Mr. Nichols:

I am writing to request your review of the Essential Fish Habitat (EFH) Assessment for the Mid-Chesapeake Bay Island Environmental Restoration Project that the Baltimore District is proposing at James and Barren Islands in Dorchester County, Maryland. A feasibility report with an integrated Environmental Impact Statement (EIS) is currently being prepared and is scheduled for public review in the summer of 2005.

Initial coordination with NMFS identified the Choptank River as the appropriate geographic area upon which to base the Mid-Chesapeake Bay Islands EFH analysis. In a telephone conversation on February 21, 2005, it was concluded that of species with EFH designated in the Choptank River, only juvenile and adult summer flounder (*Paralicthys dentatus*), adult and juvenile bluefish (*Pomatomus saltatrix*), and juvenile red drum (*Sciaenops occelatus*) were likely to occur at the proposed project site. Informal consultation has occurred continuously throughout the feasibility study via your involvement at regular project delivery team meetings and through your participation on the Mid-Bay plan formulation subgroup.

The District's EFH assessment for the proposed project is enclosed. The District is requesting your concurrence that the proposed project complies with the provisions of the Magnuson-Stevens Fishery Conservation and Management Act, as amended, and as such will not have a substantial adverse effect on essential fish habitat for Federally managed species. Please review the enclosed EFH assessment and provide your agency's concurrence or comments within 30 days of the date of this letter.

If you have any questions, please contact Ms. Angie Sowers at (410) 962-7440.

Sincerely,

Wesley E. Coleman, Jr.
Chief, Civil Project Development Branch

Enclosures

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, U.S. ARMY CORPS OF ENGINEERS
P. O. BOX 1715
BALTIMORE, MARYLAND 21203-1715

REPLY TO
ATTENTION OF

May 17, 2005

Planning Division

Ms. Julie Crocker
National Marine Fisheries Service
U.S. Department of Commerce
One Blackburn Drive
Gloucester, MA 01930-2298

Dear Ms. Crocker:

Section 7(a)(2) of the Endangered Species Act (ESA) (16 U.S.C. 1531 et. seq.) requires every Federal agency, in consultation with and with the assistance of the United States Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS), to ensure that any action it authorizes, funds, or carries out, in the United States or upon the high seas, is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. The purpose of this letter is to request your review of the ESA Section 7(a)(2) assessment the Baltimore District, U.S. Army Corps of Engineers has prepared for the proposed Mid-Chesapeake Bay Island Environmental Restoration Project at James and Barren Islands in Dorchester County, Maryland. A feasibility report with an integrated Environmental Impact Statement (EIS) is currently being prepared and is scheduled for public review in the late summer or fall of 2005.

Section 7 (a)(2) consultation was initiated by coordination letters submitted to NMFS and USFWS from the District on June 23, 2004. A letter dated July 20, 2004, from NMFS identified the presence of shortnose sturgeon (*Acipenser brevirostrum*), and loggerhead (*Caretta caretta*), Kemp's ridley (*Lepidochelys kempi*), green (*Chelonia mydas*), and leatherback sea turtles (*Dermochelys coriacea*) in the project area. A letter dated December 1, 2004, from USFWS highlighted the use of James and Barren Islands by the federally threatened bald eagle (*Heliaeetus leucocephalus*).

The District's ESA assessment for the proposed project is enclosed. The District is requesting your concurrence that the proposed project is not likely to adversely affect the listed species or designated critical habitats under your jurisdiction. Please review the enclosed ESA assessment and provide your agency's concurrence or comments within 30 days of the date of this letter.

If you have any questions, please contact Ms. Angie Sowers at (410) 962-7440.

Sincerely,

Wesley E. Coleman, Jr.
Chief, Civil Project Development Branch

Enclosures

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, U.S. ARMY CORPS OF ENGINEERS
P. O. BOX 1715
BALTIMORE, MARYLAND 21203-1715

REPLY TO
ATTENTION OF

May 17, 2005

Planning Division

Mr. John Wolflin
Supervisor
U.S. Fish and Wildlife Service
Chesapeake Bay Field Office
177 Admiral Cochrane Dr.
Annapolis, MD 21014

Dear Mr. Wolflin:

Section 7(a)(2) of the Endangered Species Act (ESA) (16 U.S.C. 1531 et. seq.) requires every Federal agency, in consultation with and with the assistance of the United States Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS), to ensure that any action it authorizes, funds, or carries out, in the United States or upon the high seas, is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. The purpose of this letter is to request your review of the ESA Section 7(a)(2) assessment the Baltimore District, U.S. Army Corps of Engineers has prepared for the proposed Mid-Chesapeake Bay Island Environmental Restoration Project at James and Barren Islands in Dorchester County, Maryland. A feasibility report with an integrated Environmental Impact Statement (EIS) is currently being prepared and is scheduled for public review in the late summer or fall of 2005.

Section 7 (a)(2) consultation was initiated by coordination letters submitted to NMFS and USFWS from the District on June 23, 2004. A letter dated July 20, 2004, from NMFS identified the presence of shortnose sturgeon (*Acipenser brevirostrum*), and loggerhead (*Caretta caretta*), Kemp's ridley (*Lepidochelys kempi*), green (*Chelonia mydas*), and leatherback sea turtles (*Dermochelys coriacea*) in the project area. A letter dated December 1, 2004, from USFWS highlighted the use of James and Barren Islands by the federally threatened bald eagle (*Heliaeetus leucocephalus*).

The District's ESA assessment for the proposed project is enclosed. The District is requesting your concurrence that the proposed project is not likely to adversely affect the listed species or designated critical habitats under your jurisdiction. Please review the enclosed ESA assessment and provide your agency's concurrence or comments within 30 days of the date of this letter.

If you have any questions, please contact Ms. Angie Sowers at (410) 962-7440.

Sincerely,

Wesley E. Coleman, Jr.
Chief, Civil Project Development Branch

Enclosures

CF: CPD Reading File

SOWERS/sam/7440/CENAB-PL-P

BLERSCH/CENAB-PL-P

ABADIE/CENAB-PL-P

BIERLY/CENAB-PL-P

COLEMAN/CENAB-PL-P

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DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, U.S. ARMY CORPS OF ENGINEERS
P. O. BOX 1715
BALTIMORE, MARYLAND 21203-1715

REPLY TO
ATTENTION OF

March 18, 2005

Planning Division

Regina Esslinger
Critical Area Commission
1804 West Street
Suite 100
Annapolis, MD 21401

Dear Ms. Esslinger:

This letter is in reference to the U.S. Army Corps of Engineers, Baltimore District's (Corps) study to determine the potential for restoring island habitat in the Mid-Chesapeake Bay region. The Congressional study authority defines the study area as the Eastern Shore of the Chesapeake Bay, Maryland, from the confluence of the Chester River south to the State of Maryland border.

The Mid-Chesapeake Island Environmental Restoration Feasibility Study focuses on restoring hundreds of acres of aquatic and wildlife island habitat in the Mid-Chesapeake Bay region through the beneficial use of clean dredged materials from the Port of Baltimore channel system. Material from Baltimore Harbor within the Patapsco River will not be considered for placement at any restored islands. Restoration of island habitat is necessary and valuable to the Chesapeake Bay ecosystem. In the last 150 years, roughly 10,500 acres have been lost in the middle-eastern portion of Chesapeake Bay. It is estimated that most island habitats will be completely eroded and lost to the Bay within the next 10 to 20 years.

The Mid-Chesapeake Island Environmental Restoration Feasibility Study received authorization from a resolution by the Senate Committee on Environment and Public Works dated June 5, 1997. An environmental impact statement (EIS) is also being prepared in accordance with the National Environmental Policy Act of 1969.

At the start of the Feasibility Study, the Critical Areas Commission was sent a study initiation letter dated January 31, 2003. During a phone discussion on January 11, 2005, you requested further project information to satisfy a review by the Critical Areas Commission. The purpose of this letter is to provide the information requested. Please find enclosed a short description of the proposed recommended plan as well as figures of the proposed plan at Barren Island and James Island. A more detailed description of the project will be available in the *Mid-Chesapeake Bay*

Islands Environmental Restoration Project Draft Feasibility Report and Environmental Impact Statement that is scheduled for public review in the summer of 2005.

Please provide us with notification of when a decision can be expected by the Critical Areas Commission. If you have any questions regarding this matter, please contact Ms. Angie Sowers, Ph.D., at (410) 962-7440.

Sincerely,

Wesley E. Coleman, Jr.
Chief, Civil Project Development Branch

Enclosures

Mid-Bay Chesapeake Islands Environmental Restoration Project
Chesapeake Bay and Dorchester County, Maryland

Critical Areas Commission Coordination

Prepared By: Baltimore District, U.S. Army Corps of Engineers

March 2005

I. Location

The Mid-Chesapeake Bay Islands Restoration Project focuses on James and Barren Islands, both in Dorchester County. James Island is 16 miles north of Barren Island on the Eastern Shore of Maryland. James Island is situated at the mouth of the Little Choptank River, 3100' north of Taylors Island. James Island, once at least 1350 acres in the 17th century, now amounts to 3 small remnants totaling 100 acres (Maryland, 1949; Kearney, 1991). Presently, James Island is privately owned. Barren Island lies immediately west of Hoopers Island. Barren Island currently totals nearly 200 acres, but was recorded at 754 acres in 1848 (Wray, 1995). Barren Island is federally owned and managed by the U.S. Fish and Wildlife Service (USFWS) as a satellite refuge area to Blackwater National Wildlife Refuge.

II. Purpose

The purpose of the proposed project is to re-create and restore important regional island habitat that has been lost to land subsidence, rising sea level, and erosion in the Chesapeake Bay, plus provide protection to prevent future loss. In the last 150 years, it has been estimated that 10,500 acres have been lost in the middle-eastern portion of Chesapeake Bay due to erosion and sea-level rise. It is predicted that if no actions are taken most island habitats will be completely eroded and lost to the Bay in the next 10 to 20 years. At the same time, the project will provide for the beneficial use of sediments that are dredged from Bay navigation channels. There currently is a dredged material placement shortfall that will be realized in the next 8 to 10 years. The Baltimore District's Baltimore Harbor and Channels Dredged Material Management Plan (DMMP) identified, evaluated, screened, prioritized, and ultimately optimized placement alternatives resulting in the recommendation of a specific viable plan of action for the placement of dredged materials over the next 20 years. Large island restoration was one of the recommended alternatives of the Draft Baltimore Harbor and Channels Dredged Material Management Plan and Tiered Environmental Impact Statement (EIS) that is currently under public review.

III. Authority

The Baltimore District received the authority to pursue the study under the resolution of the Senate Committee on Environment and Public Works on June 5, 1997. Using the criteria defined by this resolution, the Eastern Shore, Maryland and Delaware Section 905(b) Analysis identified and recommended for further detailed feasibility-level study several projects that were within the Federal interest such as the beneficial use of dredged material to replace habitats lost from development and erosion activities and the

restoration and creation of hundreds to thousands of acres of wetlands, terrestrial and riparian habitat.

IV. Project Description

The Baltimore District, U.S. Army Corps of Engineers (Corps) in partnership with the State of Maryland Department of Transportation, Maryland Port Administration (MPA) has initiated an environmental restoration feasibility study for the restoration of island habitat in the Mid-Chesapeake Bay region. This study focuses on restoring hundreds of acres of aquatic and wildlife island habitat in the Mid-Chesapeake Bay region through the beneficial use of dredged materials from the Port of Baltimore channel system.

The Mid-Chesapeake Islands Restoration Project recommends island restoration at James Island and island protection at Barren Island (Figure 1 and 2 enclosed, respectively). The James Island portion of the project involves constructing armored dikes, breakwaters, and/or other structures approximating the island's historical footprint and filling the enclosed area with clean dredged material from Federal navigation channels in Chesapeake Bay. The 2,072-acre fill area will be subdivided to provide approximately 55% tidal wetland habitats and 45% upland island habitats. Construction at James Island will necessitate the dredging of an access channel on the northwest. The access channel would be approximately 12,720' in length, 400' in width at base with 3:1 side slopes. Of the total length, 3,070' would lie within the island footprint with 9,650' extending outside the footprint. The total footprint of the access channel is roughly 153.5 acres, with 52.7 acres within and 100.8 acres outside the island footprint. The potential project limit highlighted on Figure 1 is 4,100 acres. Approximately 40000' of perimeter dikes would be constructed. The sand for dike construction will be hydraulically dredged from within the island footprint or from the access channel. The sediment to construct the proposed wetland and upland habitat area at James Island will be dredged from the following Federal navigation channels in the Chesapeake Bay leading to Baltimore Harbor: the Craighill Entrance Channel; the Craighill Channel; the Craighill Angle, the Craighill Upper Range; the Cutoff Angle; the Brewerton Channel Eastern Extension; the Tolchester Channel, the Swan Point Channel, Inland Waterway from Delaware River to Chesapeake Bay, and other non-federal projects as determined by the Project Delivery Team (PDT).

Plans for Barren Island incorporate the use of sills to protect the current acreage of the island and the SAV/shallow water habitat off the eastern shore of Barren Island. Sills constructed along the current shoreline would be backfilled with dredged material to create wetland habitat. Phase I Barren protection would involve the modification of 4,900' of existing sill, construction of 3,840' on the north shore, 4,620' along the western shore, and a backside containment of 1,300'. Sills would be built to an elevation of 4' MLLW. Sills would be built to an elevation of 4' MLLW (mean low low water). Modification of the existing sill would require a 2 acre footprint. The near-shore sill would consume 5 acres of shallow water habitat. Approximately, 23 and 49 acres of island habitat (72 acres total) will be created by backfilling on the north and west, respectively. The material that would be used to backfill behind the breakwaters at Barren Island will be from authorized dredging of local Honga River channels and is characterized as silt and sand. Also, as part of Phase I, monitoring would be carried out to evaluate the need for constructing breakwaters off the southern tip of Barren Island following the

historic shoreline in order to protect the SAV habitat to the south and southeast of Barren Island. If it is determined that the SAV habitat to the south and southeast require further protection, a maximum of 8,200' of structure is proposed at a maximum height of 6' MLLW. If built to maximum length, the southern breakwater would have a 9.5 acre footprint. In total, Barren Island protection measures would impact a maximum of 94 acres of near-shore habitat (72 acres of created wetland plus 22 acres of sills and breakwaters).

A more detailed description of the project will be available in the *Mid-Chesapeake Bay Islands Environmental Restoration Project Draft Feasibility Report and Environmental Impact Statement* that is scheduled for public review in summer 2005.

V. Alternatives Considered

Large island restoration addresses two problems plaguing the Chesapeake Bay: 1) the rapid loss of island habitat over the past 200 years; and 2) the need to accommodate large amounts of dredged material. Additional support for large island restoration stems from the recommendations of the Draft Baltimore Harbor and Channels Dredged Material Management Plan and Tiered Environmental Impact Statement (EIS) that is currently under public review

Initially 105 islands were considered for restoration. The initial screening eliminated 84 islands, leaving 21 islands to be carried into the plan formulation process. These 21 islands were grouped into island complexes based on their vicinity and functioning as an island ecosystem. The resulting 8 island/island complexes were evaluated and ranked using 10 engineering criteria including possible restoration size, capacity, and foundation material. Public scoping meetings identified that there was public support for selecting the two highest ranking islands, Barren and James, for concept plan formulation.

A range of alternatives were developed for James and Barren Islands by the PDT. Four alignments for Barren and five alignments for James were delineated. For these alignments, a variety of wetland to upland ratios was considered ranging from all upland to all wetland configurations. A total of 20 different alignment combinations were considered that resulted in 170 alternatives.

The 170 alternatives were screened down to 14 alternatives using engineering suitability criteria and environmental considerations. Benefits and costs were developed for the 14 alternatives and a cost effective/incremental cost analysis was performed. The cost effective alternatives were evaluated against the 11 objectives identified by the PDT. From this final, screening, the recommended plan was determined.

VI. References

Kearney, MS, and J.C. Stevenson. 1991. Island land loss and marsh vertical accretion rate evidence for historical sea-level changes in Chesapeake Bay. *Journal of Coastal Research*. 7: 403-415.

State of Maryland, Department of Geology, Mines, and Water Resources. 1949. *Shore Erosion in Tidewater Maryland*. Bulletin 6. Baltimore, MD.

Wray, R.D., S.P. Leatherman, R.J. Nicholls. 1995. Historic and future land loss for upland and marsh islands in the Chesapeake Bay, Maryland, U.S.A. *Journal of Coastal Research*. 11(4): 1195-1203.

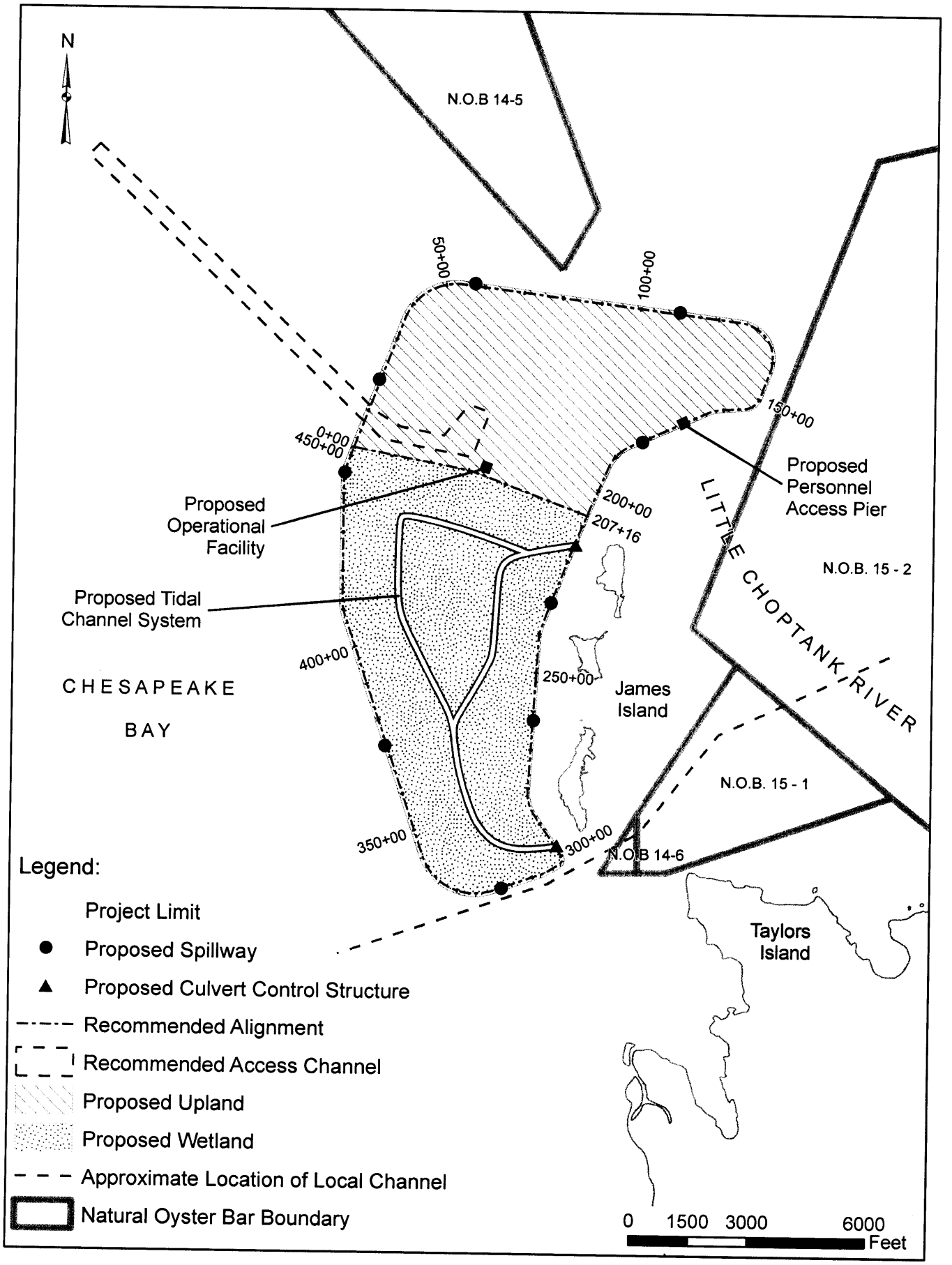

Figure 1: James Island Recommended Plan.

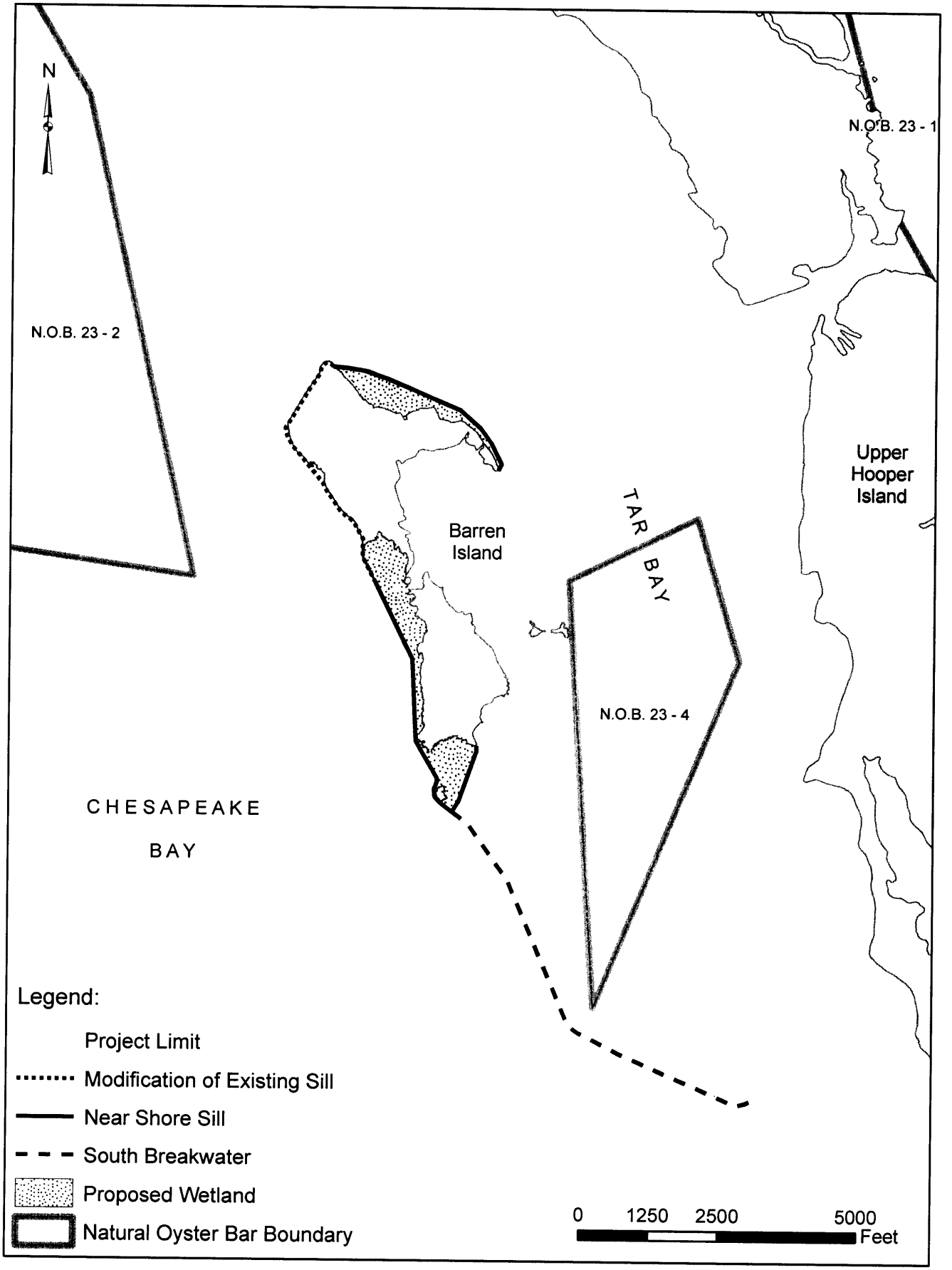

Figure 2: Barren Island Recommended Plan.

U.S. Department of Commerce
National Marine Fisheries Service
Habitat Conservation Division
904 South Morris Street
Oxford, Maryland 21654

May 20, 2005

MEMORANDUM TO: Mark Mendelsohn, Planning Division
Baltimore District, Corps of Engineers

FROM: John Nichols

SUBJECT: Mid-Chesapeake Bay Island EIS

The National Marine Fisheries Service (NMFS) has reviewed the draft Environmental Impact Statement (EIS) for the Mid-Chesapeake Bay Island Ecosystem Restoration Feasibility Study, dated March 8, 2005. The following outline briefly summarizes NMFS comments and recommendations that will be contained in our forthcoming letter for this project.

ISSUES AND CONCERNS

1. NMFS views the selection of James and Barren Islands for restoration activities as essentially one project. The preferred option for James Island (i.e., 2,072 acres, 55% wetlands and 45% uplands) will exceed the 1847 footprint of the original island (i.e., 976 acres) by 212%. Alternatively, the Barren Island portion of the project will chiefly involve stabilizing of the existing island, with minor construction of tidal marsh. Because of the higher ecological value of benthic communities and commercial pound net fisheries in the Barren Island vicinity, limiting the size of the Barren Island restoration (while concentrating dredge material placement capacity at James Island) will minimize impacts to valued existing resources. Therefore, we support the concept of a 2,072-acre James Island, coupled with a minimal action that will essentially conserve the existing footprint of Barren Island.

2. We concur with the proposal to limit sand borrow activities to areas within the footprint of James Island Option 5. Similarly, material used for wetland restoration at Barren Island should be generated only from navigation-related projects (e.g., Honga River Federal Project).

3. James Island Option 5 will result in the displacement of a documented recreational fishing ground within the north portion of the project footprint.

4. The conceptual engineering design of James Island Option 5 essentially lacks peripheral features that will benefit fish resources in adjacent waters surrounding the proposed island. Minor adjustments should be made in the design to address the latter issue.

FISH & WILDLIFE COORDINATION ACT COMMENTS

1. Where project logistics permit, tidal marsh cells should cover most of the east shoreline of the island. Arranging marsh cells on the protected lee side of the island will facilitate eventual removal of exterior dikes from these cells, to allow for more hydrologic and trophic interactions between marsh and open water.

   Additionally, we recommend an increase in the number of tidal ports (e.g., from the proposed 2 to 4 or 5) associated with the marsh cells on the east side of the island. Each port should lead to a cut channel extending back into the marsh, with a dendritic pattern of smaller tributaries feeding each channel. By locating tidal ports along the east side of the island, export of detritus and other energy from the marsh cells will be directed toward Natural Oyster Bars and oyster restoration sites within the Little Choptank River estuary.

2. The shoreline pattern of east side of the island should be diversified with a series of small coves and/or crenulations. For example, the northeast tip of the island should be re-designed with a two-prong pattern that encloses a small cove. This cove should tie into the 9-10 foot depth contour, to increase its value to recreational fishing. A similar cove could also be constructed at the southern tip of the island. Losses of upland and/or wetland area resulting from creating coves could be replaced through adjustments of the west side of the island alignment.

3. NMFS strongly supports the restoration of brackish water wetlands at the Blackwater National Wildlife Refuge, Dorchester County, with dredge material generated by maintenance of the Port of Baltimore Approach channels. To facilitate the latter project, your agency should investigate the use of James Island as a staging area for material used in the Blackwater project. As discussed at previous meetings of the Bay Enhancement Work Group, material could be pumped from James Island to the refuge (i.e., using a permanent pipeline running from James Island to a staging area or intermediate pumping station at the refuge) on an as-need basis. The latter option would provide flexibility to refuge staff for selecting the size and location of marsh restoration sites according to their preferred schedule.

ESSENTIAL FISH HABITAT COMMENTS

As recommended above, your agency should investigate diversifying the shoreline of the island to provide more habitat benefits to finfish using adjacent waters, including federally managed species. For example, small coves lined with smooth cordgrass marsh will be attractive foraging habitat for juvenile summer flounder.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, MD 21401

May 24, 2005

Colonel Robert J. Davis, Jr., P.E.
District Engineer
U.S. Army Corps of Engineers
P.O. Box 1715
Baltimore, MD 21203-1715

Attn: Angela Sowers

Re: Mid-Chesapeake Bay Island Ecosystem Restoration Study

Dear Colonel Davis:

This constitutes the report of the U.S. Fish and Wildlife Service on the Mid-Chesapeake Bay Island Restoration Study, Maryland. It is submitted in accordance with Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 *et seq.*) and Section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*). It is based on the information based in the preliminary draft Environmental Impact Statement dated March 8, 2005. The intent is to summarize the main environmental issues of the project and to set forth the Service's official position on the recommended plan. The report will not address specific details of the project such as the design of individual habitat features.

PROJECT DESCRIPTION

The project involves utilizing material from the maintenance dredging of federal navigation channels to restore and protect fish and wildlife habitat at two island locations in the middle portion of Chesapeake Bay. The main part of the project is to use material dredged from the federal main shipping channels in the upper Chesapeake Bay proper (i.e., outside of the Patapsco River) to construct a 2,070-acre island next to the remnants of James Island. The island would consist of 55 % tidal wetland habitat and 45 % upland habitat with elevation of 20 feet MLLW. Over the years James Island has been greatly reduced by erosion to the point where all that currently remains is three island remnants which total less than 100 acres. A perimeter dike (Fig. 1) would be constructed using 14.4 mcy of sandy material dredged from within the project footprint,1.5 mcy dredged from a local access channel, and 0.84 mcy of rock. Between 78 and 95 million cubic yards (mcy) of material from navigation channel dredging would ultimately be used in the creation of the island. Since the average annual quantity of material dredged from

the upper bay channels (exclusive of the Patapsco River) is approximately 2.9 mcy, this project would provide capacity for 27 to 33 years of maintenance dredging.

A secondary part of the project involves the construction of a rock sill (elevation 4 feet MLLW) near the shoreline on the north and west sides of Barren Island (Fig. 2). Approximately 11,035 feet of new sill would be constructed, and 4,900 feet of existing sill would be improved. Approximately 88 acres of tidal wetlands would be established behind the sill by depositing 0.7 mcy of material derived primarily from the maintenance dredging of the Honga River and Tar Bay federal navigation channels. Since dredging records from 1989 and 2004 (4 cycles) show a rate of 48,600 cubic yards per year, the project would provide capacity for approximately 14 years of dredging. The project also provides for construction of a rock breakwater up to 3,350 feet in length at the south end of the island if monitoring indicates that additional protection is needed for the beds of submerged aquatic vegetation on the east side of the island.

FISH AND WILDLIFE RESOURCES WITHOUT THE PROJECT

James Island has been substantially diminished by erosion and currently consists of three remnant sections which total less than 100 acres in size. The island consists of a mix of wooded upland and tidal marsh. A comprehensive effort was made to survey fish and wildlife resources in the project area. Wildlife surveys on the island revealed a variety of bird species as well as a limited number of mammals and reptiles/amphibians. The most notable species is a bald eagle which has a nest at the northern end. The aquatic habitat within the project footprint has an average depth of 8.5 feet MLLW with a range between 4 and 13.2 feet. Surveys of zooplankton, benthic invertebrates, and fish revealed typical estuarine assemblages. The Benthic Index of Biotic Integrity indicated that the benthic community was in a somewhat stressed condition. A clam survey indicated low numbers of soft clams that would not be sufficient to support commercial harvesting. There are no charted Natural Oyster Bars or oyster restoration sites within the project footprint although the edges of three bars are located within 500 yards. Crab pot surveys and incidental observations by the Natural Resources Police showed that pots for blue crabs are frequently set within and around the project footprint. However, it did not appear that the level of effort in the area was particularly high relative to other areas. Four pound nets are licensed for locations within the project footprint, although they have not been fished within the last five years. The pound nets in the region of the bay typically catch menhaden, striped bass, croaker, and spot.

The Chesapeake Bay aerial surveys of submerged aquatic vegetation (SAV) indicate that the only SAV beds in the vicinity of James Island have been reported from restricted areas on the east side of the island. The 7 surveys between 1986 and 1993 consistently reported small beds with sparse to medium density on the east side of the island. However, no SAV was reported in the surveys from 1994 to 2000. Beds were again reported in the 2001 and 2002 surveys, but they were absent from the 2003 and 2004 surveys. SAV was sampled around the island with throw rakes during Summer 2002, Spring 2003, and Summer 2003. The Summer 2002 sampling verified the presence of widgeon grass on the east side of all three island remnants. The Spring 2003 survey found horned pondweed in dense beds east of the northern remnant and in smaller less dense beds east of the southern remnant. The Summer 2003 sampling did not collect any SAV.

Barren Island consists of three main eroding remnant sections that total about 180 acres. The island is a part of the Chesapeake Islands Refuge unit of the National Wildlife Refuge System. The island is primarily composed of a mix of forest and marsh habitats. Extensive biological resource information has been collected for the area. Of particular note is the presence of two sites at the southern end of the island used by colonial nesting water birds. The principle species nesting in these colonies include great blue heron, double crested cormorant, herring gull, and brown pelican. There is also a bald eagle nest site on the south end of the island. Breakwaters have been installed along portions of the west and north sides. Initially many of the breakwaters were sand filled geotextile tubes. These structures have deteriorated and several have since been fortified with rock. Dredged material from the Honga River federal navigation project has been deposited behind many of the breakwaters to create salt marsh. There are several licensed pound net sites on the west side of Barren Island. However, only one of these would be potentially directly affected by the project, and this net has not been fished in the last five years. The Chesapeake Bay aerial SAV surveys from the past 10 years indicate that SAV was consistently absent along the exposed west side of the island. It was occasionally reported from the north side of the island in small beds. SAV was most frequently observed on the east side in fairly large beds of variable density. Qualitative SAV sampling conducted in 2002 and 2003 generally agreed with this pattern.

Barren Island is classified as an "Otherwise Protected Area" (OPA) under the Coastal Barrier Improvement Act of 1990. OPA's are not subject to the Act's restrictions on the use of federal funds except for a restriction on the use of federal flood insurance for new construction. Similarly, there is no requirement for consultation with the Service.

Federally Listed Endangered and Threatened Species

The bald eagle (*Haliaeetus leucocephalus*), which is federally listed as a threatened species, has one nest site on the north end of James Island and another nest site on the south end of Barren Island. Construction activities that occur within 0.25 mile of a nest site could have an adverse effect on the eagles. If such activities are anticipated, you should contact this office to discuss the need for scheduling the work to avoid the nesting season or other precautionary measures to reduce the potential for adverse effects. The shortnose sturgeon (*Acipenser brevirostrum*), which is federally listed as endangered, and some sea turtle species especially the loggerhead (*Caretta caretta*) and Kemp's ridley (*Lepidochelys kempi*), which are federally listed as threatened and endangered respectively, may occasionally occur within this region of Chesapeake Bay. Since these species are under the jurisdiction of the National Marine Fisheries Service, we recommend that you contact them for further information.

Future Without the Project

At James Island erosion is progressing so rapidly that we would expect that the island would completely disappear within 2 or 3 decades. At Barren Island breakwaters installed along the northwest side of the island have slowed the rate of erosion, although some of these breakwaters are becoming less effective. In view of the continuing need to dispose of dredged material from the federal channel, it appears likely that there would be an effort to extend the breakwaters

further southward. However, as this would take place slowly over many years, the southern portion of the island would continue to be exposed to a high rate of erosion.

BIOLOGICAL EFFECTS OF THE PROJECT

At the James Island site, 2,070 acres of open water habitat would be converted to an island composed of a mix of tidal wetland and upland forest. In an area of this size the existing aquatic resources are certainly significant, but high value habitats such as oyster bars, productive clam bottom, SAV beds, and popular fishing sites would be avoided. A moderate amount of blue crab commercial harvesting that occurs in the area would be displaced. The new island would be generally located in the area of the historic James Island footprint, although it would extend significantly beyond the 1847 shoreline. Due to erosion, island habitat is becoming scarce in Chesapeake Bay. Undeveloped islands often have special habitat values because their isolation tends to reduce predation and human disturbance pressures. Sensitive species such as colonial nesting birds find them especially attractive. The new island will protect the existing island remnants from the waves that develop over the long fetch from the north and west directions. The wave protected zone between the new island and the James Island remnants could become more productive and would appear to have potential for SAV colonization.

The James Island project will utilize a large quantity of navigation channel dredged material that would be difficult to dispose of without significant environmental impacts. The experience to date with the similar project at Poplar Island indicates that the disturbance associated with dike construction can be effectively managed. The fact that the habitat development goals of that project also appear to be progressing well is a good indication that the James Island project would be successful.

The environmental effects associated with the Barren Island project would be primarily favorable. Although one inactive pound net could be affected, for the most part there would not be any significant adverse effects on recreational or commercial fishing activities. The rock sill would protect this island wildlife refuge from a severe erosion threat. The retention of an intact island should help to maintain the rather extensive beds of SAV that occur on the east side and potentially the beds that occur along Hooper Island. The project would provide a placement area for the productive use of dredged material from the local federal navigation channels. There could be some disturbance of the bird rookeries by the construction activity especially in the future as the shoreline recedes closer to the colonies. This potential impact would be minimized by seasonal restrictions or other precautions, which would be included, if necessary, in the special use permit that would be required from the Refuge.

CONCLUSIONS

The James Island placement site appears to be well chosen to minimize adverse biological effects, while using dredged material for habitat development and protection purposes. Construction and development of an island habitat on such a large scale will present many challenges. However, the ongoing experience at Popular Island indicates that dredged material can be used in this way to create desirable habitat. The proposed monitoring and adaptive management plan will help to insure that the project achieves its objectives.

In conclusion, the Service enthusiastically supports both the James Island and Barren Island components of this project. If there are any questions, please contact George Ruddy at (410) 573-4528.

Sincerely,

for John P. Wolflin
Supervisor

cc: Tom Eagle, Eastern Neck Refuge

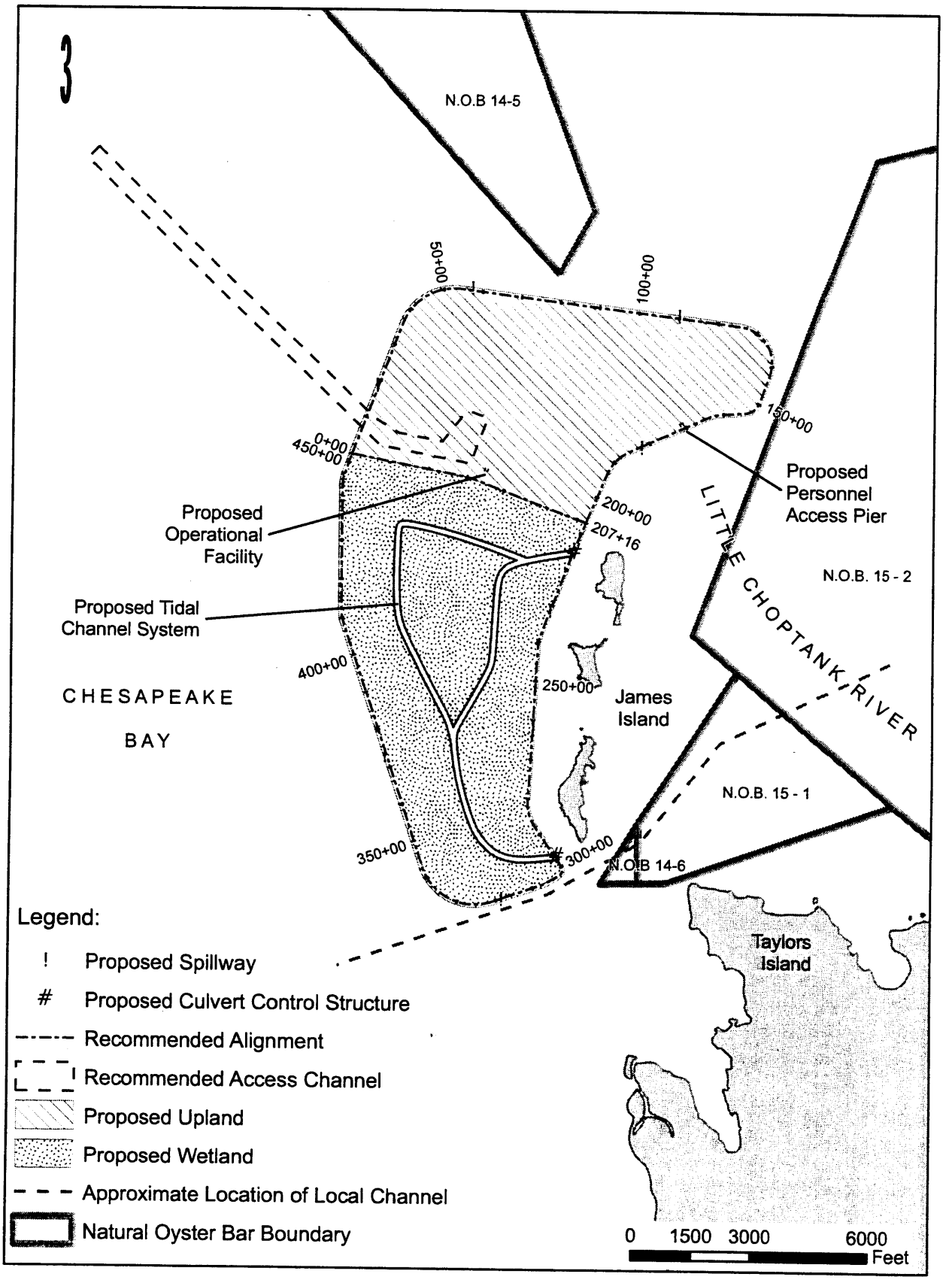

Figure 1. James Island Recommended Plan.

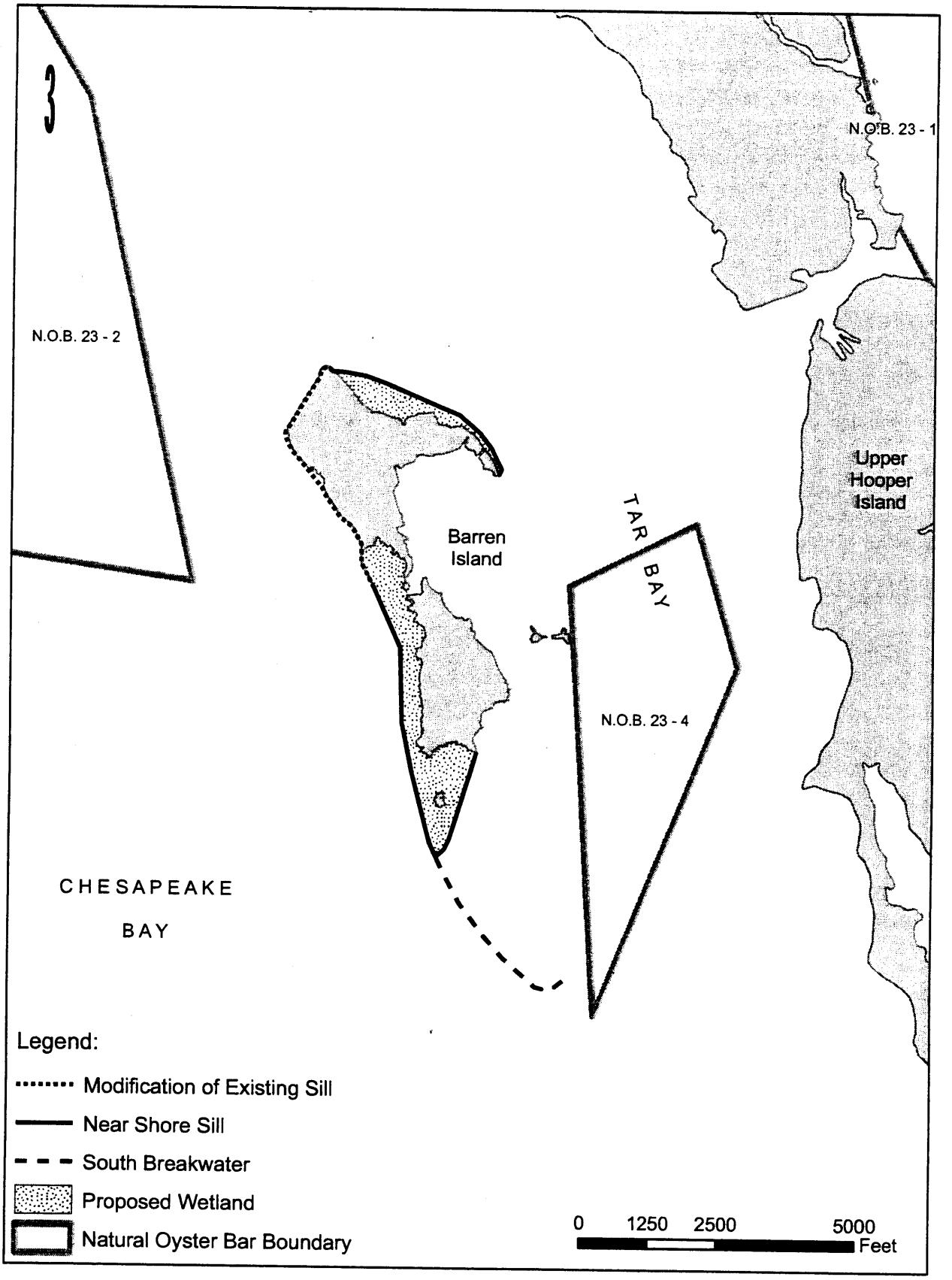

Figure 2. Barren Island Recommended Plan.

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, U.S. ARMY CORPS OF ENGINEERS
P. O. BOX 1715
BALTIMORE, MARYLAND 21203-1715

REPLY TO
ATTENTION OF

June 8, 2005

Planning Division

Mr. Jim Newcomb
Dorchester County
Soil Conservation District Director
501 Court Lane
Rm 213
Cambridge, MD 21613

Dear Mr. Newcomb:

The Baltimore District, U.S. Army Corps of Engineers (Corps) in partnership with the State of Maryland Department of Transportation, Maryland Port Administration (MPA) has initiated an environmental restoration feasibility study for the restoration of island habitat in the Mid-Chesapeake Bay region. The Mid-Chesapeake Bay Islands Environmental Restoration Feasibility Study focuses on restoring hundreds of acres of aquatic and wildlife island habitat in the Mid-Chesapeake Bay region through the beneficial use of dredged material from the Port of Baltimore channel system. The study is recommending island restoration at James Island and Barren Island, both on the Eastern Shore of Maryland in Dorchester County. A feasibility report with an integrated Environmental Impact Statement (EIS) is currently being prepared and is scheduled for public review in the late summer or fall of 2005.

The purpose of this letter is to request your determination on the impact of the proposed Mid-Chesapeake Bay Island Environmental Restoration Project on soils designated as prime farmland on James and Barren Islands in order to fulfill compliance with the Prime and Unique Farmlands Executive Order (CEQ Memorandum, 11 August 1980). Keyport silt loam occurs on the eastern shore of the northern remnant of James Island. Mattapex silt loam exists throughout Barren Island, with the largest area on the southern remnant. At this time, the Corps does not anticipate adverse impacts to the prime farmland soils at either Barren or James Island. Only positive benefits are expected as the proposed project would provide protection to both islands. Enclosed please find figures depicting the proposed activities at James and Barren Island (Figure 1 and 2, respectively).

The James Island portion of the project involves constructing armored dikes, breakwaters, and/or other structures approximating the island's historical footprint and filling the enclosed area with clean dredged material from Federal navigation channels in Chesapeake Bay. The 2,072-acre fill area would be subdivided to provide approximately 55% tidal wetland habitats and 45% upland island habitats. The proposed alignment would provide capacity for 78 to 90 million cubic yards (Mcy) of dredged material consisting of relatively low cohesion silts and clays with some fine sands. Construction at James Island would necessitate the dredging of an access channel on the northwest. The access channel would be approximately 12,720 feet in length, and 400 feet in width at base with 3:1 side slopes. Of the total length, 3,070 feet would lie within the island footprint, with 9,650 feet extending outside the footprint. The total footprint of the access channel is roughly 153.5 ac, with 52.7 ac within and 100.8 ac outside the island footprint. Approximately 40,000 feet of perimeter dikes would be constructed using sand hydraulically dredged from within the island footprint or from the access channel. The project limit is highlighted in Figure 1. The project limit identifies the project impact boundaries and provides for minor

adjustments to the location of the proposed island alignment. The sediment to construct the proposed wetland and upland habitat area at James Island would be dredged from the following Federal navigation channels in the Chesapeake Bay leading to Baltimore Harbor: the Craighill Entrance Channel; the Craighill Channel; the Craighill Angle, the Craighill Upper Range; the Cutoff Angle; the Brewerton Channel Eastern Extension; the Tolchester Channel, the Swan Point Channel, Inland Waterway from Delaware River to Chesapeake Bay, and potentially other non-federal projects.

Plans for Barren Island incorporate the use of sills to protect the current acreage of the island and the SAV (submerged aquatic vegetation)/shallow water habitat off the eastern shore of Barren Island. Sills constructed along the current shoreline would be backfilled with dredged material to create wetland habitat. Phase I Barren restoration would involve the modification of 4,900 feet of existing rock sill, construction of 3,840 feet of new rock sill on the north shore, 4,620 feet along the western and southern shore, and a back-up containment of 1,300 feet. Sills would be built to an elevation of 4 feet MLLW (mean lower low water) modification of the existing sill and construction of new sills would consume roughly 20 ac of shallow water habitat. Approximately, 23 and 49 ac of island habitat (72 ac total) would be created by backfilling on the north, and west and south, respectively. The material that would be used to backfill behind the breakwaters at Barren Island would be from authorized maintenance of local Honga River channels and is characterized as silt and sand. Also, as part of Phase I, monitoring would be carried out to evaluate the need for constructing breakwaters off the southern tip of Barren Island following the historic shoreline in order to protect the SAV habitat to the south and southeast of Barren Island. If it is determined that the SAV habitat to the south and southeast requires further protection, a maximum 8,200 feet of structure is proposed at a maximum height of 6 feet MLLW. If built to maximum length, the southern breakwater would have a 9.5 ac footprint. In total, Barren Island restoration measures would directly impact 92 ac of near-shore habitat. The project limit is identified in Figure 2.

The Corps is requesting your concurrence that the proposed project is not likely to adversely affect the soils designated as prime farmland on James and Barren Islands. Please review the enclosures and provide your agency's concurrence or comments within 30 days of the date of this letter.

If you have any questions, please contact Ms. Angie Sowers at (410) 962-7440.

Sincerely,

Wesley E. Coleman, Jr.
Chief, Civil Project Development Branch

Enclosures

DORCHESTER SOIL CONSERVATION DISTRICT

501 Court Lane, Room 213
Cambridge, Maryland 21613
Phone (410) 228-3733

June 27, 2005

Department of the Army
Baltimore District, U.S. Army Corps of Engineers
Planning Division - c/o Wesley E. Coleman Jr.
P.O. Box 1715
Baltimore, Maryland 21203-1715

Dear Mr. Coleman:

This letter is in reference to your letter dated June 8, 2005 about your proposed project to restore parts of James and Barren Islands. Pertaining to effects of these restoration efforts on the prime farmland soils remaining on these two islands, we see no adverse effects. If anything there will only be positive effects by protecting the limited acreage left. With out any intervention these islands will be completely gone in the near future, so we only see positive benefits by protecting and expanding what is currently there.

If you have any questions or need any additional information please contact us.

Sincerely;

James A. Newcomb Jr.

James A. Newcomb Jr.

Our Soil — Our Strength

WILLIAM GIESE, JR., Chairman
ALAN JOLICOEUR, Treasurer
G. STEELE PHILLIPS, Vice-Chairman
BETSY GALLAGHER, Secretary & Extension Agent
JOSEPH LAYTON, Member
GENE SKINNER, District Conservationist
JOHNSON SHUFELT, Member
JULIE MILLIKEN, District Secretary
JAMES NEWCOMB, JR., District Manager

Appendix F

Mid-Chesapeake Bay Island Proposed Adaptive Management Plan for James Island Project

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MID-CHESAPEAKE BAY ISLAND PROPOSED ADAPTIVE MANAGEMENT PLAN FOR JAMES ISLAND PROJECT

June 2005

1.0 PURPOSE OF ADAPTIVE MANAGEMENT AT BARREN ISLAND AND JAMES ISLAND

The Mid-Chesapeake Bay Island Environmental Restoration project will utilize suitable dredged material to complete island habitat restoration/ protection at Barren Island and habitat restoration at James Island. The proposed project at James Island will beneficially use suitable clean dredged material from the Chesapeake Bay to restore approximately 2070 acres of island habitat. The proposed habitat restoration/ protection project at Barren Island will create shoreline protection along the western side of Barren Island, and clean local dredged material will be used to build wetlands behind the protection. The goals of the Mid-Chesapeake Bay Island Environmental Restoration project (Mid-Bay Island), as stated in the Project Management Plan is:

> *"To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material."*

2.0 MID-BAY ISLAND BACKGROUND

2.1 James Island

James Island is located in the Chesapeake Bay in Dorchester County, Maryland near the mouth of the Little Choptank River and about one mile offshore from Taylor's Island (Figure 1). Since 1847, over 800 acres have eroded from the privately owned island. As of 2002, James Island consisted of three eroding island remnants totaling less than 100 acres. The habitat restoration project at James Island consists of creating new island habitat using clean dredged material from the Chesapeake Bay approach channels to the Port of Baltimore. Approximately 2070 acres of island habitat will be restored by placing 78 to 92 million cubic yards (mcy) of dredged material behind 45,235 linear feet of containment dikes. The dredged material will be placed, dewatered, graded, and planted if necessary to create 55% wetland habitat (approximately 1140 acres) and 45% upland habitat (approximately 930 acres). A variety of intertidal habitats will be restored in the wetland as areas including low marsh, high marsh, beaches, and mudflats. The wetlands will also include vegetated and unvegetated habitat islands, ponds, and tidal channels to enhance the habitat value for fish, reptiles, amphibians, birds, and mammals. Scrub shrub areas and forested areas will be created in the upland areas, and transition zones will be created between the upland and wetland areas. The containment dikes for the restoration project may be constructed using a single phase or a multi phase approach. Once construction is complete, the project is expected to accept dredged material for approximately 28 years assuming an average inflow rate of 3.2 mcy per year (USACE, 2005).

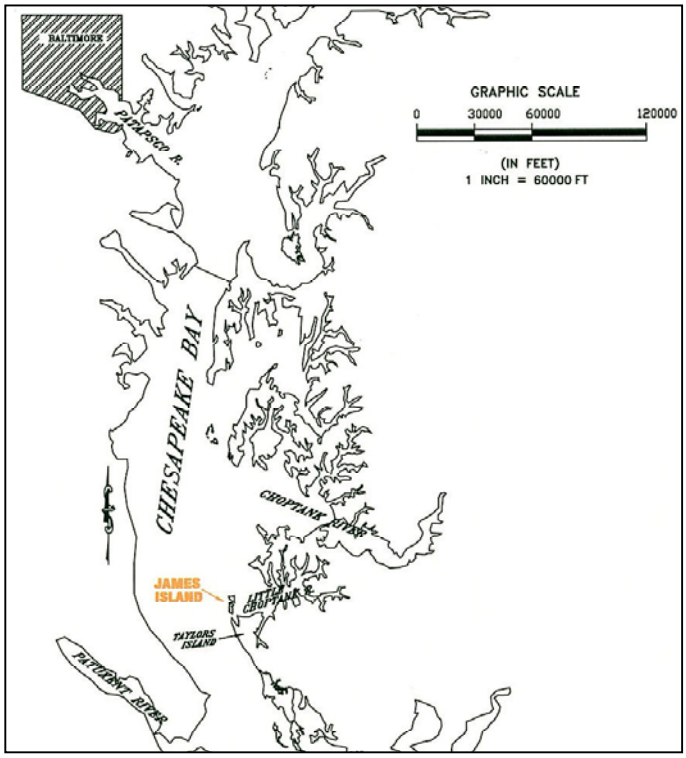

Figure 1. James Island Site Location

2.2 Barren Island

Barren Island is an uninhabited island located in the Chesapeake Bay in Dorchester County, Maryland near the Honga River and immediately west of Hoopers Island (see Figure 2). Since 1848, about 78% of its acreage has been lost to erosion. Currently, Barren Island consists of three eroding island remnants totaling about 180 acres in size. The island is federally owned and managed by the U.S. Fish and Wildlife Service (USFWS) as a satellite refuge area to Blackwater National Wildlife Refuge. The restoration/ protection project will consist of constructing 13,550 linear feet of breakwater along the western shore of Barren Island, extending southward beyond the island, and 3,840 linear feet of breakwater along the northern shoreline of the island. It is expected that once construction of the shoreline protection component is complete, local dredged material will be used to periodically fill in the areas behind the breakwater to create up to 94 acres of wetlands (USACE, 2005).

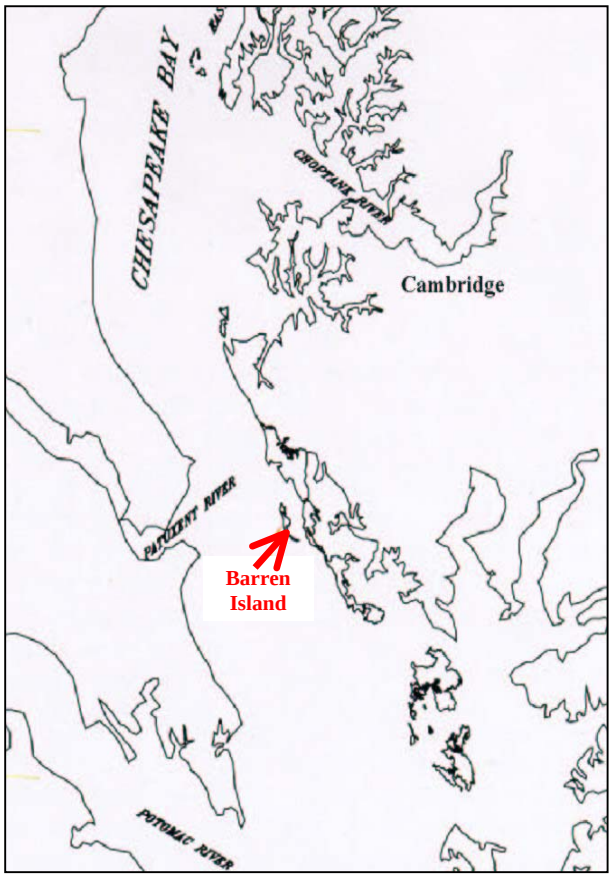

Figure 2. Barren Island Site Location

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3.0 INTRODUCTION TO ADAPTIVE MANAGEMENT

Adaptive Management is an iterative process of setting a management plan, reviewing progress toward executing the goals and objectives of the plan, and revising the plan as necessary to reflect "lessons learned". Adaptive management methods allow for versatility when developing environmental restoration projects. It allows management to continually refine objectives, goals, and implementation methods. Due to its versatility, Adaptive Management is very applicable to environmental restoration projects (USACE, 2004).

An Adaptive Management Plan includes the following key elements:

- Goals and objectives for the final project outcome
- Measurable end points upon which to evaluate progress toward those goals, including acceptable bounds of success around those end points
- Methods for measuring progress toward those end points
- A schedule for reviewing the measurements and assessing progress
- A mechanism for developing corrective actions when progress is outside of the acceptable bounds
- A mechanism for implementing those corrections, and
- A mechanism for incorporating the lessons learned from those assessments into a revised management plan, which could include revising the goals and objectives and/or the end points (USACE, 2004).

Figure 3 illustrates the Adaptive Management process.

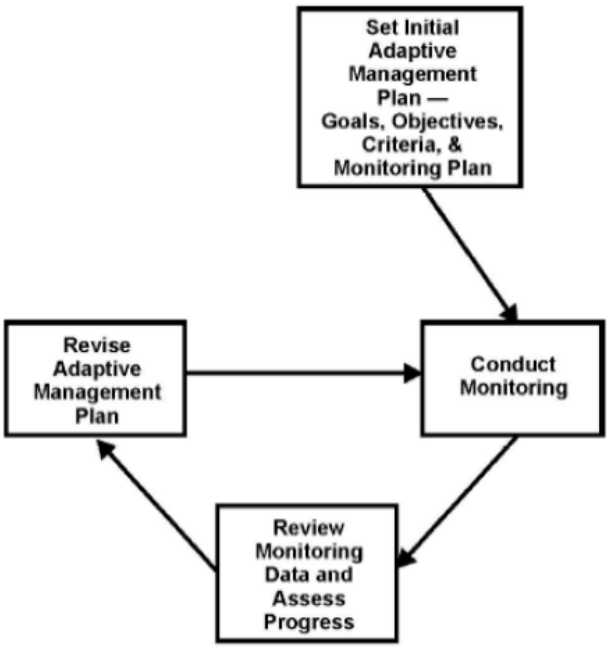

Figure 3. Adaptive Management Process (taken from USACE, 2004)

4.0 INTEGRATION OF THE ADAPTIVE MANAGEMENT PLAN WITH MID-BAY ISLAND ENVIRONMENTAL RESTORATION PROJECT MANAGEMENT

Adaptive Management practices are currently being used for the Poplar Island Environmental Restoration Project (PIERP), which is a project very similar to the proposed habitat restoration at James Island. The Adaptive Management process outlined for PIERP is the model for this Adaptive Management Plan. Management of the proposed Mid-Bay Island Environmental Restoration Project will incorporate both Adaptive Management and traditional task management methods. Tasks related to the habitat restoration goal will be managed using Adaptive Management methods, tasks such as general design, construction, and maintenance will be managed using more traditional task management methods (USACE, 2004). The Adaptive Management Plan described in this document outlines the Adaptive Management approach to tasks for both areas of the Mid-Bay Island project: habitat restoration/ protection at Barren Island and habitat restoration at James Island.

4.1 Management Structure

Figure 4 illustrates the organization of the management teams for PIERP; it is likely that the management team for the proposed Mid-Bay Island project will follow this model. The project partners, the Baltimore District of the U.S. Army Corps of Engineers (Corps) and the Maryland Port Administration (MPA), will form the Ecosystem Restoration Project Coordination Team. A Site Development Team, Site Operations Team, and Adaptive Management Team will support the Project Coordination Team and are responsible for daily tasks. The primary responsibility of the Adaptive Management Team will be to draft and execute management plans and guidance

documents related to the habitat restoration and environmental monitoring components of the project. In addition to members from the Corps and MPA, the Adaptive Management Team will include representatives from the Maryland Environmental Service (MES), and involved contractors (USACE, 2004).

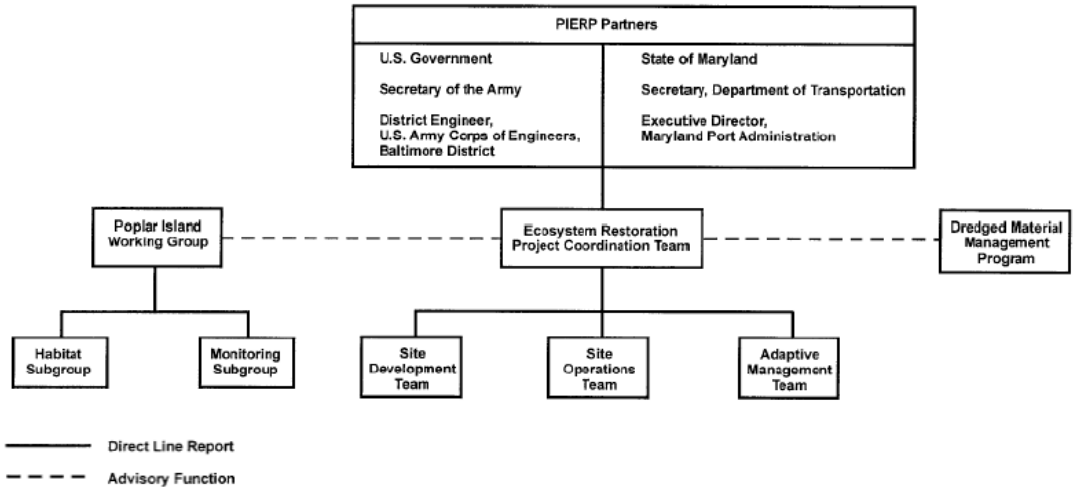

Figure 4. Example of Project Management Team Structure for PIERP (USACE, 2004)

4.2 Key Environmental Documents

Figure 5 illustrates the relationship between the Adaptive Management Plan and other key environmental documents for the PIERP (USACE, 2004). The same environmental documents will likely be required for the Mid-Bay Island Environmental Restoration Project. Some of the documents included in Figure 5, such as the Cell development Plans, the Wildlife Management Plan, and the Habitat Development Framework, will be drafted later in the project planning process.

The Habitat Development Framework (HDF) is the primary document supporting the island restoration. It provides the basic design goals and guidelines for each of the habitat types proposed for creation, such as low tidal marsh, high tidal marsh, habitat islands in the marsh, upland/ wetland transition zones, tidal creeks, ponds, upland scrub shrub, and upland forested habitat. The design goals and guidelines as described in the Mid-Bay Island feasibility study are reflected in the goals and objectives of the Adaptive Management Plan. The goals and objectives of habitat restoration will be evaluated on a regular basis, and, adjusted to reflect lessons learned during the ongoing development of the island. Any revisions resulting from the review process will be incorporated into an updated version of the HDF. Due to this system of regular updates, this Adaptive Management Plan (AMP) and the HDF will be mutually supportive documents (USACE, 2004).

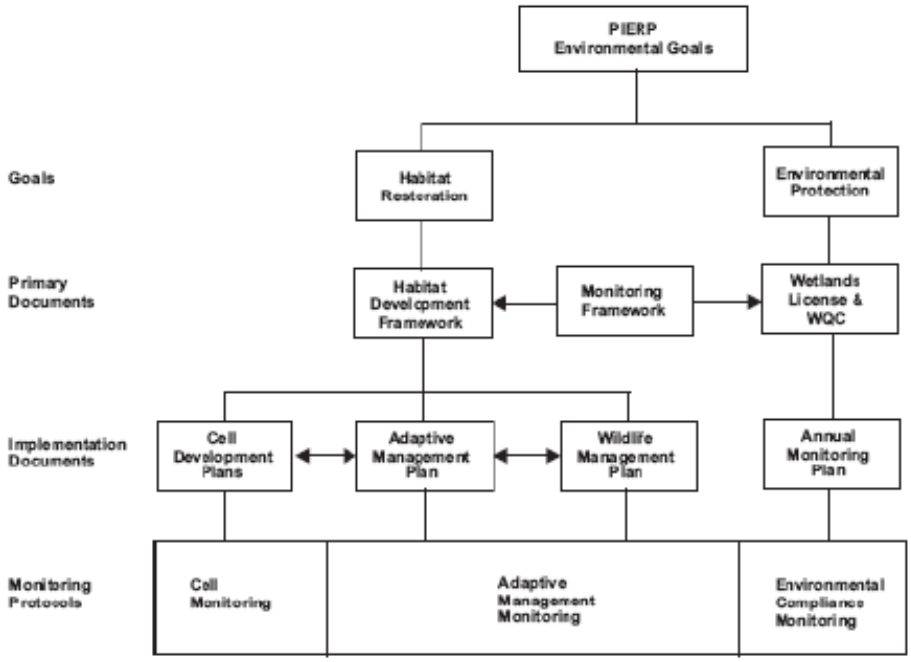

Figure 5. Example of Interrelationships of Key Environmental Planning Documents for PIERP (USACE, 2004)

The island habitat restoration project at James Island will be divided into discrete cells and subcells for purposes of dredged material placement and habitat restoration. A Cell Development Plan will be developed for each cell to outline the habitat restoration process in that cell. This Plan will provide cell-specific design details such as substrate elevation, tidal channel morphology (for marsh cells), and vegetation plantings. The specifics of the Cell Development Plan will be derived from the goals and guidelines contained in both the HDF and the AMP (USACE, 2004). The restoration/ protection project at Barren Island will not be divided into cells due to its smaller size. However, a plan that fills the same role as the Cell Development Plan may be developed for the Barren Island restoration/ protection project if necessary.

A Monitoring Framework will be prepared for the James Island and Barren Island projects in consultation with federal and state agencies. The Monitoring Framework will outline the study methods used to document progress on the habitat restoration goals. The studies in this framework will include sediment characterization, water quality, vegetation, submerged aquatic vegetation (SAV), and wildlife monitoring. Section 7.0 will describe how these studies support the monitoring component of the AMP. The AMP allows for the monitoring studies to be revised and additional studies added in response to project needs; therefore the Monitoring Framework will likely change as the AMP evolves (USACE, 2004).

5. ADAPTIVE MANAGEMENT APPROACH FOR MID-BAY ISLAND ENVIRONMENTAL RESTORATION PROJECT MANAGEMENT

Adaptive Management is a tiered approach that will relate to the broad habitat restoration goal of the Mid-Bay Island project, and to specific criteria for assessing progress toward attaining that goal. The hierarchy of elements in this Adaptive Management Plan is (USACE, 2004):

• Goal	Primary project goal
• Subgoal	Secondary goal in support of primary goal
• Objective	Action task to be implemented (e.g., create, improve, achieve)
• Attribute	Specific, measurable aspect of the objective (e.g., size, concentration, species composition)
• Criterion: • Target • Acceptable boundary around the target	Measurable endpoint for each attribute, expressed as: Most probable outcome Acceptable range around that outcome, recognizing environmental variability and the inherent uncertainty of ecological restoration projects
• Monitoring Plan • Approach/methods • Schedule	Plan for measuring progress toward achieving the objective, including: Specific approach to measuring each attribute Frequency for conducting the measurements

(Taken from USACE, 2004)

The Adaptive Management Team will implement the following steps for the Mid-Bay Island Adaptive Management process (USACE, 2004):

1. Develop the initial project goals, objectives, criteria, and monitoring framework.

   This initial AMP is developed based on the goals and environmental parameters described in the Mid-Bay Island feasiblity study.

2. Periodically assess progress toward meeting the objectives and criteria.

   The Adaptive Management Team will review the Adaptive Management Plan annually by evaluating environmental monitoring data collected during the year and assessing progress toward achieving the Plan's objectives and criteria. The project partners can review specific objectives, criteria, or monitoring plans more frequently in response to project needs; interim Adaptive Management decisions will be documented and incorporated in the annual update.

3. Develop corrective actions, as necessary, to re-align the project design or operation or to adjust the key environmental plans.

   If the annual review indicates that the project is not on target for meeting the objectives, the Adaptive Management Team develops corrective actions. Corrective actions can include redesigning or reconstructing, revising cell or habitat development guidelines, redefining goals or objectives, or modifying criteria. Following submittal to the Working Group for review, the proposed corrective actions will be implemented or submitted to the Site Development Team or Site Operations Team. All corrective actions are subject to the approval of the Ecosystem Restoration Project Coordination Team (USACE, 2004).

6. ADAPTIVE MANAGEMENT GOALS, OBJECTIVES, AND CRITERIA

The Adaptive Management Plan has two components: Restoration and Cell Development. The Restoration Component relates to habitat creation, and the outcome of the restoration once development is complete and the habitat has matured. This component establishes long term habitat restoration objectives that are used to evaluate the success of the project. Monitoring of

the restoration goals will begin after a discrete unit of the habitat has been completed. This leads to a varied monitoring schedule with some monitoring types not being performed until years into the project, or after the project has been completely developed.

The Cell Development Component of the AMP generally pertains to shorter term activities than the Restoration Component; it relates to habitat development within each cell. The details of dredged material placement, developing channels, achieving correct elevations, and final planting of vegetation are detailed in the Cell Development Component. This component creates interim objectives to work toward the long term objectives described in the Restoration Component. Assessment of the goals and objectives of the Cell Development Component will be done on an annual basis during project construction, and monitoring of these goals and objectives usually commences sooner in the project schedule than the Restoration Component monitoring (USACE, 2004). Figure 6 illustrates the Adaptive Management review process for the two components, and their relationship in the overall project plan.

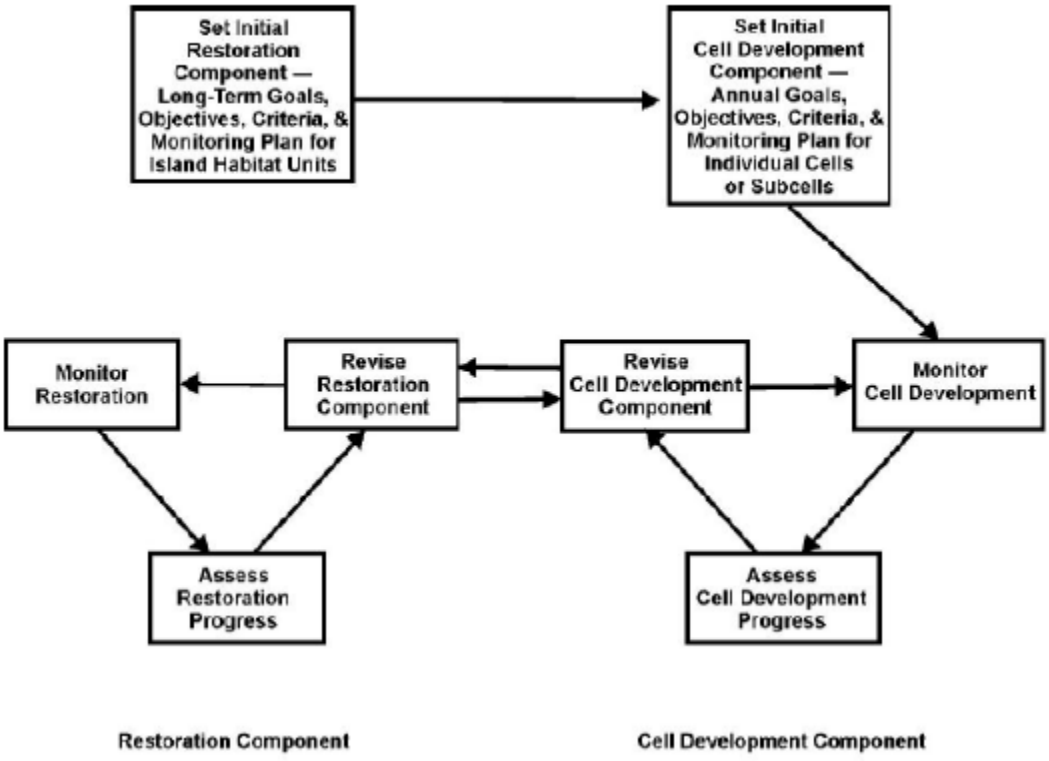

Figure 6. Interrelationship Between Restoration and Cell Development Components

6.1 Restoration Component

The habitat restoration goal of the Mid-Bay Island project is to create approximately 2070 acres of remote island habitat at James Island and restore up to 94 acres of wetlands and provide shoreline protection at Barren Island. The habitat at James Island will consist of 55% wetlands and 45% uplands. This Restoration Component is divided into ten subgoals:

- 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 habitat
- Minimize impacts to existing commercial fisheries
- Minimize establishment of invasive species to maximum extent possible
- Optimize the capacity for placement of dredged material (3.2 mcy/yr).

These subgoals were developed by the Mid-Bay Island Project Delivery Team (PDT) and documented in the Mid-Bay Island Feasibility Report. The AMP breaks down the subgoals into the Adaptive Management elements: objectives, attributes, and criteria (targets and acceptable bounds). Table 1 depicts an example of the AMP structure, and Attachment 1 contains the full Restoration Component of the Mid-Bay Island AMP (USACE, 2004).

No.	Objective	Attribute	Criterion		Monitoring Plans		Source	Current Conditions
			Target	Acceptable Bounds	Approach	Schedule		
Subgoal #4: Increase wetlands acreage in the Chesapeake Bay watershed;								
4-1	Construct 1138 acres of additional wetlands at James Island using suitable dredged material from the Chesapeake Bay.	Size	1138 acres	1138 to 1242 acres	Engineering survey	Annual HDF update (MES, 2004)	MidBay Feasibility Study (Appendix C) states there will be 1138 acres of intertidal habitat. PIERP AMP sets acceptable bounds at ±5%.	Total size of marsh cells in __% design is __. The restoration project has not yet begun.
4-2	Construct wetlands at Barren Island using local dredged material.	Size	TBD	TBD	Engineering survey	Annual HDF update (MES, 2004)	MidBay Feasibility Study (Appendix C) states there will up to 94 acres of intertidal habitat. PIERP AMP sets acceptable bounds at ±5%.	Total size of marsh cells in __% design is __. The restoration project has not yet begun.

Table 1. Example of Adaptive Management Structure, Restoration Component

Restoration Component objectives relate to habitat creation for each subgoal, and many of the criteria for each objective establish numeric targets that are derived from project drawings, information described in the Mid-Bay Island feasibility study, and information from similar projects such as PIERP. Many of the subgoals also relate to habitat use by wildlife; the objectives for these goals tend to be non-numeric, establishing the presence or absence of the species in that particular habitat. The Restoration Component criteria presented in the AMP will include targets and bounds determined by the Adaptive Management Team. Data from environmental studies conducted in the vicinity of James Island and Barren Island and lessons learned from PIERP were used to develop the criteria. It should be noted that the acceptable bounds often establish a numerical range for the target, and success for the objective does not

necessarily require establishing an identical habitat to a reference area. The AMP also includes columns providing a reference, explanation, and source for each target and bound (see Attachments 1 and 2) (USACE, 2004c).

6.2 Cell Development Component

The Mid-Bay Island feasibility study provides one subgoal for the Cell Development Component: optimize the capacity for placement of dredged material (3.5 mcy/yr).
Additional subgoals can be added to the AMP as project development progresses.

Objectives, attributes, and criteria will be assigned to describe each of the Cell Development subgoals, as outlined in Section 5.0. The objectives contained in the Cell Development component relate to operating goals and details on cell construction to prepare for habitat restoration. Operating goals can include dewatering and placement of dredged material. Cell construction goals can include criteria for hydrology, substrate, vegetation, and elevation. Table 2 is an example of the structure of the Cell Development Component from the PIERP AMP. The Cell Development Component pertinent to the Mid-Bay Island Restoration Project is located in Attachment 2. It should be noted that Table 2 contains objectives and attributes that are specific to a certain cell. These cell specific objectives and attributes are derived from the general objectives and attributes that would be provided in the Restoration Component (USACE, 2004c).

Subgoal #2: Operate Site to Optimize Drying and Consolidation of Placed Material and to Support Habitat requirements at James Island								
No.	Objective	Attribute	Criterion		Monitoring Plan		Source	Current Condition
			Target	Acceptable Bounds	Approach	Schedule		
2-1	Maximize Consolidation at James Island	Shrinkage factor	0.68		Calculated from measured void ratio and cut void ratio.		PIERP AMP	Not yet applicable
2-2		Void Ratio	2.8		Calculated from moisture content and specific gravity tests of in place material.		PIERP AMP	Not yet applicable
2-3		Surface elevation • Wetland cells • Upland cells	(1)+1.4 ft. (2)+1.5 ft. (1)+20 ft. (2)+18 ft.		Engineering Survey		PIERP AMP	Not yet applicable

Table 2. Example of Adaptive Management Structure, Cell Development Component

7.0 MONITORING PLANS

A monitoring plan will be developed for each objective or attribute in the Restoration or Cell Development Components of the AMP. A monitoring plan outlines the parameters to be measured, the methods to be used, and the schedule for conducting the monitoring. The Monitoring Framework is usually cited in the AMP when additional information is needed regarding monitoring goals and methods. In addition to the Monitoring Framework, a monitoring plan will be developed annually for the Mid-Bay Island Environmental Restoration Project that will cover all the required regulatory monitoring. The annual monitoring plan is compiled from input from monitoring agencies, contractors, and lessons learned from previous

years of monitoring. It is expected that the Mid-Bay Island monitoring framework will be similar to PIERP, and contain studies to monitor discharge quality, SAV presence, sediment quality, water quality, benthic community, nekton, birds, and other wildlife. The results of these studies will be evaluated by the Adaptive Management Team and used to refine the AMP as needed.

8.0 ONGOING REVIEWS AND UPDATE

The Adaptive Management Team will review the AMP annually, however, the project partners can review specific objectives, criteria, or monitoring plans more frequently in response to project needs. The review process assesses the monitoring data for each criterion, and evaluates the progress toward achieving the habitat objectives. Favorable monitoring results and acceptable progress may lead the Adaptive Management Team to leave the AMP unrevised. However, the AMP can be revised in the following ways to correct unsatisfactory progress or monitoring results:

- Revise the Adaptive Management Plan level (subgoal, objective, attribute, criterion) to make it more realistic
- Revise the monitoring plan to better determine why progress is not occurring
- Revise the design and/or operation of the project to try to recover or redirect progress toward the goal or objective
- Revise the design and/or operation of the project to reflect a new or revised goal or objective
- Revise the Habitat Development Framework
- Revise the Monitoring Framework
- Revise individual cell development plans (USACE, 2004).

It is likely that the review process during the initial years of the project will concentrate on the Cell Development Component of the AMP. During the early stages of the project there will be few completed habitat areas to evaluate or monitor, and the Restoration Component may only have to be revised if an objective is determined to be unachievable. Monitoring for the long-term restoration goals outlined in the Restoration Component will begin once that habitat has been created at the project. The types of monitoring that may be required for the project are discussed in Section 7.0. Details of monitoring objectives, methods, and schedules will be included in a Monitoring Framework.

Historic records should be maintained to document the changes that have occurred to objectives, attributes, criteria, and the reasons those revisions were made in the evolving AMP. The records should include:

- Data used in the assessment (i.e., current conditions at the time of the assessment),
- Evaluations of those data versus the criteria,
- Recommended changes,
- Implemented changes or reasons for not implementing specific recommended changes. (USACE, 2004).

9.0 References:

U.S. Army Corps of Engineers (USACE), Baltimore District. 2005. Draft Environmental Impact Statement for Mid-Chesapeake Bay Island Ecosystem Restoration Feasibility Study. June 2005.

U.S. Army Corps of Engineers (USACE), Baltimore District. 2004. Poplar Island Environmental Restoration Project Adaptive Management Plan. July 2004.

Attachment 1
Adaptive Management Plan Restoration Component

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Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule**		
Subgoal #1: Restore and enhance marsh, aquatic, and terrestrial island habitat for fish, reptiles, amphibians, birds, and mammals.								
1-1	Create 1138 acres of intertidal habitat at James Island.	Size (acres)	TBD	TBD	Engineering survey	Annual HDF update	Draft Mid-Bay Report (Appendix C) states there will be 1138 acres of intertidal habitat. (USACE, 2005)	Design phase/ construction has not begun.
1-2	Create low marsh at James Island	Size (acres)	TBD	TBD	Engineering survey	Annual HDF update	TBD	Design phase/ construction have not begun
1-3		Location • Up-grade from sand beach • Not up-grade from sand beach	 TBD TBD	 TBD TBD	Engineering survey	Annual HDF update	TBD	Design phase/ construction have not begun
1-4		Elevation	0.3 ft to 1.73 ft	TBD	Engineering survey	Annual HDF update	Elevations specified in Cell Development component of PIERP AMP (USACE, 2004).	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule**		
1-5		Target Flora --species composition • S. alterniflora • S. patens • Other reference species • Nuisance species	≥80% ≤20% ≤20% 0%	20-100% 0-80% 0-80% 0-10%	Wetland Vegetation Monitoring	Annual HDF update	Monitoring specified in Mid-Chesapeake Bay Feasibility Report. (USACE, 2005) Coverage percentages from PIERP AMP (USACE, 2004).	Design phase/ construction have not begun
1-6		Target Flora--% coverage by wetland plants (areas do not include channels, islands, ponds, or mud flats)	≥90%	≥85%	Wetland Vegetation Monitoring	Annual HDF update	Monitoring specified in Mid-Chesapeake Bay Feasibility Report. (USACE, 2005) Coverage percentages from PIERP AMP (USACE, 2004).	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule**		
1-7		Target Fauna utilization • Herpetiles • Wading birds • Waterbirds • Shorebirds • Waterfowl • Fish	TBD	TBD	Bird Utilization & Wetlands Use by Wildlife Monitoring	Annual HDF update	Mid-Chesapeake Bay Feasibility Report (USACE, 2005)	Design phase/ construction have not begun
1-8	Create high marsh at James Island	Size (acres)	TBD	TBD	Engineering survey	Annual HDF update	TBD	Design phase/ construction have not begun
1-9		Location • Adjacent to uplands	TBD	TBD	Engineering survey	Annual HDF update	TBD	Design phase/ construction have not begun
1-10		Elevation	1.73 to 2.2 ft.	TBD	Engineering survey	Annual HDF update	Elevations specified in Cell Development component of PIERP AMP (USACE, 2004).	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule**		
1-11		Target Flora --species composition • S. patens • S. alterniflora • Other reference species • Nuisance species	≥80% ≤20% ≤20% 0%	20-100% 0-80% 0-80% 0-10%	Wetland Vegetation Monitoring	Annual HDF update	Monitoring specified in Mid-Chesapeake Bay Feasibility Report. (USACE, 2005) Species percentages from PIERP AMP (USACE, 2004).	Design phase/ construction have not begun
1-12		Target Flora--% coverage by wetland plants (areas do not include channels, islands, ponds, or mud flats)	≥90%	≥85%	Wetland Vegetation Monitoring	Annual HDF update	Monitoring specified in Mid-Chesapeake Bay Feasibility Report (USACE, 2005). Coverage percentages from PIERP AMP (USACE, 2004).	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***

No.	Objective	Attribute	Criterion		Monitoring Plans		Source	Current Conditions
			Target	Acceptable Bounds	Approach	Schedule		
1-13		Target Fauna utilization • Herpetiles • Wading birds • Waterbirds • Shorebirds • Waterfowl • Fish	TBD	TBD	Bird Utilization and Wetlands Use by Wildlife Monitoring	Annual HDF update	Monitoring specified in Mid-Chesapeake Bay Feasibility Report (USACE, 2005).	Design phase/ construction have not begun
1-14		Hummocks • size • location • elevation	 TBD TBD TBD	 TBD TBD TBD	Engineering Survey	Annual HDF update	Monitoring specified in Mid-Chesapeake Bay Feasibility Report (USACE, 2005).	Design phase/ construction have not begun
1-15	Create beach habitat at James Island	Size (acres)	TBD	TBD	Engineering survey	Annual HDF update	TBD	Design phase/ construction have not begun
1-16		Size (length of shoreline)	TBD	TBD	Engineering survey	Annual HDF update	TBD	Design phase/ construction have not begun
1-17		Slope	TBD	TBD	Engineering survey	Annual HDF update	TBD	Design phase/ construction have not begun
1-18		Substrate • type • size	 sand TBD	 TBD TBD	Engineering survey	Annual HDF update	TBD	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule**		
1-19		Target Flora --species composition • S. patens • S. alterniflora • Other reference species • Nuisance species	TBD	TBD	Wetland Vegetation Monitoring	Annual HDF update	Monitoring specified in Mid-Chesapeake Bay Feasibility Report (USACE, 2005).	Design phase/ construction have not begun
1-20		Target Flora--% coverage by wetland plants (areas do not include channels, islands, ponds, or mud flats)—areas are expected to be sparsely vegetated.	TBD	TBD	Wetland Vegetation Monitoring	Annual HDF update	Monitoring specified in Mid-Chesapeake Bay Feasibility Report (USACE, 2005).	Design phase/ construction have not begun
1-21		Target Fauna utilization • Herpetiles • Wading birds • Water birds • Shorebirds • Waterfowl • Fish	TBD	TBD	Bird Utilization and Wetlands Use by Wildlife Monitoring	Annual HDF update	Monitoring specified in Mid-Chesapeake Bay Feasibility Report (USACE, 2005).	Design phase/ construction have not begun
1-22	Create unvegetated mudflat habitat	Size (acres)	TBD	TBD	Engineering survey	Annual HDF update	TBD	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule**		
1-21	at James Island	Substrate • Type • Size	Silt/clay/ fine sediment TBD	TBD TBD	Engineering survey	Annual HDF update	TBD	Design phase/ construction have not begun
1-22		Elevation	-0.6 to +0.9 ft	TBD	Engineering survey	Annual HDF update	Elevations specified in Cell Development component of PIERP AMP (USACE, 2004).	Design phase/ construction have not begun
1-23		Target Flora--% coverage by wetland plants (areas do not include channels, islands, ponds, or mud flats)	0%	TBD	Wetland Vegetation Monitoring	Annual HDF update	Monitoring specified in Mid-Chesapeake Bay Feasibility Report. (USACE, 2005)	Design phase/ construction have not begun
1-24		Target Fauna utilization • Herpetiles • Wading birds • Water birds • Shorebirds • Waterfowl • Fish	TBD	TBD	Bird Utilization and Wetlands Use by Wildlife Monitoring	Annual HDF update	Monitoring specified in Mid-Chesapeake Bay Feasibility Report. (USACE, 2005)	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***

No.	Objective	Attribute	Criterion		Monitoring Plans		Source	Current Conditions
			Target	Acceptable Bounds	Approach	Schedule		
1-25	Create tidal creek habitats at James Island	Size	Acreage TBD	TBD	Engineering survey	Annual HDF update	Mid-Chesapeake Bay Feasibility Report , Section 3 (USACE, 2005) and PIERP AMP (USACE, 2004).	Design phase/ construction have not begun
1-26		Dimension • Width • Depth	TBD TBD	TBD TBD	Engineering survey	Annual HDF update	Mid-Chesapeake Bay Feasibility, Section 3 Report (USACE, 2005) and PIERP AMP (USACE, 2004).	Design phase/ construction have not begun
1-27		Location • Low marsh • Mudflat • Beach	Within intertidal habitat	TBD	Engineering survey	Annual HDF update	Mid-Chesapeake Bay Feasibility Report , Section 3 (USACE, 2005) and PIERP AMP (USACE, 2004).	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule**		
1-28		Target Flora (SAV) Species Composition: • Widgeon grass (*Ruppia maritime*) • Horned pondweed (*Zannichellia palustris*) • Sago pondweed (*Potamogeton pectinatus*)	80% 10% 10%	0%-80% 0%-20% 0%-20%	SAV Monitoring	TBD	Mid-Chesapeake Bay Feasibility Report, Section 2 (USACE, 2005). Monitoring specified in Mid-Chesapeake Bay Feasibility Report (USACE, 2005)	Not yet applicable.
1-29		Target Flora –SAV density	TBD	TBD	SAV Monitoring	Annual HDF update	Monitoring specified in Mid-Chesapeake Bay Feasibility Report (USACE, 2005)	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule**		
1-30		Target fauna: • Forage fish • Commercial/predatory/ higher trophic fish	TBD TBD	TBD TBD	Fisheries Monitoring & Wetlands Use by Wildlife Monitoring	Annual HDF update	Monitoring specified in Mid-Chesapeake Bay Feasibility Report, Section 8 (USACE, 2005)	Design phase/ construction have not begun
1-31	Create open water (pond/ pool) habitats at James Island	Size	Acreage TBD		Engineering survey	Annual HDF update	Mid-Chesapeake Bay Feasibility Report, Section 3 (USACE, 2005) and PIERP AMP (USACE, 2004).	Design phase/ construction have not begun
1-32		Dimension • Width • Depth	TBD TBD	TBD TBD	Engineering survey	Annual HDF update	Mid-Chesapeake Bay Feasibility Report, Section 3 and PIERP AMP (USACE, 2004).	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***

No.	Objective	Attribute	Criterion		Monitoring Plans		Source	Current Conditions
			Target	Acceptable Bounds	Approach	Schedule		
1-33		Location • High Marsh • Uplands	#TBD	TBD	Engineering survey	Annual HDF update	Mid-Chesapeake Bay Feasibility Report, Section 3 and PIERP AMP (USACE, 2004).	Design phase/ construction have not begun
1-34		Target Flora (SAV) Species Composition: • Widgeon grass (*Ruppia maritime*) • Horned pondweed (*Zannichellia palustris*) • Sago pondweed (*Potamogeton pectinatus*)	80% 10% 10%	0%-80% 0%-20% 0%-20%	SAV Monitoring	TBD	Mid-Chesapeake Bay Feasibility Report, Section 2. Monitoring specified in Mid-Chesapeake Bay Feasibility Report, Section 8 (USACE, 2005)	Design phase/ construction have not begun
1-35		Target Flora –SAV density	TBD	TBD	SAV Monitoring	Annual HDF update	Monitoring specified in Mid-Chesapeake Bay Feasibility Report, Section 8 (USACE, 2005)	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule**		
1-36		Target fauna: • Forage fish • Commercial/predatory/ higher trophic fish • Herpetiles • Wading birds • Water birds • Shorebirds • Waterfowl	TBD (not in all ponds) TBD (not in all ponds) TBD (in fish-less ponds) TBD TBD TBD TBD	TBD TBD TBD TBD TBD TBD TBD	Bird Utilization, Fisheries Monitoring, & Wetlands Use by Wildlife Monitoring	Annual HDF update	Monitoring specified in Mid-Chesapeake Bay Feasibility Report, Section 8 (USACE, 2005)	Design phase/ construction have not begun
1-37	Create a habitat transition zone between upland and wetland habitat at James Island to disperse water flow into wetlands.	Width	TBD	TBD	Engineering Survey	Annual HDF update	Mid-Bay Report (Appendix C) states there will be a transition zone between the wetlands and uplands (USACE, 2005).	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule**		
1-38		Slope	TBD	TBD	Engineering Survey	Annual HDF update	Mid-Bay Report (Appendix C) states there will be a transition zone between the wetlands and uplands (USACE, 2005).	Design phase/ construction have not begun
1-39		Flora--% coverage	TBD	TBD	Wetland Vegetation Monitoring	Annual HDF update	Mid-Chesapeake Bay Feasibility Report, Section 3 (USACE, 2005) and PIERP AMP.	Design phase/ construction have not begun
1-40		Flora—species composition: Potentially freshwater wetlands species once upland cells have been dewatered.	TBD	TBD	Wetland Vegetation Monitoring	Annual HDF update	Mid-Chesapeake Bay Feasibility Report, Section 3 (USACE, 2005) and PIERP AMP (USACE, 2004).	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule**		
1-41	Create 932 acres of forested and scrub shrub upland habitat at James Island.	Size • Scrub-shrub • Forested	TBD	TBD	Engineering survey	Annual HDF update	Mid-Chesapeake Bay Feasibility Report, Section 3 (USACE, 2005) and PIERP AMP (USACE, 2004).	Design phase/ construction have not begun
1-42		Flora--% vegetation coverage • Scrub-shrub • Forested	TBD	TBD	Vegetation Monitoring	Annual HDF update	Monitoring specified in Mid-Chesapeake Bay Feasibility Report (USACE, 2005).	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule**		
1-43		Flora—Species composition in forested area (potential) • *P. taeda* • *A. rubrum* • *N. sylvatica* • *L. styraciflua* • *Q. alba* • *Q rubra* • *Q. phellos* • *P.serotina* • *C. occidentalis* • *V. dentatum* • *L. benzoin* • *C. alnifolia*	TBD	TBD	Vegetation Monitoring	Annual HDF update	Mid-Chesapeake Bay Feasibility Report (USACE, 2005), Section 3 and PIERP AMP (USACE, 2004). Monitoring specified in Mid-Chesapeake Bay Feasibility Report (USACE, 2005).	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule**		
1-44		Flora—Species composition in scrub shrub area (potential) • *P. quinquefolia* • *C. radicans* • *Rubus sp* • *S. rotundifolia* • *I. frutescens* • *B. halimifolia* • *M. cerifera* • *P. maritima*	TBD	TBD	Vegetation Monitoring	Annual HDF update	Mid-Chesapeake Bay Feasibility Report, Section 3 (USACE, 2005) and PIERP AMP (USACE, 2004). Monitoring specified in Mid-Chesapeake Bay Feasibility Report (USACE, 2005).	Design phase/ construction have not begun
1-45	Create unvegetated island nesting habitat for birds at James Island.	Size • Total area above high tide line • Individual area above high tide line • Diameter above high tide line	8 acres ≤2 acres ≥50 feet (15 meters)	6-12 acres ≤2 acres ≥30 feet (10 meters)	Engineering survey	Annual HDF update	Mid-Bay Report (Appendix C) (USACE, 2005) and PIERP AMP (USACE, 2004)	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule**		
1-46		Elevation	+8 feet	+6 feet – 12 feet	Engineering survey	Annual HDF update	Mid-Bay Report (Appendix C) (USACE, 2005) and PIERP AMP (USACE, 2004)	Design phase/ construction have not begun
1-47		Moat • width at MLLW • depth at MLLW	TBD	TBD	Engineering survey	Annual HDF update	Mid-Bay Report (Appendix C) (USACE, 2005) and PIERP AMP (USACE, 2004)	Design phase/ construction have not begun
1-48		Substrate • Material • Average shell diameter	TBD TBD	TBD TBD	Engineering survey	Annual HDF update	Mid-Bay Report (Appendix C) (USACE, 2005) and PIERP AMP (USACE, 2004)	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule**		
1-49		Vegetation • % Cover • Height	10% 3-10 inches	5-20% 3-16 inches	TBD	Measure in Spring prior to nesting season	Mid-Bay Report (Appendix C) (USACE, 2005) and PIERP AMP (USACE, 2004)	Design phase/ construction have not begun
1-50		Target Fauna utilization • Terns • Other colonial waterbirds/ shorebirds	TBD	TBD	Bird Utilization Monitoring	Annual HDF update	Mid-Bay Report (Appendix C) (USACE, 2005) and PIERP AMP (USACE, 2004) Monitoring specified in Mid-Chesapeake Bay Feasibility Report.	Design phase/ construction have not begun
1-51	Create vegetated island nesting habitat birds	Size • Total area above high tide line • Individual area above high tide line	8 acres 3.5 acres	6-12 acres 2.5-5 acres	Engineering survey	Annual HDF update	Mid-Bay Report (Appendix C) (USACE, 2005) and PIERP AMP (USACE, 2004)	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule**		
1-52		Moat • Width at MLLW • Depth at MLLW	TBD	TBD	Engineering survey	Annual HDF update	Mid-Bay Report (Appendix C) (USACE, 2005) and PIERP AMP (USACE, 2004)	Design phase/ construction have not begun
1-53		Elevation	+8 feet	+6 feet – 12 feet	Engineering survey	Annual HDF update	Mid-Bay Report (Appendix C) (USACE, 2005) and PIERP AMP (USACE, 2004)	Design phase/ construction have not begun
1-54		Substrate • Material • Average shell diameter	TBD TBD	TBD TBD	Engineering survey	Annual HDF update	Mid-Bay Report (Appendix C) (USACE, 2005) and PIERP AMP (USACE, 2004)	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule**		
1-55		Vegetation • % Cover • Height	≥60% Trees/ shrubs >3 feet high	≥50% >3 feet high	TBD	Measure in Spring prior to nesting season	Mid-Bay Report (Appendix C) (USACE, 2005) and PIERP AMP (USACE, 2004)	Design phase/ construction have not begun
1-56		Target fauna: • Herons • Egrets • Other wading birds	TBD	TBD	Bird Utilization, Monitoring	Annual HDF update	Mid-Chesapeake Bay Feasibility Report, Section 8 (USACE, 2005)	Design phase/ construction have not begun
1-57	Create intertidal habitats at Barren Island using local dredged material as it becomes available.	Size of low marsh	94 acres	Range TBD	Engineering survey	Annual HDF update	Mid-Bay Report (Appendix C) states there will be wetlands (USACE, 2005).	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***

No.	Objective	Attribute	Criterion		Monitoring Plans		Source	Current Conditions
			Target	Acceptable Bounds	Approach	Schedule		
1-58	Create low marsh at Barren Island	Size (acres)	TBD	TBD	Engineering survey	Annual HDF update	Mid-Bay Report (Appendix C) states there will be wetlands (USACE, 2005).	Design phase/ construction have not begun
1-59		Elevation	0.3 ft to 1.73 ft	TBD	Engineering survey	Annual HDF update	Elevations specified in Cell Development component of PIERP AMP (USACE, 2004).	Design phase/ construction have not begun
1-60		Target Flora --species composition • S. alterniflora • S. patens • Other reference species • Nuisance species	≥80% ≤20% ≤20% 0%	20-100% 0-80% 0-80% 0-10%	Wetland Vegetation Monitoring	Annual HDF update	Monitoring specified in Mid-Chesapeake Bay Feasibility Report (USACE, 2005). Species percentages from PIERP AMP (USACE, 2004).	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule**		
1-61		Target Flora--% coverage by wetland plants (areas do not include channels, islands, ponds, or mud flats)	≥90%	≥85%	Wetland Vegetation Monitoring	Annual HDF update	Monitoring specified in Mid-Chesapeake Bay Feasibility Report (USACE, 2005). Coverage percentages from PIERP AMP (USACE, 2004).	Design phase/ construction have not begun
1-62		Target Fauna utilization • herpetiles • wading birds • waterbirds • shorebirds • waterfowl • fish	TBD	TBD	Bird Utilization & Wetlands Use by Wildlife Monitoring	Annual HDF update	Mid-Chesapeake Bay Feasibility Report (USACE, 2005)	Design phase/ construction have not begun
1-63	Create high marsh at Barren Island	Size (acres)	TBD	TBD	Engineering survey	Annual HDF update	TBD	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule**		
1-64		Target Flora --species composition • S. patens • S. alterniflora • Other reference species • Nuisance species	≥80% ≤20% ≤20% 0%	20-100% 0-80% 0-80% 0-10%	Wetland Vegetation Monitoring	Annual HDF update	Monitoring specified in Mid-Chesapeake Bay Feasibility Report (USACE, 2005). Coverage percentages from PIERP AMP (USACE, 2004).	Design phase/ construction have not begun
1-65		Elevation	1.73 to 2.2 ft.	TBD	Engineering survey	Annual HDF update	Elevations specified in Cell Development component of PIERP AMP (USACE, 2004).	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***

No.	Objective	Attribute	Criterion		Monitoring Plans		Source	Current Conditions
			Target	Acceptable Bounds	Approach	Schedule		
1-66		Target Flora--% coverage by wetland plants (areas do not include channels, islands, ponds, or mud flats)	≥90%	≥85%	Wetland Vegetation Monitoring	Annual HDF update	Monitoring specified in Mid-Chesapeake Bay Feasibility Report (USACE, 2005). Coverage percentages from PIERP AMP (USACE, 2004).	Design phase/ construction have not begun
1-67		Target Fauna utilization • herpetiles • wading birds • waterbirds • shorebirds • waterfowl • fish	TBD	TBD	Bird Utilization and Wetlands Use by Wildlife Monitoring	Annual HDF update	Monitoring specified in Mid-Chesapeake Bay Feasibility Report (USACE, 2005).	Design phase/ construction have not begun
1-68		Hummocks • size • location • elevation	TBD TBD TBD	TBD TBD TBD	Engineering Survey and Bird Utilization and Wetlands Use by Wildlife Monitoring	Annual HDF update	Monitoring specified in Mid-Chesapeake Bay Feasibility Report (USACE, 2005).	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***

No.	Objective	Attribute	Criterion		Monitoring Plans		Source	Current Conditions
			Target	Acceptable Bounds	Approach	Schedule		
1-69	Create beach habitat at Barren Island	Size (acres)	TBD	TBD	Engineering survey	Annual HDF update	TBD	Design phase/ construction have not begun
1-70		Size (length of shoreline)	TBD	TBD	Engineering survey	Annual HDF update	TBD	Design phase/ construction have not begun
1-71		Slope	TBD	TBD	Engineering survey	Annual HDF update	TBD	Design phase/ construction have not begun
1-72		Substrate • type • size	 sand TBD	 TBD TBD	Engineering survey	Annual HDF update	TBD	Design phase/ construction have not begun
1-73		Target Flora --species composition • *S. patens* • *S. alterniflora* • Other reference species • Nuisance species	TBD	TBD	Wetland Vegetation Monitoring	Annual HDF update	Monitoring specified in Mid-Chesapeake Bay Feasibility Report (USACE, 2005).	Design phase/ construction have not begun
1-74		Target Flora--% coverage by wetland plants (areas do not include channels, islands, ponds, or mud flats)-- areas are expected to be sparsely vegetated.	TBD	TBD	Wetland Vegetation Monitoring	Annual HDF update	Monitoring specified in Mid-Chesapeake Bay Feasibility Report (USACE, 2005).	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule**		
1-75		Target Fauna utilization • Herpetiles • Wading birds • Water birds • Shorebirds • Waterfowl • Fish	TBD	TBD	Bird Utilization and Wetlands Use by Wildlife Monitoring	Annual HDF update	Monitoring specified in Mid-Chesapeake Bay Feasibility Report (USACE, 2005).	Design phase/ construction have not begun
1-76	Create unvegetated mudflat habitat at Barren Island	Size (acres)	TBD	TBD	Engineering survey	Annual HDF update	TBD	Design phase/ construction have not begun
1-77		Substrate • Type • Size	Silt/clay/ fine sediment TBD	TBD TBD	Engineering survey	Annual HDF update	TBD	Design phase/ construction have not begun
1-78		Elevation	TBD	TBD	Engineering survey	Annual HDF update	TBD	Design phase/ construction have not begun
1-79		Target Flora--% coverage by wetland plants (areas do not include channels, islands, ponds, or mud flats)	0%	TBD	Wetland Vegetation Monitoring	Annual HDF update	Monitoring specified in Mid-Chesapeake Bay Feasibility Report (USACE, 2005).	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule**		
1-80	Create tidal creek habitats at Barren Island	Size	Acreage TBD		Engineering survey	Annual HDF update	Mid-Chesapeake Bay Feasibility Report, Section 3 (USACE, 2005) and PIERP AMP (USACE, 2004).	Design phase/ construction have not begun
1-81		Dimension • Width • Depth	TBD TBD	TBD TBD	Engineering survey	Annual HDF update	Mid-Chesapeake Bay Feasibility Report, Section 3 (USACE, 2005) and PIERP AMP (USACE, 2004).	Design phase/ construction have not begun
1-82		Location • Low marsh • Mudflat	Within intertidal habitat	TBD	Engineering survey	Annual HDF update	Mid-Chesapeake Bay Feasibility Report, Section 3 (USACE, 2005) and PIERP AMP (USACE, 2004).	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule**		
1-83		Target Flora (SAV) Species Composition: • widgeon grass (*Ruppia maritime*) • horned pondweed (*Zannichellia palustris*) • Sago pondweed (*Potamogeton pectinatus*)	80% 10% 10%	≥80% 0%-20% 0%-20%	SAV Monitoring	TBD	Mid-Chesapeake Bay Feasibility Report, Section 2. Monitoring specified in Mid-Chesapeake Bay Feasibility Report, Section 8 (USACE, 2005)	Design phase/ construction have not begun
1-84		Target Flora –SAV density	TBD	TBD	SAV Monitoring	Annual HDF update	Mid-Chesapeake Bay Feasibility Report, Section 2. Monitoring specified in Mid-Chesapeake Bay Feasibility Report, Section 8 (USACE, 2005)	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule**		
1-85	Create open water (pond/ pool) habitats at Barren Island	Size	Acreage TBD		Engineering survey	Annual HDF update	Mid-Chesapeake Bay Feasibility Report, Section 3 (USACE, 2005) and PIERP AMP (USACE, 2004).	Design phase/ construction have not begun
1-86		Dimension • Width • Depth	TBD TBD	TBD TBD	Engineering survey	Annual HDF update	Mid-Chesapeake Bay Feasibility Report, Section 3 (USACE, 2005) and PIERP AMP (USACE, 2004).	Design phase/ construction have not begun
1-87		Location • High Marsh • Uplands	TBD	TBD	Engineering survey	Annual HDF update	Mid-Chesapeake Bay Feasibility Report, Section 3 (USACE, 2005) and PIERP AMP (USACE, 2004).	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule**		
1-88		Target flora: SAV (species composition TBD)	TBD	TBD	SAV Monitoring	Annual HDF update	Mid-Chesapeake Bay Feasibility Report, Section 2. Monitoring specified in Mid-Chesapeake Bay Feasibility Report, Section 8 (USACE, 2005)	Design phase/ construction have not begun
1-89		Target Flora (SAV) Species Composition: • Widgeon grass (*Ruppia maritime*) • Horned pondweed (*Zannichellia palustris*) • Sago pondweed (*Potamogeton pectinatus*)	 80% 10% 10%	 ≥80% 0%-20% 0%-20%	SAV Monitoring	TBD	Mid-Chesapeake Bay Feasibility Report, Section 2. Monitoring specified in Mid-Chesapeake Bay Feasibility Report, Section 8 (USACE, 2005)	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule**		
1-90		Target fauna: • Forage fish • Commercial/predatory/ higher trophic fish • Herpetiles • Wading birds • Water birds • Shorebirds • Waterfowl	TBD (not in all ponds) TBD (not in all ponds) TBD (in fish-less ponds) TBD TBD TBD TBD	TBD TBD TBD TBD TBD TBD TBD	Bird Utilization, Fisheries Monitoring, & Wetlands Use by Wildlife Monitoring	Annual HDF update	Mid-Chesapeake Bay Feasibility Report, Section 8 (USACE, 2005)	Design phase/ construction have not begun
1-91	Achieve use of restored and enhanced habitat at James Island and Barren Island by fish, reptiles, invertebrates amphibians, birds, and mammals.	Target species: • Invertebrate species TBD • Nekton species TBD • Avian species (including waterfowl, colonial waterbirds, shorebirds) TBD • Reptile species TBD • Mammal species TBD • Amphibian species TBD	Presence of animal	TBD	Bird utilization terrapin, horsehoe crab, benthic, fisheries, and wetlands monitoring.	Annual HDF update	Target species from PIERP AMP (USACE, 2004). Monitoring from Mid-Chesapeake Bay Feasibility Report, Section 8 (USACE, 2005).	Design phase/ construction have not begun
Subgoal #2: Protect existing island ecosystems, including sheltered embayments.								

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***

No.	Objective	Attribute	Criterion		Monitoring Plans		Source	Current Conditions
			Target	Acceptable Bounds	Approach	Schedule		
2-1	Protect James Island from further erosion.	Size	Preserve James Island size at completion of dike construction	TBD	TBD—potentially Engineering Survey/ Aerial Survey	TBD	Section 3, Mid-Chesapeake Bay Feasibility Report (USACE, 2005)	As of 2002, total area of James Island was <100 acres.
2-2	Enhance quiescent conditions on eastern side of the James Island.	Wave action—reduced from pre-construction	Protection construction	TBD	TBD—potentially Engineering Survey/ hydrodynamic modeling	TBD	Section 3 and Section 6 of the Mid-Chesapeake Bay Feasibility Report (USACE, 2005).	Design phase/ construction have not begun
2-3	Protect Barren Island from further erosion.	Size	Preserve Barren Island size at completion of construction	TBD	TBD—potentially Engineering Survey/ Aerial Survey	TBD	Section 3, Mid-Chesapeake Bay Feasibility Report (USACE, 2005)	Section 2 of the Mid-Chesapeake Bay Feasibility Report states that Barren Island is approximately 180 acres as of 2004.

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule**		
2-4	Protect the embayment east of Barren Island.	Wave action—reduced from pre-construction	TBD	TBD	TBD—potentially Engineering Survey/ hydrodynamic modeling	TBD	Section 3 and Section 6 of the Mid-Chesapeake Bay Feasibility Report (USACE, 2005).	Design phase/ construction have not begun.

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule***		
Subgoal #3: Minimize impacts to existing fisheries nursery, feeding, and protective habitats								
3-1	Displace minimal known SAV beds or tidal marshes at James Island.	Acreage of SAV beds displaced.	0 acres	TBD	Environmental Studies and Construction Plan	Pre-construction	Section 6, Mid-Chesapeake Bay Feasibility Report (USACE, 2005).	No known SAV beds are located within the James Island habitat restoration project footprint.
3-2	Displace minimal known SAV beds or tidal marshes at Barren Island.	Acreage of SAV beds displaced.	0 acres	TBD	Environmental Studies and Construction Plan	Pre-construction	Section 6 and Appendix C, Mid-Chesapeake Bay Feasibility Report (USACE, 2005).	No known SAV beds are located within the western Barren Island restoration/ protection project footprint. SAV presence in the northern option may need to be determined.

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule***		
3-3	Develop the habitats in Subgoal #1 to attract fisheries species to James Island and Barren Island.	Target species: (Fisheries species) • Crabs • Menhaden • Croaker • Spot • Striped bass	Presence of fisheries species	TBD	Fisheries Monitoring	TBD	Mid-Chesapeake Bay Feasibility Report, Section 3 (USACE, 2005) and PIERP AMP (USACE, 2004).	Design phase/ construction have not begun
3-4		Lifestage: • Juvenile • Adult	Presence of varied life stages.	TBD	Fisheries Monitoring	TBD	Mid-Chesapeake Bay Feasibility Report, Section 3 (USACE, 2005) and PIERP AMP (USACE, 2004).	Design phase/ construction have not begun
3-5	Cause no changes in sediment quality that would affect benthic habitat at James Island or Barren Island.	Chemical quality of sediment	Concentrations ≤ criteria (Threshold effects level) If no criteria is available, concentrations ≤mean reference concentrations	Concentrations ≤2 times reference mean concentration.	Sediment Quality Monitoring	TBD	PIERP AMP, Section 8 Mid-Chesapeake Bay Feasibility Report (USACE, 2005).	See Section 2 of Mid-Chesapeake Bay Feasibility Report.

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule***		
3-6	Cause no accumulation of contaminants in benthic tissue at James Island or Barren Island.	Concentrations of organics and metals in tissue.	Concentrations ≤baseline concentration	Concentrations ≤2 times reference mean concentration.	Benthic Community Monitoring	TBD	PIERP AMP, Section 8 Mid-Chesapeake Bay Feasibility Report (USACE, 2005).	See Section 2 of Mid-Chesapeake Bay Feasibility Report.
Subgoal #4: Increase wetlands acreage in the Chesapeake Bay watershed								
4-3	Construct 1138 acres of additional wetlands at James Island using suitable dredged material from the Chesapeake Bay.	Size	1138 acres	TBD	Engineering survey	Annual HDF update	Mid-Bay Report (Appendix C) states there will be 1138 acres of wetlands (USACE, 2005).	Total size of marsh cells in __% design is __. The restoration project has not yet begun.
4-4	Construct wetlands at Barren Island using local dredged material.	Size	94 acres	TBD	Engineering survey	Annual HDF update	Mid-Bay Report (Appendix C) (USACE, 2005).	Total size of marsh cells in __% design is __. The restoration project has not yet begun.

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule***		

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule***		
Subgoal #5: Decrease local erosion and turbidity.								
5-1	Achieve shoreline protection for James Island and Taylors' Island.	Wave action—reduced from pre-construction	TBD	TBD	Pre- and post construction hydrodynamic studies.	Annual HDF update	Section 3 and Section 6 of the Mid-Chesapeake Bay Feasibility Report (USACE, 2005).	Design phase/ construction have not begun
5-2	Achieve shoreline protection for Barren Island and Hooper Island.	Wave action—reduced from pre-construction	TBD	TBD	Pre- and post construction hydrodynamic studies.	Annual HDF update	Section 3 and Section 6 of the Mid-Chesapeake Bay Feasibility Report (USACE, 2005).	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule***		
5-3	Improve water clarity	Secchi Depth (April 1 to October 1)	Chesapeake Bay Program (CBP) water quality criteria (see Source column)	CBP water quality criteria (see Source column)	Water Quality monitoring	Annual HDF update	EPA Ambient Water Quality Criteria for Chesapeake Bay (p. 96): Water clarity criteria for mesohaline and polyhaline waters of the Chesapeake Bay: Water depth Min. Secchi depth 1.0 m 1.0 m (3.3 ft) (3.3 ft) 1.5 m 1.4 m (4.9 ft) (4.6 ft) 2.0 m 1.9 m (6.6 ft.) (6.2 ft)	See Mid-Chesapeake Bay Feasibility Report Section 2.

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule***		
Subgoal #6: Promote conditions to establish and enhance submerged aquatic vegetation								
6-1	Enhance quiescent conditions on eastern side of the James Island.	Wave action—reduced from pre-construction	TBD	TBD	Pre- and post construction hydrodynamic studies.	Annual HDF update	Section 3 and Section 6 of the Mid-Chesapeake Bay Feasibility Report (USACE, 2005).	Design phase/ construction have not begun
6-2	Protect the embayment east of Barren Island.	Wave action—reduced from pre-construction	TBD	TBD	Pre- and post construction hydrodynamic studies.	Annual HDF update	Section 3 and Section 6 of the Mid-Chesapeake Bay Feasibility Report (USACE, 2005).	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule***		
6-3	Improve water clarity	Secchi Depth (April 1 to October 1)	CBP water quality criteria (see Source column)	CBP water quality criteria (see Source column)	Water Quality monitoring	Annual HDF update	EPA Ambient Water Quality Criteria for Chesapeake Bay (p. 96): Water clarity criteria for mesohaline and polyhaline waters of the Chesapeake Bay: Water depth Min. Secchi depth 1.0 m 1.0 m (3.3 ft) (3.3 ft) 1.5 m 1.4 m (4.9 ft) (4.6 ft) 2.0 m 1.9 m (6.6 ft.) (6.2 ft)	See Mid-Chesapeake Bay Feasibility Report Section 2.

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule***		
6-4	Establish SAV in tidal creeks of constructed wetlands at Barren Island and James Island.	Species Composition: • widgeon grass (*Ruppia maritime*) • horned pondweed (*Zannichellia palustris*) • Sago pondweed (*Potamogeton pectinatus*)	80% 10% 10%	≥80% 0%-20% 0%-20%	SAV Monitoring	Annual HDF update	Mid-Chesapeake Bay Feasibility Report, Section 2 (USACE, 2005).	Design phase/ construction have not begun
6-5		% Coverage	TBD	TBD	SAV Monitoring	Annual HDF update	Mid-Chesapeake Bay Feasibility Report, Section 2 (USACE, 2005).	Design phase/ construction have not begun
Subgoal #7: Promote conditions that support oyster recolonization								
7-1	Reduce turbidity and minimize sedimentation on oyster bars at James Island and Barren Island. (See also Subgoal #5)	Sedimentation rate	0 inches per year	TBD	Shellfish bed sedimentation monitoring	Annual HDF update	Mid-Chesapeake Bay Feasibility Report Section 3 &8(USACE, 2005).	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule***		
7-2	Establish perimeter dike habitat that can be colonized by oysters at James Island	Size—linear feet of dike	45,235 linear feet	TBD	Engineering Survey	Annual HDF update	Mid-Chesapeake Bay Feasibility Report Appendix C (USACE, 2005).	Design phase/ construction have not begun
7-3	Establish breakwater and sill habitat that can be colonized by oysters at Barren Island.	Size—linear feet of dike • Western option • Northern option	13,550 linear feet 3840 linear feet	TBD	Engineering Survey	Annual HDF update	Mid-Chesapeake Bay Feasibility Report Appendix C (USACE, 2005).	Design phase/ construction have not begun
7-4	Protect existing Natural Oyster Bars (NOBs) to the east of James Island (NOB 14-6, NOB 15-1, NOB 15-2) from adverse impacts, post-construction. (during construction is addressed in Subgoal #9)	Sedimentation (post construction)	0 inches per year	0 inches per year	Shellfish bed sedimentation monitoring. Hydrodynamic modeling studies	Post construction Pre-construction	Mid-Chesapeake Bay Feasibility Report Section 3 & 8 (USACE, 2005).	Design phase/ construction have not begun
7-5		Area Displaced	0 acres	0 acres	Construction Plan Engineering Survey	Post construction	Mid-Chesapeake Bay Feasibility Report Section 3 & 8 (USACE, 2005).	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule***		
7-6	Protect existing NOB 23-4 to the east to the Barren Island from adverse impacts, post-construction. (during construction is addressed in Subgoal #9)	Sedimentation (from construction)	0 inches per year	0 inches per year	Shellfish bed sedimentation monitoring. Hydrodynamic modeling studies	Post construction Pre-construction	Mid-Chesapeake Bay Feasibility Report Section 3 & 8 (USACE, 2005).	Design phase/ construction have not begun
7-7		Area Displaced	0 acres	0 acres	Construction Plan Engineering Survey	Post construction	Mid-Chesapeake Bay Feasibility Report Section 3 (USACE, 2005)	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule***		
Subgoal #8: Minimize impacts to rare, threatened, and endangered species and their habitat								
8-1	Implement time of year restrictions to prevent human disturbance.	Target Species: • Bald Eagles • Wading bird rookeries • TBD	TBD	TBD	Bird Utilization & Wetlands Use by Wildlife Monitoring	Annual HDF update (MES, 2004)	TBD	Design phase/ construction have not begun
8-2		Distance	TBD	TBD	TBD	Annual HDF update	TBD	Design phase/ construction have not begun
8-3		Time period	TBD	TBD	TBD	Annual HDF update	TBD	Design phase/ construction have not begun
8-4	Implement inflow methods to minimize risk to marine species.	Target Species:	TBD	TBD	TBD	Annual HDF update	TBD	Design phase/ construction have not begun
8-5		Method	TBD	TBD	TBD	Annual HDF update	TBD	Design phase/ construction have not begun
Subgoal #9: Minimize impacts to existing commercial fisheries								
9-1	Construction will not adversely impact Natural Oyster Bars (NOBs) to the east of James Island (NOB 14-6, NOB 15-1, NOB 15-2)	Sedimentation (from construction)	0 inches per year	0 inches per year	Shellfish bed sedimentation monitoring. Hydrodynamic modeling studies	Pre- and post construction Pre-construction	Mid-Chesapeake Bay Feasibility Report Section 3 & 8 (USACE, 2005).	Design phase/ construction have not begun
9-2		Displacement	0 acres	0 acres	Construction Plan Engineering Survey	Pre- and post construction	Mid-Chesapeake Bay Feasibility Report Section 3 & 8 (USACE, 2005).	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule***		
9-3	Construction will not adversely impact NOB 23-4 to the east of Barren Island	Sedimentation (from construction)	0 inches per year	0 inches per year	Shellfish bed sedimentation monitoring. Hydrodynamic modeling studies	Pre- and post construction Pre-construction	Mid-Chesapeake Bay Feasibility Report Section 3 & 8 (USACE, 2005).	Design phase/ construction have not begun
9-4		Displacement	0 acres	0 acres	Construction Plan Engineering Survey	Pre- and post construction	Mid-Chesapeake Bay Feasibility Report Section 3 (USACE, 2005)	Design phase/ construction have not begun
9-5	Construction will not displace existing pound net locations at Barren or James Islands.	Number of licensed pound nets within footprint of James Island restoration project	0 nets	0 nets	Construction Plan Environmental Studies	Pre- and post construction	Mid-Chesapeake Bay Feasibility Report Section 3, Mid-Chesapeake Bay Feasibility Report Section 6 (USACE, 2005)	No licensed pound net locations are within recommended plan footprint at James Island.
9-6		Number of licensed pound nets within footprint of Barren Island restoration/ protection project	0 nets	0 nets	Construction Plan Environmental Studies	Pre- and post construction	Mid-Chesapeake Bay Feasibility Report Section 3, Mid-Chesapeake Bay Feasibility Report Section 6 (USACE, 2005)	One licensed pound net location is within recommended plan footprint at Barren Island.

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule***		
9-7	Minimize impact of construction of the projects at James Island and Barren Island on blue crab fishery.	Limit acreage of displaced crab potting areas within James Island project footprint.	TBD	TBD	Construction Plan Environmental Studies	Pre- and post construction	Mid-Chesapeake Bay Feasibility Report Section 3, Mid-Chesapeake Bay Feasibility Report Section 6 (USACE, 2005)	An estimated 1,900 acres of productive crabbing area would be displaced by the restoration project (USACE, 2005).
9-8		Limit acreage of displaced crab potting areas within Barren Island project footprint.	TBD	TBD	Construction Plan Environmental Studies	Pre- and post construction	Mid-Chesapeake Bay Feasibility Report Section 3, Mid-Chesapeake Bay Feasibility Report Section 6 (USACE, 2005)	The Barren Island restoration project will be built in shallower water and would not remove a significant amount of available area for crabbing.

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule***		
Subgoal #10: Minimize establishment of invasive species to maximum extent possible								
10-1	Control invasive and nuisance species in habitat restoration areas at the James Island project.	Species Composition • Flora—*Phragmites australis* (common reed), *Lonicera japonica* (Japanese honeysuckle), nuisance species on habitat islands, others TBD. • Animal: mute swan, cormorant, predatory gulls, nutria, other species TBD.	0% TBD	0-10% TBD	Bird utilization terrapin, horseshoe crab, benthic, fisheries, and wetlands monitoring.	TBD	Monitoring specified in Mid-Chesapeake Bay Feasibility Report (USACE, 2005). Coverage percentages from PIERP AMP (USACE, 2004).	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule***		
10-2	Control invasive and nuisance species in wetland restoration areas of Barren Island	Species Composition • Flora: *Phragmites australis* (common reed), *Lonicera japonica* (Japanese honeysuckle), nuisance species on habitat islands, others TBD. • Animal: mute swan, cormorant, predatory gulls, nutria, other species TBD.	0% TBD	0-10% TBD	Bird utilization terrapin, horseshoe crab, benthic, fisheries, and wetlands monitoring.	TBD	Monitoring specified in Mid-Chesapeake Bay Feasibility Report (USACE, 2005). Coverage percentages from PIERP AMP (USACE, 2004).	Design phase/ construction have not begun
10-3	Reduce invasive species populations on existing Barren Island and James Island remnants to prevent colonization.	Species Composition • Flora: (see species above) • Animal: (see species above).	0% TBD	0-10% TBD	Bird utilization terrapin, horseshoe crab, benthic, fisheries, and wetlands monitoring.	TBD	Monitoring specified in Mid-Chesapeake Bay Feasibility Report (USACE, 2005). Coverage percentages from PIERP AMP (USACE, 2004).	As of 2004, common reed is present on both Barren Island and James Island. 2002-2003 bird surveys documented

Attachment 2
Adaptive Management Plan Cell Development Component

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Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule**		
Subgoal #1: Optimize the capacity for placement of dredged material (3.2 mcy/yr) at James Island.								
1-1	Manage inflow placement yearly at James Island.	Placement volume: • Total • Cell __ • Cell __	=3.2 mcy/ year TBD TBD	TBD	TBD	Annual HDF update	MidBay Feasibility Report, Appendix C (USACE, 2005)	Design phase/ construction have not begun
		"Lifespan" of project	25 years	25 to 30 years	TBD	Annual HDF update	MidBay Feasibility Report, Appendix C (USACE, 2005)	Design phase/ construction have not begun
		Yearly placement • Year 1 • Year 2 • Year 3 • Etc.	≅3.2 mcy/ year	TBD	TBD	Annual HDF update	MidBay Feasibility Report, Appendix C (USACE, 2005)	Design phase/ construction have not begun
Subgoal #2: Operate Site to Optimize Drying and Consolidation of Placed Material and to Support Habitat requirements at James Island								
2-4	Maximize Consolidation at James Island	Shrinkage factor	0.68	TBD	Calculated from measured void ratio and cut void ratio.	Annual HDF update (MES, 2004)	PIERP AMP (USACE, 2004)	Design phase/ construction have not begun
2-5		Void Ratio	2.8	TBD	Calculated from moisture content and specific gravity tests of in place material.	Annual HDF update	PIERP AMP (USACE, 2004)	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule**		
2-6		Surface elevation, average: • Wetland cells • Upland cells	+1.5 ft. +18 ft.	TBD	Engineering Survey	Annual HDF update	PIERP AMP (USACE, 2004)	Design phase/ construction have not begun
Sub-Goal #3: Develop Cells to Achieve Habitat Requirements at James Island								
3-1	Construct demonstration cell to meet wetland physical requirements	Size	TBD	TBD	TBD	Annual HDF update	PIERP AMP (USACE, 2004)	Design phase/ construction have not begun
3-2		Hydrodynamics • Hydroperiod • Residence time • Maximum depth-average velocity in channels (at ebb) • Maximum scour velocity in channel (at ebb) • Width of outlet	TBD	TBD	Engineering Survey	Annual HDF update	PIERP AMP (USACE, 2004)	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule**		
3-3		Low Marsh • Size • Elevation (at MLLW) • Tidal range • Salinity • pH • Alkalinity • Substrate type • Substrate salt content • Substrate pH • Substrate sulfides • Substrate nutrients	 TBD 0.3 ft to 1.73 ft. MTL-MHW 3-25 ppt 4.5-8.5 34-555 mg $CaCO_3$/L Silt/clay/sand/peat 10-35 ppt TBD TBD TBD	TBD	Engineering Survey	Annual HDF update	PIERP AMP (USACE, 2004)	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***

No.	Objective	Attribute	Criterion		Monitoring Plans		Source	Current Conditions
			Target	Acceptable Bounds	Approach	Schedule		
3-4		Low marsh channel: • Depth at MLLW • Width--4th order, 3rd order, & 2nd order • Length--4th order • Length--3rd order • Length--2nd order • Length ratio--4th order • Length ratio--3rd order • Length ratio--2nd order • Bifurcation ratio--4th order • Bifurcation ratio --3rd order • Bifurcation ratio --2nd order • Sinuosity--4th order • Sinuosity--3rd order • Sinuosity--2nd order	TBD	TBD	Engineering Survey	Annual HDF update	PIERP AMP (USACE, 2004)	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***

No.	Objective	Attribute	Criterion		Monitoring Plans		Source	Current Conditions
			Target	Acceptable Bounds	Approach	Schedule		
3-5		Mudflats • Size • Elevation (at MLLW)	TBD -0.6 to +0.9 ft	TBD	TBD	Annual HDF update	PIERP AMP (USACE, 2004)	Design phase/ construction have not begun
3-6		Low marsh pond/ pools • Size • Bank slope • Depth/ area at MLLW	TBD 5:1 10% @ 0.5 ft, 80% @ 1 ft, 10% @ 3 ft	TBD	TBD	Annual HDF update	PIERP AMP (USACE, 2004)	Design phase/ construction have not begun
3-7		Nesting islands • Size (area above high tide line) • Elevation (at MLLW) • Width (diameter) of each island above high tide line • Substrate • Moat width • Moat depth	2 acres 8 ft. ≥50 ft. Sand, covered with shell <0.5 in. TBD	≤2 acres ≥30 ft. Shell size <1.0 in. TBD	Engineering Survey	Annual HDF update	PIERP AMP (USACE, 2004)	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule**		
3-8		High Marsh • Size • Elevation (at MLLW) • Tidal range • Salinity • pH • Alkalinity • Substrate type • Substrate salt content • Substrate pH • Substrate sulfides • Substrate nutrients	TBD 1.73 to 2.2 ft. MHW-MSHW 3-25 ppt 3.7-3.9 170-8600 mg $CaCO_3$/L Silt/clay/sand/peat TBD TBD TBD TBD TBD	TBD	TBD	Annual HDF update	PIERP AMP (USACE, 2004)	Design phase/ construction have not begun
3-9		High marsh pond/ pools • Size • Bank slope • Depth/ area at MLLW	TBD	TBD	TBD	Annual HDF update	TBD	Design phase/ construction have not begun
3-10	Construct a demonstration cell to achieve low marsh habitat requirements	Species composition • Year 1 • Year 3 • Year 5	TBD	TBD	TBD	Annual HDF update	TBD	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule**		
3-11		Survival • Year 1 • Year 2	TBD	TBD	TBD	Annual HDF update	TBD	Design phase/ construction have not begun
3-12		Species density • Year 1 • Year 3 • Year 5	TBD	TBD	TBD	Annual HDF update	TBD	Design phase/ construction have not begun
3-13		% Cover • Year 2 • Year 3 • Year 5	≥50% ≥75% ≥90%	≥45% ≥70% ≥85%		Annual HDF update	PIERP AMP (USACE, 2004)	Design phase/ construction have not begun
3-14	Construct a demonstration cell to achieve high marsh habitat requirements	Species composition • Year 1 • Year 3 • Year 5	TBD	TBD	TBD	Annual HDF update	TBD	Design phase/ construction have not begun
3-15		Survival • Year 1 • Year 2	TBD	TBD	TBD	Annual HDF update	TBD	Design phase/ construction have not begun
3-16		Species density • Year 1 • Year 3 • Year 5	TBD	TBD	TBD	Annual HDF update	TBD	Design phase/ construction have not begun
3-17		% Cover • Year 2 • Year 3 • Year 5	≥50% ≥75% ≥90%	≥45% ≥70% ≥85%	TBD	Annual HDF update	PIERP AMP (USACE, 2004)	Design phase/ construction have not begun

Restoration Goal: ***To restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material.***								
No.	**Objective**	**Attribute**	**Criterion**		**Monitoring Plans**		**Source**	**Current Conditions**
			Target	**Acceptable Bounds**	**Approach**	**Schedule**		
3-18	Provide goose fencing in the demonstration cell.	Grid Spacing	TBD	TBD	TBD	Annual HDF update	TBD	Design phase/ construction have not begun
Sub-Goal #4: Manage Undesirable Species on James Island and Barren Island								
4-1	Manage undesirable species	• Phragmites • Gulls • Swans • Cormorants • Predators	TBD	TBD	TBD	Annual HDF update	TBD	Design phase/ construction have not begun

Attachment 3
Supporting Studies

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Supporting Studies from Monitoring Framework						
No.	Objective	Attribute	Monitoring Plan		Notes	Current Conditions
			Approach	Schedule		
1	Monitor physical and chemical (metals, etc.) parameters in sediments outside of the projects at James Island and Barren Island. Also monitor sediments within the project for input on ecological function and need for soil conditioning.	Concentrations of: • Metals • Nutrients • Pesticides • Dioxin/furan congener • PCB congener • PAHs	Sediment Quality Monitoring in Mid-Chesapeake Bay Feasibility Study (USACE, 2005)	TBD		Project construction and monitoring have not yet started.
2		Grain size	Sediment Quality Monitoring in Mid-Chesapeake Bay Feasibility Study (USACE, 2005)	TBD		Project construction and monitoring have not yet started.
3	Monitor vegetation in restored marshes at James Island and Barren Island to provide operational input on survival of plant species and methods to increase planting success	Measure plant community: • Species composition • Density • production	Wetland Vegetation Monitoring in Mid-Chesapeake Bay Feasibility Study (USACE, 2005)	TBD		Project construction and monitoring have not yet started.
4		Compare plant community: • species composition • zonation	Wetland Vegetation Monitoring in Mid-Chesapeake Bay Feasibility Study (USACE, 2005)	TBD		Project construction and monitoring have not yet started.
5	Monitor water quality characteristics in the project area to evaluate the presence (if any) of long-term changes.	Concentrations of CBP criteria (nutrients)	Water Quality Monitoring in Mid-Chesapeake Bay Feasibility Study (USACE, 2005)	TBD		Project construction and monitoring have not yet started.
6		Concentrations of Inland Testing Manual (ITM) parameters (chemical)	Water Quality Monitoring in Mid-Chesapeake Bay Feasibility Study (USACE, 2005)	TBD		Project construction and monitoring have not yet started.
7		Concentrations of priority pollutant metals and organics (field parameter).	Water Quality Monitoring in Mid-Chesapeake Bay Feasibility Study (USACE, 2005)	TBD		Project construction and monitoring have not yet started.

Supporting Studies from Monitoring Framework						
No.	Objective	Attribute	Monitoring Plan		Notes	Current Conditions
			Approach	Schedule		
8	Monitor decapod and fish densities in the restored marshes, reference marshes, and the remnants of James Island and Barren Island.	Measure communities: • species composition • densities	Wetlands Use by Fish Monitoring in Mid-Chesapeake Bay Feasibility Study (USACE, 2005)	TBD		Project construction and monitoring have not yet started.
9	Monitor utilization and document types of fauna encountered on the projects at James Island and Barren Island.	Measure communities: • species composition • densities	Wetlands Use by Wildlife Monitoring in Mid-Chesapeake Bay Feasibility Study (USACE, 2005)	TBD		Project construction and monitoring have not yet started.
10	Monitor the change in sedimentation rates on charted oyster bars nearest to James Island and Barren Island.	Sedimentation rates	Shellfish Bed Sedimentation Monitoring in Mid-Chesapeake Bay Feasibility Study (USACE, 2005)	TBD		Project construction and monitoring have not yet started.
11	Monitor bird utilization on and around the James Island and the Barren Island projects.	Measure communities: • species composition • densities	Bird Utilization Monitoring in Mid-Chesapeake Bay Feasibility Study (USACE, 2005)	TBD		Project construction and monitoring have not yet started.
12	Monitor the use of nesting and habitat by diamondback terrapins, and if the projects are affecting terrapin population dynamics.	Quantify nesting	Terrapin Monitoring in Mid-Chesapeake Bay Feasibility Study (USACE, 2005)	TBD		Project construction and monitoring have not yet started.
13		Assess hatchling: • viability • sex ratio • recruitment rates	Terrapin Monitoring in Mid-Chesapeake Bay Feasibility Study (USACE, 2005)	TBD		Project construction and monitoring have not yet started.
14	Monitor the location and health of submerged aquatic vegetation (SAV) in the vicinity of the projects at	Measure communities: • species composition • densities	Submerged Aquatic Vegetation (SAV) Monitoring in Mid-Chesapeake Bay Feasibility Study (USACE, 2005)	TBD		Project construction and monitoring have not yet started.

Supporting Studies from Monitoring Framework						
No.	Objective	Attribute	Monitoring Plan		Notes	Current Conditions
			Approach	Schedule		
15	James Island and Barren Island.	Location	Submerged Aquatic Vegetation (SAV) Monitoring in Mid-Chesapeake Bay Feasibility Study (USACE, 2005)	TBD		Project construction and monitoring have not yet started.
16		Size	Submerged Aquatic Vegetation (SAV) Monitoring in Mid-Chesapeake Bay Feasibility Study (USACE, 2005)	TBD		Project construction and monitoring have not yet started.

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Appendix G

Public Involvement

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Appendix G

Attachment A	Notice of Intent Notice of Availability
Attachment B	Public Meetings-Advertisements, Newsletter, Agendas, Handouts, Transcripts Scoping Meeting, February/March 2003 Watermen's Public Meeting, March 2004 Public Meeting, October 2006
Attachment C	Public Comments
Attachment D	News Releases, Articles, and Advertisements

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ATTACHMENT A

Notice of Intent
Notice of Availability

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2532-2533 Federal Register / Vol. 68, No. 12 / Friday, January 17, 2003 / Notices

DEPARTMENT OF DEFENSE

Department of the Army; Corps of Engineers

Intent To Prepare a Draft Environmental Impact Statement for the Mid-Chesapeake Bay Island, MD, Environmental Restoration Feasibility Study

AGENCY: Department of the Army, U.S. Army Corps of Engineers, DoD.

ACTION: Notice of intent.

SUMMARY: The Baltimore District, U.S. Army Corps of Engineers (Corps) in partnership with the State of Maryland Department of Transportation, Maryland Port Administration has initiated an environmental restoration feasibility study for the restoration of island habitat in the Mid-Chesapeake Bay region. The study focuses on restoring hundreds of acres of aquatic and wildlife island habitat in the Mid-Chesapeake Bay region through the beneficial use of dredged materials from the Port of Baltimore channel system. As part of this study and in accordance with the National Environmental Policy Act (NEPA) of 1969, an Environmental Impact Statement (EIS) will be prepared to document the plan formulation process and recommendations of this study.

FOR FURTHER INFORMATION CONTACT:

Questions or information about the proposed action and draft EIS can be addressed to
Ms. Michele (Mimi) Bistany,
U.S. Army Corps of Engineers, ATTN: CENAB–PL, 10 South Howard Street, P.O. Box 1715, Baltimore, MD 21203–1715, telephone 410–962–4934; e-mail address: *michele.a.bistany@usace.army.mil.*

SUPPLEMENTARY INFORMATION: The Mid-Chesapeake Bay study area is defined by the confluence of the Chester River south to the confluence of the Potomac River with the Chesapeake Bay, Maryland. Land subsidence, rising sea level, and wave action have caused valuable island habitats to be lost through erosion throughout the Chesapeake Bay. Through the beneficial use of dredged material, a restored island can be constructed to replace hundreds of acres of wetland and upland habitat. Therefore, the goal for this feasibility study is to restore valuable aquatic and terrestrial resting, foraging, and nursery habitat that has been lost in the Chesapeake Bay for many migratory birds, fish, and wildlife species through the beneficial use of dredged material. This habitat will afford improved productivity to the surrounding area, while providing an environmentally sound method for the use of dredged material removed from Bay channels. Corps feasibility studies are conducted using a six-stage planning approach that incorporates the NEPA process: (1) Identify problems, opportunities, goals, and objectives; (2) Inventory baseline conditions; (3) Formulate alternatives; (4) Evaluate effects of the alternatives; (5) Compare alternatives; and (6) Select a recommended plan or set of alternative plans that are environmentally, economically, and engineering sound. The project delivery team is actively seeking public opinion, participation, and advice to be incorporated into the planning process and the selection of an island for restoration. At this time, the islands that are under consideration within the Mid-Chesapeake Bay region include Barren, Bloodsworth, James, Holland, Lower Eastern Neck, Parson's and Sharp's islands. The team is open to any additional islands for consideration in the Mid-Bay region. As part of the initial phase of the study, an objective screening criteria will be developed based on information obtained for the State of Maryland's Dredged Material Management Program, public and agency input, available data, and best professional judgment. Following the Corps and NEPA processes, once the island is selected for restoration, a detailed analysis of the current existing conditions will be undertaken; alternative restoration plans will be developed, analyzed and compared; the impacts

of those plans will be analyzed; and a recommended plan will be selected. To solicit public input into the study and into the island election, up to three public scoping meetings are planned for the late January/early February 2003 timeframe. A newsletter broadcasting the dates, times, and locations will be sent to agencies, groups and individuals on the study's mailing list once the meetings have been scheduled. To verify your inclusion, or to be added in the mailing list, please contact the study team leader, Ms. Michele Bistany (*see* **FOR FURTHER INFORMATION CONTACT**). The study will be conducted in compliance with Section 404 and Section 401 of the Clean Water Act, Section 7 of the Endangered Species Act, the Clean Air Act, the U.S. Fish and Wildlife Coordination Act, Section 106 of the National Historic Preservation Act, Prime and Unique Farmlands, the Magnuson-Stevens Fishery Conservation and Management Act, and National Pollutant Discharge Elimination System Act. All appropriate documentation (*i.e.*, Section 7, Section 106 coordination letters, and public and agency comments) will be obtained and included as part of the EIS. As part of the EIS process, recommendations will be based on an evaluation of the probable impact of the proposed activity on the public interest. The decision will reflect the national concern for the protection and utilization of important resources. The benefit, which may reasonably be expected to accrue from the proposal, will be balanced against its reasonably foreseeable detriments. All factors that may be relevant to the proposal will be considered, among these are wetlands; fish and wildlife resources; cultural resources; land use; water and air quality; hazardous, toxic, and radioactive substances; threatened and endangered species; regional geology; aesthetics; environmental justice; cumulative impacts; and the general needs and welfare of the public. The draft EIS for the Mid-Chesapeake Bay Island environmental restoration study is expected for public release in July 2005.

Robert W. Lindner,

Chief, Planning Division.

[FR Doc. 03–1112 Filed 1–16–03; 8:45 am]

BILLING CODE 3710–41–M

http://regulations.gov as they are received without change, including any personal identifiers or contact information.

SUPPLEMENTARY INFORMATION: The original publication indicated that portions of the draft changes contained information that was in bold lettering or underlined. This formatting was not contained in the version published. The version published without such highlighting is consistent with the final version of the Executive Order. Those desiring a version of the draft changes with bold and underline portions highlighting the change should request this from the designated point of contact, below.

FOR FURTHER INFORMATION CONTACT: Lieutenant Colonel L. Peter Yob, Executive Secretary, Joint Service Committee on Military Justice, Office of the Judge Advocate General, Criminal Law Division, 1777 N. Kent St., Rosslyn, VA 22209–2194, (703) 588–6744, e-mail *Lousi.Yob@hqda.army.mil.*

Dated: September 1, 2006.

L.M. Bynum,

OSD Federal Register Liaison Officer, DoD.

[FR Doc. 06–7509 Filed 9–7–06; 8:45 am]

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DEPARTMENT OF DEFENSE

Department of the Army

Department of Defense (DoD) Task Force on Mental Health; Meeting

AGENCY: Department of the Army; DoD.

ACTION: Notice of Meeting Change in Venue.

SUMMARY: The DoD Task Force on Mental Health meeting on September 20, 2006 from 8:30 a.m.–5 p.m. and September 21, 2006 from 8:30 a.m.–11 a.m. published in the **Federal Register** on August 18, 2006 (71 FR 47782) has changed venues. The previous location was Howze Auditorium, Bldg 33009, 7500 761st Tank Battalion Ave., Fort Hood, TX 76544–5008. The new location is The Plaza Hotel, 1721 East Central Texas Expressway, Killeen, TX 7641–9144.

FOR FURTHER INFORMATION CONTACT: Colonel Roger Gibson, Executive Secretary, Armed Forces Epidemiological Board, Skyline Six, 5109 Leesburg Pike, Room 682, Falls Church, VA 22041–3258, (703) 681–8012/3.

SUPPLEMENTARY INFORMATION: None.

Brenda S. Bowen,

Army Federal Register Liaison Officer.

[FR Doc. 06–7505 Filed 9–7–06; 8:45 am]

BILLING CODE 3710–08–M

DEPARTMENT OF DEFENSE

Department of the Army

Department of Defense Historical Advisory Committee; Meeting

AGENCY: Department of the Army, DoD.

ACTION: Notice of open meeting.

SUMMARY: In accordance with Section 10(a)(2) of the Federal Advisory Committee Act (Pub. L. 92–463), announcement is made of the following committee meeting:

Name of Committee: Department of Defense Historical Advisory Committee.

Date: October 26, 2006.

Time: 9 a.m. to 4:30 p.m.

Place: U.S. Army Center of Military History, Collins Hall, Building 35, 103 Third Avenue, Fort McNair, DC 20319–5058.

Proposed Agenda: Review and discussion of the status of historical activities in the United States Army.

FOR FURTHER INFORMATION CONTACT: Dr. Jeffrey J. Clarke, U.S. Army Center of Military History, *ATTN:* DAMH–ZA, 103 Third Avenue, Fort McNair, DC 20319–5058; telephone number (202) 685–2706.

SUPPLEMENTARY INFORMATION: The committee will review the Army's historical activities for FY 2006 and those projected for FY 2007 based upon reports and manuscripts received throughout the period. And the committee will formulate recommendations through the Chief of Military History to the Chief of Staff, Army, and the Secretary of the Army for advancing the use of history in the U.S. Army.

The meeting of the advisory committee is open to the public. Because of the restricted meeting space, however, attendance may be limited to those persons who have notified the Advisory Committee Management Office in writing at least five days prior to the meeting of their intention to attend the October 26, 2006 meeting.

Any members of the public may file a written statement with the committee before, during, or after the meeting. To the extent that time permits, the committee chairman may allow public presentations or oral statements at the meeting.

Dated: August 21, 2006.

Jeffrey J. Clarke,

Director, Center for Military History.

[FR Doc. 06–7507 Filed 9–7–06; 8:45 am]

BILLING CODE 3710–08–M

DEPARTMENT OF DEFENSE

Department of the Army; Corps of Engineers

Availability of a Draft Integrated Feasibility Report and Environmental Impact Statement for the Mid-Chesapeake Bay Island Ecosystem Restoration Project in Dorchester County, on Maryland's Eastern Shore

AGENCY: Department of the Army, U.S. Army Corps of Engineers, DOD.

ACTION: Notice of availability.

SUMMARY: In accordance with the requirements of the National Environmental Policy Act (NEPA), the U.S. Army Corps of Engineers (USACE), Baltimore District has prepared a Draft Integrated Feasibility Report and Environmental Impact Statement (EIS) for the Mid-Chesapeake Bay Island Ecosystem Restoration Project in Dorchester County, on Maryland's Eastern Shore. Approximately 90 to 95 million cubic yards of material, primarily dredged during maintenance of the Chesapeake Bay approach channels to Baltimore Harbor, would be placed behind dikes at James Island. Material placed at Barren Island would be from authorized maintenance dredging of Federal navigation channels in the Honga River. After placement, the material would be shaped and planted to provide 2,144 acres of island habitat at James and Barren Islands as well as protect existing island ecosystem habitat, including critical submerged aquatic vegetation.

DATES: Two public meetings will be held. The meeting dates are:

1. October 11, 2006, 7 p.m., Cambridge, MD.
2. October 12, 2006, 7 p.m., Taylors Island, MD.

ADDRESSES: The first public meeting will be held at the Dorchester County Public Library, Central Branch, 303 Gay Street, Cambridge, MD 21613. The second public meeting will be held at Taylors Island Volunteer Fire Company, 510 Taylors Island Road, Taylors Island, MD 21617.

FOR FURTHER INFORMATION CONTACT: U.S. Army Corps of Engineers, Baltimore District, Attn: Ms. Stacey S. Blersch, CENAB–PL–P, P.O. Box 1715, Baltimore, MD 21203–1715, electronically at

Stacey.S.Blersch@usace.army.mil or by telephone at (410) 962–5196 or (800) 295–1610. You may view the Draft EIS and related information on the USACE Web page at *http://www.nab.usace.army.mil/publications/non-reg_pub.htm.*

SUPPLEMENTARY INFORMATION: A Notice of Intent (NOI) to prepare a draft EIS was published by the U.S. Environmental Protection Agency (EPA) in the **Federal Register** (68 FR 2532) on January 17, 2003. The Mid-Chesapeake Bay Ecosystem Restoration was one of three actions specifically recommended by the USACE-Baltimore District's *Dredged Material Management Plan* (DMMP) and *Final Tiered Environmental Impact Statement* (December 2005). The USACE is making the Draft Mid-Chesapeake Bay Island Ecosystem Restoration Integrated Feasibility Report and EIS available to the public for review and comment through a Notice of Availability published in the **Federal Register.** The recommendations of the draft Mid-Chesapeake Bay report and EIS are:

- Construction of a 2,072-acre fill area at James Island, consisting of approximately 55 percent tidal wetland habitat and 45 percent upland island habitat;
- Construction and backfilling of sills at Barren Island to protect both the current acreage of the island and the adjacent submerged aquatic vegetation (SAV)/shallow water habitat, providing approximately 72 acres of wetland habitat on the northern and western portions of the island; and
- If deemed necessary to protect the SAV, construction at Barren Island of a maximum of 3,350 feet of breakwater extending South from the southern tip of the existing island at a maximum height of plus 6 feet MLLW.

James and Barren Islands have been identified by the U.S. Fish and Wildlife Service, and other natural resource management agencies as a valuable nesting and nursery area for many species of wildlife, including bald eagles, diamondback terrapins, and potentially horseshoe crabs. The project would restore James Island and protect Barren Island from further erosion. The Draft EIS documents the NEPA compliance and information specific to the actions for the proposed Mid-Chesapeake Bay project.

The Draft Integrated Feasibility report and EIS has been prepared in accordance with (1) NEPA of 1969, as amended (42 U.S.C. 4321 *et seq.*), (2) regulations of the Council on Environmental Quality for implementing the procedural provisions of NEPA (40 CFR parts 1500–1508), and (3) USACE regulations implementing NEPA (ER–200–2–2).

USACE filed the Draft document with EPA on September 1, 2006 for the publication of Notice of Availability in the September 8, 2006 **Federal Register.** We must receive comments on or before October 23, 2006, to ensure consideration in final plan development. At both public meetings, the public will have an opportunity to present oral and/or written comments. All persons and organizations that have an interest in the Mid-Chesapeake Bay Integrated Ecosystem Restoration Feasibility Report and EIS are urged to participate in one or both meetings. Staff will be available one hour prior to the meeting start time. A Record of Decision may be signed no earlier than 30 days after the EPA Notice of Availability for the Final document.

Your comments must be contained in the body of your message; please do not send attached files. Please include your name and address in your message. You may view the Draft EIS and related information on the USACE Web page at *http://www.nab.usace.army.mil/publications/non-reg_pub.htm.* USACE has distributed copies of the Draft Integrated Feasibility Report and EIS to appropriate members of Congress, State, and local government officials, Federal agencies, and other interested parties.

Copies are available for public review at the following public reading rooms:

(1) Andrew G. Trial Library, Anne Arundel Community College, 101 College Parkway, Arnold, MD 21012.

(2) Anne Arundel County Public Library, 1410 West Street, Annapolis, MD 21401.

(3) Anne Arundel County Public Library, Annapolis Branch, 5 Harry S. Truman Parkway, Annapolis, MD 21401.

(4) Calvert County Public Library, 30 Duke Street, Prince Frederick, MD 20678.

(5) Chesapeake College Library, Wyes Mills, MD 21679.

(6) Corbin Memorial Library, 4 East Main Street, Crisfield, MD 21817.

(7) Dorchester County Public Library, 303 Gay Street, Cambridge, MD 21613.

(8) Dorchester County Public Library, Hurlock Branch, 222 S. Main Street, Hurlock, MD 21643.

(9) Eastern Shore Public Library, 23610 Front Street, Accomack, VA 23301.

(10) Enoch Pratt Free Library, 400 Cathedral Street, Baltimore, MD 21201.

(11) Federal Maritime Commission, 110 L Street NW., Washington, DC 20573.

(12) Kent County Public Library, 408 High Street, Chestertown, MD 21620.

(13) Maryland State Law Library, Court of Appeals Building, 361 Rowe Boulevard, Annapolis, MD 21401.

(14) Northumberland County Public Library, 7204 Northumberland Highway, Heathsville, VA 22473.

(15) Queen Anne's County Public Library, Centreville Branch, 121 S. Commerce Street, Centreville, MD 21617.

(16) Queen Anne's County Public Library, Stevensville Branch, 200 Library Circle, Stevensville, MD 21666.

(17) Somerset County Library, 11767 Beechwood Street, Princess Anne, MD 21853.

(18) Somerset County Library, Ewell Branch, 20910 Caleb Jones Road, Ewell, MD 21824.

(19) State Department of Legislative Reference Library, 90 State Circle, Annapolis, MD 21401.

(20) St. Mary's County Memorial Library, Leonardtown Branch, 23250 Hollywood Road, Leonardtown, MD 20650.

(21) Sudlersville Memorial Library, Easton Branch, 100 West Dover Street, Easton, MD 21601.

(23) Talbot County Public Library, St. Michaels Branch, 106 Freemont Street, St. Michaels, MD 21663.

(24) Talbot County Public Library, Tilghman Island Elementary School Branch, 21374 Foster Avenue, Tilghman, MD 21671.

(25) Twin Beaches Library, 3819 Harper Road, Chesapeake Beach, MD 20732.

(26) Wicomico County Free Library, 122 S. Division Street, Salisbury, MD 21801.

After the public comment period ends on October 23, 2006, the USACE will consider all comments received. The Draft Integrated Feasibility Report and EIS will be revised as appropriate and a Final Integrated Feasibility Repot and EIS will be issued.

Amy M. Guise,

Chief, Civil Project Development Branch.

[FR Doc. 06–7506 Filed 9–7–06; 8:45 am]

BILLING CODE 3710–41–M

DEPARTMENT OF ENERGY

Office of Energy Efficiency and Renewable Energy

Hydrogen and Fuel Cell Technical Advisory Committee (HTAC); Notice of Open Meeting

AGENCY: Department of Energy.

ACTION: Notice of open meeting.

Corrections

Federal Register

Vol. 71, No. 179

Friday, September 15, 2006

This section of the FEDERAL REGISTER contains editorial corrections of previously published Presidential, Rule, Proposed Rule, and Notice documents. These corrections are prepared by the Office of the Federal Register. Agency prepared corrections are issued as signed documents and appear in the appropriate document categories elsewhere in the issue.

DEPARTMENT OF AGRICULTURE

Animal and Plant Health Inspection Service

9 CFR Part 93

[Docket No. APHIS–2006–0107]

Spring Viremia of Carp; Import Restrictions on Certain Live Fish, Fertilized Eggs, and Gametes

Correction

In rule document E6–14478 beginning on page 51429 in the issue of Wednesday, August 30, 2006, make the following correction:

§93.901 [Corrected]

On page 51436, in the second column, §93.901(b)(3) is corrected to read as follows: ''(3) They are moved in accordance with any additional conditions prescribed in the permit and determined by the Administrator to be necessary to ensure that the live fish, fertilized eggs, or gametes through the United States do not introduce SVC into the United States.''.

[FR Doc. Z6–14478 Filed 9–14–06; 8:45 am]

BILLING CODE 1505–01–D

DEPARTMENT OF DEFENSE

Department of the Army; Corps of Engineers

Availability of a Draft Integrated Feasibility Report and Environmental Impact Statement for the Mid-Chesapeake Bay Island Ecosystem Restoration Project in Dorchester County, on Maryland's Eastern Shore

Correction

In notice document 06–7506 beginning on page 53090 in the issue of Friday, September 8, 2006, make the following corrections:

1. On page 53091, in the third column, entry (21) should read as follows:

''(21) Sudlersville Memorial Library, 105 West Main Street, Sudlersville, MD 21668.''.

2. On the same page, in the same column, insert an entry (22) to read as follows:

''(22) Talbot County Public Library, Easton Branch, 100 West Dover Street, Easton, MD 21601.''.

[FR Doc. C6–7506 Filed 9–14–06; 8:45 am]

BILLING CODE 1505–01–D

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

[NV–025–1232–NX–NV19; Special Recreation Permit #NV–025–06–01]

Notice to the Public of Temporary Public Lands Closures and Prohibitions of Certain Activities on Public Lands Administered by the Bureau of Land Management, Winnemucca Field Office, NV

Correction

In notice document E6–14668 beginning on page 52569 in the issue of Wednesday, September 6, 2006, make the following correction:

On page 52569, in the second column, in the document subject, in the last line, ''NE'' should read ''NV''.

[FR Doc. Z6–14668 Filed 9–14–06; 8:45 am]

BILLING CODE 1505–01–D

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ATTACHMENT B

Public Meetings- Advertisements, Newsletter, Agendas, Handouts, Transcripts

Scoping Meeting, February/March 2003
Watermen's Public Meeting, March 2004
Public Meeting, October 2006

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U.S. Army Corps
of Engineers
Baltimore District

Mid-Chesapeake Bay Island, Maryland Environmental Restoration Feasibility Study

NEWSLETTER/ISSUE NO. 1 ***January 2003***

GENERAL STUDY INFORMATION

The U.S. Army Corps of Engineers, Baltimore District, in partnership with the State of Maryland, Department of Transportation, Maryland Port Administration, has initiated an environmental restoration feasibility study for the restoration of island habitat in the Mid-Chesapeake Bay region. The study focuses on restoring hundreds of acres of aquatic and wildlife island habitat in the Mid-Chesapeake Bay region through the beneficial use of dredged materials from the Port of Baltimore channel system. By Congressional study authority, the study area is defined as the Eastern Shore of the Chesapeake Bay, Maryland from the confluence of the Chester River south to the State of Maryland border (please see the following page).

Land subsidence, rising sea level, and wave action have caused valuable island habitats to be lost through erosion throughout the Chesapeake Bay. Through the beneficial use of dredged material, a restored island can be constructed to replace hundreds of acres of wetland and upland habitat. Therefore, the goal for this feasibility study is to restore valuable aquatic and terrestrial resting, nesting, foraging, and nursery habitat that has been lost in the Chesapeake Bay for many migratory birds, fish, and wildlife species through the beneficial use of dredged material. This habitat will afford improved productivity to the surrounding area, while providing an environmentally sound method for the use of dredged material removed from Bay channels.

This is the first newsletter distributed for the study, as part of a series of public involvement activities designed to exchange information with the public. The purpose of this newsletter is explain the study process and to announce the upcoming public scoping meetings.

STUDY PROCESS

U.S. Army Corps of Engineers projects are developed through a two-phase planning process, reconnaissance and feasibility. The reconnaissance phase is used to make a preliminary determination whether there is likely to be a plan the Corps can implement. The reconnaissance effort (1) identifies water resources problems, needs, opportunities, and potential solutions; (2) determines whether more detailed investigations are warranted as part of a feasibility study, based on a preliminary appraisal of costs, benefits, environmental impacts, and consistency with Corps policies; and (3) assesses the level of interest and support of a non-Federal cost-sharing partner(s) in potential solutions and in cost-sharing the feasibility study.

Public Scoping Meetings

Tuesday, February 18, 2003 –
Queen Anne's County Public Library, 200 Library Circle, Stevensville, MD

Thursday, February 20, 2003 –
Dorchester County Public Library, 303 Gay Street, Cambridge, MD

Tuesday, February 25, 2003 –
Anne Arundel Community College, Room 219 John A. Cade Center for Fine Arts, 101 College Parkway, Arnold MD

All Meetings: 7 - 9 p.m.

Purpose: To present the study process and learn the public's interest and concerns in island restoration through the beneficial use of dredged materials.

The feasibility phase of the process involves a multidisciplinary team of scientists, planners, engineers, economists, cultural specialists and others who (1) identify problems and opportunities, (2) inventory resources or information, (3) formulate alternatives to solve the problems, (4) evaluate these alternatives, (5) compare the best plans, and, finally, (6) recommend the best solution to the problem.

The results of the evaluation will be documented in an Environmental Impact Statement (EIS) in accordance with the National Environmental Policy Act (NEPA) of 1969. The EIS will include descriptions of the investigations made, existing site conditions, alternatives considered and the impacts, and public responses to the potential project. The EIS will also describe the recommended plan or plans and be distributed for public review in the March 2005 timeframe. The EIS will be available at local libraries, government offices, or by mail if requested. The feasibility study will be completed by November 2005.

STUDY PROGRESS

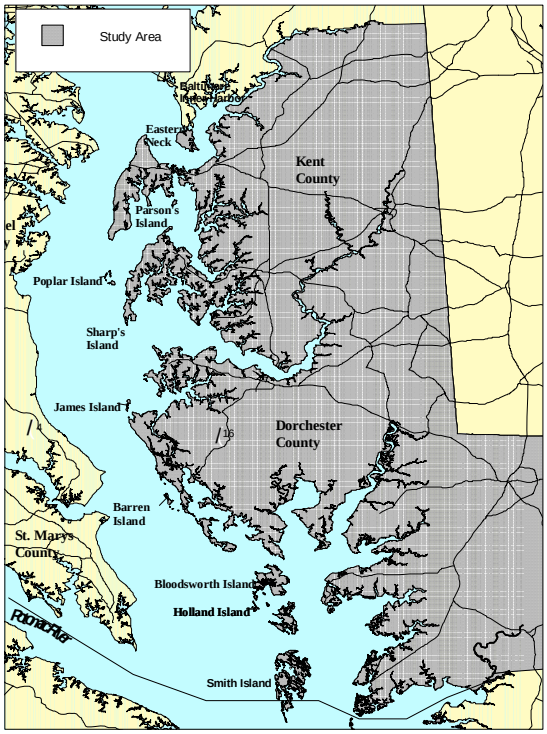
At this time in the study process, the team is undergoing the initial phase of the feasibility study. This involves establishing the objectives and constraints for island restoration, and establishing a formulation process and criteria for selecting the island to be restored. As part of the initial phase of the study, an objective screening criteria will be developed based on information obtained for the State of Maryland's Dredged Material Management Program, public and agency input, available data, and best professional judgment. During the public meetings, the team will be presenting the preliminary screening approach and the criteria for selection of the island. We will also be presenting our goals and objectives of the study.

PUBLIC INVOLVEMENT

Extensive public involvement is being conducted as part of the study. Public involvement is important because more ideas result in better projects and because the process defined by NEPA requires that the public be informed about, and involved in, projects that use Federal money, are built on Federal lands, or require Federal permits.

Three Public Scoping Meetings will be held, as listed above, to discuss the study process and learn public concerns and comments. Your input will help us formulate the best project.

FURTHER INFORMATION



If there is anyone you know who would be interested in receiving information on this feasibility study, or if you do not wish to be on our mailing list, please fill out the last page and send to:

Mid-Chesapeake Bay Island Environmental
Restoration Feasibility Study
ATTN: Michele A. Bistany
U.S. Army Corps of Engineers
10 South Howard Street
P.O. Box 1715
Baltimore, MD 21203-1715

Any questions or comments may be submitted to this address, you may call us at **(410) 962-4934;** toll free **(800) 295-1610** or you may fax us at **(410) 962-4698**. This mailing list will not be provided to any other organizations. Questions, comments and mailing list requests may also be sent via e-mail. The e-mail address is:
michele.a.bistany@usace.army.mil

You may also like to visit the Baltimore District internet site at **http://www.nab.usace.army.mil**. This newsletter and information on other District activities are included on the website.

_____
_____
_____

Place
Stamp
Here

U.S. Army Corps of Engineers, Baltimore District
Mid-Chesapeake Bay Island
Environmental Restoration Feasibility Study
ATTN: CENAB-PL-P (M. Bistany)
P.O. Box 1715
Baltimore, Maryland 21203-1715

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEERS DISTRICT, BALTIMORE
CORPS OF ENGINEERS
P.O. BOX 1715
BALTIMORE, MD 21203-1715

OFFICIAL BUSINES

---------- CUT HERE AND MAIL ----------

☐ Please **add** my name to the study mailing list.
☐ Please **remove** my name from the study mailing list.

Name (Please Print):_____

Title:_____

Company/Organization:_____

Address:_____

Telephone Number: _____ Fax Number:_____

E-mail Address:_____

Please submit any comments you have on the Mid-Chesapeake Bay Island Environmental Restoration Feasibility Study to the address listed in this newsletter.
Comments/Suggestions:_____
_____
_____
_____

PUBLIC SCOPING MEETINGS

Mid-Chesapeake Bay Island, Maryland
Environmental Restoration Feasibility Study

The U.S. Army Corps of Engineers, Baltimore District and the State of Maryland, Department of Transportation, Maryland Port Administration are conducting a series of three public scoping meetings for the initiation of an environmental restoration feasibility study of island habitat in the Mid-Chesapeake Bay region using dredged material from the Port of Baltimore channel system. The scoping meetings have been scheduled as follows: **February 18, 2003** – Queen Anne's County Public Library, 200 Library Circle, Stevensville, MD; **February 20, 2003** – Dorchester County Public Library, 303 Gay Street, Cambridge, MD; and **February 25, 2003** – Anne Arundel Community College, Room 219 of the John A. Cade Center for Fine Arts, 101 College Parkway, Arnold, MD. All meetings will be conducted from 7:00 to 9:00 p.m.

The study area is defined as the Eastern Shore of the Chesapeake Bay, Maryland from the confluence of the Chester River south to the State of Maryland border. As part of the restoration study, an Environmental Impact Statement will be prepared to document the findings and process of the study in accordance with the National Environmental Policy Act of 1969. The purpose of the public meetings is to present the study process and progress and to learn the public's interest and concerns in island restoration through the beneficial use of dredged materials.

Oral or written comments may be provided for determination of the scope of the study at the public scoping meetings. Written comments may also be submitted to the Corps up to March 31, 2003. Written comments may be mailed to the U.S. Army Corps of Engineers – Baltimore District, CENAB-PL, Attn: Ms. Michele Bistany, P.O. Box 1715 Baltimore, Maryland 21203-1715 or sent electronically to michele.a.bistany@usace.army.mil. If you have questions concerning the scoping meetings, please contact Ms. Bistany by telephone **(410) 962-4934,** or toll free **(800) 295-1610.**

PUBLIC SCOPING MEETING

Mid-Chesapeake Bay Island, Maryland
Environmental Restoration Feasibility Study

March 13, 2003

The U.S. Army Corps of Engineers, Baltimore District and the State of Maryland, Department of Transportation, Maryland Port Administration are conducting a public scoping meeting for the initiation of an environmental restoration feasibility study of island habitat in the Mid-Chesapeake Bay region using dredged material from the Port of Baltimore approach channel system. The scoping meeting is scheduled for **March 13, 2003** from 7:00 to 9:00 p.m. at the Somerset County Commissioner's Office, 11916 Somerset Avenue, Princess Anne, Maryland 21853. An open house from 6:00 to 7:00 p.m. will be held for anyone wishing to view exhibits or speak directly with the study team prior to the meeting.

The study area is defined as the Eastern Shore of the Chesapeake Bay, Maryland from the confluence of the Chester River south to the State of Maryland border. As part of the restoration study, an Environmental Impact Statement will be prepared to document the findings and process of the study in accordance with the National Environmental Policy Act of 1969. The purpose of the public meetings is to present the study process and progress and to learn the public's interest and concerns in island restoration through the beneficial use of dredged materials.

Oral or written comments may be provided for determination of the scope of the study at the public scoping meetings. Written comments may also be submitted to the Corps up to March 31, 2001. Written comments may be mailed to the U.S. Army Corps of Engineers – Baltimore District, CENAB-PL, Attn: Ms. Michele Bistany, P.O. Box 1715 Baltimore, Maryland 21203-1715 or sent electronically to michele.a.bistany@usace.army.mil. If you have questions concerning the scoping meetings, please contact Ms. Bistany by telephone **(410) 962-4934,** or toll free **(800) 295-1610.**

US Army Corps of Engineers
Baltimore District

BARREN ISLAND

Location: Barren Island is a satellite refuge of the Blackwater National Wildlife Refuge, located in Dorchester County, off the western shore of Hooper Islands.

Current Ownership: U.S. Fish and Wildlife Service.

Current Size: 175 acres.

Previous Historical Size: Barren Island has lost approximately 450 acres in the past 325 years.

History: As late as the turn of the century, U. S. Geological Survey maps record the presence of 13 buildings on Barren Island. There are six archeological sites on or near Barren Island.

Pros of Island Restoration Project:

- Shoreline stabilization for the remaining island & mainland in the "shadow" of the island.
- Protection from further erosion of the existing island & nearby shorelines.
- Improvement of water quality in the vicinity of the site & the general area.
- Potential for accretion along Hooper Islands (evident at Poplar Island Environmental Restoration Project).
- Protects island habitat for wildlife including Diamondback Terrapin.
- Promotes nursery habitat for fish and shellfish species.
- Restore upland and wetland habitat.
- Provide remote nesting habitat for avian species including Great Blue Heron and Brown Pelican.
- Shoreline stabilization reduces erosion, decreases turbidity & improves submerged aquatic vegetation (SAV) growing conditions & helps improve oyster fisheries.
- Potential for jobs & economic growth to the area.
- Provides needed dredged material placement capacity for channel maintenance.
- Potential to protect habitat for Rare, Threatened, and Endangered Species such as Bald Eagle, Least Tern, Black Skimmer, and Northeastern Beach Tiger Beetles.
- Potential to protect historical sites, such as, a colonial-era cemetery and possibly other undocumented historic resources on the eroding remnants.
- Potential to improve recreational fisheries through 'reef' affect of rock dikes.
- Federally owned property.

Cons of Island Restoration Project:

- Potential short-term effects to water quality during construction.
- Potential short-term effect to aesthetics & noise to nearby areas.
- Potential to temporarily disrupt wildlife from the area.
- Mobile aquatic species will be displaced within the concept areas.
- Potential to reduce Essential Fish Habitat (EFH) and Habitat of Particular Concern (HAPC) for some fish species.
- Conversion of benthic/bottom & shallow water habitat to upland/wetland habitat.

US Army Corps of Engineers
Baltimore District

- **HOLLAND ISLAND**

Location: Holland Island is located in Dorchester County, south of Bloodsworth Island, in the Chesapeake Bay.

Current Ownership: Holland Island is privately owned. A foundation established by the owners is attempting to find partners for saving the existing remnants and habitat.

Current Size: Three remnant islands totaling 87 acres.

Previous Historical Size in 1855: 253 acres

History: Holland Island once supported over 50 families. Due to the rising tide and erosion, residents were forced to move in the early 1920's. Three sites on Holland Island (house remnants, cemetery, and a pier) are registered with the Maryland Historical Trust (MHT). A house and cemetery that are not recorded at MHT are also present on the island and other unrecorded sites may exist. The location of the pier and un-recorded graveyard is uncertain and there is a possibility of submerged graves in the area.

Pros of Island Restoration Project:

- Shoreline stabilization for the remaining island & other islands in the "shadow" of the island.
- Protection from further erosion of the existing island & nearby shorelines.
- Improvement of water quality in the vicinity of the site & the general area.
- Potential for accretion (evident at Poplar Island Environmental Restoration Project).
- Protects island habitat for wildlife including diamondback terrapins.
- Restore upland and wetland habitat.
- Provide remote nesting habitat for avian species.
- Promotes nursery habitat for fish and shellfish species.
- Shoreline stabilization reduces erosion, decreases turbidity & improves submerged aquatic vegetation (SAV) growing conditions & helps improve oyster fisheries.
- Potential for jobs & economic growth to the area.
- Provides needed dredged material placement capacity for channel maintenance.
- Potential to protect habitat for Rare, Threatened, and Endangered Species such as Bald Eagles, Loggerhead and Kemp's Ridley turtles.
- Potential to protect historical sites on eroding remnants.
- Potential to improve recreational fisheries through 'reef' affect of rock dikes.

Cons of Island Restoration Project:

- Potential short-term effects to water quality during construction.
- Potential short-term effect to aesthetics & noise to nearby areas.
- Potential to temporarily disrupt wildlife from the area.
- Mobile aquatic species will be displaced within the concept areas.
- Potential to reduce Essential Fish Habitat (EFH) for some fish species.
- Conversion of benthic/bottom & shallow water habitat to upland/wetland habitat.
- Potential to cover historical sites (only if present in water).
- Privately owned island, owner may not want to participate

US Army Corps of Engineers
Baltimore District

- **HOOPER ISLAND**

Location: Hooper Island is located in Dorchester County, in the vicinity of Barren Island.

Current Ownership: Privately owned**.**

Current Size: 1193 acres.

Previous Historical Size in 1848: 3900 acres.

History: The Hooper Island complex was settled from the 17th century to the present. It appears that lower Hooper Island was the last settled. There are six Maryland Historic Trust (MHT) archeological sites on the island. The Hooper Island Light, located on Middle Hooper Island, is eligible for National Register Status.

Pros of Island Restoration Project:

- Shoreline stabilization for the remaining island & mainland in the "shadow" of the island.
- Protection from further erosion of the existing island & nearby shorelines.
- Improvement of water quality in the vicinity of the site & the general area.
- Potential for accretion (evident at Poplar Island Environmental Restoration Project).
- Protects island habitat for wildlife.
- Restore upland and wetland habitat.
- Protects the island from erosion therefore preserving the crab picking and processing plant.
- Provide remote nesting habitat for avian species.
- Shoreline stabilization reduces erosion, decreases turbidity & improves submerged aquatic vegetation (SAV) growing conditions helping improve blue crab and oyster fisheries (if present).
- Potential for jobs & economic growth to the area.
- Provides nursery habitat for fish and shellfish species.
- Provides needed dredged material placement capacity for channel maintenance.
- Potential to protect habitat for Rare, Threatened, and Endangered Species such as Bald Eagles, Least Tern, and Black Skimmer.
- Potential to protect historical sites on eroding remnants.
- Potential to improve recreational fisheries through 'reef' affect of rock dikes.

Cons of Island Restoration Project:

- Potential short-term effects to water quality during construction.
- Potential short-term effect to aesthetics & noise to nearby population centers.
- Potential to temporarily disrupt wildlife from the area.
- Mobile aquatic species will be displaced within the concept areas.
- Potential to reduce Essential Fish Habitat (EFH) for some fish species.
- Conversion of benthic/bottom & shallow water habitat to upland/wetland habitat.
- Potential to cover historical sites (only if present in water).

US Army Corps of Engineers
Baltimore District

- **JAMES ISLAND**

Location: James Island is located in Dorchester County at the mouth of the Little Choptank River in the Chesapeake Bay.

Current Ownership: Privately owned.

Current Size: Three remnant islands totaling about 92 acres.

Previous Historical Size in 1847: 976 acres.

History: Maps from the 18th century show that James Island was connected to the mainland by Taylors Island. By 1847, the connection with Taylors Island was nearly breached. Today, James Island is separated from Taylors Island by about one mile of shallow open-water and consists of three remnant islands. There are four recorded archeological sites along the eastern shore of the remnant islands.

Pros of Island Restoration Project:

- Shoreline stabilization for the remaining island & mainland in the "shadow" of the island.
- Protection from further erosion of the existing island & nearby shorelines.
- Improvement of water quality in the vicinity of the site & the general area.
- Potential for accretion along the mainland (evident at Poplar Island Environmental Restoration Project & applies for James Island as shown by hydrodynamic modeling results).
- Protects island habitat for wildlife such as diamondback terrapin and sika deer.
- Restore upland and wetland habitat.
- Provide remote nesting habitat for avian species.
- Shoreline stabilization reduces erosion, decreases turbidity & improves submerged aquatic vegetation (SAV) growing conditions & helps improve oyster fisheries.
- Potential for jobs & economic growth to the area.
- Provides needed dredged material placement capacity for channel maintenance.
- Potential to protect habitat for Rare, Threatened, and Endangered Species such as Bald Eagles, loggerhead turtles and Kemp's Ridley turtles.
- Potential to protect historical sites located on eroding remnant islands.
- Potential to improve recreational fisheries through 'reef' affect of rock dikes.
- Possible dual restoration potential with Ragged Island due to the close proximity of the islands.
- The owner has expressed interest in the possibility of a restoration project.

Cons of Island Restoration Project:

- Potential short-term effects to water quality during construction.
- Potential short-term effect to aesthetics & noise to nearby areas.
- Potential to temporarily disrupt wildlife from the area.
- Mobile aquatic species will be displaced within the concept areas.
- Potential to reduce Essential Fish Habitat (EFH) and Habitat of Particular Concern (HAPC) for some fish species.
- Conversion of benthic/bottom & shallow water habitat to upland/wetland habitat.

US Army Corps of Engineers
Baltimore District

- **LITTLE DEAL ISLAND**

Location: Little Deal Island is located in Somerset County, in the vicinity of Holland Island. (For preliminary purposes, general assessments about Little Deal Island were made based on the information at Holland Island).

Current Ownership: The Maryland Department of Natural Resources (MDNR).

Current Size: 280 acres.

History: The entire Little Deal Island is listed by the Maryland Historical Trust due to the discovery of a fluted, Paleolithic point from an unknown location on the island.

Pros of Island Restoration Project:

- Shoreline stabilization for the remaining island & mainland in the "shadow" of the island.
- Protection from further erosion of the existing island & nearby shorelines.
- Improvement of water quality in the vicinity of the site & the general area.
- Potential for accretion (evident at Poplar Island Environmental Restoration Project).
- Protects island habitat for wildlife.
- Promotes nursery habitat for fish and shellfish species.
- Restore upland and wetland habitat.
- Provide remote nesting habitat for avian species.
- Shoreline stabilization reduces erosion, decreases turbidity & improves submerged aquatic vegetation (SAV) growing conditions & helps improve clam, blue crab, and oyster fisheries (if present).
- Potential for jobs & economic growth to the area.
- Provides needed dredged material placement capacity for channel maintenance.
- Potential to protect habitat for Rare, Threatened, and Endangered Species such as Bald Eagle.
- Potential to protect historical sites (if present) on eroding remnants.
- Potential to improve recreational fisheries through 'reef' affect of rock dikes.

Cons of Island Restoration Project:

- Potential short-term effects to water quality during construction.
- Potential short-term effect to aesthetics & noise to nearby areas including Deal Island.
- Potential to temporarily disrupt wildlife from the area.
- Mobile aquatic species will be displaced within the concept areas.
- Potential to reduce Essential Fish Habitat (EFH) for some fish species.
- Conversion of benthic/bottom & shallow water habitat to upland/wetland habitat.
- Potential to cover historical sites (only if present in water).

US Army Corps of Engineers
Baltimore District

- **RAGGED ISLAND**

Location: Ragged Island is located in Dorchester County, in close proximity to James Island. For preliminary purposes, general assessments about Ragged Island were made based on the information at James Island.

Current Ownership: Privately owned.

Current Size: 106 acres.

History: Historically connected to Hills Point Neck. There was only one structure of possible cultural value at Hills Point during the turn of the century and the other structures appear to be in the area, which is still fastland at Hills Point Neck.

Pros of Island Restoration Project:

- Shoreline stabilization for the remaining island & mainland in the "shadow" of the island.
- Protection from further erosion of the existing island & nearby shorelines.
- Improvement of water quality in the vicinity of the site & the general area.
- Protect island habitat for wildlife.
- Restore upland and wetland habitat.
- Promote nursery habitat for fish and shellfish species.
- Provide remote nesting habitat for avian species.
- Shoreline stabilization reduces erosion, decreases turbidity & improves submerged aquatic vegetation (SAV) growing conditions helping improve oyster fisheries (if present).
- Potential for jobs & economic growth to the area.
- Provides needed dredged material placement capacity for channel maintenance.
- Due to its proximity to James Island, restoration of Ragged Island could potentially protect habitat for Rare, Threatened, and Endangered Species such as Loggerhead and Kemp's Ridley turtles.
- Potential to protect historical sites (if present) on eroding remnants.
- Potential to improve recreational fisheries through 'reef' affect of rock dikes.
- Potential for dual restoration project with James Island due to their proximity.

Cons of Island Restoration Project:

- Potential short-term effects to water quality during construction.
- Potential short-term effect to aesthetics & noise to nearby areas.
- Potential to temporarily disrupt wildlife from the area.
- Mobile aquatic species will be displaced within the concept areas.
- Privately owned, the owners may not want to participate.
- Due to its proximity to James Island, there is potential to reduce Essential Fish Habitat (EFH) for some fish species.
- Conversion of benthic/bottom & shallow water habitat to upland/wetland habitat.
- Potential to cover historical sites (only if present in water).

US Army Corps of Engineers
Baltimore District

- **SOUTH MARSH ISLAND**

Location: South Marsh Island is located in Dorchester County south of Holland Island. For preliminary purposes, general assessments about South Marsh Island were made based on information previously collected at Holland Island.

Current Ownership: State of Maryland, Wildlife Management Area (WMA).

Current Size: 2,898 acres.

History: Records indicate that South Marsh Island has historically been completely marshland. There are no known structures or inhabitants. It is unclear if transients may have left any cultural resources.

Pros of Island Restoration Project:

- Shoreline stabilization for the remaining island in the "shadow" of the island.
- Protection from further erosion of the existing island & nearby shorelines.
- Improvement of water quality in the vicinity of the site & the general area.
- Potential for accretion (evident at Poplar Island Environmental Restoration Project).
- Protect island habitat for wildlife.
- Restore upland and wetland habitat.
- Promotes nursery habitat for fish and shellfish species.
- Provide remote nesting habitat for avian species such as barn owls.
- Shoreline stabilization reduces erosion, decreases turbidity & improves submerged aquatic vegetation (SAV) growing conditions helping improve oyster, clam, and blue crab fisheries (if present).
- Potential for jobs & economic growth to the area.
- Provides needed dredged material placement capacity for channel maintenance
- Potential to protect habitat for Rare, Threatened, and Endangered Species such as Peregrine Falcon, Black Skimmer, and Kemp's Ridley turtles.
- Potential to protect historical sites (if present).
- Potential to improve recreational fisheries through 'reef' affect of rock dikes.
- Provides placement capacity for dredged material management.

Cons of Island Restoration Project:

- Potential short-term effects to water quality during construction.
- Potential short-term effect to aesthetics & noise to nearby areas.
- Potential to temporarily disrupt wildlife from the area.
- Mobile aquatic species will be displaced within the concept areas.
- Potential to reduce Essential Fish Habitat (EFH) and Habitat of Particular Concern (HAPC) for some fish species.
- Conversion of benthic/bottom & shallow water habitat to upland/wetland habitat.
- Potential to cover historical sites (only if present in water).

Public Scoping Meeting February 2003
USACE Presentation

Mid-Chesapeake Island Environmental Restoration Feasibility Study

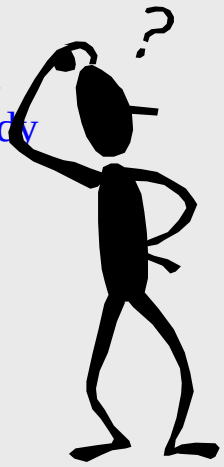
Michele (Mimi) Bistany
(410) 962-4934

Public Scoping Meeting

Why Are We Here?

The purpose of this scoping meeting:

- Obtain public comments and input into the scope of the feasibility study
- Discuss the Study Process
- Discuss the Study Progress
- Discuss Island Restoration Information
- Present Schedule and Important Dates



Civil Works Project Phases

- Reconnaissance Study
- Feasibility Study
- Pre-Construction, Engineering, and Design
- Construction
- Operation and Maintenance

Civil Works Project Phases

- Reconnaissance Study
- Feasibility Study
- Pre-Construction, Engineering, and Design
- Construction
- Operation and Maintenance

Problems to Projects

Reconnaissance Phase

- Purposes
  - Problems warrant Federal participation?
  - Non-Federal support by study sponsor(s)?
  - Prepare project study plan for feasibility study.
- Federally funded.
- Product is feasibility cost sharing agreement.
- Schedule to complete is typically 12 months.

Feasibility Phase

- Purposes
  - Determine problem.
  - Collect data.
  - Develop alternatives to solve problems.
  - Evaluate effect of alternatives.
  - Compare alternatives.
  - Select best plan or set of plans.
- Cost shared 50% Federal, 50% non-Federal.
- Feasibility report is used to authorize projects.
- Schedule to complete is 2 1/2 to 3 years.

Eastern Shore, MD & DE Reconnaissance Study

- **Study area:** Watersheds of the DE & MD portion of the Delmarva Peninsula within the Chesapeake Bay watershed
- **Identified problems:**
  - Wetland/aquatic/terrestrial habitat loss; excessive erosion and sedimentation; Bay grass loss; fish blockages; and water quality degradation
- **Recommendations:**
  - Beneficial use of dredged material for habitat restoration; wetland and flood plain habitat restoration; fish passage structures; and water quality improvements
- **Results:**
  - Feasibility Cost Sharing Agreement and Project Management Plan between the Maryland Port Administration and Corps

Corps Six-Step Planning Process

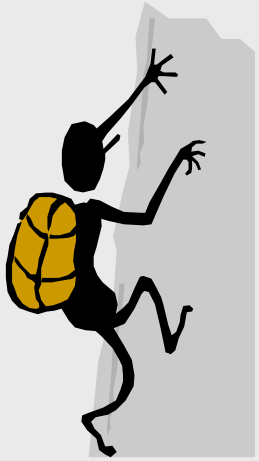
1. Identify Problems and Needs - Establish Goals and Objectives
2. Determine Existing Conditions -
   - Determine Islands Available for Restoration
     - Develop a Screening Process and Criteria for Island Restoration
     - Screen Islands
     - Select Island(s) for Restoration
   - Determine Baseline Conditions/Collect Detailed Data
3. Develop Alternatives
4. Analyze and Evaluate Alternatives
5. Compare Alternatives
6. Recommend Plan - Prepare Feasibility Report and Integrated Environmental Impact Statement

Study Area Map

- Study Area Defined: Eastern Shore of the Chesapeake Bay, MD from the confluence of the Chester River south to the State of Maryland Board

Feasibility Study Goal

To restore valuable aquatic and terrestrial resting, nesting, foraging, and nursery habitat that has been lost in the Chesapeake Bay for many migratory birds, fish, and wildlife species through the beneficial use of dredged materials from the Port of Baltimore Channel system.



Feasibility Study Progress

- ✓ Define Problem - Habitat loss in the Bay; Placement of Dredged Material from Port of Baltimore Channels
- ✓ Define Goals and Objectives
- ✓ Determine Existing Conditions -
  - ✓ Determine Islands Available for Restoration
    - ◆ State of Maryland Island Database
- ✓ Develop a Screening Process and Criteria for Island Restoration
- ● Screen Islands
- ● Select Island(s) for Restoration

Island Screening Criteria

- **Tier I:** Island needs to be in study area
- **Tier II:**
  - ■ Island needs to have historically been or now at least 200 acres or more; currently needs to possess the ability to be 200 acres or more
  - ■ Island must be reasonably accessible for dredged material placement
  - ■ Island restoration cannot negatively affect the hydraulic conditions of existing river systems
  - ■ Island cannot negatively impact current navigation of existing waterways
  - ■ Must be an island/not shoreline

Island Screening Criteria

- **Tier II Continued:**
  - Island must not be a major population center
  - Island must not involve any unexploded ordinance or hazardous, toxic and radioactive waste
  - If island is currently State or Federally managed as a wildlife area, must have support from the landowners for restoration
  - Consideration for any other Corps-led studies being conducted on the island

Islands Currently Under Consideration

- Barren Island, Dorchester County
- Holland Island, Dorchester County
- Hoopers Islands, Dorchester County
- James Island, Dorchester County
- Little Deal Island, Somerset County
- Ragged Island, Dorchester County
- Smith Island, Somerset County
- South Marsh Island, Somerset County

Data/Public Concern's Needed

- Asking the public and all agencies to provide any information regarding these islands
- Island needs to be selected by March in order to collect winter environmental data
- Provide comments by regular, or electronic mail; fax or to the court reporter

MID-CHESAPEAKE BAY ISLAND
ENVIRONMENTAL RESTORATION FEASIBILITY STUDY
PUBLIC SCOPING MEETING

Meeting in the above-captioned matter was taken on Tuesday, February 25, 2003, at Anne Arundel Community College, Arnold, Maryland, commencing at 7:00 p.m. before Carol T. Lucic, Notary Public.

REPORTED BY: Carol T. Lucic

PRESENT:

Michele Bistany

Mark Mendelsohn

Michael Snyder

Scott Johnson

Jeff McKee

Michele Gomez

Corps of Engineers

Stephen Storms

Frank Hamons

David Bibo

Nat Brown

Maryland Port Administration

Andy Smarick

Congressman Gilchrest's Office

MS. BISTANY: Good evening, everyone. My name is Mimi Bistany, and I'm the study team leader for the Mid-Chesapeake Bay Island Environmental Restoration Study. This is our first series of public meetings, and there will be three sets of public meetings throughout this study process.

Tonight we have a court reporter here to get formal comments for the record, but we ask that if you're going to speak on the record, that you state your name and spell your name so that Carol knows who you are. We're also asking that everyone make sure that they register at the front desk and pick up a copy of all the handouts. Around the room you will see handouts, too, so make sure you grab copies of everything you see.

I want to note some of the project team members we have here tonight. We have a lot of the Poplar Island study team members, project members from engineering, operations, project

management, from the Maryland Port Administration, from the contractors from the

Port Administration, so if you don't feel comfortable asking a question, after the meeting you're more than welcome to grab anybody that you would like and ask whatever question you may have. We also have a representative from Congressman Gilchrest's office here this evening, too.

Tonight we're going to be giving you a few brief presentations, and then we're going to be opening up the floor for public comments. The purpose of the meeting tonight is obviously we want to obtain all of your comments on everything that we've done so far, and we're going to use that information in our study process. We want to be able to discuss tonight the study purpose and need of the Poplar Island environmental restoration project. We're going to discuss the process that we followed so far for the island selection, and we want your

comments on that process. We're going to give you some important dates, important public information dates, which you have those, and we're going to present the schedule to you.

Public comments can be given to us in a variety of formats. Everyone should have a blue comment card tonight, and please either submit those to us tonight when you're leaving or you can mail them in to us. Take all the handouts, but take a lot of those comment cards, and anybody else that you know that's interested in our study, please give those out to as many people as you can. The information package that you have has my fax number, my phone number, my regular address, my e-mail address. I'll take any format that you can give them to me, but we do need all of the public comments in by the 30th of March in order to use the information and stay on schedule.

So with that I'm going to turn the meeting over to Dr. Steve Storms of the Maryland Port

Administration who is going to be talking about the purpose of the meeting tonight.

DR. STORMS: Thank you, Mimi. I'm very glad you could all make it here this evening. As Mimi said, I'm with the Maryland Port Administration. Before I start my formal presentation I would like to say a little bit

about why the Port is involved with this project.

As you may or may not know, the Maryland Port Administration is charged with keeping the Port of Baltimore operating in an efficient and cost effective way. One of the ways we do that is to help the Corps, to work with the Corps. The Corps dredges the shipping channels, as we'll talk a little bit more about this later, and the Port helps by helping to find places to put that dredged material and ways to manage the dredged material after it's removed from the shipping channels. So that's the role that the Port of Baltimore has and their interest in this

project.

Specifically I'm here to talk about the purpose and need for the project. The purpose of the feasibility study is to continue the efforts that were started in a reconnaissance study earlier by the Corps of Engineers, and Mimi will talk a little bit more about that in just a few moments. The outcome of this feasibility study is a feasibility report that

satisfies several objectives. It's a complete decision document that meets the National Environmental Policy Act. It also provides the basis for recommending construction of the project, for preparing a design memorandum, if appropriate, and for preparing plans and specs for the project.

There are eight major objectives of the feasibility study: To conduct detailed engineering, economic, environmental, and cultural investigations; to identify possible environmental restoration projects; to comply

with NEPA requirements; to estimate cost and benefits; to determine appropriate construction and cost sharing arrangements with the Port such as on this project there is a 50/50 cost share between the Port and the Corps of Engineers; to prepare appropriate documentation for federal project authorization; recommend favorable environmental restoration projects for authorization and construction; and finally to handle any real estate issues that come up.

Dredged material we feel is a material that can be put to beneficial use, and

specifically we're interested in this project in using dredged material to restore an island. Island habitat is preferred by migratory birds as well as fish and other wildlife. Using dredged material to restore these islands can also prevent further island erosion. It can also restore shallow and protected water areas, which would be appropriate for SAV, and also that provide essential nursery and foraging

habitat.

It also protects environmentally, historically, and culturally significant remnant island habitat, protects shoreline, which is also very helpful for different types of wildlife, and it also provides needed dredged material placement capacity for the Port of Baltimore. So that ties in the interest of the Port of Baltimore in this project.

With that I'll turn it over to Mark. I should point out one more thing. I'm sorry, Mark. I forgot to hit that one last slide.

It should be critical to remember that this project is focused on placing dredged

material from the main shipping channels leading into Baltimore Harbor, so we're talking specifically about channels outside the North Point to Rock Point line, which is right about here. So the material to be placed at this mid-bay island, the material to be used to restore this mid-bay island will not come from

the harbor channels inside the North Point-Rock Point line, only from outside that line. So that's very important to remember. Thank you.

MR. MENDELSOHN: I'm Mark Mendelsohn. I'm a biologist with the Corps of Engineers, and I have been working on the Poplar Island project since the beginning.

I would like to give you a quick overview of what the site looks like. As most of you know, islands are rapidly eroding in the bay. The isolated habitat is very scarce. The middle part of the bay suffers from sea level rise and also land subsidence, so that it's more of an issue. It's a big issue down in that area.

This is what Poplar looked like. The blue area is 1847, and the green area is what it looked like when we started the study. So you

can see there is quite an erosion problem. There are two privately owned islands in the area. There is Coaches Island and Jefferson Island that are part of the archipelago.

This is what Poplar Island looks like now. It's 1,140 acres, 570 acres of area that's going to be marsh, 80% low marsh and 20% high marsh, 570 acres here that will be upland habitat, it will be forested, there will be ponds, shrubs, meadows, and there will be a rookery there I'm sure, and it will be very valuable isolated island habitat.

This is an idea of what the 570 acres will look like. You can see that we've got intertidal flat, which will be used by shore birds, and then the marsh starts. We move up to a low marsh, which is mostly sparteine alterniflora. Then we move up to a high marsh, which will be salt marsh A and some other species, plus some shrubs, and then we get to the upper habitat, which will be mostly forested.

This is an example of what the dike looks

like. What we have is a dike that is made from the borrowed material in the area. It has got a

sand core and it has got different types of stone and a filter cloth. Mike Snyder, who is our geotechnical engineer, is here if you need more information on the construction of the dike.

This is an idea of what the armor looks like for the dike just to give you a sense of scale. Different size rocks were involved. Next is kind of a show and tell where we just have some nice pictures to give you an idea of what is going on there. This is the Poplar Harbor area where we hope to establish submerged aquatic vegetation, just an example of great blue herons that are in the area.

We had two snowy olds come a couple of winters ago, which was kind of a pleasant surprise. We had least terns nesting and hatching on the area. These are just the eggs. We built islands for them, but they chose to nest on the dikes, so we had to accommodate them by changing our inflow procedure, but they all

did very well. This is a state listed threatened species.

We were kind of surprised by the diamond back terrapins. They're shown here going through the wetlands that we created. We had 565 hatchlings at the site, and we discovered 60 nests. We tagged the turtles, and we will be keeping track of them throughout their life if they're in the area.

These are underwater photos taken by Ken Paynter of the University of Maryland with his remote camera. This is an example of the 34 acres of underwater habitat at Popular that's a result of the dikes. This is a branch coral there, and you will see some anemones. There are a lot of sea squirts this year because it's salty.

One of the overlooked things at Poplar is that it's basically a 34 acre reef there with the diked area that provides hiding places, provides food sources. There is just a terrific

community there, and it will only get better with time.

This is just more samples of the fouling community, which developed really within a year or two at the island, and just more examples of what that looks like. It may not be the most dramatic thing, but it's really good habitat.

This is an area that's within walking distance of here, and it's called the Providence Center, and it hires severely mentally handicapped folks. They work in cooperation with Steve Ailstock at the community college here, and he provides the seed for them, and they grow the plants out. So we entered into a contract with them last year and we bought 25,000 plants from them. This year I hope to buy 100,000 plants from them. This is just an example of their operation. They're right down College Parkway off of Shore Acres Road.

This is our first delivery of plants from them. They were just really good people to work

for, and we were able to buy the plants at a price that was competitive with the commercial nursery. This is the truck with their plants on the way to Poplar Harbor where we loaded them on boats. These are their plants that we planted in this area called the notch. We also got plants from environmental concerns.

This is volunteers or conscripts that were out there planting the plants. This is about three months later to show you what the plants looked like. Some of you have been out there to see it. This is the area called the notch area.

We also were trying to figure out how the upland plants will work there, so we planted 1,100 trees and shrubs of different native species to see how they would do. It's kind of an oasis out there because there is really not a lot of greenery out there. So this is our test plot. It ranges from everything from a couple of poplars to blueberries to oaks and pines.

Also we have a lot of diked area that was

vegetated, and our project manager said maybe we

can throw some wildflowers in there, so we have this. So this is a native grass area and some wildflowers, and it's doing as well for stabilization as the traditional stuff that you would see on the highway.

I will be around afterwards, and if you have any questions, I will be glad to answer them.

MS. BISTANY: After Mark's presentation where you see all the pretty pictures, I have slides.

Again, I'm here tonight to talk about the study process and progress, I'm here to discuss our island restoration selection process, and present the study schedule and important information dates for comments.

All Corps civil work studies are completed in five phases, and they all start with a problem that's typically identified by a nonfederal entity. What typically happens is

some local person, agency, will identify a problem and they will talk to maybe their congressman or some sort of representative, and

the Corps of Engineers will get what is called a study authorization. That authorization gives the team the opportunity to conduct a reconnaissance study. I'm going to talk more about these in a few moments, the specifics of each of these.

From the reconnaissance study if the problems warrant federal participation and we have a nonfederal sponsor, it goes into a detailed feasibility study. If at the end of that feasibility study there is a recommendation for a project, then we would go into our plans and specifications phase, we call it a preengineering design and construction, PED, and finally construction.

This slide shows a typical civil works process from the time we get our study authorization -- these are in years up top, ten

plus. Typically the reconnaissance phase takes about a year, and at that point we negotiate a feasibility cost sharing agreement and a project management plan. That takes about a year to negotiate with a nonfederal sponsor, and then we

enter into the feasibility phase. That phase takes approximately three years, and you can see from where we are tonight we're right in the very beginning phases of the feasibility phase.

If at the end of the feasibility phase we have a recommended project, we would need Congressional authorization in order to construct a project. We also would go into our design, the plans and specifications phase. That puts us at about six to seven years, and sometime in this time frame we would be asking for a Congressional budget for the project.

Once we receive that budget we could go into construction, and operation would follow afterwards. Operation of the project would follow afterwards.

The reconnaissance phase, the purposes are to determine if the problem that was presented warrants federal participation, and if it does, is there a nonfederal sponsor that's willing to cost share the feasibility study. The feasibility studies are 50% federally financed, 50% nonfederally financed. This reconnaissance

study itself is 100% federally financed. Again, the product of it is a feasibility cost sharing agreement, a legal agreement between the Federal Government and the nonfederal sponsor, and that schedule again takes about 12 months to complete.

The purposes of the feasibility phase are to conduct a detailed analysis of the problems, the existing conditions, the alternatives to the problem, evaluating those alternatives, and determining if there is a recommended solution to that problem. It's cost shared 50% federal, 50% nonfederal, and the feasibility report, as Steve mentioned, is what we use to send to

Congress to authorize the construction of a project. It takes approximately up to three years.

The Eastern Shore, Maryland, Delaware was the reconnaissance study for this Mid-Chesapeake Bay Feasibility Study, and in that report it identified problems of wetland aquatic loss, excessive erosion sedimentation, bay grass loss, fish blockages, and water quality degradation.

The recommendations of that report, among many, were the beneficial use of dredged material for habitat, wetland and flood plain restoration efforts, fish passage structures, and water quality improvements, and it resulted in the project management plan or the scope of study for the feasibility study.

As I mentioned, the Corps of Engineers uses a six-step planning process for the feasibility study. Those six steps are to identify the problems and needs; to determine the existing conditions, and in this case it's

to determine what islands are available for restoration, and I'm going to be talking about specifically to this study in a few minutes, but to determine what the existing conditions are; to determine any alternatives; evaluate those alternatives in detail; and compare and make a recommendation for the recommended product. This feasibility study will also include an environmental impact statement.

Just a reference to the study area itself, it's the eastern shore of the Chesapeake Bay

from the confluence of the Chester River south to the State of Maryland border with Virginia. You have a lot of that information with you in your handout packages.

Our feasibility study goal is to restore valuable habitat, resting, nesting, foraging, and nursery habitat that has been lost in the Chesapeake Bay for many migratory birds, fish, wildlife through the beneficial use of dredged material from the Port of Baltimore shipping

channels and the approach channels, as Steve had mentioned.

I'm not going to go through these objectives because Steve mentioned many of them in his presentation.

Where we are today. The study itself was initiated in November, and we have begun to develop the problems and objectives, our goals, and we're in the process of determining our existing conditions. We've looked at the State of Maryland's island database, and in that island database it has about 103, 105 islands that could be used for potential restoration.

So we took that information and we developed a screening criteria to try to figure out what islands were available for restoration. I'm going to get into that right now.

The next couple of slides are going to show by county the islands that we looked at when we were going through the screening process, and also at the back of the room

they're on the back if you would like to take a closer look.

This is Dorchester. These are all within the study area. So as far as the screening criteria, the first screening we did was to look at that 100-plus islands and determine exactly if they were within our study area. Some of these within Kent County fell out of our study area. So that was our first Tier I screening. After we determined that we went through a Tier II screening, and I'm going to talk about each of these right now, give you examples.

Tier II involved was the island at least 200 acres, had it historically been 200 acres, and it also currently needed to possess the

ability to be 200 acres or more. The island must be reasonably accessible for dredged material placement. Some of these islands were located very far up river channels, and it would have been very difficult to get a barge or any sort of equipment in there to place materials.

Another criteria was the islands could not negatively affect the hydraulic conditions of the area for any restoration effort, and by this I mean that we couldn't create an island at the end of a river system because that might impact how the water flows into the bay.

The island could not significantly impact our navigation of any of the existing channels or waterways. We couldn't create an island that would be within one of the existing federally dredged channels or if there was any sort of heavily used marinas or recreational or commercial fisheries, we needed to take that into consideration, and it must be an island and not a shoreline was another criteria we used.

Continuing, the island must not be a highly populated center, and the example that I

will give for this is Kent Island. As Mark showed, the remote island habitat is good for a lot of wildlife, but if it's a very heavily populated area, it would be very difficult to

support any sort of wildlife populations.

The island must not have any unexploded ordnance or hazardous, toxic, or radioactive waste. The example I can give of this is Bloodsworth Island was a previously used Naval bombing range. It has a lot of unexploded ordnance. For safety reasons we would not consider that as one of the islands for restoration.

If the island is currently state or federally managed as a wildlife area, we would need to have the landowners express their interest in us being involved in the study with them. By this I mean, for example, Barren Island is owned by the Fish and Wildlife Service. It would not be appropriate for us to just walk up to the Fish and Wildlife Service and tell them that we were going to restore their island. We need them to suggest to us

that they needed to be involved in the study.

Finally, the restoration site needs to be

compatible with any other Corps led studies being conducted on the island. At Smith Island we have a feasibility study that has recommended several projects, so anything that we would do at Smith Island would have to be compatible with anything that has been recommended for construction.

So from that list of 103 plus, 105, the islands that are still under consideration and the islands that we are requesting any data, any interest, any information that you may have on any of these islands are Barren, Holland, Hooper, James, Little Deal, Ragged, Smith, and South Marsh.

Around the room you will see fact sheets where these islands are located. So please make sure you get a copy of all of the information and provide to me any information that you have on any of these islands for our screening process.

The next step that we will be doing is

taking all of the public information that we get and any sort of comments or suggestions that you have and developing a screening process to get down to the island or set of islands that we would be restoring. We're going to be using information that the bay enhancement working group -- some of you may know that the State of Maryland has a bay enhancement working group made up of a bunch of environmental agencies. They're going to be providing some information to the screening process. Cost will be a factor, engineering considerations, and, again, public information.

I did want to say one thing. We have not determined any configuration so far. We are just in the process of trying to figure out which island we would restore. There may be the potential for a combination of restoration alternatives. Something that has been considered and is being considered is Ragged Island and James Island are very close to each

other, within the distance of a channel, and so there may be an opportunity to say restore Ragged Island for a wetlands habitat and use James Island maybe for an upland habitat or some sort of combination there. So, again, I want everyone to know that nothing has been finalized. We're still accepting any information and suggestions you have.

So our next steps, screen the islands, start to collect the detailed environmental engineering and socioeconomic data, prepare the conceptual plans, and determine what this configuration could look like, analyze and compare those plans, and select the recommended plan are our next steps.

I'm going to be presenting right now some important dates to you, and I highlighted several of them. The comments again are due by the end of March, and that's so that we can stay on schedule. Once we begin these conceptual plans we're going to be having another

newsletter that goes out to let everybody know what the conceptual plans are and to let you know that there is going to be another public information series of meetings that will give everyone the opportunity to comment on what we prepared.

That information will be used in the final design selection, and once we develop the detailed designs and feasibility report we're going to be having another set of public information meetings to present the environmental impact statement, and that's another opportunity. There will be a newsletter that's sent out about that.

So getting back to my original comment, please take those cards and distribute them to anybody that you think may be interested, and if you can also give us some suggestions on how you think this information can best get to the people that might be involved, we appreciate that, too.

So with that I'm going to turn the floor

over. Again, if you're going to speak, please let Carol know your name and spell it for the record.

MR. KEEN: My name is George Keen. Of the eight islands listed, how many are you prepared to designate in March?

MS. BISTANY: For restoration? It will depend on the information that we get and how this fits together. We have not made any definitive plans for that. It will depend on cost, engineering, environmental.

MR. KEEN: This is March of '03?

MS. BISTANY: Yes.

MR. KEEN: So this is your priority. If these are the top priority islands, I was just curious to know how many of these you can undertake beginning March.

MS. BISTANY: That is for the feasibility study, for a detailed study, and cost will play a big consideration in that and the amount of

information and public interest or not. People might say to us thank you, but no thank you. We're not interested.

MR. KEEN: Just one other question to the biologist. What was the depth of the water of those underwater photographs that you took?

MR. MENDELSOHN: It was taken in November, and it's about 5 or 6 feet below the surface. I had one last time that showed some rockfish, but they weren't clear. Ken has got a mobile camera that he uses off the dikes.

MR. KEEN: The beach area in those photographs will not have rip-rap or support?

MR. MENDELSOHN: No. That is an area that's not rip-rapped. The wetlands will be breached, the inner dike here. There will be breaches along here to open it up to the bay. We're looking at a cell this spring that's about 18 acres that will have wetlands and channels and islands in it, but our intent once we get the vegetation stabilized is to have a natural

looking shoreline into Poplar Harbor.

MR. KEEN: Thank you very much.

MR. SMARICK: My name is Andy Smarick. If I could go back to his question, I'm trying to get an idea of the eight islands that could

possibly be used, is it conceivable that all eight will be used or is it conceivable that one will be used? Then what are we really talking about here? I assume cost and dredged material will be a consideration. Is it conceivable that you would come back and say we're going to use all eight of these as long as they cost under 200 million or 500 million?

What I'm trying to figure out is do you guys have in your mind we need to place X amount of square feet of dredged material and we're just trying to place it within these different places within a certain limit? What I'm hearing is there are eight islands that we're going to put stuff places, but what other actual physical constraints are there, the material and the

money involved?

MS. BISTANY: I'm going to say a few things. There are considerations, for example, Barren Island, the Fish and Wildlife Service told us that the biggest island they would support is a 1,000 acre island. So costs are going to play a big factor, but the project

management plan that we -- the scope of study was an island or a reasonable set of alternatives, for example, when I mentioned the James and the Ragged, those would be split evenly. We are not looking to use this study to restore every island within the bay.

MR. WILLIAMS: My name is John Williams. I have several questions. First, you indicated one of your tier criteria was that it must be an island and you could not place the material adjacent to the shoreline. I don't understand why that criteria was utilized.

MS. BISTANY: Well, we had said when we were studying this project management plan that

we would be looking at island restoration, and so that's what we kind of stuck with when we were doing our criteria, but if you have comments, please -- that's what we were using for our criteria. Are there concerns about that?

MR. WILLIAMS: I just thought it might be unduly restrictive given the background and the possibilities that the State has considered in

its options, and the reconnaissance study did not draw a restriction between islands versus mainland or at-land placement.

MS. BISTANY: But within our scope of study we made that distinction.

MR. WILLIAMS: I guess you've made that distinction. I would ask another question then relative to the PMP, and I'll quote from the project management plan. It states: "The purpose of this PMP is to outline the tasks and costs of the island restoration site that will be selected as a result of the DMMP process. At

this time Barren, James, Holland, and Parsons Islands and Lower Eastern Neck are being evaluated in the State's DMMP. A decision of which of these sites this study will investigate in feasibility level detail will be made as the first task of the feasibility study."

So I would ask you to explain how this purpose statement, which was dated November, and that listing of five possible sites matches with your current eight sites which you've described this evening, and of those above sites, of

course, one of them is here in Kent Island, but the other is -- the Lower Eastern Neck possibility was one of these shoreline placement activities.

MS. BISTANY: One of the things that you do have in your handouts are all the islands and the reasons that they were screened out when we went through that tier process. The project management plan does in fact say that, but we realized that it was incumbent upon us to try to

cast the widest net that we could for any type of island restoration efforts, so we took a step back from what was in there and we actually tried to identify any possible island site that we could and not be so definitive in the eight that we had on that PMP. We actually tried to go and cast, like I said, as wide a net as we could. We wanted to try to figure out any other island that may have been available for restoration, and so that's how we came up with the State of Maryland database.

Does that address your question? Is there anybody else that would like to make a comment?

MR. WHITE: Steve White. I own Holland Island. I'm sorry I missed the last Thursday meeting, but I didn't know about it until Friday. I'm pretty skillful, but I couldn't manage that one.

In your evaluation of island restoration do you consider the possible benefits? We know that these barrier islands in the bay are going

fast, and they do afford a tremendous amount of benefit to the waters and the lands to the east of them. In your evaluation is that given consideration? For instance, Bloodsworth, Adams, and Holland all but protect Holland Straits, and Holland Straits is being decimated. It's about four square miles of area in there. The Holland Straits channel had oyster rocks on each side of it. 50% of them are now under about a foot of sediment, and the others are being decimated, too, and I was wondering in the consideration if there is a value placed on a restored island, protected island, the benefit it might be to a place like Holland Straits.

MS. BISTANY: I know that within Poplar

Island -- and I'm going to have to ask the project team to help me out here -- I don't know that it has been quantified as to the benefits. I know that there is anecdotal evidence of supporting protected shorelines. Can you guys help me out? That has not been quantified, has

it?

MR. WHITE: I'll give you an illustration. Four years ago three-fifths of a mile of Holland Island breached. Immediately east of it there was probably 2,000 acres of seeded grass so thick that if you didn't have a weedless prop, you would have to stop and put it in reverse to get the grass off. Within two years after the breaching of this three-fifths mile at least 200 acres of the grass was completely covered with silt. That's what I mean by a restored island being a benefit to the water and land in its shadow.

MR. MENDELSOHN: If I can say one thing, this Poplar Harbor historically was a really good place for submerged aquatic vegetation, and there was a lot of erosion and a lot of

siltation in the harbor. What we anticipate is that eventually the submerged aquatic vegetation will start moving in here as the water becomes clearer. That hasn't happened yet. It has

gotten a little bit better, but it hasn't gotten to the historical area.

At the beginning of the project we were anticipating this area would become calmer and that SAV would start developing. We intend to plant some SAV in this area to try to regain that area, but the northwest fetch created a huge amount of turbidity in that area.

MR. THOMAS: I'm Clark Thomas. I own property that received dredged material one time. I've never seen a state project not have Phragmites on it. What happens when whatever you plant turns into Phragmites? Are you going to eradicate that plant or just let it go?

MR. MENDELSOHN: The answer is yes, that we would eradicate it. We have a Phragmites eradication plan at Poplar. We have an aggressive plan with the desirable plants to stop Phragmites from establishing. It's a

problem. If you don't think the elevation is exactly right, you don't get what you want, you

get Phrag, but we don't consider it desirable. There are some people that will say that it is desirable because of the water quality and the stabilization protection, but it's not in our project design to have Phragmites.

MS. BISTANY: Any other comments?

MR. CLARK: My name is Kelton Clark. I have a question about the shoreline being -- I saw a lot of rocks and boulders and rip-rap being put out. Are they going to be part of the permanent shoreline?

MR. MENDELSOHN: The larger rocks are on the side facing west where there is a strong northwest current and wind coming. The area inside Poplar Harbor is much smaller rocks, and that area will be breached, opened up for tidal influence. First we're going to start with pipes, and then when we get everything established, we won't use the pipes anymore, and it will be a more natural looking shoreline, but to get the upland elevations and because of the

deeper water and the currents we needed to have larger rocks on the side facing west.

MR. CLARK: Those rocks represent a heightened shoreline. Were you looking at what that does to change the soft sediment system to a hard substrate? Are you looking at what effects that might have?

MR. MENDELSOHN: Well, Poplar had so much erosion to start with, it was a very shifting environment, and there is still a fair amount of sediment coming to that area from the north, but given what we needed to do at the site we couldn't do it with a soft shoreline and get the dike elevations that we need. The inner harbor, that's going to look much softer.

MR. CLARK: Can you estimate what percentage of the shoreline will be hard?

MR. MENDELSOHN: This is just for Poplar. The whole thing is hardened, but it's much bigger. The rocks are much higher here. They're much lower there. This area will be

breached. It will be opened up. We haven't determined exactly where the breaches will be, but our goal would be to get it to look as much like a natural marsh as we can.

MR. CLARK: I'm sorry. I don't understand the concept of breaching.

MR. MENDELSOHN: That's when we would knock holes in the dike. At first we would put pipes in at the experimental cells. Eventually we would either leave the pipes open or remove them, and as you go down, there will be openings all through there. There could be 50 to a couple hundred feet to allow anything that wants to get inside -- those are habitat islands. There will be tidal guts in there for fish that will be about 4 feet deep, maybe 5 feet wide. There will be pools in there. Our goal is to make this look as much as a marsh and function as much as a marsh as possible.

As far as the big rocks there, there is just nothing we can do about it with the deep

water. I know some people think that that's not the way to go, but there is no way you can do a soft structure in those kinds of conditions. Also this area here is going to have the uplands, the trees. This will be a regular kind of a forested-type area with meadows. This area would probably -- I can't see this ever being opened up there, but this one, the plans are to open that up for the fish, birds, turtles.

MR. CLARK: While I understand the engineering aspects of the need for this hardened substrate, I might suggest that you might want to look at what it means to the ecology of the water to open up what is historically a soft sediment system to a hard substrate, what organisms might come in.

MR. MENDELSOHN: Right. We have an extensive monitoring project going on at Poplar where we have Fish and Wildlife evaluating the wetlands at the site and also the adjacent area. We have the National Marine Fishery Services

doing the fishery utilization of the project. We have USGS doing birds, and then we have all the monitoring for water quality and sediment quality.

One thing I need to point out is this was not a great area to start with. We stayed outside the oyster bars. We met with all of the watermen in the area, and we tried to align it as much as we could to the historic island footprint, which was approximately -- if you go back to the colonial records, it was about 1,000 acres of an island there.

I should have mentioned that there was a thriving community there during the colonial period, and up until this century there were farms, sawmills, post offices, and what was left of it was used by Democratic Presidents Roosevelt and Truman as a retreat.

So it was not always open water. It just recently had become open water, and finally the last family just had to leave because there was

nothing left of the island. I can understand your concern because diked it looks much

different than it did before, and clearly the dikes incorporated the bottom.

MR. CLARK: My concern came up when you showed me Ken's picture. This is a discussion we can take later.

MR. MENDELSOHN: Well, we hired him to go out and take pictures, and some of them that show -- we're having trouble getting them over, but we've got some of them that show rockfish. We've got some of them that show anemones. He didn't do the whole diked area. During the dike stabilization surveys we found oysters on the dikes.

So we believe that it's going to be a pretty good habitat there on the dikes and we'll have a very good fouling community there.

MR. KEEN: How will you handle the issue of private ownership of some of these priority islands of the eight islands?

MS. BISTANY: We had the same question come up last time, and Scott gave a really good example of Poplar Island, how it was handled at Poplar Island. So, Scott, can you repeat what

you just said.

MR. JOHNSON: How are we going to handle private property? We're going to avoid it if possible. We have a couple of options. We can either buy it if it's feasible or in the case of -- it's very difficult to see. This is Coaches Island right here. This is private property. Jefferson Island, private property.

As you can see, we stayed 300 feet off of this property because you want to be able to shoot 300 feet, safe gunning range, so we stayed that far away from the property. This is actually quite valuable habitat, and this is where all of the turtles came in here this year. It's all nice sandy beaches. So we're finding this may be a desirable way of working around private property, stay off of it, develop some

channels within that area, and utilize that as some good habitat to develop.

That's one option. Another option, as I said, would be to purchase easements, purchase the property, and connect or buy the whole island if that seems feasible.

MR. KEEN: A couple of the islands on the sheets of paper there indicate that they're now privately owned, but they're under the eight on the priority. You can't avoid them; you've chosen them for your eight priority. Do you think you can buy them or whatever?

MR. JOHNSON: Remember where we are at right now. We've only screened these islands; we haven't even looked at ownership at this point. All we've looked at is we have an island there that used to be historically larger that now could be restored to its historical configuration and provide good habitat and good placement area for dredged material. That's basically all the criteria. There was a number

of other criteria we looked at, but that's as far as we've gone right now. At this point now we're asking for public comment. Some of the comments we're looking for is if the owners want to come and say yea or nay. In the case of Barren Island we have the Fish and Wildlife saying yea, we would like you to come. Other people may say no, and that will definitely be

factored into our discussion making.

MR. KEEN: Thank you.

MS. BISTANY: Any other comments? Again, please make sure that you grab some of those comment cards and distribute them. We're really asking for your information and your input into the study, and if you have comments or you have concerns about what we've done so far, please let us know. We need this information. We need to know whether anyone is interested in these islands. We also need to know again the best way to get the information out to everybody. How did you get the information, did it work,

did it not work. We put advertisements in the paper. We have been told that the people did not see those. So let us know how it works best for you so we can make sure in the future we get the information out as best we can.

Thank you all very much for coming out. We appreciate it.

(Whereupon at 8:00 p.m. the meeting was adjourned.)

MID-CHESAPEAKE BAY ISLAND

ENVIRONMENTAL RESTORATION FEASIBILITY STUDY

PUBLIC SCOPING MEETING

Meeting in the above-captioned matter was taken on Thursday, February 20, 2003, at the Dorchester County Public Library, 303 Gay Street, Cambridge, Maryland, commencing at 7:00 p.m. before Carol T. Lucic, Notary Public.

REPORTED BY: Carol T. Lucic

PRESENT:

Michele Bistany

Stephen Storms

Mark Mendelsohn

Michael Snyder

Scott Johnson

Jeff McKee

Corps of Engineers

Cecilia Donovan

Maryland Environmental Services

Jane Boraczek

EA Engineering

MS. BISTANY: Good evening, everyone. My name is Mimi Bistany, and I'm the study team

leader for the Mid-Chesapeake Bay Feasibility Study. I want to welcome you and make sure that you've all signed in at the registration desk and picked up a copy of everything that we have.

We have a court reporter here tonight to capture any comments that you have for the record. I want to give a little idea of what the format of the meeting is tonight. We're going to be giving a short series of presentations, and then we're going to open the floor up to public comments. If you're going to speak on the record, please let Carol know your name and your organization, and if you could spell that for her, that would be great.

We have members here tonight from the Port Administration, from the consultants of the Port, from the study team for this study and also for Poplar Island. There are members from operations, engineering, and project management,

so you have if any specific questions after the meeting, if you want to ask them specific information questions, please by all means do that.

The purpose of tonight's meeting is to

present the study, the study process, and the study progress. We're going to be presenting the study's purpose and need and giving a presentation on the Poplar Island environmental restoration study. We're also actively seeking your participation and your comments into this study, and so, as I mentioned, we have a court reporter here tonight. We have comment cards. If you want to just send us the comments, you can fax them, e-mail them to me, any way you would like.

We're also going to be giving you some important public information dates. As I mentioned, this is the first series of public meetings, but there will be three series of those meetings at different points in the study.

The public comments that we receive tonight are going to be used in our planning efforts. They're also going to be used in our island screening process, and I will be talking about this, where we are tonight and how these comments really make a difference. But we do need to have all of these comments on the

scoping part of the study by the end of March in order to stay on schedule and make sure that our island selection process is a good one.

So with that I'm going to turn the meeting over to Dr. Steve Storms from the Maryland Port Administration, who is going to be talking to you about the study's purpose and need.

DR. STORMS: Thank you, Mimi. Thank you very much. I'm really happy to see that we have a good turnout here.

Let me first say a little something about why the Maryland Port Administration is partnering with the Corps on this project. The Maryland Port Administration is charged with

keeping the Port of Baltimore operating in an efficient way. As you probably all know, the Port is a strong economic engine driving the economy of the entire State of Maryland, so it's very important for all of us to keep the Port of Baltimore operating efficiently. The group that I work with at the Maryland Port Administration is called harbor development, and I work there together with some of my colleagues, Dave Bibo.

Dave and I, we're charged at harbor

development with finding places to put the dredged material that the Corps is responsible for removing from the shipping channels coming into the Port of Baltimore. So Dave and I need to find places to put this dredged material, and that leads into why we're doing this feasibility study here.

The purpose of the feasibility study is to carry forward a reconnaissance study that the Corps did on a Mid-Chesapeake Bay island, and Mimi will talk a little bit more later about

that reconnaissance study.

The feasibility study that we're going to come up with as a result of this effort, there are several important things about it. One, it complies with the National Environmental Policy Act. Also it will provide the basis for recommending how this project will be constructed for preparing a design memorandum -- and we can get into what that is a little bit later -- and for preparing plans and specs at the next phase of the project.

The objectives of this feasibility study

are to conduct detailed engineering, economic, environmental, and cultural investigations to support the project plan. We need to identify appropriate environmental restoration projects that produce high priority environmental results that comply with the NEPA requirements I mentioned earlier, and we need to estimate costs and benefits as well.

The Corps and the Port also need to

negotiate appropriate cost sharing agreements because of the partnering nature of our relationship with the Corps. We need to prepare appropriate federal documentation. We also need to recommend what environmental restoration projects look as if they would be good for this project and determine other paperwork that needs to be done.

Here is where we get to why the Port is involved with this. The Port, as I mentioned, is always on the lookout for ways to handle the dredged material that is removed from the shipping channels. We're trying to focus more and more on beneficial reuse of the dredged material rather than some methods which might

have been used in the past or are still used throughout the U.S. such as just open water placement of dredged material.

One very appropriate beneficial use of dredged material is island restoration. That's what we're here to talk about today. Island

habitat has a lot going for it. It's preferred by migratory birds and other wildlife, it prevents island erosion, it propagates or can increase shallow and protected waters, which is where you get a lot of good submerged aquatic vegetation. The shallow water is also real good as a nursery area for fish and shellfish. It protects very important island habitat.

Shorelines are also protected, and that's very important for all of the wildlife and very important for the Port. These restored island habitats can provide a place to build with dredged material.

So with that I believe that Mark may be up next.

MR. MENDELSOHN: I'm Mark Mendelsohn. I'm a biologist with the Corps of Engineers, and I

have been on the project since the beginning. Steve has told you about all of the benefits of island habitat and how it's scarce. What I basically have are pictures of Poplar Island.

The brochures will give you a lot more information.

Let me just show you what we have. As Steve mentioned, the islands are really disappearing. They're valuable because they provide remote habitat. This is what Poplar looked like when we first started. Historically it was about 1,000 acres, and during the colonial period it was a thriving farm community with a school, a post office, and then it got smaller and became a retreat for President Franklin Roosevelt and Harry Truman.

The dark blue is the historic footprint of what the island looked like. The green area is what was in 1993. So you can see that there wasn't a lot left. When we started, it was down to about four acres when we started construction.

This is what it looks like now. It's 1,140 acres. On this site here there will be

570 acres of forested uplands, which will

provide recluse for herons. There will be meadows, little ponds, and this area here will be 570 acres of marsh including these little habitat islands there.

So this kind of shows what it will look like. This will be this area. We'll eventually breach part of the dikes. We'll have an area with low marsh and then high marsh, and there will be mud flats for the shore birds, and then up here will be the forested area.

I don't really understand this, but we do have people here. We've got Mike Snyder back there, who is our geotechnical engineer, so he can explain this to you, but basically it's just a really big dike. I understand this part. This kind of shows you the scale of the project and the size of rock that's involved. This is the side that gets the most exposure.

I've got a few wildlife pictures to show you of what is going on. This is Poplar Harbor. We have just a lot of great blue herons there.

We had two snowy owls that came in over the winter, and they're not typically found in this area. These are least tern eggs. They're very rare in this area, and they're listed by the state as being threatened. We had about four dozen nesting pairs. They are really scarce, and they came in before we expected them to. We built islands for them, and they chose to nest on the dikes when we are going to inflow, so we had to rearrange our inflow schedule to give them time to hatch their chicks and take off.

We had an unexpected surprise last year, and we had about 600 diamond back terrapins nesting there. We marked all the nests, we tagged the turtles, and then we let them loose in a controlled environment so the herons couldn't get to them, but it seems like we've got a pretty good population of the terrapins there.

This one is hard to see. We hired Ken Paynter of the University of Maryland to do

underwater photography of the dikes, and the files are so big we had trouble getting them, but the point is that we've got 34 acres of underwater dike habitat there if you just count the wetted surface. So it's a huge reef. I've got some other pictures I couldn't get working. I've got anemones. This one is supposed to show a rockfish right there because we have one picture with two rockfish. I have been guaranteed a better one.

But you can see with this fowling community and all the spaces in the rocks it's a very valuable habitat. It kind of pales compared to the wetlands and the uplands, but 34 acres of dike like this with the fowling community is very good.

This is the harbor area. This is the area we call the notch. We started planting wetlands plants there last year, and we will be doing a lot more this year. These are plants that we got some of them from environmental concerns in

Saint Michaels, some of them from the Providence

Center in Arnold, Maryland. In association with Anne Arundel Community College they hire severely mentally handicapped people to grow plants. So we were able to get a small contract with them and a bigger one this year.

That's goose fencing there. We have more geese than we need there. This is just -- they're not really volunteers; we recruited them, but some of them are MES folks and Corps folks. This is just the planting process. This is what it looked like in August. The planting took place in April and May and June.

We also have an upland area where we're trying trees and shrubs to see what will grow there. This is kind of like our nursery. Some folks refer to it as an oasis because there is just not a lot out there right now. When we vegetated the dike stabilization, our project manager Scott back there said why can't we throw some wildflowers in the stabilization mix, so we

did that, and that has provided additional habitat.

MS. BISTANY: Compared to Mark's presentation mine is going to be pretty

straightforward.

Again, as I mentioned, we're here tonight to talk about the study process and progress. I'm here to talk to you about that and talk to you specifically about our island restoration selection process that we've kind of gone through. I'm also going to be presenting to you some important study dates for the public involvement process.

All Corps projects undergo five phases, reconnaissance study; feasibility study; preconstruction, engineering, and design, which is the plans and specifications phase; construction; and then operation and maintenance.

Here is how it works: All of our studies start with some sort of problem, and that

problem is typically brought to the Corps by a nonfederal sponsor, and it undergoes a reconnaissance study, which I'm going to be talking about in a little more detail. From that, if it shows that there is a problem that the Corps of Engineers can participate in, it

goes on to a feasibility study and then on to plans and specs and construction and operation.

I'll give you a little bit more detail on the reconnaissance efforts. The reconnaissance phase has three purposes: Do the problems warrant federal participation, and, if so, is there a nonfederal sponsor that will cost share the feasibility study? The result of that is a project management plan, and in that project management plan it lays out the scope of study for the feasibility study.

The reconnaissance phase is 100% federally financed, and it results in a feasibility cost sharing agreement, a legal agreement between the Corps and a nonfederal sponsor to enter into

that feasibility study, and the typical schedule is about 12 months to completion.

In the feasibility phase the purpose is to conduct a detailed analysis of those problems, identify the existing conditions, determine what alternatives to that problem can be prepared, and then analyze and compare those alternatives and select a recommended plan. That phase is cost shared with the nonfederal sponsor, 50%

federal, 50% nonfederal. The entire nonfederal share can be done through in-kind services. If they provide support to the study, the sponsors can get credit for that. The feasibility report, as Steve mentioned, is what is used to authorize projects, and the typical schedule is about two and a half to three years.

The Eastern Shore, Maryland, Delaware reconnaissance study was the reconnaissance effort for this study. That study was completed in July of 1999. The study area itself was the Eastern Shore of the Chesapeake Bay watershed

within Maryland and Delaware. It encompassed a huge area. Some of the identified problems that the report noted were aquatic and terrestrial habitat loss, excessive erosion and sedimentation, bay grass loss, fish blockages, and water quality degradation.

Some of the recommendations in that study were the beneficial use of dredged material for habitat restoration, wetland and flood plain habitat improvements, fish passage structures, and water quality improvements, and it resulted

in the feasibility cost sharing agreement, the legal agreement between the Corps of Engineers and the Maryland Port Administration.

During the feasibility phase all studies are -- the Corps uses a six-step planning process, and I'll explain this a little bit more. You identify the problems and needs, and you establish the goals and objectives of the study. Then you determine your existing conditions, what is currently out there, what do

we have. In this case we're looking at islands that may be available for restoration. I'll get more into this. You determine the screening process and you determine your baseline conditions, you develop alternatives to those conditions, evaluate, compare, and then recommend your plan. You prepare what is called a feasibility report, and we're preparing with that an integrated environmental impact statement.

For the mid-bay feasibility study the study area is defined as the eastern shore of the Chesapeake Bay from the confluence of the bay and the Chester River south to the State of

Maryland border with Virginia, a big area.

So our goal is to restore valuable resting, nesting, foraging, nursery habitat that has been lost in the bay for migratory birds, fish, wildlife species through the beneficial use of dredged material.

I'm not going to go into this in too much

detail. These are several of our study objectives. Steve mentioned a lot of them in his discussions, and it's here if you would like to look at it.

As far as feasibility progress, the study itself was initiated in November with the signing of the FCSA, and what we've done so far is we've defined the problem that there is habitat loss in the bay and there is a need for the placement of dredged materials. We defined the goals and objectives of the study, and we're in the process now of trying to determine the island or set of islands that we would restore for this study.

So what we've done is we looked at the Maryland database for islands that were

17 historically within our study area and tried to
18 cast as broad a net as we could. We tried to
19 find any island that could be included in the
20 study. In the back of the room -- and in a few
21 minutes I'm going to show you some slides of

1 these -- but it turned out to be 103 islands
2 that we screened for this process, and please
3 take a look in the back for more information.
4 So these are by county the islands that we
5 looked at. I also want to mention they're on
6 your handout sheet, too. You have each of these
7 listed.
8 So the first step in our island screening
9 criteria was to determine, Tier I screening, are
10 those islands in our study area. Some of the
11 islands in Kent County fell out of our study
12 area. They were north of the Chester River, and
13 so therefore they weren't considered in this
14 study. The next step was to conduct a Tier II
15 screening. If you have questions, please stop
16 me. This may be confusing.
17 So in the Tier II screening all these
18 islands were looked at. Was the island
19 historically 200 acres or more, and does it now

have the potential to be 200 acres or more? That was one of the screening criteria. Another

criteria was it needed to be reasonably accessible for dredged material placement. Some of these islands that you will see are located very far up in river channels, and they would not be accessible for material placement.

The next criteria was the island restorations cannot negatively affect the hydraulic conditions of the existing river systems. By this I mean if you were to place an island at the mouth of a river, you could be seriously impacting that flow of water, so that was something we looked at.

Another criteria, the island cannot negatively impact the existing navigation. So if recreational or commercial fishermen were using this area and there was a marina or if there was some reason that you couldn't put an island that would impact the navigation, that was another screening criteria.

Then the island needed to be an island, not shoreline, and the island could not be in a

highly populated center. Kent Island, for example, is a very highly populated area, and to create any sort of aquatic habitat might not work because of the population centers there. We used another screening criteria that it could not involve any unexploded ordnance or hazardous, toxic, and radioactive waste. An example I give of this is Bloodsworth Island. That was a past bombing area I believe for the Navy, and so for safety reasons we would not consider that as an island that could be restored.

Two more criteria: If the island is currently state or federally managed as a wildlife area, we must have the landowner's support for restoration. This is really important because in the case of Barren Island, which is managed by the Fish and Wildlife Service, we don't want to be telling anyone else as a federal agency how we can go ahead and manage their property or change their property

in any way unless they're interested and come to us and say, yes, this is something we want to consider.

Finally, the island needed to be compatible. Any restoration opportunity needed to be compatible with other Corps led studies. As an example, Smith Island. The Corps of Engineers has a feasibility study at Smith Island, and in that report there are several projects that are being considered, so any type of restoration opportunities would have to be compatible with those type of studies and what was already recommended.

So with that being said, our 103 islands got down to eight islands that are still under consideration. It's very important for us tonight to find out what you think about, one, the screening criteria that we used and then give us any information, any data, any feelings that you have towards these islands because that's what we're here for tonight is to get an

idea of what you all consider to be valuable for restoration.

As part of the next series of screening criteria that we're going to use on these eight, public involvement and public interest is a very large part of that. We're also going to be looking at these from the perspective of environmental considerations. Some of you know that the State of Maryland has the bay enhancement working group. It's a group that's involved in the placement of dredged material throughout the bay. They're ranking potential sites for environmental considerations. So that type of information would be used as one piece in the second screening.

We also looked at the cost, any engineering considerations that would go into restoring these type of islands, so please tonight speak on the record and let us know what you think.

I also want to point out that around the

room there are the eight islands that are still under consideration, and each of them have little fact sheets that we've provided, so

please take the handouts.

Then some of the important dates that I just want to talk to you quickly about. We need the public comments in and any data in by the end of March. One of the main reasons for that is that we're going to be collecting winter data for whatever island that we restore, and we need environmental data, and so although you look outside and you see it's pretty cold and it doesn't look like winter is going away any time soon, we need to make sure that we're staying on schedule and we're able to collect that data. So we're thinking by April would probably be almost like when the spring starts to come through and the process starts to change.

So after we get that information and we decide what island or set of islands we would be restoring we will begin the conceptual designs

in June of 2003. Around December of 2003 you can expect to see a second newsletter letting you know that we're going to be having another series of public meetings where we come and present to you the conceptual designs that are

being considered and ask for your information and any sort of concerns that you have on those conceptual plans. June of next year is when we would probably be on track to select the final design and take that into detail designs.

You can expect to see the draft feasibility report with the environmental impact statement sometime in July of 2005. When that report is released, there is going to be another series of public meetings to get your input on the recommended plan and the environmental and associated economic concerns you may have for that plan.

Finally we're going to take all that information and finalize the report, and our study is expected to be complete in November of

2005.

So with that we're going to open it up for public comments. Again, if you're going to speak on the record, please let Carol know your name and spell it for the record. We also have comment cards. If you don't feel comfortable speaking in public, you can just write your comments down and make sure that we get them,

e-mail them to me, any way that you would like. We have again our project team members. If you don't feel comfortable asking questions here, you can ask them individually after the meeting.

So are there any questions or are you ready to get started? Are you ready, Joe?

MR. COYNE: Thank you very much, Michele, and all the folks from Baltimore, the Army Corps of Engineers, and the Maryland Port Administration for visiting us tonight. My name is Joseph Coyne. I'm president of the Dorchester County Resource Protection and Development Corporation, and in addition I

represent Dorchester County at the dredged material management program under the Maryland Port Administration on the citizens advisory committee. Did I do that right; Steve?

MR. STORMS: Absolutely right.

MR. COYNE: I've become quite familiar with all of the initials and the issues that are relevant here. I would like to just back up a moment to kind of build a foundation for Dorchester County's interest in what is being

proposed here.

In 1996 Hurricaine Fran came through and did a lot of damage in Dorchester County. Shorelines were beat up, islands were beat up, and we kind of looked around and tried to find out what we do about all of this, and we didn't know where to look and no one in the county really knew where to look. So a small group of citizens got together and formed a nonprofit group with the long name that I just gave you to see if we could together find a way to begin

resolving some of the issues relevant to shoreline erosion including the loss of islands, and we quickly identified three major issues that are pretty straightforward, environmental issues, social issues, and economic issues that go with the problem.

These three issues were brought together because with the environment, the quality of the water degrading, we were losing to sediment, to nutrients, we were losing our fish hatchery, we were losing our crabbing, we were losing our oyster hatchery. So we had a whole lot of problems that were causing in turn economic

issues with the families that were trying to make their living through these industries and social issues because these families, many of them were having to stop doing what they were doing.

We spun our wheels for quite a while trying to see where we could go as a group, and there was a lot of despair in the early days.

One of our local legislators at about that time invited us to Annapolis where we sat down with folks from the DNR, Department of Natural Resources, and after kind of looking at each other for a while one of the folks there, a guy by the name of Len Casanova, bless his soul, introduced us to a study authorized by Congress in 1983 directing the Army Corps of Engineers to conduct a study of the bay conditions including shoreline erosion issues. They did in my view for the technology available at the time a wonderful job of analyzing the problem and gathering a wealth of data that we just did not know was available to help guide us in our next steps.

In that study the Army Corps of Engineers folks identified a number of areas particularly where Dorchester County because of its geographic lay where it kind of sticks out like a thumb into the bay catches winds from the southwest, from the northwest, from the

northeast, and from the west all depending on the nature of the storm was doing considerable damage to our shoreline. We did not work on the upper tributaries. We concentrated our efforts where the Dorchester County shore for the most part borders on the Chesapeake Bay.

When we analyzed what the Corps of Army Engineers had done during that period of time, we saw a number of problems being identified, and in our own minds we said what more can we do to organize this? So we took our membership, we identified the problems members were having, we sent letters out to all citizens that we could identify owning shoreline property, and we engaged the local politicians in our effort. We engaged the at that time county commissioners to let them know -- to educate them on the problems that we had found. We then engaged our

representatives to the State Assembly in Annapolis to let them know, and concurrently we began advising our Congressional representatives

at the House and Senate level telling them of this enormous problem that we had in Dorchester County.

In the first blush we all came to the agreement that this is so mammoth that there is no way that we can find the resources to solve these problems, so we began to segregate the problems into various elements, one of the most important being the major projects that the Army Corps of Engineers had identified. A second was where can we get help from the State. The Army Corps of Engineers came back and said we'll join you, but not until the State has a master plan. So we had kind of a Catch 22.

We then went to the State and said, you've got to help us get a master plan for the State of Maryland covering the Chesapeake Bay. That led to the creation by the governor of a task force called Task Force 2000 Shoreline Erosion in the Chesapeake Bay. That particular study

analyzed and came up with many of the issues

that have been identified by our speakers here this evening, the problems of the environment, the problems of water quality, the problems of loss of submerged aquatic vegetation affecting the quality of the fishery and that sort of thing.

So we began to see some cohesiveness in terms of interest at the state level and being matched by the people we had been talking with at the Corps of Engineers, but with all of that overlay there was some clinical structure at the local, state, and federal level, and all through this process we were continually getting endorsement and support by this group of people, which was wonderful for our group. One of the people sits in the audience tonight, Jay Newcomb, who was commissioner for the district for much of the island work that would take place in Dorchester County if selected.

We had wonderful support through all of this. Then comes the hard part: Where do we go

with all of the information that we have gathered? We took this information to the political parties and to everyone else and said, here is the issue; how can we prioritize this? We began building priorities in the state plan and we began talking with our Congressional representatives, and they have been helping us with various projects, not directly related, but indirectly related to all of the things that we're trying to do.

So we are getting money from the Federal Government. We are now getting money from the State to begin solving some of these problems in spite of tough budget times. It will probably be not as much as we wanted, but it will be there.

At the most recent development of this last year folks from the Maryland Port Administration came down and made a presentation to the county commissioners in Dorchester County to a standing room only crowd, and there was

unanimous endorsement that the work that they were proposing, that is, to find a place for dredged materials that would contribute to the environmental quality of Dorchester County in the bay was something that they endorsed, that the contribution that this could make to the social impact that the degradation of shoreline erosion and island erosion was having, if we could stop that, it would be endorsed, and if we could contribute to the economic well-being of the county and the people who were making a living from the water -- if we could do something to help that, why they endorsed that.

So there was unanimous endorsement at that meeting, and we're very happy to report that I think the same holds true. I'm still the Dorchester County representative to the Dredged Materials Management Citizens Advisory Committee, and I was asked this afternoon to make sure that I would be here by the county council, not the county commissioners due to a

change in legislation.

So I'm here to say that at least from

those two aspects I can say we support the effort that the Corps of Army Engineers is doing here, and we particularly look to the areas where we think the biggest bang for the buck could be gained. It appears to us to be probably James Island and Barren Island when we look at all the aspects of the fishery and that sort of thing, what are we going to gain.

There are people in the audience tonight that I'm sure will speak. Ben Parks probably will have something to say. I think he could add a great deal to what we might hope to get out of this regarding the fishery. Rick Neild is a family member of long standing on one of the islands. Cindy Bech is from Hooper Island. Jay can speak from the whole county; he has been immersed in this, and I'm sure others can as well.

But I just want to say with this

background and experience we have been working in Dorchester County trying to find solutions, and we're happy that the Corps of Engineers and the Maryland Port Administration is now looking

to Dorchester County to help bring us some of the answers. Thank you.

MR. BATTISTA: Greetings. I'm John Battista. I live on Taylor's Island. I have property that overlooks James Island. I live along Cators Cove, and the property we own is about 5,000 feet of shore frontage with diverse types of terrain there and foliage and aquatic conditions.

We have a wildlife refuge and a tree farm. It's an area that we hope to keep in its pristine state as it now is down through that area for as many generations as we can. We don't plan on placing any condominiums or other structures on the area.

I have some concerns about the selection of the islands at this time and I have a lot of

confusion. Some of the confusion that I have is that the newspapers recently within the past two weeks have identified James Island and Barren Island as the two selected sites; however, we have been told today that there are 100 and some odd sites under consideration.

It appears to us and I must say at this

time with all due respect to the work that Joe and his group is doing that we do not all agree that James Island is a selected site for the fill. Please understand that. We respect that there are opinions here by other people, both watermen, private citizens, and property owners that do not agree that James Island is the place to go with 80 million cubic yards of fill. 80 million cubic yards of fill. May I say that again? 80 million cubic yards of fill.

There is confusion in that the report that goes to the Maryland General Assembly state budget and taxation committee and House appropriation committee regarding the governor's

strategic plan for dredging material dated October 2000 identifies some of these islands that we understand this evening are not yet selected as to be in the near term, one to six years, that will be implemented for a dredging location.

We're not sure what the time frame is here for selecting these islands. We're not sure what the connection is between the year 2000

report and what this group is doing here. It seems that they're working hand in glove, and one of the things that confuses me is what is the real purpose of the island restoration work? Is the real purpose of the island restoration work to find locations for the dumping or for the confining of dredged material from the Baltimore area? How many miles away from Taylor's Island is Baltimore by sea? Maybe 70.

The material from this report is all coming down from the Baltimore area, dredging materials coming down. Siltation is coming

down. It's not going up from Dorchester to Baltimore; it's coming from Baltimore being barged into our locations some 70 miles.

We have pristine areas down off the Little Choptank River adjacent to the James Island, pristine areas with an abundance of wildlife in there. If you were there this spring, you would have seen a great number of crabs, shellfish using that island for their needs. There is a lot of subaqueous vegetation growing around that island. It was so thick you could barely get into the bar there with an outboard motor this

year. I live about a mile across from it. The year before we had heavy vegetation in Cators Cove where I live.

So that area in there is quite pristine. Dumping 80 million cubic yards of material in that area isn't going to help it to continue to be pristine. There are a lot of trees, there are a lot of eagles and shore birds there now. So that needs some serious discussion and

consideration before we select that particular James Island as an area for dropping spoilage.

Concerning James Island itself, in this report right here if you look at the outline of the confinement area that they're placing, it far exceeds the historical outline of James Island as presented in maps dating back to the 1850 era. It far exceeds it. Maybe five to ten times more land mass will be created by the confinement as shown in this report.

I'm not sure. Is it our intention to place islands in the middle of the bay of that magnitude to far exceed the historical areas that are there from 1850 on to 150 years going

forward? Why are we building huge islands in the middle with all of this dredging material, which brings up the question of how can you confine it very effectively there?

We sustain pretty good winds through that area, and if you look at Cators Cove, which is on the east side of James Island, you will see

that there is a great amount of siltation coming down through that area. I in my own mind have serious doubts that you can contain 80 million cubic yards of material successfully for several years, 20 years or more, forever, without it silting further into our areas. That's a concern.

I would like to ask has anybody defined for you what 80 million cubic yards of dredged material from Baltimore looks like? Has anybody given you a profile of what this might be? Does anybody here want to say how many cubic feet 80 million cubic yards of material equates to?

Well, I'll help you a little bit maybe. 80 million cubic yards of material would equate to somewhere near two billion, 160 million cubic feet of material. If you were to build a

building 100 feet wide, 100 feet deep, and 100 feet tall, you would be constructing about a million cubic feet. If you take that 80 million cubic yards of material and equate it to those

buildings, you would be building out on James Island 2,226 buildings.

The bridge from Taylor's Island is maybe 50 or 60 feet tall. How high is this pile going to be when we get through dredging it? How high are we going to build this skyward above and beyond the profile of the original and the existing James Island? How are you going to keep that material there?

With me is a map that the county allowed me to purchase for $30 so I could describe it to you. You can look at the map that I have there, and it very clearly shows the siltation going towards the channels from James Island. If you're going to put 80 million cubic yards of material there from Baltimore, bring it down to us, and hope to keep it there, you better build a pretty good structure to keep it there, not just a little piece.

Not only that, you very effectively destroy James Island's wildlife section right

there now, its structure right now because you're rip-rapping all the way around the island and through the cuts where so many people fish and where there are a lot of things that are just living there now. If you do this for 20 years, you're not going to enhance that. It's going to take a long time for that stuff to get restored.

I guess you probably understand that there are some of us that have questions about this and that are somewhat opposed to this. The report says that there is no appreciable fishery out there. I kind of wonder if the watermen that I see that are going out with their boats every morning before dawn throwing those funny little things out around James Island that look like boxes -- if we told them that they don't have a fishery out there or the head boats I see come over several days out of the year that fish around James Island or the sports fishermen or the guy that I see that takes clients out to do

fly fishing around James Island -- maybe you should tell them, the lobstermen, the watermen, all of these other contractors that they don't have a fishery out there. That's what the report says, you don't have a fishery there.

Not only that, but this report says to construct James Island the State is going to have to contribute $284 million. It will cost them $3 million just to do the study. That's their figures, not mine. The transport of this material is going to be -- the unloading costs alone are somewhere near $175 million annually on this stuff. That's the unloading cost. The transport costs $556 million.

This is James Island. This is one little island to take all of this stuff from Baltimore and bring it down to here and pay all of this stuff. This is the report. I ask you don't we have better places to put Baltimore's material than in a pristine area like James Island? This is in no way going to benefit Taylor's erosion

problem as the maps that I have back there will show you. There are tidal considerations that affect the shoreline considerably more than the winds that get by James Island. The winds coming from that direction are from Ragged Point. They're nowhere near James Island.

If you look at my property -- and you're welcome to come down there and look at it with me -- you will see that the scouring effect on the property faces towards Ragged Point, which is a northerly direction, not a westerly direction. All the scouring on the shoreline is in an opposite direction from the island.

The island is not going to protect us a bit. If you want to spend 1 billion, 137 thousand dollars for rip-rapping around James Island -- that's a private island. We could sure use that money a lot better along the mainland than to do James island, which is owned by three people, and I don't believe you should be spending that kind of money on private

property.

What I'm suggesting is before we make a selection to dump -- to fill James Island we need more information and further talking. I don't think that this is the way that I would like to see it go as the abutting property owner.

Thank you very much for hearing me.

MS. BISTANY: Let me just make sure that I was clear on two parts in my presentation. The material that would come to any island that we would consider restoring is from the outer approach channels. It's not from the inner harbor of Baltimore. There is a line. It's called the North Point-Rock Point line which separates the inner harbor material from the outer harbor material, and I don't know that I made that distinction clear during the presentation.

We have not made any determination as to how large this island could or should or is.

Poplar Island, for example, it is my understanding is about 32 million cubic yards, and that's about 1,100 acres. I just want to

make that clear that we have not committed to 80 million; we have not committed to 150 million. There has been no determination, but I just wanted to give you a point of reference to that Poplar Island study.

The other thing that I wanted to make clear is that there are some restrictions on how big these islands can be. The example I would use is the Fish and Wildlife Service has told us that they would only support the restoration of Barren Island to 1,000 acres. So they would not support anything greater than that. So we are looking at other factors in this restoration process.

Anyone else?

MS. HABERMAN: My name is Martha Haberman. I live on Hooper Island.

I'm just curious about the makeup of the

spoils that would be dumped -- that would be the fill for these islands.

MS. BISTANY: Did you hear that question? We have Scott Johnson and Jeff McKee and Mike Snyder from the Corps of engineers.

MS. HABERMAN: I would like to know the

state of purity of the spoils that would be placed on these islands. Who monitors them? Who will let us know what kind of chemicals or biological or whatever are in the spoils?

MR. McKEE: We test the dredged material every several years, and that information is available for anybody that's interested. As Mimi indicated, we only take material from outside in the Chesapeake Bay, not from inside Baltimore Harbor. On anything such as either Hart-Miller Island or Poplar Island there is an extensive monitoring program that goes along with that where we monitor any effluent that goes out as well as monitor the area around it to make sure that we're not having an adverse

impact on the environment.

The intent is when we build these -- if you remember Mark's picture of Poplar Island and the dikes that he showed, there is a large sand dike that has got rip-rap around it, and there are spillways where you can actually contain the material and try to minimize any material that escapes from them. Obviously on some of the

wetlands sides you may breach them later on, but the intent is to put clean material there.

MS. HABERMAN: Thank you.

MS. BISTANY: Would anybody like to speak?

MR. BATTISTA: Somebody has got to bring these things together so we get a true picture. The report clearly says that there were areas around Baltimore that were explored for putting the material, that environmental groups up there opposed it, and these sites were abandoned. That's what the report says. If they're no good for the people in Baltimore, why are they good for the people in Dorchester? That's the

question I kind of wonder about. I mean if the people around Baltimore and these sites that you show here, the C & O Canal, the Inner Harbor, the main channels, if it's not good for Baltimore, why is it good for us? And if the material is so good, why don't we use it for public works types of things along the beaches and the parks and everything that's between the bridge and Baltimore City where this material could be placed a hell of a lot cheaper than trucking it way down to here? Why don't we use

it on public works areas in Baltimore from where the material came?

We're pristine down here in Dorchester. We don't have pollution problems from inner city harbors and stuff like that. We've got clear areas. That's not going to enhance the clarity of the water down here. Why not keep it up there where it would be a lot cheaper? If it's so good, give it back to the people up there. Use it on public works, parks, playgrounds,

beaches, use it up there. 80 million cubic yards of material per year is a lot of material to give to Dorchester, which will get absolutely no benefit.

The newspaper said it's going to create something like 10,000 jobs. How many of those jobs do we think will come to Dorchester County as a result of this dredging on the report that's looking for these islands? How many jobs are going to come to Dorchester out of those 10,000 jobs reported in the newspaper a couple of weeks ago? I can bet you not one.

This is not the place to take Baltimore's

material. I think you ought to keep it up there. I'm sorry. That's the end of my talk.

MR. JOHNSON: I'll try to answer a couple of those questions. You have to make a distinction. As Jeff said and Mimi said, there is a line between North Point and Rock Point, and everything inside that line is considered to be contaminated. Some of it is; some of it

isn't. None of that material is coming anywhere outside of that line. It has to be taken to a confined placement site and placed there. That's the first thing.

Everything that we're using for Poplar Island or that we would be proposing to use for this environmental restoration project that we're working on here will be clean dredged material, which leads me to your third point.

If it was good, sandy material, we would have people knocking our doors down asking for it. It's not sandy material. It's silty material, but it's essentially just dirt. You've got to understand this material is not coming from Baltimore. This material is coming -- originally most of it is coming from

Pennsylvania coming down the Susquehanna and working its way down the bay, but it is just dirt. Unfortunately, it's very fine, silty material, which is not really suitable for beaches or playgrounds or anything else like

that. Otherwise, we would have a lot of people looking for it.

We can confine it. It will not be escaping from the site, and that's one of the major criteria that we have particularly at Poplar Island is the no releases of sediment, no releases whatsoever or virtually no releases. We have to keep the water quality around the area pretty much as we find it.

What other questions do you have?

MR. BATTISTA: That sounds good enough. My whole point here is we're experiencing erosion down through the James Island area, Taylor's Island. We're experiencing erosion and we're experiencing siltation. We're getting as much siltation in Cators Cove and through that area as we are erosion. So the problem isn't only erosion.

On top of that is this whole big confinement. There never is anything defined that's beneficial to Dorchester. Are you going

to dredge the Little Choptank and the Choptank River and bring our material over there? There never was any discussion on that as a future dumping site for our material. I don't think we're allowed to do that, are we?

MR. JOHNSON: One at a time.

MR. BATTISTA: I want to study this a lot more than to say this is a done deal.

MR. JOHNSON: We're not going to contribute to the sedimentation around the area because it will be pretty much confined. What I would encourage you to do is take a trip to Poplar Island and see how we're operating that site.

As far as jobs in Dorchester County, there will be a significant number of jobs while we're under construction, while we're building the dikes. We have in the neighborhood of 100 to 150 people working on a construction project of this size for two to four years. They stay in the area. We have a lot of local hires. So

there will be some benefit to the local economy. During the operation of the site right now we have somewhere between 15 and 20 full-time people working on the site, which will go on as long as that site is in operation, 15, 20 years. They're all local. For the most part they're local hires.

So it's not 10,000 jobs. I don't know where that number came from. The Port will probably see 10,000 jobs, but there will be some economic benefit to the local community. Certainly we need local workers. We need boat operators. There is a lot of stuff that goes on.

MR. BATTISTA: I will be happy to visit Poplar Island if I can get you to visit my area immediately adjacent to James Island.

MR. JOHNSON: I think we're getting a little ahead of the game. We haven't chosen -- again, whatever the local paper might have said, we're here looking at eight islands right now.

We started with 103. If anybody wants to put more islands back on the table, please let us know, but we feel like we have screened it down to about eight, and we're soliciting comments on all eight. So everything is still on the table.

MR. BATTISTA: I know you've got a big job. I know you're working hard.

MR. JOHNSON: As I said, please come out and visit Poplar, and I think you might find that there is a lot more environmental benefit than what you might imagine.

MR. BATTISTA: Okay.

MR. PARKS: I'm Ben Parks, president of the Dorchester County Safe Harbors Association. I'm sorry for being late. I have been in Annapolis. Larry was also at the same meeting. Larry Sims also attended the same meeting I did, and I came home and he had to go to North Carolina, so that's the reason why he's not here. I apologize for him not being here.

Other areas that have been kicked around

for a lot of years, Site 104. Maybe some of you don't know what Site 104 is and maybe some of these gentlemen back here can explain that, but that has been a lot hotter issue than what we're dealing with here today.

Site 104, in case you don't know, that was dumping in the deep trough in the bay, and I'm sure none of you want to see that, especially the charter boats in the northern part of the bay fought that right to the hilt, the sportsmen did.

In 20 years, as you say, James Island won't be there. In 20 years Barren Island won't be there. In 20 years if something is not done to save some of this erosion, we won't have an oyster bar left in this county. Silt, call it whatever you want, we're losing our oyster beds steadily. They're going down.

I've attended several meetings. I didn't know this one was going to happen tonight until the last minute, but I did attend a meeting in

Ocean City, and the comments from that meeting was 100% in favor of island restoration. I

think Poplar Island from what I've seen of it -- I missed your pictures here tonight, but from what I have seen I believe that's one of the better projects that I've seen done with spoil especially in this area where it's at.

The main concern that I see for the crab potters is maybe a loss of 1,000 acres of crab bottom. I think that's the concern of these gentlemen over here. Likewise with any island that you restore. It was the same question that was around Poplar.

Barren Island when it's gone, the main one is going to be gone, Hooper Island is going to be gone. I know how far Barren Island extended down past Hooper Island when I was a kid. You couldn't even get across the bar, which we all sail across now. They all went out in the skives and you walked there in water that was less than a foot deep. It's all gone.

I believe in my heart that island restoration is the way to go. We're going to have to deal with the issue of crab pots and all that when the time comes, and I'm sure that's going to be a big hassle with most of the

watermen that's crabbing on the outside, but we're losing our oyster bars mainly I think because of erosion in the lower part of this county, and erosion is the number one cause that we've got around here for pollution.

I can't see how we can do anything but back this. I think we have to look for these island restorations as the place to put this clean dredged spoil. Thank you.

MR. BATTISTA: Have you seen the outline of the James Island project?

MR. PARKS: Yes, sir.

MR. BATTISTA: Do you agree that that magnitude far beyond the 1850 land confinement is necessary out there?

MR. PARKS: I'm not going to get into an

arguing match about what size any of it needs to be, and I don't think that the Corps is here tonight to talk about that, and neither at the meetings that I've attended has anybody addressed any specific island that I know of. I haven't heard anything about any specific island, but I think if we work together instead

of pulling both ends against the middle, that we can accomplish something.

MR. BATTISTA: Do you distinguish between sedimentation and erosion? I mean can somebody tell us that the problem is mainly erosion or sedimentation coming down the river from above Baltimore that's causing the problems we have?

MR. PARKS: I don't know how long you have been in this area. I caretake a place below Hooper Island that is an island that people moved off there back in early maybe 1925. It was surveyed in 1972 with an access of 600 acres, and today as we're talking it's probably just over three. I know in 7/84 it was less

than four. Where do you think that's going? That's not going back to Baltimore. It's coming in Honga River and it's covering the oyster bars up. We had a place in Hooper Straits that we all crab potted in back in the '60s that had 60 to 80 feet of water into it. The deepest place you find in Hooper Straits now is 40.

MR. BATTISTA: I don't doubt that --

MR. PARKS: I'm not here to debate with you. I just made a public comment like you did,

sir, and I'm not going to answer your questions.

MR. BATTISTA: Well then, let me say it this way: Just because things have changed over time doesn't mean that there is an immediate need to restore it back to where it was 150 years ago. Everything changes. We were going by horse and buggy. You didn't have a bridge here a long time ago. I mean things change. Thanks for the information, though.

MR. NEILD: I'm Rick Neild, and I happen to be chairman of the board of directors of

Joe's -- that he's president of. We call it the Dorchester Shoreline Erosion Group. I'm one of the original founders.

I would like to mirror what Joe said, but speak to the group as a landowner and what I would consider a young native by some standards of Dorchester County and Taylor's Island. I will be 51 in March, and I've spent all but four years of my life on Taylor's Island. As it turned out, I happen to be -- I wasn't born there, but I grew up on a farm that's adjacent to where John is speaking about on the north end

of Taylor's Island.

I can remember when the last house on James Island washed overboard. I know that Ben was relating to some of these same situations. I know when it took probably an hour to go around James Island. You couldn't go between James Island over to Taylor's Island because there was no channel there. There was like a big ditch.

I'm not a watermen, but I have worked on the water, and I watched and been around watermen all of my life, and they cut the first channel because the land disappeared. My grandfather when he was a young man walked from Taylor's Island on a county road to James Island. There were homes, there were schools. All of that was out there.

The farmland we own on Taylor's Island, two of the fields that are across the cove from where John speaks of, it hasn't been that many years that they were 20 acre fields. Today one of them is 8.9 and the other one is 10.5. I would suggest that the sediment that came out of that field is now in Cators Cove and across the

oyster bars between James Island and Taylor's Island. It went somewhere.

I can tell you as a child that we used to walk the coves around Taylor's Island and the north shore, but when there was still some marshland and hedgerows between there and the

shoreline, and there was, you know, a hard bottom. There was crabs. You didn't mire down in the mud, as we would say. Now you go knee deep in sediment. There are no crabs in Cators Cove. There are a few. There are no fish there. I can remember when it was a navigable channel. Now it's a mud flat the majority of the time.

Behind your house, John, that land, there was actually islands out there well past Mike Willey's pound nets. That's all gone. It was a long walk from where you live to the water. On the opposite side where we live, which has a greater impact from erosion because the island -- if this is Taylor's Island and this is James Island, the erosion is kind of like working this way, and the fetch out of the northwest, which

is the predominant winds, I would bet money, I mean substantial money, that this year we've lost between 15 and 20 feet on our side of the cove because James Island is no longer there.

I can remember when you could almost walk across the Little Choptank on work boats in 1978. Sauders Creek was choked with watermen from Hooper Island and everyone around because the oyster bar inside of James Island was the best there was. Today it's not. Some of it's disease, but I guarantee it's covered up.

The Hooper Point used to have a colonial graveyard. It had an Indian graveyard. I remember seeing the holes in the wall when I walked along that beach with my grandfather when it used to be sand. Now it's a clay bottom, and there is no evidence of any history there at all.

I support the rebuilding of James Island as a landowner and as a businessman, as an associate watermen per se -- I used to have a license -- because our, quote, unquote, pristine areas that the people that come in here enjoy and our children may enjoy and we ourselves

enjoy today are at risk because these islands

are gone. I mean what you've got is only pristine for another five years. Whether you want to believe it or not, it's going to go here because I know what pristine used to be. It's not there anymore.

On the Chesapeake Bay side, which we as our group have calculated the rebuilding of James Island would have some impact, in 1958 my grandfather bought a piece of property there. It was 76 acres. In 1978 he was looking for some income, so we looked at the possibilities of selling it because of personal health issues. He was a farmer and needed outside income at that time to address some of those issues. It was at 48 acres. That was in 20 years. Today it's probably around 30.

I hunted on that shoreline with my grandfather, which would have been prior to say 15 or 16 or about that age, say 35 years ago, and where I hunted used to be about a 15 acre farm that now is one acre, and it used to be

probably a couple hundred feet from the fields to the bay, and I would say 600 feet is where I used to sit. That's out in the bay now.

That bottom is barren, absolutely barren. If you can stand out there on one of those storms and think you've got something that's pristine, it's not there. Change has occurred over 150 years, and that's one of the things that's only absolute, there is a going to be change, but I kind of think in terms of the shore erosion and this island disappearance like the commercial they used to have on TV where the Indian stood over the Hudson and watched the trash go down the river. I think some of us natives stand on the edge of the shoreline with a tear in the eye. We're not seeing the trash, but we're watching the islands and the shoreline disappear. It's not ever going to come back unless we bring it back.

So I'm in favor of it, I support it, and would play any role or part that I could to

support it. Thank you.

MS. BISTANY: Any other comments?

MS. BECH: My name is Cindy Bech, and I live on Hooper Island. I'm also involved with the shoreline erosion group.

I really support the restoration of the islands. Several of us went to Poplar Island last summer and were very impressed with what has been done there. We would love to see something done with Barren Island because if it goes, Hooper goes, too. So we really support it.

MS. BISTANY: Do I have anybody else that would like to make a comment?

MR. BATTISTA: If you select an island that is privately owned and you put all of these funds, federal funds and state funds into it, does that island become totally privately owned still or is it open to the public whose tax dollars have contributed to this? In other words, if we take one of these islands and use

federal and state funds to restore it, does that

mean we have to allow this island to be used by the general public because it's their monies that restored these islands? Does it go back to the private landowner? For instance, James is owned by three people. If we build this big island that we're doing there, do those same three people have all of this island that we spent over a billion dollars on it?

MS. BISTANY: I'm going to let Scott talk about that.

MR. JOHNSON: I'll address first things first. This is Poplar Island. I know you can't see it very well from there. This is Coach's Island. That's privately owned. We've stayed off 300 feet, safe gunning distance. I mean we could have gone right up next to the shoreline, and Poplar Island still would not be part of his property.

We have a couple of options. We could have purchased that property and incorporated it

into the island and it would have been part of the project and accessible to the public, although Poplar Island is not intended -- this is a remote wildlife area. It's not intended to

be open to the public. That could change.

The island that we're proposing here, we don't know what the ultimate purpose is yet. We haven't determined that. It could be remote wildlife habitat. It could have some recreational components to it. There are a lot of options, but it will not be privately owned. I can tell you that.

What we can do is just stay off of the island similar to what we did here. This is actually one of the most valuable environmental areas, that little gut that we have right in there. That's where all the turtles nest. As mentioned earlier, we had 600 and some baby turtles released right from that general area. We've got herons and an eagle's nest right there, which were not disturbed as part of the

construction.

That's another thing that wasn't discussed here, but you were talking about the eagles that you have there and nesting birds. All of these little circles and lines are oyster bars, heron and eagles' nests. We have time of year

restrictions that we have to adhere to when we're constructing this thing and while we're operating it. We take a lot of care of the existing environmental conditions, and all of that will be incorporated. All the lessons that we have learned from this, all the things that we've done right and not done so right we will incorporate into this next island.

Does that answer the question?

MR. BATTISTA: That answers a lot. I appreciate your taking the time to answer that, but I'm not sure what you will do with James Island, to the way the configuration goes.

MR. JOHNSON: Again, we're not there yet. What Mimi said earlier is if we would select

that island, then we have to look at a number of configurations, optimize that configuration, come back out to the public and say what do you think of this, how does this work.

MR. BATTISTA: So you have further steps.

MR. JOHNSON: The first thing we want to do is get it down to that island and then proceed with that further study.

MR. MENDELSOHN: For any island that's

selected an environmental impact statement will have to be prepared. There are several more meetings. When we did Poplar, we met with all of the locals. The shape got changed based upon various -- I'm just saying that still an environmental impact statement will have to be done, and we'll meet with the local community several more times to talk about an alignment. That would hold true for any island selected.

MR. BATTISTA: If you take the right steps, I will be happy.

MR. MENDELSOHN: We intend to take the

right steps.

MR. BATTISTA: I hope you do. Thank you.

MS. BISTANY: Is there anything else?

MR. NEWCOMB: Jay Newcomb, past commissioner from Dorchester County.

We fought the project a good while back. We worked with the DNR, we worked with Miss Mikulski, we worked with Senator Gilchrest. There are so many win-win situations with this. The Port Authority, there are so many millions of dollars coming into the State of Maryland

through that Port that we need that in this state. We know the port is going to have dredged material. We came to Mr. Storm here, and he has been very helpful to us. We moved Jim up. He replaced another guy on the committee. He has worked very hard. We have had a good working relationship. We've done the shore erosion project on Cators Cove. That's going to be done. It will soon be going out for bid. We've done some on Hooper Island. We had

a public hearing that night. We had, like Joe said, a full audience. We had nobody opposed to it that night, and the commissioners backed it as long as the watermen's problems were addressed. Now we've got a project, the one going on at Fishing Creek Bridge. Every two years this material is going to go to one of the islands. We just got released the money that has been appropriated for Back Creek, which has not been dredged since 1956, and we're hoping that can get to Barren Island or somewhere, but that money is in the budget.

We're all working very hard for this project. I'm not speaking on behalf of the

county. Even when I was on the board, we had the full backing of the board, and now you're going to have to -- you have to get an official document, statement, but I think for the most part maybe all of them are in favor of this project. We hope you will continue on. I know you have some problems, but we'll work with you

and try to address your problems. Thank you. Also the jobs, we lost two county employees to Poplar Island, so they do hire. We lost two employees.

MS. BISTANY: Would anybody else like to speak? As your handouts show, you have my e-mail, phone. Any way you can contact me would be great. Any comments that you have, any data that you have on any of the islands that are still under consideration will be used and greatly appreciated.

So thank you all very much for coming out. We appreciate your information and comments.

(Whereupon at 8:30 p.m. the meeting was adjourned.)

Meeting Summary
Mid-Chesapeake Bay Island Environmental Restoration Feasibility Study

Watermen's Public Meeting
Hooper Island Volunteer Fire Department, Fishing Creek, Maryland
6:30 PM, March 10, 2004

Agency Attendees:
Mark Mendelsohn, Michele Gomez, Angie Sowers—U.S. Army Corps of Engineers, Baltimore District
Fran Flanigan, Dave Bibo—Maryland Port Administration
Jane Boraczek—EA Engineering, Science, and Technology, Inc.
Gwen Gibson—Maryland Environmental Service
John Gill, Glen Carowan, Tom Eagle—U.S. Fish and Wildlife Service, Blackwater Wildlife Refuge

Citizen Attendees:

Keith Elliott	Rosemary Murphy	Bill Ruark
Daniel Shoemaker	Curtis Phillips	Louie Frase
Marcus Flowers	Thomas Powley	Mike Murphy
Dusty Flowers	Bob Tenanty	Judy Phillips
Teresa flowers	Rudy Nohlie	Russell Phillips
Philip L. Jones	Henry Emrich	Jay Newcomb
John Fetcho	Winnie Emrich	Mike Willey
Walt Pritchett	Priscilla McGlaughlin	
Martin Talley	Josh McGlaughlin	
Joe Ruark Jr.	Frank King	
Carlton Thomas	John Blake	
Edythe Thomas	Kathy Blake	
John Battista	Edward Dean Sr.	
Larry Friedel	Chuck Davis	
Joseph K. Coyne	Ray Dean	
Andy Treeannelli	Helen Houston	
Raymond E. Cartwright	Harold Cartright	
James Simmons	William E. Houston	
Mark Phillips	Tommy Gootee	
Kevin Kelly	Henry Gootee	
Joyce Coyne	Larry Powley	
Dale Stecher	Bruce Coulson	
Cindy Bech	Jason Doty	
Rosemary Dean	Nellie Flowers	
Steve Lewis	Dot Ruark	

Executive Summary:

Mark Mendelsohn convened the meeting, introduced himself, and thanked everyone for coming. He informed the attendees that the goal for the meeting was to have the watermen tell the U.S. Army Corp of Engineers (the Corps) about the areas they fished around James and Barren Islands, but wanted to begin the meeting by listening to their concerns and questions about the study. Mr. Mendelsohn pointed out that maps were provided on each table for the attendees to note the areas they used. He added that the watermen also had the option to take the maps home, mark them privately, and send them back to the Corps. Mr. Mendelsohn informed the group that the address for the Corps was listed on the point of contact handout provided to each attendee. Mr. Mendelsohn gave a brief explanation of the Mid-Bay Island project, and introduced Michele Gomez.

Ms. Gomez explained the Mid-Bay Island Feasibility Study to the attendees. She described the roles of the Corps and the Maryland Port Administration and the project process. Ms. Gomez provided some background of the project, including the study area (Chester River to MD/VA line), the examination of 105 islands in this area, and narrowing down the potential alternatives to James Island and Barren Island after going through a screening/ranking process. She stated that the Mid Bay Island Study is currently in the "data gathering" phase for these two sites. Ms. Gomez explained that the study will investigate engineering and environmental criteria, including, location of suitable borrow areas, depth to the suitable substrate, substrate type (ability to support the construction), navigation restrictions, tidal prism and subsequent surge, and locations of natural oyster bars (NOB) and submerged aquatic vegetation (SAV). Based on these constraints, a composite constraint map of each island was developed and presented. The area outlined in red indicated that the area was suitable for location of expansion alignments; but the entire area is not necessarily the proposed expansion area. Ms. Gomez then reiterated that the Corps was seeking input from the watermen so the project site can avoid their fisheries resources. Ms. Gomez reviewed the maps with the group. She indicated the general study area, and pointed out known submerged aquatic vegetation (SAV) and natural oyster bar (NOB) areas on the maps. She said that the red lined delineated project area on the map avoided NOBs. Ms. Gomez requested that the watermen use the charts provided to mark the areas they used for fishing, and requested they also label the type of fishery. Ms. Sowers reminded the group that points of contacts for the Study were provided as a handout.

After Ms. Gomez described the project, Mr. Mendelsohn opened the floor to questions.

Question (Q): Please explain the process of island creation, and explain the project area boundary line on the map.

Answer (A): Ms. Gomez replied that the red line outlines areas that have both suitable substrate on which to build berms, and that are in 8-10 feet of water. Eight to 10 feet of water is the maximum depth for engineering purposes. She explained that the areas within the red lines could be used as "borrow" areas for berm construction material, and stated that the dikes consist of stone revetment and sand. Mr. Mendelsohn added that the red line is not necessarily the dike alignment, and that the size and alignment of the project has not been finalized. He explained that the Environmental Impact Statement (EIS) must be completed before the alignment is finalized, and the current studies are gathering data for the EIS. Mr. Mendelsohn noted that the Corps is seeking the watermen's input at this time, so it can be considered during alignment development.

Q: For the Barren Island alignments, will the berms be 10 feet away from the Barren Island shoreline, and also surround it?

A: Ms. Gomez and Ms. Sowers explained that the alignment would be located on the west side of Barren Island, and the berms would be located greater than 10 feet from the shoreline. Mr. Mendelsohn stated that U.S. Fish and Wildlife Service (USFWS) representatives from Blackwater Refuge are present, and that the USFWS will have input on the project.

Q: Will a restoration project be built at both James Island and Barren Island, or at just one of the two islands?

A: Mr. Mendelsohn replied that both options are being studied, and the location at one or both islands will depend on the results of the environmental, engineering, and benthic studies. He stated that the project will have similarities to Poplar Island Environmental Restoration Project (PIERP), but will be customized to the project site.

Q: How long will the study take?

A: Ms. Gomez replied that the study would be released for public comment during Summer 2005. Mr. Mendelsohn said that construction of the chosen project would be completed in approximately 2010. He stated that more public meetings will occur, and that the study process was still in its early stages.

Q: James Island is eroding quickly, and the remnant islands may not remain in 2010.

A: Mr. Mendelsohn said that the Corps study process needs to follow federal guidelines and funding cycles, and that they want to restore Mid-Bay islands. In response to a follow up comment, Mr. Mendelsohn stated the studies were ongoing, and that a restoration project was not a "done deal."

Q: Is the study really two projects tied together—dredging and island restoration? How will the dredged material be transported?

A: Mr. Mendelsohn replied that the project would be island restoration using dredged material, and that the dredged material will be transported with barges, the same way it is with PIERP.

Q: What assurances are there that the dredged material will be "clean?"

A: Mr. Mendelsohn explained that the dredged material would undergo rigorous testing as per federal guidelines, and that the project will function under a water quality certification and be constantly monitored. He added that the goal is to have a clean island restoration project.

Q: How big will a project at Barren Island be?

A: Mr. Mendelsohn said it might be up to 1000 acres. Ms. Gomez added that the size would depend on the selected alignment.

Q: How does ownership of the remnant island effect ownership of the project? Will the property belong to the State?

A: Mr. Mendelsohn answered that the bottom is state owned, and the project area would be owned by the state. He said that the project might eventually be a park or refuge. In response to a follow up questions, Mr. Mendelsohn said that the project would not be developed as residential or commercial property, but be consistent with a wildlife habitat restoration project.

Q: Why are islands being considered, and not a mainland site?

A: Mr. Mendelsohn replied that the Dredged Material Management Plan (DMMP) covers 20 years and is investigating various dredged material placement alternatives. Large island restoration is one of the options being considered. He said that available northern Bay sites are hard to find. Open water dumping is against State law and Hart-Miller Island is closing; both of these options were northern Bay dredged material placement sites. John Gill of the USFWS added that the Mid-Bay Islands are targeted because they are uninhabited, and not protected from erosion. He said that erosion is eliminating waterbird nesting habitat and SAV habitat that exists on the lee side of the islands (i.e., Tangier Sound). Mr. Gill stated that the USFWS approached the Corps about an island restoration project because they were unable to restore the islands with their own budget. He pointed out that island restoration is not the cheapest dredged material disposal option, but it targets resources that need protection. Mr. Gill said that island restoration provides a partnership opportunity with the Corps and MPA for dredged material placement and habitat protection.

Q: Where does the dredged material go now?

A: Mr. Mendelsohn stated that dredged material from the mainstem Bay currently goes to PIERP. PIERP has a 40 million cubic yard (mcy) placement capacity, and will receive approximately 2 mcy in the next year. He added that a feasibility study of a PIERP expansion is underway. Mr. Mendelsohn explained that finding enough dredged material capacity is a challenge; so many alternatives are being evaluated including recycling, capping, and brownfields redevelopment. He said that the PIERP expansion and Mid-Bay study are part of the larger DMMP study, but that the two studies are moving forward concurrently with the DMMP.

Q: How many years does island restoration take?

A: Mr. Bibo of the MPA responded to this question. He said that planning and construction of a facility can take a total of 10 years, and that Hart-Miller Island planning and construction took 15 years. Mr. Bibo added that the 20-year plan in the DMMP coincides with the 20-year term leases held by the Port of Baltimore tenants. He said that there is capacity to support dredged material placement through the year 2009 or 2010, but that Hart-Miller Island closes in 2009 and PIERP will close in 2010. Mr. Mendelsohn inquired about the construction time required for PIERP. Mr. Bibo replied that Phase I of PIERP was built in 2 to 3 years, and that PIERP Phase II was constructed while Phase I began receiving dredged material.

Q: Where does contaminated dredged material go? Is there any chance of it coming to a Mid-Bay Island restoration project?

A: Mr. Mendelsohn replied that dredged material from Baltimore Harbor is currently taken to Hart-Miller Island, and a new facility is being prepared at Cox Creek in northern Anne Arundel County. He said that other options for Baltimore Harbor dredged material such as mine placement and brownfields redevelopment are being investigated as part of the DMMP. Mr. Mendelsohn explained that state law does not allow material from Baltimore Harbor to be placed at the island restoration projects in the Bay. Ms. Boraczek added that MPA is currently seeking a new site for Baltimore Harbor material. Mr. Mendelsohn stated that a subgroup was formed to investigate placement options for Baltimore Harbor dredged material.

Q: From where do the rocks in the dike originate? How high will they be?

A: Mr. Mendelsohn said that the rocks in the dike come from West Virginia, and are barged down the Bay. He said that the dikes may be 10 feet high, but the armor stone may not need to be that high,

and that the dikes would eventually be breeched to allow for tidal flow along the eastern shoreline. Mr. Mendelsohn explained that Cell 4DX at PIERP has been restored as a wetland and opened to tidal flow.

There were no further questions at this point. Mr. Mendelsohn reminded the group of the handouts containing the Study points of contact, and said that the staff had business cards to provide upon request. He also thanked the Watermen's Association and everyone who helped put signs up and spread the word about the meeting.

Mr. Mendelsohn explained that for the next part of the meeting, they would like the watermen to review the charts of James Island and Barren Island on each of their tables, and mark comments and locations of the areas they use for fishing. The staff attending the meeting circulated among the tables and discussed the maps and the project study with the attendees.

Ms. Boraczek worked with a group of watermen from Barren Island, and discussed their favored crabbing and fishing areas in the vicinity of that island. The watermen marked the map with the areas they used and the types of fishery at each area. One of the watermen pointed out Fall and Spring season crabbing areas, and areas fished for peeler crabs. The group discussed rates of erosion at James Island. The group also noted gillnet areas in the vicinity of Barren and where they fished each month of the Winter season (December, January, and February). One of the attendees pointed out where there was a "cut through" in Barren Island. The group voiced a positive opinion regarding a proposed island restoration project at both Barren and James Islands.

Many attendees took maps and points of contact handouts away from the meeting, so they could review and mark the maps at home, and send them back to the Corps.

Mr. Mendelsohn and Ms. Boraczek worked with a group of attendees to review the locations of registered pound nets. Some of the attendees pound net all year except for the coldest part of winter. Spring and Fall are for striped bass, herring, menhaden, and croaker. Summer is for menhaden, which is used as crab bait. Several had spoken with a DNR official to detail their catches by season.

John Battista, a landowner on Taylor's Island, suggested that the Corps seek input from the Federal Emergency Management Agency (FEMA) to model tidal changes due to the proposed projects. He expressed concerns about the change in currents that may occur around an island restoration project, and also suggested that NOAA representatives be consulted on the project. Mr. Battista was thanked for his suggestion, and informed that hydrodynamic modeling would be included as part of the studies, and that NOAA was part of the team that would plan the restoration project.

Kevin Kelly expressed concerns to Ms. Sowers regarding current dredging operations at Barren Island that appeared to be poorly managed. He said dredging contractors working with the current projects were allowing abandoned equipment to drift into neighboring properties. Ms. Sowers referred him to John Gill to discuss the concerns. Mr. Gill explained where the dredged material was being placed at Barren Island. He said that the dredged material placement at Barren Island involved a county project, and was separate from the Mid-Bay Island Restoration project. Mr. Kelly described his concerns about the management of the current dredged material placement operations to Mr. Gill, and Mr. Gill gave Mr. Kelly a contact at the Corps to speak with.

Joe Coyne, a member of the Citizens Advisory Committee, stated that he has discussed the proposed island restoration with a local marina owner, and the owner mentioned that he has heard no opinions against the project from local customers. Many other attendees also informed Ms. Gomez that they were in favor of the project and hoped construction would start soon. The attendees were also interested in visiting PIERP so they could see how an island restoration site might look and function during operations.

Ms. Boraczek worked with another group discussing previously abundant oystering areas in the vicinity of Barren Island and southern James Island. They described the area east of Barren Island as very productive at one time, but currently silted over. Several of them are working with DNR recovery groups to dredge bars to clean them of dead or diseased oysters prior to seeding. The discussion lead into a secondary discussion of crabbing over some of the old oystering areas.

Ms. Gomez joined a group with Ms. Boraczek and they discussed more pound net locations around Barren Island. Several members of this group gillnet in winter as well. Ms. Gomez inquired about the process of relocating pound nets for the Poplar Island construction. Ms. Boraczek replied that the registered owner of the pound nets locations displaced by PIERP construction had quit using the locations, so the nets did not have to be relocated. The Corps and MPA do not have the power to officially assign a new area, but would help work with DNR to fulfill the process. The watermen used the charts to note what they believed to be the most suitable locations for the potential Barren Island restoration, as well as pointing out hard sandy bottom suitable for borrow material.

The meeting adjourned, and the attendees were encouraged to take point of contact handouts, and to call or e-mail the Corps with any further questions or comments

Final Meeting Summary
Mid Bay Islands Study Public Watermen's Meeting
Hoopers Island Volunteer Fire Department, Fishing Creek, MD
6:00 PM-7:30 PM, May 2, 2005

Attendees:

Residents: Harold Cartwright, Rose Dean, Bill and Helen Houston, Marcus and Teresa Flowers, Ken Klustra, Mike Willey
Dorchester County Shore Erosion Group: Bruce Coulson
Wright's Creek Restoration Project: Brenda Ebeling, Nick Roetzel, Jim and Doris Senior
EA Engineering, Science, and Technology, Inc: Jane Boraczek
Maryland Port Administration: Dave Bibo, Fran Flanigan
Maryland Environmental Service: Jim Jett
U.S. Army Corps of Engineers, Baltimore District: Stacey Sloan-Blersch, Angie Sowers
U.S. Fish and Wildlife Service: Bill Giese

Welcome and Meeting Goals **Fran Flanigan**

The meeting convened at 6:00 and everyone in attendance introduced himself or herself. Ms. Flanigan informed the group that the goal of the meeting would be to update the attendees on recent developments of the Mid Bay Islands Ecosystem Restoration project and to discuss the proposed alignments for the Barren Island and James Island projects.

Mid-Chesapeake Bay Islands Presentation **Stacey Sloan-Blersch, USACE**

Ms. Blersch informed the group that the Mid-Chesapeake Bay Islands Restoration project was developed as a beneficial use dredged material placement site for the Federal Dredged Material Management Plan (DMMP). Ms. Blersch provided a brief explanation of the state and federal DMMPs to the group. Ms. Blersch also explained the purpose of the feasibility study and informed the group that the goal would be to get the report prepared for public review by September.

Ms. Blersch informed the group that the Mid-Chesapeake Bay region is classified as the area between the mouth of the Chester River and the MD/VA border. Ms. Blersch stated that over 10,500 acres of island habitat have been lost to erosion over the past 150 years. At these rates it is estimated that all Chesapeake Bay islands will be lost to erosion within 10-20 years. Ms Blersch explained that initial screening eliminated 84 of the 105 islands in the Chesapeake Bay and that of the final eight islands, James Island and Barren Island were recognized to be most critically in need of habitat restoration. Ms. Blersch provided historic illustrations of the islands, noting that James has lost 884 acres since 1847 and Barren has lost 664 acres since 1847.

Ms. Blersch presented data from the commercial and recreational fishing study to the watermen. Ms. Blersch pointed out that the studies have shown a lot of crab potting around Barren Island. Gill netting and pound nets are employed to the west of the island. Ms. Blersch indicated that the objective of the Mid Bay project would be to maximize capacity through a large-island restoration at James Island and to

minimize impacts to the fisheries around Barren Island. The Barren Island restoration/protection project would be composed of the construction of a +6 ft breakwater extending from the southernmost end of the island and +4 ft sills. Ms. Blersch stated that hydrodynamic modeling was still needed before the breakwater alignment is finalized. Ms. Blersch noted that the breakwater was developed to protect valuable SAV growth to the east of the island and the Hoopers Island shoreline from erosion. Ms. Blersch briefly explained the NEPA process in the project. Ms Blersch stated that the feasibility report is now at an informal stage and the parties involved in the Mid Bay Island restoration project would like to make sure there are minimal impacts to the surrounding environment.

Group Discussion **All**

Ms. Flanigan stated that she wanted to ensure that everyone understood the information presented and invited comments on the Mid-Chesapeake Bay Islands proposal. Ms. Flanigan stated a substantial part of Maryland's economy is dependent on the Port of Baltimore and that maintenance dredging of Chesapeake Bay shipping channels is necessary to keep the port operating. The need for dredged material placement is now focused on restoring Barren Island and James Island. Ms. Flanigan expressed that there has been some debate in the past regarding which Island will be constructed first and invited some discussion on this part.

Mr. Houston questioned why the Barren and James were selected when there are other islands that are in closer proximity to dredging operations. Ms. Flanigan explained that Barren and James are intended to be ecosystem restoration projects and therefore will receive federal funding for their environmental benefits. Barren Island in particular presents a relatively inexpensive alternative to achieve environmental benefits and as a means to protect the Hoopers Island shoreline from further erosion. Mr. Houston asked if dredged material from Baltimore Harbor would be brought down to restore the Mid Bay Islands. Ms. Flanigan replied that Harbor material is by law classified as contaminated material and cannot be placed outside of the North Point/Rock Point line. Ms. Flanigan explained that Harbor material is currently placed in designated Dredged Material Containment Facilities on the Patapsco River such as Cox Creek, and will be placed at proposed sites such as Masonville, and Sparrows Point in the future. The islands will only be receiving clean dredged material from the main Chesapeake Bay channels. Ms. Boraczek added that only material that is suitable for habitat restoration would be considered for placement on the Mid-Chesapeake Bay Islands. Ms. Sowers stated that Barren Island could possibly receive dredged material from local navigational dredging projects.

Mr. Klustra, referring to James Island, asked if the project would include any dredging of the navigational channel south of James Island. Ms. Boraczek commented that this is not a federal channel and would therefore not be dredged during this operation. Dredging of this channel would be more likely undertaken by the county or state. Mr. Klustra stated that there would be problems with natural southerly flow of the island, explaining that the sediment from construction operations will be transported and fill the –4 ft channel. Mr. Flowers contended that if a bulkhead were constructed to the south of James Island the channel would deepen. Ms. Blersch added that the USACE is currently developing models for the area to determine what effects the island will have on the existing channel

Ms. Blersch informed that the group that initial construction could be completed and ready for inflow by 2017. Ms. Blersch explained that funding for the Mid Bay Island Restoration project would be contingent upon getting the project included to the WRDA 2005. Ms. Flanigan noted that there is

presently a large backload of proposed federal projects that will be attempting to be included to the WRDA 2005 and that it may be difficult to raise the necessary funding for the project.

Ms. Flanigan stated that wetlands in Blackwater National Wildlife Refuge (BNWR) have been another topic of concern in the region. Vegetation loss, sea level rise, and saltwater intrusion have converted much of the wetlands within this area into open water. It is estimated that BNWR has lost nearly 8,000 acres of wetlands. Ms. Flanigan stated that the USFWS has presented interest in using clean dredged material to fill in these areas to the reestablish wetlands. This would allow for the potential for three dredged material placement sites operating in Dorchester County. Ms. Boraczek mentioned that there has been discussion of possibly linking the James Island restoration to the BNWR wetlands restoration. It has been proposed that the dredged material be dewatered on James Island and subsequently transported to BNWR for thin-layer placement. Ms. Blersch stated that there is enough need for dredged material placement that both projects could begin simultaneously, but added that Barren Island would be very attractive in that it provides environmental benefits and would be relatively inexpensive.

Mr. Cartwright pointed out that there exists a –12 ft channel running just south of the small remnant to the south of Barren Island. Mr. Cartwright stated that the channel was used by local watermen and asked if the breakwater could be divided into segments to allow travel through this channel. Mr. Flowers commented that a segmented breakwater would promote a build up of sediment behind the structures. Mr. Flowers added that residents of Hoopers Island have already seen this occur from the breakwaters constructed for the Hoopers Island Bridge. If a continuous breakwater were constructed it would only increase travel time by a few minutes. Ms. Boraczek stated that the residents attending the last Hoopers Island Watermen's meeting expressed that they would prefer a thin island or a continuous, protective breakwater constructed next to Hoopers Island rather than something wider (to avoid crabbing and gillnetting). Ms. Boraczek noted that the project team considered this in the design and if the residents want the configuration changed then this opinion should be accounted.

The attendees gathered around and discussed the figure of the proposed Barren Island breakwater alignment. Several watermen commented that the original island extended straight to the south more than the historic alignment projected on the map but was otherwise correct. Mr. Willey commented that the there was not a true channel to the south of Barren Island but a deep area called the wash out located just south of the southern remnant. Several watermen commented that the increased SAV growth between Barren Island and Hoopers Island would enhance habitat for soft crabs but would be worse for boating. One waterman asked if the +6 ft breakwater elevation would be continuous for the entire length of the structure. Ms. Blersch replied that the breakwater extending to the south of the island would be 6 ft but be minimized to 4 ft along the western shore to the north of Barren Island. Mr. Coulson remarked that creating a segmented breakwater would be a mistake. Mr. Flowers added that any segments in the breakwater would receive a large amount of wash through which would adversely affect SAV between Barren Island and Hoopers Island. Residents offered to present the map of the proposed Barren Island alignment to local watermen to collect their feedback and see if anyone would prefer to see any alterations to the alignment. Ms. Blersch agreed and provided her contact information. The meeting adjourned at 7:30 PM.

US Army Corps of Engineers
Baltimore District

MARYLAND

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Cambridge, MD 21613

Thursday, October 12, 2006

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Taylors Island Volunteer Fire Hall
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Taylors Island, MD 21669

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Bay Times Sept 27, 2006 pg 8

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Baltimore District

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Bay Weekly Sept 27, 06 page 19

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Baltimore District

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The Capital
September 22, 2006
Page B3

US Army Corps of Engineers
Baltimore District

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Taylors Island, MD 21699

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Daily Banner Sept 2006 page 12

THE DAILY AND SUNDAY TIMES
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Sincerely,

Meghan Storke
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MID-CHESAPEAKE BAY ISLAND ECOSYSTEM RESTORATION PROJECT

Was published 9/22, '06. in THE DAILY TIMES

Meghan Storke
The Daily Times

PUBLIC MEETING FOR THE MID-CHESAPEAKE BAY ISLAND ECOSYSTEM RESTORATION PROJECT

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mbs, 9/22, '06.

The Daily Time (Salisbury, MD)
September 22, 2006

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9/22

The Dorchester Star
Cambridge, MD

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published in Dorchester County,

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successive weeks beginning the

22nd day of September

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22nd day of September

20 06

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Publishers of The Dorchester Star

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Notice of Public Meetings

Mid-Chesapeake Bay Island Ecosystem Restoration Project

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Wednesday, October 11, 2006
6:00 p.m. displays, 7:00 p.m. presentation
Dorchester County Public Library - Cambridge Branch
303 Gay Street
Cambridge, MD 21613

Thursday, October 12, 2006
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The two public meetings will be identical in format and are being held to provide opportunities for residents and interested parties to take part in the public involvement process. Displays regarding information on the planned restoration and the alternatives considered as part of the Draft Integrated Feasibility Report and EIS will be available for review approximately one hour prior to the public meetings. The meetings will include a presentation by the Corps and will allow for open discussions and public comment.

Oral or written comments may be provided for the Draft Integrated Feasibility Report and EIS at the public meetings. If you cannot attend the meeting and wish to comment, all comments need to be received on or before October 23, 2006 to ensure consideration in final plan development. Written comments may be mailed to the U.S. Army Corps of Engineers - Baltimore District, CENAB-PL, Attn: Stacey Biersch, P.O. Box 1715, Baltimore, Maryland 21203-1715 or e-mailed to Stacey.S.Biersch@usace.army.mil. If you have questions concerning the public meetings, please contact Stacey Biersch at 410-962-5196 or 1-800-295-1610, or at the above e-mail address.

DS 9/22 1594716

US Army Corps of Engineers
Baltimore District

MARYLAND

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Dorchester Star Sept 22, 2006
Pg A6

US Army Corps of Engineers
Baltimore District

MARYLAND

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Dorchester Star October 6, 2006
pg A3

The Examiner.
BALTIMORE

PROOF OF PUBLICATION

I, Michael Phelps, Publisher of the
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a newspaper in the City of
Baltimore, published
In English for 1 consecutive
day or more prior to the issue of
September 22th 2006, certify that the notice of

Notice of Public Meeting
For the Mid-Chesapeake Bay Island Ecosystem Restoration Project

For

Maryland Environmental Service

attached hereto has been published on

September 22th, 2006

Michael Phelps
Michael Phelps

Sworn to and subscribed before me this
22nd day of September, 2006

US Army Corps of Engineers
Baltimore District

MARYLAND

Public Meeting for the Mid-Chesapeake Bay Island Ecosystem Restoration Project

In accordance with the National Environmental Policy Act (NEPA), the U.S. Army Corps of Engineers, Baltimore District (Corps) and the non-Federal sponsor, the Maryland Port Administration (MPA), are conducting two public meetings following the preparation and release of the Draft Integrated Feasibility Report and Environmental Impact Statement (EIS) for the Mid-Chesapeake Bay Island Restoration Project in Dorchester County, on Maryland's Eastern Shore. Approximately 90 to 95 million cubic yards of dredged material, primarily from maintenance of the Chesapeake Bay approach channels to the Port of Baltimore, would be placed behind dikes at James Island. Material placed at Barren Island would come from maintenance dredging of Federal navigation channels in the Honga River area. The material will be shaped and planted to provide 2,144 acres of island habitat at James (2,072 acres) and Barren (72 acres) Islands and would protect existing island ecosystem habitat, including critical submerged aquatic vegetation. James and Barren Islands have been identified by the U.S. Fish and Wildlife Service and other natural resource management agencies as a valuable nesting and nursery area for many species of fish and wildlife, including bald eagles, diamondback terrapins, and horseshoe crabs. The Corps and the MPA invite interested agencies, organizations, and individuals to attend a public meeting during which information will be provided. The public is encouraged to participate in the meeting and to provide spoken or written comments on the Draft Integrated Feasibility Report and EIS. Corps and MPA staff will be available to provide information and answer questions.

Wednesday, October 11, 2006

6:00 p.m. displays, 7:00 p.m. presentation

Dorchester County Public Library
303 Gay Street
Cambridge, MD 21613

Thursday, October 12, 2006

6:00 p.m. displays, 7:00 p.m. presentation

Taylors Island Volunteer Fire Hall
510 Taylors Island Road
Taylors Island, MD 21669

If you cannot attend the meeting and wish to comment, you may contact Ms. Stacey Blersch at P.O. Box 1715, Baltimore MD 21203, call (410) 962-5196 or 1-800-295-1610, or at the following e-mail address: Stacey.S.Blersch@usace.army.mil.

Baltimore Examiner Sept 22, 06 page 12

US Army Corps of Engineers
Baltimore District

Public Meeting for the Mid-Chesapeake Bay Island Ecosystem Restoration Project

MARYLAND

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MD Gazette Sept 23, 06
page A11

US Army Corps of Engineers
Baltimore District

MARYLAND

Public Meeting for the Mid-Chesapeake Bay Island Ecosystem Restoration Project

In accordance with the National Environmental Policy Act (NEPA), the U.S. Army Corps of Engineers, Baltimore District (Corps) and the non-Federal sponsor, the Maryland Port Administration (MPA), are conducting two public meetings following the preparation and release of the Draft Integrated Feasibility Report and Environmental Impact Statement (EIS) for the Mid-Chesapeake Bay Island Restoration Project in Dorchester County, on Maryland's Eastern Shore. Approximately 90 to 95 million cubic yards of dredged material, primarily from maintenance of the Chesapeake Bay approach channels to the Port of Baltimore, would be placed behind dikes at James Island. Material placed at Barren Island would come from maintenance dredging of Federal navigation channels in the Honga River area. The material will be shaped and planted to provide 2,144 acres of island habitat at James (2,072 acres) and Barren (72 acres) Islands and would protect existing island ecosystem habitat, including critical submerged aquatic vegetation. James and Barren Islands have been identified by the U.S. Fish and Wildlife Service and other natural resource management agencies as a valuable nesting and nursery area for many species of fish and wildlife, including bald eagles, diamondback terrapins, and horseshoe crabs. The Corps and the MPA invite interested agencies, organizations, and individuals to attend a public meeting during which information will be provided. The public is encouraged to participate in the meeting and to provide spoken or written comments on the Draft Integrated Feasibility Report and EIS. Corps and MPA staff will be available to provide information and answer questions.

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Record observer
Sept 22, 06 A18

US Army Corps of Engineers
Baltimore District

MARYLAND

Public Meeting for the Mid-Chesapeake Bay Island Ecosystem Restoration Project

In accordance with the National Environmental Policy Act (NEPA), the U.S. Army Corps of Engineers, Baltimore District (Corps) and the non-Federal sponsor, the Maryland Port Administration (MPA), are conducting two public meetings following the preparation and release of the Draft Integrated Feasibility Report and Environmental Impact Statement (EIS) for the Mid-Chesapeake Bay Island Restoration Project in Dorchester County, on Maryland's Eastern Shore. Approximately 90 to 95 million cubic yards of dredged material, primarily from maintenance of the Chesapeake Bay approach channels to the Port of Baltimore, would be placed behind dikes at James Island. Material placed at Barren Island would come from maintenance dredging of Federal navigation channels in the Honga River area. The material will be shaped and planted to provide 2,144 acres of island habitat at James (2,072 acres) and Barren (72 acres) Islands and would protect existing island ecosystem habitat, including critical submerged aquatic vegetation. James and Barren Islands have been identified by the U.S. Fish and Wildlife Service and other natural resource management agencies as a valuable nesting and nursery area for many species of fish and wildlife, including bald eagles, diamondback terrapins, and horseshoe crabs. The Corps and the MPA invite interested agencies, organizations, and individuals to attend a public meeting during which information will be provided. The public is encouraged to participate in the meeting and to provide spoken or written comments on the Draft Integrated Feasibility Report and EIS. Corps and MPA staff will be available to provide information and answer questions.

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Star Democrat
Sept 22, 2006 A10

US Army Corps of Engineers
Baltimore District

Public Meeting for the Mid-Chesapeake Bay Island Ecosystem Restoration Project

MARYLAND

In accordance with the National Environmental Policy Act (NEPA), the U.S. Army Corps of Engineers, Baltimore District (Corps) and the non-Federal sponsor, the Maryland Port Administration (MPA), are conducting two public meetings following the preparation and release of the Draft Integrated Feasibility Report and Environmental Impact Statement (EIS) for the Mid-Chesapeake Bay Island Restoration Project in Dorchester County, on Maryland's Eastern Shore. Approximately 90 to 95 million cubic yards of dredged material, primarily from maintenance of the Chesapeake Bay approach channels to the Port of Baltimore, would be placed behind dikes at James Island. Material placed at Barren Island would come from maintenance dredging of Federal navigation channels in the Honga River area. The material will be shaped and planted to provide 2,144 acres of island habitat at James (2,072 acres) and Barren (72 acres) Islands and would protect existing island ecosystem habitat, including critical submerged aquatic vegetation. James and Barren Islands have been identified by the U.S. Fish and Wildlife Service and other natural resource management agencies as a valuable nesting and nursery area for many species of fish and wildlife, including bald eagles, diamondback terrapins, and horseshoe crabs. The Corps and the MPA invite interested agencies, organizations, and individuals to attend a public meeting durihg which information will be provided. The public is encouraged to participate in the meeting and to provide spoken or written comments on the Draft Integrated Feasibility Report and EIS. Corps and MPA staff will be available to provide information and answer questions.

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Sun 9-22-06 pg 6E

Notice of Public Meetings

Mid-Chesapeake Bay Island Ecosystem Restoration Project

In accordance with the National Environmental Policy Act (NEPA), the U.S. Army Corps of Engineers, Baltimore District (Corps) and the non-Federal sponsor, the Maryland Port Administration (MPA), are conducting two public meetings following the preparation and release of the Draft Integrated Feasibility Report and Environmental Impact Statement (EIS) for the Mid-Chesapeake Bay Island Restoration Project in Dorchester County, on Maryland's Eastern Shore. Approximately 90 to 95 million cubic yards of dredged material, primarily from maintenance of the Chesapeake Bay approach channels to the Port of Baltimore, would be placed behind dikes at James Island. Material placed at Barren Island would come from maintenance dredging of Federal navigation channels in the Honga River area. The material will be shaped and planted to provide 2,144 acres of island habitat at James (2,072 acres) and Barren (72 acres) Islands and would protect existing island ecosystem habitat, including critical submerged aquatic vegetation. James and Barren Islands have been identified by the U.S. Fish and Wildlife Service and other natural resource management agencies as a valuable nesting and nursery area for many species of fish and wildlife, including bald eagles, diamondback terrapins, and horseshoe crabs. The Corps and the MPA invite interested agencies, organizations, and individuals to attend a public meeting during which information will be provided. The public is encouraged to participate in the meeting and to provide spoken or written comments on the Draft Integrated Feasibility Report and EIS. Corps and MPA staff will be available to provide information and answer questions. The public meetings have been scheduled as follows:

Wednesday, October 11, 2006
6:00 p.m. displays, 7:00 p.m. presentation
Dorchester County Public Library – Cambridge Branch
303 Gay Street
Cambridge, MD 21613

Thursday, October 12, 2006
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The two public meetings will be identical in format and are being held to provide opportunities for residents and interested parties to take part in the public involvement process. Displays regarding information on the planned restoration and the alternatives considered as part of the Draft Integrated Feasibility Report and EIS will be available for review approximately one hour prior to the public meetings. The meetings will include a presentation by the Corps and will allow for open discussions and public comment.

Oral or written comments may be provided for the Draft Integrated Feasibility Report and EIS at the public meetings. If you cannot attend the meeting and wish to comment, all comments need to be received on or before October 23, 2006 to ensure consideration in final plan development. Written comments may be mailed to the U.S. Army Corps of Engineers – Baltimore District, CENAB-PL, Attn: Stacey Blersch, P.O. Box 1715, Baltimore, Maryland 21203-1715 or e-mailed to Stacey.S.Blersch@usace.army.mil. If you have questions concerning the public meetings, please contact Stacey Blersch at 410-962-5196 or 1-800-295-1610, or at the above e-mail address.

Watermen's Gazette October 2006
page 15

US Army Corps of Engineers
Baltimore District

Planning Division

NOTICE OF AVAILABILITY

August 30, 2006

Draft Integrated Feasibility Report and Environmental Impact Statement

Mid-Chesapeake Bay Island Ecosystem Restoration Study

ALL INTERESTED PARTIES:

In accordance with the requirements of the National Environmental Policy Act (NEPA), the U.S. Army Corps of Engineers (USACE), Baltimore District has prepared a Draft Integrated Feasibility Report and Environmental Impact Statement (EIS) for the Mid-Chesapeake Bay Island Ecosystem Restoration Project in Dorchester County, on Maryland's Eastern Shore. Approximately 90 to 95 million cubic yards of material, primarily dredged during maintenance of the Chesapeake Bay approach channels to Baltimore Harbor, would be placed behind dikes at James Island. Material placed at Barren Island would be from authorized maintenance dredging of Federal navigation channels in the Honga River. After placement, the material would be shaped and planted to provide 2,144 acres of island habitat at James and Barren Islands as well as protect existing island ecosystem habitat, including critical submerged aquatic vegetation (SAV). James and Barren Islands have been identified by the U.S. Fish and Wildlife Service, and other natural resource management agencies as a valuable nesting and nursery area for many species of wildlife, including bald eagles, diamondback terrapins, and potentially horseshoe crabs. The Draft EIS documents the NEPA compliance and information specific to the actions for the proposed Mid-Chesapeake Bay project. Mid-Chesapeake Bay Island Ecosystem Restoration was one of three actions specifically recommended by the USACE-Baltimore District's, *Dredged Material Management Plan (DMMP) and Final Tiered Environmental Impact Statement* (December 2005). The USACE is making the Draft Mid-Chesapeake Bay Island Ecosystem Restoration Integrated Feasibility Report and EIS available to the public for review and comment through a Notice of Availability published in the Federal Register. The recommendations of the Draft EIS are:

- Construction of a 2,072-acre fill area at James Island, consisting of approximately 55 percent tidal wetland habitat and 45 percent upland island habitat;

- Construction and backfilling of sills at Barren Island to protect both the current acreage of the island and the adjacent SAV/shallow water habitat, providing approximately 72 acres of wetland habitat on the northern and western portions of the island; and

- If deemed necessary to protect the SAV, construction at Barren Island of a maximum of 3,350 feet of breakwater extending South from the southern tip of the existing island at a maximum height of plus 6 feet MLLW.

We must receive comments on or before October 23, 2006, to ensure consideration in final plan development. Two public meetings will be held for the Mid-Chesapeake Bay Draft Integrated Feasibility Report and EIS. The first public meeting will be held at the Dorchester County Public Library, Central Branch, 303 Gay Street, Cambridge, Maryland 21613, on Wednesday, October 11, 2006, beginning at 7 p.m. The second public meeting will be held at Taylors Island Volunteer Fire Company, 510 Taylors Island Road, Taylors Island, Maryland 21669, on Thursday, October 12, 2006 beginning at 7 p.m. Staff will be available one hour prior to meeting start time. Both meetings will provide an opportunity for the

public to present oral and/or written comments. All persons and organizations that have an interest in the Draft Mid-Chesapeake Bay Integrated Feasibility Report and EIS are urged to participate in one or both meetings.

Please send written comments concerning this report to U.S. Army Corps of Engineers, Attn: Ms. Stacey Blersch, Planning Division, P.O. Box 1715, Baltimore, MD 21203. Telephone: (410) 962-5196 or 1-800-295-1610. Please submit electronic comments to Stacey.S.Blersch@usace.army.mil. Your comments must be contained in the body of your message; please do not send attached files. Please include your name and address in your message. You may view the Draft EIS and related information on the USACE web page at http://www.nab.usace.army.mil/publications/non-reg_pub.htm. USACE has distributed copies of the Draft Integrated Feasibility Report and EIS to appropriate members of Congress, State, and local government officials, Federal agencies, and other interested parties. Copies are also available for public review at the following locations:

(1) Andrew G. Truxal Library, Anne Arundel Community College, 101 College Parkway, Arnold, MD 21012

(2) Anne Arundel County Public Library, 1410 West Street, Annapolis, MD 21401

(3) Anne Arundel County Public Library, Annapolis Branch, 5 Harry S. Truman Parkway, Annapolis, MD 21401

(4) Calvert County Public Library, 30 Duke Street, Prince Frederick, MD 20678

(5) Chesapeake College Library, Wye Mills, MD 21679

(6) Corbin Memorial Library, 4 East Main Street, Crisfield, MD 21817

(7) Dorchester County Public Library, 303 Gay Street, Cambridge, MD 21613

(8) Dorchester County Public Library, Hurlock Branch, 222 S. Main Street, Hurlock, MD 21643

(9) Eastern Shore Public Library, 23610 Front Street, Accomac, VA 23301

(10) Enoch Pratt Free Library, 400 Cathedral Street, Baltimore, MD 21201

(11) Federal Maritime Commission, 110 L Street NW, Washington, DC 20573

(12) Kent County Public Library, 408 High Street, Chestertown, MD 21620

(13) Maryland State Law Library, Court of Appeals Building, 361 Rowe Boulevard, Annapolis, MD 21401

(14) Northumberland County Public Library, 7204 Northumberland Highway, Heathsville, VA 22473

(15) Queen Anne's County Public Library, Centreville Branch, 121 S. Commerce Street, Centreville, MD 21617

(16) Queen Anne's County Public Library, Stevensville Branch, 200 Library Circle, Stevensville, MD 21666

(17) Somerset County Library, 11767 Beechwood Street, Princess Anne, MD 21853

(18) Somerset County Library, Ewell Branch, 20910 Caleb Jones Road, Ewell, MD 21824

(19) State Department of Legislative Reference Library, 90 State Circle, Annapolis, MD 21401

(20) St. Mary's County Memorial Library, Leonardtown Branch, 23250 Hollywood Road, Leonardtown, MD 20650

(21) Sudlersville Memorial Library, 105 West Main Street, Sudlersville, MD 21668

(22) Talbot County Public Library, Easton Branch, 100 West Dover Street, Easton, MD 21601

(23) Talbot County Public Library, St. Michaels Branch, 106 Freemont Street, St. Michaels, MD 21663

(24) Talbot County Public Library, Tilghman Island Elementary School Branch, 21374 Foster Avenue Tilghman, MD 21671

(25) Twin Beaches Library, 3819 Harper Road, Chesapeake Beach, MD 20732

(26) Wicomico County Free Library, 122 S. Division Street, Salisbury, MD 21801

After the public comment period ends on October 23, 2006, the USACE will consider all comments received. The Draft Integrated Feasibility Report and EIS will be revised as appropriate and a Final Integrated Feasibility Report and EIS will be issued.

Amy M. Guise
Chief, Civil Project Development Branch

REGISTRATION / SIGN-IN SHEET

Public Meeting for the Mid-Chesapeake Bay Island Ecosystem Restoration Study

Dorchester County Public Library - Cambridge Branch

October 11, 2006

Personal information concealed for privacy

	#	Name	Affiliation	Address	Email	Add to Mailing List?	Receive Copy of Final EIS?	Do you have prepared comments?
1		MARGARET WOREALL				No Yes	No Yes	No Yes
2		Doug Worrall				No Yes	No Yes	No Yes
3		Jason Doty				No Yes	No Yes	No Yes
4	2	Capt Larry Pouley				No Yes	No Yes	No Yes
5		Linda Boccuti				No Yes	No Yes	No Yes
6	2	Charles & Julianna Pace				No Yes	No Yes	No Yes
7		Patricia Jones	MPA.			No Yes	No Yes	No Yes
8						No Yes	No Yes	No Yes
9						No Yes	No Yes	No Yes
10						No Yes	No Yes	No Yes
11						No Yes	No Yes	No Yes
12						No Yes	No Yes	No Yes
13						No Yes	No Yes	No Yes
14						No Yes	No Yes	No Yes
15						No Yes	No Yes	No Yes
16						No Yes	No Yes	No Yes
17						No Yes	No Yes	No Yes
18						No Yes	No Yes	No Yes
19						No Yes	No Yes	No Yes
20						No Yes	No Yes	No Yes
21						No Yes	No Yes	No Yes
22						No Yes	No Yes	No Yes
23						No Yes	No Yes	No Yes
24						No Yes	No Yes	No Yes
25						No Yes	No Yes	No Yes
26						No Yes	No Yes	No Yes
27						No Yes	No Yes	No Yes
28						No Yes	No Yes	No Yes
29						No Yes	No Yes	No Yes
30						No Yes	No Yes	No Yes

REGISTRATION / SIGN-IN SHEET

Public Meeting for the Mid-Chesapeake Bay Island Ecosystem Restoration Study
~~Taylors Island Volunteer Fire Hall~~ Dorchester Co. Library - Cambridge Branch
October ~~12~~ 11, 2006

#	Name	Affiliation	Address	Email	Add to Mailing List?	Receive Copy of Final EIS?	Do you have prepared comments?
1	Ken Smith				No Yes	No Yes	No Yes
2	[illegible]				No Yes	No Yes	No Yes
3					No Yes	No Yes	No Yes
4	JOHN LAIRD				No Yes EMAIL	No Yes	No Yes
5	(6) Fred Pomeroy				No Yes	No Yes	No Yes
6	JAN REESE				No Yes	No Yes	No Yes
7	[illegible]				No Yes	No Yes	No Yes
8	[illegible]				No Yes	No Yes	No Yes
9	(1) [illegible]				No Yes	No Yes	No Yes
10	3 Ben Parker				No Yes	No Yes	No Yes
11	John Gill				No Yes	No Yes	No Yes
12	FRAN FLANIGAN				Yes	No Yes	No Yes
13	4 BRUCE COULSON				No Yes	No Yes	No Yes
14	5 ART BOCCUTI				No Yes	No Yes	No Yes
15	~~Jeannie Haddaway~~	~~Delegate~~			~~No Yes~~	~~No Yes~~	~~No Yes~~
16	GARY O. WILLIAMS				No Yes	No Yes	No Yes
17	FRANK SPITZ				No Yes	No Yes	No Yes
18	CAROL SPITZ				No Yes	No Yes	No Yes
19	BOB TENANTY				No Yes	No Yes	No Yes
20	Jeannie Haddaway	Delegate			No Yes	No Yes	No Yes
21	DAVID BIBO	MD Port Ad			No Yes	No Yes	No Yes
22					No Yes	No Yes	No Yes
23					No Yes	No Yes	No Yes
24					No Yes	No Yes	No Yes
25					No Yes	No Yes	No Yes
26					No Yes	No Yes	No Yes
27					No Yes	No Yes	No Yes
28					No Yes	No Yes	No Yes
29					No Yes	No Yes	No Yes
30					No Yes	No Yes	No Yes

Personal information concealed for privacy

REGISTRATION / SIGN-IN SHEET

Public Meeting for the Mid-Chesapeake Bay Island Ecosystem Restoration Study

Taylors Island Volunteer Fire Hall

October 12, 2006

	#	Name	Affiliation	Address	Email	Add to Mailing List?	Receive Copy of Final EIS?	Do you have prepared comments?
1		Paul Tobin		[redacted]		No Yes	No Yes	No Yes
2		Carol Embrey				No Yes	No Yes	No Yes
3		Wm Morrell				No Yes	No Yes	No Yes
4		John Cotter				No Yes	No Yes	No Yes
5		Anna Cotter				No Yes	No Yes	No Yes
6		HAROLD CARTRIGHT				No Yes	No Yes	No Yes
7		Roy R Harrison				No Yes	No Yes	No Yes
8		A J O'Brien				No Yes	No Yes	No Yes
9		Ann Rasmussen				No Yes	No Yes	No Yes
10		Mark Rankin				No Yes	No Yes	No Yes
11		Glenn Carowan				No Yes	No Yes	No Yes
12		PAUL TOBIN				No Yes	No Yes	No Yes
13		Karin Olsen				No Yes	No Yes	No Yes
14	3	Ellie Polley				No Yes	No Yes	No Yes
15		FRAN FLANIGAN				No Yes	No Yes	No Yes
16		Henry Winnie Emrich				No Yes	No Yes	No Yes
17		Pete Cohn				No Yes	No Yes	No Yes
18	1	Joe Cooper	Dorch Cty			No Yes	No Yes	No Yes
19		[illegible]				No Yes	No Yes	No Yes
20		John Gill				No Yes	No Yes	No Yes
21	2	Bruce Coulson	Shore Erosion			No Yes	No Yes	No Yes
22		Ed Bacon	"PICA"			No Yes	No Yes	No Yes
23		Ray Carbonetti	" "			No Yes	No Yes	No Yes
24		[illegible] Tartal	Tartal			No Yes	No Yes	No Yes
25		DAVE BIBO	MD Port Adm			No Yes	No Yes	No Yes
26		Bill Neild	TIVFC			No Yes	No Yes	No Yes
27		Tim Bennett				No Yes	No Yes	No Yes
28		[illegible]				No Yes	No Yes	No Yes
29	4	Ben Parks				No Yes	No Yes	No Yes
30		Shawn Raidelah				No Yes	No Yes	No Yes

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REGISTRATION / SIGN-IN SHEET

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#	Name	Affiliation	Address	Email	Add to Mailing List?	Receive Copy of Final EIS?	Do you have prepared comments?
1	June Phelps				No Yes	No Yes	No Yes
2	Ed Peters				No Yes	No Yes	No Yes
3	Daniel Rahold				No Yes	No Yes	No Yes
4	Frances Rahold				No Yes	No Yes	No Yes
5	[illegible]				No Yes	No Yes	No Yes
6	Charles Wright				No Yes	No Yes	No Yes
7	[illegible]				No Yes	No Yes	No Yes
8	[illegible]				No Yes	No Yes	No Yes
9	Jeannie Haddaway	Deleg			No Yes	No Yes	No Yes
10	Bill Giese				No Yes	No Yes	No Yes
11	Sally [illegible]				No Yes	No Yes	No Yes
12	[illegible]				No Yes	No Yes	No Yes
13	Kathy Newcomb				No Yes	No Yes	No Yes EO#3
14	[illegible]	Da Star			No Yes	No Yes	No Yes
15		Dorchester Star			No Yes	No Yes	No Yes
16					No Yes	No Yes	No Yes
17					No Yes	No Yes	No Yes
18					No Yes	No Yes	No Yes
19					No Yes	No Yes	No Yes
20					No Yes	No Yes	No Yes
21					No Yes	No Yes	No Yes
22					No Yes	No Yes	No Yes
23					No Yes	No Yes	No Yes
24					No Yes	No Yes	No Yes

Frequently Asked Questions: Draft Integrated Feasibility Report and Environmental Impact Statement for the Mid-Chesapeake Bay Islands Ecosystem Restoration Project

What is a Feasibility Report?
The purpose of a Feasibility Report is to look at the technical, economic, and environmental feasibility of constructing water resources development projects, including protecting, restoring, and creating aquatic, intertidal wetland, and upland habitat for fish and wildlife, in a designated study area. The report is a complete decision document, which provides a sound and documented basis for decision makers at all levels to judge the recommended solution(s).

What is an Environmental Impact Statement (EIS)?
An EIS is a comprehensive document that is prepared to describe and evaluate the effects from a proposed action on the environment. The National Environmental Policy Act of 1969 (NEPA) requires the Federal government to provide a detailed statement of impacts (known as an EIS) resulting from any major Federal action that has the potential to significantly affect the environment. A Federal action is an activity that is entirely or partly financed, assisted, conducted or approved by a Federal agency. In this case, the "environment" is defined as the natural and physical environment and the relationship of people with that environment. A change in consequence, resulting from the action(s) is considered an impact. Impacts can be positive, negative or both. An EIS describes all impacts to the affected environment, including effects to the land, water, air, living organisms, as well as social, cultural, and economic aspects. NEPA requires an analysis of all practicable alternatives. An EIS also evaluates impacts resulting from any reasonable alternatives to the proposed action. It is a decision-making document in that it selects the preferred alternative after thoroughly evaluating the alternatives and associated impacts.

Although NEPA applies to all actions carried out, assisted, or licensed by the Federal government, the act specifies when an EIS must be prepared and the Council for Environmental Quality (CEQ) regulations provides the recommended format and content. In accordance with the CEQ regulations, Section 1502.1, the EIS "shall provide full and fair discussion of significant environmental impacts and shall inform decision makers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment".

A tiered EIS is prepared when there is a need to have subsequent NEPA documents (either an EIS or an Environmental Assessment) after an initial EIS. For example, another NEPA document might be needed to address impacts that may result from a follow-on, site-specific action that is included in the overall program. The tiered EIS is prepared to eliminate repetitive analysis of the same issues. During a tiered EIS process, the subsequent document will concentrate on discussions and analysis specific to the follow-on action, but will only summarize and reference issues discussed in the original, broader document.

What is an Integrated Feasibility Report and EIS?
An Integrated Feasibility Report combines a feasibility report and EIS into a single document. It allows decision makers to fully evaluate all aspects of a proposed project. This Integrated

Feasibility Report considers using clean dredged material from the Baltimore Harbor and Channels Federal navigation project for an ecosystem restoration project within the Mid-Chesapeake Bay Islands study area. Specifically, this feasibility study will (1) examine and evaluate the problems and opportunities related to the restoration of island habitat through the beneficial use of dredged material; (2) formulate plans to address these problems and opportunities; and (3) recommend cost-effective solutions for implementing a project, or projects, that will restore island ecosystem habitat and address dredged material management options recommended in the Federal Dredged Material Management Plan (DMMP).

What is dredged material?

In general, dredged material is sediment that has been removed with an underwater excavating machine called a dredge. Dredging may be conducted either mechanically (using a bucket) or hydraulically (using a pump). Dredged material removed from waterways is categorized into two general types: maintenance material and new work material. Maintenance material is material that has filled in areas that have previously been dredged to similar depths and widths. Maintenance material consists of sediments that are already on the bottom of the waterway or recently deposited sediment material that originated as eroded soil carried to the riverbed or estuary bottom by rainfall runoff, wave action, or tidal currents. This typically uncontaminated sediment is removed as part of maintenance dredging programs. New work material is material taken from depths not previously dredged.

What is a beneficial use?

Beneficial use of dredged material is recycling of dredged material for use as a product that has value. Dredged material has historically been considered a waste product and managed by creating facilities for permanent confinement of the material. The United States Army Corps of Engineers (USACE) and other technical experts have found alternatives involving the use of dredged material for beneficial use, such as beach replenishment, shoreline restoration, island restoration, manufactured topsoil, construction fill, landfill, abandoned mine reclamation and Brownfield cover, wetland, oyster bar, and habitat restoration.

Why do you need a Mid-Bay Island ecosystem restoration project?

The Federal and State of Maryland's DMMPs have identified a placement capacity shortfall that will begin in approximately 2010. Engineering Regulation (ER) 1105-2-100 requires dredged material management planning for Federal navigation 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 and Tiered Environmental Impact Statement concluded that there is insufficient capacity for dredged material placement to meet Federal and State of Maryland dredging needs in the next twenty years, insufficient time to develop new placement site(s) before existing sites are filled, and potential for inefficiencies at existing placement sites if new sites are not constructed. The restoration of island habitat in the Chesapeake Bay was one of the options considered and recommended during the DMMP process. In addition, islands are being lost in the Chesapeake Bay at a rapid rate. Over 10,500 acres of islands have been lost in the Bay over the last 150 years. As such, the Mid-Chesapeake Bay Island Ecosystem Restoration Study reflects the recommendation of the Federal DMMP and tiered EIS and restores and protects valuable island habitat.

What is the recommended plan for the restoration of James Island?
Restoration of James Island and protection of its existing remnants would consist of creating a 2,072-acre fill area, subdivided to provide approximately 55 percent tidal wetland habitats (1,140 acres) and 45 percent upland island habitats (932 acres). This restoration would involve constructing armored dikes, breakwaters, and/or other structures approximating the island's historical footprint from 1877, and filling the enclosed area with clean dredged material from Federal navigation channels. An access channel approximately 12,720 feet in length would be dredged on the northwest end of the island. The upland cells are located on the northern portion of the site overlaying the primary borrow sources, with the wetlands located in the southern portion of the site. A tidal gut passes through the center of the wetland areas. Each wetland cell will either be opened to tidal flow from the tidal gut or from the much lower energy of the Bay on the east side of the alignment. The final recreation components of the project have not been determined, however, they are expected to include rock reefs for fishing, a water trail for canoeing and kayaking, and informative signage.

What is the recommended plan for the environmental restoration of Barren Island?
Restoration and protection at Barren Island would use breakwaters to protect the current acreage of the Island and the SAV/shallow water habitat off the eastern shore of Barren Island. Approximately 72 acres of island habitat will be created by backfilling on the northern (23 acres) and western (49 acres) shorelines of the Island. The material that would be used to backfill behind the breakwaters at Barren Island would be from authorized maintenance of Federal navigation channels in the Honga River area. The recommended plan for Barren Island is broken down into two phases. Phase I Barren restoration would involve the modification of 4,900 feet of existing rock breakwaters and the construction of 9,760 feet of new rock breakwater (3,840 feet on the northern shore, 4,620 feet on the western shore, and 1,300 feet on the southern shore). Breakwaters would be built to an elevation of 4 feet above mean lower low water (MLLW). Phase II of the restoration of Barren Island would consist of construction of breakwaters off the southern tip of the Island following the historic shoreline. A maximum of 8,200 feet of structure is proposed to a maximum height of 6 feet above MLLW for this phase.

Why are these islands being considered for dredged material placement?

The recommended plan proposed by the final Federal Dredged Material Management Plan (DMMP) to meet dredged material placement needs in the Bay is multi-faceted, and includes a large island restoration project in the Mid-Chesapeake Bay region. Initially 105 islands within the study area were considered. To narrow down the number of potential alternatives, an initial screening of all 105 islands within the study area was conducted. Initial screening criteria were developed and using existing technical information and best professional judgment the Mid-Bay Project Delivery Team (PDT) determined whether each island met the criteria. To further narrow down the number of islands under consideration, the PDT, with input from the Bay Enhancement Working Group (BEWG), ranked the 8 island/island complexes that had, thus far, met all of the ranking criteria. Based upon engineering and environmental criteria, the two islands that ranked highest were James Island and Barren Island.

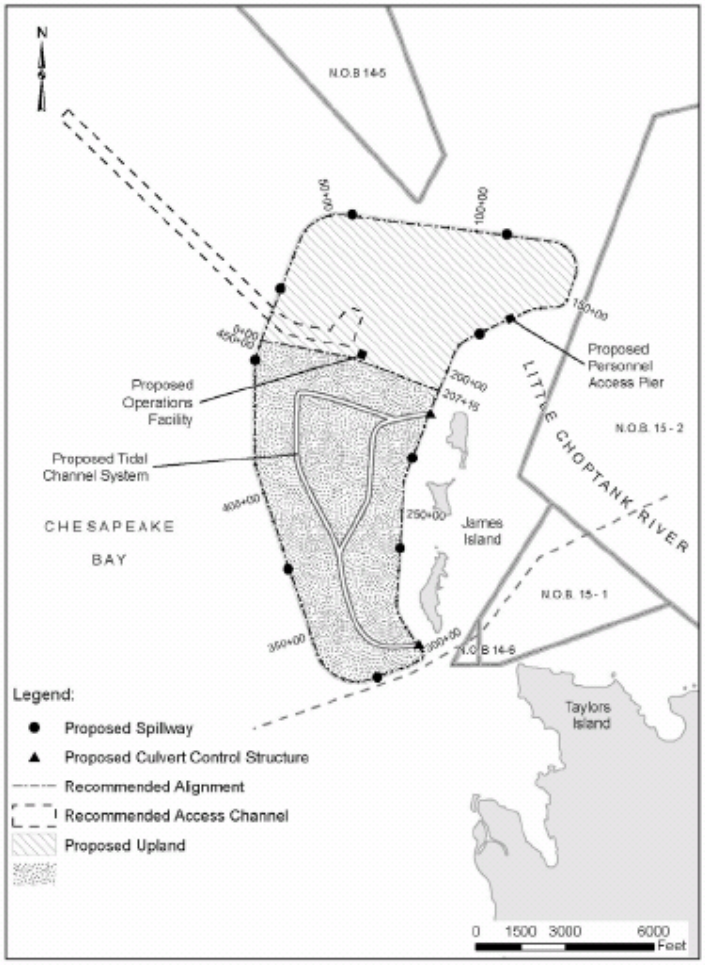


Figure 1- Final Recommended Plan at James Island

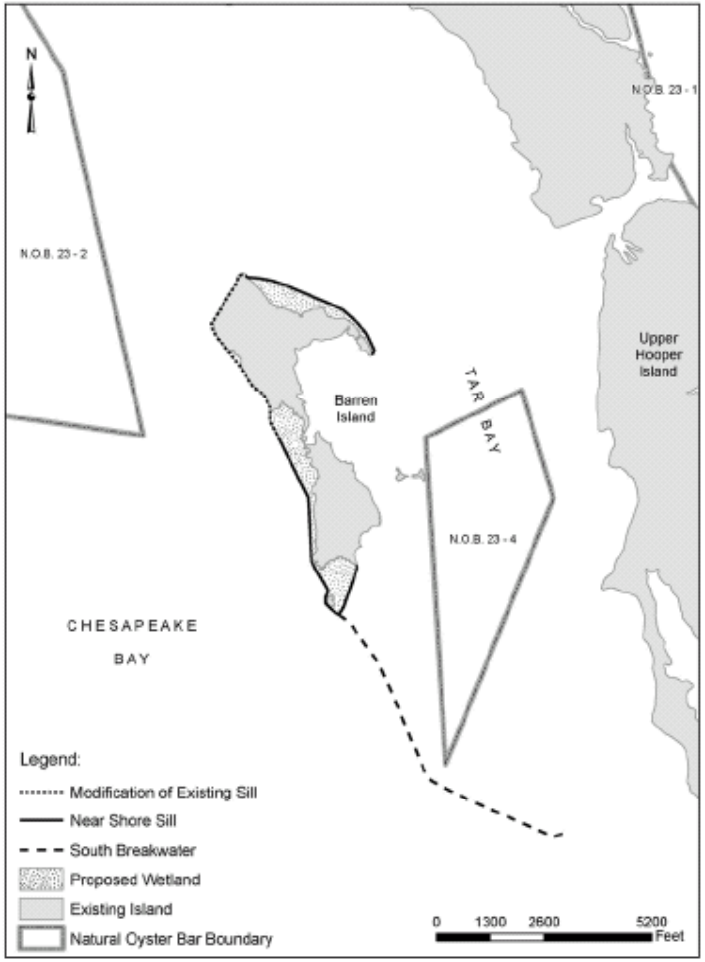


Figure 2- Final Recommended Plan at Barren Island

What recreational/educational opportunities will be available at the islands?
Recreational components at ecosystem restoration project should enhance the public's experience while remaining compatible with the objectives of the project. At James Island, the rock reefs, segmented breakwater structures, and armored perimeter dikes 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. Passive recreational and educational components were also considered including: a self-guided interpretive water trail in the tidal gut, informative signage, and avian observation from the water. Other components such as public tours of the islands, research opportunities for universities, and volunteer opportunities will be available during the construction of the project.

Both residents and non-residents of Dorchester County are likely to engage in wildlife viewing via boat around James and Barren Islands, either as the main purpose of their trip or as part of other activities.

Barren Island, which is owned and regulated by the United States Fish and Wildlife Service (USFWS), is available for use by researchers, and a current restoration program has attracted a variety of school groups and volunteers to the Island who are interested in assisting and learning about wetland restoration. All other access to Barren Island is restricted.

What type of dredged material will be accepted at the site?
Dredged material accepted at James Island will originate from the C&D Canal approach channels and the Chesapeake Bay approach channels to the Port of Baltimore in Maryland, as well as potentially other Federal navigation channels in the James Island vicinity. Material placed at Barren Island will be from authorized maintenance dredging of federal navigation channels in the Honga River area.

Will contaminated dredged material be accepted?
No. Dredged material considered for future placement at James Island and Barren Island will continue to be tested and analyzed prior to dredging and placement to ensure that the sediment quality is acceptable. Material from Baltimore Harbor within the Patapsco River will **not** be considered for placement at James Island or Barren Island in accordance with the Mid-Chesapeake Bay Island Ecosystem Restoration Integrated Feasibility Report and Environmental Impact Statement (EIS).

Can we obtain access to the islands?
Access to James Island will likely be limited to protect the habitat and because the Island will be an active construction site. Public outreach and involvement is an important consideration for this project and the potential exists for guided tours to be arranged while the project is under construction. Other possibilities such as research opportunities for universities and volunteer opportunities will likely be available during the construction of the project.

Access to Barren Island is restricted unless arrangements are made through USFWS, which owns and regulates the Island.

I fish/crab/clam within the project area. Where can I move my gear? Will additional harvest areas be opened?

The USACE and Maryland Port Administration (MPA) will continue coordinating with Maryland Department of Natural Resources (DNR) and other resource agencies to further assess the commercial fishing activity in the area. They are also willing to meet with local groups and representatives to obtain additional information regarding existing commercial use within the potential project areas. DNR would be responsible for assessing the opening of additional harvest areas.

Will there be negative effects on clamming, oystering, crabbing, and fishing in the proposed restoration or protection areas?

The proposed project permanently removes clam beds from the fishery that have the potential to be productive in the future. However, the areas are not presently considered productive clam bars and at current clam densities, the proposed ecosystem restoration would not significantly impact the abundance or catch of either type of commercial clam species.

DNR has delineated three natural oyster bars (NOBs) in the vicinity of James Island and two in the vicinity of Barren Island. The proposed restoration at James Island and the restoration/protection at Barren Island are configured in such a way that no dredging, construction, or filling activities will occur over any oyster harvesting areas; the bars will be avoided. The staging area for material placement at James Island will be sufficiently far from the oyster bars to prevent impacts from resuspension of material due to barge traffic. Time-of-year restrictions are expected to further protect NOBs. No long-term impacts from the project on the adjacent oyster bars are, therefore, expected.

The waters surrounding James and Barren Islands have been identified as a regionally important area for harvesting blue crabs. A short-term impact to blue crabs could include a period of lower usage of the Island restoration area during construction. The main impact to this resource will be the loss of 2,072 acres of prime summer blue crab habitat at James Island due to burial and island construction. The shallows surrounding the remnant islands provide habitat (cover and food sources) sought by juvenile and adult crabs in the summer.

The marsh creeks formed by the restored island construction and the SAV beds that should be protected by the proposed projects are expected to provide excellent crab habitat in the future. Restoration at James Island would represent a net loss of currently productive blue crab habitat that is not associated with SAV. The largest impact is to the commercial crabbers who fish the waters within the proposed project area and will have to relocate their operations. The project has the potential to increase crab abundance in adjacent areas, particularly if SAV beds adjacent to the Islands expand. However, increased travel time and fishing congestion in these areas (pots per acre) may offset these positive effects. Because the project is not anticipated to negatively affect crab abundance, it is reasonable to expect that the economic impacts of the project on overall crab fisheries will be minimal. However, there may be temporary impacts to individual crabbers who are displaced by the project as they search for new productive areas to set pots and some long-term impacts for any fishermen who must travel farther to set pots.

Overall, impacts of the restoration and protection projects to commercial finfisheries are expected to be minimal. It is expected that the composition of the adult finfish community in the waters surrounding the proposed projects will not be impacted significantly in the long-term. However, construction impacts such as bottom disturbance or turbidity may deter short-term usage by the adults and young of some commercially important species. In addition, burial of available cover items such as snags would remove preferred habitat for species such as striped bass. It is not anticipated that any long-term impacts to commercially important finfish will be significant, and, once the construction phase is completed, finfish are expected to move back into the area quickly. At James Island, there will be impacts to non-active pound net sites, but not active pound nets. At Barren Island, there is a possibility that one inactive pound net will be affected and, if the southern breakwater is extended, one active pound net could be affected. Any impacts to active pound nets may result in the fisherman having to relocate. The additional stone dikes, wetlands, and potential increase in SAV associated with the proposed project are expected to provide more shelter and foraging habitat for commercially valuable finfish species. Based on surveys of existing channel usage, increased travel-time impacts to fishermen associated with the proposed project are anticipated to be minimal.

What about the viewshed?

The affected land area for James Island includes primarily residential and agricultural areas along the Little Choptank River and Chesapeake Bay mainstem. The James Island restoration has the potential to be a significant element in the landscape for some viewpoints, but from the majority of vantage points the Island will blend into the existing landscape.

For Barren Island, the affected land areas are residences, commercial areas and roads on Upper Hoopers Island. The types of non-residential areas with views of the Island include boat launches, churches, and a waterfront restaurant. Transient views of the Island may be seen from secondary roads where the roads are close to the shoreline. Boaters near Barren Island will be able to see the existing Island, but will only see the protection from the northern and western sides of the Island, with the exception of the southern breakwater, which will be visible from the eastern side as well. Furthermore, the rocks and sand that make up the restoration/protection project are likely to be noticeable only by those within a half-mile of the Island.

By preventing erosion of the Island, the project protects the current view of Barren Island and improves many measures of the quality of the view including land use diversity, percent of tree cover, proportion of natural land use in view, and range of vertical elevation.

What type of economic benefits do you foresee this bringing to Dorchester County?

The total number of Dorchester County jobs created by the project, including new jobs for existing county residents and new jobs for people who will relocate to Dorchester County for the initial construction of the project, is estimated to be 243 direct annual jobs. A full-time staff of 25-30 people is expected over the 30+ year operational life of the project after dike construction is completed.

What kind of environmental monitoring will be conducted at James and Barren Islands?

It is anticipated that the project will operate under a Maryland Department of the Environment (MDE) Water Quality Certificate and Tidal Wetlands License. The environmental monitoring

framework for the James Island restoration project and the Barren Island restoration/protection project will contain studies to monitor discharge water quality, receiving water quality, SAV presence, sediment quality, benthic communities, nekton, birds, fish, and other wildlife.

Monitoring is performed to ensure regulatory compliance, to document the creation of beneficial habitat, to confirm the expected findings of no negative impacts, and to provide operational input on the success of habitat creation and potential changes which will increase the habitat value and utilization. The water quality, sediment quality, benthic community data, spillway discharge, and interior water quality/algae data are evaluated, reviewed, and submitted to MDE to document water quality conditions adjacent to the site and at nearby reference sites. Other biological data (fish, shellfish, wetlands, birds, etc.) are used to assist with habitat development initiatives. The Mid-Chesapeake Bay Island Monitoring Framework consists of twelve monitoring components:

- Turbidity monitoring
- Shellfish bed sedimentation
- Sediment quality
- Wetland vegetation
- Water quality
- Benthic and epibenthic community
- Wetlands use by fish
- Wetlands use by wildlife
- Wetlands use by birds
- Interior water quality/algae
- Maryland terrapin monitoring
- SAV growth and cover

The location and number of additional monitoring locations and the frequency of monitoring events for each component would be determined based on consultation with the appropriate agency representatives, and approved by members of the Monitoring Subgroup. Changes and updates to the monitoring framework will be evaluated as part of the adaptive management process. The public already does and would continue to have the opportunity to participate in activities that currently take place at Barren Island, such as planting of cells. There is a possibility that this opportunity would also exist at James Island at a later time.

Who will be responsible for the Island once it is completed? What are the long-term maintenance issues?

The construction, operation, and maintenance of James Island will be a cooperative effort between USACE-Baltimore District and MPA similar to the arrangement for the restoration and maintenance of the Poplar Island Environmental Restoration Project (PIERP). The USACE and MPA will be responsible for construction of James Island and the day-to-day operations during dredged material inflow. As each functional element of the project is completed and determined to be functioning as intended, it will become the responsibility of the MPA to operate, maintain, repair, replace, and rehabilitate the project elements as needed. Such functional elements include: containment dikes including armor stone, internal dikes, service structures, access channels, and each of the wetland and habitat areas defined by permanent cell divisions. Ultimately, the entire site will become the responsibility of the MPA.

James Island will be managed by a multi-component management framework. The project management team structure for the adaptive management plan (AMP) would be similar to that established for the PIERP. There would be two groups broken out from the entire project partnership: (1) working group, and (2) Ecosystem Restoration Project Coordination Team. Two

subgroups would be formed from the working group: a Habitat subgroup and a Monitoring subgroup. There would be three subgroups developed from the Coordination Team: (1) a Site Development team, (2) a Site Operations team, and (3) an Adaptive Management team. Locations of monitoring stations and frequency of monitoring for each component would be determined based on consultation with the appropriate agency representatives, and approved by members of the Monitoring subgroup. In addition, geotechnical sampling and testing of dredged material for upland and wetland development will occur and adjustments made as necessary. Changes and updates to the monitoring framework will be evaluated as part of the adaptive management process.

What about marker lights to make sure no one runs aground on the rock structure?
Lights used as aids to navigation will be added to mark the project. These navigation lights may be visible at nearby residences, but will be in keeping with existing lighting along the waterway and will comply with U.S. Coast Guard regulations. Similar to existing conditions, for safety purposes during construction, warning signs for recreational boaters would be placed in locations where potential submerged hazards may exist. In addition, the U.S. Coast Guard will issue Notices to Mariners and the National Ocean and Atmospheric Administration will publish nautical charts indicating the extent of construction activities and showing the new Island configuration. The MDNR police would also cooperate with the State to enforce restrictions at the Islands during construction, when necessary.

Will the restoration/protection projects provide more erosion protection for the mainland?
Island structures inhibit the erosion of mainland shorelines by providing shelter from wind and wave forces. Specifically, Barren Island is believed to provide protection from wind and waves for the populated Hoopers Island shoreline to the east. If Barren Island is not present to provide shoreline protection, Hoopers Island will be exposed to more erosive forces. Similarly, if James Island is lost completely to erosion, more erosive forces will likely impact the shoreline of Taylors Island.

Why aren't you planning to stop erosion on Barren and Hoopers Island completely?
While protecting the Islands from erosion is part of the goal of the project, the primary purpose is to restore and protect valuable but threatened island ecosystems through the beneficial use of dredged material. Mainland protection is an incidental benefit of the proposed project.

How do you quantify the benefits of James and Barren Islands in terms of island habitat and what that means for the Bay?
The Island Community Unit (ICU) method was developed to capture the value of island habitat diversity and the benefit to the communities that inhabit islands over the life of the restoration project. The method, developed by USACE-Baltimore District with input from a working group comprised of Federal and State resource agencies, environmental groups, and academia, uses fish and wildlife communities to quantify benefits, rather than individual species. To determine the environmental benefits for each alternative, workgroups had to identify what species used island habitat in the Chesapeake Bay, determine what habitat types they used, establish limiting conditions for those habitats, and then determine what benefits each community received from the habitat.

A preliminary calculation of habitat output versus the cost for the alternative was performed. Those alternatives in which the cost was large compared to the habitat benefits were not carried forward for further consideration.

Will there be an oversight committee to monitor the project and can the public participate?
For a project of this size and complexity a network of teams and working groups will be required to support the decision-making process for the project. A Working Group will be formed to provide oversight, technical advice and support to the project partners and Adaptive Management Team. In addition, Subgroups such as a Habitat Subgroup and Monitoring Subgroup can advise the Working Group. The subcommittees of the Working Group will be established to advise the management teams on restoration planning and operations and on environmental monitoring activities. The working groups and subgroups will include members from State and Federal resource agencies, environmental groups, academia, and may include members of the pubic. If there is sufficient interest, a citizens advisory committee could be established to provide oversight and advice on project matters.

Is this project a sure bet?
This project is not a sure bet. We are still in the Feasibility and NEPA process and no decision has been made regarding the recommendations of the report. NEPA requires an analysis of all practicable alternatives and construction cannot occur until a Record of Decision (ROD) has been signed. This would not occur until after the EIS has been finalized. Construction of the project will likely need Congressional authorization to proceed.

Do you anticipate opposition?
Generally, for a project of this magnitude there will be some opposition; however, so far, more people have come forward in support of the project than in opposition.

Will the existing channel between James Island and Taylors Island be maintained?
The channel between James Island and Taylors Island will remain intact. As a result of public meetings, the study team considered a request by local watermen to preserve a channel between James Island and Taylors Islands and modified the project alignment to maintain the channel.

Will the projects accommodate dredged material from other jobs, such as the city of Cambridge?
No, only dredged material from Federal navigation projects will be eligible for placement at James and Barren Islands. Authority to take dredged material from non-Federal channels would have to be evaluated on a case-by-case basis.

What is the possibility of switching the priority of the Poplar Island Expansion Restoration Project and the Mid-Chesapeake Bay Islands Restoration Project?
Due to the urgent need for dredged material capacity, USACE and MPA do not have a preference as long as one of the projects is authorized and funded. Building the Mid-Chesapeake Bay Island project first is attractive because it provides a long-term solution for the dredged material capacity shortfall and provides high environmental benefits to the Bay community. However, there is less implementation risk involved in expanding the existing Poplar Island

project as opposed to starting a new project and Poplar Island is further along in the study process.

What is a breakwater?
Breakwaters are offshore structures built for the purpose of protecting the coast and decreasing erosion caused by wave energy. Stone or other material is placed in long mounds; the slope of the mounds and the rough texture of the stone decreases the energy in waves approaching the shoreline.

Will the Barren Island portion of the project include breakwaters?
Breakwaters are proposed to protect the northern and western shores of Barren Island as well as the Phase II portion of the project south of Barren Island. Phase II of the restoration of Barren Island will consist of construction of breakwaters off the southern tip of the Island following the historic shoreline. A maximum of 8,200 feet of structure is proposed to a maximum height of 6 feet above MLLW.

How good are segmented breakwaters at protecting land?
Segmented breakwaters have been shown to work well at Tilghman, Smith, and Barren Islands and other places around the Bay.

Would this project be impacted by potential future construction activities such as crossings from Dorchester County to Calvert County, as well as the proposed transmission and gas line?
We don't expect impacts; however, at this time we don't have a lot of information.

What about future raising of the dikes or expanding the footprint of the projects?
This project will provide dredged material placement capacity for 30 years. Current Corps of Engineers Regulations require us to look at existing projects when additional material placement capacity is needed. At this time it is not anticipated that the proposed dikes would be raised higher than described in the report or that the footprint be expanded. The DMMP also recommends looking at wetlands restoration in Dorchester County for future dredged material placement needs.

Are you considering sea level rise and climate change in your design?
Yes, we are. We will incorporate new data as it becomes available. Sea level rise could affect the elevations used for the wetlands planting so this is an important consideration.

What is the relationship between this project and Dorchester County wetlands restoration?
The DMMP recommended the restoration of wetlands in Dorchester County as a beneficial use of dredged material from the shipping channels. A study has been initiated to consider wetlands restoration in Dorchester County, including the Blackwater National Wildlife Refuge. One of the initial suggestions is that James Island be used as a staging area for the controlled flow of dredged material to the degraded wetlands. However, a restoration project of this magnitude would require a considerable amount of analysis and planning at a level at least as great as the Mid-Bay Island study and all options must be considered before a decision can be made.

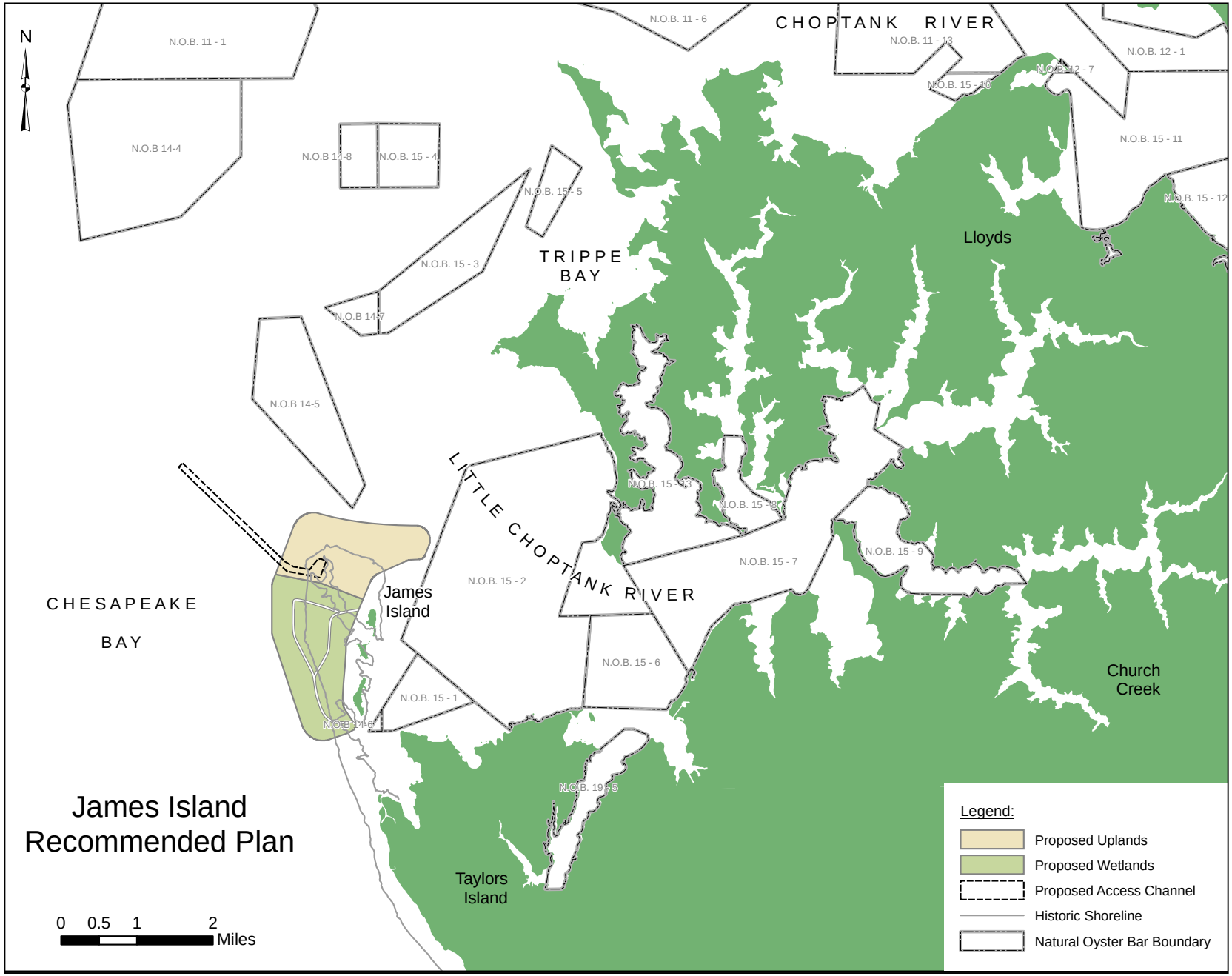
What are the differences in the heights of the proposed breakwater at Barren Island?
The heights of the proposed breakwater at Barren Island range from 4 ft to 6 ft above MLLW for the alternative plans considered. In general, higher breakwaters provide more wave protection and would be expected to enhance the success of SAV in the project area. Computer modeling indicates that a 6 ft MLLW breakwater would reduce storm waves by 0.5 ft to 1.0 ft more than a 4 ft MLLW breakwater. Tradeoffs to be considered include the increased construction cost of the higher breakwaters, the benefits to SAV of greater wave reduction and navigation safety issues.

Would there be any impacts on the mainland shoreline if James Island or Barren Island eroded completely?
Computer modeling of wave conditions indicates that the maximum wave heights near the mainland shoreline are reduced by as much as 2 ft by existing James Island remnants. Therefore, with complete erosion of James Island, wave heights along the mainland shoreline could increase by 1 to 2 ft. For Barren Island, computer modeling indicates that wave heights at the mainland shoreline could increase up to 3 ft if Barren Island erodes completely.

Will the oyster bars be buried because of this project?
No. In fact, modeling results show small reductions in sediment accretion over these areas. Based on computer modeling of sediment transport following construction of the proposed projects, it is not anticipated that the projects will negatively impact either oyster bars or submerged aquatic vegetation beds.

Will there be a change in the local channels due to deposition?
No adverse changes in the location and depths of local channels are expected following the construction of the proposed projects. For the James Island area, computer modeling indicates that increased velocities in the local channel southeast of James Island during storms would result in some erosion of the channel bed and thus a deepening of the channel. For the Barren Island area, the north island tidal channel cut, which experiences the highest sediment shoaling under existing conditions during storms, would experience a decrease in shoaling following construction of the project. For the Honga River Tar Bay entrance channel, under existing conditions, high current velocities erode the channel bed during storms and deposit the sediment in portions of the channel with lower velocities. Following construction of the proposed project, less erosion of the channel bed will occur along with a corresponding reduction in sedimentation along other portions of the Honga River Channel.

Vicinity Map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Lloyds
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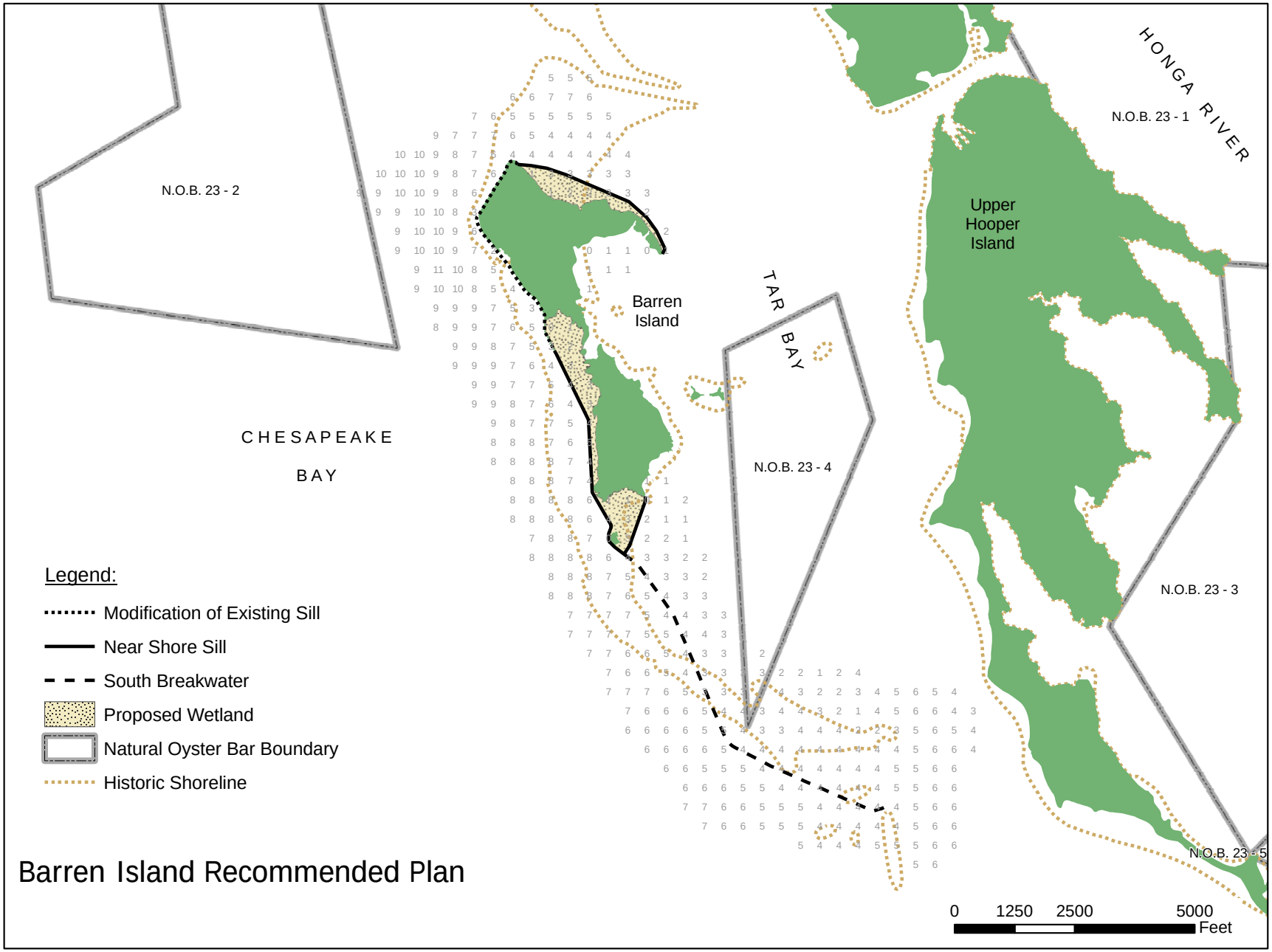
Proposed Wetlands
Proposed Access Channel
Historic Shoreline
Natural Oyster Bar Boundary



Barren Island Recommended Plan

James Island

James Island is a privately owned island located in the mid-Chesapeake Bay. Native Americans used the island for centuries before Europeans arrived. When Europeans first settled the island around the 1660s, it encompassed over 1,200 acres of land. In the mid-1800s, the island began to suffer the effect of erosion, splitting into two separate islands. At that time, James Island supported homes, a store, and a school. In the late 1800s, a church was built to serve the roughly twenty families that inhabited James Island. Eventually these families left the island, and by 1916, it was no longer inhabited by humans.

In 1999, archaeological surveys indicated that an area of James Island was potentially used as an oyster processing facility in the late 1800s or early 1900s. Additionally, Maryland Historical Trust has identified two historical sites on the island. One is believed to represent a War of 1812 site, and the other is a house site from the late 1800s to early 1900s. The area where the house used to stand is now almost completely eroded.

In 1916, a mainland resident imported a herd of Sika deer to the James Island. The Sika deer, as well as indigenous whitetail deer, flourished. In current times, the Maryland Department of Resources allows hunting to control the deer populations on James Island.

James Island currently consists of three island remnants totaling less than 100 acres.

References

Cronin, William B. 2005. The Disappearing Islands of the Chesapeake. Johns Hopkins University Press, Baltimore. 182 pages.

Maryland Port Administration. 2004. Underwater Archaeological Surveys In The Vicinity Of James And Barren Islands In The Chesapeake Bay, Maryland: James Island Survey. August 2004. Prepared by Panamerican Consultants, Inc.

US Army Corps of Engineers. 2006. Draft Mid-Chesapeake Bay Island Ecosystem Restoration Integrated Feasibility Report & Environmental Impact Statement. August 2006.

Barren Island

Barren Island is one of a chain of at-risk and eroding islands located just off the eastern shore of the Chesapeake Bay. In the mid 19th century, Barren Island, which sits about 19 miles southwest of Cambridge, MD, extended across 580 acres of farmland, with homes, a church, a school and stores. As recently as the early 1980s, the Island still boasted a functioning sportsman's lodge near its northern end, the last structure to remain on the Island. However, relentless erosion began to undermine the lodge in the 1980s, and by the late 1990s, the lodge was gone and the Island's footprint had eroded to less than 120 acres.

Prior to restoration efforts, the western shore of Barren Island was receding due to erosion at more than 10-15 feet per year. Without measures to halt the erosion, Barren Island was at risk of washing away altogether, causing the loss of valuable sea grass beds in its lee and putting the developed shoreline of Hoopers Island on the Eastern Shore at risk from erosion and storm damage. In the fall of 2000, the US Army Corps of Engineers began the process of fortifying the western edge of Barren Island by placing sand filled geotubes in two semi-circles along the seaward shore and filling the space behind the tubes with clean dredged material taken from nearby shipping channels. The dredged material was filled to an intertidal elevation suitable for later marsh planting and establishment.

Beginning in 2001, the National Aquarium in Baltimore began a series of large-scale volunteer planting events at Barren Island to establish marsh plants in the dredged material placed by the Army Corps behind the geotubes, and later, the stone riprap. Including the first planting event in June 2001, the Aquarium has coordinated five events, planting over 333,000 marsh grass plugs across approximately 23 acres on Barren Island. A full complement of birds, fish, crabs and other typical marsh animals can be found throughout the created marshes on Barren Island.

Project Summary

US Army Corps of Engineers
Baltimore District

Draft Mid-Chesapeake Bay Island Ecosystem Restoration Integrated Feasibility Report and Environmental Impact Statement (EIS)

Public Meeting Information Sheet

Purpose of the Public Meeting

Welcome to the Public Meeting for the Draft Mid-Chesapeake Bay Island Ecosystem Restoration Integrated Feasibility Report and Environmental Impact Statement (EIS). The purpose of today's meeting is to present the findings of the Mid-Chesapeake Bay Island Ecosystem Restoration Study and solicit comments for the record from the public. This meeting is part of an ongoing public involvement process that has continued throughout the study.

Members of the study team are available to answer questions before and after today's meeting. You are invited to submit comments or ask questions at this meeting or by calling Stacey Blersch, Study Manager, at (410) 962-5196. Comments may also be sent by regular mail or by electronic mail to the following addresses:

U.S. Army Corps of Engineers, Baltimore District
Mid-Bay Draft EIS
ATTN: CENAB-PL-P (S. Blersch)
P.O. Box 1715
Baltimore, Maryland 21203-1715
Stacey.S.Blersch@usace.army.mil

Please submit all comments by October 23, 2006 to ensure that your comments are incorporated into the public record. You may view the Draft EIS and related information on the USACE web page at: http://www.nab.usace.army.mil/publications/non-reg_pub.htm.

Mid-Chesapeake Bay Island Ecosystem Restoration Study

In accordance with the National Environmental Policy Act (NEPA) of 1969, the U.S. Army Corps of Engineers, Baltimore District (Corps) and the non-Federal sponsor, the Maryland Port Administration (MPA), are conducting two public meetings following the preparation and release of the Draft Integrated Feasibility Report and Environmental Impact Statement (EIS) for the Mid-Chesapeake Bay Island Ecosystem Restoration Project in Dorchester County, on Maryland's Eastern Shore. Approximately 90 to 95 million cubic yards (mcy) of dredged material, primarily from maintenance of the Chesapeake Bay approach channels to the Port of Baltimore, would be placed behind dikes at James Island. The approximately 0.38 mcy of dredged material that would be placed at Barren Island would come from maintenance dredging of Federal navigation channels in the Honga River area. The material at James Island would be shaped and planted to restore 2,072 acres of remote island habitat, and at Barren Island 72 acres of wetlands would be restored. The project at Barren Island would also protect existing island ecosystem habitat, including environmentally and commercially important submerged aquatic vegetation (SAV). James and Barren Islands have been identified by the U.S. Fish and Wildlife Service and other natural resource management agencies as a valuable nesting and nursery area for many species of fish and wildlife, including bald eagles, diamondback terrapins, and horseshoe crabs.

NEPA is a Federal law that requires Federal agencies to consider the direct and indirect environmental and socioeconomic impacts associated with the proposed projects. NEPA applies to all projects that involve Federal funding, Federal land, and/or Federal permits. The purpose of the EIS was to identify the need for the project, consider reasonable alternatives, and evaluate the significant environmental consequences, if any, of the proposed project. The EIS process is designed to incorporate and encourage public participation.

Draft Mid-Chesapeake Bay Island Ecosystem Restoration Integrated Feasibility Report and Environmental Impact Statement (EIS)

The recommended plan proposed in the Draft Integrated Feasibility Report and EIS represents a cost-effective and environmentally beneficial plan to restore remote island habitat at James Island and Barren Island using approximately 90 to 95 mcy of clean dredged material from the Chesapeake Bay approach channels to the Port of Baltimore and Federal channels in the James and Barren Island areas .

The recommendations of the EIS are:

- Construction of a 2,072-acre island adjacent to James Island, consisting of approximately 55 percent tidal wetland habitat and 45 percent upland island habitat;

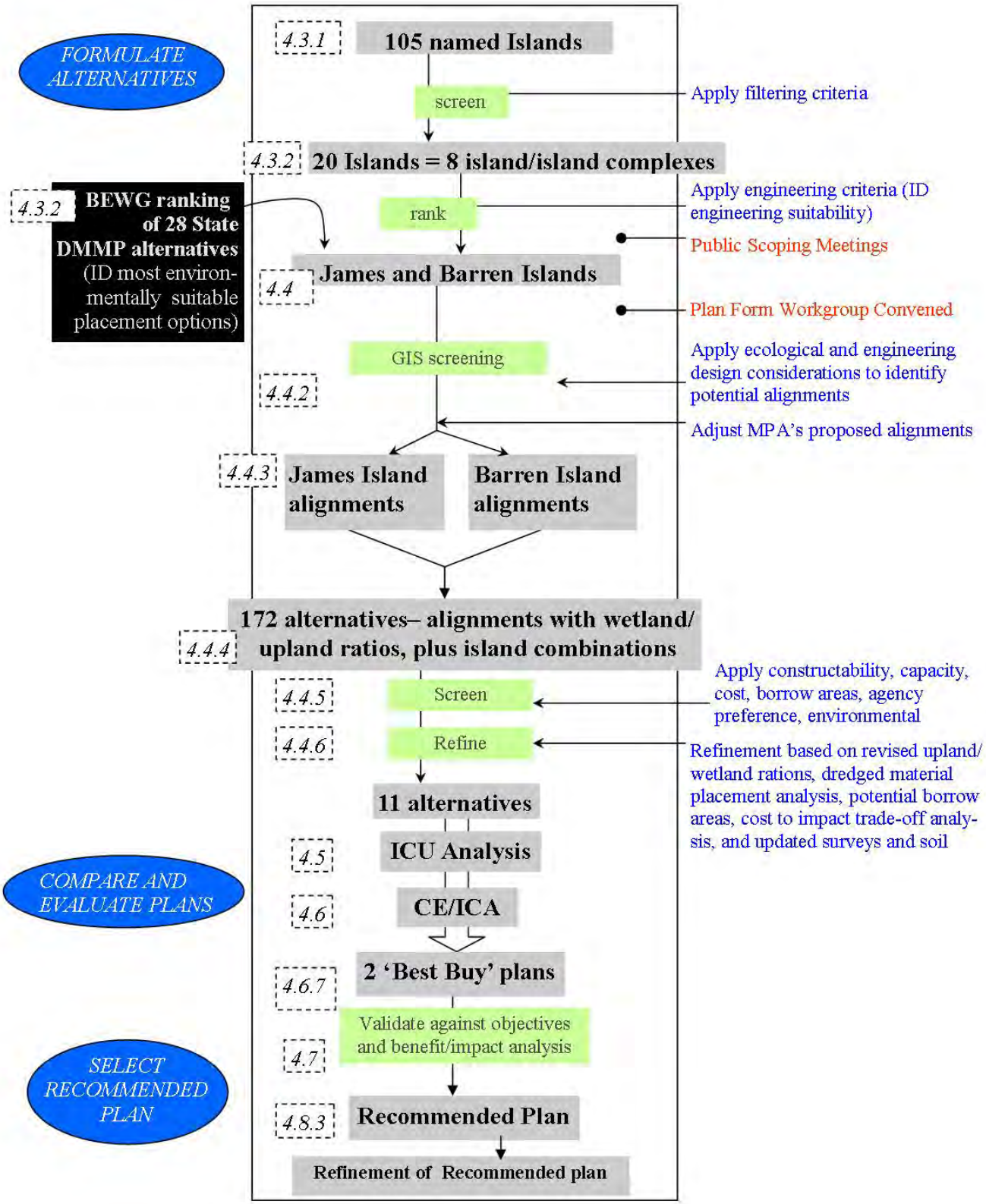
- Construction of breakwaters and backfilling with dredged material at Barren Island to protect both the current acreage of the island and the adjacent submerged aquatic vegetation (SAV)/shallow water habitat, providing approximately 72 acres of wetland habitat on the northern and western portions of the island; and

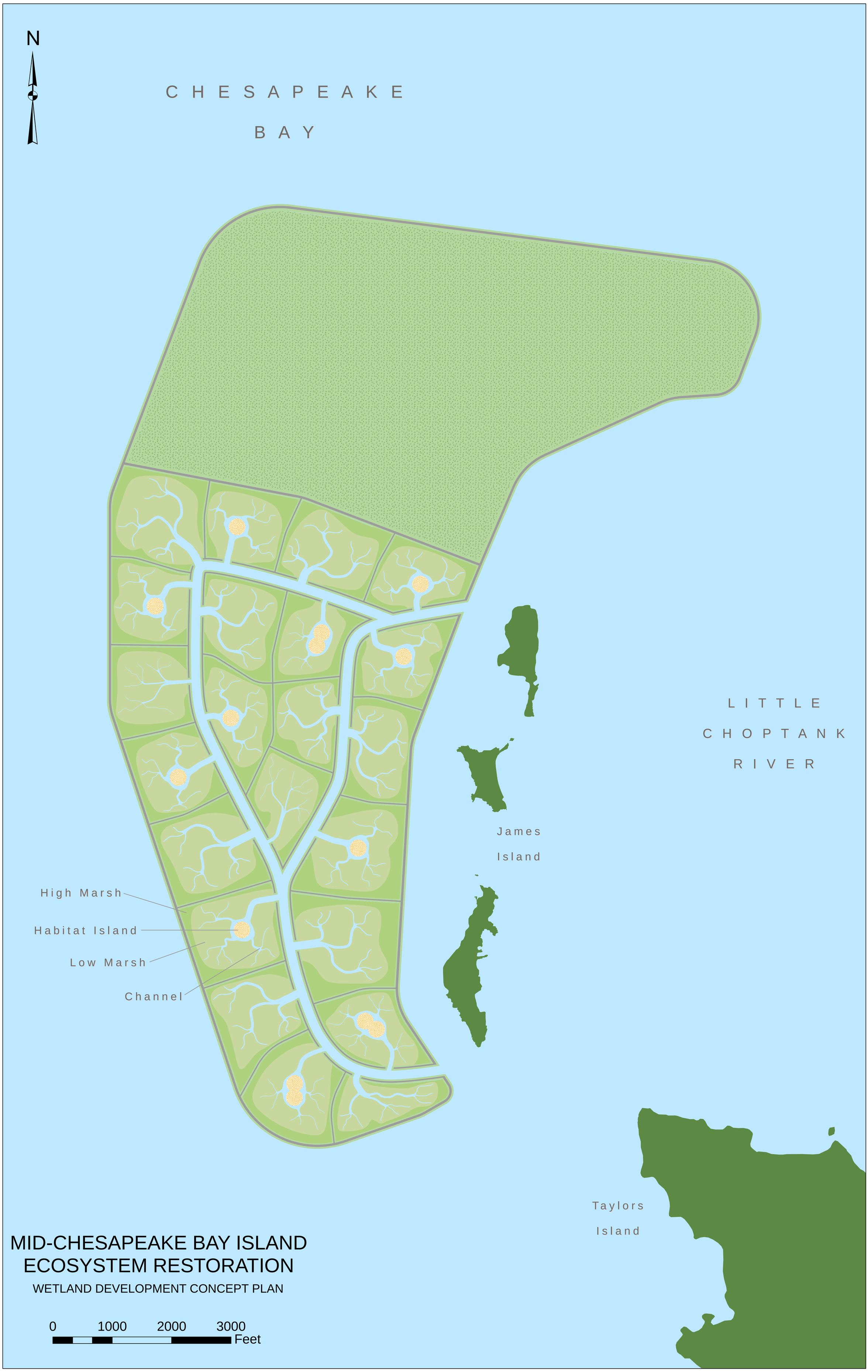
- Construction of a breakwater at Barren Island with a maximum of 8,200 feet of structure at a height of +6 feet mean lower low water (MLLW).

Mid-Chesapeake Bay Island Draft Integrated Feasibility Report and EIS Schedule

Notice of Intent	January 2003
Public Scoping Meetings	February and March 2003
Alternative Plan Development	December 2002 through June 2004
Existing Conditions Studies	
Barren Island	Summer & Fall 2002; Winter and Spring 2003; May 2003 through March 2004
James Island	Fall 2001; Spring and Fall 2002; Winter, Spring, and Summer 2003; Winter 2004
Public Update Meetings	March 2004 and May 2005
Release Draft EIS for Public Comment	September 8, 2006
Public Information Meetings	**October 11 and 12, 2006**
Public Comment Period ends	**October 23, 2006**
Final EIS	December 2006
Complete Study - Record of Decision	Fall 2007

Plan Formulation Process





MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION

WETLAND DEVELOPMENT CONCEPT PLAN

Mid-Chesapeake Bay Island Ecosystem Restoration

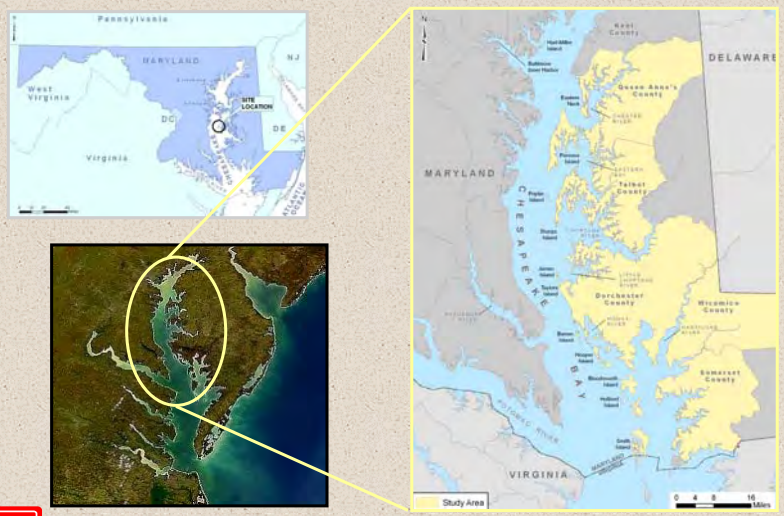
Draft Integrated Feasibility Report & Environmental Impact Statement

Public Comment Meetings
October 11 and 12, 2006
Cambridge and Taylors Island, Maryland

Meeting Format

- Formal presentation
- Public comments for the record
- Completion of formal portion of the evening
- Question & answer session

Site Map and Project Location

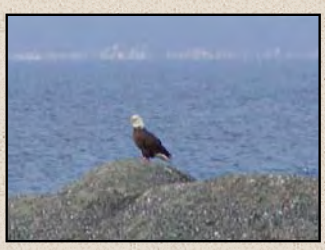


NEPA
The National Environmental Policy Act of 1969

- Federal Law Effective January 1, 1970
- Promotes better environmental planning and decision making to protect the environment
- Applies to proposed projects involving:
  - Federal Monies
  - Federal Lands
  - Federal Permits

NEPA
Environmental Impact Statement (EIS)

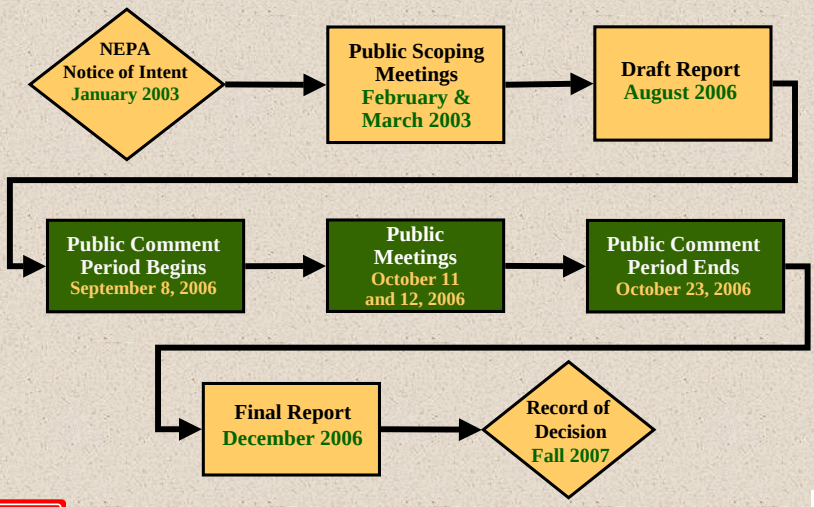
- Document prepared by a Federal agency to help officials plan actions and make decisions considering:
  - Purpose and need for project
  - Reasonable alternatives
  - Significant environmental consequences of the project



- Some of the factors considered include:

Water and Sediment Quality	Socioeconomics
Aquatic Resources	Aesthetics
Terrestrial Resources	Navigation
Endangered Species	Land Use
Hydrology and Hydrodynamics	Air Quality
Cultural Resources	Cumulative Impacts

NEPA Process for the Mid-Chesapeake Bay Island Ecosystem Restoration Integrated Feasibility Report & EIS



Need for the Proposed Project

- Protect and restore island habitat
- Efficiently manage 3.2 mcy of dredged material per year
- Current capacity will become limited in 2010
- Federal and State DMMPs recommend large island restoration

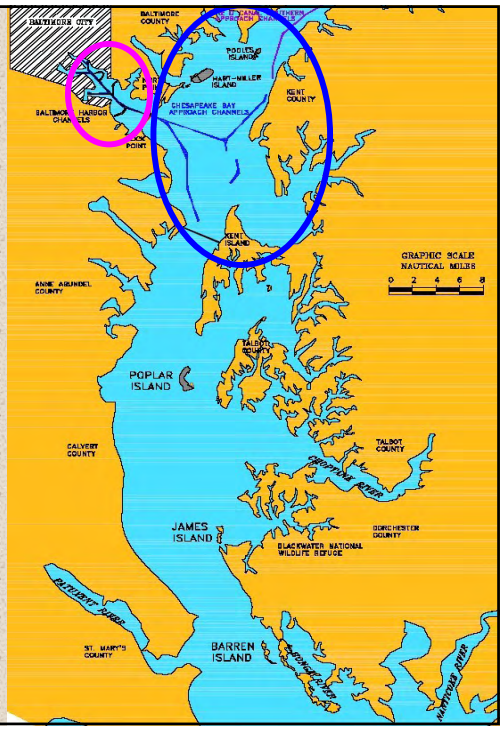
Chesapeake Bay Island Loss

Approximately 10,500 acres have been lost in middle eastern portion of Chesapeake Bay alone

- Most unprotected islands will be lost in near future
- Remote island habitats preferred by many migratory birds, plus fish and wildlife

Long-term Solution to the Dredged Material Capacity Need

- Large island restoration project could provide long-term placement capacity for the eight Chesapeake Bay channels
- Material from maintenance dredging of local Federal channels such as Honga River also considered
- Material from Baltimore Harbor **WILL NOT** go to Mid-Bay Islands



Purpose of the Mid-Chesapeake Bay Island Study

- To formulate plans to address problems and opportunities related to island habitat restoration through the use of dredged material
- To recommend cost-effective solutions for implementing projects that restore island ecosystem habitats
- To examine and evaluate impacts of the proposed alternatives

Planning Objectives & Constraints of the Mid-Bay Study

- Restore marsh, aquatic, and terrestrial island habitat for fish, birds, reptiles, amphibians, and mammals
- Protect existing island ecosystems, including sheltered embayments, to prevent further loss of habitat
- Provide capacity for placement of dredged material
- Assist in meeting goals of Chesapeake 2000 Agreement
- Decrease local erosion and turbidity
- Promote conditions beneficial to SAV
- Promote conditions beneficial to oysters

Planning Objectives & Constraints of the Mid-Bay Study (continued)

- Avoid and minimize impacts to existing commercial fisheries
- Avoid and minimize impacts to existing fisheries, nursery, feeding, and protective habitats
- Avoid and minimize impacts to rare, threatened, and endangered species and their habitats
- Avoid and minimize establishment of invasive species

Development of Project Plan: Initial Evaluation and Screening: Step 1

- 105 islands initially narrowed down to 20 using the following screening criteria:
  - Restoration potential
  - Cost-effective construction
  - Convenience to land access
  - Fall within authorized study area
  - Attempting to avoid sites which:
    - Impact sensitive areas due to maintenance and hydraulics
    - Impact shallow water
    - Impact major populations
    - Impact existing navigation
    - Contain potential munitions of explosive concern
    - Are not an existing Corps/MPA project

Development of Project Plan: Initial Evaluation and Screening: Step 2

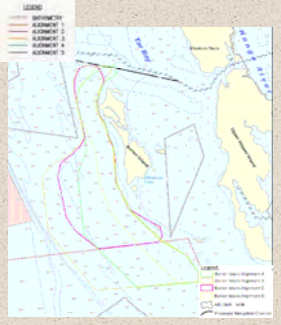
- Choices further narrowed down (from 20 to 8 options) based on engineering and environmental criteria
- James and Barren received highest scores based on these criteria
- James and Barren were also the preference of public meeting attendees

James Island
MARYLAND

Barren Island
MARYLAND

Development of Alternatives

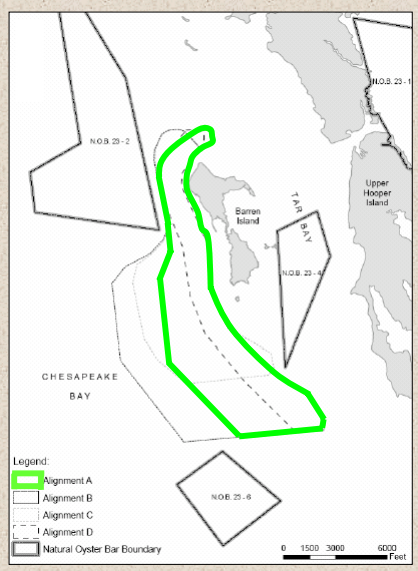
- Various alignments considered at each island
- Variety of habitat proportions: 100%, 70%, 50%, 30%, or 0% wetland habitat
- Optimized for:
  - Constructability
  - Dredged material capacity
  - Borrow area locations
  - Environmental benefits of the restored wetland and upland habitats
  - Economic considerations



No-Action Alternative

- James Island 2004 acreage: 79 acres
- At current erosion rates, James Island would be submerged by 2021

- Barren Island 2004 acreage: 197 acres
- At current erosion rates, Barren Island would be submerged by 2052

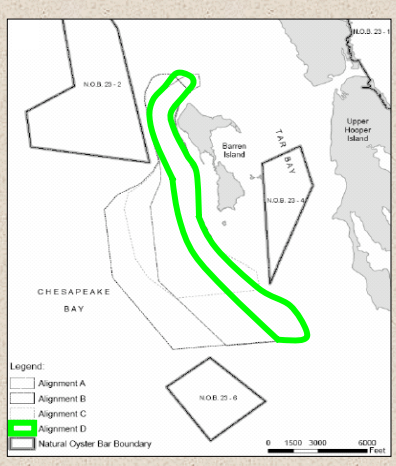


Alternative 1

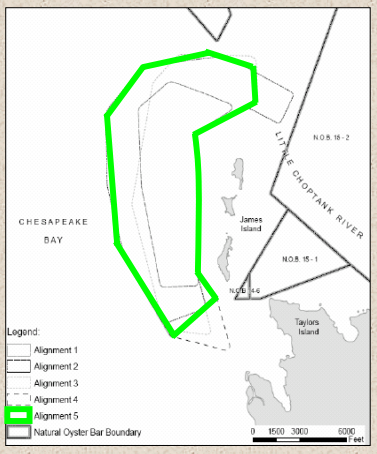
- Barren Island only
- **55% wetland habitat**
- **45% upland habitat**
- 1,354 acres of restored island
- Upland dike height of 25 feet

Alternative 2

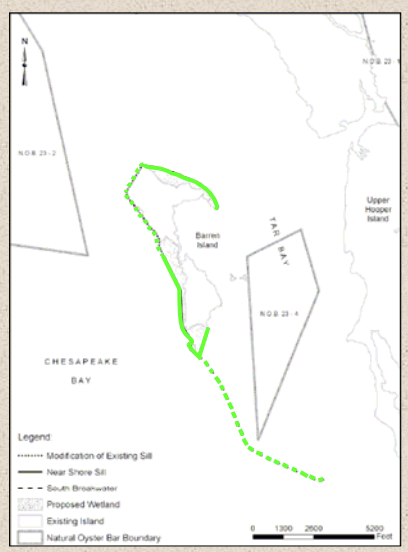
- **60% wetland habitat**
- **40% upland habitat**



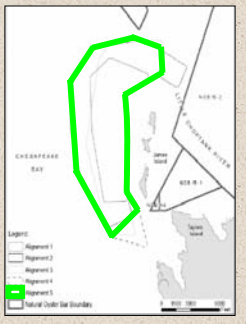
- James and Barren Islands
- 2,756 acres of restored islands
  - 2,072 acres at James Island
  - 684 acres at Barren Island
- Upland dike height of 25 feet



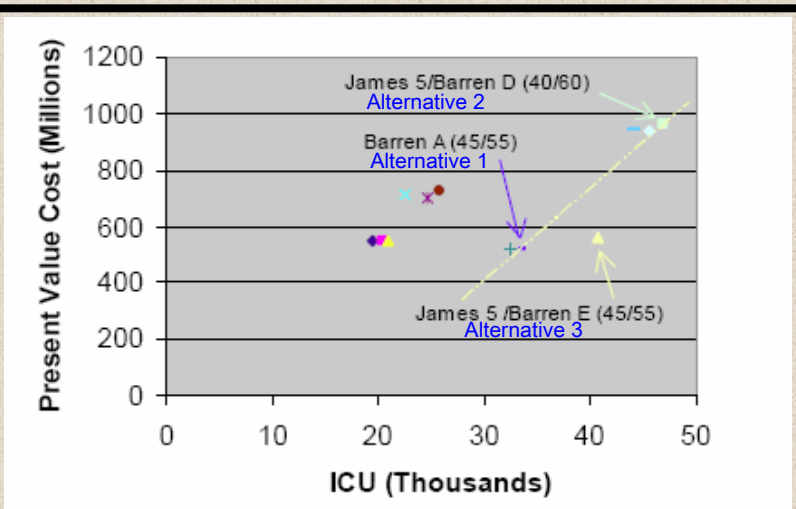
Alternative 3



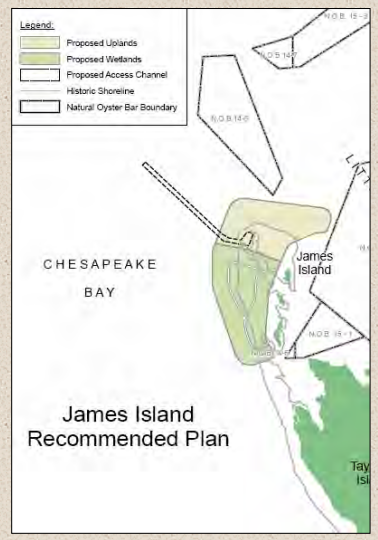
- James and Barren Islands
- 2,072 acres remote island habitat restored at James Island
- **55% wetland habitat**
- **45% upland habitat**
- Upland dike height of 20 feet at James Island
- Protection of remnants and restoration of 72 acres of wetlands at Barren Island



"Best Buy" Plan: James and Barren Islands



Recommended Plan – James Island



- Design Features
  - 2,072 acres
  - Wetland and upland habitat
  - Tidal gut throughout wetlands
  - Coves lined with wetlands
  - Freshwater ponds
  - Intertidal/unvegetated mudflats
  - Breakwaters
  - Bird nesting structures
- Cost $1.1 billion
  - Federal 75%
  - State 25%
- Capacity 90-95 mcy
- Duration 24-30 years

Recommended Plan – Barren Island

- Design Features
  - 72 acres
  - Wetland restoration
  - Bird nesting structures
  - Breakwaters
    - SAV protection
    - Erosion protection
- Cost $29 million
  - Federal 65%
  - State 35%
- Capacity 0.38 mcy
- Duration ~7 years

Summary of Impacts Evaluation

Impacts:

- Loss of Bay bottom, including crab and clam habitat
- Loss of open water habitat
- Loss of shallow water habitat
- Viewshed changes

Benefits:

- Remote island habitat restoration
- Additional bird nesting habitat
- Fisheries nursery habitat
- Meets the dredged material capacity need identified in the DMMP to keep the approach channels to the Port navigable
- Protection of SAV beds near Barren Island
- Some protection of mainland, Taylors Is., and Hoopers Is. from erosion

Recreational/Educational Opportunities

Must be consistent with the goal of the project, to restore *remote island habitat*, and could include:

During construction

- Research opportunities for educational institutions
- Volunteer opportunities
- Resting/viewing areas

After construction is complete

- Self-guided/interpretive water trail
- Informative signage

Summary of the Recommended Plan

James Island

Restore 2,072 acres of remote island habitat (55% tidal wetland habitat; 45% upland habitat) using dredged material from the Chesapeake Bay approach channels to Port of Baltimore and local Federal channels

Barren Island

Restore 72 acres of remote island habitat using dredged material from Federal channels in the Honga River area

Protect existing island and SAV habitat with breakwaters

Important Restoration Study Milestones

• Notice of Intent	January 2003
• Public Scoping Meetings	February & March 2003
• Alternative Plan Development	December 2002 through June 2006
• Existing Conditions Studies	
* Barren Island	Summer & Fall 2002; Winter & Spring 2003; May 2003; March 2004
* James Island	Fall 2001; Spring & Fall 2002; Winter, Spring, & Fall 2003; Winter 2004
• Public Update Meeting	March 2004 & May 2005
• Release Draft Report for Public Comment	September 8, 2006
• **Public Information Meetings**	
* **Cambridge**	**October 11, 2006**
* **Taylors Island**	**October 12, 2006**
• **Public Comment Period Closes**	**October 23, 2006**
• Final Report	December 2006
• Chief of Engineers' Report	April 2007
• Record of Decision	Fall 2007

Thank you for coming!

Mid-Chesapeake Bay EIS Website:

http://www.nab.usace.army.mil/publications/non-reg_pub.htm

For more information:

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Planning Division
P.O. Box 1715, Baltimore, MD 21203
Stacey.S.Blersch@usace.army.mil
410-962-5196 or 1-800-295-1610

MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION DRAFT
INTEGRATED FEASIBILITY
REPORT AND ENVIRONMENTAL IMPACT STATEMENT

PUBLIC MEETING

Hosted
by
U.S. Army Corps of Engineers
and
Maryland Port Administration

Conducted by: Scott Johnson

Location: Dorchester County Public Library
303 Gay Street
Cambridge, Maryland 21613

Date: Wednesday, October 11, 2006

Time: 7:00 p.m.

Reported by: David M. Schafer, AA, CCR

C-O-N-T-E-N-T-S

Formal Presentation: Scott Johnson..... 3

SPEAKERS:

Steve Storms 23

Joe Coyne 25

Delegate Jeannie Haddaway 29

Larry Polwey 30

Ben Parks 31

Bruce Coulson 32

Art Boccuti 33

Fred Pomeroy 34

Informal Question and Answer Session.... 37

John Gill 40

Art Boccuti 41

Dave Bibo 43

Joe Coyne 45

P-R-O-C-E-E-D-I-N-G-S

MR. JOHNSON: Good evening. My name is Scott Johnson. I'm with the U.S. Army Corps of Engineers.

I'd like to welcome you to the public meeting for the Mid-Chesapeake Bay Island Ecosystem Restoration Draft Integrated Feasibility Report and Environmental Impact Statement, which from hereon will be referred to simply as the Mid-Bay Island Report or simply the Report. The Corps and the Maryland Port Administration are the agencies responsible for preparation of this Report.

We will begin this meeting with a formal presentation lasting about 25 minutes, followed by an opportunity for you to comment on the record. Your comments will be recorded by our court reporter and entered into the formal record for this project. You may also enter a written statement for the record if you choose, and we encourage you to do so.

Once we have heard from all those who

wish to speak, the formal portion of this meeting will be concluded and I will then open up the floor for questions. We will answer as many of your questions as we can, and will remain after the conclusion of the meeting to talk to you individually. The important thing is that we document your comments and questions for the record, which we will include in the final Report.

The Mid-Chesapeake Bay study area includes the eastern side of the bay, adjacent to the land mass shown in the yellow on the map on the right side of the screen.

First let me explain the process that we go through in our studies and why we are here tonight. The National Environmental Policy Act of 1969, or NEPA, went into effect as a Federal law in January 1970, with the goal of protecting the environment by promoting better planning, decision-making and coordination with the public. NEPA reviews are required for any proposed project that includes Federal money, lands or permits.

Within NEPA there is a process called an Environmental Impact Assessment. This is documented in an Environmental Impact Statement, or EIS. An EIS documents the purpose and need of a proposed action, evaluates reasonable alternatives, and analyzes the significant environmental and other consequences of that action.

In doing so, it assists officials in planning projects and making sound decisions. Some of the environmental factors which are considered include water and sediment quality, aquatic and terrestrial resources, socioeconomics, and cultural resources, to name a few.

This chart illustrates the NEPA process. The process begins with a Notice of Intent to Prepare an EIS, which is published in the Federal Register. It notifies the public that a Federal agency will be preparing a NEPA document to evaluate the impacts associated with a good proposed action.

The second step is public scoping meetings where the public is invited to comment on

the purpose and extent of the study and to identify significant issues. In this case these meetings were held in Dorchester County, Queen Anne's County and Anne Arundel County in February and March of 2003.

The third step is the preparation of a Draft EIS, which evaluates a proposed project in light of the project need, reasonable alternatives, and environmental and other consequences.

The Draft report is then submitted for public review and comment, for a minimum of 45 days. At the same time, it is also sent to the Federal and State agencies for their review.

The Draft for this EIS was submitted on September 8, 2006. Following release of the Draft Report, a second round of meetings is generally held, during which public comments are solicited, and that's the purpose of tonight's meeting. The public comment period for this Draft will close October 23, 2006.

After taking all the comments into

consideration, the Report will be finalized and submitted for higher-level review.

The last step is the preparation of a Record of Decision, or ROD, which formally concludes the NEPA process.

Now I'd like to provide some information on this particular action. The Mid-Bay Island Report addresses two critical issues in the bay, loss of island habitat and the need for dredged material placement capacity. The Report specifically looks at ways to beneficially use 3.2 million cubic yards of the dredged material per year to protect and restore remote island habitat.

Over the last 150 years, the Mid-Chesapeake Bay region has lost over 10,000 acres of islands, which provide valuable habitat for migratory birds, fish and wildlife, as well as providing protection for mainland areas from wave energy. At the current erosion rates, most unprotected islands will be lost in the near future.

The Corps and the State of Maryland each

recently completed a Dredged Material Management Plan, or DMMP, that was a comprehensive evaluation of the dredged material placement needs for the channels serving the Port of Baltimore. The DMMP studies identified a shortfall in dredged material placement capacity beginning in 2010, and recommended a number of additional studies to meet this need. One of the additional studies recommended by both the Federal and State DMMPs was large island restoration in the Mid-Chesapeake Bay.

Dredged material from the Chesapeake Bay approach channels to the Port of Baltimore, indicated here in blue, as well as local Federal channels, were considered for placement at a Mid-Bay island site. Materials from the channels within the Patapsco River and Baltimore Harbor, as indicated here in pink, are not considered for placement at the Mid-Bay islands.

The purpose of this Report is first to formulate plans to address problems and opportunities related to habitat restoration through

the use of dredged material; second, to recommend cost-effective solutions for implementing projects that restore island ecosystem habitats; and third, to examine and evaluate impacts of the proposed alternatives.

Planning objectives for this study include restoring marsh, aquatic and terrestrial island habitats; protecting existing ecosystems and providing capacity for placement of dredged material. Additional objectives include contributing to the goals of the Chesapeake 2000 Agreement; decreasing local erosion and turbidity, and promoting conditions beneficial for submerged aquatic vegetation, or SAV, and oysters.

As mentioned in the previous slide, both objectives and constraints were considered while formulating the recommended plan. The constraints include avoiding and minimizing impact to existing fisheries and their nursery, feeding and protective habitats; avoiding and minimizing impacts to rare, threatened and endangered species; and avoiding and

minimizing the establishment of invasive species.

To evaluate the proposed island ecosystem restoration activities, we first started by looking at all 105 named islands in the Mid-Chesapeake Bay study area. For each island, we considered a number of environmental, engineering and cost factors, shown here, as well as the concerns of the local citizens and watermen. The initial screening steps eliminated 85 islands from consideration. If you would like to see a diagram of the screening and plan formulation process, please feel free to visit the poster in the back of the room or refer to the plan formulation figure in your handouts.

The remaining 20 islands were further screened to eight islands or island complexes. Each was evaluated based on engineering and environmental criteria. Engineering criteria were based on lessons learned in design and construction of Poplar Island restoration project. Based on these engineering criteria, James Island and Barren Island

were ranked first and second, respectively. Based on the environmental criteria, Barren Island was first and James Island was second. Since there was no basis for eliminating either one of the islands, we carried both forward in our evaluation.

At the public scoping meetings which were held in February and March of 2003, public preference was also for restoration of James Island and Barren Island.

James Island is privately owned and currently consists of three eroding remnants, totaling less than 100 acres. It has lost approximately 89 percent of its historical area due to erosion. All three remnants have areas of high and low salt marsh and uplands. The northern and western shorelines showed the greatest erosion.

James Island supports a variety of birds, fish and other wildlife. The photos shown here are some examples of the species found on and around the island. Surveys have found 71 species of birds using the island, including the American bald

eagle, as well as a variety of waterfowl, wading birds and shorebirds. Aquatic species such as blue crab, striped bass, flounder and bay anchovy are found in the waters surrounding the island. Some of the mammals observed at James Island include river otter, deer and racoon. Also, diamondback terrapins have been observed nesting on the island.

Barren Island, which is owned by U.S. Fish and Wildlife Service has lost approximately 75 percent of its historical acreage due to erosion. The island currently consists of several types of habitats, including low and high salt marsh, tidal flats and uplands. Relatively few upland areas remain on Barren Island, and those are continually affected by erosion.

Similar to James Island, the habitats at Barren Island support a variety of wildlife, including 107 species of birds. A large nesting area of egrets and herons exists on the island, and it provides habitat for the narrow-mouthed toad, an endangered species in the State of Maryland. The

island remnants appear to be partially responsible for the protection of the surrounding shallow water habitats, which support environmentally important beds of SAV.

Once James Island and Barren Island were selected, we formulated a set of alternatives designed to restore island habitat as well as protect remaining island remnants. These alternatives include various alignments at each island separately and in combination. We looked at a range of upland/wetland habitat proportions for each of the proposed alignments, and then optimized the alignments based on constructability, dredged material capacity, location of borrow areas, environmental benefits, and economic considerations. The results of this screening process led us to the three alternatives discussed in the following slides and detailed in the Report.

The first alternative is the no-action alternative. NEPA requires that this alternative be included in all impact assessments.

The no-action alternative is designed as the projected future without-project conditions. In this case the remaining acreage at James Island and Barren Island would continue to erode at their present rate. Based on historic erosion rates and current acreage, James Island will be completely submerged by 2021 and Barren Island will be submerged by 2052.

Alternative 1 would protect Barren Island and its associated resources such as SAV. James Island is not a part of this alternative. This alternative would restore over 1,300 acres of island habitat with 55 percent wetland and 45 percent upland. It is important to note that over 1,300 acres of healthy bay bottom would be permanently transformed into island habitat. While some commercial fisheries would be displaced, others would be enhanced with dike construction and SAV protection. Since James Island is not a part of this plan, it would eventually erode away and potentially increase impacts to shoreline properties

on the mainland.

Alternative 2 would protect existing James and Barren Islands and possibly the leeward mainland, as well as associated resources such as SAV beds. Each island would be constructed with a 60 percent wetland, 40 percent upland habitat configuration and an upland dike elevation of 25 feet. This alternative would impact over 2,700 acres of shallow water habitat, impacting a larger area of stressed habitat at James Island rather than healthy bay bottom at Barren Island. If chosen, this alternative would result in the greatest amount of shallow water habitat loss, and displace commercial fishery.

Alternative 3 would protect existing James and Barren Islands, and possibly the leeward mainland as well as associated resources such as SAV beds, with over 2,100 acres of restored remote island habitat. James Island would be constructed with 55 percent wetland and 45 percent upland habitat, and an upland dike height of 20 feet.

Rather than island creation at Barren Island, this alternative involves construction and backfill of a breakwater using dredged material from Federal channels in the Honga River area. Seventy-two acres of wetlands would be restored at Barren Island while protecting the existing remnants and minimizing impacts to the existing healthy bay bottom.

Commercial fisheries would be displaced at James Island, but there would be no significant negative impact to fisheries at Barren Island. Protection of SAV and enhancement of hard bottom availability may enhance some fisheries.

The primary goal of the project is to restore island ecosystems using dredged material while maximizing the future environmental benefits. This chart shows the remaining alternatives following an incremental cost analysis including the three alternatives I just discussed. It compares the cost of the project to Island Community Units, or ICUs, which quantify the environmental benefits

over the life of the project. As you can see, Alternate 3, combining James and Barren, provides the greatest environmental benefit for the lowest cost. Therefore, this alternative is the recommended plan.

The recommended plan at James Island is over 2,000 acres of wetland and upland habitat that include features to enhance the project by providing diversity. These features include a tidal gut through the wetland cells, wetland-lined coves, fresh water ponds, intertidal and unvegetated mud flats, breakwaters and bird nesting structures.

The anticipated project cost at James Island is $1.1 billion, 75 percent of which would be funded Federally. The remaining 25 percent would be funded by the State of Maryland. James Island would have a capacity of 90 to 95 million cubic yards and would provide 24 to 30 years of placement. Initial construction of this project would be expected to begin in 2010 and is estimated to take four to five years.

At Barren Island, restoration of 72 acres of wetland would be the main focus of the environmental design, but bird nesting structures are included as a design feature. Breakwaters would be constructed for protection of the existing SAV beds and protection of Barren Island from further erosion.

The anticipated project cost at Barren Island is $29 million, 65 percent of which would be funded Federally. The remaining 35 percent would be funded by the State of Maryland. Barren Island would have a capacity of 300,000 cubic yards, which would provide placement capacity for approximately seven years. Construction of Barren Island would be expected to be completed in 2010.

Of course, there are negative impacts associated with a project of this magnitude; however, these impacts are offset by benefits. Over 40 resources, including environmental, cultural, socioeconomic, recreational and aesthetic were evaluated. One primary impact was identified - the

loss of approximately 2,000 acres of shallow water habitat at James and Barren Islands, including crabbing and clamming areas. Additional impacts include the loss of approximately 100 acres of open water habitat at James Island and hardening of the shoreline at Barren Island. In addition, we also recognize that there will be a change to the view shed from the mainland, and other impacts, such as noise related to the extended construction and operations.

Benefits of the project include the restoration of remote island upland and tidal marsh habitat as well as additional bird nesting and fish nursery habitat. In addition, the proposed project will meet the dredged material capacity need identified in the DMMP to keep the approach channels to the Port navigable over the next 30 years. Modeling efforts have demonstrated that the proposed project at Barren Island would provide protection of SAV beds in the vicinity of the island and the proposed projects at James and Barren islands could

provide some protection of the mainland from erosion.

Recreational and educational opportunities during and after construction activities were also considered in this Report. Recreation and educational components must be consistent with the project's objective to restore remote island habitat, and incorporation of any of these components will require additional study prior to their implementation, however, we are recommending that they be included in the project.

During construction, research opportunities for educational institutions could be made available, as well as volunteer opportunities for planting and other activity.

After construction is complete, a self-guided, low-impact water trail will be created through the main tidal gut area at James Island. Informative signage would point out wildlife and other elements of island restoration.

In summary, there are two parts to the

recommended plan in the Draft Mid-Bay Island Report:

The first part of the plan would restore 2,072 acres of island habitat at James Island, which would provide the primary dredged material capacity for the project. Fifty-five percent of the island would be a tidal wetland habitat and the remaining 45 would be upland habitat. Material for placement at James Island would be dredged from the Chesapeake Bay approach channels to the Port of Baltimore and local Federal channels.

The second part of the recommended plan would restore 72 acres of remote island habitat at Barren Island using dredged material from Federal navigation projects in the vicinity of the Honga River. Breakwaters would be constructed to protect the island and SAV habitat.

The schedule for the Report is shown here. The Draft Report was prepared in August of this year and made available for public comment beginning on September 8, 2006. We are holding two public comment meetings; the first is this one here

in Cambridge and the second is tomorrow night at the Taylors Island Volunteer Fire Hall. The public comment period will extend until October 23, 2006. The final Report is scheduled to be issued in December 2006 with a Chief of Engineer's Report in April 2007, and a Record of Decision to follow in fall 2007.

Thank you for coming. If you wish to review the Mid-Chesapeake Bay Island Ecosystem Restoration Integrated Feasibility Report and EIS, you can do so by visiting any of the libraries listed in the Notice of Availability, which is included in the folder of handouts you received when you came in this evening.

You may also obtain a CD from our welcome table or visit the website listed here. All comments on the Report should be submitted in writing by October 23, 2006, to Ms. Stacey Blersch, at the address listed here. Thank you for your attention.

And I will now open the floor to those

of you wishing to offer formal comments for the record. I would ask that when you approach the microphone, please provide your name and spell it for the court reporter, as well as your affiliation if you have one.

As the first speaker, however, I would like to introduce Doctor Steve Storms, from the Maryland Port Administration, our non-Federal sponsor and a key partner in the continued success of this project.

DR. STORMS: My name is Steve Storms. S-T-E-V-E. S-T-O-R-M-S. I'm a project manager for the Maryland Port Administration, which is a part of the Maryland Department of Transportation.

The flow of international commerce through the Port of Baltimore is a major generator of jobs and revenue for the State of Maryland. The jobs of more than 136,000 Marylanders are in some way related to the movement of cargo across Baltimore's docks. The Port is the State's second largest economic engine, generating more than $1

billion in business and government revenues.

Continued dredging of the approach channels in the Chesapeake Bay is an absolute necessity for maintaining the Port. And existing placement sites for approach channel dredged material will run out of space by 2014.

The Port of Baltimore fully supports this project to provide continued efficient management of this dredged material. The Maryland Department of Transportation is a non-Federal sponsor for this project. The Maryland Port Administration, under the auspices of the Department of Transportation and acting through its office of Harbor Development, was involved in all of the coordination related to this study.

The Port Administration has indicated their intent to proceed with the next phase of project implementation and to provide the non-federal cooperation required for the project implementation. Thank you.

MR. JOHNSON: Thank you, Steve.

When you came in, anybody who signed up to make a formal comment was given a number, so we're going to go by the numbers. So Number 1. Joe, would you like to come up here?

MR. COYNE: Good evening. My name is Joe Coyne.

My purpose in being here tonight is to urge approval of the the Draft Integrated Feasibility Report and Environmental Impact Statement for the Mid-Chesapeake Bay Island Restoration Project in Dorchester County.

Several years ago the then Dorchester County Commission had asked that I and my colleague, Bruce Coulson, representing the Dorchester County Resource Preservation Development Corporation, serve as Dorchester County's representatives on a relatively new committee that was formed in Baltimore. This committee was formed to get opinions and ideas on the Maryland Port Administration's plans to identify and implement a beneficial use plan for some of the almost 47

million cubic yards of dredged material it removes each year to ensure clear shipping lanes into Baltimore's harbor.

The question is why is this so important to Dorchester County. Some of those questions were answered in Scott's presentation.

You may remember Hurricane Fran back in 1996 and the damage that it did around here. What we learned in the immediate aftermath of that storm was that there was no support group to really assess damage, make fixes and plan for future remedies.

Shortly after Fran, a group of citizens organized to try to correct those problems. A newly formed Shoreline Erosion Group was introduced to work, authorized by the Congress back in 1983. This authorization directed the U.S. Army Corps of Engineers to -- quote -- evaluate shoreline protection agents which will protect both land and water resources of the Chesapeake Bay from the adverse effects of continued erosion.

The final report of the study conducted

by the Corps and issued in 1990 cited several areas as critical and in need of protection. Two of those areas cited were Barren and James Island. As a result of the DMMP we now have the opportunity to implement parts of those recommendations that relate to the preservation of Barren and James Island. Said preservation has been a major goal for our Dorchester Shoreline Erosion Group.

The committee that I referred to in our introduction formed as a part of the Port Administration Dredged Material Management Program is called the Citizens Advisory Committee. The committee is composed of a cross-section of people representing government, non-government and private sector organizations. We are regularly briefed on the work of the Maryland Port Administration and the Corps of Engineers, and we provide feedback to them as they go about the business of putting together the documents we are discussing tonight.

So the point that I'm trying to make here is that at least a set of four eyes from

Dorchester County have been through the process that Scott described here and seen all the information and data that's been gathered and presented to this particular committee. It's been intriguing to see the quality of the work performed, the quality of the people doing the work; quite high.

So really this is a great opportunity to now see the results of the Corps at work in that very thick EIS that sits out in the waiting room, and to offer comments and suggestions that you may have.

I want to take this opportunity to also thank the Port Administration for creating the structure where we all have the opportunity to participate; such a huge undertaking, when approved for construction will ultimately, I believe, make significant contributions to the health of our portion of the Chesapeake Bay.

Again, I urge full support of the Report that's been presented by Scott. Thank you very much.

MR. JOHNSON: Number two.

DELEGATE HADDAWAY: I'm going to interrupt the process for just a second. My name is Jeannie Haddaway, and I'm a member of the Maryland House of Delegates, representing this area. And I want to thank the Army Corps for coming out tonight and doing this presentation here.

A couple of things I just would like to mention quickly. First of all, the Port and its importance to Maryland's economy. We automatically think of Baltimore when we think of the Port, but honestly, there are hundreds of companies and businesses here on the Eastern Shore that rely on that Port to move goods for them, so it's important to the Eastern Shore's economy as well.

And I know we are not here to talk about Poplar Island tonight, but I think it is a very successful model and we really from the State's perspective appreciate the way that the Army Corps and the Maryland Port Administration and the Department of Natural Resources have worked with us

to get that project done, including working with the watermen to make sure that if some of the bottom is displaced there are other areas that are opened up that are comparable. And I would encourage the Army Corps to do the same with these projects. But certainly shoreline erosion is a very important issue particularly for Dorchester County, so thank you for the information you are presenting here tonight.

MR. JOHNSON: Thank you. Is that what you were trying to tell me, Martin? Sorry.

Now Number 2.

CAPTAIN POWLEY: Captain Larry Powley, vice president of Dorchester Seafood Harvesters Association. P-O-W-L-E-Y.

Living on Hoopers Island, just inside of Barren Island, we have seen this grass just leave very fast because the water is getting deeper, it's getting rougher into our bay. And by you all restoring Barren Island, it would really benefit the grasses in that bay. If we lose our grasses, ladies

and gentlemen, our bay is going to be dead. And that was one of the most important grass beds that we had in lower Dorchester County.

And just another thing I'd like to add, I hope that you'll employ some of the local watermen down there, and it would be a benefit to them to give them some jobs, plus some money in the local community. Thank you.

MR. JOHNSON: Thank you. Number 3.

MR. PARKS: Ben Parks, President of Dorchester County Seafood Harvesters Association.

I'd like to thank you all for holding these public meetings. To date I have not had anyone call me in opposition to this project, either Barren or James. I'm not saying you won't find some resistance somewhere, but nobody contacted me.

What he spoke about the grasses, you've got to remember when these islands erode they are also burying our oyster beds. Tarr Bay was probably one of the better oyster harvesting grounds that there was in the lower Dorchester area. On the

inside of James Island, we had multiple oyster beds there everywhere, and they're all being silted over and it's all coming from erosion.

And we thank you for what you are doing for us.

MR. JOHNSON: Thank you. Number 4.

MR. COULSON: Hi. I'm Bruce Coulson, Taylors Island, vice president of the Dorchester County Shore Erosion Group. I came tonight to speak in favor of this project. I guess it's all been said about the environmental benefits we are going to gain out of this. And it's going to be a long-term economic benefit for the community also with the jobs it's going to create and the areas going to be utilized with the workers.

And if you want to get an idea of what this project will look like when it's done, take a tour of Poplar Island. Poplar Island is a -- I've been out there twice myself, once on a tour and once planting grasses. It will give you a good idea what the finished product will look like once these

islands are restored.

I think what they have done is, as Joe said earlier, they have been dotting the i's and crossing the t's on everything on this project and they're overturning everything and creating models to see what will happen, and I think they've done a very good job on this, and I support it and urge you all to support it also.

MR. JOHNSON: Thank you. Number 5.

MR. BOCCUTI: When I came in I had my name upside down, and my wife said, well, that's because you may forget your name. My name is Art Boccuti. B-O-C-C-U-T-I.

I've come this evening primarily to encourage and urge the passage and approval of the plan that was shown tonight by the Corps of Engineers.

I am a resident of Dorchester County; I'm also a resident of Ragged Point. I live on Ragged Point, which is directly leeward; we're behind the James Island complex. And from my

perspective, which I get every day, I can continue to see the erosion of the mainland and, of course, the islands themselves. We frequently see the beach along the front of Ragged Point washed away; we frequently see the road washed out; and we frequently see the demise of the turtles that plant their eggs in the sand, and the run-off of eagles which live along the shoreline there.

So I'm here to tell you that it would be greatly in favor of James Island and the mainland and the habitat, including us folks that live there. Thank you very much.

MR. JOHNSON: Thank you. Where are we, seven?

FROM THE FLOOR: Six.

MR. JOHNSON: Six. Would anybody else like to make a formal comment for the record?

MR. POMEROY: My name is Fred Pomeroy. That's P-O-M-E-R-O-Y.

I'd basically like to echo the comments of Mr. Parks and Mr. Powley. I, too, am a

fisherman. I first caught crabs and fish at James Island -- I'm going to date myself now -- probably about 40 years ago, and in that time I've seen the mouth of the Little Choptank River change from a river habitat to what I would call an open-bay ecosystem and, as a result -- Mr. Parks is right on, the most beautiful oysters in the Chesapeake were to be caught between James Island and Taylors Island. We used to call that a creek. That was called Oyster Creek, aptly named because the oysters were so good there. And erosion has caused all those beds to silt over and the moving sand has cut the oysters and now there's just shell there, there are no oysters.

But I would like to see the project done. And I would also like to echo Mr. Powley's comments that we should look into using our watermen to help with this project. There will be some watermen whose livelihoods are disrupted by this in the James Island area. I myself would benefit because I fish on the river side of James Island, so

it would be more like it used to be, which was a protected area. Now it's an open-bay area and it's hard to work for me. But the ones who work outside James Island, perhaps if there was a way that the watermen could be used on some of this, that would, that would benefit us.

And I see it as in the long-term as a great economic boon to our ecotourism, which is something we are trying to develop in Dorchester County. You know, that habitat would be just awesome for the people that come kayaking and canoeing and those kinds of things. So I'm in favor of the project.

MR. JOHNSON: Thank you. Anybody else?

I would remind you that you can feel free to put in a written comment for the record as well if you would like.

If there are no other comments, then this concludes the formal portion of this evening. Now I'd like to come from behind the podium and we can just start answering questions rather than being

so formal about it.

We are going to continue to record, though, so please, again, give us your name and any affiliation and everything, because we really want to capture your questions as well as comments.

So I'll open it up to anybody who would like to ask a question. Yes, sir yes.

MR. POWLEY: You said you were going to start on James in 2010. When would you be starting Barren?

MR. JOHNSON: Barren would hopefully start a little bit sooner. The process, for those of you who aren't familiar with the Federal process, this Report will be finalized, as I said, in December, hopefully, and it goes to Washington and gets reviewed by our headquarters down there and hopefully will get approved. It also gets reviewed by the Assistant Secretary of the Army, the Office of Management and Budget. When everybody is comfortable with it, then it gets sent to Congress as a completed Report, and Congress has to authorize

the project.

It's authorized in what's called the Water Resources Development Act. And typically -- I say typically -- they used to do them every two years. We haven't seen one since 2000, so a lot of this is contingent upon what they do.

Once they authorize it, then we can budget for it, they can give us money and then we can get started. So it's a step-by-step process. So I would hope that we could get started in possibly 2008 on Barren, 2009, somewhere in that time frame if everything goes well. Again, I'm not making any promises, because we haven't had an authorization in WRDA since 2000 and they closed up shop this year without one. Congress will be coming back after the elections, may take it up, but there's no guarantees. And since this one isn't done, the Report isn't done yet, it may not even be eligible for this WRDA. Yes.

MR. POMEROY: My question is, when this upland habitat is created, would the Port Authority

own this or who would own this?

MR. JOHNSON: Well, with regard to Barren, that would be U.S. Fish and Wildlife would still be responsible for that. James Island would be turned over to the State of Maryland. It's doubtful that the Maryland Port Administration would want to take that, so it's likely that the Department of Natural Resources would.

We are asking the same questions with Poplar Island, and we really haven't completely resolved that. It's looking more and more like the Department of Natural Resources would be the responsible agency at the end of it.

By the way, I wanted to mention; somebody mentioned a tour of Poplar Island. I would like to open that up to everybody. You know, you can ask me or any of the folks in the room, we can give you -- if anybody is interested in a tour out there, we have a tour coordinator. There is a bus on the island. We can take groups up to about 25 individuals. And right now they are booked out

quite a ways. We get a lot of people, probably over 2,500 a year, I think, we are doing now. A lot of school groups go out there. It's getting to be quite a -- you talk ecotourism, we have been very successful with that. So anybody that would like to see what something like this looks like, please feel free. Next question. John.

MR. GILL: John Gill. G-I-L-L.

Specific to Barren, whenever you look to get started, would you be able to do all the rock work first and then fill as needed based on the site work at Honga?

MR. JOHNSON: That's my vision of it, would be to do the rock work and leave the area behind it for whenever the Honga River Federal channels get dredged. As has been done in the past, they could fill it and you could plant it at that time.

MR. GILL: So once rock is in place, Hoopers gets the protection there.

MR. JOHNSON: Yes. The idea is to get

the rock in place first, gain the maximum environmental -- the most environmental benefits are achieved right away by the protection of the existing island, protection of the resources behind it, so that's what we would be wanting to do first. I mean, certainly developing the wetlands adds additional benefit, but that can wait.

Also, one of the goals for this whole project is the dredged material placement capacity. So the Honga River channels are always looking or would always be looking for a source, so this is it as far as I see it.

MR. BOCCUTI: Art Boccuti. Is there a potential or the possibility of starting both projects simultaneously, James and Barren?

MR. JOHNSON: That's always a possibility, but it's going to require some hefty lifting, getting that kind of money. As I said -- I don't know if you noticed it, I tried to slip past it real fast -- but a billion dollars is a lot of money in anybody's book. Even though it's spread

out over a long, long period of time, the initial construction cost of something 2,000 acres in size is not insignificant, and getting that much money all at once, you know, that's just not up to me.

MR. BOCCUTI: Of course not. But my thought might be that while the great preponderance of the money be allocated to Barren, a much smaller quantity to start the project on James could at least get the anchor in the ground, so to speak --

MR. JOHNSON: Yes.

MR. BOCCUTI: -- so that we could be sure the project would continue and it would not be rescinded or diverted or delayed depending on what administration was in office.

MR. JOHNSON: I agree wholeheartedly, and I wish I had that kind of control over the situation. I do not. It's not that we would oppose that in any way. I'd love to do it that way.

MR. BOCCUTI: For the record, I'm in favor, and I'm sure that the residents along Hills Point and Ragged Point are as well.

MR. JOHNSON: Similar to Barren Island, by constructing the dikes at James Island you gain tremendous environmental benefits right away, very quickly, and that's what we would like to do, but again, it's not in our hands. Mr. Bibo.

MR. BIBO: My name is Dave Bibo. I have a question that I've been asked from time to time on the Poplar Island project. While everyone knows --

THE COURT REPORTER: I'm sorry, sir, I'm having a hard time hearing you. While everyone knows --

MR. JOHNSON: Would you step up to microphone, please.

TH COURT: I'm sorry. Thank you.

MR. BIBO: Yes. My name is Dave Bibo. B-I-B-O.

One of the questions that has been raised from time to time concerning dredged material for Poplar Island, that the project has been reserved for Federally maintained channels. We have received questions in the past for dredging from

private marinas or private localities. Can you address if there is any possibility that there would be opportunities for other dredging projects to be placed at James Island?

MR. JOHNSON: We did look at that as part of the study in trying to expand it, and we met some resistance. The primary concern was encouraging dredging, encouraging more people to take it there. It primarily has to do with the cleanliness of whatever material we would be taking in there. There is significant environmental testing that would have to be done to prove that the material was clean enough to take it to an environmental restoration project. One of the main reasons we are not taking materials from the harbor areas is because it can't be classified as clean enough. With the material from the approach channels we do routine testing and we can demonstrate that it is clean.

We can't totally rule out the possibility that we can take material from local

channels, but they would have to be addressed on a case-by-case basis. There are procedures for doing that. The problems would be more economic and environmental than anything. I mean, I think there would be a significant amount of expensive testing that would have to be required of people, and for a small marina or something like that it's going to be a burden.

MR. BIBO: Thank you.

MR. JOHNSON: There's got to be some questions.

MR. COYNE: We've seen in the newspapers that Congressman Gilchrest has determined that he would be in favor of proceeding with James and Barren Island but not Poplar Island extension. If he's successful in precluding Poplar Island getting a WRDA, what effect will that have, if any, on your schedule for James and Barren.

MR. JOHNSON: That's a good question. That could potentially accelerate the James and Barren. It would necessitate it in a way.

When we did our dredged material management planning we looked at and we got permission to and we looked at doing an expansion of Poplar Island and this Mid-Bay Island Study concurrently, and they both followed along a similar path.

Now, Poplar Island being an existing site, it was easier and eventually that one moved ahead of this Mid-Bay Island Study. It also is a smaller project and it was determined to be less risky than a project, just trying to get a brand-new project started, because there's been rules against starting new projects and it's an expensive project. So Poplar Island expansion was always considered a stopgap to get this to one, recognizing that getting this authorized and getting enough funding to get it built could potentially be problematic.

If you take Poplar Island expansion out of the equation, we are going to be in a situation where we need the next placement site by about 2014. Right now we are looking at with Poplar Island

expansion we would want to have the James Island site available by about 2018. So I would say the consequences of taking Poplar expansion out would be accelerating this by four years at least. It means we've got to get started that much sooner.

It's awfully quiet.

FROM THE FLOOR: You did such a good job on this, all the questions have been answered.

MR. JOHNSON: I couldn't have done that good a job. Come on. Okay. What else can we talk about? If there are no further questions, you all can be dismissed.

FROM THE FLOOR: Isn't it wonderful when every one agrees?

MR. JOHNSON: Yeah. Thanks for coming. We really appreciate it.

(Proceeding adjourned at 7:50 p.m.)

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I, David M. Schafer, a Notary Public in and for the State of Maryland, County of Wicomico, do herby certify the foregoing a true and accurate record of the aforementioned proceeding, transcribed from my stenographic notes to the best of my ability.

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David M. Schafer

MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION DRAFT
INTEGRATED FEASIBILITY
REPORT AND ENVIRONMENTAL IMPACT STATEMENT

PUBLIC MEETING

Hosted
by
U.S. Army Corps of Engineers
and
Maryland Port Administration

Conducted by: Scott Johnson

Location: Taylors Island Volunteer Fire Company
510 Taylors Island Road
Taylors Island, Maryland 21669

Date: Thursday, October 12, 2006

Time: 7:00 p.m.

Reported by: David M. Schafer, AA, CCR

C-O-N-T-E-N-T-S

Formal Presentation: Scott Johnson..... 3
Speakers:
Delegate Eckardt 23
Delegate Haddaway 24
Jay Newcomb 26
Joe Coyne 28
Steve Storms 32
Bruce Coulson 34
Ellie Polley 37
Ben Parks 38
Glenn Carowan 39
Informal Question and Answer Session:
A.J. O'Brien 41
Carol Embrey 44
Ellie Polley 49
Paul Tobin 50
John Cutter 57
Henry Embrey 60
Ray Carbonetta 63
James Tartal 65
John Cutter 69
Bill Neild 70
Ann Rasmussen..... 71

P-R-O-C-E-E-D-I-N-G-S

MR. JOHNSON: Good evening. My name is Scott Johnson. I'm with the U.S. Corps of Engineers, Baltimore District, and I'd like to welcome you to the public meeting for the Mid-Chesapeake Bay Island Ecosystem Restoration Draft Integrated Feasibility Report and Environmental Impact Statement, which from here on will be referred to as the Mid-Bay Island Report or simply the Report. The Corps and the Maryland Port Administration are the agencies responsible for the preparation of this report.

We will begin the meeting with a formal presentation lasting about 20, 25 minutes, followed by an opportunity for you to comment on the record. Your comments will be recorded by our court reporter and entered into the formal record for this project. You may also enter a written statement for the record if you choose, and we would encourage you to do so.

Once we have heard from all those who wish to speak, the formal portion of the evening will be concluded and I will then open up the floor for questions. We'll answer as many of your questions as we can. We have a lot of folks with us around here that know a lot about the project. And we'll remain afterwards to talk to you individually as well. The important thing is that we document your comments and questions for the record, which will be included in the final report.

The Mid-Chesapeake Bay study area includes the eastern side of the Bay, adjacent to the land mass shown here in yellow on the map on the right-hand side of the screen.

First let me explain the process we go through in our studies and why we are here tonight. The National Environmental Policy Act of 1969, or NEPA, went into effect as a Federal law in January 1970, with the goal of protecting the environment by promoting planning, decision-making and coordination with the public. NEPA reviews are required for any

proposed project that includes Federal monies, lands or permits.

Within NEPA there is a process called Environmental Impact Assessment. This is documented in an Environmental Impact Statement, or EIS. An EIS documents the purpose and need of a proposed action, evaluates reasonable alternatives and analyzes the significant environmental and other consequences of that action. In doing so, it assists officials in planning projects and making sound decisions. Some of the environmental factors which are considered include water and sediment quality, aquatic and terrestrial resources, socioeconomics and cultural resources, to name a few.

This chart illustrates the NEPA process. The process begins with a Notice of Intent to Prepare an EIS which is published in the Federal Register. It notifies the public that a federal agency will be preparing a NEPA document to evaluate the impacts associated with a proposed action.

The second step is public scoping meetings where the public is invited to comment on the purpose and the extent of the study and to identify significant issues. In this case those meetings were held in Dorchester County, Queen Anne's County and Anne Arundel County in February and March 2003.

The third step is the preparation of a draft EIS, which evaluates the proposed project in light of the project need, reasonable alternatives and environmental and other consequences. The Draft report is then submitted for public review and comment for a minimum of 45 days. At the same time it is also sent to federal and state agencies for their reviews. The draft for this EIS was submitted on December 8, 2006.

Following release of the Draft report a second round of meetings is generally held, during which public comments are solicited, and that's the purpose of tonight's meeting. The public comment period for this Draft will close October 23, 2006.

After taking all comments into consideration, the report will be finalized and submitted for higher-level review. The last step is the preparation of a Report of Decision, or ROD, which formally concludes the NEPA process.

Now I'd like to provide some information on this particular action. The Mid-Bay Island Report addresses two critical issues in the bay; loss of island habitat and the need for dredged material placement capacity. The report specifically looks at ways to beneficially use 3.2 million cubic yards of dredged material per year to protect and restore remote island habitat.

Over the last 150 years, the Mid-Chesapeake Bay region has lost over 10,000 acres of islands, which provide valuable habitat for migratory birds, fish, and wildlife, as well as providing protection for mainland areas from wave energy. At the current erosion rates, most unprotected islands will be lost in the near future.

The Corps and the State of Maryland each

recently completed a Dredged Material Management Plan, or DMMP, that was a comprehensive evaluation of the dredged material placement needs for the channels serving the Port of Baltimore. The DMMP studies identified a shortfall in dredged material placement capacity beginning in 2010 and recommended a number of additional studies to meet this need. One of the additional studies recommended by both the federal and state DMMPs was large island restoration in the Mid-Chesapeake Bay.

Dredged material from the Chesapeake Bay approach channels to the Port of Baltimore, indicated here in blue, as well as local Federal channels, were considered for placement at a Mid-Bay island site. Materials from the channels within the Patapsco River and Baltimore Harbor, as indicated here in pink, are not considered for placement at the Mid-Bay islands.

The purpose of this Report is first to formulate plans to address problems and opportunities related to habitat restoration through

the use of dredged material; second, to recommend cost-effective solutions for implementing projects that restore island ecosystem habitats; and third, to examine and evaluate impacts of the proposed alternatives.

Planning objectives for this study include restoring marsh, aquatic and terrestrial island habitats; protecting existing ecosystems and providing capacity for placement of dredged material. Additional objectives include contributing to the goals of the Chesapeake 2000 Agreement; decreasing local erosion and turbidity, and promoting conditions beneficial for submerged aquatic vegetation, or SAV, and oysters.

As mentioned in the previous slide, both objectives and constraints were considered while formulating the recommended plan. The constraints include avoiding and minimizing impact to existing fisheries and their nursery, feeding and protective habitats; avoiding and minimizing impacts to rare, threatened and endangered species; and avoiding and

minimizing the establishment of invasive species.

To evaluate the proposed island ecosystem restoration activities, we first started by looking at all 105 named islands in the Mid-Chesapeake Bay study area. For each island, we considered a number of environmental, engineering and cost factors, shown here, as well as the concerns of the local citizens and watermen. The initial screening steps eliminated 85 islands from consideration. If you would like to see a diagram of the screening and plan formulation process, please feel free to visit the poster in the back of the room or refer to the plan formulation figure in your handouts.

The remaining 20 islands were further screened to eight islands or island complexes. Each was evaluated based on engineering and environmental criteria. Engineering criteria were based on lessons learned in design and construction of the Poplar Island restoration project. Based on these engineering criteria, James Island and Barren Island

were ranked first and second, respectively. Based on the environmental criteria, Barren Island was first and James Island was second. Since there was no basis for eliminating either one of the islands, we carried both forward in our evaluation.

At the public scoping meetings which were held in February and March of 2003, public preference was also for restoration of James Island and Barren Island.

James Island is privately owned and currently consists of three eroding remnants, totaling less than 100 acres. It has lost approximately 89 percent of its historical area due to erosion. All three remnants have areas of high and low salt marsh and uplands. The northern and western shorelines showed the greatest erosion.

James Island supports a variety of birds, fish and other wildlife. The photos shown here are some examples of the species found on and around the island. Surveys have found 71 species of birds using the island, including the American bald

eagle, as well as a variety of waterfowl, wading birds and shorebirds. Aquatic species such as blue crab, striped bass, flounder and bay anchovy are found in the waters surrounding the island. Some of the mammals observed at James Island include river otter, deer and racoon. Also, diamondback terrapins have been observed nesting on the island.

Barren Island, which is owned by U.S. Fish and Wildlife Service, has lost approximately 75 percent of its historical acreage due to erosion. The island currently consists of several types of habitats, including low and high salt marsh, tidal flats and uplands. Relatively few upland areas remain on Barren Island, and those are continually affected by erosion.

Similar to James Island, the habitats at Barren Island support a variety of wildlife, including 107 species of birds. A large nesting area of egrets and herons exists on the island, and it provides habitat for the narrow-mouthed toad, an endangered species in the State of Maryland. The

island remnants appear to be partially responsible for the protection of the surrounding shallow water habitats, which support environmentally important beds of SAV.

Once James Island and Barren Island were selected, we formulated a set of alternatives designed to restore island habitat as well as protect remaining island remnants. These alternatives include various alignments at each island separately and in combination. We looked at a range of upland/wetland habitat proportions for each of the proposed alignments, and then optimized the alignments based on constructability, dredged material capacity, location of borrow areas, environmental benefits, and economic considerations. The results of this screening process led us to the three alternatives discussed in the following slides and detailed in the Report.

The first alternative is the no-action alternative. NEPA requires that this alternative be included in all impact assessments.

The no-action alternative is designed as the projected future without-project conditions. In this case the remaining acreage at James Island and Barren Island would continue to erode at their present rate. Based on historic erosion rates and current acreage, James Island will be completely submerged by 2021 and Barren Island will be submerged by 2052.

Alternative 1 would protect Barren Island and its associated resources such as SAV. James Island is not a part of this alternative. This alternative would restore over 1,300 acres of island habitat with 55 percent wetland and 45 percent upland. It is important to note that over 1,300 acres of healthy bay bottom would be permanently transformed into island habitat. While some commercial fisheries would be displaced, others would be enhanced with dike construction and SAV protection. Since James Island is not a part of this plan, it would eventually erode away and potentially increase impacts to shoreline properties

on the mainland.

Alternative 2 would protect existing James and Barren Islands and possibly the leeward mainland, as well as associated resources such as SAV beds. Each island would be constructed with a 60 percent wetland, 40 percent upland habitat configuration and an upland dike elevation of 25 feet. This alternative would impact over 2,700 acres of shallow water habitat, impacting a larger area of stressed habitat at James Island rather than healthy bay bottom at Barren Island. If chosen, this alternative would result in the greatest amount of shallow water habitat loss, and displace commercial fishery.

Alternative 3 would protect existing James and Barren Islands, and possibly the leeward mainland as well as associated resources such as SAV beds, with over 2,100 acres of restored remote island habitat. James Island would be constructed with 55 percent wetland and 45 percent upland habitat, and an upland dike height of 20 feet.

Rather than island creation at Barren Island, this alternative involves construction and backfill of a breakwater using dredged material from Federal channels in the Honga River area. Seventy-two acres of wetlands would be restored at Barren Island while protecting the existing remnants and minimizing impacts to the existing healthy bay bottom.

Commercial fisheries would be displaced at James Island, but there would be no significant negative impact to fisheries at Barren Island. Protection of SAV and enhancement of hard bottom availability may enhance some fisheries.

The primary goal of the project is to restore island ecosystems using dredged material while maximizing the future environmental benefits. This chart shows the remaining alternatives following an incremental cost analysis including the three alternatives I just discussed. It compares the cost of the project to Island Community Units, or ICUs, which quantify the environmental benefits

over the life of the project. As you can see, Alternate 3, combining James and Barren, provides the greatest environmental benefit for the lowest cost. Therefore, the alternative is the recommended plan.

The recommended plan at James Island is over 2,000 acres of wetland and upland habitat that include features to enhance the project by providing diversity. These features include a tidal gut through the wetland cells, wetland-lined coves, fresh water ponds, intertidal and unvegetated mud flats, breakwaters and bird nesting structures.

The anticipated project cost at James Island is $1.1 billion, 75 percent of which would be funded Federally. The remaining 25 percent would be funded by the State of Maryland. James Island would have a capacity of 90 to 95 million cubic yards and would provide 24 to 30 years of placement. Initial construction of this project would be expected to begin in 2010 and is estimated to take four to five years.

At Barren Island, restoration of 72 acres of wetland would be the main focus of the environmental design, but bird nesting structures are included as a design feature. Breakwaters would be constructed for protection of the existing SAV beds and protection of Barren Island from further erosion.

The anticipated project cost at Barren Island is $29 million, 65 percent of which would be funded Federally. The remaining 35 percent would be funded by the State of Maryland. Barren Island would have a capacity of 300,000 cubic yards, which would provide placement capacity for approximately seven years. Construction of Barren Island would be expected to be completed in 2010.

Of course, there are negative impacts associated with a project of this magnitude; however, these impacts are offset by benefits. Over 40 resources, including environmental, cultural, socioeconomic, recreational and aesthetic were evaluated. One primary impact was identified - the

loss of approximately 2,000 acres of shallow water habitat at James and Barren Islands, including crabbing and clamming areas. Additional impacts include the loss of approximately 100 acres of open water habitat at James Island and hardening of the shoreline at Barren Island. In addition, we also recognize that there will be a change to the view shed from the mainland, and other impacts, such as noise related to the extended construction and operations.

Benefits of the project include the restoration of remote island upland and tidal marsh habitat as well as additional bird nesting and fish nursery habitat. In addition, the proposed project will meet the dredged material capacity need identified in the DMMP to keep the approach channels to the Port navigable over the next 30 years. Modeling efforts have demonstrated that the proposed project at Barren Island would provide protection of SAV beds in the vicinity of the island and the proposed projects at the James and Barren islands

could provide some protection of the mainland from erosion.

Recreational and educational opportunities during and after construction activities were also considered in this Report. Recreation and educational components must be consistent with the project's objective to restore remote island habitat, and incorporation of any of these components will require additional study prior to their implementation, however, we are recommending that they be included in the project.

During construction, research opportunities for educational institutions could be made available, as well as volunteer opportunities for planting and other activity.

After construction is complete, a self-guided, low-impact water trail will be created through the main tidal gut area at James Island. Informative signage would point out wildlife and other elements of island restoration.

In summary, there are two parts to the

recommended plan in the Draft Mid-Bay Island Report:

The first part of the plan would restore 2,072 acres of island habitat at James Island, which would provide the primary dredged material capacity for the project. Fifty-five percent of the island would be a tidal wetland habitat and the remaining 45 would be upland habitat. Material for placement at James Island would be dredged from the Chesapeake Bay approach channels to the Port of Baltimore and local Federal channels.

The second part of the recommended plan would restore 72 acres of remote island habitat at Barren Island using dredged material from Federal navigation projects in the vicinity of the Honga River. Breakwaters would be constructed to protect the island and SAV habitat.

The schedule for the Report is shown here. The Draft Report was prepared in August of this year and made available for public comment beginning on September 8, 2006. We are holding two public comment meetings; the first was yesterday in

Cambridge and the second is tonight's meeting. The public comment period will extend until October 23, 2006. The final Report is scheduled to be issued in December 2006 with a Chief of Engineer's Report in April 2007, and a Record of Decision to follow in fall 2007.

Thank you for coming. If you wish to review the Mid-Chesapeake Bay Island Ecosystem Restoration Integrated Feasibility Report and EIS, you can do so by visiting any of the libraries listed in the Notice of Availability, which is included in the folder of handouts you received when you came in this evening.

You may also obtain a CD from our welcome table or visit the website listed here. All comments on the Report should be submitted in writing by October 23, 2006, to Ms. Stacey Blersch, at the address listed here. Thank you for your attention.

And I will now open the floor to those of you wishing to offer formal comments for the

record.

We are fortunate tonight to have two elected officials with us, three elected officials with us. I am not certain about the seniority level here, but we'll start with Ms. Addie Eckardt.

DELEGATE ECKARDT: Thank you very much and good evening to the U.S. Army Corps of Engineers team. I appreciate the opportunity. I am Delegate Addie Eckardt and I represent this area along with the rest of the partial counties in the Maryland House of Delegates.

This issue has been very near and dear to my heart and I'm excited to see this. It takes long for things to happen in government. But I met with Joe Coyne and Bruce Coulson, I think it was back in 1996, '7 or '8, when I first learned about the Poplar Island project and the need to dredge the channels to maintain the Port and its viability. So we sat down and met with a number of folks out of the Port and the Department of Transportation and talked about the possibility of restoring James and

Barren.

So I am very excited to see something that looks like the reality of that moving forward. And without much information, it looked like all Alternative 3 was a good option to my way of thnking. Now, I know it's very expensive and that's going to be the issue. I also know that things take longer than we anticipate. And so, you know, my wish is that we could move this along pending, you know, the involvement and the comments that we hear from the folks here in Taylors Island and the rest of the community, because I think that's a very important part of this process.

So thank you for bringing it this far, and I will do whatever I can to move it along as long as I know that I have the support of the community. Thank you.

MR. JOHNSON: Jeannie Haddaway.

DELEGATE HADDAWAY: Good evening. My name Jeannie Haddaway. I am the other state representative in the Maryland House of Delegates in

Annapolis for this district. And for those of you who attended last night, forgive me for repeating myself.

I just would like to say how important the Port is, not only to Baltimore but also to the Eastern Shore, where we have hundreds of businesses that rely on the Port to move goods for them, and from the environmental standpoint of how important these projects can be, not only for landowners but also for the health of the bay.

So if you have not been out to Poplar Island, I would encourage you to go, check it out. It's a very similar project, a very good model of how this can work.

Again, we just appreciate the way the Army Corps and the Maryland Port Administration worked with us on that project, and we would anticipate the same level of cooperation on these projects as well. Thank you.

MR. JOHNSON: Thank you. And Jay Newcomb.

MR. NEWCOMB: I'm not elected officially yet, but I was a Commissioner when you started a while back.

We had a problem, and Senator Sarbanes came down to Hoopers Island. We had a location we had to find a spoil site for. Mr. Sarbanes worked very hard to get to use Barren Island as a spoil site.

And also we were looking at a place to save a -- a shore erosion group was trying to save James Island and Barren Island. So several meetings we come up and the Corps was interested in looking for another place to restore. Dorchester was not being represented right. At that time we had a person who was not showing up to the meetings.

But at this time I think we need to give a hand to Mr. Joe Coyne and Bruce Coulson for attending these meeting, went to many meetings in Baltimore. They have done a outstanding job for this. I think we should give them a hand of applause right now because if it weren't for them we

wouldn't be where we are today. (Applause)

So I think this is a win-win situation. We've got help with the port, we'll have the channel dredged out. We need placement for our local watermen, keep our local channels dredged out. Charley Wright's trying to get one dredged out today. He's still fighting finding a spoil site. And we need to save James Island and Barren Island, also save Taylors Island and Hoopers Island.

So I'd like to thank the Corps, the Port Administration, and all the local people. We met with the watermen; most of them seemed be onboard. There was a few questions. Most of those have been ironed out. So I hope we can start this project even sooner than you projected, and I hope we can move quickly. Thank you.

MR. JOHNSON: Thank you. Before we move on, two points from what Jay just said. One is tours of Poplar Island. There is a possibility to take a tour. And if you would like to see what these projects will look like, I would recommend it.

And, Mark, did we get the name?

FROM THE FLOOR: The information is over here.

MR. JOHNSON: Okay. There is a sheet of paper over there with the tour information. You just call our tour guide out there and she can arrange either individually or in groups.

The second thing is you mentioned Senator Sarbanes. I'd like to let everybody know that the Poplar Island project, his involvement in that project was tremendous, and they have officially named that project, as of January 1, 2007, it will be the Paul S. Sarbanes Environmental Restoration Project at Poplar Island.

Okay. We're going to move into the rest of the speakers. When you come up to the microphone, if you would please state your name and spell it for the court reporter, and any affiliation that you may have. And we'll start with Joe Coyne.

MR. COYNE: Thank you. My name is Joe Coyne. That's spelled C-O-Y-N-E. I'm from Madison,

Maryland, a suburb of Susquehanna Point. Many of you are familiar.

I wanted to spend a minute or two on the Citizens Advisory Committee that Jay talked about. Bruce and I have been members of the Citizens Advisory Group for four or five years. We were trying to remember just how long it's been and we couldn't come up with a firm time.

Basically, people wonder what we have done and been doing on the Citizens Advisory Committee. It's as you pointed out earlier, it's a part of the dredged material management program, and I think a very important part because it kept the citizens, public interest groups, non-government and government agencies involved in the development of this plan, this report that you talked about, the one with the long name, and it kept the comments flowing back and forth from the people who were developing the plan and those who were interested in the plan and the impact of that report on the communities that it would be involved in.

The other thing is that this report provides a culmination of many hours of work of really expert people, scientists, engineers, technicians; They're a select group, and I've never seen quite so many good people working on a project with a single aim to produce a really good product. I think that stands on its own.

The work of the Citizens Advisory Group was to review the work of that project draft and make comments in terms of what the impact might be if this project -- if this particular island or site were chosen for the selection of the beneficial use of dredged material, what would be the impact on that community and island and particularly on the environmental. I think the Citizens Advisory Group had a lot of good impact in making that happen.

The other question, issue that I would like to mention is the impact of shoreline erosion in Dorchester County. We have this thing called the Dorchester Shoreline Erosion Group here in the county, and we're trying to identify problems that

are raised by shoreline erosion and that sort of thing. We really categorize them in three ways: The environmental side, which includes things like the submerged aquatic vegetation or the death thereof; excess nutrients; siltation causing problems for the oyster beds; and the economic side, which causes at least the loss of income, loss of land; and the social side, which includes loss of viable watermen community and loss of the seafood-packing community, those kinds of issues that have always been associated -- communities that have always been associated with the lower part of Dorchester County.

The recommendation that Barren and James Islands be the next site chosen I believe is a very good one. In view of these documents, they address very serious issues, provide the best available solutions with regard to our concerns regarding James and Barren Islands.

In closing, I strongly urge the acceptance of this document package reviewed by the

U.S. Army Corps of Engineers, Chief of Engineers, April of 2007, followed by a positive Record of Decision no later than the fall of 2007. And of course if those dates could be moved up sooner, the better, we'd appreciate that.

I'd also like to take this opportunity to commend the teams from both the Army Corps of Engineers and the Maryland Port Administration for their joint effort in bringing the overall project to this stage. Thank you very much.

MR. JOHNSON: Thank you. Now I need to remedy my mistake and introduce Doctor Steve Storms from the Maryland Port Administration, our key partner in the continued success of this project.

DOCTOR STORMS: My name is Steve Storms, and I'm the project manager for the Maryland Port Administration, which is a part of the Maryland Department of Transportation.

As has been pointed out here earlier this evening, the flow of international commerce through the Port of Baltimore is a major generator

of jobs and revenue for the State of Maryland. The jobs of more than 126,000 Marylanders are in some way related to the movement of cargo across Baltimore's docks. The Port is the state's second largest economic engine, generating more than a billion dollars annually in business and government revenues.

Continued dredging of the approach channels in the Chesapeake Bay is an absolute necessity for maintaining this port. And existing placements sites for approach channel dredged material will run out of space by 2014. The Port of Baltimore fully supports this project to provide continued efficient management of this dredged material.

The Maryland Department of Transportation is the non-federal sponsor for this project. The Maryland Port Administration, under the auspices of the Department of Transportation and acting through its Office of Harbor Development, was involved in all of the coordination related to this

study.

The Port Administration has indicated their intent to proceed with the next phase of the project implementation and to provide the non-federal cooperation required for project implementation. Thank you.

MR. JOHNSON: Thank you, Steve.

The next speaker will be Bruce Coulson.

BY MR. COULSON: Hello. I'm Bruce Coulson -- C-O-U-L-S-O-N -- Taylors Island. Most of the people here know me.

I just wanted to say I support this project. It's a very good project and, as Joe said before, there's been a lot of time and effort put into this. Both the Port and the Corps should be commended for the work they've done on this project. They have dotted all the i's and crossed all the t's.

A couple things I'd like to talk about. One is you should take a tour of Poplar Island to get an idea of what James Island will look like

after it's done. I've been out there twice myself, and there was a time lag in between and I could see the differences out there. You can go out and you can see the water quality, how nice the water is on the leeward side of Poplar Island, and you can see the habitat that's out there. It's really, really amazing. I urge everybody to sign up and call that person and arrange a tour of Poplar Island. It would be very well worth your while.

But as well as the environmental benefits that we in this area will receive out of this project, you will also see some economics impacts here, too, the local people, the jobs that this is going to create over a 30-year project. They're going to be using people from our area to do work on these types of projects, so it's going to help our local economies here and help some of the watermen here also that would want to use people -- to get jobs to be able to shuttle workers back and forth.

The other thing I'd like to bring up --

and I don't know if everybody here knows what goes on in the Port -- I received this information packet from Jeannie Haddaway today that she got from the Port -- but the Port employs 42,400 Maryland citizens, and 900 of those citizens live on the Eastern Shore. There are 120 businesses on the Eastern Shore that use the Port as import and export, and they ship approximately 30 million tons -- I'm sorry -- 30 thousand tons of goods from the Port, which is about 3.7 percent.

Just so you know, some of the local businesses in Cambridge that use this port: Cambridge Yacht Brokers, GKD, Interstate Container Cambridge, Interstate Corrpack; a person by the name of Jeffrey Debrine, Maryland Wire Belts, POK Firefighting, Regina Corporation and a person by the name of Reginald Bromwell; East New Market, a person by the name of Lisa Bracy; and in Hurlock, Defender Packaging. All these people use the Port. These are 2005 Eastern Shore importers and exporters.

And close by to us, Federalsburg, would

be -- I believe I'm pronouncing this right -- Faquir Farms, the Lafrance Corporation, M&M Consignment and Maryland Plastics and Solo Cups. You can see there are businesses around here that utilize the Port of Baltimore.

I'd like to submit this, if I could, for the record.

MR. JOHNSON: If you could just give that to Stacey.

MR. COULSON: Sure, I will, and have this submitted so, you know, this is part of the public record. I wanted everybody to know what corporations around here locally use this port. Thank you.

MR. JOHNSON: Thank you. Yes, anything that you would like to provide us will be incorporated into the final report.

Next is Ellie Polley. Did I pronounce that right?

MS. POLLEY: Yes. I've been a resident of Taylors Island for 33 years. I've seen such a

drastic change in those years. When I first came down here, we had sailboats and boats went out towards James Island and we could never go all the way straight through because there was a bit of land that was attached to Taylors Island. And since that time it is long since gone.

And I've also noticed that we're getting more water coming into our Slaughter Creek. And without this, I think we'd be really underwater here on Taylors island. So I definitely am for this project and I can't wait until we get started.

MR. JOHNSON: Thank you. Ben Parks.

MR. PARKS: Ben Parks, President of Dorchester County Seaford and Oyster Association.

To date, I haven't had anybody call me in opposition to this project, so we support it.

You've got to remember, erosion is probably one of the biggest polluters that we have here that's destroying our oyster bars. They are being covered up all over the bay. Right out here inside James Island, Oyster Cove, Choptank, Peanut

Hill, Ragged Point, Honga River is the same way, we've lost one of the biggest oyster bars probably through the seventies due to erosion of Barren Island, which was lower Tarr Bay, at times probably three or four hundred boats working in there. We don't have it any longer.

So it's important to the watermen to protect what we have left and save the oyster industry and also the SAV beds that are all around the area. Thank you.

MR. JOHNSON: Thank you. That's everybody that signed up to speak. Would anybody else like to make a statement for the record?

MR. CAROWAN: Good evening. My name Glenn Carowan. That's Glenn with two n's. C-A-R-O-W-A-N. I'm the manager of Blackwater National Wildlife Refuge, and I'd like to speak to this project in the context of the work that we've been doing working with the state and local government, as well as the Corps of Engineers and the Port restoring Barren Island, the 11 acres that

we have done over there to date. And certainly my knowledge of the work that's been done at Poplar, it's been outstanding.

We will continue to work with the various partners and hopefully make this project equally impressive as those are. Thank you very much.

MR. JOHNSON: Thank you. Would anybody else like to make a formal comment for the record? If not, that concludes the formal portion of the evening.

Before I start answering questions, I'd like to point out a couple of things. After we are done answering questions, as I said earlier, we'll stick around and talk to you individually.

We have a number of stations around here. There's a few computers over on the desk to my left there. One of them is a view shed model which will show what these proposed projects will look like from the air and from the ground. The other model, the other one will show reduction --

it's a hydrodynamic modeling which will show reduction in wave energy, it shows current changes, sedimentation changes around the project as well.

We have a third station, behind me here, if it's running. That was running a Poplar Island Maryland Public Television segment. It's an excellent segment if you haven't seen it before. They periodically rerun it. It shows what's going on at Poplar, as well as some of the history of that island. I know James Island has a history very similar to that one as well. And if anybody here does have any information on the history of particularly James, we would be interested in hearing about that as well.

So with that, that concludes the formal portion of the evening. I get to take my coat off and we can start answering your questions. Who would like to go first? Yes, sir.

MR. O'BRIEN: A.J. O'Brien. Hoopers Neck Road.

Did you take into account the

possibility of building another bay bridge coming across? I'm adamantly against it. But one of the proposals was to go through those islands, onto Taylors Island as another bay bridge.

MR. JOHNSON: We did not have any information that would lead us to consider that. We did not consider it at all; it's not part of our mission, it's not what we were looking at.

I will tell you that we did consider the possibility of bridging from Taylors Island out to James, you know, since that was historically attached, but we haven't really looked at that too seriously. That would be a very expensive proposition.

MR. O'BRIEN: I know you wouldn't do it, but I noticed the governor had a committee looking into another bridge.

MR. JOHNSON: I do not have any information. Steve, do you have anything? No, we don't really have any information as to what the state might be considering. I don't think their

planning process is far enough along.

MR. O'BRIEN: You called James Island privately owned?

MR. JOHNSON: Yes.

MR. O'BRIEN: What does that mean?

MR. JOHNSON: That means -- well, it means it's owned by a private individual or organization; whereas Barren Island is owned by U.S. Fish & Wildlife Service, that's publicly owned.

MR. O'BRIEN: So is there a lien or lease to do this or something, or is it donated to the Federal government?

MR. JOHNSON: Well, if you noticed, we are not touching the island, we are building the project in front of the island. There will be a gap between the existing remnants and our island.

Now, we would love -- I don't know if the owners are here or you know them, but if they'd like to donate that property, we'd gladly accept it, or the state would.

But yeah, that's one of the issues that

we had at both Poplar Island and here, is we don't want to get involved in trying to purchase those island remnants, so we just lay off of them. We can protect them, they are a valuable resource, but to own them is problematic.

I couldn't have done that good of job.

MS. EMBREY: I have a question. My name is Carol Embrey, from Church Creek. I understand that you have tours on Poplar Island. I wasn't aware of that. I hope it's very limited. And I'm hoping that maybe that won't be the case. Obviously it won't be the case at James, but also Barren. Will it be left to the wildlife? Is that the hope that that's what's going to happen? And, of course, the U.S. -- the wildlife biologists, U.S. Fish & Wildlife, of course. But as far as the public --

MR. JOHNSON: Let me address one at a time, I guess. As far as Barren goes, Fish & Wildlife will be controlling that and controlling access. In all three of these cases they are remote island habitat, which means limited public access.

However, the tours at Poplar Island are not as limited as you might imagine. We have been doing at least 2,500 people a year out there, including this year we had I think 750 school children from Anne Arundel County have come out there. They were bringing class after class out there. We have folks, some of the school groups, involved in raising our turtles. We have maybe 180 diamondback terrapin nests out there with 10 to 15 hatchlings per nest. And we have the premier Maryland terrapin expert is working with us on that. And we take some of those and give them to classrooms; they raise them and bring them back and release them. So there is a lot going on.

On the island itself we have a bus. We can handle up to about 25 people in a group at one time or, you know, we can mix and match. If you call the tour coordinator -- and the number is over there -- you can either get in with a group that's already going out or you can arrange a tour. We've had high school reunions, we've had groups from

Japan, just a wide mix; we have had people from all over. It's becoming somewhat of a destination. Does that answer your questions?

We would envision very much the same thing at James Island, although, because it will ultimately be a remote island habitat, there are no golf courses, no condos, no marinas. And we get asked that, believe me, from time to time. But it's going to have to be ecofriendly. Ecotourism is the current terminology that people use.

MS. EMBREY: Well, are they studying the effect from having the tours so that they -- I mean, it sounds very good because it's very educational and getting children in there and that's very, very important, educationalwise.

MR. JOHNSON: At Poplar right now, you have to understand -- and James would be the same way -- we have about 20 to 30 people working out there full time, year in, year out. And when we are inflowing dredge material we work seven days a week, 24 hours a day.

We try to be very sensitive to the wildlife that is existing out there. We work very closely with Department of Natural Resources, Fish & Wildlife. We have some people full time working on nothing but that to make sure we aren't interfering, especially during nesting season. But it is a construction site.

So the tours right now really don't -- that's a minor part of it. We keep people on the roads, we keep them in the buses, and we don't interfere, we don't go into nesting area or disturb nesting or anything of that nature, so very minimal impact at this point.

Later on, when we move off and it does become strictly a remote island habitat, then it's a different story. We don't want to create any traffic, so there will have to be some kind of controls. What those are, I'm not quite sure. But we do want to encourage -- you can't plop something down that big, not in this day and age; people are going to go there whether you want them to or not.

It's a matter of how you control that.

Our thoughts are that we'd create some smaller areas where tour boats could go out or somebody could go out, maybe go through a trail through a marsh, you know, self-guided little tours through a small area, keep it segregated, and have the rest of the island just remote island habitat. That's our thinking right now.

But we ultimately would plan to work with the local planning or recreational groups or the counties, as well as, you know, DNR and Fish & Wildlife and whoever else would be involved with that.

THE COURT REPORTER: Excuse me, ma'am, could you give me your name again? I couldn't hear it.

MS. EMBREY: Carol Embrey. E-M-B-R-E-Y.

THE COURT REPORTER: Thank you, ma'am.

MR. JOHNSON: Don't feel intimidated by this. This is a formal process that we have to go through, as I explained earlier. It's just for the

record and, you know, we are not going to be quoting you or anything.

MS. EMBREY: That's all right.

MR. JOHNSON: Yes.

MS. POLLEY: Ellie Polley. I was wondering what happens when you leave the island and you have people with boats and whatever, how are we going to keep that going or not going?

MR. JOHNSON: Well, that's the problem, we're not. I mean, we don't prevent people from bringing boats up to the island. Our concern right now is more safety; the rocks are not safe, the dredge material itself when it's initially placed in there or even after it's been there quite some time it's not safe, it's like ice, it might have a crust on the top but you can fall through very easily. Our biggest concern is public safety and the safety of our own workers. So while we are under construction everything is controlled. You know, we allow access but it's under control.

MS. POLLEY: I mean after you leave.

MR. JOHNSON: Afterwards? That's what I'm talking about. We'll be turning this facility over to the State of Maryland, most likely the Maryland Department of Natural Resources, and we and they will have to determine how it's managed so it isn't a public nuisance.

But it really is not going to be any -- it will be similar to any other island that's out there; people are going to go there. It's going to be hard -- I mean, people, I understand, are going out to James Island right now. You know, how do you keep them off? That's very challenging.

I'm not sure I'm answering your question, but I'm not sure I have the right answer.

MS. POLLEY: Yes, you did.

MR. JOHNSON: Yes.

MR. TOBIN: I'm Paul Tobin, Taylors Island. I have just a couple questions.

The dike height of 25 feet or 20 feet on some of those, what does that mean? Is that the riprap around the outside that is going to hold the

spoils in there?

MR. JOHNSON: Well, there's going to be two parts to the island, at least at James Island, the uplands and the wetland habitat. The uplands will go up to a final elevation of 20 feet. We will initially build those dikes up to probably 25 feet, and then we fill it up with material. And it has to go higher, you have to have what's called freeboard because it's a lot of water coming in there, so we build the dikes up higher than they will ultimately will be; it settles down, we knock those dikes down and plant it, and eventually it will be a 20-foot, more or less, plateau out there.

I'm not sure -- does that answer what you were --

MR. TOBIN: Yeah. That just seems awfully high to me. Taylors Island might be 10 feet at the highest.

MR. JOHNSON: Yeah. That's been one of the concerns we have had throughout this process, is that we'll be maybe the highest location in the

county.

This project is intended to be what we call beneficial use of dredged material. There are two components to it; the environmental restoration and there's the dredged material part of it. The dredged material part of it, we need the capacity. I mean to make the project go, you need to be able to deal with a certain volume of this material or it's just not worthwhile.

What we have determined is that the optimum mix is about 80 percent of your capacity goes into this upland and 20 percent goes into the wetland part of it. And in order to get that 80 percent in there, the dike heights need to be about 20 feet.

MR. TOBIN: Another question was the price of 1.1 billion. Is that actually projected out over all those years it's going to be open or is that something they are going to be spending it just to build it in the first place?

MR. JOHNSON: That's spread -- it's a

little bit of both. There's quite a large front-end cost of about 200 million to build the dikes if we were to build all the dikes up to all the final elevations at once, which is not likely to happen, but it could, and then the rest of it is spread out over the life of the project, which will be the initial construction will probably be four or five years and then we'll have about 30 years of operation where we are bringing in the dredged material, and then probably another, I'd say, four or five years beyond that where we are actually finishing off the habitat development. It takes quite some time. You can't just bring the dredged material in there and plant it. It takes years to get it consolidated and settled down to a stable elevation where you can actually plant it and do something with it. It's going to be out there a long time.

MR. TOBIN: One other question. Was the computer models of the currents and all that, that you did at Poplar Island, does anybody go back after

the thing is built and compare the actual compared to the predicted?

MR. JOHNSON: It's interesting you mention that. We actually did that. The models for Poplar Island were originally done back in the early nineties, and we have had several generational changes in the modeling since that time. They have gotten more and more sophisticated. We were talking about that earlier.

We went back after Isabel. Isabel actually created two breaches in Poplar Island. One of them was predictable, in a predictable location, and one of them was not. And we went back and remodeled Poplar Island with the newer technology and it did then predict that second breach. We are continuously doing that, upgrading our models and continuing to look at what's going on around there to see if what we predict is actually occurring, and we'll basically do the same with James and Barren.

But what we are working with right now is pretty much state-of-the-art modeling, so, you

know, this is the best we can do. And it's a very -- I have a technical report with me. There's a lot of folks here, technical experts, that can talk about that. They have the model they can run for you that show some of the results the modeling produces. It's quite sophisticated and I think it's getting much better.

Is it going to be perfectly accurate? No. Can we get the resolution to talk about some of these individual properties? I don't think we are quite there yet. But we are getting much better at it and we will come back once we've built it and see what's happening.

I feel pretty confident at this stage with this new model that we have a pretty good handle on what will happen. I would encourage you to take a look at some of the boards and the model.

MR. TOBIN: Will they also place buoys or something to measure the current, the actual current out in the water?

MR. JOHNSON: We have done that at

Poplar. I suspect that we will probably -- we are looking at waves, wave height, current. It's a continuous -- it's something -- the term that we used for Poplar, which will apply here, it applies to almost any environmental type project, it's called Adaptive Management. When you are trying to development habitat and you are working with a lot of uncertainties, working with dredged material or with wildlife and habitat, you can't guarantee that you get it right the first time, so you learn by doing. You do something and you model it, monitor it, and then you change your process and improve your process as you go along. That's exactly what we are doing at Poplar and what we would intend to do here as well.

I mean, when you have a project that's take takes 30 or 40 years to build, you have a lot of opportunity to learn as you go and apply newer technologies and apply what you learn.

MR. TOBIN: Thank you.

MR. JOHNSON: Yes.

MR. CUTTER: John Cutter, Taylors Island.

What's the projected time line, if the approval is fall 2007, for construction actually to start?

MR. JOHNSON: Let me go through that whole process. There is a Federal process. Surprise. What I've given you today is just the NEPA process; that just gets the report approved by the administration, by the U.S. Army Corps of Engineers, we get it approved by the Assistant Secretary of the Army. They transmit it to the Office of Management and Budget, they look at it and say that's a lot of money but we're okay with it. Then they transmit it to Congress.

Congress ultimately has to authorize anything. They authorize all our projects in what's called a Water Resources Development Act. That just says, okay, it's good to do. It doesn't give you any money to do anything, it just says we're okay with it and we'd like to go ahead with that project.

We haven't had a Water Resources Development Act since 2000, so the projects are continuing to stack up. I saw something today that said there's 13 or 14 billion dollars worth of backlog that's waiting to be authorized. So this will go into that queue and we are hoping to get one this year when they come back. They did not pass WRDA. They were working on it; they did not pass it before they adjourned. They will come back in November, but it's going to be after the elections, so I have no idea whether they'll pick it up or not. If they don't, then you are talking about the next opportunity if they work on it all year, typically they'll pass it in the fall of the year.

Once you get it authorized, then you then you can budget for it. Typically we budget two years in advance.

I mean, there's ways of short-circuiting that system. A congressman or senator can come in and do what's called an add and give you the money ahead of that process and

accelerate things. But for our typical bureaucratic process, that's the way it works. Yes.

DELEGATE ECKARDT: Is the best thing for this group to do would be to write letters to our congressmen? Is that what you're saying?

MR. JOHNSON: No, ma'am. I'm not allowed to advocate.

DELEGATE ECKARDT: I'm just looking for what the folks in this room can do if they think this is a good project to move it along.

MR. JOHNSON: I can't say a word.

FROM THE FLOOR: He can't say a word.

MR. JOHNSON: Yeah, that's one avenue that you do have, you can always work with your local elected officials to, you know, request their assistance in moving things through. I mean, it's no secret that Congressman Gilchrest wrote a letter to the Water Resources and Development Act Committee earlier, when they were sitting or working on this, and he was in support of Barren and James and Smith Islands, of restoring and protecting those islands.

So he's aware of the project and at least recently has indicated support, if that helps.

Right now it's a tough time for civil works projects. To be perfectly honest with you, with the war going on, continuing to go on, and with Katrina and issues like that, a lot of the discretionary money is being siphoned off, so we are not seeing a lot of money coming our way, it's a little bit at a time.

I don't want to be discouraging, but at the same time I don't want to give you any false expectations, either.

MR. EMBREY: Henry Embrey. We live on Taylors Island. We look at James Island all the time from our place.

When you go through the back door and get all this approved, what would be the first project; Bulkheading the whole way around it and then start filling it?

MR. JOHNSON: That's typically the way it works, is we would put the containment dikes

around it.

MR. EMBREY: Both sides?

MR. JOHNSON: Well, that's what I would like to do. It depends on the funding that we would get. We would request to do it that way. It's more likely that we would be building it in some kind of phased approach, so you might do the north section first and then south. I can't say at this time how we would configure that. Some of it would have to do with how much money we get.

There are some constraints that are going to dictate how we do that. The first thing you need to do, you do need to dike it in so you can contain dredged material. Then we've got discharge structures to release the water after we put the dredged material in there, where we do a lot of monitoring to make sure the water quality meets all the standards, and there are quite a few standards that we do have to meet for Maryland Department of Environment.

MR. EMBREY: But the original three

islands that are there, you're not trying -- I suppose the big island you're going to put in to save what's left of that.

MR. JOHNSON: Yes, sir, that's the idea.

MR. EMBREY: You can get started next week.

MR. JOHNSON: Yes, sir. We can all hope there won't be any big storms. We are not going to be protecting the east side of those islands, obviously. I understand they still get eroded from that side as well. Again, that's a private property issue. And I don't know if I mentioned earlier, but one of the things cannot do is protect private property, we are not allowed to go out and do that.

MR. EMBREY: Then you have not tried to find out who the owner is or to contact him, whether he'd donate it to you?

MR. JOHNSON: No. That's something either, that we --

MR. EMBREY: You're not allowed to?

MR. JOHNSON: Not really. I don't

believe that we are allowed to go out and solicit. If somebody came to us and said we'd like to do this, then we could entertain it.

MR. EMBREY: Do you know the owner?

MR. JOHNSON: We know who they are, yes, we know. That's part of the background searches that we do, background check that we would do on the work we are doing around there. Personally I don't know who they are, but I'm sure we've looked into that.

MR. O'BRIEN: Do they pay taxes?

MR. JOHNSON: I'm sorry?

MR. O'BRIEN: Do they pay real estate taxes? (laughter)

MR. JOHNSON: Yes, sir.

MR. CARBONETTA: Ray Carbonetta, Taylors island. Is there a priority as to which phase would be started first or would they be run concurrently, Barren and James Island?

MR. JOHNSON: That all depends on who you talk to. If you talk to Mr. Carowan, I would

say Barren first. No, not really, we don't have a particular preference, although the environmental benefits at Barren Island are tremendous. So, you know, the sooner we can get that done, the sooner we'd achieve a higher level of environmental benefit, although there is a lot to be had at -- I believe James is eroding faster, so there is an argument for protecting that as well. So personally, no, I'd like to do them both, you know, at the same time if we could.

MR. CARBONETTA: Is there a processes established by which you determine which one starts first at the time you get funding?

MR. JOHNSON: What's going to happen with this is they are going to be probably approved as two distinct projects because they have two different authorities. I don't know if you noticed when I was talking about the funding, the cost sharing is different between the two because they are different authorities; one is 75/25 Federal and one is 65/35 because it's primarily environmental

restoration. But we are actually still working with our headquarters to determine the exact authorities, whether it's going to be Congressionally authorized for James or whether we already have the authority to do that. But being such a large project, it's most likely that we will have to request authorization from Congress, but that's still under evaluation.

MR. TARTAL: James Tartal. With regard to the modeling, what work was done to evaluate whether or not sand deposits or sediment sources that are in James Island or in the surrounding shallow waters is a source for some of the sand that's been reported at Taylors Island's northern end and the bay side of Taylors Island? And if not, is that going to be looked at and is it an issue that has been considered in the modeling at all, particularly sand transport and the accretion of sand on Taylors Island from areas to the north?

MR. JOHNSON: We did look at the changes in sediment transport. Whether or not we looked at

your particular issue, I'm going to have to punt that to our technical experts.

MR. TARTAL: I think the issue isn't so much whether it changes the transport itself as whether or not a person's borrowing a vast quantity of sand from the bottom in the area around these structures and dikes as cutting off the source of sand that's actually providing protection to Taylors Island now in its current condition and whether or not the purchasing of huge dikes and stone will permanently cut off that source, potentially increasing the erosion rates on the bay side.

MR. JOHNSON: I'm going to have to punt that one. I do believe we did look at that. I know we looked at it around the Barren area, and I'm pretty sure we looked at it at James. Where's my helpers here? Can anybody answer that question. Ed, there you are. Step up to the microphone.

MR. FULFORD: Yeah, I'll add a little bit. We didn't work --

THE COURT REPORTER: Could you have him

come to the mic? I'm having a --

MR. JOHNSON: I'm sorry.

THE COURT REPORTER: If you want this on the record, I've got to hear it.

MR. JOHNSON: I'm sorry, folks, we are going to ask you to step up to the microphone. Ed.

THE COURT REPORTER: Thank you.

MR. FULFORD: Our group did not work specifically on James, but there was circulation modeling that was conducted throughout the whole area to see what the impact would be in the localized channel areas, in James particularly since one of them is a navigation channel used by commercial watermen, and basically it showed that there was going to be actually a weepage in the open channel and not --

THE COURT REPORTER: I can't hear when he's turned away from me. I'm sorry.

MR. FULFORD: I'm assuming that there's going to be additional modeling done as part of the next effort, report. There was a lot of wave

modeling done and it actually looked at the shelfing effects of James Island proposed, as well as Barren Island proposed, and it's going to be significant, I'm sure. But again, there is additional modeling that needs to be done. But there was a lot of sedimentation modeling done and basically it's described in the report that Scott referred to that's just been released actually out, you know, publicly released.

THE COURT REPORTER: Who was that person?

MR. JOHNSON: Ed Fulford.

MR. FULFORD: I'm sorry. Ed Fulford.

THE COURT REPORTER: Thank you. I don't know all these people.

MR. JOHNSON: I know. I'm sorry. We've got to help him out here, folks. Thanks.

I'm not sure we answered your question.

MR. TARTAL: Well, I don't think there is a good answer to the question at this point, anyway, because you don't know.

MR. JOHNSON: Well, yeah.

MS. BLERSCH: We did look at the sediment and we did look at accretion rates to see how we were going to affect it, and we do have the modeling report. I don't know if we have some extra copies here to give you a copy. They were just delivered on Tuesday.

MR. JOHNSON: Yeah. This is --

MS. BLERSCH: They're on the CDs.

MR. JOHNSON: This is a very technical aspect of this. If we could, why don't we get together afterwards. We'll get the technical folks together and see if we've covered your concerns or not. It's just that you've got to understand this is a -- if you haven't seen this document, as I said earlier, it's about 10 inches tall. I don't have it memorized just yet. But that's a good question. Thank you.

Anybody else? Yes, sir.

MR. CUTTER: John Cutter. What's the emergency response plan for Poplar Island and would

you have something similar for James, you know, for an injured worker?

MR. JOHNSON: Oh, yeah, there is a whole plan, and it depends on the situation and what's occurring, but typically we are working with the local first responders. Do we have anyone here from MES that is familiar with that? I'm not sure we have all the details.

MR. NEILD: This fire company will be first in.

THE COURT REPORTER: I'm sorry, sir?

MR. NEILD: I'm sorry. Bill Neild, Taylors Island.

This fire company will be first in for James Island. We have a rescue boat that's pretty well equipped but it's only 8 feet long, so it would be a limited number of people it's capable of transporting.

MR. JOHNSON: It depends on the situation. We can land a helicopter out there; we have provisions for that if necessary, and we have

done that to evacuate, you know, someone that's injured or for whatever other purpose. It just depends. If something hazardous spills, we generally start with the State Police. Their response units -- I'm trying to think of other scenarios. But yes, there will be, I guarantee you there will be a full-blown safety plan for operating the island. If you'd like to see what we are doing at Poplar especially, I can put you in touch with somebody that could talk about that.

But I'll reiterate, primary concern of the Corps of Engineers is always safety, public and in particular all workers, our people and anybody that works for us. I can't say that often enough. We harp on that constantly. You can be assured that there will be a very well established plan in place.

MS. RASMUSSEN: Ann Rasmussen. R-A-S-M-U-S-S-E-N. I guess my question is related to the one this gentleman asked earlier. If you are displacing all this water, the tide water that is coming in and out of the bay, and it's going to be

moving around these two enormous islands -- and forgive me, I'm not an engineer -- do you know for sure that it won't be eroding the western shore of Taylor's Island by moving around these islands?

MR. JOHNSON: Yeah, that one I can say for sure. That was a specific issue that we looked at in some detail. And I would again ask you to take a look at the boards in the back or the modeling on the computer, because we have modeled the current changes.

MS. RASMUSSEN: Okay.

MR. JOHNSON: Okay. Yes.

MS. POLLEY: I want to thank you very much. I really appreciate this. In 30 years I probably won't be here, but I thank you for what you'll be doing before that.

MR. JOHNSON: We are trying. Well, if there aren't any other questions, again, as I said, there are a number of folks here and we will stay as long as you want to stay and talk to us. So I thank you very much for coming again. Unless there's any

last-minute questions, that's it, then, we're done.

(Proceeding adjourned at 8:13 p.m.)

I, David M. Schafer, a Notary Public in and for the State of Maryland, County of Wicomico, do hereby certify the foregoing a true and accurate record of proceedings aforementioned, transcribed from my stenographic notes to the best of my ability.

_____

David M. Schafer

My Commission expires October 2010

ATTACHMENT C

Public Comments

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Bistany, Michele A NAB02

From: Whiskers [whiskers@fastol.com]
Sent: Saturday, March 01, 2003 11:59 AM
To: Bistany, Michele A
Cc: Jack Samakow
Subject: James Island

I am a waterfront land owner on the Northeast end of Taylors Island and I am very concerned about the erosion taking place on James Island. As a result I am very interested and in full support of any effort to rebuild James Island; the sooner the better. The Island is my only buffer for the sometimes horrific West or Northwest winds that come howling across the bay and the little choptank on a fairly regular basis.
Please put me on your mailing list and/or e-mail list. I am interested in anything that can be done to save both Islands.
My mailing addres is: Edward S. Nogosek
P.O. Box 174
Taylors Island, Md. 21669

Thank you for the opportunity to comment on the proposed project and full speed ahead.

Taylors Island, Md. 21669

Bistany, Michele A NAB02

From: tiedercontrols.com\jbtieder [jbtieder@tiedercontrols.com]
Sent: Wednesday, February 26, 2003 12:28 PM
To: Bistany, Michele A
Subject: james island restoration

I AM IN FAVOR OF RESTORING JAMES ISLAND HOWEVER A CHANNEL SHOULD BE LEFT BETWEEN TAYLORS ISLAND AND JAMES ISLAND LOCALS HAVE USED THIS GAP AS A MEANS TO GET TO LOWER BAY POINTS IN EXCESS OF 30 YEARS THERE IS A DEPTH OF 13 FEET ON LOW WATER IN THE SLEW AS WE CALL IT WITH ENTRANCE DEPTHS OF 6 FEET BOTH EAST AND WEST USING THIS SHORTCUT SAVES 40 MINUTES GOING TO POINTS SOUTH OF JAMES ISLAND TRAVELING 20 KTS PER HOUR THIS TRANSLATES INTO ON THE ADVERAGE A SAVINGS OF 25 GALLONS OF FUEL AT CURRENT PRICE OF 1.90 PER GALLON A COST 47 DOLLARS AND 50 CENTS ONE WAY REMEMBER WE MUST GET HOME ANOTHER 47.50 TOTAL ROUND TRIP COST OF 95.00 DOLLARS THEN THERE ARE THE ENVIROMENTAL IMPACTS OF BURNING AN EXTRA 50 GALLONS OF FUEL BOTH IN THE WATER AND IN THE AIR AND WHAT IMPACT WILL YOU HAVE BLOCKING A ENTRANCE/EXIT WAY THAT HAS BEEN ESTABLISHED FOR DECADES TO MARINE LIFE I AM IN FAVOR OF RESTORING JAMES ISLAND BUT LEAVE US A WAY TO GET THROUGH JAMES ISLAND SLEW

JB TIEDER
PO BOX 251
4204 ROBINSON NECK RD
TAYLORS ISLAND MD 21669
WATERMAN FROM 1982 TO 1993
USCG CAPTIAN SINCE 1994
PRESENTLY V-PRES. JOHN W TIEDER INC.
PH WK 410-228-5262
PH HOME 410-228-3585

Michele A NAB02

Lisa Neild [lisan@nbcambridgemd.com]
Monday, February 24, 2003 1:24 PM
Bistany, Michele A
Tracy Whitby-Fairall; Tim McCarter; Marcia & Ryan; Lee Neild; Lance Bramble; John R. Neild, Sr.; Jack and Audrey; Bud and Abby Stoudt; Bill Neild; Pat and Ann Neild

Subject: Restoration of James Island

The restoration of James Island as shown on your concept drawing would be of enormous value to not only the citizens of Dorchester County, but also to the recreational and commercial boaters, fishermen, watermen and hunters that use the Chesapeake Bay and Choptank River. The erosion of James Island during the last two centuries has had significant adverse impact on an extremely large area of shoreline in our County. Anything that can be done to stop further erosion would be a great benefit to the County as a whole. The potential for greater protection of, and enhancement to, the fish and wildlife of our area through the restoration of James Island is something that should be vigorously pursued as expeditiously as possible. Thank you for the opportunity to comment on this matter.

Lisa Neild
5819 Ross Neck Road
Cambridge, Md. 21613
Telephone 410-221-0155

Bistany, Michele A NAB02

From: John R. Neild, Sr. [jrneild@fastol.com]
Sent: Monday, February 24, 2003 8:32 AM
To: Bistany, Michele A
Subject: RE: FYI

We and I want to help make this a reality. Maybe I am a little premature in using a brouchure showing a concept area, but from what I understand, even that in the Port Authority info is subject to design change. A concept would only be that. It is our thought that James should hook around to the East more to "really" protect the old and potentially restructured oyster beds that the Little Choptank were famous for. I have spoke to many people since your meeting and none have had any objective thought on this. They also find rebuilding the Ragged area exciting. I do not believe any true Dorchester Countian or Eastern Shore persons would be against this.

Keep me in mind if I can do anything for the effort and of course The Shoreline group is there for you.

Rick

-----Original Message-----
From: Michele.A.Bistany@nab02.usace.army.mil [mailto:Michele.A.Bistany@nab02.usace.army.mil]
Sent: Monday, February 24, 2003 8:18 AM
To: jrneild@fastol.com
Subject: RE: FYI

Rick: Thanks so much for all your information and help in this study. We really appreciate and need your input. At this point, we still are conducting two other public meetings to get public comments and then we would begin to screen the final site (or combination of sites, if appropriate) for restoration. I just want to make something more clear than I obviously had at the public meeting, the report that Mr. Battista was quoting from is not what we are using for this study. We have made no determinations regarding the conceptual plans or the size of the potential restoration site yet. That would all be done in the next stage once the island(s) is selected. Can you please get that word out if anyone else is confused? Again, thanks! Mimi

-----Original Message-----
From: John R. Neild, Sr. [mailto:jrneild@fastol.com]
Sent: Friday, February 21, 2003 3:54 PM
To: Michele Bistany-USCorp of Eng.
Subject: FYI

I thought I would show you what I came up with for James. We are going to get this around with the yellow cards for input. We may do the same for Barren Island. Quite frankly, those are the only two island restorations that we have been pounding for because of the mainland erosion issue. I think Hoopers restoration is excellent, but Barren restoration could lessen the protection necessary for Hoopers restoration if Barren was done first. Of course, my preference would be James and Ragged for our personal interests.

Rick Neild

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Checked by AVG anti-virus system (http://www.grisoft.com).
Version: 6.0.455 / Virus Database: 255 - Release Date: 2/13/2003

Bistany, Michele A NAB02

From: John R. Neild, Sr. [jrneild@fastol.com]
Sent: Saturday, February 22, 2003 7:06 PM
To: bette nieberlein; Bill Neild-Home (Bill Neild); BNeild@cambridge-intl.com; Bruce Coulson; CJBARSTAD@aol.com; J. R. Neild Jr.; JB and Patti (Tieder); June; Lisa Neild; Marcia Neild; 'The Neild's' ('The Neild's'); Tim Bishop; Tom & lisa Neild (Tom & lisa Neild); Tom Collins; Warren Papin; Jack Shiloh
Cc: Michele Bistany-USCorp of Eng.; Tom Miller-Wye Center
Subject: Rebuilding Islands

James Island.doc

The attachment shows the erosion problem with James Island. The Concept area shows what is intended to be replaced. Please forward to all on your lists and ask for comments pro or con. Their intention is to rebuild out side of private property upwards of 2500 acres. They are considering and trying to get rights to rebuild Ragged Island. Their intention is to do all of Ragged in Marsh habitat and James would be 75% upland and 25% marsh and water fowl habitat. The barrier reef would be hundreds and hundreds of feet surrounding this project and be an awesome fish and crab sanctuary and nursery. Protecting the Little Choptank would re establish the most productive oyster and fish habitat of the state. The comments are really to establish the publics acceptance of rebuilding islands. Barren, Hoopers lower, Holland are other islands that are being considered. We as Dorchesterians need to support all, but given the location, James and Barren should be the number one priorities.

Rick

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Version: 6.0.456 / Virus Database: 256 - Release Date: 2/18/2003

Bistany, Michele A NAB02

From: John R. Neild, Sr. [jrneild@fastol.com]
Sent: Friday, February 21, 2003 3:54 PM
To: Michele Bistany-USCorp of Eng.
Subject: FYI

James Island.doc

I thought I would show you what I came up with for James. We are going to get this around with the yellow cards for input. We may do the same for Barren Island. Quite frankly, those are the only two island restorations that we have been pounding for because of the mainland erosion issue. I think Hoopers restoration is excellent, but Barren restoration could lessen the protection necessary for Hoopers restoration if Barren was done first. Of course, my preference would be James and Ragged for our personal interests.

Rick Neild

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Version: 6.0.455 / Virus Database: 255 - Release Date: 2/13/2003

Bistany, Michele A NAB02

From: John R. Neild, Sr. [jrneild@fastol.com]
Sent: Friday, February 21, 2003 2:19 AM
To: Michele Bistany-USCorp of Eng.
Subject: Cambridge meeting

James.pdf

Hello Michele,

I thought the meeting was very good and I hope I contributed to your cause. I have attached the slides of the foot print concept that we all have had on the James Island rebuild for your info. We have Barren and Holland also and I will send it to you Friday. These came from the recon study by the port so after looking at it, I figure you should of or could of had it. Call on us to help in any aspect freely.

I am going to do an article locally to generate as much positives as we can and get the yellow comment sheets around. You may get emails and mail as we promote the comment need for you.

Thank you for the Corps interest. We NEED to rebuild James as well as the others. Our need is to look at a vision of its entirity rather than personal. Barrier island rebuild does this.

Rick Neild

Outgoing mail is certified Virus Free.
Checked by AVG anti-virus system (http://www.grisoft.com).
Version: 6.0.455 / Virus Database: 255 - Release Date: 2/13/2003

Bistany, Michele A NAB02

From: John Neild [jsneild@fastol.com]
Sent: Saturday, February 22, 2003 9:41 PM
To: Bistany, Michele A
Subject: Island Restoration

I am an owner of land on Taylors Island.
The idea of restoring James and other Islands is the RIGHT idea. The sediment in the channels mostly came from erosion, and it is only natural to return it to where it came from. This would recover lost land, improve fish and crab habitat, protect other land behind the restored area, and generally improve Bay water quality. There are many good reasons for pursuing this solution to disposal of dredged material.
I favor this project, and especially the restoration of James Island
John S. Neild, Jr.
5110 North Drive
Cambridge, MD 21613

Outgoing mail is certified Virus Free.
Checked by AVG anti-virus system (<http://www.grisoft.com>).
Version: 6.0.455 / Virus Database: 255 - Release Date: 2/13/2003

Bistany, Michele A NAB02

From: pritch [pritch@fastol.com]
Sent: Thursday, February 27, 2003 1:50 PM
To: Bistany, Michele A
Subject: jamesisland

my name is jack samakow I live at 4245 robinson neck rd taylors island i think that saving james island should be done as soon as possible it is leaving very fast from the bay the look changes every year thank you jack

Mid-Chesapeake Bay Island Environmental Restoration Feasibility Study
Public Scoping Meeting – February 20, 2003
Dorchester County, Maryland

Name (Please Print): MR. & MRS. LAWRENCE J. FRIEDER

Title:

Company/Organization:

Address: 1709 DOEHLER ROAD, FISHING CREEK, MD. 21634

Telephone Number: 410 397 3021 Fax Number:

E-mail Address:

Comments/Suggestions: I WOULD LIKE TO SEE YOU GO ON WITH THESE PROJECTS, PREFERABLY BARREN ISLAND & HOOPER ISLAND. I WOULD LIKE TO SEE SOMETHING LIKE NATURE TRAILS SET UP ON BARREN ISLAND. PEOPLE COULD GO THERE BY BOAT AND WALK AROUND. SET UP SIMILAR TO BLACK WATER WILDLIFE REFUGE.

L J F

PLEASE SEND FUTURE NEWSLETTERS & PUBLICATIONS

Dorchester County Resource Preservation and Development Corp.

Joe Coyne, Pres., 913 Parsons Drive, Madison, MD 21648 410-228-8209
Bruce Coulson, V-Pres., P.O. Box 156, Taylor's Island, MD 21669 410-397-3275
Bette Stecher, Tres., 1729 Hoopersville Rd. Fishing Creek, MD 21634
Cindy Bech, Sec., 2315 Hoopers Island Rd, Fishing Creek, MD 21634

February 28, 2003

Mid-Chesapeake Bay Island Environmental
Restoration Feasibility Study
ATTN: Michele A. Bistany
U. S. Army Corps of Engineers
P. O. Box 1715
Baltimore, Maryland 21203-1715

Dear Ms. Bistany:

Thank you for visiting Cambridge on February 20th, 2003, to brief the local citizenry on the Mid-Chesapeake Bay Island Environmental Restoration Feasibility Study. The agenda was well thought out and comprehensive in scope.

The group that I represent, The Dorchester County Resource Preservation and Development Corporation is organized exclusively for non profit purposes to further the preservation and economic development of the Natural Resource Area of Dorchester County and its environs and to promote and assist in the preservation of the area as well as its economic viability.

We have organized our efforts around two separate but very related needs:

First, to find a way to provide direct assistance to property owners and others impacted by shore line erosion, and

Second, to find more long range and permanent help by stabilizing shore lines with environmentally sound off shore barriers.

The goal set out in your Feasibility Study, "to restore valuable aquatic and terrestrial resting, nesting, foraging, and nursery habitat that has been lost in the Chesapeake Bay for many migratory birds, fish, and wildlife species through the beneficial use of dredged material," and to create a "habitat that will afford improved productivity to the surrounding area, while providing an environmentally sound method for the use of dredged material removed from Bay Channels", is strongly endorsed by our organization.

We further encourage the selection of a site or sites in Dorchester County for location of your restoration program. Dorchester County has a history and culture very much a part of the environment you are proposing to enhance. Erosion has caused the deterioration of several of our barrier islands, such as Barren and James Islands. This in turn has been harmful to fish and wildlife habitat in those areas. Sediment and nutrients, released into the Bay as a result of erosion have caused significant damage to the fish and wildlife habitat in the Bay. Selection of one or more of the Dorchester sites you are considering would lead, we are convinced, to significant restoration of those damaged areas.

In closing we endorse your overall effort, and support the selection of a Dorchester County site for the restoration of hundreds of acres of aquatic and wildlife island habitat through the beneficial use of dredged materials.

Sincerely yours,

Joseph G. Coyne
President

Already In

Mid-Chesapeake Bay Island Environmental Restoration Feasibility Study
Public Scoping Meeting – February 20, 2003
Dorchester County, Maryland

Name (Please Print): Captain Ben Parks

Title: President and Board of Directors - Md. Watermens Assoc., Inc.

Company/Organization: Dorchester County Seafood Harvesters Assoc., Inc.

Address: 311 N Athans Avenue, Cambridge, Md. 21613

Telephone Number: 410-228-7837 Fax Number: 410-228-2509

E-mail Address: Rockfish@intercom.Net

Comments/Suggestions: In favor of islands Restorations in Dorchester County.

1. Barren Is.
2. James Is.

ENVIRONMENTAL
CONCERN

Mid-Chesapeake Bay Island Environmental Restoration Feasibility Study
ATTEN: Michele A. Bistany
U.S. Army Corps of Engineers
10 South Howard Street
P.O. Box 1715
Baltimore, MD 21203-1715

RE: Restoration of Hambleton Island -utilizing dredged material.

Purpose:
The purpose of this letter is to request that Hambleton Island, Broad Creek be included in the Mid Chesapeake Bay Island, Maryland Environmental Restoration Feasibility Study.

Background:
At the February 20, 2003 Scoping meeting, the criteria for selecting islands to be considered for restoration, using dredged material, was presented to the interested public. (Schedule A –attached).
The first criteria listed is *Limited Restoration Potential < 200 acres.*
Approximately 50% of the possible locations were eliminated under this first criteria. Several participants requested additional information in support of the minimum size qualification. At least one participant questioned the ecological benefit and the wisdom of building a 300-acre island 8-15 feet high. In follow up discussion, USACE Staff indicated that economics drove the minimum size qualification.
The third criteria listed is *Hydraulics Impacts*
Fourteen of the listed islands were judged unacceptable for *Hydraulics Impacts*. Each of these fourteen islands was also rated *Limited Restoration Potential < 200 acres.*
Hydraulics Impacts was not defined in the literature or in the presentation.
Hambleton Island, Broad Creek is one of six islands judged unacceptable due to size and hydraulics impacts only.

Comment:
There is no correlation between "size and elevation" and "high priority environmental outputs." We believe many small islands, 60-150 acres in size and dominated by wetlands, provide all the *Need for Island Habitat Restoration* as presented by the USACE.
Specifically, small islands, dominated by wetlands will:

- replace lost wetland and upland habitat
- provide resting, nesting, foraging and production areas
- prevent further island erosion
- improve water clarity and help promote aquatic vegetation
- protect shallow water areas, suitable for SAV
- provide essential nursery habitat for anadromous fish
- protect environmentally, historically, and culturally significant remnant island habitat
- protect shoreline for avian, reptilian, and mammilian species resting/nesting/foraging areas

P. O. Box P, St. Michaels, Maryland 21663
http://www.wetland.org
(410) 745-9620
(410) 745-3517 Fax

Many small islands, dominated by wetlands, will provide the needed dredged material placement capacity to ensure that shipping channels to the Port of Baltimore remain open and safe for navigation. The "environmental return" of many small islands, dominated by wetlands, far exceeds the return from one large island, dominated by upland.

Consider the following benefits:

Erosion protection:
Studies have concluded that more than half of normal wave energy is dissipated as it passes over the first three meters of marsh vegetation. Within 10 meters, the destructive energy is completely absorbed.

Sediment Traps:
Wetlands improve water quality by acting as sediment basins. They are especially effective at trapping sediments in slow-moving water. Wetland vegetation slows water velocity; particles settle out as the velocity of the tidal flow decreases. The decreased turbidity allows light to penetrate more effectively, encouraging the growth of phytoplankton and other tiny organisms that make up the base of the food web. Turbid water can lead to a host of problems; the burying ~~burped~~ benthic organisms that exist on the soil's surface, and alterations in the normal fluctuation of water temperature.
In fact, more constructed wetlands, functioning as sediment traps, will over time reduce the need for dredging in the shipping channels.

Biological Functions:
The sustained yield of organic material is a salient characteristic of wetlands. As a whole wetlands are the world's most productive ecosystem, generating more than 10 tons of useful organic matter per acre – more than twice the yield of a cornfield, ten times that of the bay waters and thirty times as much as the open waters of the ocean.
Eighty percent of all breeding bird populations in the United States, along with more than half of the protected migratory bird population species, rely on wetlands at some point in their life cycle. Ninety-five percent of all U.S. commercial fish and shellfish species depend on wetlands.

Conclusion:
The cost benefit of creating smaller islands, dominated by wetlands, far exceeds that of one large island dominated by upland.
We respectfully request that the USACE select Hambleton Island as one of several islands to be restored utilizing dredged material.

Sincerely
Environmental Concern Inc.
BY:

Gene Slear
11 March 2003

ENVIRONMENTAL
CONCERN

Dear Mr. Mendelsohn:

I want to take the opportunity to commend the Army Corps of Engineers on the success of the Poplar Island Restoration. I support this project and the ongoing dredging needs of The Port of Baltimore.

I understand that the Corps is conducting a Mid Bay Island Study that includes the restoration of James & Barren Islands. Having worked with the Shoreline Erosion groups for the last ten years, I believe the restoration of these islands are critical and must be given priority over or in addition to the Poplar Island Expansion.

While I realize funding for such projects is tight, including James and Barren Island in the discussion of dredge sites at this time would be extremely beneficial both to the environment as well as the dredge plan for the Port of Baltimore.

Thank you in advance for your attention to this matter. Please feel free to call upon me if I can be of any additional assistance..

Sincerely,

Addie Eckardt

Addie C. Eckardt

ACE/cbss

Dear Delegate Eckardt:

Thank you for your support of the Poplar Island project and taking the time to provide comments on our expansion study.

Our recently completed Dredged Material Management Plan developed a long-term strategy for dredged material placement and recommended concurrent studies of Poplar Island expansion and a Mid Bay Island restoration. We recognize the importance of these critical islands not only for the valuable habitat they provide through the beneficial use of dredged material but also for the protection of the adjacent shorelines. However, our responsibility to keep the navigation channels serving the Port of Baltimore open and safe also requires us to seek solutions with a high likelihood of success. While Poplar Island expansion provides lower risk to the Corps, and our partners the Maryland Port Administration, of meeting our near term placement needs, we are also completing the Mid Bay island study as quickly as possible. With both studies complete by early next year, the decision makers within the Administration, Congress and the State of Maryland will have a choice of options.

Your request to prioritize James and Barren Island over Poplar Island expansion is a comment we have heard many times during our study process. We must consider the restrictive funding environment that currently exists and be wary of the implementation costs of each alternative. As mentioned previously, the final choice of which project will proceed first lies with those who will be asked to fund the projects. We will include your comment in our reports and in our discussions with higher authority. Also, after completion of our draft report for the Mid Bay Island study, it will be made available for public comment and we will be holding public meeting(s)(most likely in the Dorchester County area). This will give you and other interested parties another opportunity to support these projects and provide comment and input to the process.

Thank you again for your support.

Mark Mendelsohn

Biologist, Baltimore District

USACE

DHCD
Maryland Department of Housing
and Community Development

Robert L. Ehrlich, Jr.
GOVERNOR

Michael S. Steele
LT. GOVERNOR

Victor L. Hoskins
SECRETARY

Shawn S. Karimian
DEPUTY SECRETARY

April 4, 2005

Ms. Linda C. Janey, J.D.
Director
Maryland State Clearinghouse for Intergovernmental Assistance
Maryland Department of Planning
301 West Preston Street
Room 1104
Baltimore, Maryland 21201-2305

Dear Ms. Janey;

This office has received the report prepared to address the Baltimore Harbor and Channels Dredged Material Management Plan (DMMP):

> Draft Baltimore Harbor and Channels Dredged Material Management Plan and Tiered EIS
> State Application Identifier: MD20050211-0072

The extent of effects on historic properties by the outlined projects cannot be determined due to insufficient information. Federal and/or State historic preservation requirements have not been met by this draft document.

Our initial review of Volume II – Appendices; Appendix E - Cultural Resources Study indicates a need for additional archeological research and underwater survey, after the U.S. Army Corps of Engineers selects a finalized DMMP plan. Survey scopes can be developed when DMMP determines more precisely where dredged material will be placed; where new spoils placement will occur or the extent of expansion of existing facilities.

Our review identified the need for archeological surveys if existing facilities are expanded (i.e. Hart-Miller Island and Pooles Island open water site), creation of new islands (West of Tolchester Channel), restoration (Parson's Island and Mid –Bay Shoreline), use of open water dumping of spoils (the Deep Trough), or upland deposal sites (Cecil County). Our experience has shown that the potential for cultural resources in any of these options range from the region's earliest, Paleo-Indian sites, to historically significant shipwrecks.

DIVISION OF HISTORICAL AND
CULTURAL PROGRAMS

100 Community Place
Crownsville, MD 21032

PHONE 410-514-7600
TOLL FREE 1-800-756-0119
FAX 410-987-4071
TTY/RELAY 711 or 1-800-735-2258
WEB www.mdhousing.org

We request that the Corps maintain consultation with Maryland Historical Trust (MHT) staff, including myself. Please forward all detailed plans as they become available to me as well as MHT's Office of Preservation Services staff.

Further consultation with our office, by the Corps and consultants, will be necessary to fulfill compliance with Section 106 of the National Historic Preservation Act of 1966, as amended. All surveys needs to be performed in accordance with the "Standards and Guidelines for Archeological Investigations in Maryland" (Shaffer and Cole 1994), Archeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines (1983) and direct consultation with Maryland Historical Trust underwater archeologists.

Thank you for your early consultation and cooperation. If you have any questions or require further information, please contact me at (410-514-7662) or Mr. Stephen Bilicki (410) 514-7668.

Sincerely,

Susan B.M. Langley, Ph.D.
State of Maryland Underwater Archeologist
200500348
cc: Mr. Bob Rosenbush
Ms. Elizabeth J. Cole
Mr. Stephen R. Bilicki

DORCHESTER COUNTY RESOURCE
PRESERVATION AND DEVELOPMENT CORP., INC.

2315 Hooper's Island Road
Fishing Creek MD 21634

April 21, 2005

Scott Johnson
Project Manager, Mid-Bay Island Study
U.S. Army Corps of Engineers
Baltimore District
PO Box 1715
Baltimore MD 21203-1715

Dear Scott,

On behalf of the Dorchester County Shoreline Erosion Group, thank you very much for taking your Saturday to give us an update on the use of beneficial dredge material to restore James and Barren islands.

We appreciated your patience with all our questions and your answers were very helpful.

Very sincerely,

Cindy Bech

Cindy Bech, Secretary

cc: Joe Coyne
Frank Spitz

July 26, 2005

The Honorable Paul S. Sarbanes
Senator
110 W. Church Street
Suite D
Salisbury, MD 21801

Dear Senator Sarbanes:

The Army Corp of Engineers is currently proposing a Poplar Island Expansion to be included in the next WRDA. I support his project and the dredging needs of the Port of Baltimore. The Corp is also conducting a Mid Bay Island Study that includes the restoration of James & Barren Islands. I believe you should have this project included along with the Popular Island expansion or instead of the Popular Island expansion in the next WRDA.

The Port of Baltimore is vital to the economy of Maryland. If the Poplar Island project were to run into obstacles beyond our control and not be able to be used, the Corp would not have a site to place dredge material and be forced to discontinue dredging. This would eventually stop shipping and seriously hurt the Port. The economic impact would be felt though out our state by the loss of jobs and the material being shipped to and from the port. By adding this project this would be the 20 year dredge material plan the Corp has been charged create.

The Poplar Island Restoration has been a great success for the Corp of Engineers and the State of Maryland. We need to get started now to save James & Barren Islands from eroding away. The restoration of these islands will provide the same great environmental benefits that have made Poplar Island a great success. I again urge to work to have the Mid Bay Islands Restoration project included in this WRDA. I know funding is tight but just imagine the amount of funds lost if we lose the Port of Baltimore.

Sincerely,

Frank J. Spitz, Jr.

Frank J. Spitz, Jr. CM,SET
1120 Ross Thumb Road
Cambridge, MD 21613
410-228-4551

Cc: Governor Robert L. Ehrlich, Jr
Senator Richard Colburn
Delegate Rudolph C. Cane
Delegate Adelaide C. Eckardt
Delegate Jeannie Haddaway
Dorchester County Council
USACE Mark Mendelsohn
MPA Frank Hammons

EIS
Letters

DORCHESTER SOIL CONSERVATION DISTRICT

501 Court Lane, Room 213
Cambridge, Maryland 21613
Phone (410) 228-3733

September 25, 2006

U.S. Army Corps of Engineers
Attn: Ms. Stacey Blersch – Planning Division
P.O. Box 1715
Baltimore, MD 21203

Dear Ms. Blersch,

On behalf of The Dorchester Soil Conservation District (SCD) please accept this letter of support and endorsement for the Mid-Chesapeake Bay Island Restoration. After receiving and reviewing your draft feasibility report and environmental impact statement dated August 2006, our District believes this would be a mutually beneficial project.

The SCD continually work with Dorchester landowners along the Chesapeake Bay who are losing 25 to 50 feet of shoreline a year if not properly protected. The deterioration of James and Barren Islands creates a larger list of landowners feeling those types of effects from the Bay. The process of rebuilding these natural barriers to shoreline erosion would greatly benefit Dorchester County and its residents living in that part of the County. Restoration of these islands also benefits the natural habitat in the area by restoring an entire eco-system that is in danger of washing away.

The District realizes that these projects are years away, but please keep us in mind as a resource and as a supportive partner in your efforts.

Sincerely,

James A. Newcomb Jr.

James A. Newcomb Jr.
District Manager

Our Soil — Our Strength

WILLIAM GIESE, JR., Chairman
ALAN JOLICOEUR, Treasurer
G. STEELE PHILLIPS, Vice-Chairman
BETSY GALLAGHER, Secretary & Extension Agent
JOSEPH LAYTON, Member
GENE SKINNER, District Conservationist
N. WESLEY MESSICK III, Member
LESLIE WARFIELD, District Secretary
JAMES NEWCOMB, JR., District Manager

EIS
Comments

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
Custom House, Room 244
200 Chestnut Street
Philadelphia, Pennsylvania 19106-2904

IN REPLY REFER TO:

October 17, 2006

ER 06/0901

Ms. Stacey Blersch
U.S. Army Corps of Engineers
Baltimore District, Planning Division
Post Office Box 1715
Baltimore, MD 21203-1715

Dear Ms. Blersch:

The Department of the Interior (Department) has reviewed the Draft Integrated Feasibility Report and Environmental Impact Statement (DEIS) for the Mid-Chesapeake Bay Island Ecosystem Restoration Study, Dorchester County, Maryland, dated August 2006. Please consider the following comments in completing the final version of the report.

GENERAL COMMENTS

The report contains the Fish and Wildlife Coordination Act Report, dated May 24, 2005, produced by the U. S. Fish and Wildlife Service, which expresses general support for both the James Island and Barren Island components of the project. The DEIS adequately describes the project effects for which the Department has jurisdiction or special expertise. Certain points that appear to be inaccurate or in need of clarification are discussed below.

SPECIFIC COMMENTS

Pg ES-5, lines 2-3. The statement that "Barren Island is used as nesting habitat by several Federally listed threatened bird species" is incorrect. The bald eagle is the only such species.

Pg ES-15, lines 5-6. The statement that "the proposed James Island restoration project would preserve approximately 100 acres of existing wooded, fringe marsh, and beach island habitat that is subject to rapid erosion" is misleading. Page 3-2 notes that the Island remnant acreage was only 92 acres in 1994. Page 3-75 notes that the Island erodes at a rate of 4.9 acres per year and is projected to disappear by 2021. According to the project implementation schedule, dike construction would not begin until fiscal year 2010. Since it appears that the amount of preserved island habitat would be considerably less than 100 acres, the statement should be appropriately qualified.

Pg 3-7, lines 31-32. The statement that "the salinity of the Chesapeake Bay water varies from 3.5 percent (seawater, 18 ppt) at the mouth" is incorrect. It is true that the average salinity of the open ocean is approximately 3.5 percent (i.e., 35 grams of salt per liter of seawater). However, the salinity at the bay mouth is somewhat less and, while varying temporally and with depth, tends to be on the order of 3.0 percent which is equal to 30 ppt.

Pg 3-9, lines 14-15. The statement that "the tides are greater at the mouth of the Chesapeake Bay [0.9 m (2.95 ft)] and decrease northward to ~0.3 m (1ft) near the Fall Zone at the head of the head of the Chesapeake Bay" is not quite correct. The general pattern is that the tides decrease from the Bay mouth and reach a low of approximately 1 foot in the area near Annapolis, but then increase to nearly 2 feet at Town Point near the head of the Bay.

Pg 4-31, line 4. The wetland/upland ratio of the selected plan is not 45/55 as stated here, but rather 55/45.

Pg 5-1, lines 21-22. The statement that the James Island proposal would be constructed to approximate the historic 1877 island footprint conflicts with previous information from the report (page 3-5) that states that the 1847 footprint consisted of only 976 acres, far smaller than the 2,072-acre proposal.

Pg 5-1, lines 38-39. The statement that the recommended alternative "includes the option to reconfigure the wetland and upland ratios" needs to be clarified since this is an important aspect of the project. From information presented on page 5-3, it appears that this refers to an option to increase the wetland portion of the project from 55 to 60 percent. It would improve clarity if this information was added to qualify the statement on reconfiguring the wetland and upland ratio.

Pg 6-2, lines 25-26. The statement that Barren Island has lost 520 to 660 acres in the last 325 years is inconsistent with information presented on page 3-5 and Figure 3-4 which appears to calculate this loss of acreage from the 1848 footprint. Since erosion has been an ongoing process over the past few hundred years, there are various "historic" footprints for the islands depending on what dates are selected. To reduce confusion our suggestion would be to emphasize the 1847/48 footprint because this data is likely to be more reliable than the data from the 1600's. It should be evident that the farther back in time one goes, the larger will be the footprint.

Thank you for the opportunity to present these comments. If there are any questions, please contact George Ruddy of the U. S. Fish and Wildlife Service's Chesapeake Bay Field Office at (410) 573-4528.

Sincerely,

Michael T. Chezik

Michael T. Chezik
Regional Environmental Officer

cc: G. Ruddy, FWS, Annapolis, MD

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

October 23, 2006

Ms. Stacey Blersch
Planning Division
P.O. Box 1715
Baltimore, Md. 21203

Subject: Mid-Chesapeake Bay Island Ecosystem Restoration Integrated Feasibility Report and Environmental Impact Statement CEQ # 20060366

In accordance with the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act, the U.S. Environmental Protection Agency (EPA) offers the following comments regarding the Mid-Chesapeake Bay Island Ecosystem Restoration project Draft Environmental Impact Statement. The recommended plan would restore 2,144 acres of habitat, protect 623 acres of existing island habitat that includes 352 acres of critical submerged aquatic vegetation and provide 90 to 95 million cubic yards of dredged material placement capacity. The recommended plan selects the James and Barren Islands for island ecosystem restoration.

EPA region 3 has participated in the Baltimore Harbor and Cannels, Dredged Material Management Plan and Tiered Environmental Impact Statement developed to address the dredging needs of the area over a 20 year planning horizon. While EPA clearly concurs with the need for protection and restoration of Barren and James Islands, there also needs to be a long term management effort to protect and improve wetlands in the Black Water Wildlife (BWR) Refuge in Dorchester County which must be considered for future restoration. The BWR needs millions of cubic yards of materials and while this alternative will require some major engineering and design, this site is of national aquatic significance and has the potential for large scale wetlands creation.

Based upon our review of the Draft EIS the project is rated as LO, Lack of Objections (LO). A copy of the EPA rating criteria is enclosed for your reference. If you have any questions or comments please feel free to contact me at 215-814-3367 or Mr. Bill Muir at 215-814-2741.

Sincerely,

William Arguto, NEPA Team Leader
Environmental Programs Branch

Enclosures:

U.S. Environmental Protection Agency

National Environmental Policy Act (NEPA)

Compliance and Enforcement Home

National Environmental Policy Act Home

Basic Information

Where You Live

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Environmental Impact Statements - Notices of Availability

Submitting Environmental Impact Statements

Obtaining Environmental Impact Statements

EPA Comments on Environmental Impact Statements

EPA Compliance with NEPA

Environmental Impact Statement (EIS) Rating System Criteria

EPA has developed a set of criteria for rating draft EISs. The rating system provides a basis upon which EPA makes recommendations to the lead agency for improving the draft EIS.

- Rating the Environmental Impact of the Action
- Rating the Adequacy of the Draft Environmental Impact Statement (EIS)

RATING THE ENVIRONMENTAL IMPACT OF THE ACTION

- **LO (Lack of Objections)** The review has not identified any potential environmental impacts requiring substantive changes to the preferred alternative. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposed action.

- **EC (Environmental Concerns)** The review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact.

- **EO (Environmental Objections)** The review has identified significant environmental impacts that should be avoided in order to adequately protect the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). The basis for environmental Objections can include situations:

  1. *Where an action might violate or be inconsistent with achievement or maintenance of a national environmental standard;*

  2. *Where the Federal agency violates its own substantive environmental requirements that relate to EPA's areas of jurisdiction or expertise;*

  3. *Where there is a violation of an EPA policy declaration;*

  4. *Where there are no applicable standards or where applicable standards will not be violated but there is potential for significant environmental degradation that could be corrected by project modification or other feasible alternatives; or*

  5. *Where proceeding with the proposed action would set a precedent for future actions that collectively could result in significant environmental impacts.*

- **EU (Environmentally Unsatisfactory)** The review has identified adverse environmental impacts that are of sufficient magnitude that EPA believes the proposec action must not proceed as proposed. The basis for an environmentally unsatisfactory determination consists of identification of environmentally objectionable impacts as defined above and one or more of the following conditions:

1. *The potential violation of or inconsistency with a national environmental standard is substantive and/or will occur on a long-term basis;*

2. *There are no applicable standards but the severity, duration, or geographical scope of the impacts associated with the proposed action warrant special attention; or*

3. *The potential environmental impacts resulting from the proposed action are of national importance because of the threat to national environmental resources or to environmental policies.*

Return to Top

RATING THE ADEQUACY OF THE DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS)

- **1 (Adequate)** The draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

- **2 (Insufficient Information)** The draft EIS does not contain sufficient information to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the proposal. The identified additional information, data, analyses, or discussion should be included in the final EIS.

- **3 (Inadequate)** The draft EIS does not adequately assess the potentially significant environmental impacts of the proposal, or the reviewer has identified new, reasonably available, alternatives, that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. The identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. This rating indicates EPA's belief that the draft EIS does not meet the purposes of NEPA and/or the Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS.

Maryland Department of Planning

Robert L. Ehrlich, Jr.
Governor
Michael S. Steele
Lt. Governor

Audrey E. Scott
Secretary
Florence E. Burian
Deputy Secretary

September 7, 2006

Ms. Stacey Blersch
Planning Division
U.S. Army Corps of Engineers, Baltimore District
P.O. Box 1715
Baltimore, MD 21203-1715

STATE CLEARINGHOUSE REVIEW PROCESS

State Application Identifier: **MD20060907-0960**
Reviewer Comments Due By: October 14, 2006
Project Description: Draft Mid-Chesapeake Bay Island Ecosystem Restoration Integrated Feasibility Report and EIS: proposed restoration of habitat; protection of ecosystem habitat; provision of dredged material placement capacity; minimization of erosion
Project Location: Maryland
Clearinghouse Contact: Bob Rosenbush

Dear Ms. Blersch:

Thank you for submitting your project for intergovernmental review. Participation in the Maryland Intergovernmental Review and Coordination (MIRC) process helps ensure project consistency with plans, programs, and objectives of State agencies and local governments. MIRC enhances opportunities for approval and/or funding and minimizes delays by resolving issues before project implementation.

The following agencies and/or jurisdictions have been forwarded a copy of your project for their review: the Maryland Departments of the Environment, General Services, Natural Resources, Transportation, the Maryland Environmental Service, the Counties of Cecil, Anne Arundel, Dorchester, Queen Anne's, Calvert, Baltimore, Talbot, Kent, Somerset, St. Mary's, Harford, and Wicomico; the Cities of Baltimore, and Cambridge; and the Maryland Department of Planning, including the Maryland Historical Trust.

They have been requested to contact your agency directly by **October 14, 2006** with any comments or concerns and to provide a copy of those comments to the State Clearinghouse for Intergovernmental Assistance. Please be assured that after **October 14, 2006** all MIRC requirements will have been met in accordance with Code of Maryland Regulations (COMAR 14.24.04). The project has been assigned a unique State Application Identifier that should be used on all documents and correspondence.

301 West Preston Street • Suite 1101 • Baltimore, Maryland 21201-2305
Telephone: 410.767.4500 • Fax: 410.767.4480 • Toll Free: 1.877.767.6272 • TTY Users: Maryland Relay
Internet: www.MDP.state.md.us

Maryland Department of Planning

Robert L. Ehrlich, Jr.
Governor
Michael S. Steele
Lt. Governor

Audrey E. Scott
Secretary
Florence E. Burian
Deputy Secretary

If you need assistance or have questions, contact the State Clearinghouse staff noted above at 410-767-4490 or through e-mail at brosenbush@mdp.state.md.us. Thank you for your cooperation with the MIRC process.

Sincerely,

Linda C. Janey

Linda C. Janey, J.D., Director
Maryland State Clearinghouse for Intergovernmental Assistance
LCJ:BR
Enclosure(s)
cc: Pat Goucher – MDPL*
Brooks Royster - MPA
Cleveland L. Rippons – CAMBRIDGE*
Joane Mueller – MDE*
Nelson Reichart – DGS*
Ray Dintaman – DNR*
James Harkins – MES*
Cindy Johnson – MDOT*
Beth Cole – MHT*
Eric Sennstrom – CECL*
Robert Caffrey – ANAR*
Steven Dodd – DRCH*
Faith Rossing – QANN*
Gregory Bowen – CLVT*
Bill Hughey – BLCO*
Terry Royce – BCIT*
George Kinney – TLBT*
Joe Tassone – MDPE*
Gail Owings – KENT*
Charles Massey – SMST*
George Forrest – STMA*
Theresa Raymond – HRFD*
Gary Pusey – WCMC*

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Maryland
Department of Agriculture
Office of the Secretary

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Robert L. Ehrlich, Jr., Governor
Michael S. Steele, Lt. Governor
Lewis R. Riley, Secretary
John R. Brooks, D.V.M., Deputy Secretary

The Wayne A. Cawley, Jr. Building
50 Harry S. Truman Parkway
Annapolis, Maryland 21401

Internet: www.mda.state.md.us

410.841.5700 Baltimore/Washington
301.261.8106 Washington, D.C.
410.841.5914 Fax
800.492.5590 Toll Free

September 27, 2006

U.S. Army Corps of Engineers
Attn: Ms. Stacey Blersch
Planning Division
PO Box 1715
Baltimore MD 21203

Dear Ms. Blersch:

The *Draft* Mid-Chesapeake Bay Island Ecosystem Restoration Integrated Feasibility Report & Environmental Impact Statement has been reviewed and found to be within Maryland Department of Agriculture's plans, programs, and objectives.

If you have any questions, please contact me at 410.841.5880 or via email: MinnicGC@mda.state.md.us.

Sincerely,

Gloria Minnick

Gloria Minnick
Executive Associate

MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard • Baltimore Maryland 21230-1718
(410) 537-4120

Robert L. Ehrlich, Jr.
Governor

Michael S. Steele
Lt. Governor

Kendl P. Philbrick
Secretary

Jonas A. Jacobson
Deputy Secretary

September 28, 2006

Ms. Stacey Blersch
U.S. Army Corps of Engineers, Baltimore District
P.O. Box 1715
Baltimore, MD 21203

RE: State Application Identifier: MD20060907-0960
Project: Draft Mid-Chesapeake Bay Island Ecosystem Restoration

Dear Ms. Blersch:

Thank you for the opportunity to review the above referenced project. The document was circulated throughout the Maryland Department of the Environment (MDE) for review, and the following comments are offered for your consideration.

1. Any above ground or underground petroleum storage tanks that may be utilized must be installed and maintained in accordance with applicable State and federal laws and regulations. Contact the Oil Control Program at (410) 537-3442 for additional information.

Again, thank you for giving MDE the opportunity to review this project. If you have any questions or need additional information, please feel free to call me at (410) 537-4120.

Sincerely,

Joane D. Mueller
MDE Clearinghouse Coordinator
Technical and Regulatory Services Administration

cc: Bob Rosenbush, State Clearinghouse

Maryland Department of Planning

Robert L. Ehrlich, Jr.
Governor
Michael S. Steele
Lt. Governor

Audrey E. Scott
Secretary
Florence E. Burian
Deputy Secretary

November 2, 2006

Ms. Stacey Blersch
Planning Division
U.S. Army Corps of Engineers, Baltimore District
P.O. Box 1715
Baltimore, MD 21203-1715

STATE CLEARINGHOUSE REVIEW – ADDITIONAL REVIEWER COMMENTS RECEIVED

State Application Identifier: MD20060907-0960
Project Description: Draft Mid-Chesapeake Bay Island Ecosystem Restoration Integrated Feasibility Report and EIS: proposed restoration of habitat; protection of ecosystem habitat; provision of dredged material placement capacity; minimization of erosion
Project Location: Maryland
Clearinghouse Contact: Bob Rosenbush

Dear Ms. Blersch:

We are forwarding the enclosed comments made by the Maryland Department of Agriculture, and Harford County regarding the referenced project for your information.

Should you have any questions, contact the State Clearinghouse staff person noted above at 410-767-4490 or through e-mail at brosenbush@mdp.state.md.us. Your cooperation and attention to the review process is appreciated

Sincerely,

Linda C. Janey

Linda C. Janey, J.D., Director
Maryland State Clearinghouse for Intergovernmental Assistance

LCJ: BR

Enclosures (Comments Received)
cc: Theresa Raymond – HRFD
Gloria Minnick - MDA

06-0960_OLRR.OTH.doc

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Maryland
Department of Agriculture

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50 Harry S. Truman Parkway
Annapolis, Maryland 21401

Internet: www.mda.state.md.us

410.841.5700 Baltimore/Washington
301.261.8106 Washington, D.C.
410.841.5914 Fax
800.492.5590 Toll Free

September 29, 2006

Mr. Bob Rosenbush
Maryland Department of Planning
301 West Preston Street, Suite 1101
Baltimore MD 21201-2305

RE: MD20060907-0960

Dear Mr. Rosenbush:

The *Draft* Integrated Feasibility Report and Environmental Impact Statement, Mid-Chesapeake Bay Island Ecosystem Restoration Study has been reviewed and found to be within Maryland Department of Agriculture's plans, programs, and objectives.

If you have any questions, please contact me at 410.841.5880 or via email: minnicgc@mda.state.md.us.

Sincerely,

Gloria Minnick
Executive Associate

Maryland Department of Planning

Robert L. Ehrlich, Jr.
Governor
Michael S. Steele
Lt. Governor

Audrey E. Scott
Secretary
Florence E. Burian
Deputy Secretary

September 7, 2006

Ms. Stacey Blersch
Planning Division
U.S. Army Corps of Engineers, Baltimore District
P.O. Box 1715
Baltimore, MD 21203-1715

STATE CLEARINGHOUSE REVIEW PROCESS

State Application Identifier: **MD20060907-0960**
Reviewer Comments Due By: October 14, 2006
Project Description: Draft Mid-Chesapeake Bay Island Ecosystem Restoration Integrated Feasibility Report and EIS: proposed restoration of habitat; protection of ecosystem habitat; provision of dredged material placement capacity; minimization of erosion
Project Location: Maryland
Clearinghouse Contact: Bob Rosenbush

Dear Ms. Blersch:

Thank you for submitting your project for intergovernmental review. Participation in the Maryland Intergovernmental Review and Coordination (MIRC) process helps ensure project consistency with plans, programs, and objectives of State agencies and local governments. MIRC enhances opportunities for approval and/or funding and minimizes delays by resolving issues before project implementation.

The following agencies and/or jurisdictions have been forwarded a copy of your project for their review: the Maryland Departments of the Environment, General Services, Natural Resources, Transportation, the Maryland Environmental Service, the Counties of Cecil, Anne Arundel, Dorchester, Queen Anne's, Calvert, Baltimore, Talbot, Kent, Somerset, St. Mary's, Harford, and Wicomico; the Cities of Baltimore, and Cambridge; and the Maryland Department of Planning, including the Maryland Historical Trust.

They have been requested to contact your agency directly by **October 14, 2006** with any comments or concerns and to provide a copy of those comments to the State Clearinghouse for Intergovernmental Assistance. Please be assured that after **October 14, 2006** all MIRC requirements will have been met in accordance with Code of Maryland Regulations (COMAR 14.24.04). The project has been assigned a unique State Application Identifier that should be used on all documents and correspondence.

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Maryland Department of Planning

Robert L. Ehrlich, Jr.
Governor
Michael S. Steele
Lt. Governor

Audrey E. Scott
Secretary
Florence E. Burian
Deputy Secretary

If you need assistance or have questions, contact the State Clearinghouse staff noted above at 410-767-4490 or through e-mail at brosenbush@mdp.state.md.us. Thank you for your cooperation with the MIRC process.

Sincerely,

Linda C. Janey

Linda C. Janey, J.D., Director
Maryland State Clearinghouse for Intergovernmental Assistance
LCJ:BR
Enclosure(s)
cc: Pat Goucher – MDPL*
Brooks Royster - MPA
Cleveland L. Rippons – CAMBRIDGE*
Joane Mueller – MDE*
Nelson Reichart – DGS*
Ray Dintaman – DNR*
James Harkins – MES*
Cindy Johnson – MDOT*
Beth Cole – MHT*
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Gail Owings – KENT*
Charles Massey – SMST*
George Forrest – STMA*
Theresa Raymond – HRFD*
Gary Pusey – WCMC*

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MARYLAND
ENVIRONMENTAL
SERVICE

Robert L. Ehrlich, Jr., Governor **James M. Harkins, Director**

October 2, 2006

Ms. Stacey Blersch
Planning Division
U.S. Army Corps of Engineers
Post Office Box 1715
Baltimore, MD 21203-1715

Re: State Clearinghouse Review Process
State Application ID MD20060907-0960
Draft Mid-Chesapeake Bay Island Ecosystem Restoration Integrated Feasibility Report and EIS

Dear Ms. Blersch,

Maryland Environmental Service (MES) has received a request for review of the above-referenced report from the Maryland Department of Planning State Clearinghouse for Intergovernmental Assistance, as attached. The correspondence requests that comments and concerns be directed to your agency by October 14, 2006.

Our response to the request for review is based on our experience as the document handler for the report, which allowed MES the opportunity to write and edit portions of the report, in addition to reviewing the complete document as distributed.

It is MES's position that the content of the Draft Feasibility Report for the Mid-Chesapeake Bay Island Ecosystem Restoration is consistent with the Agency's plans, programs and objectives.

While MES is pleased to have had the opportunity to participate in the completion of the Draft Feasibility Report for the Mid-Chesapeake Bay Island Ecosystem Restoration, the regulations affecting the proposed plan are regulated or enforced by other State and Federal agencies. Therefore, MES defers to each responsible agency for concurrence on these specific components (US Fish and Wildlife Service for any potential Endangered species concerns, Maryland Department of the Environment for potential water quality concerns, etc.).

Thank you for providing MES with an opportunity to comment on the proposed project. Please direct any questions regarding this correspondence to Cecelia L. Donovan of my staff at (410) 729-8200.

Sincerely,

Charles Madison
Executive Director
Technical and Environmental Services

Cc: Mr. James Harkins, MES
Mr. John O'Neill, MES
Ms. Cecelia Donovan, MES
Linda C. Jansey, MD State Clearing House for Intergovernmental Assistance

Attachments

259 Najoles Road • Millersville, Maryland • 21108
phone 410-729-8200 • fax 410-729-8220 • www.menv.com

Please Complete Your Review & Recommendation Before October 14, 2006

Return Completed Form To: Linda C. Janey, J.D., Director, Maryland State Clearinghouse for Intergovernmental Assistance, Maryland Department of Planning, 301 West Preston Street, Room1104, Baltimore, MD 21201-2305
Phone: 410-767-4490 Fax: 410-767-4480

State Application Identifier: MD20060907-0960	**Clearinghouse Contact:** Bob Rosenbush, 410-767-4490 brosenbush@mdp.state.md.us
Location: MD	
Applicant: U.S. Army Corps of Engineers, Baltimore District and the Maryland Port Administration	
Description: Draft Mid-Chesapeake Bay Island Ecosystem Restoration Integrated Feasibility Report and EIS: proposed restoration of habitat; protection of ecosystem habitat; provision of dredged material placement capacity; minimization of erosion	

Based on a Review of the Information Provided, We Have Checked (●) the Appropriate Determination Below

		CONSISTENT RESPONSES - (For Use By STATE AGENCIES Only)
✓	C1	It is **Consistent** with our plans, programs, and objectives
	C2	It is **Consistent** with the policies contained in **Executive Order 01.01.1992.27** (Maryland Economic Growth, Resource Protection, and Planning Act of 1992), **Executive Order 01.01.1998.04** (Smart Growth and Neighborhood Conservation Policy), **and** our plans, programs, and objectives.
	C3	**(MHT ONLY)** It has been determined that the project will have "no effect" on historic properties and that the federal and/or State historic preservation requirements have been met.
	C4	**(DNR ONLY)** It has been determined that this project is in the Coastal Zone and is not inconsistent with the Maryland Coastal Zone Management Program.
	C7	**(MDP ONLY)** It is consistent with the requirements of State Finance and Procurement Article 5-7B-02; 03; 04 and 05 Smart Growth and Neighborhood Conservation (Priority Funding Areas).
		CONSISTENT RESPONSES - (For Use By *COUNTY & LOCAL AGENCIES* Only)
	C5	It is **Consistent** with our plans, programs, and objectives.
	C6	It is **Consistent** with the Economic Growth, Resource Protection, and Planning Visions (Planning Act of 1992), State Finance and Procurement Article 5-7B – Smart Growth and Neighborhood Conservation (Priority Funding Areas), **and** our plans, programs, and objectives.
		OTHER RESPONSES - (For Use By ALL)
	R1	**GENERALLY CONSISTENT WITH QUALIFYING COMMENTS:** It is generally **Consistent** with our plans, programs and objectives, but the attached qualifying comment is submitted for consideration.
	R2	**CONTINGENT UPON CERTAIN ACTIONS:** It is generally **Consistent** with our plans, programs and objectives contingent upon certain actions being taken as noted in the attached comment(s).
	R3	**NOT CONSISTENT:** It raises problems concerning compatibility with our plans, programs, objectives, or Planning Act visions/policies; or it may duplicate existing program activities, as indicated in the attached comment(s). If a meeting with the applicant is requested, please check here: ☐
	R4	**ADDITIONAL INFORMATION REQUESTED:** Additional information is required to complete the review. The information needed is identified below. If an extension of the review period is requested, please check here: ☐
	R5	**FURTHER INTEREST:** Due to further interest/questions concerning this project, we request that the Clearinghouse set up a conference with the applicant.
	R6	**SUPPORTS:** Supports "Smart Growth" and Federal Executive Order 12072 (Federal Space Management), which directs federal agencies to locate facilities in urban areas.

Attach additional comments if necessary OR use theses spaces: _____

Name: Cece Donovan / Charles Madison
Organization: Maryland Environmental Service
Address: 259 Naples Road
Millersville, MD 21108

Signature: Cecilia L. Donovan
Phone: (410) 729-8333
Date Completed: 10/2/06

_ **Check here if comments are attached.**

MDPCH-1A

MARYLAND
DEPARTMENT OF
NATURAL RESOURCES

Robert L. Ehrlich, Jr., *Governor*
Michael S. Steele, *Lt. Governor*
C. Ronald Franks, *Secretary*

October 31, 2006

Ms. Stacey Blersch
Planning Division
U.S. Army Corps of Engineers, Baltimore District
P.O. Box 1715
Baltimore, Maryland 21203-1715

RE: U.S. Army Corps of Engineers; Draft Integrated Report and Environmental Impact Statement Mid-Chesapeake Bay Island Ecosystem Restoration Study; Dorchester County

Dear Ms. Blersch:

The above referenced project has been reviewed by the Department of Natural Resources for associated ecological impacts. Thank you for providing us with the opportunity to review the document. The proposed work would result in the construction of a 2,072-acre island from material dredged from the approach channels to Baltimore Harbor at James Island, consisting of approximately 55 percent tidal wetland habitat and 45 percent upland island habitat; construction and backfilling of sills at Barren Island to protect the current acreage of the island and the adjacent submerged aquatic vegetation (SAV) and shallow water habitat, providing approximately 72 acres of wetland habitat on the northern and western portions of the island; and if deemed necessary to protect the SAV, construction at Barren Island of a maximum of 3,350 feet of breakwater extending South from the southern tip of the existing island at a maximum height of plus 6 feet at MLLW.

Based on an intra-Departmental review of the material submitted we offer the following comments:

1. The proposed island configuration at James Island would result in a section of the proposed outer perimeter dike being located within 500 yards of the boundaries of a charted natural oyster bar (NOB). The area within the boundaries of these NOBs is specifically established, reserved, and protected from activities and impacts considered detrimental to oyster populations or destruction of the bottom. Oysters spawn and subsequently set their spat during the period June through September in estuarine sections of rivers and the Bay. During this period, dredge units can entrain and destroy oyster eggs and larvae. In addition, sediments resuspended by dredging activities may affect oysters. Potentially, ingesting sediment particles that are the same size as prey organisms could starve larval oysters. Larval oysters could also delay metamorphosis to spat because the substrate is covered with loose sediments and is therefore unsuitable. Oysters also become inactive during the colder months of the year and are more liable to burial (inability to clear themselves of deposited sediment) during this period of reduced activity. To minimize the potential impacts, any excavation of foundation material or placement of unconfined dike material within 500 yards of the boundary of a designated

NOB should not occur during the periods 16 December through 14 March or 1 June through 30 September of any year.

2. The locations of the oyster restoration sites shown on Figure 3-12 should be included on Figure 5-1. Any dredging for the access channel and/or the dike construction that would be within 500 yards of these oyster restoration sites would have the same oyster time-of-year restrictions as dredging within 500 yards of the NOB boundaries.

3. The document should provide additional discussion regarding the relationship of the proposed 2,072-acre island at James Island to the historic footprint of James Island and a figure showing the relationship of the proposed island footprint to the historical footprint of James Island.

4. The Corps should continue to work with the Department's Wildlife and Heritage Service staff to avoid impacts to sensitive species at James and Barren Islands through island design modifications and/or time-of-year restrictions on construction activity.

5. If it becomes necessary to construct the breakwater extending to the south of Barren Island, the Department asks that all due consideration be given to incorporating the placement of one or more small (1-5 acres in size) islands in the breakwater design to serve as nesting sites for colonial waterbirds. Small islands surrounded by extensive areas of open water provide important predator-free nesting sites that are currently being lost in the Bay to erosion. In addition the island(s) would provide additional visual clues to mariners of the location of the breakwater.

The Department looks forward to continuing to work with the Corps on the development of the Mid-Chesapeake Bay Island Ecosystem Restoration project. If you have any questions regarding these comments please feel free to contact Roland Limpert of my staff at 410-260-8333.

Sincerely,

Ray C. Dintaman Jr.

Ray C. Dintaman, Jr., Director
Environmental Review Unit

cc: Frank Dawson, DNR-OOS
Dave Goshorn, DNR-RAS
Howard King, DNR-FS
Elder Ghigiarelli, MDE

F
CoE
E52

SEP 1 2006

US Army Corps of Engineers
Baltimore District

Planning Division

NOTICE OF AVAILABILITY

August 30, 2006

EIS

Draft Integrated Feasibility Report and Environmental Impact Statement

Mid-Chesapeake Bay Island Ecosystem Restoration Study

MD

ALL INTERESTED PARTIES: 200602853

In accordance with the requirements of the National Environmental Policy Act (NEPA), the U.S. Army Corps of Engineers (USACE), Baltimore District has prepared a Draft Integrated Feasibility Report and Environmental Impact Statement (EIS) for the Mid-Chesapeake Bay Island Ecosystem Restoration Project in Dorchester County, on Maryland's Eastern Shore. Approximately 90 to 95 million cubic yards of material, primarily dredged during maintenance of the Chesapeake Bay approach channels to Baltimore Harbor, would be placed behind dikes at James Island. Material placed at Barren Island would be from authorized maintenance dredging of Federal navigation channels in the Honga River. After placement, the material would be shaped and planted to provide 2,144 acres of island habitat at James and Barren Islands as well as protect existing island ecosystem habitat, including critical submerged aquatic vegetation (SAV). James and Barren Islands have been identified by the U.S. Fish and Wildlife Service, and other natural resource management agencies as a valuable nesting and nursery area for many species of wildlife, including bald eagles, diamondback terrapins, and potentially horseshoe crabs. The Draft EIS documents the NEPA compliance and information specific to the actions for the proposed Mid-Chesapeake Bay project. Mid-Chesapeake Bay Island Ecosystem Restoration was one of three actions specifically recommended by the USACE-Baltimore District's, *Dredged Material Management Plan (DMMP) and Final Tiered Environmental Impact Statement* (December 2005). The USACE is making the Draft Mid-Chesapeake Bay Island Ecosystem Restoration Integrated Feasibility Report and EIS available to the public for review and comment through a Notice of Availability published in the Federal Register. The recommendations of the Draft EIS are:

- Construction of a 2,072-acre fill area at James Island, consisting of approximately 55 percent tidal wetland habitat and 45 percent upland island habitat;

- Construction and backfilling of sills at Barren Island to protect both the current acreage of the island and the adjacent SAV/shallow water habitat, providing approximately 72 acres of wetland habitat on the northern and western portions of the island; and

- If deemed necessary to protect the SAV, construction at Barren Island of a maximum of 3,350 feet of breakwater extending South from the southern tip of the existing island at a maximum height of plus 6 feet MLLW.

We must receive comments on or before October 23, 2006, to ensure consideration in final plan development. Two public meetings will be held for the Mid-Chesapeake Bay Draft Integrated Feasibility Report and EIS. The first public meeting will be held at the Dorchester County Public Library, Central Branch, 303 Gay Street, Cambridge, Maryland 21613, on Wednesday, October 11, 2006, beginning at 7 p.m. The second public meeting will be held at Taylors Island Volunteer Fire Company, 510 Taylors Island Road, Taylors Island, Maryland 21617, on Thursday, October 12, 2006 beginning at 7 p.m. Staff will be available one hour prior to meeting start time. Both meetings will provide an opportunity for the

public to present oral and/or written comments. All persons and organizations that have an interest in the Draft Mid-Chesapeake Bay Integrated Feasibility Report and EIS are urged to participate in one or both meetings.

Please send written comments concerning this report to U.S. Army Corps of Engineers, Attn: Ms. Stacey Blersch, Planning Division, P.O. Box 1715, Baltimore, MD 21203. Telephone: (410) 962-5196 or 1-800-295-1610. Please submit electronic comments to Stacey.S.Blersch@usace.army.mil. Your comments must be contained in the body of your message; please do not send attached files. Please include your name and address in your message. You may view the Draft EIS and related information on the USACE web page at http://www.nab.usace.army.mil/publications/non-reg_pub.htm. USACE has distributed copies of the Draft Integrated Feasibility Report and EIS to appropriate members of Congress, State, and local government officials, Federal agencies, and other interested parties. Copies are also available for public review at the following locations:

(1) Andrew G. Truxal Library, Anne Arundel Community College, 101 College Parkway, Arnold, MD 21012

(2) Anne Arundel County Public Library, 1410 West Street, Annapolis, MD 21401

(3) Anne Arundel County Public Library, Annapolis Branch, 5 Harry S. Truman Parkway, Annapolis, MD 21401

(4) Calvert County Public Library, 30 Duke Street, Prince Frederick, MD 20678

(5) Chesapeake College Library, Wye Mills, MD 21679

(6) Corbin Memorial Library, 4 East Main Street, Crisfield, MD 21817

(7) Dorchester County Public Library, 303 Gay Street, Cambridge, MD 21613

(8) Dorchester County Public Library, Hurlock Branch, 222 S. Main Street, Hurlock, MD 21643

(9) Eastern Shore Public Library, 23610 Front Street, Accomac, VA 23301

(10) Enoch Pratt Free Library, 400 Cathedral Street, Baltimore, MD 21201

(11) Federal Maritime Commission, 110 L Street NW, Washington, DC 20573

(12) Kent County Public Library, 408 High Street, Chestertown, MD 21620

(13) Maryland State Law Library, Court of Appeals Building, 361 Rowe Boulevard, Annapolis, MD 21401

(14) Northumberland County Public Library, 7204 Northumberland Highway, Heathsville, VA 22473

(15) Queen Anne's County Public Library, Centreville Branch, 121 S. Commerce Street, Centreville, MD 21617

(16) Queen Anne's County Public Library, Stevensville Branch, 200 Library Circle, Stevensville, MD 21666

(17) Somerset County Library, 11767 Beechwood Street, Princess Anne, MD 21853

(18) Somerset County Library, Ewell Branch, 20910 Caleb Jones Road, Ewell, MD 21824

(19) State Department of Legislative Reference Library, 90 State Circle, Annapolis, MD 21401

(20) St. Mary's County Memorial Library, Leonardtown Branch, 23250 Hollywood Road, Leonardtown, MD 20650

(21) Sudlersville Memorial Library, 105 West Main Street, Sudlersville, MD 21668

(22) Talbot County Public Library, Easton Branch, 100 West Dover Street, Easton, MD 21601

(23) Talbot County Public Library, St. Michaels Branch, 106 Freemont Street, St. Michaels, MD 21663

(24) Talbot County Public Library, Tilghman Island Elementary School Branch, 21374 Foster Avenue Tilghman, MD 21671

(25) Twin Beaches Library, 3819 Harper Road, Chesapeake Beach, MD 20732

(26) Wicomico County Free Library, 122 S. Division Street, Salisbury, MD 21801

After the public comment period ends on October 23, 2006, the USACE will consider all comments received. The Draft Integrated Feasibility Report and EIS will be revised as appropriate and a Final Integrated Feasibility Report and EIS will be issued.

Amy M. Guise
Chief, Civil Project Development Branch

The Maryland Historical Trust has determined that there are no historic properties affected by this undertaking

E. J. Cole Date 11/8/06

MARYLAND STATE CLEARINGHOUSE
AGENCY RESPONSE TO THE CLEARINGHOUSE

State Application Identifier: MD20060907-0960

Description: Draft Mid Chesapeake Bay Island Ecosystem Restoration Integrated Feasibility Report and EIS

Applicant: U.S. Army Corps of Engineers, Baltimore District and MD Port Administration

COMMENTS:

I recommend checking option #2 with the qualifying statement that the dredging process adheres to state of the art technology and the dredge material is monitored to minimize hazardous and toxic conditions.

COMMENTS SUBMITTED BY:

Susan Kelly
Director, Environmental Health
Harford County Health Department

October 17, 2006

Ms. Stacey Blersch, Study Manager
Mid-Bay Draft EIS
U.S. Army Corps of Engineers, Baltimore District
P.O. Box 1715
Baltimore, Md. 21203

Dear Ms. Blersch,

I am writing as a representative of the citizens group Dorchester Citizens for Planned Growth, LLC. Our association would like to register its support of the Mid-Bay Island Restoration project. Our group is concerned with the preservation of open space and natural habitat in Dorchester County and the Eastern shore. The Mid-Bay restoration project has tremendous potential to help reverse the loss of wetlands which has had such a negative impact on our marine resources in recent years. Those of us who are long time residents of Dorchester County have witnessed first hand the rapid loss of James and Barren Islands and the transformation of a sheltered marine ecosystem into what I would call an open bay ecosystem

Our group is also concerned with helping to promote sustainable economic development in Dorchester County. The natural beauty and varied marine habitat of the county lends itself perfectly to the growing industry of eco-tourism. We see the James Island project as a major boon to our tourism industry and a perfect complement to the nearby Blackwater Wildlife Refuge. We would like to encourage low impact public use of the restored island and would be glad to offer specific proposals for such use at the appropriate time.

We also recognize the potential economic benefit of local jobs that could result from this large scale project. We would request that every effort be made to enlist our watermen and other native Dorchester Countians in the construction work force.

We have taken notice of the success of the Poplar Island project and the benefits to Maryland's natural resources resulting from its restoration. We believe the potential is at least as great for positive benefits resulting from the Mid-Bay Island project and we urge you to move forward with its implementation.

Sincerely yours,
Fred C. Pomeroy

Fred C. Pomeroy, Chairman
Dorchester Citizens for Planned Growth
5429 Stoney Ridge Road
Cambridge, Maryland 21613

Steering committee: Douglas Worrall, Catherine McCulley, William Giese, Beth Giese, Lexine Lowe, Mark Wilson, Linda Wilson

Blersch, Stacey S NAB02

From: Margaret Carter [nmcarter1@verizon.net]
Sent: Monday, October 23, 2006 10:30 AM
To: Blersch, Stacey S NAB02
Cc: Betssy Johnson
Subject: Sierra Club comments on Draft IFR& EIS: MCBIERS

W. R. Carter, III

14272 Draper's Mill Road

Greensboro, Maryland 21639

October 21, 2006

Ms. Stacey S. Blersch

Planning Division

U.S. Army Corps of Engineers, Baltimore District

P.O. Box 1715

Baltimore, Maryland 21203

Dear Ms. Blersch,

The following constitutes the comments of the Maryland Chapter, Sierra Club on the Draft Integrated Feasibility Report and Environmental Impact Statement: Mid-Chesapeake Bay Island Ecosystem Restoration Study (DIFR & EIS: MCB IERS).

We congratulate you on developing a massive document which pulls together many diverse lines of information. We are fully cognizant of the great amount of work and organization which went into this effort. Further, we are aware of the economic and political pressures to both find means of disposing of great amounts of dredged spoil and to make constructive use of a material that is difficult and expensive to manage. As the development of Poplar Island showed, restoration of eroding island habitats can, in some instances, provide a means of accomplishing these goals.

At the same time, we are concerned that these economic and political pressures can lead to decisions to re-build islands that are not always necessarily objectively justified, ecologically or scientifically. The apparent environmental success at Poplar Island, per se, has the potential to lead to a mindset that could be characterized as "let's just do it again" (a little farther down the Bay), as each new spoil island becomes full and additional disposal capacity is needed. This could lead to an effectively endless series of 1,000- 2,000 acre construction works in Chesapeake Bay that are, for periods of 20 to 50 years each, essentially industrial sites with some ancillary environmental benefits. Indeed, Table 4-3 (p. 4-52), lists a number of other potential sites, such as Smith, Little Deal, Holland, South Marsh, Hooper's, and Ragged Island (s). Figure B-30 indicates that since James Island's 2072 acres of spoil receiving capacity will be filled after 24-27 years of use, yet another site must be ready by approximately year 2042-2045. Planning will have to begin by about 2030. Already, 1140 acres are being filled at Poplar Island, with 575 acres of expansion planned there. Various "wetland and SAV protection" efforts at Smith, Tangier, and Taylor's Islands are planned (p. ES-15). 2142 acres of filling at James and Barren Islands are the subject of the present DIFR & EIS, and 101

acres of access channel into the re-built James Island will be dredged (Table ES-5, p. ES-9.).

Tradeoffs between re-creating island wetland and terrestrial habitat and destroying productive shallow water aquatic habitat by filling with dredged spoil must take into careful consideration the values of the habitat that will be lost. It is in this area that we find the DIFR & EIS to be lacking as a decision-making document.

While a great deal of thought and effort obviously went into the development of "island community units" ("ICU" 's)(cf. Fig. 4-7, p. 4-43; Fig. 4-9, p. 4-44) as a means of accounting the ecological benefits of re-building islands, we believe that techniques for characterization of the shallow aquatic habitat at James Island, where most of the loss will occur, may not have been executed properly. The shallow aquatic habitat at James Island has been characterized as "stressed" in the DIFR & EIS (Table ES-5, p. ES-9; p. 3-28; p.3-31; p. 4-27; Table 4-33, p. 4-87.)

We are concerned that a characterization of an existing situation as "stressed" implies that its loss is of relatively little importance, biasing a decision towards altering large areas of such a habitat, when in fact they are productive and valuable to Chesapeake bay in their present condition

In support of our concern, we note the following:

1. Page 3-28 notes that 100 species of benthic invertebrate species were collected at James Island and that the majority of species were stress-tolerant.

2. However, Table 3-20 (p. 3-122) shows, for 25 collections during 2002-2003 at 9 tabulated James Island stations, only one collection effort showed more than 10 % of the individuals were stress-indicative species. Two collections showed over 1 % (1.327 % and 1.44 %) stress indicative organisms, seven showed between 0.1% and 1 %, 4 showed between 0.01 % and 0.1 %, six had between 0.001 % and 0.01 %, and four had 0.0 % stress indicative organisms. The collections were dominated by the gem clam (Gemma gemma) (p.3-29) which is not listed by Llanso (2002) or Weisberg, et al (1997) as a stress indicative species.

3. Further, whereas the benthic invertebrate habitat at Barren Island is characterized as 'healthy' (Table ES-5, et seq.), page 3-29 notes that a dominant organism there was the polychaete worm Mediomastus ambiseta, which both Llanso and Weisberg, et al, (both op. cit) do list as pollution indicative.

4. The characterization of the James Island benthic habitat as 'stressed' rests on the calculation of a benthic index of biotic integrity (B-IBI), which was developed by Weisberg, et al (1997) and the calculation of which was explicated by Llanso (2002). Both authors specifiy that the application of the B-IBI "...is limited to samples collected in summer, defined as July 15 through September 30." (Llanso, p.4). However, Tables 3-20 (p. 3-122) and 3-21 (p. 3-123) both utilize collections made in Summer, 2002, and Spring, 2003 to calculate B-IBI values. Table 3-20 (for stations at James Island) also utilizes collections in Fall, 2002. Further, although Weisberg, et al present techniques for computing B-IBI scores for stress-sensitive and stress-indicative organisms for mesohaline mud, Table 3-20 does not compute those B-IBI's for that habitat at James, noting that because that station was mesohaline mud, those scores were not calculated.

Finally, we believe that habitat condition characterizations based on the Weisberg, et al, technique of computing B-IBI, while impressively objective in many ways, tend to ignore the benefits to Chesapeake Bay of high productivity. The Weisberg technique notes that very high abundance of some species can sometimes be attributed to somewhat stressful or marginally impaired conditions. This is due to the suppression of competition by other less-well adapted species. For example, the extensive semi-pure stands of Spartina patens (saltmarsh hay) and Distichlis spicata (salt grass) in high marsh are due to their ability to exploit a habitat type that is stressful to most other species. However, no one would argue that such a habitat was impaired or polluted. It simply has characteristics that some species have been able to adapt to, and some others have not: SAV's grow under water, oak trees do not.

Hence while we recognize that one of the IBI metrics, benthic organism abundance (no. per square meter) has a place in evaluating habitat, high abundance, such as occurs at James Island should not necessarily suggest that the benthic habitat there is impaired.. The year round abundance at James Island is some 82 times that at Barren Island. This is high

productivity that is transferrable to other, valued trophic levels, such as fish. This may be reflected in the estimate of some 8,000 recreational fishing days per year near James Island (p. 3-73).

In conclusion, we believe that in order to make the DIFR & EIS: MCB IERS an adequate decision-making document, further attention should be paid in the Final EIS to long term, future cumulative impacts and additional techniques besides the B-IBI should condition the characterization of habitats that will be lost should the decision to build be implemented.

Literature Cited

Llanso`, Roberto J. Nov. 11, 2002. Methods for calculating the Chesapeake Bay benthic index of biotic integrity. Versar, Inc. 9200 Rumsey Road, Columbia, MD 21045. Http://www.baybenthos.versar.com/docs/ChesBayBIBI.pdf. <Http://www.baybenthos.versar.com/docs/ChesBayBIBI.pdf.> (Accessed 10/20/06)

Weisberg, Stephen B., J.A.Ranasinghe, D.M.Dauer, L.C. Schaffner, R.J.Diaz, and J.B. Frithsen. 1997. An estuarine benthic index of biotic integrity (B-IBI) for Chesapeake bay. Estuaries 20(1): 149-158.

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, U.S. ARMY CORPS OF ENGINEERS
P. O. BOX 1715
BALTIMORE, MARYLAND 21203-1715

REPLY TO
ATTENTION OF

May 7, 2007

Planning Division

Mr. W.R. Carter III
Sierra Club
14272 Draper's Mill Road
Greensboro, Maryland 21639

Dear Mr. Carter:

I am responding to your letter dated October 21, 2006, to Ms. Stacey Blersch of my staff, regarding the Baltimore District's Draft Integrated Feasibility Report and Environmental Impact Statement: Mid-Chesapeake Bay Island Ecosystem Restoration Study dated August 2006.

The concerns raised in your letter of October 21, 2006, focus on the benthic conditions at both James and Barren Islands, and how the existing benthic condition at each island was factored into the site selection process (alternatives analysis). To completely address your concerns, I would like to make two general points regarding the alternatives analysis while also specifically responding to each concern raised in your letter.

First, (as was noted in your letter), many islands were initially considered for habitat restoration through the beneficial use of dredged material. James Island was chosen for restoration based on a multitude of factors, including 52 environmental parameters and 10 engineering suitability criteria (Section 4.3.2 of the Draft EIS). Throughout the selection process, James Island was identified among the islands most in need of stabilization and habitat restoration. Of all of the islands examined for restoration, James Island has the highest current erosion rates and among the earliest predicted extinction dates. In terms of the need to preserve and restore wetlands in the Mid-Chesapeake Bay region, James Island was among the islands identified as having the greatest overall need.

Second, the benthic community condition was only one of the environmental factors that were considered in the alternatives analysis to determine the aquatic conditions in the vicinity of James and Barren Islands to assess the best potential area for island restoration. Many other factors, such as the presence or absence of submerged aquatic vegetation (SAV) and oyster bars, sediment chemistry, and fisheries utilization also factored into the analysis. The James Island area (particularly west of James Island) is stressed due, presumably, to the continually eroding shifting substrates and the turbidity in that area. This stress is not only reflected in the benthic community conditions analysis in the benthic index of biotic integrity (B-IBI), but also in other aspects of the benthic community. Even though few pollutants were found in the sediments at any station near James or Barren Islands, there were some significant differences in presence of SAV and oyster bars when comparing the two sites and especially when comparing the east and

west sides of the existing islands. The area west of James Island supported less of these other resources relative to the east side or even to the area west of Barren Island.

The Baltimore District's responses to the specific comments made by the Sierra Club are attached. To address the Sierra Club's comments, we have revised some of the benthic metric evaluations (to include calculations for metrics that previously had not been calculated at both Barren and James Islands) and has revised the report where needed. However, the analyses that we have performed do not significantly alter the findings in the draft report (that, based on the calculation of the B-IBI, the Barren Island area has a relatively healthy benthic community and the James Island area is classified as severely degraded). The additional calculations also do not alter the conclusions within the draft report regarding productivity and the shallow water conditions at James or Barren Islands.

The Corps has attempted to provide a holistic assessment of the conditions of the aquatic resources in the Mid-Bay area and specifically those in the vicinity of the islands that were found to rank highest in terms of restoration potential (i.e., James and Barren Islands). Although important, benthic condition was only one component of that assessment. The multi-agency Chesapeake Bay Enhancement Working Group has reviewed all of the data for these sites and concurs that the area west of James Island would be the least environmentally damaging practicable alternative for construction of a large island restoration project.

I believe the District's enclosed responses and the changes that have been made to the report will adequately address the Sierra Club's comments. We will finalize the report and submit it to our Headquarters for approval, after which it will be circulated to agencies and the public. Your letter dated October 21, 2006, this letter to you, and the attached responses will be included in the final document. The Comment and Response table will indicate sections in the report that were changed to respond to the Sierra Club comments.

We are willing to meet with you to further discuss the responses. Please contact Ms. Stacey Blersch, Study Manager, at (410) 962-5196 if you should have any question regarding this matter.

Sincerely,

Amy M. Guise
Chief, Civil Project Development Branch

Enclosure

ATTACHMENT

COMMENT 1.

"1. Page 3-28 notes that 100 species of benthic invertebrate species were collected at James Island and that the majority of species were stress-tolerant."

Response: Noted. Report changed to say: "were *not* stress-tolerant".

COMMENT 2.

"2. However, Table 3-20 (p. 3-122) shows, for 25 collections during 2002-2003 at 9 tabulated James Island stations, only one collection effort showed more than 10 % of the individuals were stress-indicative species. Two collections showed over 1 % (1.327 % and 1.44 %) stress indicative organisms, seven showed between 0.1% and 1 %, 4 showed between 0.01 % and 0.1 %, six had between 0.001 % and 0.01 %, and four had 0.0 % stress indicative organisms. The collections were dominated by the gem clam (*Gemma gemma)* (p.3-29) which is not listed by Llanso (2002) or Weisberg, et al (1997) as a stress indicative species."

Response: The statement that is being referenced in comment 1 is referring to the total numbers of species and the statement has been corrected. The metrics noted in Comment 2 are calculated based upon the actual abundances of organisms at each sampling location. As noted, the gem clam (*Gemma gemma*) dominated collections at most locations in most seasons, and drives the tremendous abundance numbers noted at the James Island locations. Gem clams are not a stress-indicative species and that is why the overall percentages of stress-indicative taxa (a metric that is based on abundances) are low and the associated metrics are high. However, benthic communities that exhibit low diversity, high abundance, and dominance by a single species are themselves indicators of stressed environments, regardless of whether the species in question is specifically classified as stress-indicative. Clarifications regarding the influence of single dominant species and the role of gem clams in the ecosystem have been added to the EIS text.

COMMENT 3.

"Further, whereas the benthic invertebrate habitat at Barren Island is characterized as 'healthy' (Table ES-5, et seq.), page 3-29 notes that a dominant organism there was the polychaete worm Mediomastus ambiseta, which both Llanso and Weisberg, et al, (both op. cit) do list as pollution indicative."

Response: The benthic conditions at Barren were very generally characterized as healthy based on a variety of factors including high diversity indices and relative high percentages of stress-sensitive taxa. *Mediomastus ambiesta* was collected around Barren Island and is characterized as pollution indicative. Although it was the most abundant species in most seasons, it constituted only approximately 18% of all collections (as noted by the commenter). The remaining 82% of the composition was dominated by taxa that do not tolerate stressors (such as pollution) in most seasons.

COMMENT 4.

"The characterization of the James Island benthic habitat as 'stressed' rests on the calculation of a benthic index of biotic integrity (B-IBI), which was developed by Weisberg, et al (1997) and the calculation of which was explicated by Llanso (2002). Both authors specify that the application of the B-IBI "...is limited to samples collected in summer, defined as July 15 through September 30." (Llanso, p.4). However, Tables 3-20 (p. 3-122) and 3-21 (p. 3-123) both utilize collections made in Summer, 2002, and Spring, 2003 to calculate B-IBI values. Table 3-20 (for stations at James Island) also utilizes collections in Fall, 2002. Further, although Weisberg, et al present techniques for computing B-IBI scores for stress-sensitive and stress-indicative organisms for mesohaline mud, Table 3-20 does not compute those B-IBI's for that habitat at James, noting that because that station was mesohaline mud, those scores were not calculated."

Response: The first sentence in this statement is not exactly accurate; as noted elsewhere; many other factors were considered. With respect to the B-IBIs calculated in all seasons: Tables 3-20 and 3-23 were derived for comparative purposes across stations and seasons, to completely evaluate the seasonal variability of the benthic community composition. Although total B-IBI scores were calculated for each of the sampling events, the source documents (seasonal survey data reports) caution the reader that only scores from the warmer months should be considered for comparable assessments of the community composition. The text was revised to reflect the fact that the classification of the benthic community as "stressed" was based only on the summer B-IBI scores. However, the benthic community data collected at both James and Barren Island indicated that there was little seasonal variability at each location.

In response to the mesohaline mud part of the comment: Weisberg et al. does present a technique for calculating the metrics for ***high*** mesohaline mud, defined as having salinities greater than 12 ppt. James and Barren Islands lie in an area that varies from low mesohaline (5-12 ppt) to high mesohaline (12-18 ppt) and the majority of the salinities recorded were greater than 12 ppt (across all seasons). [Specifically, (at James Island) salinities ranged from 12.4 to 16.8 ppt in the summer and fall and only fell to 10-11 ppt during the spring sampling period. At Barren salinities ranged from 12.8 to 18.7 ppt in summer and fall and ranged from 11-15 ppt in spring]. However, throughout the analysis, the B-IBI calculations followed the updated guidance in Llanso 2002 which indicates that stress-sensitive and stress-indicative taxa abundances are not indicated for mud in high mesohaline reaches. For consistency with other stations, these metrics were calculated at Stations JAM-004 and JAM-010 and added to the summary tables. The addition of these metrics did not change the total score at JAM-010 in fall and only elevated the total scores from 1 to 1.8 at JAM-004 in summer and fall and JAM-010 in summer and spring. Considering only summer (warmer season indicated by the B-IBI guidance), scores of 1.8 would still classify stations JAM-004 or JAM-010 as severely degraded.

The Corps acknowledges that the B-IBI has utility as one evaluation tool for benthic condition but it is only one measure of aquatic health and is somewhat limited. The high abundances of gem clams (*Gemma gemma*) do confound the evaluation in the ways noted

by the commenter and in the #2 response (above). Dominance of a single species (as noted by the commenter) can be indicative of marginally impaired conditions and the dominant species can exploit a niche to the exclusion of other species. This is likely what the gem clam is doing to the west of James Island and in similar areas throughout the mainstem of the Chesapeake Bay that are subjected to shifting (sandy) substrates. The gem clam does occur in large numbers and may be providing a food source that could be utilized buy other aquatic species such as fish and some birds. However, utilization of the western side of James Island by these groups was not found to be greater than at the eastern side of James Island or at the Barren Island area during existing conditions surveys of the islands. Timed bird observations found the area west of the James Island remnants to have fewer birds in most seasonal surveys than areas to the east and also relative to Barren Island in similar seasons. Also, although present, no large aggregations of diving ducks (that would be utilizing the clam resources directly) were noted to the west of James Island, even in winter.

In terms of fish utilizing the clam resources west of James Island, inferences can be made from the trawling and gillnet data collected during the existing conditions surveys. Trawling in the vicinity of James yielded far fewer fish in most seasons when compared to Barren Island (table 3-25). Examining the station-specific data, trawling west of James yielded few or no fish relative to the stations on the eastern side of the island. In terms of gillnetting, collections at James did yield higher numbers of fish than similar collections at Barren in most seasons; however, most were planktivores or piscivorous species and few-to-no species that would be expected to utilize clams as a food resource were collected. Further, little-to-no difference was noted in the composition of the gillnet collections among station (east or west of James Island) in the seasons that were sampled. While there is no doubt that recreational fishing activity is high in the vicinity of James Island, the estimates for Barren were even greater (p. 3-73) and much of that activity is likely focused on recreational species such as striped bass which are mainly piscivorous.

Blersch, Stacey S NAB02

From: MaryLou Bentz [many_quilts@yahoo.com]
Sent: Friday, October 06, 2006 10:53 AM
To: Blersch, Stacey S NAB02
Subject: Barren Island Restoration

Stacey,

I will try to attend one of the meetings but wanted to comment prior anyway.

I think what you are doing is a great idea. It finds use for dredge spoil at the same time saving wildlife areas. If you stop the erosion of Barren Island it will also protect my property on the shore opposite it on Tar Bay. The island reduces the fetch of the wind from the Northwest and stops the waves form the bayside of Barren.

Hooper Island is threatened by erosion and rising sea level. I am in favor of all steps to protect and prevent that erosion. I would like to see Barren started first as it protects more private property than James.

Both islands are a huge benefit to wildlife.

Thank You for your time

Frank Bentz Jr.
2570 Hooper Island Rd.
Fishing Creek, Md. 21634

Do you Yahoo!?
Get on board. You're invited <http://us.rd.yahoo.com/evt=40791/
*http://advision.webevents.yahoo.com/mailbeta> to try the new Yahoo! Mail.

Draft Mid-Chesapeake Bay Island Ecosystem Restoration Integrated Feasibility Report and Environmental Impact Statement (EIS)

Public Meeting – October 11 and 12, 2006

Name (Please Print): ANNA CUTTER

Title:

Company/Organization:

Address: 3876 PUNCH ISLAND ROAD TAYLORS ISL. MD 21669

Telephone Number: 410-221-8102 Fax Number:

E-mail Address: johnanna@shorenet.net

Comments/Suggestions: I support the JAMES ISLAND ECOSYSTEM RESTORATION PROJECT. I AM GRATEFUL FOR THE TOP NOTCH PUBLIC MEETING PRESENTATION AT TI ON Oct. 12, 2006

Please return comment cards by OCTOBER 23, 2006

Draft Mid-Chesapeake Bay Island Ecosystem Restoration Integrated Feasibility Report and Environmental Impact Statement (EIS)

Public Meeting – October 11 and 12, 2006

Name (Please Print): JOHN CUTTER

Title:

Company/Organization:

Address: 3876 PUNCH ISLAND RD TAYLORS ISLAND MD 21669

Telephone Number: 410-221-8102 Fax Number:

E-mail Address: johnannae@shorenet.net

Comments/Suggestions: I'M IN FAVOR OF THE JAMES ISLAND. RESTORATION PROJECT. I FEEL IT WOULD BENEFIT THE ENVIROMENT, WILDLIFE AND RESIDENTS OF TAYLORS ISLAND AND DORCHESTER COUNTY.

Please return comment cards by OCTOBER 23, 2006

Draft Mid-Chesapeake Bay Island Ecosystem Restoration Integrated Feasibility Report and Environmental Impact Statement (EIS)

Public Meeting – October 11 and 12, 2006

Name (Please Print): ARTHUR BOCCUTI

Title: DORCHESTER COUNTY HOMEOWNER ON RAGGED PT Rd. ACROSS/BEHIND JAMES ISLAND.

Company/Organization:

Address: 5247 RAGGED POINT Rd. CAMBRIDGE 21613

Telephone Number: 410-221 0378 Fax Number:

E-mail Address:

Comments/Suggestions: THE SHORELINE ALONG RAGGED POINT Rd. IS WASHING AWAY. THE ROAD WASHES OUT REGULARLY AND IS IN NEED OF CONSTANT REPAIR. WE ENCOURAGE THE IMPLEMINATION OF THE ACOE PLAN. THANK YOU.

Please return comment cards by OCTOBER 23, 2006

Blersch, Stacey S NAB02

From: Mark and Linda Wilson [lcmw@fastol.com]
Sent: Sunday, October 22, 2006 10:44 AM
To: Blersch, Stacey S NAB02
Subject: Mid-Bay Restoration Project

Dear Mr. Blersch,

We strongly support the proposed creation of upland and wetland habitat on the western side of James Island and the continued work at Barren Island. These projects will not only create new sub aquatic and terrestrial habitat, they will help protect existing shorelines that are being severely eroded.

We live on Back Creek near the mouth of Hudson Creek on the Little Choptank River. We are both Eastern Shore natives and have lived in the Neck District of Dorchester County for almost thirty years. Having been a waterman in the 1980's, I am familiar with the erosion of James Island and its affects on the crab and oyster fisheries in the Little Choptank. The bottom line is that more open water means stronger tides and less suitable area for trot lining and hand tonging. Also, more open water means more shoreline erosion that causes increased turbidity which negatively impacts aquatic life.

As we have seen with the Poplar Island Project, the concept appears to be a win/win situation for the environment and the Port of Baltimore.
We would suggest that every effort be made to proceed with the proposed new project as soon as possible. We would also suggest that a real effort be made to employ waterman and other local people on this new project.

Thank you for your consideration.

Sincerely,

Mark and Linda Wilson
5314-2 Ross Neck Rd.
Cambridge, MD 21613
410-228-3818
lcmw@fastol.com

07 JAN 31 PM 3: 22

January 20, 2007

The Honorable Barbara Mikulski
U.S. Senate
Suite 1E, Building B
1201 Pemberton Drive
Salisbury, MD 21801-2403

RECEIVED
BALTIMORE

Dear Senator Mikulski:

The Corp is completing the Mid Bay Island Restoration project that will restore James & Barren Islands using dredge material from the Baltimore Harbor approach channels. I support this project. I believe you should have this project included, instead of the Popular Island expansion, in the next WRDA.

The Poplar Island Restoration has been a great success for the Corp of Engineers and the State of Maryland. We need to get started now to save James & Barren Islands from eroding away. The restoration of these islands will provide the same great environmental benefits that have made Poplar Island a great success. I again urge to work to have the Mid Bay Islands Restoration project included in the next WRDA.

Sincerely,

Mary Habermann

Ms. Mary Habermann
PO Box 39
Fishing Creek, MD 21634-0039

07 JAN 31 PM 3:21

January 20, 2007

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U.S. Senate
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Salisbury, MD 21801-2403

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Sincerely,

Joseph E. Habermann

Ms. Mary Habermann
PO Box 39
Fishing Creek, MD 21634-0039

07 JAN 31 PM 3:36

January 20, 2007

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U.S. Senate
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Sincerely,

C. Bromwell
1048 Taylor Is. Rd
Madison Md.
21648

January 20, 2007

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U.S. Senate
Suite 1E, Building B
1201 Pemberton Drive
Salisbury, MD 21801-2403

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Sincerely,

Tom R. Carbonetta

Danuta M. Carbonetta

3821 Punch Island Road
Taylor's Island, MD 21669-0292

RECEIVED
BALTIMORE
07 JAN 31 PM 3:35

January 20, 2007

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U.S. Senate
Suite 1E, Building B
1201 Pemberton Drive
Salisbury, MD 21801-2403

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Sincerely,

Charles W Wright
PO Box 201
Taylors Is MD 21669-0201

RECEIVED
BALTIMORE
07 JAN 31 PM 3:34

January 20, 2007

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U.S. Senate
Suite 1E, Building B
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Sincerely,

Jack Dillon

The Nature Conservancy

Mr John J Dillon Jr
543 Park Ave.
Towson, MD 21204

RECEIVED
BALTIMORE

07 JAN 31 PM 3:34

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U.S. Senate
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Sincerely,

Douglas Worrall
1604 Town Point Rd
Cambridge, Md. 21613

RECEIVED
BALTIMORE

07 JAN 31 PM 3:33

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U.S. Senate
Suite 1E, Building B
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Sincerely,

Cindy Bech
2315 Hoopers Island Road
Fishing Creek MD 21634

RECEIVED
BALTIMORE
07 JAN 31 PM 3:33

07 JAN 31 PM 3:32

January 20, 2007

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Sincerely,

W.E. BACON
P.O. BOX 233
TAYLORS ISLAND
MD 21669

07 JAN 31 PM 3:32

January 20, 2007

RECEIVED
BALTIMORE

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U.S. Senate
Suite 1E, Building B
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Salisbury, MD 21801-2403

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Sincerely,

Arthur Boccuti

Arthur H. Boccuti
5247 Ragged Point Rd.
Cambridge, MD 21613

07 JAN 31 PM 3:31

January 20, 2007

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U.S. Senate
Suite 1E, Building B
1201 Pemberton Drive
Salisbury, MD 21801-2403

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Sincerely,

Thelma P. Insley
P.O. Box 12
Taylors Isl. Md. 21669

Ms. Thelma Insley
P.O. Box 12
Taylors Island, MD 21669-0012

07 JAN 31 PM 3:29

January 20, 2007

RECEIVED
BALTIMORE

The Honorable Barbara Mikulski
U.S. Senate
Suite 1E, Building B
1201 Pemberton Drive
Salisbury, MD 21801-2403

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Sincerely,

Virginia L. Stine

Virginia L. Stine
2322 Wingte Bshp Head Rd
Wingate, MD 21675

07 JAN 31 PM 3:29

January 20, 2007

RECEIVED
BALTIMORE

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U.S. Senate
Suite 1E, Building B
1201 Pemberton Drive
Salisbury, MD 21801-2403

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Sincerely,

Eleanor B. Polley

I have lived on Taylors Island for thirty-three years. I've seen how the erosion has affected James Island from the Chesapeake Bay. I'm seventy-two years old I would like to know that this project will get started before I die.

Ms. Eleanor B. Polley
P.O. Box 215
Taylors Is. MD 21669

January 20, 2007

07 JAN 31 PM 3: 24

The Honorable Barbara Mikulski
U.S. Senate
Suite 1E, Building B
1201 Pemberton Drive
Salisbury, MD 21801-2403

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BALTIMORE

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Sincerely,

Joyce Coyne

Joyce G. Coyne
913 Parsons Dr.
Madison, MD 21648

BARBARA A. MIKULSKI
MARYLAND

COMMITTEES:

APPROPRIATIONS

HEALTH, EDUCATION, LABOR,
AND PENSIONS

United States Senate

WASHINGTON, DC 20510–2003

IN REPLY PLEASE REFER TO
OFFICE INDICATED:

☑ 1629 THAMES STREET, SUITE 400
BALTIMORE, MD 21231
(410) 962–4510
VOICE/TDD: (410) 962–4512

☐ 60 WEST STREET, SUITE 202
ANNAPOLIS, MD 21401–2448
(410) 263–1805
BALTIMORE: (410) 269–1650

☐ 6404 IVY LANE, SUITE 406
GREENBELT, MD 20770–1407
(301) 345–5517

☐ 94 WEST WASHINGTON STREET
HAGERSTOWN, MD 27140–4804
(301) 797–2826

☐ SUITE 1E, BUILDING B
1201 PEMBERTON DRIVE
SALISBURY, MD 21801–2403
(410) 546–7711

February 2, 2007

Colonel Peter W. Mueller
Commander and District Engineer
U. S. Army Corps of Engineers
PO Box 1715
Baltimore, Maryland 21203-1715

Dear Colonel Mueller:

I am forwarding for your attention, correspondence I have received from numerous of my constituents who are concerned about the Mid Bay Island Restoration Project and dredging for James and Barren Islands.

I am requesting that you take their concerns into consideration as the Corps continues to address this matter and that you make their comments part of the record. Please respond directly to my constituents, and send a copy of your response to my Projects Director, Ms. Sally Wingo in my Baltimore office, at the above address.

Thank you for your attention. I look forward to hearing from you.

Sincerely,

Barbara A. Mikulski

Barbara A. Mikulski
United States Senator

BAM:wbk

MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard • Baltimore MD 21230
410-537-3000 • 1-800-633-6101

Martin O'Malley
Governor

Anthony G. Brown
Lieutenant Governor

Shari T. Wilson
Secretary

Robert M. Summers, Ph.D.
Deputy Secretary

May 8, 2007

Mr. Mark Mendelsohn
Planning Division
Corps of Engineers, Baltimore District
P.O. Box 1715
Baltimore, MD 21203

RE: Mid-Chesapeake Bay Island Ecosystem
Restoration Project, Dorchester County

Dear Mr. Mendelsohn:

I am responding to your request for preliminary water quality certification (WQC) for the referenced project. The project consists of the restoration of James Island through the construction of a 2,072 acre fill area comprised of approximately 55% tidal wetland habitat and 45% upland island habitat, and the construction and backfilling of sills at Barren Island to provide approximately 72 acres of wetland habitat on the northern and western portions of the island. In total, approximately 2,144 acres of island habitat will be created as well as protection provided to existing island ecosystem habitat, including submerged aquatic vegetation.

Approximately 90 to 95 million cubic yards of dredged material from the maintenance dredging of the Chesapeake Bay approach channels to Baltimore Harbor will be utilized for the restoration of James Island. The material placed at Barren Island would be from the authorized maintenance dredging of Federal navigation channels in the Honga River.

The Maryland Department of the Environment (MDE) participated in the development of the Draft Environmental Impact Statement for the project. MDE concurs with the State and federal natural resource agencies' identification of James and Barren Island as valuable nesting and nursery areas for many species of wildlife, including bald eagles, diamond-back terrapins, and potentially horseshoe crabs.

As you are aware, the Maryland Port Administration is required to obtain a Tidal Wetlands License from the Board of Public Works, based on a review and recommendation from MDE. Based on its involvement to date, MDE anticipates approval of the project, including the issuance of the Section 401 WQC as part of the tidal wetlands authorization.

If you have any questions, please contact me at (410) 537-3763.

Sincerely,

Elder A. Ghigiarelli, Jr.

Elder A. Ghigiarelli, Jr.
Deputy Program Administrator
Wetlands and Waterways Program

EAGJr:cma

cc: Rick Ayella, Chief, Tidal Wetlands Division

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ATTACHMENT D

News Releases and Articles

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Dredge material could be used on Barren or James island

By: GAIL DEAN, Dorchester Editor

(Text only)

July 22, 2002

CAMBRIDGE - A project like the effort to restore Poplar Island near Talbot County could be in the future for two of Dorchester's Chesapeake Bay islands.

Barren Island is ranked fourth in Maryland's Dredged Material Management Program. James Island is ranked seventh. Two other islands are also ranked but not among top contenders in the current plans - Holland ranked 10th and Sharps Island ranked 26th.

Frank Hamons of the Maryland Port Administration told the Dorchester County Commissioners Tuesday that 106 million cubic yards of dredge material will need to be disposed of in the next 20 years from channel dredging projects.

Most of this is not from Baltimore Harbor. Dredge spoil from the harbor cannot be returned to Bay waters and by law could not be used to restore Bay islands.
"The law says we must treat it as contaminated, even if it isn't," Hamons said of dredge spoil from Baltimore Harbor.

The MPA had planned to use Site 104 in the Upper Bay for dredge spoil until the state stopped those plans in June 2000. With that action, Hamons said, "Our 20-year plan became an eight year plan."

In 2009, Hamons said, the MPA will run out of a place to put dredge material. A variety of options are being considered. One idea would be to thinly distribute dredge spoil over wetlands, a possibility for wetlands restoration at Blackwater National Wildlife Refuge.
Part of the plan now in place is for 33 million cubic yards of dredge material to be used over a 16-year period to restore 1,140 acres of wetland and upland habitat at Poplar Island.

That project began in spring 2001.
For more than a year, people have been working, sometimes around the clock, to pump dredge spoil on Poplar Island. The project helps with maintenance of the Chesapeake Bay's channels. It also protects Tilghman Island from taking the brunt of the Bay's erosive action.
The Dorchester County Commissioners hope a similar project can be created for Dorchester's Bay islands.

Stabilizing Barren Island would have the added bonus of helping to keep Barren Island Gap open, a vital channel for Hoopers Island.

Barren Island Gap continues to be a problem area for dredging. There have been problems with recent dredging efforts and there is a near continuous need to dredge there.

Barren Island is estimated to have been around 760 acres in 1660. The island has lost 78 percent of this land since 1848, eroding at a rate of 2 to 3 acres per year, according to the U.S. Fish and Wildlife Service, which owns the island that is a part of Blackwater refuge.

Hamons said Barren Island could be restored to 1,000 or even 2,000 acres.

"One of the greatest benefits of this project would be that it protects the mainland," said Dorchester County Commission President Tom Flowers.

If James Island were selected for a project like the one now underway at Poplar Island, it would help protect Taylors Island.

In 1847, James Island was estimated to be 976 acres. In 1994, it was 92 acres, eroding at a rate of about 6 acres a year.

An 800 to 2,000 acre restoration project is possible for James Island. It is privately owned by three people - Richard Bernstein of Easton, Leland Phillips and Paul Nasetta.

The Poplar Island project also provides long-term employment for about 35 people, Hamons said, many hired from nearby communities.

"The process of getting it authorized, permitted and funded is what takes so long," Hamon said, explaining that Congress authorizes funding for such projects every two years.

The current aim is to create a new project in order to begin funding authorization in 2006. If the project goes through normal procedures, it could be 2014 before it would begin. Hamons said the MPA hopes to have a project ready to begin construction in 2011.

Other benefits of island restoration are the habitats it creates. At Poplar Island, Hamons said, the project is currently encountering a problem with diamondback terrapins nesting in the dikes.
Fishing has already improved around Poplar Island, Hamons said. "It is habitat for things fish feed on."

Hamons said many ideas are being considered for use of dredge material from Bay channels. "As the process proceeds, you will have many opportunities to talk to us," he told the commissioners and those gathered to hear his presentation.

He also said three Dorchester residents are among the members of a citizens committee in the Dredged Material Management Program - Joe Coyne, Bruce Coulson and Robert Tenanty, Dorchester's county engineer.

"We hope you will choose James and Barren Island," Flowers said.

©The Star Democrat 2002

Washington Post

Massive U.S. Budget Bill Brings Windfall for Area Projects

By Southern Maryland Notebook
From Staff Reports
Thursday, February 20, 2003; Page SM02

When Congress passed the overdue fiscal 2003 Omnibus Appropriations Conference Report last week, there was much grumbling by members of the House and Senate that the big budget bill was so cumbersome that it was impossible to know what was in it.

Rep. Steny H. Hoyer, the new Democratic House Whip who represents Southern Maryland, knows what was in it for his district. At the end of last week his office issued a list of 15 programs receiving funding under the bill -- a catalogue of reasons why Hoyer keeps winning reelection in a district that, particularly in Southern Maryland, is generally seen as more conservative than he is.

"The overdue funding Congress has included in the conference report today will support a wide variety of programs, bringing much needed resources and services to our great state," Hoyer said. "Included in the conference report were greatly needed funds for the Chesapeake Bay, St. Mary's College, Space Camp, the Patuxent River Naval Air Museum, Alice Ferguson Foundation and other programs. I am extremely pleased that we were able to secure this money even in the face of increasingly tight budgets."

Hoyer's list included these programs:

• Maryland Bus Program -- $8 million. This Maryland Mass Transit Administration service, operated through local jurisdictions, is used for commuting, running errands and getting to medical and other appointments by residents of Anne Arundel, Calvert, Charles, St. Mary's and Prince George's counties.

• The Chesapeake Bay Program -- $22.6 million. The program, which is run by the Environmental Protection Agency, addresses a variety of restoration and water quality issues.

• Chesapeake Bay Agro-Ecology Research Initiative -- $320,000. The funding will allow the program to continue work addressing agricultural nutrient flows that, along with soil erosion, contribute to toxic organism outbreaks that threaten the Chesapeake Bay living and natural resources.

• Chesapeake Bay Oyster Recovery -- $3 million. The goal of this program is to increase the oyster population in the bay tenfold by 2010.

• Job Access and Reverse Commute Programs -- $5 million. The programs are aimed at low-income workers, particularly those coming off welfare.

• Patuxent River Naval Air Museum & Visitors Center -- $3.4 million. The new museum and

visitors center will be near Gate 1 at the Patuxent River Naval Air Station. The funding provides $2 million to construct an access road to the proposed museum and visitor center and $1.4 million to assist in the development of the center. The total cost of the project is $13.6 million, with the rest of the funding coming from county and state government and the Navy.

• Alternative Tobacco Research Project -- $360,000. The University of Maryland's Upper Marlboro Research Farm and the College Park campus will use this funding to continue work to assess the feasibility of potential nonsmoking uses for Maryland tobacco.

• Historic St. Mary's City -- $300,000 for conservation and partial reconstruction of the Old Brick Chapel, a key element in the designation of St. Mary's City as a National Historic Landmark.

• Alice Ferguson Foundation/Hard Bargain Farm Environmental Center -- $515,000. This 330-acre working farm near Accokeek, with the National Park Service and the Maryland Department of Education, has developed a cooperative program that teaches environmental education and preservation to more than 10,000 students per year.

• Rebuilding Together with Christmas in April -- $400,000. The funding will be used for the organization's safe at home program, which will raise awareness of the need for home modifications, provide training and technical assistance, and oversee delivery of home modification services in low-income homes.

• Modification of Herring Creek Federal Navigation Project -- $295,000. The Herring Creek Navigation Project was constructed in 1960 by the U.S. Army Corps of Engineers and has since suffered from shoreline erosion induced by the Herring Creek entrance jetties. In 1985, the problem was addressed, but one section was still suffering from erosion. This funding will address the erosion problem in this section.

• Milton S. Eisenhower Foundation -- $250,000. The Eisenhower Foundation is a continuation of the National Violence Commission on the Causes and Prevention of Violence and the National Advisory Commission on Civil Disorders. As a result of funding last year, for the first time in its history, Charles County had a summer camp for teenagers designed and implemented in collaboration with the school and the Department of Community Services. This year's $250,000 allocation will be used to help provide technical assistance to the existing schools as well as to help replicate additional full-service schools across the country, one of which will be in Maryland.

• St. Mary's College of Maryland -- $250,000. The funds will be used to upgrade St. Mary's College's broadband from Internet I to Internet II, and will allow the campus to begin wiring with fiber optic cable. It will also be used to upgrade some of the school's servers, switches and hubs.

• St. Mary's College, Waterfront and Shoreline Improvements Project -- $180,000. This is an effort to protect the shoreline at the college by installing additional piers and boardwalks. It

will also improve access to the St. Mary's River.

• State of Maryland Dredging Projects. The Army Corps of Engineers will receive $18.4 million for work on the Baltimore Harbor to continue its extensive dredging of approximately 2.5 million cubic yards of material that is removed to maintain the deep channels in the Baltimore District each year. The Corps also will receive $10.6 million for the Baltimore Channel Anchorage Project to continue construction and improvements to anchorages and connecting channels within the Port of Baltimore. Finally, the Corps will receive $10.6 million for the Poplar Island Beneficial Use Project to help the port face the critical problem of proper disposal of dredge materials.

• Lower Potomac Estuary Study -- $100,000. The funding is part of initial efforts to modernize river levees.

Vacancy on Aging Council

The Charles County commissioners are seeking a county resident 60 or older to fill a vacancy on the Area Council on Aging.

The 16-member council advises the commissioners on the needs, problems, and concerns of the county's senior citizens, and assists in the development and review of the Area Aging Plan. Members serve four-year terms. Meetings are usually held at 1 p.m. the second Thursday of each month in La Plata.

Anyone interested should send a letter of interest and brief résumé by March 1 to Linda Rollins, Clerk to the County Commissioners, Charles County Government Building, P.O. Box 2150, La Plata, Md. 20646; fax to 301-645-0560; or e-mail to rollinsl@govt.co.charles.md.us.

For more information, call Rollins at 301-645-0554.

House Opens Possibility of Ferry

The House of Delegates unanimously approved legislation last week allowing Somerset County to begin negotiations with companies interested in starting a fast ferry service across the Chesapeake Bay.

Supporters of the bill say that a ferry service from Crisfield, Md., to Reedville, Va., would boost tourism and business in Maryland's poorest county and drastically reduce travel time.

A similar bill is moving through the Senate, where it was to be voted on this week. That bill has had a few minor amendments, including a provision banning gambling on the ferry.

Last year, a bill to permit negotiations to set up ferry service between Crisfield and Point Lookout in St. Mary's County died on the final day of the General Assembly session. Sen. Roy P. Dyson (D-St. Mary's and Calvert) opposed the idea, leading advocates to shift the

destination to Virginia.

Under current plans, passenger cars would pay about $35 for a one-way trip. The ride would last about an hour and 15 minutes, and the boat likely would make about three trips a day.

Report Released on Breton Bay

A community meeting scheduled from 6 to 8:30 p.m. Wednesday at Leonardtown Middle School will include a presentation by experts from the Center for Watershed Protection of the draft Breton Bay Watershed Restoration Action Strategy.

During the past year, staff from the county, the Town of Leonardtown, various state and federal agencies, and local citizen groups have been working to identify sources of nutrients, sediments and bacteria that have been identified as problems for Breton Bay.

A stream corridor survey assessed conditions for 177 miles of streams in the watershed and identified 136 sites with problem erosion, 97 sites with inadequate forested buffers, 34 fish migration barriers, 42 channel alterations, 24 mystery pipes entering the streams and a number of other unusual conditions.

The water quality and habitat analysis showed that the nitrogen and phosphorous entering streams from the groundwater east and north of Breton Bay is very low compared with other watersheds in Maryland. Water quality testing of streams in the western parts of the Breton Bay watershed is scheduled for this spring.

Based on data collected so far, it appears the majority of problems with nutrients entering Breton Bay are coming from the tidal Potomac.

Once the draft plan is revised based on public comment, county and town officials will consider it for adoption through a formal review and approval process.

DelmarvaNow.com

Search narrows for next bay dredge dump site

Army Corps of Engineers still considering eight Shore islands for restoration project

By Gabriel Baird
Capital News Service

Friday, February 21, 2003

WASHINGTON -- Federal officials are focusing on eight islands in the mid-Chesapeake Bay that could be the next dumping grounds for silt dredged from bay shipping channels.

Barren, Holland, Hooper, James and Ragged islands of Dorchester County and Little Deal, Smith and South Marsh islands of Somerset County are still on a list of islands the Army Corps of Engineers is considering to replace the current dump site, Poplar Island.

The Maryland Port Administration did a similar study and identified James and Barren islands as favored sites last fall, said Jenn Aiosa, senior scientist with the Chesapeake Bay Foundation and a member of the port administration's selection committee.

The corps and the port administration are working together on the project and will share the cost.

"It really is a cooperative venture between the state and federal partners," said Richard Sheckells, the port administration's director of planning and environment.

The corps planned to hold the first of three public meetings on the issue Thursday in Dorchester County. Another hearing is scheduled Tuesday at Anne Arundel Community College and a third hearing in Queen Anne's County, delayed by this week's snow, has yet to be rescheduled.

"Some of these (islands), after the meetings, might fall off the list, just because people might tell us they're not interested," said Michele Bistany, the Army Corps of Engineers' study team leader. "I'd imagine the list will be narrowed down to one or two."

Bistany said the corps hopes to further narrow the list in the next few months in hopes of replacing Poplar Island, which is expected to reach capacity in about 10 years.

Scott Johnson, the corps' Poplar Island restoration project manager, said the need to identify a new site is "fairly urgent." The current hearings are just an early stage in a multiyear selection process, he said.

The corps must still study the remaining islands to evaluate environmental impact, engineering feasibility and cost before it selects a dump site.

The islands under consideration must have been at least 200 acres at one time. Other criteria used by the corps include requirements that the islands not hurt existing navigational routes if used as a dump and that they are surrounded by deep-enough water to ship the dredge there.

Johnson said about 4.5 million cubic yards of sand and mud must be dredged yearly from the bay to keep two shipping channels open.

Once an island is restored it serves as a shield, protecting the shoreline behind it from erosion, he said. At the same time, it can serve as a habitat for plants, birds and animals.

Maryland's process of selecting a new site has become more involved as a result of legislation passed in 2001 after a plan to dump the dredge in an area of the bay known as Site 104 was blocked, said the bay foundation's Aiosa.

The foundation and other groups, including the Maryland Watermen's Association, have not yet taken a position on the sites but are waiting for more research on the islands that get selected.

"We support the idea of rebuilding those islands," said Larry Simns, president of the watermen's association. "We will have to look closer at how each (site) would affect local watermen before we give our support."

The Star Democrat

Island hunting continues

By: GABRIEL BAIRD, Capital News Service

February 24, 2003

WASHINGTON - Federal officials are focusing on eight islands in the mid-Chesapeake Bay that could be the next dumping grounds for silt dredged from Bay shipping channels.

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DelmarvaNow.com

Feds eye way to save bay islands

By Liz Holland
Somerset Herald

Saturday, March 22, 2003

PRINCESS ANNE -- Eight eroding Chesapeake Bay islands in Somerset and Dorchester counties are being considered for restoration through the use of dredged materials from the Port of Baltimore.

Narrowed down from a list of 105 bay islands, the eight are now part of a three-year feasibility study by the U.S. Army Corps of Engineers, which will partner with the Maryland Port Administration.

Corps officials are not certain how many of the eight will be selected for restoration, which could be another eight to 10 years away, said Mimi Bistany, who is working on the Corps' study and presented the plan recently at a public information meeting in Princess Anne.

Part of the final decision will be based on the cost which will be split equally between the state and federal governments, she said.

Three of the eight in the study -- Smith Island, Little Deal Island and South Marsh Island -- are in Somerset County.

The remaining five are Ragged Island, Barren Island, Holland Island, Hoopers Island and James Island in Dorchester County.

The proposal would fulfill two goals: to find a dump site for dredged material and to create new wildlife habitat areas in the Chesapeake Bay, said Steve Storms of the Port Administration.

The Corps would use only material from the main shipping channel, not Baltimore Harbor, he said.

The proposed island restoration plan would be similar to recent work on Poplar Island in Talbot County.

Though it once had more than 1,000 acres, Poplar Island had about four acres remaining by the 1990s.

By using material dredged from the Port of Baltimore's shipping channel, the island was returned to its mid-19th century footprint in 2001. Since then, it has become a nesting area for a variety of birds and diamondback terrapins.

The Corps plans two more public information meetings before concluding the study in November 2005.

Bay Journal

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The Rise and Fall of Bay's Level Determines Islands' Empires

PAST IS PROLOGUE

By Dr. Kent Mountford

(Text only)

During Capt. John Smith's first voyage up Chesapeake Bay, one of his projects was to map what he encountered.

Smith's barge, an open row– and sailing vessel of *"near three tuns burden"* (capacity) was well-packed with the captain, his party of gentleman adventurers, a few sailors and Dr. Walter Russell, who was likely a doctor of philosophy—perhaps with some medical training—but not a surgeon in the limited sense of 17th century practice. Russell had just arrived that spring of 1608 aboard the Phoenix, a small, square-rigged ship, which had resupplied the colonists.

When the Phoenix left to return to England, Smith's explorers started out in convoy, separating from her near Smith's Isles at the Bay's mouth, then turning northward for exploration.

Smith's *"Mappe"* is generally acclaimed as one of the most successful, widely used and copied of this exploration age. It shows a chain of islands they encountered extending out to form a loose arm embracing what came to be known as Tangier Sound, which borders Maryland's Eastern Shore of the Chesapeake Bay. The first of these, which was approached during a violent spring thunderstorm, was named Russells Isles by Smith and his shipmates in honor of their recently arrived comrade. Smith's map shows nine of these islands ranging up to the latitude of the Patuxent River, 39 deg. 20' N.

Opposite the Patuxent, Smith's barge was trapped for two days by violent squalls that came out of straits between the islands, which was dubbed "Limbo" because of their delay there. (Today it's known as Hooper Strait.)

On the Bay's Western Shore, they saw and mapped three large islands east of their course, but apparently failed to see the Choptank River beyond. It remained for future explorers to name Kent, Tilghman and Sharps Islands, the

latter of which vanished after centuries of erosion.

As the Bay's first exploration party returned down the Western Shore, Russell saved Smith's life after the latter's wrist was pierced by a poisonous stingray spine. Smith would later write his *"Generall Historie,"* which includes a section contributed by Russell.

As for Russell's namesake isles, they, unfortunately, no longer recall his contribution. Many of the islands and all of the shorelines he saw have disappeared. That's nature's way, and has been for thousands of years.

Today, there are about 44 islands in a loose chain south of the Patuxent. These are slowly being dissected over time by sea level rise and shoreline erosion, leaving the higher areas as distinct islets. This process has been taking place since a rising ocean inundated coastal river valleys to form the Chesapeake at the end of the last (Wisconsin) glaciation 10,000–12,000 years ago. A peninsula slowly pinches off to an island, to chain of islands, then slowly vanishes.

The region's Archaic period hunter-gatherers of that time settled near creeks and shorelines. Most of their cultural remains, campsites and artifacts are lost on the Bay's bottom, occasionally dug up by oystermen or clammers.

Colonial plantation owners were the first to pay attention to the sometimes rapid process of shoreline erosion because their culture, which was based on land ownership, led them to survey and set property lines and values on what had been a commons for native Americans.

The owner of a waterfront plantation could watch his holdings erode into the Bay.
(The social and economic influences of this are graphically depicted through several centuries for the mythical Devon Island in James Michener's novel, *"Chesapeake,"* which was probably patterned on the now-vanished Sharps Island.)

Although apparently uninhabited in Smith's time, the Bay's island shores reveal native American artifacts, some of them thousands of years old. The oldest date to immediate post-glacial times and the hunter-gatherer cultures who ranged these lands in the time of great Pleistocene mammals. There was no Chesapeake Bay then, only a landscape dissected by river valleys that would some day form our estuary's core.

Many other artifacts date from the Middle Woodland period of native American culture, from about A.D.750 to the time of European colonization. The sea level was much lower then and the islands had greater geographic

relief and were large enough to have freshwater sources that would be lost to saltwater intrusion by the 17th century.

Several of those lower Bay islands, including Smith, Tangier, Barren, Hooper, James and Sharps, were settled by Chesapeake farmers and watermen. While the salt marsh has swallowed their farmland in the lifetime of people now living, Smith and Tangier still have viable fishing settlements and are popular tourist destinations.

Many other islands were abandoned by humans and reverted to wild habitat along the course of their devolution from island to estuary. Barren Island is a formerly inhabited place in this archipelago.

Bill Cronin, in his forthcoming book, *"The Chesapeake's Vanishing Islands,"* says that by legend, Barren Island first came into English hands when a Nanticoke chief lost a wrestling match to some tough colonist.

Later, Richard Preston, a Puritan seeking religious freedom in Lord Baltimore Charles Calvert's more liberal Maryland colony, settled on lands just south of St. Leonard Creek on the Patuxent River. Despite his anti-Calvert and anti-Roman Catholic activities, Calvert, in 1664, granted him land in Dorchester County as well as all of Barren Island, which at the time was probably near a thousand acres. Preston paid his landlord a "quit" or "free and clear" rent of 14 shillings annually.

Cronin states that in the 18th and 19th centuries, Barren Island contained 14 farms, a one-room school, small local stores, and a Methodist Church served by a visiting minister.

A colleague, Michelle Monte, once found a stamped copper medallion dating from this period while beachcombing. It resembles an Indian head penny, but is pierced for a cord or wire on one edge and bears the date 1803, which is long before the U.S. Indian head penny was minted. It was once thought to be a tobacco tag but an expert has since scotched that interpretation, and it remains a mystery.

I discovered Barren Island nearly three decades ago while navigating my yawl, *Cemba*, through Tar Bay and the Hooper Island chain to reach the Honga River through Barren Island Gap. On that course, with the island close to starboard, one could not help but see that the big hunting lodge on its western face, was being threatened by erosion.

The lodge was built in 1929, with materials scavenged from the Caswell Hotel demolition in Baltimore, and barged over from Solomons Island.

Louis L. Goldstein, Maryland's late comptroller, once told me that he'd bought both Barren Island and the hunt club from for $55,000. "I got the guns and all," he said gleefully. He didn't keep it for long, and subsequent owners were faced with the rapid erosion of the island's west face.

In 1985, we took a dinghy ashore to witness the slow destruction of the old lodge, which was renewed with each winter's northwest gales and each year's few millimeters of sea level rise. It was a dramatic commentary on the impropriety of building on a windward shore. Despite an extensive bulkhead, the Bay was having her way, and the lodge was collapsing into the Bay.

The floor of the lodge's main room was already a ramp down which upholstered furniture and disembodied cast-iron radiators were sliding. The roof, still intact, provided shelter for a whirling colony of swallows, which nested and fledged its young each spring. The room's bar still had glasses perched against its sloping varnished rail and many of these contained bird droppings. Curtains, much the worse for wear, blew in the sea wind across glass-paned double doors now askew.

Years later, I sailed my yawl, *Nimble*, to Barren Island with Chesapeake Bay Program colleagues, all of whom were enthralled by this special and increasingly wild place. The massive cast-iron coal stove that once cooked waterfowl stews and roasts for visitors had been hauled away by someone as salvage.

By the end of the century, the last standing part of the structure had collapsed, leaving a mound of broken beams and shingles atop which a nervous osprey had nested.

We found an old bulldozer in the island's forest on the eastern side a few years ago. It had been inundated by corrosive salty Bay washovers often enough for the 2-inch thick steel working edge of the blade to be rusted through. Traces of paint remained on some parts, and a brass patent plate gave a date of 1946. The machine had apparently been used to sculpt the topography to encourage wet impoundments and attract waterfowl. At least one such pond still exists, now inhabited by frogs, minnows…and mosquitoes.

One autumn night in 2000, I anchored completely alone in Barren Island's silent but uncertain lee, protected from a southeast wind.

This was one of those times when the island spoke to me: October's sun had set quickly, and the water was oiled orange and indigo, the shadow of Cove Point's cliffs across the Bay was a smoky burnt hue, and the sky above graded from yellow to yellow-green to the increasing dark of blued-steel. Geese conversed over submerged grass beds up by the island and a loon called. I

could have easily been in the 17th century.

I turned to go below for the night and was stunned to find the full moon had risen above Barren Island's north end, and hung over a Bay so calm, just a single reflected image sat swimming in the water next to me, tranquil and lovely.

My lee vanished in the night and I woke early with *Nimble* pitching at her anchor, exposed to a fresh northwest wind.

I took my dinghy into Tar Bay, on the east side behind Barren, and worked cautiously through a vast underwater meadow of widgeon grass. About 150 geese and some black ducks were feeding on this marvelous resource, rich with seed at this seasonal juncture. I rowed through the last of it to Possum Island, which lies behind Barren off the Hooper Island chain and in the middle of Tar Bay. Cronin reports there was once a 175-acre farm on what today is only a remnant with a few struggling trees.

Traces of the house can still be found in the shallows: bits of crockery, shingle, brick, parts of a cast iron stove.

And there at my feet were the broken parts of two native American quartz projectile points and some bits of Late Woodland shell-tempered pottery which could have been well over 1,000 years old.

I was snapped out of my reverie, looking up to find a man on the beach. No doubt he wondered what I was doing in his space. After a hearty greeting, I learned he was Edward Simmons of nearby Hooper Island. He has lived and guided hunters here for more than half a century.

Simmons leases three spots for duck blinds on Possum and was out salvaging washed-up crab-pot buoys. He splits the bullet-shaped floats lengthwise, adds a piece of copper pipe in the resulting groove for weight and sticks in a carved wooden head to make inexpensive bufflehead duck decoys for hunting the most common species taken from his blinds. "I just love it out here; lookin' at the world…" he said.

Simmons said that Eastern Shore artifact expert Bill Yates thinks points like the larger one I found may have been Indian oyster knives. At our feet, in Possum Island's shallows, I could have still picked up half a peck of oysters that morning. People have found more than a thousand points of various kinds out here over the years, Simmons claimed.

Simmons told me about Barren Island's vanished settlement. "They lived on the Bay (side) 'cause that's where the deep water was and they sailed to

Baltimore and Philadelphia." There were three cemeteries, one long gone into the Bay, a second disappearing and the third — he pointed to a copse of trees at an area called Cove Point — is near a heron rookery that sometimes hosts 350 nests.

"I brought some people from the West out here, looking for graves." Simmons mused, "and I found the grave of one of my neighbors' grandma." Mrs. Phillips had died in 1892, and last year he brought her granddaughter the stone, laboriously lugged in three pieces aboard his skiff. Brought it right to her door, so it could be erected in the family plot on Hooper Island. All together again, but…on another eroding island!

Graves on the west side of Hooper Island are also being lost. In one spot, a cemetery has stone riprap placed around it and the graveyard now protrudes from the shoreline into the Bay.

As erosion took away the island's west face, one after another family moved east to the Hooper Island chain. Houses were jacked up and slid aboard barges for their new locations. Simmons bets there are maybe 13 houses there that once occupied lots on Barren Island.

In his parent's memory, the last owners on the island were the Moultons. "My mother said the last was a pretty rough old character, wore just a piece of rope to hold his pants up. Grew most everything he ate right on the island.…gathering oysters and such, too. Used to be oysters there…" he pointed east to the once intertidal flat that permitted walking on a very low tide, all the way from Hooper to Barren Island with just one deep spot to wade.

The 1862 chart of Barren Island seems to pre-date the settlement Simmons spoke of, showing just farmland here, and today's navigation channel, leading east to Hooper Islands and the Honga River was absent, not dredged until well into the 20th century.

A string of low sandy islands, today collectively called "The Marshes" trail down from the south end of Taylor Island, which lies north of Barren. Together with the Hooper Islands, these define the perimeter of Tar Bay. Simmons said that in his lifetime, and before Barren Island Gap was dredged, you could occasionally wade from Taylor's Island to Barren.

These bars of sand and shells have been the sites of wonderful colonies of nesting terns as well as territory for a few oystercatchers. I sailed the Chesapeake Bay Program's first director, William Horne, over to the Marshes in June 1990. We landed cautiously, staying along the water to avoid disturbing the nesting birds or accidentally trampling eggs that are simply laid

in small depressions on the bare sand.

Intrusions were — and should be — so rare that an osprey, usually high in some dead tree, had nested right on the ground. Her two beautiful and robust chicks gazed at us with baleful red eyes — powerful predators in the making.

A few black skimmers were nesting here, too, the first I'd seen north of Tangier Island. The sky above us was dramatic and full of skirling birds. We quickly left to minimize our impact on their afternoon. Horne and our wives have never forgotten that afternoon.

Tar Bay had been made a wildlife management area by the Maryland Department of Natural Resources five years earlier, and one of their biggest management challenges lay just offshore that afternoon. The Bay was virtually white with non-migrating mute swans, and we quickly counted about 500. Their impact on the terns and skimmers would be very damaging as they increasingly occupied these breeding islands as loafing areas, trampling eggs and chicks, driving off adults.

That afternoon I estimated that there were 200 pounds of dog-sized swan feces deposited on these skinny sand islets. In future years, the count of nesting tern pairs would drop to barely a dozen as these big birds took over the territory.

Barren Island's pedigree during these years was checkered. There was a proposal for an upscale 200-slip $25 million marina with a lodge and cabins. It was even considered as a prison site, With an estimated value of $250,000 in 1988, the DNR upped the ante to $495,000, and buyers with questionable proposals backed off. Eventually, a deal was struck with the U.S. Fish and Wildlife Service, which will manage the island in perpetuity.

Two years ago, brown pelicans, whose summer visits to the Chesapeake were unprecedented in history, used Barren's southernmost islet remnant as a loafing area and last summer they nested and fledged many young. I estimated about 50 nests when I visited, long after the birds had flown south for winter.

The nests were in low groundsel bushes to avoid periodic flooding, but on the marsh surface were some of the season's casualties. The wing bones of an adult lay there, marvelous hollow structures, light as balsa wood, with the attachment scars of primary flight feathers dotting one edge.

Several years ago, when the channel at Barren Island Gap was given one of its periodic dredgings, the U.S. Army Corps of Engineers sponsored a series of "geotube" shoreline protection structures along the island's north end. Silty material from the channel was pumped into fabric tubes to make a string of "sausages" offshore to impede wave action, then more material was pumped

behind them to create fast land. The tubes leaked silt until, at substantial expense, coarser grained sand was brought in to do the job.

Bare, cracking sediment from the drying dredged material extended out a long distance from where the original — if eroding — marsh edge had been, and thousands of periwinkle snails and fiddler crabs crept out across what was to them an interminable desert, and died for want of water. Success was declared a couple years back, and volunteers came out to plant the drying sediment with beach grasses.

A new proposal is being floated by the Maryland Port Administration and the Corps to make Barren Island, and a short list of other eroding islands, sites for the disposal and beneficial use of dredged material from upper Bay navigation channels, much as the Poplar Island group is being used presently. Barren Island is a long, expensive way down the Bay to transport wet silt and sand, but there are other islands still farther south under consideration.

The environmental buy-in comes from the intended re-creation of Bay-island habitat lost to erosion, and the possible protection offered to leeward islands — in this case Hooper. While dredged channel material is not necessarily hazardous, it is still a waste product that the Bay community has fought over for years.

Before plans for Barren Island go too far, I hope people will take a close and personal look at the Poplar Island project, which I visited last autumn. It is not one of the wild Bay islands I've come to love — even treasure — during my decades on the Bay, but very much a massive, stone ramparted fort and repository for one of navigation's difficult disposal problems. The work to make it look natural is too expensive.

While many birds will colonize any open space in the interim and while they have to, it will be many years before this project will be left alone for wildlife; many years with heavy construction equipment, all-night floodlights and the coming and going of innumerable barge loads of silt.

All of it bears a significant load of nitrogen for the Bay, both in its removal and deposition. Look carefully at the sources of those dredged materials and be very clear about the real and justifiable need for those proposed channel works. Poplar Island should last many years longer than projected. Visit and appraise the joined structure of Hart and Miller Islands in the Upper Chesapeake, where portions of the dredged material disposal cells are being closed and public use is permitted on part of the island. This facility still releases nitrogen to the Chesapeake.

I hope I will be too old to sail to my special Bay island habitats before they

undergo such restoration and improvement. I prefer the memories I can still gather there in solitude, watching the Bay continuing to slowly take back the land as time goes by, and sea level rises.

The Star Democrat

Three Dorchester islands under consideration by Port Administration for state dredging project

CAMBRIDGE - Three islands in Dorchester County top the list of sites the Maryland Port Administration is considering to take dredged material from the Chesapeake's shipping channels.

"It looks now like Dorchester County will be selected, one way or another," the Dorchester County Council was told Tuesday by Joe Coyne, the county's representative on a MPA citizen's advisory committee

"They've culled it down from 100 to three," Coyne said of the list of sites considered for the dredge spoil.

Barren and James Island top the list of sites being considered. And there is a possibility of a project that would combine both islands.

The other island being considered is the lower island of Hoopers Island. Once the site of the community of Applegarth, it was abandoned for good once the bridge to the island was destroyed in the Great August Storm of 1933.

County Councilman Tom Flowers also asked Coyne about the status of dredging projects at Barren Island Gap and Back Creek at Hoopers Island.

Coyne said the U.S. Department of Interior has agreed to allow dredge spoil to be deposited on Barren Island, which is now part of the Blackwater National Wildife Refuge system.

With spoil sites approved, Coyne said, the dredging projects should be able to move forward.

Coyne told the council they will need to participate in the process for drafting the federal legislation to fund the project. The county wants to be able to dispose of local dredge spoil in any site approved in Dorchester for the MPA project.

This legislation would need to include a provision to allow Dorchester County to use whatever spoil sight the MPA selects.

Barren Island would allow for dredge material to be used to recreate wetlands. Coyne said the Interior Department has set a cap of 1,000 acres of dredge material to be placed on Barren Island.

Coyne said James Island will offer the MPA plenty of space to place spoil dredged for the Bay's shipping channels. He said the island near the mouth of the Choptank has, "almost unlimited potential for creating uplands of dredge spoil." He said the site would serve the channel maintenance needs of the MPA "for as much as 20 years, perhaps even longer."

He told the council the project at James Island could be very similar to the one at Poplar Island in Talbot County's Bay waters near Tilghman Island. "It will emulate the Poplar Island work."

The MPA is in the process of creating an environmental impact study for the project.

It faces its own deadline of finding a new site for dredge spoil disposal, a need that will become critical in the next several years. Which specific island environment the MPA will be studying remains to be decided.

"They are a couple of months away from making their decision," Coyne said.

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Most of What Now Exists of Eroding James Island is Memories

PAST IS PROLOGUE

By Dr. Kent Mountford

(Text only)

"Wind SE to SSW, 6 to 20 knots. …Beat out to James Island, anchored…and put the boat ashore. Rich swam in. Island full of deer, 'coon and birds, hawks, egret, heron, yellow-legs. Black flies terrible... Made sail from anchor at 1500 hours; quite heavy sailing homeward."

— September 1971 log, CEMBA

This section from our yawl's log records my first introduction to James Island, one of the eroding Eastern Shore islands of the Delmarva Peninsula. I have returned many times to learn its history and enjoy the sense of place that comes from experiencing what the Bay might have been like centuries ago.

During a very early period of Native American history 10,000 years ago, this was not an island, but high ground adjacent to a stream that ran west to join the ancestral Susquehanna gorge.

Archeologist Darrin Lowery, is certain there were people on the land at that time. He has found remains of their stone tools on a Choptank oyster bar now submerged by sea level rise, as well as a variety of projectile points around the island's present margins, which suggest that occupation continued up until colonial times.
These Eastern Shore Islands were incompletely depicted on John Smith's 1612 map based on explorations of Chesapeake Bay, because his course up the Western Shore missed the Choptank River.

English colonists named the island for Saint James. Historian Bill Cronin says it was settled by the early 1660s and encompassed 1,350 acres. The island was purchased by the Pattison family, who held onto it for more than 200 years.

Piecing together the vanishing island's history is a story told mainly through maps and memories.
The tip of this land is shown as James Pt. on Augustine Herrman's map of 1670. A

secondary islet between James and Taylors is found on John Speed's map of 1676 and on Johann Homann's 1719 chart.

James Island appears to have connected and disconnected from the mainland, as erosion along its western face allowed sand to migrate south and create a long neck of land to adjoining Taylors Island. Maps show it was close to connecting in 1689; separated in 1780, 1794 and 1832; had only a rivulet between them in 1838–48; and was firmly joined to Taylors Island in 1868 and 1903.

During my early visits, the channel to Taylors Island was wadable, but in 2002 a motorboat easily crossed what was once dry land.

Since the mid-19th century, James Island has gone from more than 1,300 acres to about 550 acres in the late 1990s.

A map from 1903, when the north end was a mile wide, shows a road running down the west shore with lanes leading to four likely dwellings along the shoreline in a configuration that suggests they might have been farms. There's archaeological evidence for some of this settlement scattered in shallows on the Bay's bottom, and at least one partial foundation with a doorstep stone still survives on the island's marshy west side.

Dr. Ralph Eshelman, a historian, has discovered one site not found on the 1903 map that might have been an oyster shucking house.

Some of the island's former residents are buried in a cemetery on an inland ridge.

Mareen Waterman, who once co-owned the island with fellow sportsmen, told me that he once found an old embalming fluid bottle on the island, along with a blue Bromoseltzer bottle and—to his children's delight—several bottles for "Waterman's Ink." He says there was also a small schoolhouse at one time.

Cronin said there was a small store, owned by J.T. Leonard, who was part owner and namesake for a sloop built in 1882 at neighboring Taylors Island by Moses Geoghegan. Long after the store had been claimed by the Bay and its owner by time, the J.T. Leonard went to the Chesapeake Bay Maritime Museum in St. Michaels where she was once on exhibit.

Archaeologists have found evidence suggesting habitation periods from 1820-1860 and from 1900-1930, but nothing remains of the village of 20 families and Methodist Church purported to have been there in 1892. These dwellings might have been on the more rapidly eroding west face of the island.

The island returned to forest and was probably logged by the Spicer Lumber Company, which built an access pier into the Bay to ship rough-milled boards, and left behind a huge sawdust pile. They also drilled several hundred feet through the island's basement and opened a more productive aquifer for water. This source was slightly artesian and

rose to within a few feet of the surface, where it was drawn with a simple hand pump atop the pipe.

During World War I and as late as 1920, Clemment Henry raised a herd of small oriental elk known as sika deer (*Cervus nippon*). They were valuable, because the wild populations had been almost hunted to extinction for the antlers of the bucks, which when "in velvet," were believed to be an aphrodisiac.

About 1916, he released four or five deer on James Island. They prospered and by 1955 the herd had grown to about 300 animals, a density of more than one deer per acre. The neck or shallow bar to adjoining Taylors Island, allowed them to spread there, and herds of 40 deer were observed swimming across the channel. They were hunted on both James and Taylors islands.

With no natural predators, a large number of sika deer stayed on James Island and these small ungulates began to reduce their available food supply, grazing trees and shrubs as high as possible. They ate virtually anything they could reach, including poison ivy, and stripped the bark of loblolly pines. Many native plants were extirpated by the mid-1950s. Researchers did not perceive that the food supply was threateningly low as much as they noticed that the average size of the deer was decreasing.

In 1958, a die-off of about 161 deer was reported. Van Flyger, from the University of Maryland, collected 147 skulls and published a photo of them arrayed on tarpaulins in Chesapeake Science. About 109 animals on the island survived.

Scientists John Christian, Flyger and Dave Davis studied 18 of the surviving deer and determined that while they were in good nutritional condition, their physiology indicated hyperstimulation from the stress of crowding, and attributed the many deaths to this.

The condition of the sika deer improved, and by the 1970s and '80s, they had again stressed the island vegetation. The browse line could be seen long distances into the forest, a clear sign of overpopulation to wildlife managers. It is still evident in 2003.

Drawn by a winter goose population of 7,000–10,000 birds in the adjacent Little Choptank River, Waterman and eight other sportsmen formed the James Island Gun Club and bought the island from Louis Goldstein, the late Maryland comptroller, in the 1960s.

They built a cabin about 100 feet inland and drove a point well into the freshwater lens. The logged forest had regrown to where most of the trees were 6–8 inches in diameter by then. Fifteen years ago, the cabin site was 15 feet out in the Bay and their well pipe stood vertically out of the water, the only evidence that they had once been there.

Water on James Island initially came from the accumulation of rainwater in the soil, perched atop an underlying clay layer that kept it from seeping away.

Waterman said the water traveled laterally, and all along the eroding west side of the island, fresh water seeped out where the clay layer and steep bank had been cut by waves.

This freshwater lens was opened and bermed up into a pond of about one acre on the island's west side. It has since eroded away, but in low spots, vernal pools still intersect the soil surface and provide water for raccoons and sika deer.

During the 1960s, visitors had to walk their boats ashore through broad shallow beds of submerged aquatic vegetation, especially in spring. Waterman said beds of what he thought were Eurasian milfoil (*Myriophyllum spicatum L.*) ran 1,000 feet out from the shore. It was very likely mixed with at least widgeon grass (*Ruppia maritima*), which is present today and possibly eelgrass (*Zostera marina*), which also occurred farther up the Bay than at present.

Local fishermen harvested softshell and peeler-crabs in these beds using what Waterman described as roller nets in the dense grass.

The grass beds have almost completely disappeared today, and scientists suspect nutrients and turbidity are the major causes.

Where grasses significantly prevented erosion on the island's east side, now there are only small remnant beds. A dozen years ago, Waterman said he could run his boat with a 3-foot draft right up to the beach, the shallow area having been swept away to greater depth, probably the result of currents and modern sea level rise.

The remaining parcels of James Island are owned at present by three men.

My friend John Little pulled up in his skiff once, looking to camp in a wild place on the Chesapeake. He met one of the owners who had no objection as long as no damage was done and no trash left behind. Enough flotsam already washes up from careless people up and down the Bay.

In 2001, someone wasn't so cautious and ignited a fire, which burned for weeks across the southernmost part of James, working its way, in that year of drought, through the pine straw on the forest floor.

When I was last at James Island this spring, I saw 31 northern gannets (*Sula bassanus*) in the surrounding waters. These impressive birds, which normally winter on the ocean, have a wingspan of nearly 6 feet, and can plummet from 50–100 feet in the air to catch swimming prey, sometimes diving 50 feet beneath the surface of the water.

In previous decades, their winter grounds were found from Cuba and Mexico to Virginia, but they have been moving up the Chesapeake during our recent progressively milder winters.

Gannets nest farther north, in a small number of rocky colonies. James Island is an undisturbed place where they overwinter or feed.

As more and more people move close to the shore and continue to alter or destroy wild places, there are many bird species that need the insulated habitat islands such as these provide. Meanwhile, these islands are disappearing.

Wildlife managers have latched onto this and created a bandwagon for “island restorations” such as the projects at Hart-Miller and Poplar islands. This philosophy dovetails with the large amounts of money the Port of Baltimore is willing to spend for channel dredging and disposing of the massive volumes of material this activity generates.

I was an early proponent of this approach, and made the first hypothetical drawings of what such a project might look like, with low, offshore breakwaters and frequent access points for water exchange into labyrinthine creeks with upland hummocks. This set of sketches was used for a while to sell the concept; then it became clear that engineers and sediment volume estimators were not satisfied with my low-impact version.
Poplar Island today is a very large facility with massive surrounding riprap walls, and a significant port facility at which large machinery offloads and distributes dredged material over a couple of miles of a high-walled containment. Sections of both upland and marsh habitat are planned and in progress.

Having visited Poplar and nearby Coaches Island, I am not comfortable with the scale to which the project is being built. It seems to be mostly designed to hold huge volumes of sediment.

But given projected dredging needs, not just for Baltimore Harbor and its approaches, but also channels farther up the Bay, the capacity at Poplar Island will soon be reached.

Proposals are being floated at public meetings for making dredged material deposition sites at several eroding Bay islands. First in line among these—though still in the selection stage—is James Island. Serious on-the-water survey work is in progress.

The reason for these continual project expansions, dredge watchdog Dr. John Williams says, is that much of the material for a deposition site is scheduled to come from the Chesapeake and Delaware Canal approach channels. He has argued forcefully and often effectively, to regulatory officials that the actual and likely ship traffic transiting the C&D simply does not merit the high cost of dredging.

If so, one might ask if there’s a real need for James Island as a future repository.

I don’t think there’s anything wrong with stabilizing the eroding faces of some islands to delay their eventual loss to sea level rise. There are projects proposed to help Smith and Tangier Islands, to protect the shore adjacent to threatened communities.

If we can use clean dredged material to do social good in these places, that's not a bad way to give back some taxpayer dollars. But that's different from what's developed at the upper Bay fill projects. They have been less considered in their own right, as undisturbed habitats, elements in the region's overall ecology, and even less as places of beauty and refuges for contemplation.

I guess it's in this latter place that I find myself, anchored in refuge behind one or another island, listening to the deer or birds at work in their forests. There is no more tranquil place for a sailor in a gale, where you hear the rush and pounding of seas against the island's windward shore, and the urgent sound of wind through tall island pine woodlands.

Then there is standing, alone or in company, on some eroding point watching the sea reclaim what it possessed once millions of years ago, or looking at sunlight and birds feeding along the long silent curve of a sandy beach.

There are few places, precious few in the Chesapeake Bay, where one can still do this. I would like to still have that opportunity untrammeled in my remaining time here.

Newszap.com Eastern Shore of Maryland News and Information

Army Corps studies local islands

By Pete Macinta, Daily Banner

(Text only)

June 24, 2004

CAMBRIDGE - An update on the Mid-Chesapeake Bay Feasibility Study was presented to the Dorchester County Council Tuesday evening by members of the Baltimore District Army Corps of Engineers (BDACE).

The feasibility study includes the Eastern Shore of the Chesapeake Bay from the confluence of the Chester River south to the Maryland border with Virginia. Fifteen agencies worked together on the study, the goal of which is to restore and protect valuable but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredge material.

After defining needs, goals, and objectives, a screening process and a criteria for island restoration was developed. Islands were then screened and ranked and a selection made as to which ones to restore.

Existing conditions of selected sites were then determined, alternatives formulated, and a comparison and evaluation of plans was made. After 105 islands were considered, eight were screened, with James and Barren Islands of Dorchester County ranking the highest.

The study showed that James Island, with 92 acres in 1994, had lost a total of 884 acres since 1847. In the same time period, Barren Island went from 839 to 175 acres, which is a loss of 664 acres.

James Island is northwest of Taylors Island, where the mouth of the Choptank River meets the Chesapeake Bay. Barren Island is just west of Upper Hooper Island.

A total of 170 alternatives for these islands were screened on the basis of environmental benefits, capacity for dredging material, cost and constructability. The alternatives were then narrowed down to four possibilities, two of which would involve each island separately, and two that would involve both islands.

The next step is to begin a series of public meetings starting in January 2005. Completion of the study and a record of decision is slated for December 2005.

In January 2006, a Chief's Report is scheduled to be made, paving the way for approval and funding from the Water Research Development Act.

After the presentation was completed, Council President Glenn Bramble (District 1) asked when the restoration project would begin if approval were given and funding received.

BDACE Project Manager Scott Johnson responded, "With authorization in 2006, Congress approves the project. Then they appropriate funds."

He continued, "We could probably start designing the project in 2007, if they appropriate the funds, and start construction in 2008 or 2009."

"It will probably take at least three years to build. I would say given the current budgetary climate, it will probably be stretched out longer," he said.

Councilman Bramble then voiced a concern as to how much of the islands would be left by that time.

Also present for the report to the Dorchester County Council was Port of Baltimore Chief of Design and Construction - Harbor Development Stephen Storms.

Cambridge, Maryland April 11, 2005

The Rotoscope

Cambridge Rotary Club

President: G. Philip Reed
Secretary: Barbara Lake
Rotary International President: Glenn E. Estess, Sr., Alabama
District Governor: George Anderson, Bethel, Delaware

CELEBRATE ROTARY 100 Years

The **Rotary 4-Way Test**, of the things we think, say, or do:

1st Is it the truth?
2nd Is it fair to all concerned?
3rd Will it build good will and better friendships?
4th Will it be beneficial to all concerned?

Announcements:

Make-up meetings should be submitted to Barbara Lake by the last meeting of the month.

Board of Directors will meet on Tuesday, April 19 at noon, in the Board Room at Dorchester General Hospital.

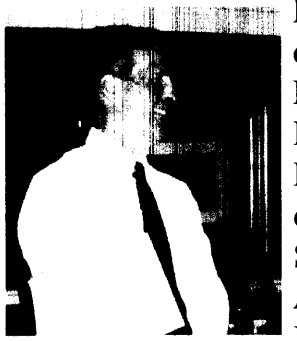
The Installation Dinner for District Governor Ted Merrill will be on July 9, 2005, at Salisbury University, Guerrieri University Center, Wicomico Room, beginning at 6:00 pm.

President Phil presented a check to Dwayne Durham from last week's "Happy Dollars" to supplement the Salvation Army food donations.

Lynn Fair has become engaged to marry Rick Houson next October! Wonderful!

Kurt Riehl announced the **Fireside Chat**, to be held on **April 27**, from 5:00 to 6:30 pm, in the Dorchester General Hospital 3rd floor conference room, with light finger food and refreshments. The Fireside Chat is an informal gathering of new Rotary members, to discuss our club's history and organization, and the

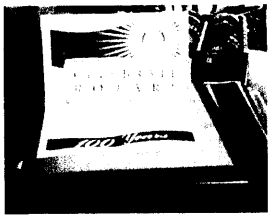
In the meeting on **April 7, 2005**, we learned about the **Mid-Bay Island Ecosystem Restoration Project**. Joseph Coyne introduced **Scott Johnson**, U.S. Army Corps of Engineers Project Manager, who described the program. He was accompanied by: Kelly Wright, Andrews Miller & Associates, the design engineers; Stephen Storms, Maryland Port Administration; Fran Flanagan, public relations contractor for the Port of Baltimore, formerly the Executive Director of the Alliance for the Chesapeake Bay; Joseph Coyne; and Melissa Thomas, Andrews Miller & Associates.



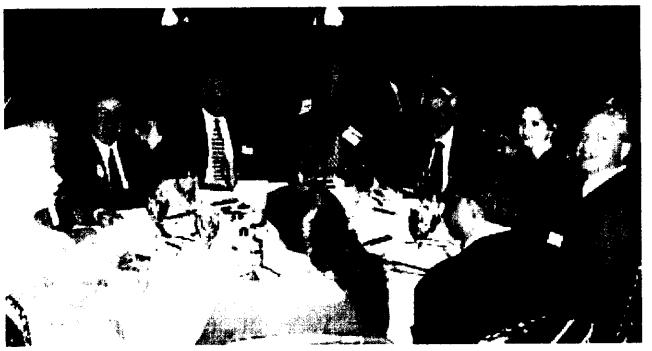
The Mid-Bay Project is part of the Corps of Engineers Dredge Material Management Program. The "mid-bay" area extends from the Chester River to the Maryland-Virginia line, and includes 105 islands. The object is to use the 3 million yards of clean spoil, which is dredged each year from tributaries, to help restore the ecosystem on some of these islands. The projects to enhance Pooles Island and Poplar

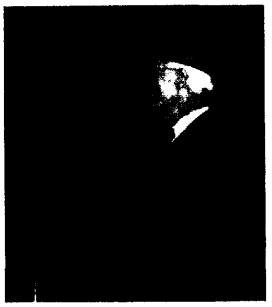
expectations of Rotary members. Our new members are urged to attend.

Kim Gscheidle graciously accepted the task of assembling the 2005 Club Scrapbook. The result is beautiful. Many thanks to Kim.



On Saturday, April 9, 25 members and spouses attended the District 7630 **Centennial Celebration Dinner**, part of the District Conference at the Hyatt. It was a great party, with Paul Harris speaking! The Party on April 8 was also great!





Proposed new member: Philip Brohawn has withdrawn, because of time conflicts.

Birthdays: None

Rotary anniversaries: Doug Bennett, 1984
Larry Jones, 2004
Bill McDonnell, 1998
Kurt Riehl, 1984

Island will continue until 2010, when they will be full. After analyzing all the other islands, Barren Island (off Hoopers Island) and James Island (on the south side of the Little Choptank River) were selected for the Mid-Bay Project. With photos and diagrams, Scott explained the work to be done. The concept is to construct a circular berm of sand dredged at that site, armor the outside of the berm to resist erosion, and deposit dredge spoil within the berm. Some of the resulting area will be high-and-dry, and some will be wetlands. Scott described the great increase in wildlife on Poplar Island, as a result of the past few years of enhancement. He said that the Barren Island project might include a breakwater extending southward to reduce erosion of the Hooper Island shore. He said that, after public review and hearings this year, he hoped that the Final Report would go to Congress in February 2006, for authorization and funding.

On April 7, 49 members attended, of the 70 in the Club, 76% with 4 make-ups. If you missed the meeting, we missed you, and you missed a very interesting program and good fellowship.

Make-ups: Sandy Grande (Easton 3/16, 3/30); Roger Harrell (Centreville 4/7, and District PETS 4/8-9); Marty Mullaney (Easton, 3/30); Paul Stagg (District PETS 4/8-9)

Visiting Rotarians, April 7: None

On April 7, the drum gave Brett Wilson the free meal, and Randy Bradford the 50/50.

For a Rotoscope announcement or comment, contact Paul Stagg, 410-228-7644, pstagg@comcast.net., or Susan Todd, 410-228-8900, susan.todd@suntrust.com.

Dredging up answer to vanishing islands

Plan would solve commerce, environment concerns
By Rona Kobell
Sun reporter
Originally published November 13, 2006

The Maryland Port Administration and the U.S. Army Corps of Engineers are proposing to spend more than $1 billion to rebuild two islands in the Chesapeake Bay -- the government's latest plan to use dredge spoil from shipping channels to enhance the environment.

The two agencies propose to remove tons of silt and sediment from the state's waters, then haul it down the bay to create a 2,000-acre wildlife preserve at James Island, a spit of land off the coast of Dorchester County that is quickly vanishing. The two agencies also want to replenish the shoreline at nearby Barren Island, another fast- disappearing remnant of land near Hoopers Island.

The James project is expected to cost $1.1 billion. The Barren project would cost about $30 million.

Both projects, which would be similar to the government's restoration of Poplar Island, are expected to attract a vast array of wildlife, including eagles, terrapins and great blue herons. Both are also expected to help stem erosion at Taylors and Hoopers islands -- inhabited peninsulas where rising sea levels cause frequent flooding.

But the main push is coming from the needs of commerce. Port officials say they must clear approach channels so that big coal and container ships can come and go, and to do that they need a place for about 3.2 million cubic yards of sediment each year -- enough to fill M&T Bank Stadium twice.

The island projects, if approved by Congress, could handle the port's disposal needs for two decades or so, said Scott Johnson, a Corps of Engineers project manager.

The proposal is expensive and approval is not certain -- especially because the plan would have to compete for funding with corps projects in post-Hurricane Katrina Louisiana. But Congress approved a similar project at Poplar Island, which has been built up over the past decade at a cost of about $400 million.

"It's a lot of money," Johnson said of the James and Barren proposal. "But when you look at the fact that you have to do something with the dredge material and you have the opportunity to turn it into something beneficial, people are pretty much endorsing it."

The proposal includes a $250 million expansion of the Poplar Island project. Johnson is

hoping Congress approves the plan next year so the agency can begin design work in 2009 and, after extensive construction of dikes, have James ready to accept new material by 2018.

Island dredge projects mark a rare intersection of environmental and economic interests. Leaving the sediment in the bay not only would jeopardize the port's $1.9 billion shipping industry, but it could also harm oysters and other marine life that need a clean bottom and good water quality to survive. Using the material to restore islands creates habitat. It also creates construction-related jobs and pumps millions of dollars into the local community, said Frank Hamons, the port's deputy director of harbor development.

"James Island is one of the best ways to use the material," Hamons said. "It will restore a habitat. It's unique. And it will protect the shoreline."

The federal government would pay to dredge the channels and for three-quarters of the island-building cost; the port would pay the remaining portion.

Officials from both agencies acknowledge that the cost is high, in part because the project involves much more than simply hauling and dumping the material. But it is one of the few options left -- a 1990 state law forbids dumping the spoil in the bay's deep trough. And it has the benefit of creating disappearing natural habitats -- among them, uplands, marshes and sandy beaches.

Baltimore County's Hart-Miller Island was the agencies' first island dredge project. The 1,100-acre site, which was built in the mid-1980s and will be accepting dredge material until 2009, is now a public park.

The two agencies then turned to Poplar Island, a once-thriving farming community off the Talbot County coast that was also known as a resort for prominent Democrats, among them Franklin D. Roosevelt. The crescent-shaped wedge had been fighting constant erosion for more than a century; by the early 1950s, the last residents left the island for good.

When the corps arrived at Poplar in the mid-1990s, all that was left were three remnant islands of about an acre each. The agencies embarked on a plan to restore Poplar to its original footprint of 1,140 acres, hoping that the island would become a welcome mat for fish and birds that are getting pushed out of mainland habitats by development pressures and natural predators.

The rebuilt Poplar Island has been that and more, with 126 species making it their home.

On a recent visit, mummichugs and crabs were swimming near the 700,000 plugs of native wetland grass that the corps has planted. Cormorants and sanderlings grazed on the island's many mud flats, while great blue herons lounged on the sand. Next to the rocky perimeter ringing the island, a common loon cruised along through the bay's waters, traveling easily between Poplar and two small neighboring islands.

"We just never expected that the shorebirds were going to show up here," said Chrissy Albanese, a wetlands education specialist. "They've just found us."

Port administration officials acknowledge that dredge islands are not always popular. In Anne Arundel County, for example, residents successfully fought plans to build an island in the Patapsco River. But in Dorchester County, some residents went to the port administration, asking officials to consider James Island for their next project.

Joseph Coyne, president of the Dorchester County Shoreline Erosion Group, was one of the first to approach port officials. His organization, which formed after Hurricane Fran, is seeking to help Lower Shore residents protect their property from rising sea levels and brutal winds. Coyne believes that James and Barren would act as barriers for those harsh north winds, slowing down the waves before they hit the Dorchester shore. That would help with the frequent flooding on county roads, which residents say has increased in the past 10 years.

"All of us wish they could do it sooner," Coyne said. 'They're doing the best they can, but they have to go through Congress and their own bureaucracy."

Coyne is also hoping that the corps will use the islands as staging areas to create wetlands at the nearby Blackwater National Wildlife Refuge. The refuge has lost 12 square miles of wetlands in the past half-century. The U.S. Fish and Wildlife Service, which manages Barren Island as part of the national refuge system, has been working to restore salt marshes there.

Like Poplar, James has a rich history. A Quaker landowner bought it to use as a hog pen in the 1600s, and soon its vast pastures were filled with settlers. Farmers grew tobacco, watermen built skipjacks and children studied in two island schools. Battered by northwest winds that had whittled it down over the centuries, it finally was abandoned in the early 1900s.

J. Court Stevenson, a marine ecology professor at the University of Maryland Center for Environmental Science, has been visiting James Island for the past 30 years. He has planted grasses and examined the island's banks in an erosion study. He has also looked for remnants of graves and other signs of the settlers who once lived there.

For the sake of James' history and its potential for future habitat, Stevenson said he hopes the corps acts soon. "I've been arguing that we really have to try to preserve these places because they're really great wildlife refuges," he said. "They're an important part of the bay that really needs to be restored. In the next 50 years, they may be the best marshes that we've got."

rona.kobell@baltsun.com

Excerpt from December 2006 Bay Journal

Maryland considers using dredged silt to repair 2 Chesapeake islands; Striped bass survey indicates below-average reproduction; and more...

News in Brief / By Staff and Wire Reports

Maryland considers using dredged silt to repair 2 Chesapeake islands

Maryland and federal officials are considering spending more than $1 billion to dredge silt from shipping channels to restore two Chesapeake Bay islands.

The plan by the Maryland Port Administration and the U.S. Army Corps of Engineers would have tons of silt and sediment deposited off Dorchester County.

The plan aims to restore shoreline on Barren Island and to create a 2,000-acre wildlife preserve at James Island. Both islands are slowly vanishing because of water level rise and erosion.

The James project is expected to cost $1.1 billion, The (Baltimore) Sun reported. The Barren project would cost about $30 million. The projects would be similar to the government's restoration of Poplar Island in Talbot County, which cost about $400 million.

If approved by Congress, the island projects could handle the port's disposal needs for about two decades, said Scott Johnson, a Corps of Engineers project manager.

Port officials say they must clear approach channels for big coal and container ships, and to do that they need a place for about 3.2 million cubic yards of sediment each year—enough to fill Baltimore's M&T Bank Stadium twice.

"It's a lot of money," Johnson said of the proposal. "But when you look at the fact that you have to do something with the dredge material and you have the opportunity to turn it into something beneficial, people are pretty much endorsing it."

The proposal includes a $250 million expansion of the Poplar Island project.

The federal government would pay to dredge the channels and for three-quarters of the island-building cost; the port would pay the remaining portion.

J. Court Stevenson, a marine ecologist at the University of Maryland Center for Environmental Science who has been visiting James Island for the last 30 years, said he hopes the Corps acts soon. "They're an important part of the Bay that really needs to be restored. In the next 50 years, they may be the best marshes that we've got," he said.

Appendix H

Report on Existing Conditions and Impacts to
Socioeconomics, Aesthetics, and Recreational Resources

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Report

UMCES Contributions to James and Barren Islands Restoration Projects Feasibility Study and Environmental Impact Statement

Report on Existing Conditions and Impacts to Socioeconomics, Aesthetics and Recreational Resources

Prepared by:

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Prepared for:

Maryland Port Administration
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Under Contract to:

Maryland Environmental Service
MES Contract # 05-07-16
MPA Contract #504804
MPA PIN 52270020

November 2006

University of Maryland
CENTER FOR ENVIRONMENTAL SCIENCE
CHESAPEAKE BIOLOGICAL LABORATORY
P.O. BOX 38, SOLOMONS, MD 20688

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Table of Contents

List of Tables 2
List of Figures 3
Chapter 1: Existing Resources 4
1.1 Environmental Resources 4
1.1.1 Noise 4
1.1.2 Light 5
1.2 Socioeconomic Resources 6
1.2.1 Land and Water Use 6
1.2.2. Demographics 16
1.2.3 Employment and Industry 19
1.3 Aesthetics and Recreational Resources 22
1.3.1 Aesthetics 22
1.3.2 Recreational Uses 22
Chapter 2: Potential Impacts of the Proposed Project 27
2.1 Short Term and Long Term Impacts to Environmental Resources 27
2.1.1 Noise 27
2.1.2 Light 34
2.2 Socioeconomic Resources 36
2.2.1 Future Land and Water Use 36
2.2.2 Fishery-related Economic Impacts 36
2.2.3 Employment and Industry 42
2.2.4 Environmental Justice 42
2.2.5 Safety to Children 51
2.3 Aesthetic and Recreational Resources 52
2.3.1 Aesthetics 52
2.3.2 Recreation 70
References 75

List of Tables

Table 1-1. Typical noise levels and subjective impressions **5**
Table 1-2. Volume and value of fisheries in South Central Bay segment **8**
Table 1-3. Volume and value of fisheries in Southern Bay segment **9**
Table 1-4. Geographic and population characteristics for Dorchester County compared with Maryland State characteristics **17**
Table 1-5. Housing and income characteristics for Dorchester County compared with Maryland State characteristics **18**
Table 1-6. Dorchester County regional population growth by county subdivision, 1990-2000 **19**
Table 1-7. Business characteristics for Dorchester County compared with Maryland State characteristics **20**
Table 1-8. Employment by sector for Dorchester County in 2000 **21**
Table 1-9. Marinas and public boat ramps near James and Barren islands in 2003 **23**
Table 1-10. Total registered motorboats by county in 2002 and estimated boats with access to waters near James and Barren islands **24**
Table 2-1. Addition of multiple sound sources **28**
Table 2-2. Estimated duration and timing of noise impacts at James Island during project development **28**
Table 2-3. Estimated duration and timing of noise impacts at Barren Island during project development **28**
Table 2-4. Lights used during operations at PIERP **34**
Table 2-5. Lights used during inflow at PIERP **34**
Table 2-6. Overlap of 2003 crabbing areas with James Island footprint **39**
Table 2-7. Total reported pound net catches from survey of commercial watermen near James and Barren islands, 1999-2003 **39**
Table 2-8. Volume and value of reported pound net catches near James Island (1 of 2 active licenses reported) **40**
Table 2-9. Volume and value of reported pound net catches near Barren Island (4 of 14 active licenses reported) **41**
Table 2-10. Summary of state economic impacts of James Island restoration **46**
Table 2-11. Summary of state impacts of Barren Island restoration **47**
Table 2-12. Summary of local economic impacts of James Island restoration **48**
Table 2-13. Summary of local economic impacts of Barren Island restoration **49**
Table 2-14. Demographic statistics for area near James Island **51**
Table 2-15. Demographic statistics for area near Barren Island **51**
Table 2-15. Landscape characteristics contributing to aesthetic quality **53**
Table 2-17. Rating system used to assess visual impact **55**
Table 2-18. Changes to middleground views associated with project (1/2 to 4 miles) **57**
Table 2-19. Changes to background views associated with project (4+ miles) **58**

List of Figures

Figure 1-1. Land use near James Island **10**
Figure 1-2. Land use near Barren Island **11**
Figure 1-3. Map of James and Barren islands showing points of interest **12**
Figure 1-4. County subdivisions of Dorchester County **13**
Figure 1-5. Natural Oyster Bars and pound nets in the vicinity of James and Barren islands **14**
Figure 1-6. Water body reporting areas for fishery catch data **15**
Figure 1-7. Comparison of registered motorboats in the vicinity of mid-Bay islands **26**
Figure 1-8. Comparison of aerial survey data of recreational boat usage within one-half mile of mid-Bay islands **26**
Figure 2-1. Zones used for noise impact analysis at James Island **32**
Figure 2-2. Zones used for noise impact analysis at Barren Island **33**
Figure 2-3. Area of potential visual impacts near James Island **60**
Figure 2-4. Characteristic shoreline area near James Island **61**
Figure 2-5. Shoreline area near James Island **61**
Figure 2-6. Area of potential visual impacts near Barren Island **62**
Figure 2-7. Shoreline area east of Barren Island **63**
Figure 2-8. Characteristic shoreline area near Barren Island **63**
Figure 2-9. View of Barren Island from boat launch on Fishing Creek. **64**
Figure 2-10. Viewpoints used for aesthetic analysis **65**
Figure 2-11. Existing middleground views **66**
Figure 2-12. Middleground view with project **67**
Figure 2-13. Background view **68**
Figure 2-14. Long water views **69**

Chapter 1: Existing Resources

1.1 Environmental Resources

1.1.1 Noise

Sources of existing noise are identified to provide a context for evaluating any potential noise-related impacts associated with the proposed project's construction and operation.

1.1.1.1 Definitions

- *Sound* – A vibratory disturbance created by a vibrating object, which, when transmitted by longitudinal pressure waves through a medium such as air, is capable of being detected by a receiving mechanism, such as the human ear or a microphone.
- *Noise* – Sound that is loud, unpleasant, unexpected, or otherwise undesirable.
- *Decibel* – A unitless measure of sound on a logarithmic scale, which indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micro-pascals.
- *A-Weighted Decibel (dBA)* – An overall frequency-weighted sound level in decibels which approximates the frequency response of the human ear.

1.1.1.2 Noise Measurement Methods

For purposes of regulation, noise is measured in dBA or A-weighted decibels. This unit weights sound frequencies according to the sensitivity of the human ear. Individuals with good hearing perceive a change in sound of 3 dB as just noticeable, a change of 5 dB as clearly noticeable, and 10 dB is perceived as doubling (or halving) of the sound level. The threshold of human hearing is 0 dBA. Values above 85-90 dBA would be considered very loud (See Table 1-1) and have the potential to harm hearing given sufficient exposure time. Noise levels above 140 dBA can cause damage to hearing after a single exposure.

Noise transmission depends on many factors including air temperature, wind and atmospheric conditions. Two common rules of thumb are that sound drops by 6 dBA for every doubling of distance over land and by 5 dBA per doubling of distance over water. In other words, a person on land that hears an 88 dBA sound level at 50 feet, will hear a sound level of 82 dBA if he doubles the distance between himself and the noise source by moving to 100 feet from the noise source. As a result of this relationship, sound generally drops off rapidly with distance. For example, in an open setting, the loud noise of a truck (~88 dBA at 50 feet) would drop to nearly background levels (56 dBA) in 2,000 feet.

Table 1-1. Typical noise levels and subjective impressions.

Source	Decibel Level (dBA)	Subjective Impression
Normal breathing	10	Threshold of hearing
Soft whisper	30	
Library	40	Quiet
Normal conversation	60	
Television audio	70	Moderately loud
Ringing telephone	80	
Snowmobile	100	Very loud
Shouting in ear	110	
Thunder	120	Pain threshold

1.1.1.3 Existing Noise Sources

Given the types of residential land uses in the area, noise sources are largely limited to activities within private yards, operation of boats and personal watercraft, and vehicle traffic. These activities can vary widely in the amount of noise produced, but according to the League for the Hard of Hearing (LHH) background noise levels are about 40 dBA on a quiet residential street. A typical maximum permitted sound level in rural and suburban areas is 55 dBA (e.g., Talbot County Code).

While the background noise level for residents in the vicinity of either island might typically be 40 dBA, a resident may also hear acute noise sources, particularly in the daytime, associated with suburban neighborhoods such as a power mower, which will generate up to 95 dBA at 50 feet or a leafblower (110 dBA at 50 feet). Shoreline residents and boaters will be exposed to noise from various types of commercial and recreational watercraft. Powerboats and personal watercraft (PWC) generate noise levels typically in the range of 70-85 dBA at 50 feet (Noise Unlimited 1995), and by law in many states cannot exceed 86-90 dBA from 50 feet away. However, sound levels up to 109 dBA for racing boats have been recorded and PWC noise may be perceived as particularly annoying, despite a moderate decibel reading because of the high pitch and variable nature of the sound. By comparison, freeway traffic is in the range of 70 dBA at 50 feet, although large trucks may typically generate 90 dBA (LHH). Nighttime noise levels are likely to be quite low.

1.1.2 Light

Sources of existing light are identified to provide a context for evaluating any potential light-related impacts associated with the proposed projects' construction and operation.

1.1.2.1 Definitions

- *Glare* -- Light emitted at an intensity great enough to reduce a viewer's ability to see, and in extreme cases causing momentary blindness
- *Light trespass* – Light that shines beyond the boundaries of the property on which it is located and onto areas where it is unwanted or interferes with land use

1.1.2.2 Existing Sources of Light

The shoreline adjacent to James and Barren islands is marked by detached single family homes interspersed with agricultural or open fields, wetlands and forest patches. A few small commercial establishments are scattered along major roads. Further inland, wetlands and forests are the dominant land uses. This type of land development has few major light sources. Existing light sources include occasional street lights in a few public spaces and commercial establishments, car headlights along local roads, and indoor and outdoor lighting of private homes. Therefore, the overall level of existing light in residential areas is low.

Within the waterway, light sources include: lighted aids to navigation (e.g., buoys), lighthouses off the southern end of Tilghman Island (near James), off Hooper Island (near Barren) and Cove Point (near Barren), low wattage dock lights, signage, and lights on pilings or posts marking marinas and entrance channels. The lights used in aids to navigation would typically be visible for miles but are not generally perceived as generating light trespass to users of the waterway or residences. In general, light levels from the waterway will be perceived as low from most locations in the vicinity of the project.

1.2 Socioeconomic Resources

Socioeconomic and demographic characteristics that influence the potential economic impact of the project are identified and discussed.

1.2.1 Land and Water Use

Land and water use are briefly characterized to identify uses that may be affected by project construction and operation. Special attention is given to sensitive resources such as public lands and scenic areas.

1.2.1.1 Local and Regional Land Use

Land use on James Island is predominantly forest and wetland (Figure 1-1). The island remnants are subdivided into three privately-owned parcels, but no residences have been built on these parcels. The nearest landmass to James Island is Taylors Island to the south. Land use on Taylors is predominantly agricultural or open fields, forest and low-density residential development. The shoreline that faces James is all privately owned, but part of Taylors Island is a wildlife management area.

The land use on Barren Island is mixed wetland and forest (Figure 1-2). The land is entirely publicly owned and the USFWS manages the area as a wildlife refuge. The nearest landmass to the island is Hooper Island where land is predominantly low to medium density residential use. Scattered commercial establishments are also present including seafood processors. Across the Bay, about 7 miles away from Barren Island, is the federally-owned Patuxent Naval Air Station where aircraft and aircraft components are tested.

The central business district for Dorchester County is Cambridge which lies along the Choptank River, to the east of James Island at the north edge of the county (Figure 1-3). Cambridge has much higher population density than the Bay shoreline and well-developed commercial zones. The northern and eastern parts of Dorchester County are dominated by

agricultural land use and also support low to medium density residential uses and scattered forest tracts (see Figures 1-1 and 1-2). Land cover in the southern portion of the county is dominated by wetlands and contains extensive tracts of federal and state holdings including Blackwater National Wildlife Refuge and several wildlife management areas.

1.2.1.2 Water Use Around James and Barren Islands

The waters in the vicinity of James and Barren islands are used primarily by recreational and commercial boaters and fishers although the areas also have other military, commercial and educational uses. The James Island area has a higher concentration of recreational users than areas around Barren Island, while the Barren Island area has a greater proportion of commercial boat use. A major shipping channel that runs the length of the Bay mainstem and which connects Baltimore Harbor with other East Coast and international shipping destinations is about 2 miles west of the proposed James Island project and 1.8 miles west of Barren Island.

James Island lies at the mouth of the Little Choptank River (see Figure 1-3). To the north of James is the entrance to the Choptank River, a common boating destination. The historic town of Oxford along that river draws recreational boaters from throughout the Bay and beyond. Unlike James, Barren Island does not lie at the entrance to any major waterway although a dredged channel to the north of the island is a route for local residents and commercial fishers traveling between the Bay mainstem and inland ports.

Certain recreational water uses are either declining slightly or holding steady depending on which statistics are used (USFWS 2001). The number of participants in fishing has declined nationwide, although the number of fishing *days* has recently increased. Hunting participation nationwide is down slightly overall, but waterfowl hunting is holding steady. The statistics for Maryland show no significant change in either hunting or fishing participation in recent years.

Commercial fishing and crabbing are common activities in the waters surrounding both project areas. Blue crabs are currently the highest value commercial fishery within the Bay and the waters around both islands are used extensively by watermen for setting crab pots. Barren Island is considered a major center of crabbing activity and the area hosts two major commercial ports. Different water depths are used by crabbers to reflect seasonal movement of the species. Bottom areas down to 15 feet are typically targeted in the spring and fall, while shallow areas (as little as 4 feet) are sought after in summer.

Pound net and gill net fisheries are active near both islands, but activity is heavier near Barren Island. Near James Island, 3 pound nets are actively set according to a February/March 2004 survey of license-holders, but only one waterman (using two nets) has reported catches to the State within the past 5 years. Near Barren Island, 17 pound nets are actively used according to a survey and 4 report catch data. In both areas, striped bass, menhaden and croaker have provided the bulk of the value of the catch for the past 5 years. An unknown number of gill nets contribute to the total mid-Bay finfish catch shown in Tables 1-2 and 1-3. Near Barren, fishers use the eastern edge of the deep channel to catch migratory species such as striped bass and red and black drum. Landings data show that finfishing in this area is seasonal with highest catches in the spring, summer and fall and little to no catch during the winter months.

Another measure of commercial fishing effort in the region is the number of striped bass permits granted locally. A total of 57 commercial striped bass collection permits were issued in 2004 to residents of the county subdivisions (see Figure 1-4) near James Island and within Cambridge. Another 57 permits have been issued to residents of the Hooper Island area near Barren Island (M. Luisi, Maryland Department of Natural Resources (DNR), pers. comm. Oct. 2004). Together these represent 9% of the 1,231 permits issued statewide and represent any fish taken using pound nets, gill nets, or hook and line.

Shellfish harvests are not thought to be significant near either island at present. Shellfish harvests have been highly variable in the Chesapeake Bay within the past decades. Despite the fact that the Little Choptank River Natural Oyster Bars (NOBs), to the east of James Island (Figure 1-5), were a productive source of oysters in the late 1990s, the oyster fishery has been devastated in recent years by high mortality (Tarnowski, 2004). Several NOBs in the vicinity of Barren have seen little or no commercial harvest in recent years due to a variety of factors (MD DNR). Shellfish catch data specific to the areas nearest the islands are not available, but data reported for the mid-Bay (South Central Bay and Southern Bay segments, Figure 1-6) show that the value of soft clam and oyster catches in the mid-Bay dropped dramatically in the past 6 years (Tables 1-2 and 1-3).

Clam productivity surveys conducted in March 2004 at both islands show a lack of productive soft clam beds. Razor clam densities were higher but still fell short of being commercially productive beds, as defined by Maryland DNR. No hard clams were found in either location.

Table 1-2. Volume and value of fisheries in South Central Bay segment (DNR waterbody code 027). Source data from Maryland DNR

	Fishery							
	Blue Crabs		Soft Clams		Oysters		Finfish	
Year	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
1998	6,027,588	$5,979,995	113,237	$772,777	279,533	$913,393	1,329,367	$939,372
1999	6,629,981	$5,756,791	65,129	$433,067	182,947	$536,181	1,962,384	$1,129,631
2000	4,211,210	$4,728,700	82,886	$504,617	59,706	$187,499	1,892,971	$1,385,482
2001	4,489,051	$4,856,868	12,312	$62,860	24,698	$73,152	1,786,933	$1,030,142
2002	5,119,869	$4,760,557	86,448	$330,461	12,688	$54,281	1,879,490	$1,185,776
2003	4,429,076	$4,517,560	5,754	$40,495	6,368	$31,757	1,119,532	$1,152,047

Table 1-3. Volume and value of fisheries in Southern Bay segment (DNR waterbody code 029). Source data from Maryland DNR

Fishery								
	Blue Crabs		Soft Clams		Oysters		Finfish	
Year	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
1998	4,550,741	$4,714,452			50,074	$161,572	1,143,228	$575,705
1999	5,744,427	$4,795,239			32,036	$105,290	1,758,425	$766,854
2000	3,801,205	$4,772,426	3,579	$22,260	13,555	$46,596	1,748,146	$780,514
2001	4,307,685	$4,637,805			7,642	$26,222	2,150,957	$814,408
2002	4,701,228	$4,595,136					2,658,111	$864,369
2003	5,555,132	$5,950,389			486	$2,380	2,586,250	$832,612

Another important water user in the vicinity of Barren Island is the US Navy. The region around Barren Island includes a large restricted area used for military exercises conducted out of the Patuxent Naval Air Station in St. Mary's County. The area is periodically off limits to boats. The northern extent of the restricted area begins just south of the existing remnant of Barren Island and continues across the Bay to the western shore to a point south of the mouth of the Patuxent River. The restricted area extends south along the mainstem of the Bay to a point about 4 miles north of the Maryland State line. The area includes the majority of waters deeper than 18 feet in this region.

Finally, the region's waters contain monitoring stations used in Bay-wide research on the condition of the estuarine ecosystem. Data on water quality and biota are collected as part of regional and long-term data sets used by researchers, educators, and resource managers. Some bottom areas in the vicinity of James and Barren islands are part of ongoing oyster restoration efforts.

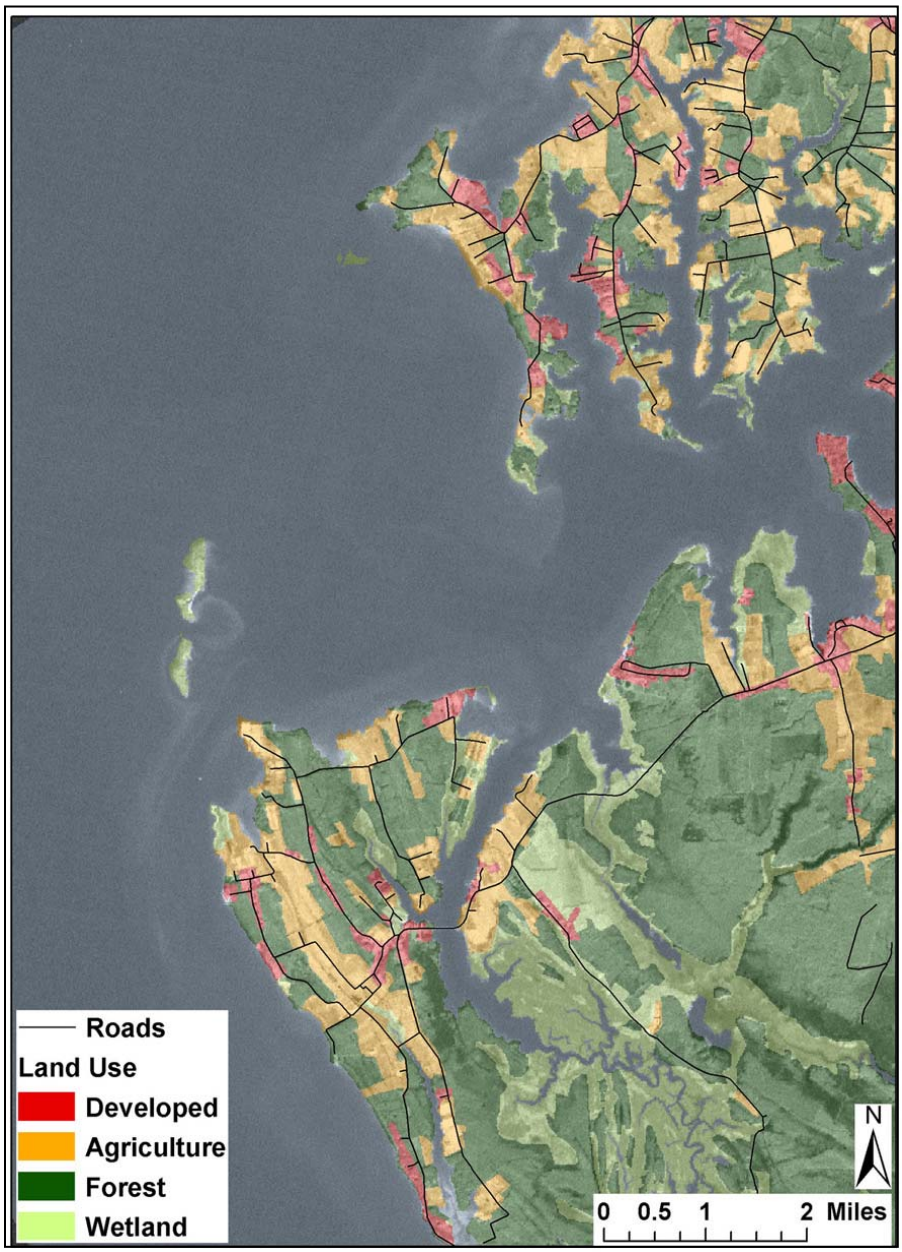

Figure 1-1. Land use near James Island. Land use source data from Maryland Department of Planning 2002.

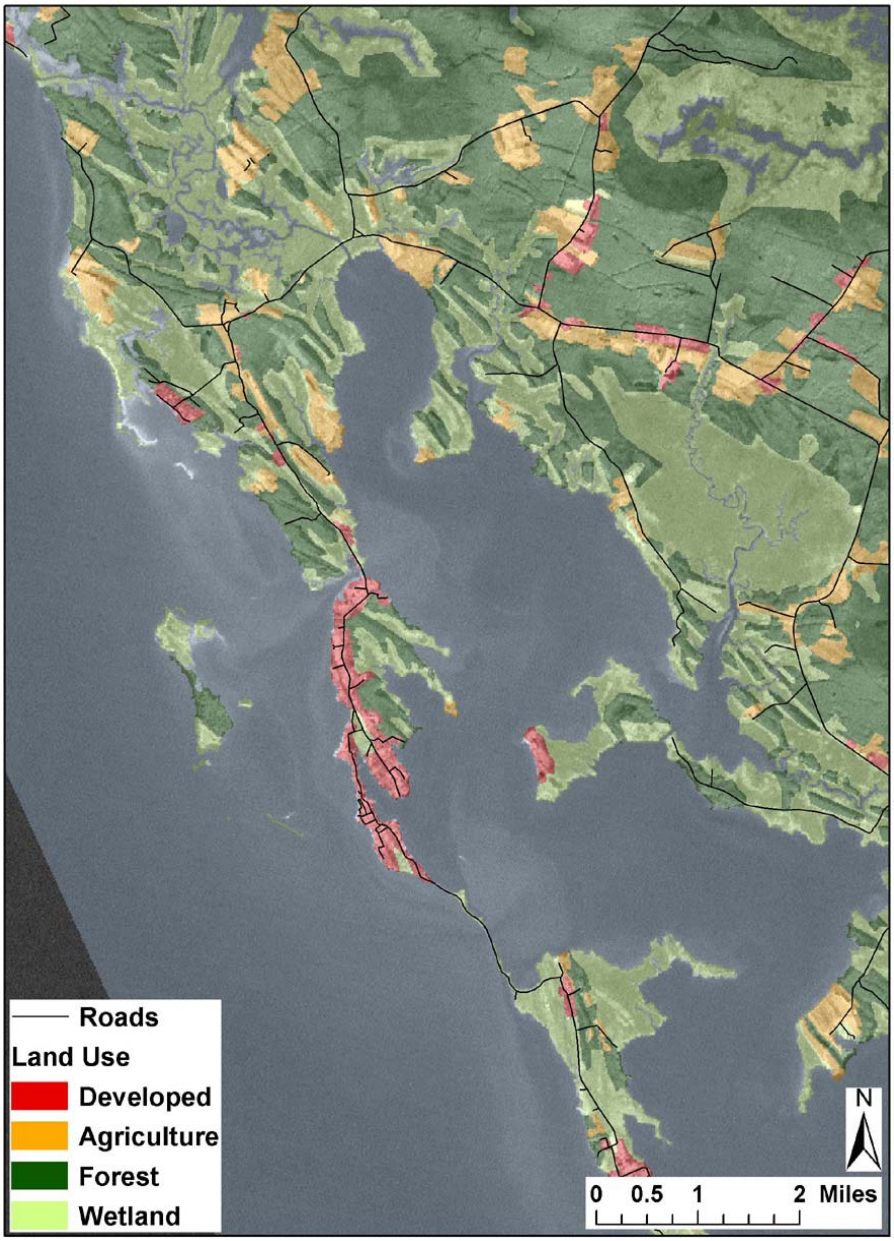

Figure 1-2. Land use near Barren Island. Land use source data from Maryland Department of Planning 2002.

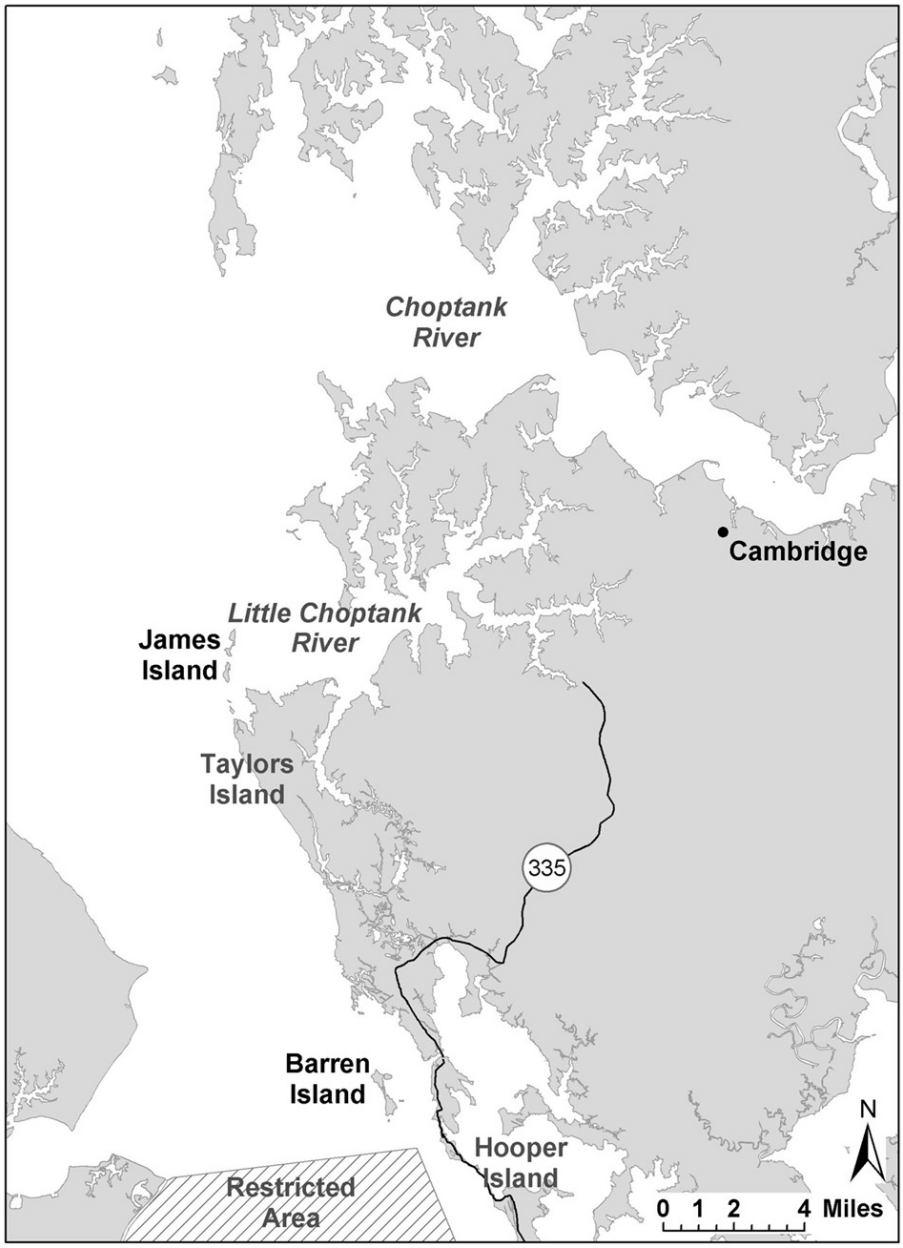

Figure 1-3. Map of James and Barren islands showing points of interest.
Note area of restricted navigation and Maryland scenic road (Maryland 335).

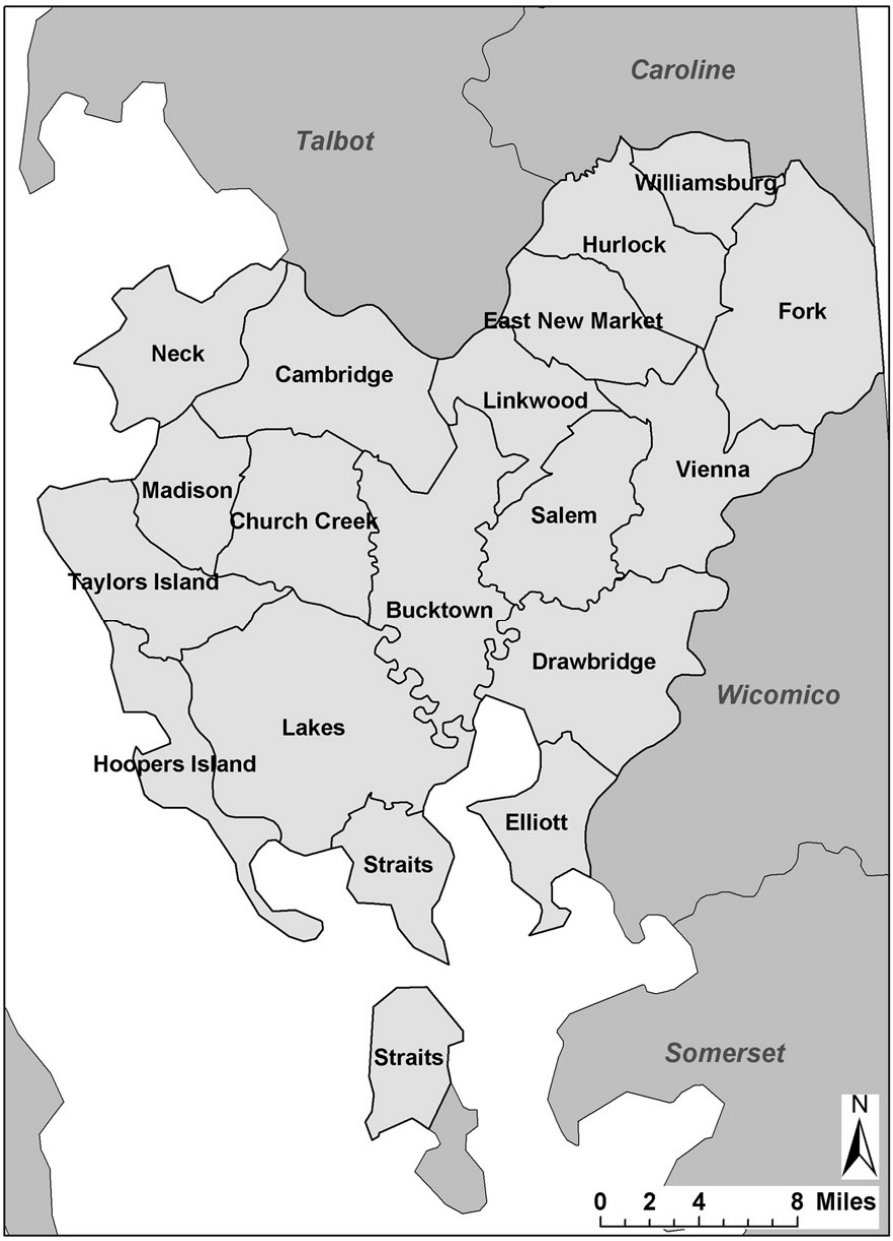

Figure 1-4. County subdivisions of Dorchester County. Source data from U.S. Census 2000

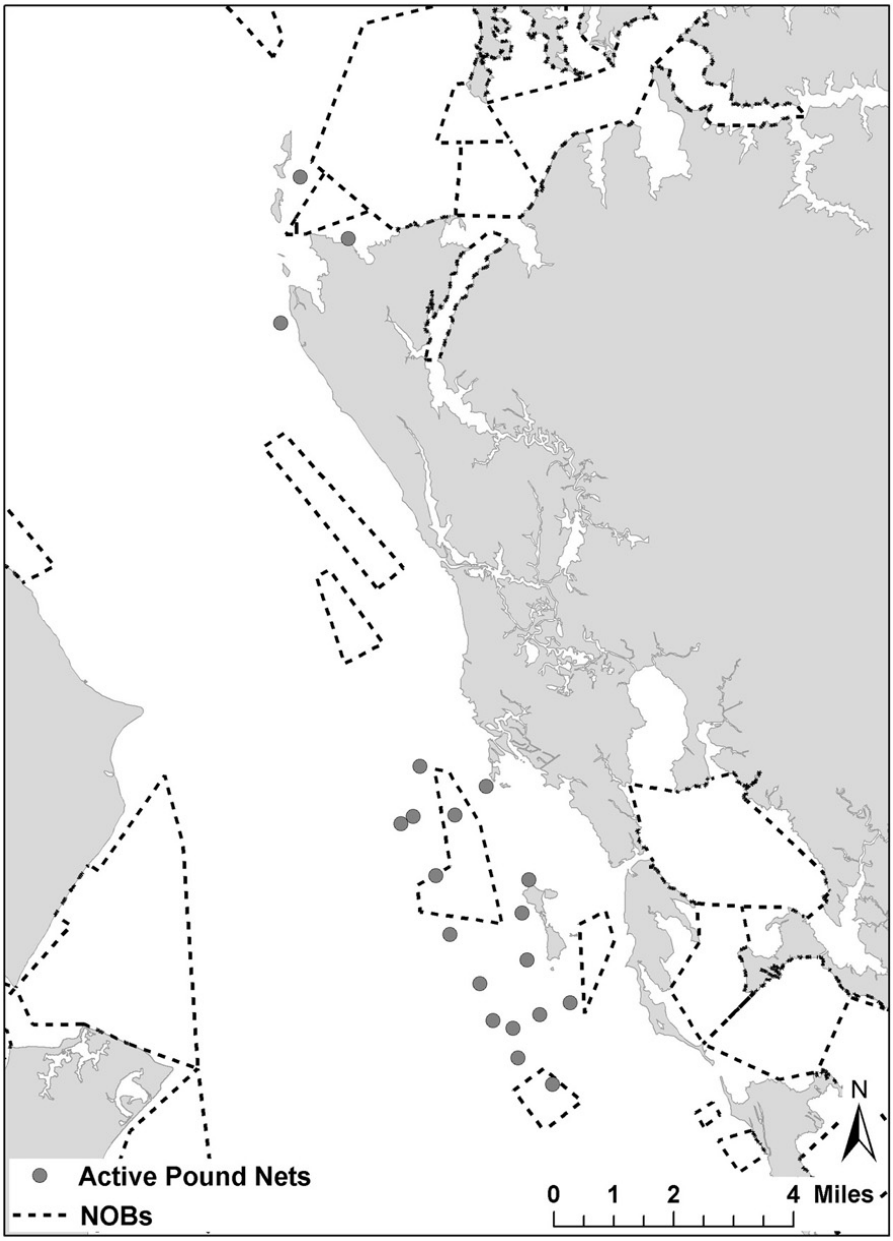

Figure 1-5. Natural Oyster Bars and pound nets in the vicinity of James and Barren islands. Pound net locations are approximate. Pound nets were active 1999-2003. Data drawn from Maryland DNR survey taken in February/March 2004.

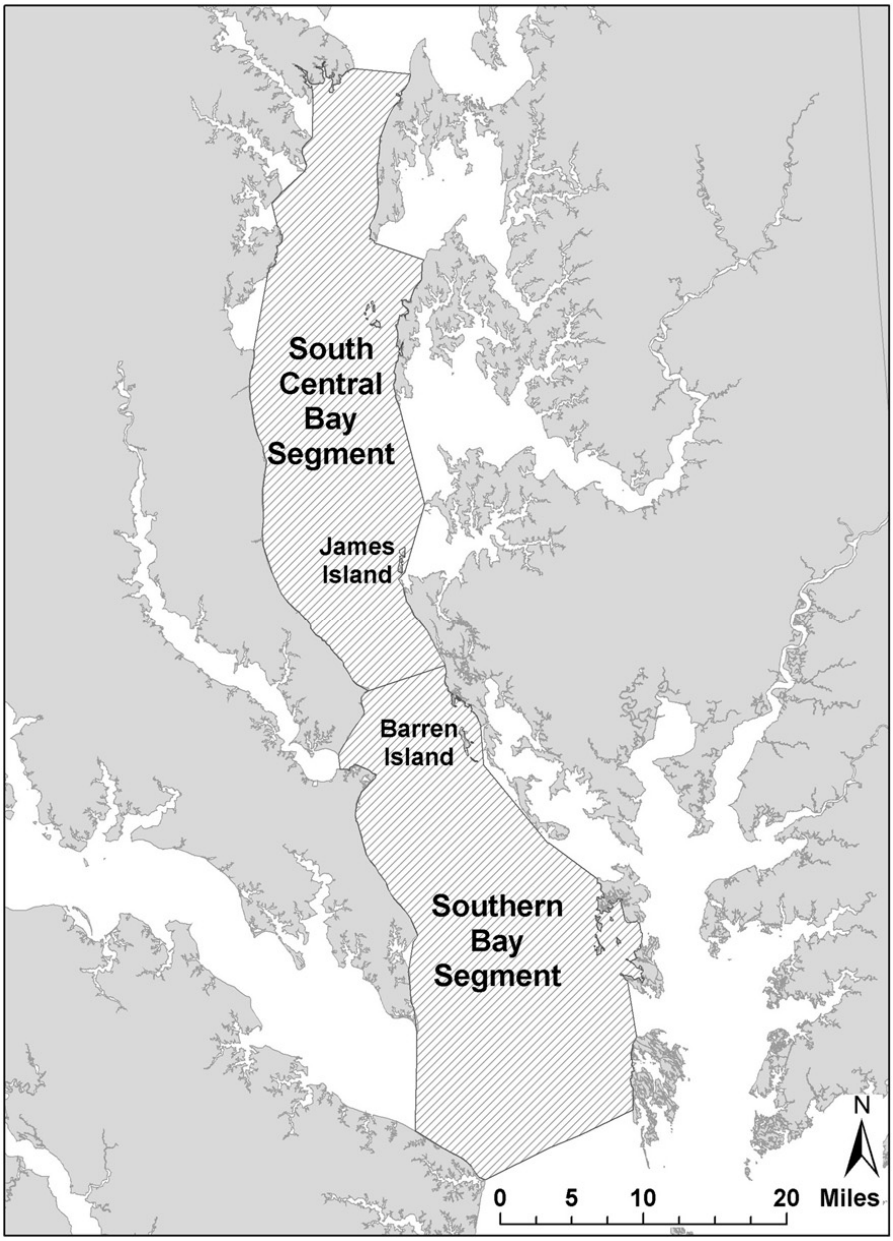

Figure 1-6. Water body reporting areas for fishery catch data. Source data from Maryland DNR.

1.2.2. Demographics

1.2.2.1 Regional Setting

James and Barren islands are located within Dorchester County on Maryland's Eastern Shore. The surrounding area is rural with very low population densities relative to the state average. Dorchester County's population accounts for roughly half of one percent of Maryland's population, and the population density is 55 persons per square mile compared to 541.9 for the state (Table 1-4).

In general, the county's demographics reflect those of the state except for a few characteristics (see Table 1-4). The population includes a slightly elevated proportion of seniors, with 17.7% of persons aged 65 years or older compared to a state average of 11.3%. The percent of Hispanic or Latino persons is 3% lower than the state average at 1.3%, and the percent of foreign-born individuals is 2.0% or 7.8% lower than the state average. The population is somewhat less mobile, with 64.6% of people living in the same house as five years ago compared to 55.7% for the state. A smaller proportion of residents hold Bachelor's degrees or higher degrees (12%), compared to Maryland's total population (31.4%), and the percent of high school graduates is also below the state average.

Table 1-4. Geographic and population characteristics for Dorchester County compared with Maryland State characteristics. Source: US Census Bureau

Geography	**Dorchester County**	**Maryland**
Land area, 2000 (square miles)	558	9,774
Persons per square mile, 2000	55.0	541.9
People	**Dorchester County**	**Maryland**
Population, 2000	30,674	5,296,486
Population, percent change, 1990 to 2000	1.4%	10.8%
Persons under 5 years old, percent, 2000	5.4%	6.7%
Persons 5-17, percent, 2000	17.9%	18.9%
Persons 18-24, percent, 2000	6.7%	8.5%
Persons, 25-64, percent, 2000	52.3%	54.6%
Persons 65 years old and over, percent, 2000	17.7%	11.3%
White persons, not of Hispanic/Latino origin, percent, 2000	69.4%	62.1%
Black or African American persons, percent, 2000 (a)	28.4%	27.9%
Persons of Hispanic or Latino origin, percent, 2000 (b)	1.3%	4.3%
Living in same house in 1995 and 2000, pct age 5+, 2000	64.6%	55.7%
Foreign born persons, percent, 2000	2.0%	9.8%
Language other than English spoken at home, pct age 5+, 2000	3.5%	12.6%
High school graduates, percent of persons age 25+, 2000	74.2%	83.8%
Bachelor's degree or higher, pct of persons age 25+, 2000	12.0%	31.4%
Persons with a disability, age 5+, 2000	6,532	854,345
Mean travel time to work, workers age 16+ (minutes), 2000	25.2	31.2

(a) Includes persons reporting only one race.
(b) Hispanics may be of any race, so also are included in applicable race categories.

The county appears to have a relatively high proportion of low-income residents based on several statistics (Table 1-5). The per capita money income of $18,929 in 2000 was well below the state average ($25,614) and was just under 88% of the US average ($21,587). Median household money income of $34,077 was well below the median state level of $52,868 and the median US level of $41,994. The percent of persons living below poverty in 1999 was high at 13.8% and the percent of families in poverty was 3.1% higher than the state average. Despite these indicators of modest incomes, home ownership rates in the county are high at 70.1%.

Table 1-5. Housing and income characteristics for Dorchester County compared with Maryland State characteristics. Source: US Census Bureau

	Dorchester County	Maryland
Housing units, 2000	14,681	2,145,283
Homeownership rate, 2000	70.1%	67.7%
Housing units in multi-unit structures, percent, 2000	15.0%	25.8%
Median value of owner-occupied housing units, 2000	$92,300	$146,000
Households, 2000	12,706	1,980,859
Persons per household, 2000	2.36	2.61
Median household money income, 1999	$34,077	$52,868
Per capita money income, 1999	$18,929	$25,614
Persons below poverty, percent, 1999	13.8%	8.5%
Families below poverty, percent, 1999	9.2%	6.1%

1.2.2.2 Local Setting

The land areas immediately adjacent to James Island include the county subdivisions of Taylors Island, Madison and Neck (see Figure 1-4). Population densities in these subdivisions are 7.5, 36.3, and 43.9 persons per square mile, respectively, which is lower or much lower than the county average of 55 persons per square mile. The total population of these three county subdivisions was 1,761 persons in 2000 (Table 1-6). Since 1990, the population has remained fairly constant in Taylors Island and Neck, but Madison's population grew almost 40%.

In the land area near Barren Island, the Hooper Island county subdivision has a population density of 48.7 persons per square mile, which is fairly close to the county average. This relatively high population density for the region is driven by the narrowness of Hooper Island and the resulting small lot sizes and does not represent a large number of residences at high density. The population of this region declined 8.3% from 1990 to 2000.

Future development in the region appears to be concentrated outside of the county subdivisions closest to the proposed projects. Of the 17 new and planned major residential and commercial developments for the county, all but one was in Cambridge and the other was far inland away from James and Barren islands (per discussions with Kathy Miller, Dorchester County Economic Development Office). Some modest level of development in Madison seems likely given recent trends and the availability of agricultural land for development. Overall, the county's population is expected to grow 3% from 30,675 in 2000 to 31,600 people in 2010 and continue to grow another 1.7% to 32,150 by 2020 (Maryland Department of Planning).

Recent residential trends in the immediate vicinity of James and Barren islands (see Table 1-6) do not show high growth rates for either area. Much of the shoreline with views of the proposed projects is already developed, although some potential for infill or increased density of development is possible. In the Neck County Subdivision near James Island (Figure 1-4), some open agricultural areas have the potential to be converted to residential uses and growth in Madison shows homes are being added to that area.

Commercial areas on Hooper Island (near Barren Island) have the potential to be converted to residences or tourist destinations since some traditional fisheries are in decline and tourism is being promoted in the county. Fisheries activities are volatile, so future activity will not necessarily be reflected in current trends. Dorchester County's tourism-related tax revenue (hotel/motel taxes and amusement and admission taxes) increased markedly from 2002-2003, but tourism in Maryland overall has only been holding steady following the post-September 11, 2001 decline (Maryland Office of Tourism Development, FY2003 Tourism Report).

Table 1-6. Dorchester County regional population growth by county subdivision, 1990-2000. Source data from US Census Bureau

County Subdivision	1990 Census	% of county population	2000 Census	% of county population	1990-2000 % change
Near James					
Taylors Island	269	0.9%	270	0.9%	0.4%
Neck	916	3.0%	934	3.0%	2.0%
Madison	401	1.3%	557	1.8%	38.9%
Near Barren					
Hooper Island	640	2.1%	587	1.9%	-8.3%
Other					
Fork	1,825	6.0%	1,881	6.1%	3.1%
East New Market	2,023	6.7%	2,233	7.3%	10.4%
Vienna	929	3.1%	908	3.0%	-2.3%
Lakes	478	1.6%	402	1.3%	-15.9%
Cambridge	13,913	46.0%	13,261	43.2%	-4.7%
Church Creek	567	1.9%	615	2.0%	8.5%
Straits	521	1.7%	479	1.6%	-8.1%
Drawbridge	82	0.3%	85	0.3%	3.7%
Williamsburg	1,026	3.4%	1,180	3.8%	15.0%
Bucktown	482	1.6%	464	1.5%	-3.7%
Linkwood	2,591	8.6%	2,698	8.8%	4.1%
Hurlock	3,272	10.8%	3,806	12.4%	16.3%
Salem	222	0.7%	228	0.7%	2.7%
Elliott	79	0.3%	86	0.3%	8.9%

1.2.3 Employment and Industry

Consistent with the small population, Dorchester County's economy is also small accounting for less than half of one percent of all private non-farm employment in Maryland (Table 1-7). The 2003 annual unemployment rate was 9.4% compared to 4.5% for the state. Unemployment does not display a strong seasonal trend and has been consistently lower than the state level for 1994-2003. The economic sectors employing the largest number of people are Services, Manufacturing, and Wholesale and Retail Trade. The Services sector employs almost twice as many people as Wholesale and Retail, accounting for 29% of workers in the county compared to 15.5%. The majority of service workers are employed in Educational, Health and Social Services. The Manufacturing sector employed about 20% of workers in 2000, which was above the state average (Table 1-8).

The economy has a significant component tied to commercial fisheries in the Chesapeake Bay. In the last economic census (1997), the manufacturing sector had the highest value of sales receipts of any economic sector in the county. This sector was dominated by food production, preparation and packaging and the largest number of establishments were in seafood processing. Recreational activities associated with the Bay and other natural areas clearly play an active part in the economy contributing to jobs and sales in the Accommodations and Foodservice sector.

Table 1-7. Business characteristics for Dorchester County compared with Maryland State characteristics. Source: US Census Bureau

	Dorchester County	**Maryland**
Private non-farm establishments, 2001	713	129,301
Private non-farm employment, 2001	10,099	2,091,198
Private non-farm employment, percent change 2000-2001	4.6%	1.6%
Nonemployer establishments, 2000	2,073	322,819
Manufacturers shipments, 1997 ($1000)	867,153	36,505,948
Retail sales, 1997 ($1000)	285,883	46,428,206
Retail sales per capita, 1997	$9,567	$9,116
Minority-owned firms, percent of total, 1997	11.0%	20.6%
Women-owned firms, percent of total, 1997	23.1%	28.9%
Housing units authorized by building permits, 2002	179	29,293
Federal funds and grants, 2002 ($1000)	195,113	49,537,440
Annual Unemployment, 2003	9.4%	4.5%

Table 1-8. Employment by sector for Dorchester County in 2000. Source data from U.S. Census Bureau

	Employed Civilian Population	Agriculture, Forestry, Mining, Fishing	Construction	Manufacturing	Wholesale & Retail Trade
United States	129,721,512	2,426,053 1.9%	8,801,507 6.8%	18,286,005 14.1%	19,888,473 15.3%
Maryland	2,608,457	16,178 0.6%	181,280 6.9%	189,327 7.3%	345,960 13.3%
Dorchester County	14,225	587 4.1%	1,335 9.4%	2,788 19.6%	2,206 15.5%

	Transportation & Utilities	Information & Finance	Services	Arts, Entertainment & Tourism	Public Administration
United States	6,740,102 5.2%	12,931,536 10.0%	44,225,526 34.1%	10,210,295 7.9%	6,212,015 4.8%
Maryland	127,294 4.9%	289,510 11.1%	1,007,608 38.6%	177,341 6.8%	273,959 10.5%
Dorchester County	715 5.0%	784 5.5%	4,177 29.4%	819 5.8%	814 5.7%

1.3 Aesthetics and Recreational Resources

Landscape character, or the visual setting of a project, is assessed to determine whether the proposed activities would contrast with the existing setting including natural or built features. Major recreational uses are identified to evaluate potential conflicts with or benefits of the proposed project.

1.3.1 Aesthetics

The existing James Island and proposed expansion lie within the mid-Chesapeake Bay mainstem, close to the Eastern Shore of Maryland. The landscape is characterized by low topographic relief, numerous areas of open water and extensive wetlands with tall grasses, shrubs or trees. Many peninsulas and islands mark the transition from land to water along the coastline. The area has an open feel due to the abundance of water views, open fields, grassed marshes and long vistas. The developed areas are dominated by one- to two-story buildings and commercial and industrial areas are small.

The current footprints of James and Barren islands represent only a portion of their extents in the mid-1800s, yet both remain widely visible features from the shoreline and surrounding water. James Island is surrounded by large expanses of water on all sides except to the south where Taylors Island is only ½ mile away. Barren Island lies less than 1½ miles off the shoreline of Hooper Island and roughly parallels the shore along its length. From a distance, vegetation on either island appears to consist primarily of tall trees (50-70 feet).

There are no National Scenic Byways or Wild and Scenic Rivers in Dorchester County, but a State Scenic Byway (Maryland 335, shown in Figure 1-3) runs along the shoreline near Barren Island and has views of the island in several places. The route is distinguished by its views of quaint fishing villages and tidal marshes.

1.3.2 Recreational Uses

The waters around James and Barren are used for a variety of recreational uses, but the dominant uses are boating and fishing. Other uses of the water and nearby lands include but are not limited to: sightseeing, wildlife viewing, swimming, hunting, walking, biking and outdoor social activities such as backyard picnics. Visitors to the county interested in outdoor recreation are drawn to the extensive wetlands of the area, which occur in and around Blackwater National Wildlife Refuge and in smaller refuge areas that provide numerous wildlife viewing opportunities by car, foot or bike.

1.3.2.1 Recreational Boating and Fishing

The waters around James and Barren islands are used by both sail and motorboats. To estimate the level of current recreational boating use in the vicinity of both projects, we used three techniques: 1) proximity of marinas and boat ramps, 2) number of registered motorboats within range of the area and 3) the number of boats observed in the area within ½ mile of either island during aerial surveys. The first two techniques indicated that James and Barren are not located near major populations of boat-users compared to other islands in the mid-Bay (i.e., islands situated from Lower Eastern Neck in the north to Holland Island in the south). Areas around these islands were estimated to have much lower usage than the more populated areas of

the upper Bay (Figure 1-7). However, the aerial survey showed the islands had among the highest boat usage of the mid-Bay islands surveyed (Figure 1-8). Therefore, the data indicate that despite being somewhat inconvenient to large numbers of boaters, these island areas nonetheless attract a large number of users for the mid-Bay.

The analysis of marinas and boat ramps indicates the potential for moderate recreational boat traffic near James and Barren islands. Based on a GIS analysis of the Maryland Department of Planning's 2004 Property View database, six marinas were within 10 miles of James Island and 12 were within 10 miles of Barren Island (Table 1-9). From the Maryland DNR public boat ramp database, we identified seven boat ramps within 10 miles of Barren and four ramps within 10 miles of James Island (Table 1-9).

Table 1-9. Marinas and public boat ramps near James and Barren islands in 2003. Source data from Maryland Department of Planning and Maryland DNR

	Marinas within 10 miles	Marinas within 5 miles	Marinas within 1 mile	Boat ramps within 10 miles	Boat ramps within 5 miles	Boat ramps within 1 mile
James Island	6	5	0	4	2	0
Barren Island	12	2	0	7	3	0

In a related analysis, marina locations and a database of registered motorboats by county were used to estimate the potential number of recreational motorboats being used within the waters near James and Barren islands. The analysis showed that a significant number of boaters have the potential to access areas near both islands, although the number was significantly lower than islands closer to more populated areas (see Figure 1-7). We estimated the total number of registered motorboats in the vicinity of James Island to be about 700. For Barren Island, the number was about 950 motorboats, or less than 1% of the state total (Table 1-10).

Based on the estimated number of registered motorboats and estimates of the number of annual user days for different types and sizes of boats, we calculated the annual number of recreational user days to be about 20,000 in the vicinity of James Island and about 25,000 in the vicinity of Barren Island. A survey of recreational boat owners demonstrated that 30% to 60% of motorboat outings were primarily for fishing, depending on whether the boat was in-water or trailered (Lipton, 2004). Using these results, annual recreational fishing days were estimated to be about 8,000 days in the vicinity of the James Island and about 11,000 days in the vicinity of Barren Island.

The estimates of motorboats by location were derived by selecting the portion of all motorboats registered in each county that were likely to have access to waters around either island. First, for a boat to be selected, it had to be of sufficient size to be likely to make a trip equal to at least 5, 10, or 15 miles. Next, the proportion of the county's marinas that fell within 5, 10, or 15 miles of the island was calculated. The total number of boats with access was then estimated by multiplying the number of boats in a given size class by the proportion of marinas in the appropriate distance zone. Marina locations were used as proxies for the location of all registered boats in the county, not just boats in marinas. The estimates of motorboats do not consider out-of-state recreational users, sailboats, non-motorized boats, or boaters traveling from counties farther than 15 miles away. Therefore, the figure is intended to give a sense of the size

of the pool of the most frequent recreational boaters and fishers of the areas near James and Barren islands, but will tend to underestimate total users.

Table 1-10. **Total registered motorboats by county in 2002 and estimated boats with access to waters near James and Barren islands**

County of Registration	Trailered Motor	In Water Motor	Boats near James Island	Boats near Barren Island
Calvert	5,870	1,028	220	601
Dorchester	2,565	1,171	396	263
St. Mary's	7,152	2,348	0	78
Talbot	3,383	1,900	95	0
Total	18,970	6,447	711	942

Based on an aerial survey of recreational boat usage in the Chesapeake Bay, the waters around James and Barren Islands have relatively high usage by both motor and sailboats compared to other mid-Bay Islands (UMCES 2004b). The aerial survey was conducted in the Maryland portion of the Chesapeake Bay during June through October 2000 and April through July 2001 and led by EA Engineering. A total of 211 boats were observed within a ½ mile of James in 25 observations. Of those boats, 103 were stationary motorboats, which were assumed to be fishing boats. Near Barren, 246 boats were observed within a ½ mile in 23 observations. Of those boats, 99 were likely fishing boats. When compared to other mid-Bay islands (from Lower Eastern Neck to Holland Island), Barren had the highest number of motorboats per observation at 10.7 boats per observation (Figure 1-8). This use rate was comparable to that of waters near Sharps Island, which had 10.5 boats per observation. The waters near James Island had the next highest average use rate of 8.4 boats per observation.

About 50% of the boats observed aerially near James and 40% of the boats near Barren are likely to have been engaged in fishing. Recreational fishers make moderate to heavy use of the waters to the west of James Island, particularly the waters deeper than 15 feet, and light use of shallow waters (M. Gary, Maryland DNR, pers. comm. May 2003). Croaker, striped bass and bluefish are the main species sought, although flounder and weakfish are also targeted. A map distributed by Maryland DNR shows recreational fishing areas near, but not adjacent to, James Island, indicating these areas are hotspots of local recreational fishing activity. No mapped areas were shown in or adjacent to Barren Island.

In summary, the aerial survey indicates that recreational boat usage in the vicinity of James and Barren islands appeared to be higher than for other mid-Bay islands, except Sharps Island. Model analyses based on proximity of registered boat users and availability of water access indicated that the waters around each island were likely to have lower usage than other mid-Bay islands for motorboat usage. Comparing the model and aerial survey results suggests that despite the fact that James and Barren islands are not convenient to large numbers of boaters, they nonetheless enjoy high use rates by all types of boaters for this segment of the Bay. The aerial survey data offer the most reliable information on usage because they capture actual

behavior rather than modeled behavior. Therefore, overall recreational boat usage of James and Barren is high for the mid-Bay, but these usage levels are still much lower than those for islands in the densely populated areas of the upper Bay according to both the aerial survey and models (data not shown).

1.3.2.2 Hunting

Maryland hosts over 145,000 hunters (resident and non-resident), the majority of whom are deer hunters (USFWS 2001). Dorchester County has many acres of wildlife management areas suitable for hunting, so hunting activity is undoubtedly high in the county. Deer and waterfowl are the main species of interest to Maryland hunters. Therefore, areas around the islands have the potential to support active waterfowl hunting, although hunting is not permitted on Barren Island.

1.3.2.3 Wildlife Viewing

Wildlife viewing is a popular activity in Maryland and enjoys special popularity in Dorchester County. Over 1,500,000 people in Maryland participated in all wildlife viewing activities in 2001 (USFWS 2001). Among the most popular wildlife viewing activities was bird watching, and waterfowl were the most watched species with 78% of birders reporting watching them (USFWS 2001). In addition, 56% of surveyed birders watched other waterbirds such as herons and shorebirds. These survey results indicate that both residents and non-residents of Dorchester County are likely to engage in wildlife viewing around James and Barren islands either as the main purpose of their trip or as part of other activities.

1.3.2.4 Educational Uses

Barren Island is available for use by researchers and an active restoration program has brought school groups and other volunteers to the island to assist with and learn about wetland restoration. Since James Island is privately owned, it is unlikely to serve any prominent educational uses.

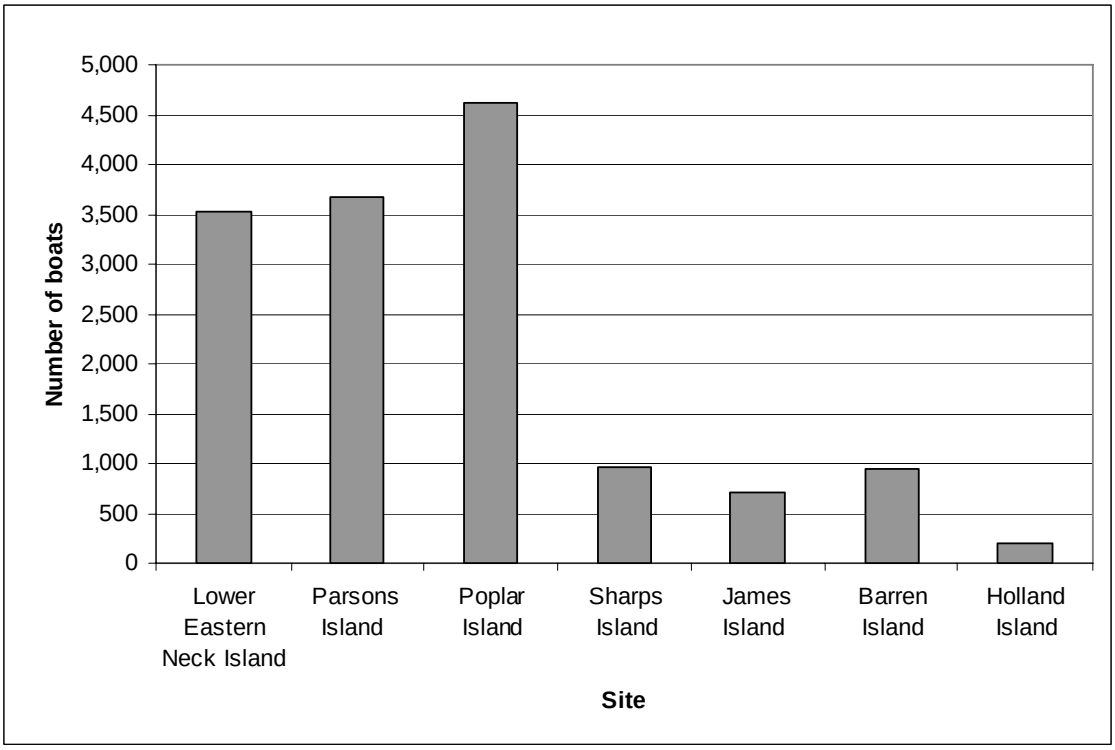

Figure 1-7. Comparison of registered motorboats in the vicinity of mid-Bay islands

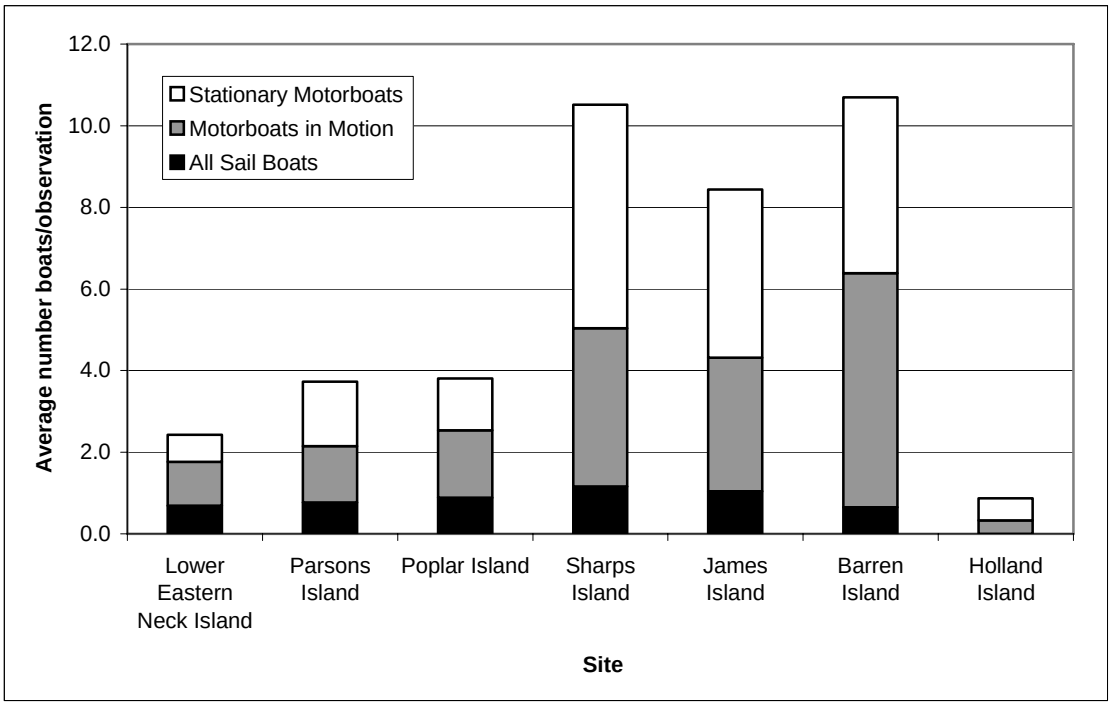

Figure 1-8. Comparison of aerial survey data of recreational boat usage within one-half mile of mid-Bay islands. Source data from EA Engineering.

Chapter 2: Potential Impacts of the Proposed Project

2.1 Short Term and Long Term Impacts to Environmental Resources

2.1.1 Noise

2.1.1.1 Regulatory Setting

The Dorchester County Code does not set forth any specific noise ordinances (i.e., maximum permitted sound level for various land uses) but does prohibit particular noises (e.g., operation of a vehicle without a muffler). The Code defines a noise disturbance as "sounds of sufficient volume, character and duration so as to be productive of actual physical discomfort or annoyance to persons of normal sensibilities." The use of commercial construction equipment that causes a noise disturbance is prohibited at nighttime, or more specifically, the period from ½ hour after sunset until 6 AM. Many activities are exempted from the ordinance including the sounding of safety signals.

2.1.1.2 Methods

Sounds associated with project construction and operations were evaluated to determine likely sound levels experienced by people or animals in the vicinity of the project. To conduct the analysis we first characterized the types of equipment likely to be used during different phases of the project and whether that equipment was likely to be used at night. Nighttime noise, in addition to being regulated in Dorchester County, is generally perceived as more bothersome than daytime noise and therefore is of particular concern. We evaluated the likely noise levels that would be associated with the equipment and identified the equipment that would tend to generate the loudest sounds or be perceived as the noisiest. We identified sensitive noise receptors including residential, recreational and commercial areas in the vicinity of the island projects using the most recent tax assessment database (Maryland Department of Planning) and other sources described in the evaluation of existing conditions. We incorporated all data in a GIS analysis to estimate the impacts of project noise to nearby residents and boaters.

Although sound transmission is a function of specific conditions between the sound source and receptor, for purposes of this analysis, we used techniques to model sound transmission that assumed typical or average conditions. We used commonly accepted rules of thumb to calculate the perceived sound levels after transmission of sound over land and water. We also followed standard assumptions regarding the additive effects of multiple sound sources. These assumptions will misrepresent sound transmission under atypical conditions, which may occur frequently. For example, temperature inversions will occur on most calm clear nights and will have the effect of amplifying sound levels heard around dawn.

Sound level attenuation between noise-generating activities and receptors was calculated by assuming that sounds originating from the island project traveled primarily over water, and therefore were attenuated 5 dBA with each doubling of distance (Blomberg 2004). Additional attenuation associated with molecular absorption and analogous excess absorption was also factored in. Molecular absorption refers to the linear attenuation of sound intensity as a result of its passage through air, and results in a 0.7 dBA decrease per 1,000 feet. Analogous excess attenuation is also linear, and is associated with other factors that reduce sound intensity such as humidity or ground cover, and was assumed to be a 1.0 dBA decrease per 1,000 feet.

When considering several sources producing sound simultaneously, sound levels cannot be added arithmetically since decibels are a logarithmic measure. Instead, the additive nature of sounds is such that the sound pressure level from two sources generating the same decibel level is approximately three dB greater than the sound pressure level of just one source (Table 2-1). Such rules were used in the analysis to calculate total sound levels associated with typical project conditions, such as the simultaneous, proximate operation of several pieces of heavy machinery.

Table 2-1. Addition of multiple sound sources. Source: Federal Highway Administration

Difference between sound level of 2 sources	Amount added to higher value
0 to 1 dBA	3
2 to 3 dBA	2
4 to 9 dBA	1
10 or more dBA	0

To quantify sound levels generated by equipment at each project, the Poplar Island Environmental Restoration Project (PIERP) was used as a model of typical conditions that could be expected during island restoration. Data on type and quantity of equipment used at PIERP, duration of each phase of that project, and timing of activities within each phase was gathered from the US Army Corps of Engineers, Maryland Environmental Service and other sources. Additionally, noise-related complaints at PIERP were considered when evaluating impacts associated with specific activities. The proposed projects at James and Barren islands are substantially different, so the probable sources and duration of noise were described separately (Tables 2-2 and 2-3).

Table 2-2. Estimated duration and timing of noise impacts at James Island during project development

	Construction – sand dredging	Construction – dike construction	Inflow	Crust Management	Habitat Development
Duration	2-3 months per phase	2-3 years[1]	Duration of project life	Duration of project life	Duration of project life
Time of Year		Year round	Seasonal (Sept – Mar)	Year round	Year round
Time of Day	Day and night	Day[2]	Day and night	Day only	Day only

[1] Construction at James Island may occur in two phases, thus duration of construction-related noise impacts would be doubled.
[2] Construction activities may start in the pre-dawn hours and end after dusk.

Table 2-3. Estimated duration and timing of noise impacts at Barren Island during project development

	Construction
Duration	1.5-2 years
Time of Year	Year round
Time of Day	Day

2.1.1.3 With-Project Noise Conditions – James Island

The highest *sustained* noise levels generated by the project are likely to be around 90 dBA at 50 feet. This sound level represents several pieces of heavy equipment (e.g., dump trucks, dozers, compactors) working simultaneously in close proximity to one another. Factoring attenuation over water, molecular absorption, and analogous excess attenuation, a 90 dBA sound will decrease to typical daytime background levels (55 dBA) within 3,200 feet of the noise source. The 55 dBA standard is a typical threshold level for noise regulation in rural areas (e.g., Talbot County Zoning Ordinance). From the GIS analysis, we determined that only the three privately-owned parcels on the James Island remnants and no improved residential or commercial mainland parcels fall within 3,200 feet of the proposed island perimeter, indicating that few if any people would notice these noises under typical conditions (Figure 2-1). However, given the rural character of the area adjacent to James Island, sound levels of 55 dBA may be greater than sound levels to which residents are accustomed. Sound levels of 90 dBA would attenuate to 45 dBA or half of the 55 dBA level within 6,400 feet of the proposed project. Eight parcels, three of which are improved, fall within this range. This noise zone does not extend into the recreational areas used by most boaters.

Back-up beepers create among the highest *periodic* sounds and their sound level can vary from 85-110 dBA at 50 ft. The placement of rock during construction will be in this sound range. Rock placement has been a source of noise-related complaints at PIERP, so these activities are likely to be judged as bothersome by neighbors that notice these sounds. Activities generating these loud, periodic sounds generally occur during daytime hours. A sound at the 110 dBA level typically attenuates to daytime background levels of 55 dBA within 10,000 feet of the source when traveling over water. The GIS analysis indicates that about 12 improved waterfront parcels and 17 improved non-waterfront parcels (agricultural, residential, and commercial) fall within 10,000 feet of the proposed project perimeter (see Figure 2-1). However, because sound is attenuated more rapidly over land by vegetation and structures, the sound levels may be attenuated below background levels before reaching some of the inland parcels. In sum, we estimate that 29 current residents, farmers and business owners/operators have the greatest potential to be affected by periodic noise levels. Tens more homes could be affected during certain weather conditions or if residents are sensitive to sounds quieter than 55 dBA.

In the future, some of the unimproved parcels in the area may be developed. Within the 10,000 foot periodic noise zone, there are 18 unimproved parcels, eight of which are waterfront. Several large (15-265 acres) unimproved parcels on the northern edge of Taylors Island have the potential to be developed into multiple residences, suggesting that the future population affected by noise could be marginally higher. This zone of periodically elevated noise levels extends west of the island over a major portion of the neighboring recreational fishing area.

Some sound-generating activities 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. Inflow occurs September to March, so these effects are expected to be seasonal. Sound levels associated with these activities would be in the range of 82 dBA for barges, 81 dBA for generators used to power lights, and 76 dBA for pumps. These sounds would combine into the equivalent of a single source generating 85 dBA at 50 feet.

That sound level would be attenuated to a nighttime background level of 40 dBA in about 6,000 feet. Three improved parcels on Taylors Island and 5 unimproved parcels are within this range of projected nighttime noise effects. Sound levels are likely to cross this threshold when activities occur on the southern or eastern edge of the island project (Figure 2-1).

Conclusions

Generally, noise impacts associated with the project at James are expected to be minimal and not interfere with activities, although nearby homes will experience elevated noise levels during certain phases of island development. The loudest sounds will be periodic or of relatively short duration. Rock placement has been a source of complaint at PIERP and is among the loudest sounds associated with the project. The sounds are likely to occur intermittently for several years. Occasionally, noise levels at about 20 nearby waterfront residences or businesses will likely exceed levels typical to quiet, suburban neighborhoods. When noise levels are high, affected residents will detect sounds louder than those to which they are accustomed. During times of the year when residents are primarily inside with windows closed, most noise levels will not be noticeable.

Significant effects will be experienced by recreational boaters, visitors to the existing James Island, and the three closest improved parcels on Taylors Island. Recreational boaters that typically use areas west of the island may be disturbed by the periodic noises, particularly during dike construction, which will exceed typical ambient noise levels. Recreational use of James Island by the three landowners or their guests is likely to be periodically disrupted by raised noise levels. Three residences on Taylors Island and 5 unimproved parcels will experience elevated nighttime noise levels (40-45 dBA). These noise levels will primarily be apparent when residents are outside their homes or have windows open and when project development occurs on the southern and southeastern sides of the island. The sounds heard at night, which are associated with material inflow, would not tend to vary greatly in pitch or volume and therefore would not be among the most annoying types of noises.

Sound levels associated with long-term sustained activities (e.g., operation of vehicles, pumping of dredged material) will not interfere with the activities of residents or boaters. Once the restoration project is complete, the occasional boat traffic that might be associated with limited visitation to the island will be consistent with pre-existing noise levels. Future waterfront land development could slightly increase the population affected by construction activities.

2.1.1.4 With-Project Noise Conditions – Barren Island

The proposed extension of the existing breakwater at Barren Island is a much smaller project than the island restoration project proposed at James Island. The project is expected to be constructed in less than 2 years and therefore will create short-term noise disturbances. However, more homes and businesses are located close to Barren Island than James Island, so noise impacts, while of a shorter duration, may affect more people.

Since the main noise-generating activities of the breakwater project are likely to be rock placement, we only evaluated one noise zone. As was done with the James Island analysis, we evaluated sensitive receptors within 10,000 feet to represent areas experiencing periodic noises above background levels of 55 dBA. The GIS analysis showed that 337 improved and 76

unimproved parcels were located within 10,000 feet of the proposed extension of the existing breakwater (Figure 2-2). Most of the affected parcels are residences, but a few restaurants, churches and other uses are present.

Construction activities are likely to take place only during the day, so noise levels associated with the project will not conflict with local nighttime noise ordinances. Noise levels are likely to be noticeable to most residents and visitors of the western waterfront area of Upper Hooper Island during rock placement. As with James Island, any recreational boaters choosing to fish within 10,000 feet of the island are likely to experience noticeable noises periodically. The Barren Island remnants are likely to experience periodic noise levels that would be perceived as moderately loud.

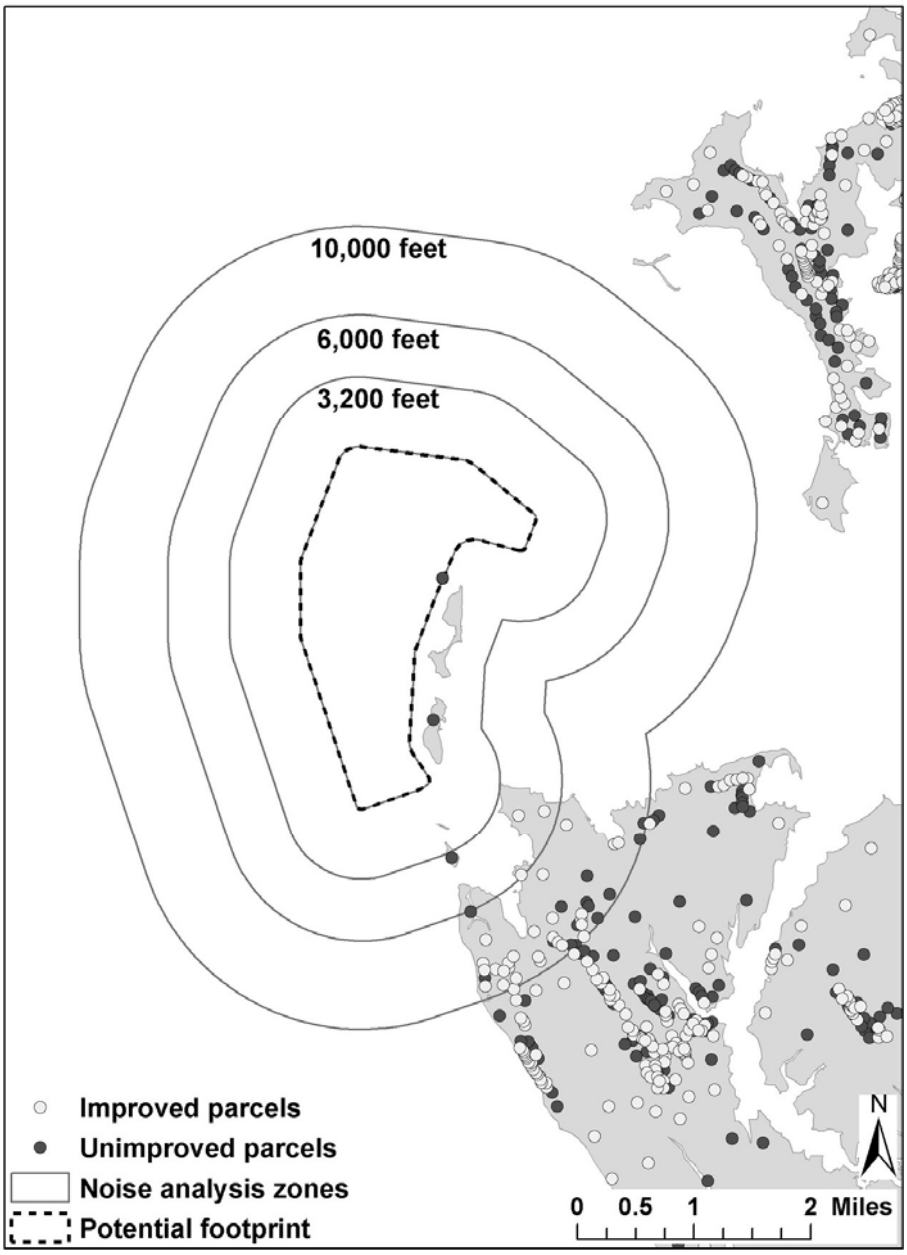

Figure 2-1. Zones used for noise impact analysis at James Island. Dots representing parcels show the centroid of the parcel.

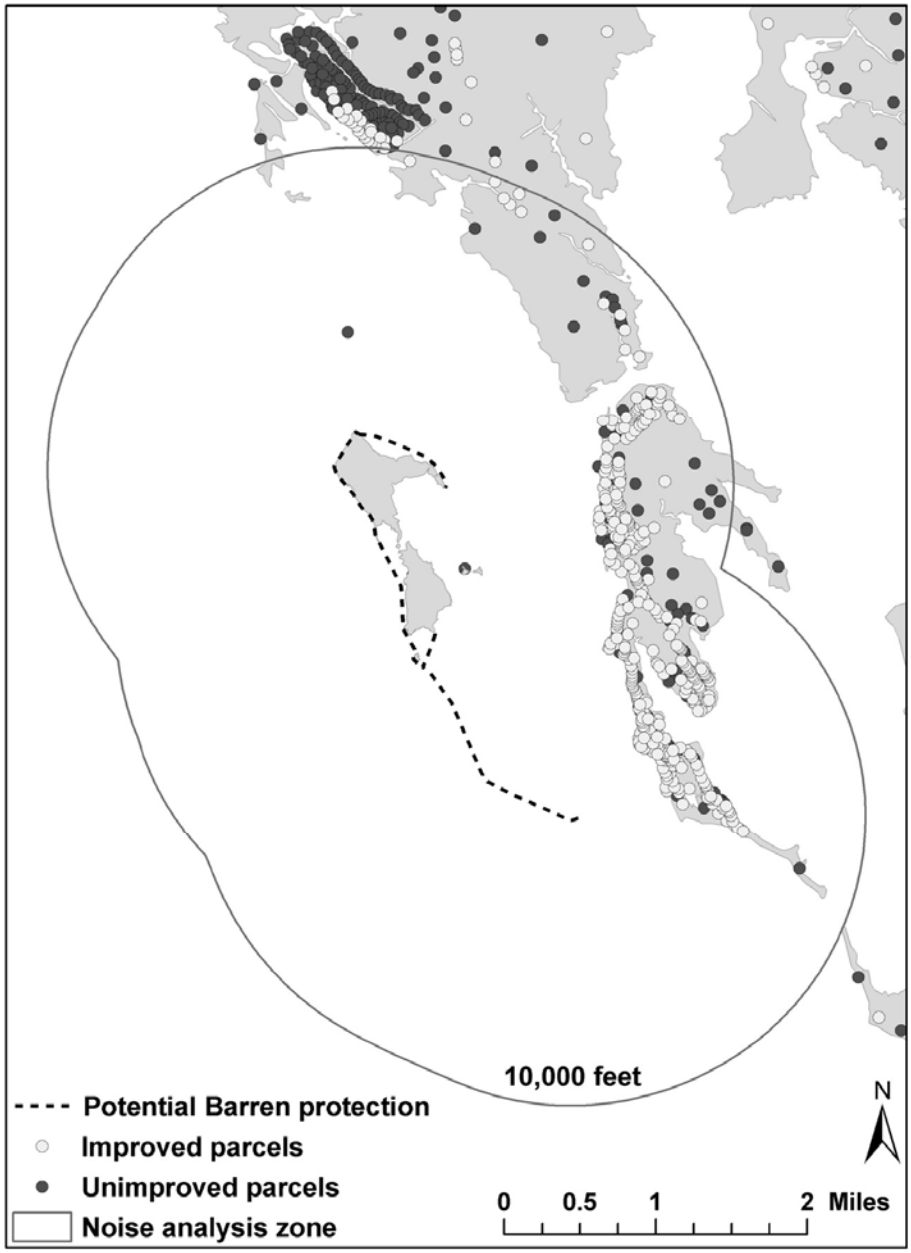

Figure 2-2. Zones used for noise impact analysis at Barren Island. Dots representing parcels show the centroid of the parcel.

2.1.2 Light

2.1.2.1 Regulatory Setting

Dorchester County has no light ordinance.

2.1.2.2 Methods

Although Dorchester County has no light restrictions, lighting is generally considered bothersome when it produces "excessive" illumination beyond the site boundary or creates glare that interferes with activities such as driving. To conduct the analysis of potential light impacts to residences and other areas, we first characterized the types of equipment and associated lighting likely to be used for different nighttime activities during different phases of the project. We evaluated potential light levels relative to existing light levels and evaluated the history of light complaints for the Poplar Island Environmental Restoration Project (PIERP) to judge potential impacts of light sources.

Lighting at PIERP was used as a model for analyzing potential light impacts associated with the proposed projects at James and Barren islands (Tables 2-4 and 2-5). Many light levels are specified by Occupational Safety and Health Administration (OSHA) regulations and are, therefore, not flexible. The brightest lights used at PIERP are shielded to direct light downwards or toward operations, so glare does not typically reach nearby residences or affect boaters. Brightness of navigation lights are mandated by the Coast Guard and are typically designed to be visible for 2 miles. Lights on barges must be visible for 3-5 miles depending on size and mast lights should be visible from 360° when boats are at anchor (US Coast Guard Navigation Rules and Regulations), such as when offloading dredged material.

Table 2-4. Lights used during operations at PIERP

Location	# lights	Wattage	Type	Height	Shielded?
Personnel pier	6	300 W	Incandescent	10 ft above dock	Yes, Down
Welcome marquis	2	300 W	Incandescent	12 ft	Yes, Down
Transformer at trailer complex	2	300 W	Incandescent	12 ft	Yes, Down
Building complex	6	60 W	Incandescent	7-8 ft	Yes
Transfer switch	1	60 W	Incandescent	5 ft	Yes
Navigation lights – buoys	2	2-4 candela	Incandescent		No
Navigation lights – Cell 6	2	2-4 candela	Incandescent		No

Table 2-5. Lights used during inflow at PIERP

Location	# lights	Wattage	Type	Height	Shielded
Spillway 1	4	1000 W	Mercury vapor	~12 ft	Yes
Spillway 3	4	1000 W	Mercury vapor	~12 ft	Yes
Spillway 4	4	1000 W	Mercury vapor	~12 ft	Yes

The main group affected by increased light levels is waterfront homeowners on shoreline adjacent to the projects. Light trespass from PIERP has been a source of a few complaints by neighboring residences. The primary complaint is a loss of the darkness that residents are accustomed to seeing. Most waterfront homes near James and Barren islands are at least as far from the proposed projects as the adjacent waterfront homes are from Poplar Island, so light

impacts are not likely to exceed those for Poplar. Only three parcels on Taylors Island are closer to the James Island project than homes at Poplar.

Similar to PIERP, a noticeable increase in nighttime light can be expected at James Island when work occurs 24 hours a day. Specifically, nighttime activities occur during the sand dredging portion of the construction phase and during the material inflow. Light from these activities is likely to be visible for many miles but will not necessarily be perceived as bothersome over that range. The inflow activities use the highest power bulbs of any project activity and these lights are raised to roughly 30 feet above sea level and have the potential to be seen over 10 miles away by an observer at 15 feet above sea level, under very clear atmospheric conditions.

The duration of nighttime activities varies. Sand dredging is continuous over the first several months of the project while inflow activities occur seasonally once initial construction is complete. Therefore, light impacts associated with these phases of activity will be temporary and seasonal, respectively. These operations use lights that are shielded, so glare should be minimal and not reach residences. Similarly, the protection project at Barren Island may have short-lived nighttime operations related to sand dredging, introducing temporary increases in lighting levels.

A minor increase in nighttime light associated with illumination of any permanent facilities at James Island (Table 2-4 above) is likely to occur over the long-term. Structures (docks, piers, breakwaters, channels) are required to be lit temporarily during construction either by floodlight and/or by federally maintained aids to navigation. Any structures remaining after construction are likely to be permanently lit by aids to navigation or low-intensity lighting (e.g., for piers). Additionally, marking the uncharted, restored James Island with aids to navigation would be a courtesy to watermen and recreational boaters in the area. These navigation lights may be visible at nearby residences, but will be consistent with existing lights in the waterway. Long-term impacts at Barren Island will be minimal since there will not be permanent facilities (i.e., buildings) at the project. Lights on breakwaters at Barren Island would be permanent after construction, and these lights would be characteristic of other navigation lights in the area.

In summary, implementation of the proposed project will introduce additional nighttime light to the project areas primarily during the initial construction and seasonal inflow phases. The main group affected by this increased lighting will be the waterfront homes in close proximity to the project, and any impacts will depend on homeowner perceptions of these increased light levels. Evidence from Poplar Island suggests that lighting will be considered tolerable to those in support of the project, but some residents are likely to notice and object to increased light levels. Permanent lighting of structures on James Island or aids to navigation used to mark James or Barren islands will be compatible with existing lighting in the area. Therefore, long-term lighting impacts are expected to be minimal.

2.2 Socioeconomic Resources

2.2.1 Future Land and Water Use

In considering the effect of future construction on an area, a baseline of likely future land conditions and probable uses in the absence of new projects should be evaluated to establish a baseline from which to compare changes. This section covers effects of the project on the economy of the region and changes to aesthetic and recreational resources. Changes in residential land use, commercial use, or recreational uses of the project areas could affect the level of perceived impact of the island restoration projects.

2.2.2 Fishery-related Economic Impacts

The impacts of island restoration projects on commercial fisheries are associated with:

- potential changes in resource conditions as reflected by changes in the abundance, availability, or catch per unit effort, of fish; and
- potential effects on fishing operations as reflected by project-imposed changes in travel time (e.g., distance to fishing areas), searching time (e.g., difficulty of locating productive fishing areas), or fishing time (e.g., difficulty operating fishing gear).

2.2.2.1 Types of Fishery Impacts

Using dredged material to restore a mid-Bay island is expected to have both negative and positive impacts on commercial fisheries. Negative impacts are associated with any: 1) loss of bottom fish habitat, 2) loss of fishing area, 3) any reduced productivity of adjacent areas due to changes in hydrodynamics or increased sedimentation, and 4) space-use conflicts between fishing and dredging/material placement equipment. Positive impacts are associated with: (1) reef habitat from the rip-rap construction of the island perimeter, (2) fishery-related improvements associated with the wetlands that will be created on the restored island, and (3) expected improvement in nearby bottom habitat associated with reduced sedimentation around the island.

2.2.2.2 Pattern of Fishery Impacts

The island restoration project at James Island would be expected to result in a pattern of impacts on fisheries that includes some short-term economic losses, followed by the potential for long-term economic gains. During initial site development, a period of five years or so, the placement of rip-rap and other construction activities may disturb bottom sediments and water quality and, at some sites, may cause small, but unavoidable space/use conflicts between equipment and barge operators involved in site construction and fishermen as they travel to and from fishing areas, set gear, and so on. These temporary adverse impacts will subside once construction ends, and will largely be offset by long-term beneficial impacts as the island matures and provides improved fish habitat and fishing areas, and reduces turbidity in nearby fish habitat areas.

Restoration of James Island will primarily reduce the quantity of fine sands and mud bottom, which have relatively low value for fish habitat. However, the loss of this 2000-acre area is considered too small to result in any significant decline in fish abundance since most affected fish populations are expected to find suitable alternative habitat nearby. This loss in the

quantity of fish habitat is expected to be offset to some extent since the restoration of the island is also expected to improve the quality of nearby fish habitat by reducing turbidity and providing underwater structure in the form of rock reefs. In addition to the potential benefits of rock reefs, some recreational species may become more abundant as a result of the potential expansion of SAV beds due to the wave and surge protection and erosion control that is expected to be provided by the restoration projects. Proximity to the high quality habitat afforded by SAV beds would also be expected to enhance commercial catch rates for some species.

2.2.2.3 Research Approach

The impact of mid-Bay island restoration on commercial fisheries was assessed by focusing on: a) expected changes in the abundance, availability, and catchability of fish; b) expected changes in travel, searching, and fishing time; and c) any "congestion externalities" that are expected to result from fishermen shifting effort from the island restoration site to locations that are already being fished.

2.2.2.4 Clam Fishery

The soft-shell clam (*Mya arenaria*) and the razor clam (*Tagelus plebius*) are the commercially important clam species in the Bay. However, the soft clam has shown dramatic declines in catch and value, in the vicinity of James and Barren islands and baywide, over the past seven years (Table 1-2). Dredging studies near James and Barren islands show the density of soft clams within either footprint is well below commercially-harvestable levels[1], and neither DNR Fisheries Service nor Natural Resource Police knew of any significant clamming activity in the vicinity of James Island. Some clamming a mile or more to the south of Barren Island was reported by DNR Natural Resource Police (Barren Island Consolidated Report FINAL August 29, 2002, p.33) but would be unlikely to be impacted by the project.

Razor clams were found to have densities approaching, but still well below, commercially productive beds at James Island (Harms, Final James Island Supplemental, October 2004, p. 13) and densities were very low at Barren Island (BBL, Final Barren Island Supplemental October 2004, pp. 3-12 to 3-13). At James Island, the most productive razor clam areas of those surveyed were within the project's proposed footprint, although these areas are not known to be used by clammers. The trends in razor clam catches are unknown because they are typically used for bait and are not tracked in the commercial catch database. Clammers reported that the dockside price of razor clams in October of 2004 was about $20/bushel.

At current clam densities, neither the James nor the Barren Island projects would significantly affect the abundance or catch of either type of clam. The only effect of the James Island project on this fishery would be the removal of beds with the potential to be productive in the future. Some potential for a razor clam fishery near James would be lost if future conditions led to increased clam densities. In summary, due to the lack of commercially productive beds and the low value of the potential catch, effects on the commercial clam fisheries appear to be minor.

[1] The MD DNR defines a productive natural clam bar as having an existing or potential harvesting rate of 1/2 bushel soft-shell clams (*Mya arenaria*) per hour, or 1.5 bushels of razor clams (*Tagelus plebius*) per hour (Code of Maryland Regulations, 2004).

2.2.2.5 Oyster Fishery

The American oyster (*Crassostrea virginica*) has historically been a commercially important species in the Bay. The areas around James and Barren are not currently productive for oysters although they have been productive in the recent past (Table 1-2). No NOBs are within either of the project footprints, so if productivity were to increase in these nearby beds in the future, the project would not be expected to have negative long-term impacts on oyster abundance. Some higher levels of turbidity associated with project construction have the potential to disrupt the oyster beds at James Island in the near term, however, time of year restrictions would be expected to minimize any impacts. In the long term, the effects of the project are unknown but it is possible the completed project will reduce sediment loads to nearby oyster beds and improve habitat quality.

The James and Barren Island restoration projects lie in shallow water and do not affect any typical boat navigation routes. Therefore, neither project is expected to increase travel time of commercial fishers to the NOBs.

2.2.2.6 Blue Crabs

The waters around James and Barren are used extensively for setting crab pots and the crab fishery is currently the most valuable fishery in the Bay. The James Island project options will cover roughly 2,000 acres of Bay bottom. The area of the project footprint that overlaps with areas of observed crab pot usage differs by month. In the three observations taken in July, August and September of 2003, the proposed footprint displaced 1,900, 1,900 and 1,400 acres corresponding to 40%, 50%, and 80% of local areas in use (Table 2-6). The high proportion of displacement in September demonstrates the importance of shallow water areas to crab fishers during times of high water temperatures. Although the surveys of crab pot usage were only spot checks, it seems clear that most if not all of the footprint area serves as productive commercial crabbing area. Therefore, 1,900 acres of displacement is a reasonable estimate of lost crabbing area since it roughly represents the area of the footprint that falls within waters four feet or deeper, which is the legal minimum depth for crab pots. The degree of the effect on catches will depend on the ability of crabbers to shift pots to new locations and the productivity of the lost area.

Abundance impacts on crabs are not expected due to the lack of projected impacts on spawning or significant habitat areas at James Island. The project has the potential to increase crab abundance if SAV beds expand. Precluding blue crabs and blue crab fishers from the island footprint area will result in both crab and crab fishers relocating to nearby areas. This shift should have a minimal effect on catch rates and expected economic returns from crab fishing overall. The higher concentration of crabs in these nearby areas may marginally increase catch rates per unit area (crab catch per acre). However, increased fishing congestion in these areas (pots per acre) may offset these positive effects. Based on evidence that the project will not affect crab abundance, therefore, it is reasonable to expect that the economic impacts of the project on crab fisheries will be minimal. However, there may be temporary impacts to individual crabbers who are displaced by the project as they search for new productive areas to set pots and some minor long-term impacts for any fishers who must travel farther to set pots.

Table 2-6. Overlap of 2003 crabbing areas with James Island footprint.

Month	Area crabbed (acres)	Area of intersection with footprint (acres)	Percent of area crabbed covered by footprint
July	4,516	1,933	43%
August	3,754	1,929	51%
September	1,651	1,358	82%

The Barren Island breakwater project will be built in shallow water and would not remove a significant amount of available area for crabbing. If we assume the information collected regarding docking areas and boat routes for pound net fishers holds for crab fishers, effects on travel time to place, tend, and collect pots are likely to be minimal (see Finfish section). Therefore, the proposed project at Barren should have no significant effect on crabbing in that area.

2.2.2.7 Finfish

Pound net, gill net, and hook and line fishing areas exist near both islands, but fishing activity is much heavier near Barren Island (M. Luisi, Maryland DNR, pers. comm. Oct. 2004). According to landings data aggregated for the region, finfish are a valuable resource in this area of the Bay. The value of finfish catches in the Southern Bay Segment, which includes waters near Barren Island, has been increasing in recent years (Table 1-3). Catches in the South Central Bay segment, which includes areas near James Island, have fluctuated but have remained fairly steady overall (Table 1-2).

A survey of commercial watermen with registered pound net locations was conducted to determine the nature of fish catches close to James and Barren islands. Pound net locations are recorded as a particular point, but pound nets may be set anywhere in the general vicinity of that point. Near James Island, 3 pound nets are actively set according to the survey, but only 1 waterman (using two nets) has reported catches to the State within the past five years (Table 2-7). At Barren Island, 14 watermen have 23 registered pound net locations in the vicinity of Barren Island, of which 17 are actively being fished. Eight of the 14 pound net fishermen reported conducting fishing activities on a daily basis from March or May through November or December each year. Catch data for the past 5 years were available for 4 of the 14 license-holders near Barren (Table 2-7).

Table 2-7. Total reported pound net catches from survey of commercial watermen near James and Barren islands, 1999-2003

	James (lbs) (1 of 2 active pound nets)	**Barren (lbs)** (4 of 14 active pound nets)
1999	10,411	382,986
2000	2,350	348,909
2001	49,948	414,665
2002	34,673	402,424
2003	23,519	292,667

In both island areas, fishers reported that their largest catches consisted of Atlantic menhaden, striped bass and Atlantic croaker. Other species caught in lower volumes included summer flounder, bluefish and white perch (Tables 2-8 and 2-9). Near Barren, fishers use the eastern edge of the deep channel to catch migratory species such as striped bass and red and black drum. Local landings data (Tables 2-8 and 2-9) and data that were aggregated for the regional water bodies encompassing James and Barren islands (Tables 1-2 and 1-3) show that striped bass, menhaden and croaker have provided the bulk of the value of the finfish catch for the past five years.

Table 2-8. Volume and value of reported pound net catches near James Island (1 of 2 active licenses reported)

Species	Total catch (lbs) 1999-2003	Total Value* 1999-2003
Striped Bass	17,273	$28,595
Croaker/Hardhead	26,996	$9,770
Menhaden	67,541	$5,821
Summer Flounder	3,704	$5,617
Bluefish	2,211	$1,242
White Perch	1,901	$1,032
Gray Sea Trout/Weakfish	502	$324
Spot	428	$253
Terrapins	87	$133
Spotted Sea Trout	65	$84
Spanish Mackerel	44	$49
Drum-Red	44	$25
Carp	97	$22
Channel Catfish	4	$2
Catfish-Other	2	$1
Bullhead Catfish	1	$0
Amberjack	3	$0

*Value was calculated by multiplying catch by average annual value per pound by species for each year.

Table 2-9. Volume and value of reported pound net catches near Barren Island (4 of 14 active licenses reported)

Species	Total Catch (lbs) 1999-2003	Total Value* 1999-2003
Striped Bass	81,959	$137,115
Menhaden	1,203,834	$108,084
Croaker	104,518	$32,915
Summer Flounder	12,710	$23,591
Bluefish	61,306	$19,663
Spanish Mackerel	19,759	$19,425
Gizzard Shad	78,561	$15,411
Spade Fish	22,846	$11,695
River Herring	71,513	$10,409
Sea Trout	14,759	$9,409
Spot	18,302	$8,905
White Perch	18,044	$8,200
Spotted Sea Trout	8,132	$7,424
Mullet	981	$731
Red Drum	363	$241
Cobia	127	$168
Winter Flounder	121	$155
Butterfish	184	$91
Atlantic Mackerel	160	$54
Channel Catfish	91	$36
Sea Herring	204	$25
Sheepshead	9	$5
Catfish-Other	12	$4
Tautog	1	$1
Shad - Unclassified	3	$1
Striped Bass - Released	123,124	$0
Amberjack	7	$0

*Value was calculated by multiplying catch by average annual value per pound by species for each year.

Potential Impacts on Fish Catch at James Island

All pound net fishers, active and inactive, have pound net locations registered outside the footprint of the proposed project and are generally well to the east of the existing island (see Figure 1-5) although this does not ensure that the area of the footprint is not used by fishers. Winter gillnet locations are typically well outside the proposed footprint in deeper water (M. Gary, MD DNR, pers. comm. May 2003). Since effort appears to be concentrated away from the project footprint, commercial fishing should not be negatively impacted by the project. Rock reefs have the potential to attract fish and increase catch rates.

Travel-time Impacts at James Island

The two active fishers setting pound nets near James Island report traveling between 8-10 ½ miles one-way to their pound net sites. For fishers traveling from the Little Choptank River, it is not expected that the project would have any significant effect on travel times to

pound net areas. Any fishers traveling out of the Little Choptank to the south should not be affected by the project because the proposed footprint does not affect the shallow, unmarked channel to the south of existing James Island. For any fishers traveling from the Choptank River, the project footprint, as currently envisioned, protrudes about 1,500 feet east of the island into the Little Choptank River causing a negligible increase in travel distances to most pound net areas (see Figure 1-5). All the inactive licensed pound net locations are on the east side of the island. Therefore, if fishing in these areas were revived, travel times to those areas would not be affected.

Potential Impacts on Fish Catch at Barren Island

At Barren Island, the footprint of the planned breakwater would not remove a significant amount of fishing area from use. The plan to place the breakwater in shallow waters ensures that the project will not overlap with areas used for pound net placement or gill net use. Some evidence suggests that the rocks used to build the seawall will act to attract fish and potentially increase abundance of certain species (e.g., striped bass) in the vicinity of the island and potentially increase catches.

Travel time Impacts at Barren Island

Fishers in the vicinity of Barren Island report traveling approximately 4-10 miles from their home ports to reach pound net locations. Several fishers reported docking at Jones Marina, so we assumed fishers were coming from this marina or nearby areas in our evaluation of the potential effects of the project on travel times. Fishers docked at Jones Marina or other major docks on Hooper Island use Fishing Creek, at the north end of Upper Hooper Island, to access waters near Barren Island. Licensed pound net locations show that nets are set both east and west of the island (see Figure 1-5).

The proposed breakwater will prevent boats from traveling east to west in the area south of the southern Barren Island remnant for a length of around one and a half miles. It is unlikely that many boats would attempt this route due to the shallow water in this area that was formerly part of Barren Island. If boats did use this approach to fishing areas, an alternative route to the south of the breakwater would increase travel distance by around two miles. However, since most boats are likely to use the northern route, the overall effect on fishers' travel time will be negligible.

2.2.3 Employment and Industry

2.2.3.1 Background

The regional economic impacts of spending on any new project, such as the restoration of James and Barren islands, are typically measured in terms of the jobs, incomes, business sales, and tax revenues that result. Spending on restoration creates direct impacts associated with the project itself, but this spending also generates indirect impacts or *multiplier effects* that are associated with purchases and sales by businesses that supply inputs to businesses that are directly impacted by project spending. Businesses unrelated to dredging may also benefit as increases in household incomes that result from direct and indirect economic impacts generate additional consumer spending and *induced multiplier effects*.

The analysis described in this section was designed to trace and measure direct, indirect, and induced economic impacts in the vicinity of the proposed James and Barren Island projects (Dorchester County, MD) and for the larger economic area of the state of Maryland. We estimated separate pathways of economic impacts associated with various stages of the project including planning, site development, dredging, transport, placement, habitat restoration, and site management and monitoring. This section outlines how the analysis was performed and summarizes results.

2.2.3.2 Methods

Our assessment of the economic impacts of dredging and island restoration involved five steps:

1) Estimate out-of-state, in-state, and local Dorchester County spending associated with various phases of planning, site development, dredging, material placement, island restoration, and site management and monitoring for each project;
2) Develop an economic input-output model of Maryland and Dorchester County; and characterize spending on various activities in terms of inputs purchased from various industrial and household sectors for each project;
3) Generate statewide and county-level economic multipliers for each industrial sector expected to experience direct impacts;
4) Use spending estimates and sector-level state and county economic multipliers to estimate direct, indirect, and induced impacts over the life of each project; and
5) Estimate the average annual economic impacts over the project period and the approximate pattern of annual economic impacts over that period for each project.

Estimates of direct spending on the tasks associated with the James and Barren Island projects were derived from cost data provided by the US Army Corps of Engineers. For James Island, the number of years of spending in each cost category varied from 4 years to 43 years. Therefore, average annual spending was calculated in each cost category by dividing total spending by the number of years of spending in that category. This average was then used to establish annual direct economic impacts associated with each major task. These direct spending estimates were then used as the basis for generating estimates of state and local direct, indirect, and induced economic impacts using the IMPLAN (IMpact PLANning) regional economic modeling system. (IMPLAN, 2002)

2.2.3.3 Approach

Expected spending on each project task was allocated to specific industrial sectors (e.g., purchases of fuel, stone, plant material) and to primary (or household) sectors (e.g., employee compensation, proprietor income) to generate estimates of direct impacts on various measures of economic performance including: job creation, employee compensation, other household income, business sales and tax revenues generated. Direct spending in each statewide and local industrial sector was then used within state and county IMPLAN models to generate total direct, indirect, and induced economic impact estimates for both economic areas for each project. Impacts at the county-level are based on estimated local spending and the existing (2004) economic structure of the county. Impacts estimated at the state level are based on statewide inter-industry linkages and patterns of in-state and out-of-state purchases and sales during 2004.

All impacts were developed based on average annual spending per activity over the duration of each phase. Because actual spending patterns vary over the life of the project, using average annual spending to reflect spending in each year will result in overestimates and underestimates of the impacts of some activities during some years. The following sections present and describe empirical results associated with average annual economic impacts for each phase, and provide a general description of the pattern of these impacts over time by showing the years in which overall spending (on all tasks) is expected to be above or below average.

2.2.3.4 General Results

Maryland Statewide Economic Impacts

The statewide economic impacts of dredging, material transport and placement, island restoration, and site management and monitoring at James Island are summarized in Table 2-10. The expected level of total spending is approximately $1.1 billion over 43 years. This direct spending is expected to generate over 8,000 direct person-years of employment (FTEs) over the life of the project. After multiplier effects are considered, this spending is expected to generate approximately 18,500 total person-years of employment (FTEs) in Maryland over the 43-year life of the project. The direct business sales in Maryland are expected to generate total (direct, indirect, and induced) statewide business sales of nearly $2 billion over the life of the project.

The statewide economic impacts of a smaller scale restoration project at Barren Island are summarized in Table 2-11. The expected level of total spending on this project is approximately $36 million over 3 years. This direct spending is expected to generate more than 300 direct person-years of employment (FTEs) over the life of the project. After multiplier effects are considered, direct spending is expected to generate approximately 690 total person-years of employment (FTEs) over the life of the project. The direct business sales in Maryland are expected to generate total (direct, indirect, and induced) statewide business sales of nearly $65 million over the life of the project.

Analytical results show that the use of dredged material to restore a mid-Bay island will generate economic impacts that will last approximately 40 years from the time of initial site selection, through site development and construction, material placement, and site finishing and restoration. Economic impacts will persist beyond 40 years as a result of long-term commitments to site monitoring and maintenance. Positive statewide economic impacts tend to accrue in the vicinity of dredging activities (primarily Baltimore County), but also accrue in the vicinity of material placement and restoration activities (Dorchester County in the case of James or Barren Island restorations). However, about half of the positive economic impacts associated with spending on dredging and material placement in Maryland leak outside the state because of imported inputs and labor. The following section summarizes the economic impacts that can be expected in Dorchester County as a result of the restoration of James and Barren islands.

Dorchester County Economic Impacts

The James Island project will result in limited direct economic impacts associated with dredging and material transport in Dorchester County because these activities involve purchases of labor and inputs from elsewhere in the state and from out-of-state. However, some job creation and local business purchases are expected as a result of work crews being stationed at James Island during material placement activities, and activities conducted as part of habitat

restoration work and site management and monitoring. These economic impacts are summarized in Table 2-12.

The analysis shows that of the $1.1 billion in overall project spending over 43 years, a total of approximately $549 million will be spent in the vicinity of the island restoration/placement site on site construction, habitat development, and site management and monitoring. This spending excludes direct spending on dredging, transport, and placement, which takes place primarily elsewhere. A significant amount of the indirect and induced economic impacts of local spending will leak outside the region because of the need to import labor and material to the restoration site. However, direct spending on the project is expected to generate nearly 3,000 person-years of employment (FTEs) in Dorchester County over the life of the project. After multiplier effects are considered, the total number of Dorchester County jobs created by spending on the project, including new jobs for existing county residents or those who will relocate to Dorchester County, is estimated to be approximately 6,000 total person-years of employment (FTEs) in Dorchester County over the 43 year life of the project. These projections assume that the entire site construction, restoration and maintenance budget would be spent within the county. If spending is spread over a larger economic area, a portion of these jobs would shift to other counties within the area. Local multiplier effects of direct spending on the James Island project are expected to result in expected total changes in business sales (direct, indirect, and induced) of approximately $750 million over the life of the project.

The smaller-scale Barren Island restoration project does not include spending on dredging, transport and placement of dredged materials from Chesapeake Bay shipping channels. Therefore, much of the spending on this project may be local. A significant amount of the indirect and induced economic impacts of local spending will leak outside the region because of the need to import labor and material to the restoration site. However, direct spending on the project is expected to generate nearly 90 person-years of employment (FTEs) in Dorchester County over the life of the project (Table 2-13). After multiplier effects are considered, the total number of Dorchester County jobs created by spending on the project, including new jobs for existing county residents and people who will relocate to Dorchester County, is estimated to be nearly 300 total person-years of employment (FTEs) in Dorchester county over the 3 year life of the project, if the entire amount is spent within the county. If spending is spread over a larger economic area, a portion of these jobs would shift to other counties in the region. Local multiplier effects of direct spending on the Barren Island project are expected to generate total business sales (direct, indirect, and induced) of approximately $50 million over the 3 year life of the project.

Table 2-10. Summary of state economic impacts of James Island restoration

STATE-WIDE ECONOMIC IMPACTS

JAMES ISLAND RESTORATION
(over 40+ year site development)

	Planning, Engineering, and Design	Site Development	Dredging	Transport	Placement	Habitat Development	Site Management & Monitoring	Total[1]
I. Direct Impacts[2]								
Year of spending in category	43	4	30	30	30	20	41	NA
Total Spending[2]	$51,996,674	$307,351,699	$177,320,777	$251,828,802	$100,731,521	$81,426,571	$108,390,609	$1,079,046,653
Average Annual Spending[3]	$1,209,225	$76,837,925	$5,910,693	$8,394,293	$3,357,717	$4,071,329	$2,643,673	NA
Average Annual Direct Employment[4]	16	470.4	9.8	41.4	4.4	110.5	41	NA
Total Direct Person-years of Employment	688	1,882	294	1,242	132	2,210	1,681	8,129
II. Average Annual Economic Impacts[5]								
Impact Category								
Annual Jobs (FTEs)[6]	29	1,229	61	130	34	143	67	NA
Annual Labor Income	$1,158,421	$53,467,399	$3,658,416	$4,848,019	$2,075,470	$2,779,627	$2,059,038	NA
Annual Employee Compensation	$1,060,840	$46,551,920	$3,065,953	$4,316,985	$1,741,908	$2,388,109	$1,823,872	NA
Annual Proprietors Income	$97,581	$6,915,479	$592,463	$531,034	$333,562	$391,518	$235,166	NA
Annual Indirect Business Taxes	$70,251	$3,891,233	$321,259	$524,713	$182,491	$255,803	$151,190	NA
Annual Other Property Type Income	$204,256	$13,511,612	$851,186	$1,861,149	$483,542	$1,230,770	$570,207	NA
Annual Value Added	$1,432,928	$70,870,244	$4,830,861	$7,233,881	$2,741,503	$4,266,200	$2,780,435	NA
Annual Business Sales	$2,285,903	$139,134,556	$10,691,139	$16,180,508	$6,074,247	$6,769,795	$4,726,831	NA
III. Total Economic Impacts[7]								
Impact Category								
Person-years per spending category	1,264	4,916	1,842	3,909	1,011	2,862	2,727	18,531
Total Labor Income	$49,812,103	$213,869,596	$109,752,480	$145,440,570	$62,264,100	$55,592,540	$84,420,558	$721,151,947
Total Employee Compensation	$45,616,120	$186,207,680	$91,978,590	$129,509,550	$52,257,240	$47,762,180	$74,778,752	$628,110,112
Total Proprietors Income	$4,195,983	$27,661,916	$17,773,890	$15,931,020	$10,006,860	$7,830,360	$9,641,806	$93,041,835
Total Indirect Business Taxes	$3,020,793	$15,564,932	$9,637,770	$15,741,390	$5,474,730	$5,116,060	$6,198,790	$60,754,465
Total Other Property Type Income	$8,783,008	$54,046,448	$25,535,580	$55,834,470	$14,506,260	$24,615,400	$23,378,487	$206,699,653
Total Value Added	$61,615,904	$283,480,976	$144,925,830	$217,016,430	$82,245,090	$85,324,000	$113,997,835	$988,606,065
Total Business Sales	$98,293,829	$556,538,224	$320,734,170	$485,415,240	$182,227,410	$135,395,900	$193,800,071	$1,972,404,844

[1] Where "NA" appears in the Total column, a simple sum of the row could not be calculated because each average annual value in the row is based upon a different number of years of spending

[2] Direct spending by task over the 40+ year project life was estimated by the US Army Corps of Engineers

[3] Average annual cost per task calculated by dividing total spending in category by number of years of spending in category

[4] Direct employment per task was estimated by UMCES using phone interviews and IMPLAN regional economic modeling results

[5] Average annual economic impacts during each phase
Includes direct, indirect and induced economic impacts of both state and federal spending in Maryland
Direct, indirect and induced impacts of spending were estimated using the IMPLAN regional economic modeling system

[6] These numbers represent the average annual number of full-time equivalent (FTE) jobs in each task for each year of spending in that category. The jobs associated with some tasks will be primarily in early years and the jobs associated with some tasks will be in later years. (See text)

[7] These numbers represent the total impacts over the life of the project, calculated by multiplying the average annual jobs or spending in each category by the number of years of spending in the category. The "Total" column reflects total spending over the life of the project.

Table 2-11. Summary of state economic impacts of Barren Island restoration

STATE-WIDE ECONOMIC IMPACTS

BARREN ISLAND RESTORATION
(over 3 year site development)

	Planning, Engineering, and Design	Site Development	Habitat Development	Site Management & Monitoring	Total[1]
I. Direct Impacts[2]					
Year of spending in category	3	2	1	2	NA
Total Spending[2]	$531,300	$29,508,926	$5,157,251	$1,048,344	$36,245,821
Average Annual Spending[3]	$177,100	$14,754,463	$5,157,251	$524,172	NA
Average Annual Direct Employment[4]	2.3	90.3	139.9	8.1	NA
Total Direct Person-years of Employment	7	181	140	16	344
II. Average Annual Economic Impacts[5]					
Impact Category					
Annual Jobs (FTEs)[6]	4	236	183	13	NA
Annual Labor Income	$169,659	$10,266,840	$3,521,021	$408,254	NA
Annual Employee Compensation	$155,368	$8,938,926	$3,025,076	$361,627	NA
Annual Proprietors Income	$14,291	$1,327,914	$495,945	$46,627	NA
Annual Indirect Business Taxes	$10,289	$747,197	$324,032	$29,977	NA
Annual Other Property Type Income	$29,915	$2,594,507	$1,559,046	$113,057	NA
Annual Value Added	$209,863	$13,608,544	$5,404,099	$551,288	NA
Annual Business Sales	$334,788	$26,716,697	$8,575,463	$937,209	NA
III. Total Economic Impacts[7]					
Impact Category					
Person-years per spending category	13	472	183	26	694
Total Labor Income	$508,977	$20,533,680	$3,521,021	$816,508	$25,380,186
Total Employee Compensation	$466,104	$17,877,852	$3,025,076	$723,254	$22,092,286
Total Proprietors Income	$42,873	$2,655,828	$495,945	$93,254	$3,287,900
Total Indirect Business Taxes	$30,867	$1,494,394	$324,032	$59,954	$1,909,247
Total Other Property Type Income	$89,745	$5,189,014	$1,559,046	$226,114	$7,063,919
Total Value Added	$629,589	$27,217,088	$5,404,099	$1,102,576	$34,353,352
Total Business Sales	$1,004,364	$53,433,394	$8,575,463	$1,874,418	$64,887,639

[1] Where "NA" appears in the Total column, a simple sum of the row could not be calculated because each average annual value in the row is based upon a different number of years of spending

[2] Direct spending by task over the 3 year project life was estimated by the US Army Corps of Engineers

[3] Average annual cost per task calculated by dividing total spending in category by number of years of spending in category

[4] Direct employment per task was estimated by UMCES using phone interviews and IMPLAN regional economic modeling results

[5] Average annual economic impacts during each phase and overall
Includes direct, indirect and induced economic impacts of both state and federal spending in Maryland
Direct, indirect and induced impacts of spending were estimated using the IMPLAN regional economic modeling system

[6] These numbers represent the average annual number of full-time equivalent (FTE) jobs in each task for each year of spending in that category. The jobs associated with some tasks will be primarily in early years and the jobs associated with some tasks will be in later

[7] These numbers represent the average annual jobs or spending in each category multiplied by the number of years of spending in the category. The "Total" column reflects total spending over the life of the project.

Table 2-12. Summary of local economic impacts of James Island restoration

LOCAL (DORCHESTER COUNTY) ECONOMIC IMPACTS

JAMES ISLAND RESTORATION
(over 40+ year site development)

	Planning, Engineering, and Design	Site Development	Habitat Development	Site Management & Monitoring	Total[1]
I. Direct Impacts[2]					
Year of spending in category	43	4	20	41	NA
Total Spending[2]	$51,996,674	$307,351,699	$81,426,571	$108,390,609	$549,165,553
Average Annual Spending[3]	$1,209,225	$76,837,925	$4,071,329	$2,643,673	NA
Average Annual Direct Employment[4]	8.9	128.3	13.3	44.0	NA
Total Direct Person-years of Employment	383	513	266	1,804	2,966

II. Average Annual Economic Impacts[5]					
Impact Category					
Annual Jobs (FTEs)[6]	15	553	38	59	NA
Annual Labor Income	$497,833	$21,866,143	$1,200,066	$1,323,022	NA
Annual Employee Compensation	$359,119	$14,716,632	$1,010,449	$1,093,782	NA
Annual Proprietors Income	$138,714	$7,149,511	$189,617	$229,240	NA
Annual Indirect Business Taxes	$29,073	$2,051,238	$100,129	$95,129	NA
Annual Other Property Type Income	$278,738	$7,795,198	$448,308	$459,321	NA
Annual Value Added	$805,644	$31,712,579	$1,748,503	$1,877,472	NA
Annual Business Sales	$1,707,124	$104,478,145	$5,878,827	$3,602,449	NA

III. Total Economic Impacts[7]					
Impact Category					
Person-years per spending category	645	2,210	764	2,419	6,038
Total Labor Income	$21,406,819	$87,464,572	$24,001,320	$54,243,902	$187,116,613
Total Employee Compensation	$15,442,117	$58,866,528	$20,208,980	$44,845,062	$139,362,687
Total Proprietors Income	$5,964,702	$28,598,044	$3,792,340	$9,398,840	$47,753,926
Total Indirect Business Taxes	$1,250,139	$8,204,952	$2,002,580	$3,900,289	$15,357,960
Total Other Property Type Income	$11,985,734	$31,180,792	$8,966,160	$18,832,161	$70,964,847
Total Value Added	$34,642,692	$126,850,316	$34,970,060	$76,976,352	$273,439,420
Total Business Sales	$73,406,332	$417,912,580	$117,576,540	$147,700,409	$756,595,861

[1] Where "NA" appears in the Total column, a simple sum of the row could not be calculated because each average annual value in the row is based upon a different number of years of spending

[2] Direct spending by task over the 3 year project life was estimated by the US Army Corps of Engineers

[3] Average annual cost per task calculated by dividing total spending in category by number of years of spending in category

[4] Direct employment per task was estimated by UMCES using phone interviews and IMPLAN regional economic modeling results

[5] Average annual economic impacts during each phase and overall
Includes direct, indirect and induced economic impacts of both state and federal spending in Maryland
Direct, indirect and induced impacts of spending were estimated using the IMPLAN regional economic modeling system

[6] These numbers represent the average annual number of full-time equivalent (FTE) jobs in each task for each year of spending in that category. The jobs associated with some tasks will be primarily in early years and the jobs associated with some tasks will be in later years. (See text)

[7] These numbers represent the average annual jobs or spending in each category multiplied by the number of years of spending in the category. The "Total" column reflects total spending over the life of the project.

Table 2-13. Summary of local economic impacts of Barren Island restoration

LOCAL (DORCHESTER COUNTY) ECONOMIC IMPACTS

BARREN ISLAND RESTORATION
(over 3 year site development)

	Planning, Engineering, and Design	Site Development	Habitat Development	Site Management & Monitoring	Total[1]
I. Direct Impacts[2]					
Year of spending in category	3	2	1	2	NA
Total Spending[2]	$531,300	$29,508,926	$5,157,251	$1,048,344	$36,245,821
Average Annual Spending[3]	$177,100	$14,754,463	$5,157,251	$524,172	NA
Average Annual Direct Employment[4]	1.3	24.6	16.8	8.7	NA
Total Direct Person-years of Employment	4	49	17	17	87
II. Average Annual Economic Impacts[5]					
Impact Category					
Annual Jobs (FTEs)[6]	2	106	48	12	NA
Annual Labor Income	$72,912	$4,198,749	$1,520,153	$262,321	NA
Annual Employee Compensation	$52,596	$2,825,896	$1,279,960	$216,869	NA
Annual Proprietors Income	$20,316	$1,372,853	$240,193	$45,452	NA
Annual Indirect Business Taxes	$4,258	$393,880	$126,835	$18,862	NA
Annual Other Property Type Income	$40,823	$1,496,838	$567,883	$91,072	NA
Annual Value Added	$117,993	$6,089,467	$2,214,871	$372,255	NA
Annual Business Sales	$250,021	$20,061,953	$7,446,853	$714,273	NA
III. Total Economic Impacts[7]					
Impact Category					
Person-years per spending category	7	212	48	23	291
Annual Labor Income	$218,736	$8,397,498	$1,520,153	$524,642	$10,661,029
Annual Employee Compensation	$157,788	$5,651,792	$1,279,960	$433,738	$7,523,278
Annual Proprietors Income	$60,948	$2,745,706	$240,193	$90,904	$3,137,751
Annual Indirect Business Taxes	$12,774	$787,760	$126,835	$37,724	$965,093
Annual Other Property Type Income	$122,469	$2,993,676	$567,883	$182,144	$3,866,172
Annual Value Added	$353,979	$12,178,934	$2,214,871	$744,510	$15,492,294
Annual Business Sales	$750,063	$40,123,906	$7,446,853	$1,428,546	$49,749,368

[1] Where "NA" appears in the Total column, a simple sum of the row could not be calculated because each average annual value in the row is based upon a different number of years of spending

[2] Direct spending by task over the 3 year project life was estimated by the US Army Corps of Engineers

[3] Average annual cost per task calculated by dividing total spending in category by number of years of spending in category

[4] Direct employment per task was estimated by UMCES using phone interviews and IMPLAN regional economic modeling results

[5] Average annual economic impacts during each phase and overall
Includes direct, indirect and induced economic impacts of both state and federal spending in Maryland
Direct, indirect and induced impacts of spending were estimated using the IMPLAN regional economic modeling system

[6] These numbers represent the average annual number of full-time equivalent (FTE) jobs in each task for each year of spending in that category. The jobs associated with some tasks will be primarily in early years and the jobs associated with some tasks will be in later years. (See text)

[7] These numbers represent the average annual jobs or spending in each category multiplied by the number of years of spending in the category. The "Total" column reflects total spending over the life of the project.

2.2.4 Environmental Justice

2.2.4.1 Definition

The EPA Office of Environmental Justice defines environmental justice as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies." Fair treatment means that no group of people including a racial, ethnic, or socio-economic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies (U.S. EPA 1996). Additionally, Maryland's definition, which builds on EPA's definition, specifically notes that all citizens of the State should expect (1) to be protected from public health hazards and (2) to have access to the socio-economic resources necessary to address concerns about their livelihood and health. (Commission on Environmental Justice & Sustainable Communities**,** *Annual Report 2002*).

2.2.4.2 Analysis

Environmental justice concerns arise only if a project is expected to generate negative environmental or economic consequences. Results of the air quality and water quality analyses suggest that sediments placed at this site will be free of contaminants and will not generate health risks to people within the area. The economic effects of the project are expected to be largely positive, so negative economic impacts are not a concern. However, temporary noise and light effects, visual impacts and recreational boater disruptions during the construction period could potentially be seen as undesirable impacts. For this reason, the presence of any vulnerable racial, ethnic, or socio-economic group in the vicinity of the projects was reviewed.

The demographics of the area around the project were evaluated using county subdivision data from the 2000 US Census. Variables on race and household income were assessed to determine whether areas near the projects contained a disproportionate share of any vulnerable group. Vulnerable groups were defined as:

- African-Americans
- Hispanics (non-white)
- All minorities (all non-white)
- Households below the federal poverty level

In addition, we evaluated whether the median household and per capita income levels were below the county or state level to further inform the evaluation of socio-economic groups.

For the county subdivisions around James and Barren islands, the only area potentially containing any vulnerable group was Taylors Island (see Figure 1-4). This subdivision contained a high proportion (20%) of persons living below the federal poverty level and an above average proportion (6.6%) received Supplemental Security Income (Table 2-14). On the other hand, the Neck subdivision, the closest area to the northeast of the project, was a fairly prosperous area of the county judging by the relatively high income levels and the low poverty level relative to both the county and the state (Table 2-14). Since the two subdivisions closest to the project cover a range of socio-economic groups, no particular group is being targeted by this project.

Table 2-14. Demographic statistics for area near James Island. Source: US Census 2000

	Taylors Island	Neck	Dorchester County	Maryland
Total Population	270	934	30,674	5,296,486
% White, not of Hispanic/Latino origin	87.8%	96.9%	69.4%	62.1%
% Black or African American, not of Hispanic/Latino origin	10.4%	1.9%	28.4%	27.9%
% Persons of Hispanic or Latino origin	0.0%	0.4%	1.3%	4.3%
Median household income	$23,750	$49,250	$34,077	$52,868
Per capita income	$36,290	$25,691	$18,929	$25,614
% Households With Supplemental Security Income (SSI)	6.6%	3.4%	4.7%	3.4%
% Persons with income below poverty level	20.1%	5.5%	13.8%	8.5%

Near Barren Island, the Hooper Island subdivision had a low median household income relative to the county and state, but no other statistics suggested high poverty levels in this area (Table 2-15). None of the county subdivisions contained a high proportion of minorities.

Table 2-15. Demographic statistics for area near Barren Island. Source: US Census 2000

	Hooper Island	Dorchester County	Maryland
Total Population	587	30,674	5,296,486
% White, not of Hispanic/Latino origin	98.3%	69.4%	62.1%
% Black or African American, not of Hispanic/Latino origin	0.5%	28.4%	27.9%
% Persons of Hispanic or Latino origin	2.6%	1.3%	4.3%
Median household income	$26,793	$34,077	$52,868
Per capita income	$24,656	$18,929	$25,614
% Households With Supplemental Security Income (SSI)	3.0%	4.7%	3.4%
% Persons with income below poverty level	4.6%	13.8%	8.5%

2.2.5 Safety to Children

2.2.5.1 Definition

"A growing body of scientific knowledge demonstrates that children may suffer disproportionately from environmental health risks and safety risks… Therefore, …each Federal agency: (a) shall make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children; and (b) shall ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks." (Executive Order 13045, April 21, 1997).

2.2.5.2 Analysis

No health or safety risks to children associated with the project have been identified. The types of activities associated with island restoration at James Island and island protection at Barren Island will not generate chemical constituents that may pose health risks to children. Additionally, as this project is located offshore, safety to children will not be an issue because children will not have access.

2.3 Aesthetic and Recreational Resources

2.3.1 Aesthetics

2.3.1.1 Methods of Visual Impact Assessment

The approach for this visual assessment is an adaptation of the Visual Resources Assessment Procedure (VRAP) developed for the US Army Corps of Engineers (Smardon et al. 1988) and the Forest Service Scenery Management System (USDA Forest Service 1995). Both procedures are intended to be used as general guidelines rather than rigid processes to inform analysis of visual effects of projects.

Evaluating project-related potential aesthetic impacts to a region begins with an inventory of the visual features of the landscape to establish a baseline of the region's visual character. This process includes assessing the quality of visual resources relative to the regional characteristics and identifying the area from which the project can be seen and the viewers affected. With this baseline, a proposed project can be systematically evaluated for its level of impact. The level of impact depends on the magnitude of change in the visual resource and the concern of viewers for those changes.

The steps followed for this analysis were:

1. Assess existing landscape character and visual resources
2. Assess scenic attractiveness of project location
3. Assess project visibility and visual sensitivity of observers
4. Simulate landscape with and without project
5. Evaluate change in view characteristics with project
6. Describe overall impact of project on visual resources

Visual resources were described by considering the following characteristics described by Smardon et al. 1988 (VRAP):

1. Landform
2. Water Resources
3. Land use and use intensity
4. Vegetation distribution

Landform is typically described in terms of elevation, range of elevation and distinct land elements such as mountains, rivers or streams. Water resources are described in terms of the proportion of a landscape in water and how water elements are incorporated in views. Land use and use intensity includes a description of land cover types, particularly how much of the land is developed vs. in a natural state, the density of development, types of buildings and other cultural features. Vegetation distribution is a description of the proportion of land in different types of vegetation and the pattern and fragmentation of elements. These characteristics combine to describe the regional character and the sensitivity of the existing landscape to change.

Elements of the landscape that contribute to quality of views can be described through a variety of variables (Table 2-16). People's preferences can vary greatly, but some elements are fairly common to visual appeal (Smardon 1983, Zube et al. 1975). Diversity of land uses, elevations, heights of dominant elements and patch sizes within views generally contribute to scenic attractiveness. Particular value is placed by viewers on water views and long views in

most contexts. The amount of natural land overall, is strongly correlated with increased public preferences, although the amount of natural land vs. agricultural or developed land seen as desirable varies by dominant land use and characteristics of the natural area (Hunziker and Kienast 1999).

Table 2-16. Landscape characteristics contributing to aesthetic quality. Adapted from Craik 1975

Landform
Range of vertical elevation
Drainage density
Mean slope
Land use
Land use diversity
Percent tree cover
Proportion of natural land use
Edges
Land use edge density
Variety across edges
Land use compatibility across edges
Contrast
Height contrast between dominant elements
Proportion of elements in height classes
Grain contrast/evenness: difference in land use patch sizes and their distribution
Water
Water edge density
Percentage area water
View
Area of view
Length of view
Relative vertical position of the viewer to the view

Scenic attractiveness and impact on attractiveness may be assessed using measures of view characteristics and results of visual preference research. However, the final test of impact of a project is the public perception of any change in visual quality, which is subjective and may be specific to the population being affected. Public opinion on attractiveness may be judged by determining whether areas are designated scenic areas or by conducting surveys. Since surveys were not conducted for this EIS, we have combined scenic designations with recognized preferences to evaluate scenic quality.

To evaluate impacts on visual resources, the measure of change in quality of a view was combined with the visibility of the project and the sensitivity of viewers to changes. Visibility of the project was assessed through a combination of GIS analysis and field reconnaissance. GIS viewshed analysis was used to delineate areas in Dorchester County that had views of the existing islands and proposed projects. Then surveys were conducted by boat and by car to assess which of the identified houses, commercial areas and road segments had views of the existing islands and adjacent waters.

Viewer sensitivity or level of concern was measured by considering the visibility of the project, the proximity of viewers, the number of viewers, the duration of views and the type of the viewer and associated expectations (e.g., recreationist, commuter, resident). Distance zones were used to describe the relative importance of changes to the viewer. Specifically, the view was divided into foreground (up to ½ mile from viewer), middleground (up to 4 miles from the foreground) and background (4 miles from viewer to the horizon) (USDA FS). Because changes that occur farther from the viewer are less apparent, changes were given less weight with increasing distance zone.

Views of the landscape with and without the project were simulated using GIS analysis. Both map views and 3-D visualizations of the viewer perspective of the projects were investigated. The with-project conditions were simulated using elevation, land cover and land use maps. The most recent conceptual diagram of the island footprint was used to evaluate with-project conditions, but it is likely that the final footprint will be different from the one evaluated. Specific layout of upland and wetland areas will affect the visual perceptions of the island, but were not available at this stage of analysis.

The effect of a change in view was evaluated using the visual impact modifiers of *spatial dominance*, *scale contrast* and *compatibility*, as defined in the VRAP (Table 2-17). To provide input into this assessment, the GIS analysis was used to calculate the change in appropriate landscape characteristics from Table 2-16. Several viewpoints were used to assess quantitative changes in the views. Locations of roads, homes, commercial property, sightseeing areas and public lands were all evaluated for applicable viewer locations. Finally, these quantitative measures were used in a qualitative assessment of the impact of the project relative to existing visual resources.

Table 2-17. Rating system used to assess visual impact. From Smardon et al. 1988

Modifier	Definition	Rating
Spatial dominance	The prevalent occupation of a space in a landscape by an object(s) or landscape element. Spatial dominance can be described in terms of being Dominant, Co-dominant, or Subordinate.	Dominant – the modification is the major object or area in a confined setting and occupies a large part of the setting. Co-dominant – the modification is one of the major objects or areas in a confined setting, and its features are of equal visual importance. Subordinate – the modification is insignificant and occupies a minor part of the setting.
Scale contrast	The difference in absolute or relative scale in relation to other distance objects or areas in the landscape. Scale contrast can be described in terms of being Severe, Moderate, or Minimal.	Severe – the modification is much larger than the surrounding objects. Moderate – the modification is slightly larger than the surrounding objects. Minimal – the modification is much smaller than the surrounding objects.
Compatibility	The degree to which landscape elements and characteristics are still unified within their setting. Compatibility can be described in terms of being Compatible, Somewhat Compatible, or Not Compatible.	Compatible – the modification is harmonious within the setting. Somewhat Compatible – the modification is more or less harmonious within the setting. Not Compatible – the modification is not harmonious within the setting.

2.3.1.2 Analysis

Regional Landscape

The general character of the region's visual resources was discussed under the existing conditions section. Some important aspects of the landscape for evaluating visual impacts are the characteristically long views enjoyed by observers on the water or shoreline, the low and relatively flat elevation of the region, and the lack of public access points to the waterfront (Figures 1-1-1 and 1-2). Due to these characteristic features, the islands in this region are highly visible for viewers on or near the water, but, because of the flat terrain, are not generally visible from inland areas. Little of the shoreline in this region is publicly owned or accessible and therefore, visual effects on the shoreline primarily affect a relatively small number of residents and the local water users.

Existing Aesthetic Quality

The aesthetic quality of the Barren Island region is easily characterized since Dorchester County tourism materials promote Hooper Island as a picturesque town and Route 335, which runs along the island, is designated as a State Scenic Road. James Island is not in view of any scenic roads, but the waterway is clearly an important visual resource for the region. The mid-Bay islands are part of a rich history of the region (e.g., Horton 1994) and add to land use diversity of views from the mainland and along the Bay mainstem.

Affected Area and Viewers

For purposes of the visual aesthetic analysis, the affected area includes 1) land areas where residents and transient visitors would be able to view the proposed island and 2) waterways where boaters would be able to view the proposed island. Residential areas will have extended periods of viewing and are therefore considered to have among the highest visual sensitivity. Views from scenic roads, businesses catering to tourists (e.g., restaurants with water views), and natural recreational areas (including water areas) are also considered to have high visual sensitivity. Other business areas and commuters or non-recreational travelers on roads, are not thought to focus on views and therefore have low visual sensitivity.

The affected land area for James Island includes primarily residential and agricultural areas along the Little Choptank River and Bay mainstem (Figures 2-3, 2-4, and 2-5). For Barren Island, the affected land areas are residences, commercial areas and roads on Upper Hooper Island (Figures 2-6, 2-7, and 2-8). The types of non-residential areas with views of the island include boat launches (Figure 2-9), churches, and a waterfront restaurant. Transient views of the islands may be seen from secondary roads where the roads are close to the shoreline.

Water users can be considered to operate anywhere in the vicinity of either project, but the greatest number of boats with views of the islands will be passing through the area along the Bay mainstem channel and channels leading to the Choptank River. Transient boaters would have lower visual sensitivity than boaters using the waters around the island. All boaters using the areas near James Island would have a clear view of the restored island. Boaters near Barren Island will be able to see the existing island, but will only see the new proposed breakwater from the western and southern sides of the island. Visual effects are likely to be noticeable only by those within a half mile of the island (i.e., those with foreground views).

Near James Island, 79 land parcels are likely to have a view of the project. Of these, 20 are agricultural (12 are improved), 1 is tax-exempt (owned by The Nature Conservancy), and the remaining 58 are residential parcels, although only 31 of those parcels currently contain houses or other structures indicating regular use. The Nature Conservancy (TNC) parcel, located at the northwest tip of Taylors Island, was previously the O'Donnell Island preserve, but the island is completely under water and the parcel is no longer managed as a preserve. The level of aesthetic impact that parcel should be minimal because the proposed footprint is north of the parcel and will not occupy a significant portion of the view.

Near Barren Island, 155 parcels will likely have a view of the island, and depending on final configuration of the protection project, a few parcels may have a view of the breakwater that extends south of the existing remnants. Of these parcels, most are residential but 2 are agricultural (1 is improved), 2 are commercial (1 store, 1 restaurant), 2 are exempt commercial (fire department and post office), 2 are tax-exempt (churches), 4 are marshland (all unimproved). The remaining 141 parcels are residential, 118 of which contain houses or other structures.

GIS Analysis of James Island

The variables that best captured the changes in views in this waterfront environment were measures of change in the proportion of long views and change in the proportion of view that was water. Views were assessed for several points in the landscape to represent concentrations

of viewers. Since no public areas had views of the project, points were selected to represent distinct residential areas (Figure 2-10).

In the GIS analysis of James Island, three areas were evaluated for changes in the foreground, middleground, and background views (see Figure 2-10). A variety of landscape features were compared for the adjacent shoreline and the proposed island and we present the variables that were quantified to judge spatial dominance of the project. Other variables examined in the GIS are considered in the following summary of impacts.

The total field of view from a particular point was first characterized for each distance zone by measuring the total angle of the field of view that reached the specified distance. For example, the total view for the middleground represents the angle of the view in which an observer can see at least ½ mile. Next, the change in the proportion of the field of view that was land or water was measured for each distance zone. Using three different distances allows the effect of changes in length of view and proportion of view that is water to be characterized.

The proposed project does not fall in the foreground of any viewpoint. Therefore, foreground views were not affected by the project.

For the middleground (½ – 4 miles), the view was assessed in terms of the angles of total view, land view, and water view with and without the project (Figures 2-11 and 2-12). The percentage change in the proportion of middleground view (at 4 miles) that is land or water with the project is shown in Table 2-18. The analysis shows that from viewer locations 1 and 3, 26% and 21% of middleground views that were water without the project became land views with the project. In addition, the proportion of the middleground view that consisted of land increased 30% and 113%. At viewer location 2, on the north side of the Little Choptank River, homes were far enough away that their middleground views were not affected.

Table 2-18. Changes to middleground views associated with project (½ to 4 miles)

	Viewpoint 1	**Viewpoint 2**	**Viewpoint 3**
Total Middleground View (width of view in degrees)	156°	172°	122°
% change in water view with project	-26%	0%	-21%
% change in land view with project	30%	0%	113%

To calculate impacts on background views, we measured total angle of background view and proportion of background view occupied by the proposed project. To make the latter measurement, we measured the total angle of the project and subtracted the angle occupied by existing James Island (Figure 2-13). Additionally, to document the potential change in long water views, we measured the with-project change in water views greater than 6 miles (Figure 2-14; Table 2-19). The results show that for the longest views from the viewer locations, between 30% and 62% of long views over water are lost with the project. From all locations, the project occupies about ¼ of the long views.

Table 2-19. Changes to background views associated with project (4+ miles)

	Viewpoint 1	Viewpoint 2	Viewpoint 3
Total Background View	82°	64°	102°
Background view occupied by project	26%	25%	21%
Change in waterview > 6 miles	-62%	-34%	-30%

2.3.1.3 Overall Impacts – James Island

Spatial Dominance

From the results of the quantitative GIS analysis, it is evident that the James Island restoration project has the potential to be a significant element in the landscape for sensitive viewpoints (e.g., nearby residential areas, waterfront businesses, fishing areas), but for the majority of viewers who will see the island as part of a background view, it is anticipated that the island will blend into the existing landscape when completed. The perceived level of dominance in the landscape will depend on the final acreage of the footprint, and the observer's sight line and distance to the project.

The new island will be a prevalent feature in the landscape when seen from residences on the adjacent shoreline or when viewed by boaters in the adjacent waters. From about 20 homes, the middleground views will be significantly changed by the project, yet no homes will have the island in their foreground views. When viewed from the water, the island is particularly visible to boaters since it sits at the mouth of the Little Choptank River, perpendicular to river flow. The island will be visible for miles upriver and out into the Bay mainstem as part of the background view for most observers. Fishers using recreational fishing grounds near James will see the island as a dominant feature of the foreground and middleground view.

Scale Contrast

The scale contrast of the restored island will be moderate for the previously described set of sensitive viewers (primarily nearby residents and local water users) since the island is much larger than the existing James Island remnant. However, the scale of the existing and proposed project is consistent with other islands along the eastern shore and is designed to be close to the size of the historical footprint. Therefore, viewers seeing the island as part of a background view will not perceive a significant scale contrast. When vegetation on the restored island is mature, the height of the restored island will be 5-10 feet higher than the highest features of the adjacent mainland shoreline and the stone-faced dikes will be a more prominent feature above the waterline than the existing shoreline in the foreground and middleground views.

Compatibility

In the long term, the modification is generally harmonious within the setting to the extent that it is a restoration of the island to the scale of its historical footprint. However, in the short term, the bare ground that will be apparent until vegetation gets established will contrast with the adjacent vegetated shoreline. In addition, the shoreline of the island is more regular than the natural shoreline and thus will contrast with existing shoreline even after vegetation has established. The degree of this incompatibility cannot be determined until the final island configuration is designed. The presence of low dikes and breached dikes associated with wetland cells has the potential to minimize this contrasting effect from some views.

2.3.1.4 Overall Impacts – Barren Island

The breakwater at Barren is an extension of an existing breakwater and a significant portion of the breakwater is out of view of the residences on the adjacent shoreline. For these reasons, the breakwater itself is expected to have minimal aesthetic impacts. Boaters using areas close to the site may notice some level of incompatibility between the natural shoreline and the breakwater.

Any adverse impacts of the breakwater would be expected to be offset by the aesthetic enhancements of preserving the existing island. Barren Island introduces an element of natural land cover to views of the region that are otherwise dominated by residential and commercial uses. By preventing erosion of the island, the project improves many measures of the quality of the view (Table 2-16) including land use diversity, percent of tree cover, proportion of natural land use in view, and range of vertical elevation.

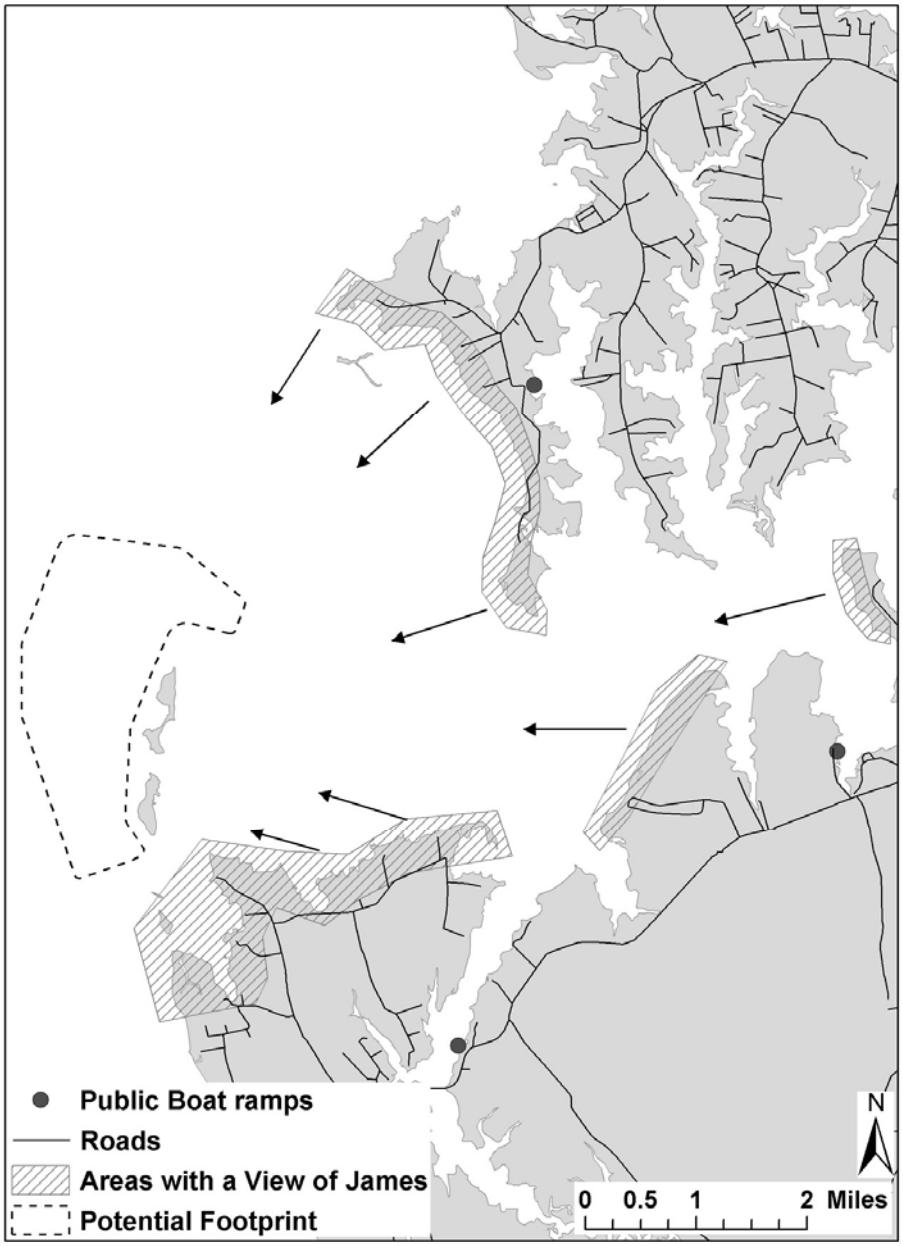

Figure 2-3. Area of potential visual impacts near James Island. Boat ramp source: Maryland DNR.

Figure 2-4. Characteristic shoreline area near James Island

Figure 2-5. Shoreline area near James Island

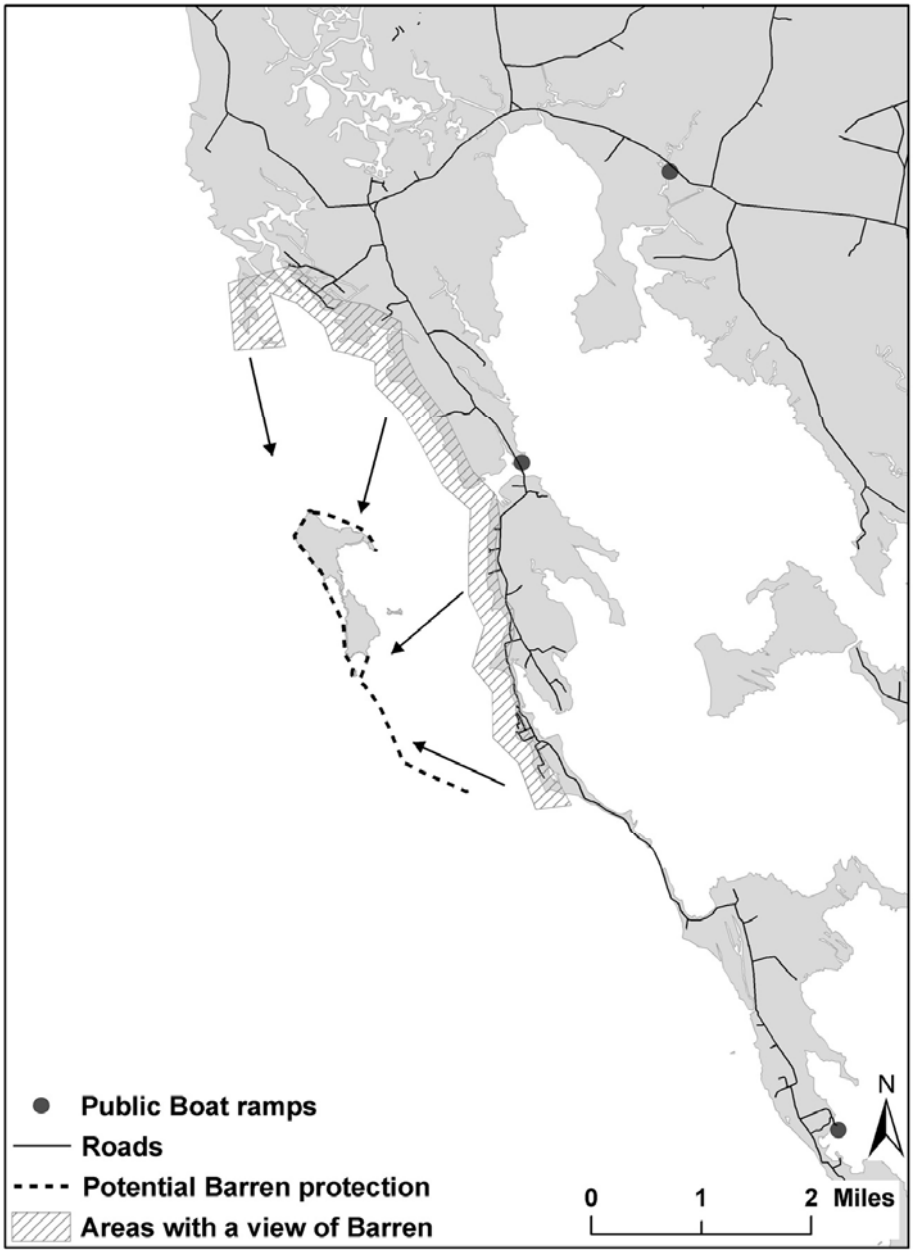

Figure 2-6. Area of potential visual impacts near Barren Island. Boat ramp data source: Maryland DNR.

Figure 2-7. Shoreline area east of Barren Island.

Figure 2-8. Characteristic shoreline area near Barren Island.

Figure 2-9. View of Barren Island from boat launch on Fishing Creek.

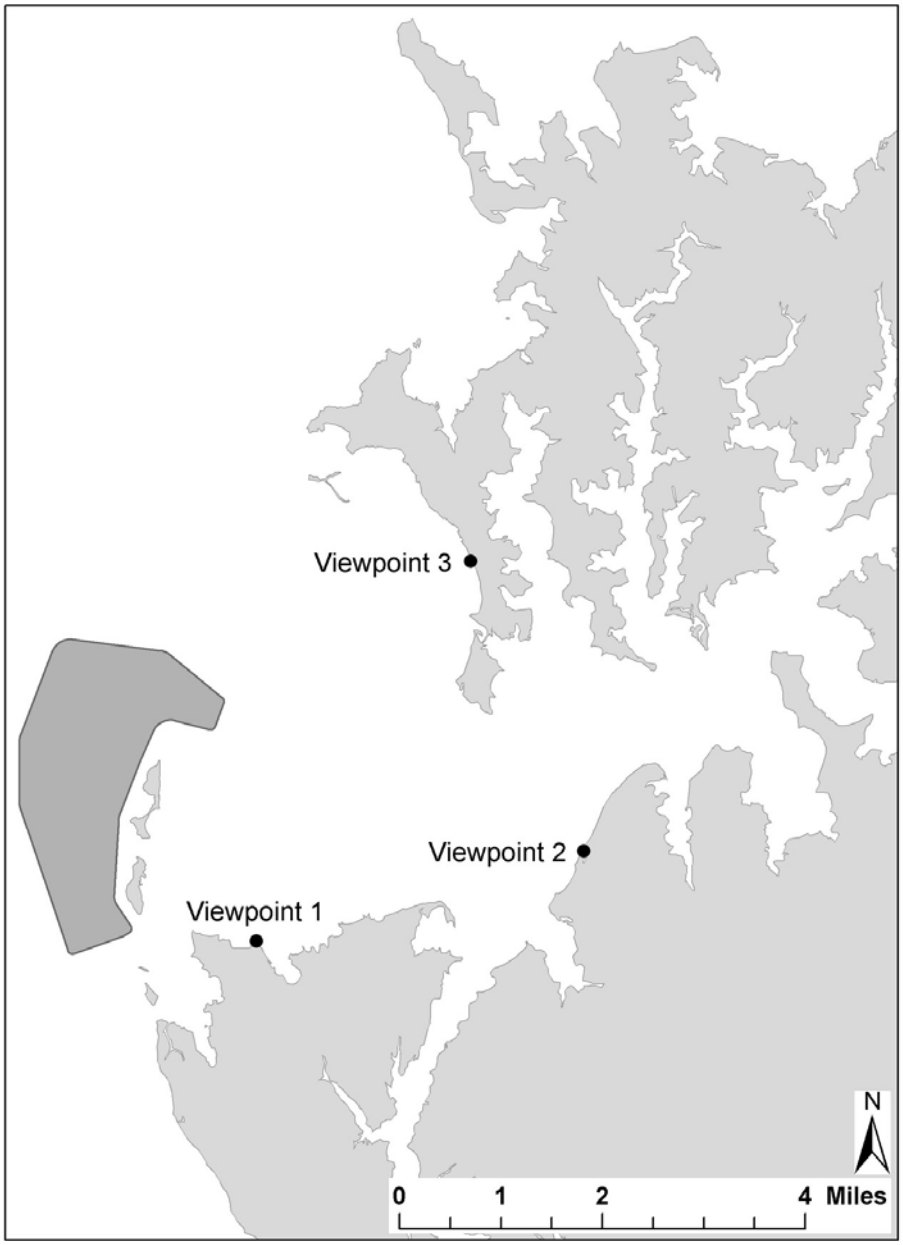

Figure 2-10. Viewpoints used for aesthetic analysis.

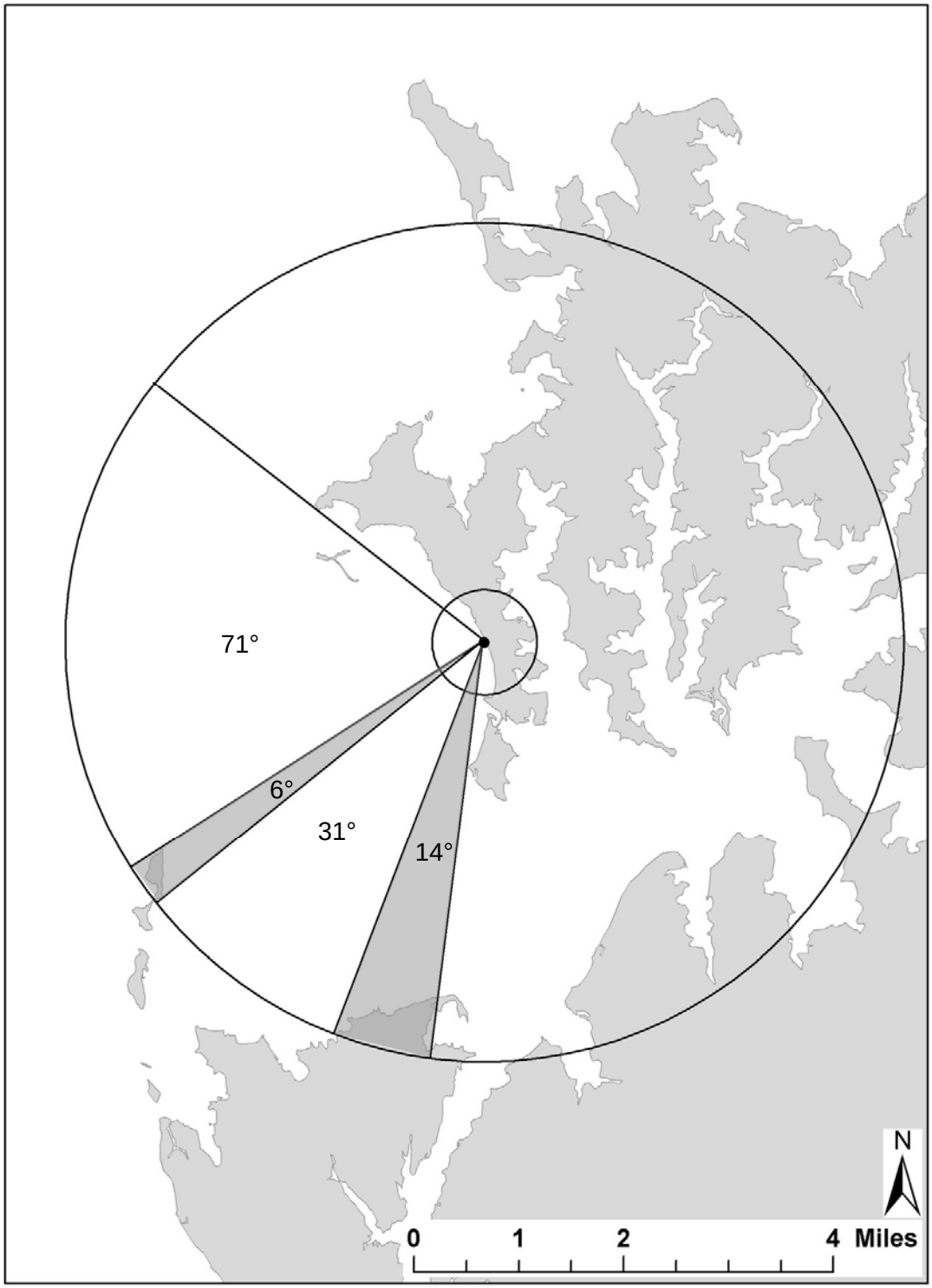

Figure 2-11. Existing middleground views. The area between the circles represents the middleground. The smaller circle has a ½ mile radius and represents the foreground. Total middleground view at Viewpoint 3 is 122° (71° + 6° + 31° + 14°). Total water view in the middleground is 102° (71° + 31°). The total land view (shaded) is 20° (6° + 14°).

Figure 2-12. Middleground view with project. The total middleground view remains 122° with project (50° + 21° + 6° + 31° + 14°). The project occupies 21° of the view (hatched area). Total water view is now 81° (50° + 31°). This represents a -21% change from without project conditions.

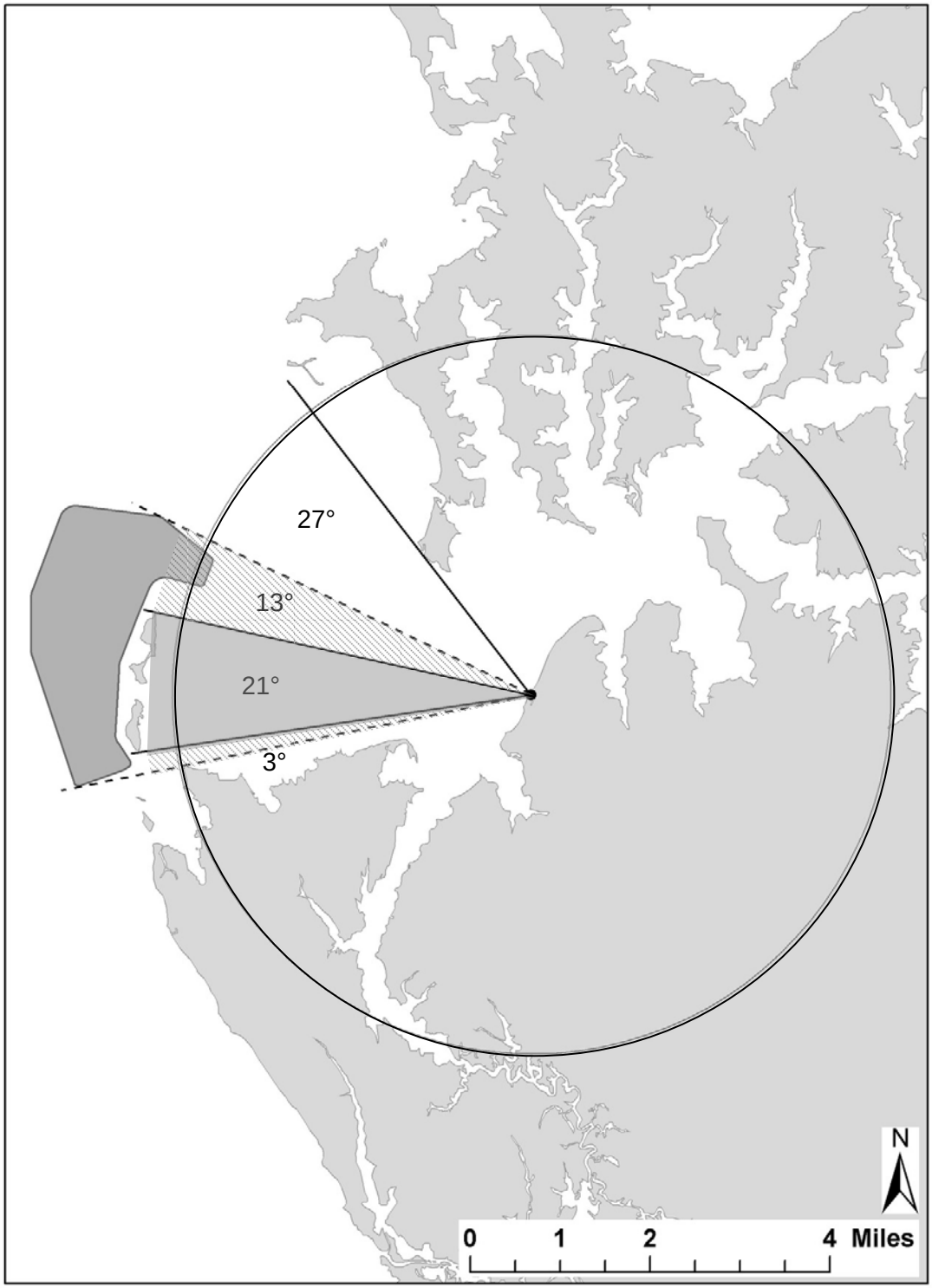

Figure 2-13. Background view. The area outside the circle represents background view (greater than 4 miles). The total background view at Viewpoint 3 is 64° (27° + 13° + 21° + 3°). Although the total angle of the project is 37°, the change associated with the proposed project is 16° (25% of total view) since existing James Island occupies 21°.

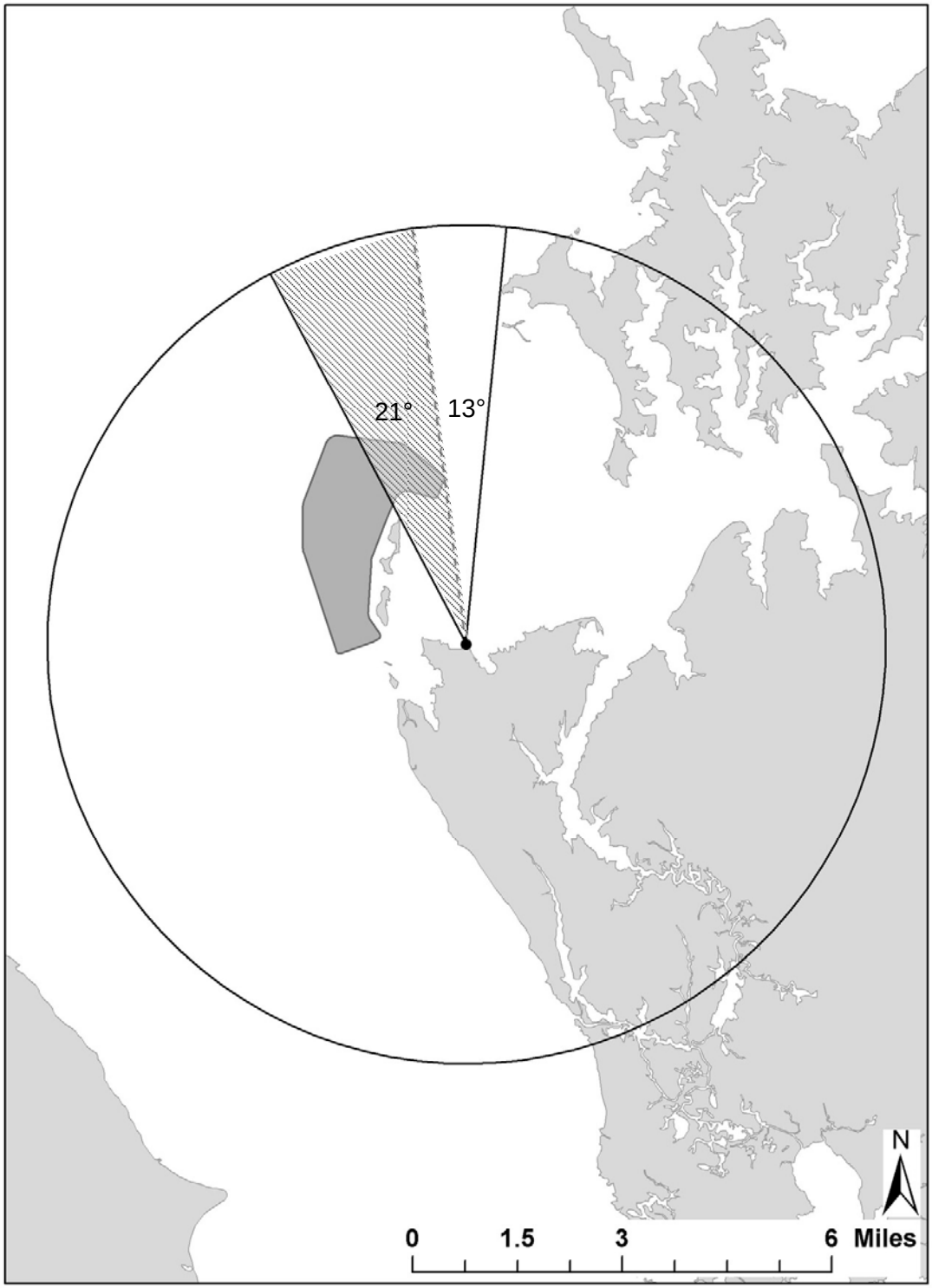

Figure 2-14. Long water views. The area outside the circle represents long views (>6 miles). The total without-project long-view at Viewpoint 1 is 34° (21° + 13°). The long-view occupied by the project is 21°, or 62%.

2.3.2 Recreation

2.3.2.1 Recreational Boating

Methods

To evaluate potential impacts of the projects on recreational boaters, we considered how recreational boating trips involving various classes of vessels could be affected by the island restoration projects. To distinguish recreational boaters from those primarily fishing, we assumed recreational boaters would be passing through the waters near James and Barren islands on their way to typical boating destinations. We considered the likely boating destinations and the typical routes that sail and motorboats would be likely to take in the vicinity of the islands. We then evaluated whether the island placement would affect passages along these routes. We also considered visual or other disruptions to commercial or recreational boaters, which were described in previous impact sections. These impacts are summarized here.

Analysis

Although boaters do not necessarily follow shipping channels or designated routes, the majority of recreational boaters that use the Bay use navigational markers of charted locations to set courses. Recreational boat use of waters in the vicinity of James Island is high for the mid-Bay, and a large portion of transient boaters would be likely to pass by James Island on their way in or out of port locations in the Choptank River. Boats navigating from the Bay mainstem channel to the river would tend to avoid the shallow water (3-8 feet) in the footprint of the project. Boats that plot courses using navigational markers would also be unaffected since the nearest navigational marker is 1.6 miles away from the project footprint. Even the small boats that choose to use the shallow waters adjacent to the channels will not typically be required to change course to avoid the island. Non-powered boats (e.g., kayaks and canoes) are not major users of this area and are typically directed by tourism literature to inland destinations (Dorchester County Dept. of Tourism, Water Trails of Dorchester County).

The breakwater project at Barren Island is in water too shallow for most boats (1-3 feet) and will have no influence on navigation or movements of transient recreational boaters. Because Barren Island is a wildlife preserve, it serves as a destination for small motor or sail boats and non-powered boats. The project will not prevent these small boats from reaching areas near the island, or prevent access to the island itself since the eastern side of the island, which is the most convenient access point for many small boaters, will not be hardened. In the long term, the project will tend to enhance this area as a destination for small boats since without the project, erosion is expected to reduce the size and the biological productivity and diversity of the island.

Boaters in the vicinity of either island during construction will be exposed to an increase in barge traffic as well as temporary noise and visual disturbances. Boats that are not fishing or lingering in the area will experience these effects for a short duration only. Boaters that wish to avoid the areas immediately around the project have many alternative boating areas and will not be prevented from reaching common boating destinations in the Choptank River. Some impact to small recreational boats approaching Barren Island should be expected during construction. Boaters will likely avoid the immediate area of Barren Island during the relatively short period when heavy equipment is in use. However, recreational boating areas that are similar to those

near Barren Island and equally accessible are abundant in the area, so these temporary disruptions should not result in significant adverse impacts on local recreational boaters.

2.3.2.2 Recreational Fishing

Methods

The economic value that recreational fishers place on a fishing site depends on factors that include: the abundance, availability, and size of fish at the site; the distance to and accessibility of the site, fishing congestion at the site, non-fish related characteristics of the site (e.g., sheltered vs. open water), and the availability of alternative fishing sites. Island restoration activities that change recreational fishing opportunities or affect fishing success at sites for which there are few comparable substitutes have far greater impacts than activities at sites that are near many other potential fishing sites.

Effects on recreational fishing were considered in three categories: 1) potential impact on boat access, 2) potential impact on fish catches 3) potential effect on quality of the recreational experience. To address the first concern, we considered routes local boaters would be likely to take and evaluated whether the projects would interfere with navigation along these routes. For the second concern, we evaluated conclusions from the aquatic biology analyses, conducted interviews with personnel knowledgeable about recreational fishers' activities near the island, and evaluated research on the potential effect of underwater rock placement on recreational fish species. For the third concern, we evaluated potential aesthetic and congestion effects during construction and in the long term.

Boat Access to Fishing Areas

The areas of primary interest to recreational fishers in the vicinity of James Island are areas deeper than 15 feet. A moderate number of fishers use intermediate depths of roughly 5-15 feet and a small number of enthusiasts use the very shallow areas primarily to fish for red drum and spotted sea trout (M. Gary, MD DNR, pers. comm. May 2003). Recreational fishers using the waters near James Island will arrive from a variety of starting points but will tend to use the same boat access channels and routes as commercial fishers. Following the analysis done for commercial fishers, we would expect only negligible effects on the time it takes most boaters to reach fishing destinations at either project location. Some minor disruption can be expected from the need to avoid barge traffic during some periods of island development.

During and after project construction, fishers wishing to access shallow waters and that approach James Island from the east might need to travel a mile or so farther west to reach open water, but this group represents a small proportion of fishers. Most fishers would already be traveling this distance to access the more popular deep-water fishing areas. In general, boats approaching the island from the east, north and south sides of the island will not change their routes significantly because island remnants and shallow water already prevent passage of most boats directly through the zone of the proposed footprint. The passage from the south of James, between James Island and Taylors Island, into the Little Choptank River will remain accessible during and after island restoration.

As discussed under recreational boating, it is unlikely that the project at Barren will alter access to waters since the breakwater is in water too shallow for most boats (1-3 feet). Temporary disruptions to fishers who will seek to avoid barges are likely to occur.

Fish Abundance and Catches

Because the James Island project will take up area of shallow Bay bottom, some shallow-water recreational fishing areas will be lost. Up to 2,000 acres of soft sands and mud and the overlying water will be converted to upland at James. Because the number of recreational fishers who seek out these soft-bottom areas is small, they should be able to shift to the abundant shallow areas adjacent to or near the site with no significant effect on congestion levels or catch rates.

For fishers targeting areas with hard bottom, dike construction has the potential to increase local fish abundance and catch rates of some recreational species in nearby fishing areas. Few studies have been done to quantify the effects on fish abundance of the "rock reefs" that are created by dike construction, but evidence suggests that the rocks serve to attract fish to an area. Observations from Poplar Island and other artificial reefs indicate that fish make use of the rocks at the base of dikes for feeding and shelter. Striped bass, in particular, have been observed in the vicinity of rock dikes around Poplar Island and thus appear to be among the fish attracted to the artificial reef created through rock placement (K. Paynter, University of Maryland, pers. comm. Dec. 2003).

Fishers near James Island often seek the types of fish attracted to hard substrate. The fishing area to the west of the proposed footprint is valued for its firm substrate and rock piles, which fishers think are responsible for attracting certain fish to the area (M. Gary, MD DNR pers. comm. May 2003). The addition of new rock piles associated with dike construction of the island is therefore expected to increase catch rates of the same types of fish currently targeted at James and Barren islands.

In addition to the potential benefits of rock reefs, some recreational species may become more abundant if the wave and surge protection and erosion-control that is expected to be provided by the restoration projects results in expanded SAV beds. Proximity to the high quality habitat afforded by SAV beds would also be expected to enhance recreational catch rates for some species.

The value of improved fishing will depend on many factors including how catch rates increase and how higher catch rates affect the total number of trips taken, trip lengths, searching time, and so on. However, economic studies have shown that increasing the probability of catching fish creates measurable economic benefits to fishers. Such studies show that even if a Chesapeake Bay rockfish angler would be expected to catch only half a striped bass extra per trip (i.e., one additional fish for every two trips) the value to that fisher, on average, would be $4.95 per trip (Lipton and Hicks 1999). Others have calculated a value of $9.53 per each additional fish caught per fisher per trip (Norton et al. 1983).

Therefore, based on the estimate of 8,000 recreational fishing days estimated for James Island (see section 1.3.2.1), if every fisher seeking striped bass could expect to catch an

additional striped bass every other trip as a result of the island restoration project, the value of increased catch rates in the striped bass recreational fishery might be on the order of $40,000 per year. For waters around Barren Island, our estimate of 11,000 recreational fishing days would generate an estimated value on the order of $55,000 annually to recreational fishers if catches were enhanced by one fish every other trip. This value only represents part of the value of any enhancements in the fishery since it does not account for any increase in the number of trips taken due to increased expected catch or other factors affecting the value of each additional fish to fishers. The true value to fishers will depend on which fish they are seeking, the importance of catch rate in making fishing decisions, actually change in catch rate, and the relative quality of the fishing grounds.

Quality of Fishing Experience

The overall recreational usage rate of waters near James Island is high for the mid-Bay and peaks during the height of croaker season (mid July to the first week of August). Typically, several hundred boats will use the waters near the site during that period of peak use. This high usage of the waters around James Island suggests there may be some potential for increased "fishing congestion" as the island restoration project displaces some fishing activity to other fishing areas that are already heavily used. However, because the project footprint primarily takes up the shallow waters that are not prime fishing areas, and is not along the route between most fishing ports and most fishing areas, the project's impact on the spatial allocation of fishing effort appears to be small. The presence of the island will force small boats that might have used the area of the footprint for passage to the fishing areas to navigate through slightly deeper waters. GIS analysis indicates that the shoreline of the new James Island segment will be closer to the prime fishing areas in the vicinity of James Island than the existing island shoreline which may make the fishing area feel more congested. However, while some open water vistas may be reduced in size, an assessment of actual fishing areas indicate that little of the prime fishing areas in the vicinity of James Island will be lost.

The quality of the fishing experience at Barren Island is not expected to be negatively affected by the breakwater, which would not increase fishing congestion. In the long run, the project is likely to enhance the quality of an outdoor experience by preserving the natural land uses on the island.

2.3.2.3 Hunting

Because the James Island restoration is likely to attract a variety of waterfowl to the area, hunting opportunities are expected to increase. Similarly, at Barren Island, preservation of the island will increase waterfowl hunting potential in the vicinity of the island. While hunting may not be permitted on either island, the waters near the islands have the potential to support hunting from boats or from adjacent shoreline. Waterfowl hunting is a popular type of hunting in the region and trends indicate that it will continue into the future (USFWS 2001).

2.3.2.4 Wildlife viewing

Wildlife viewing opportunities are likely to increase with the James and Barren islands restoration projects. If James Island is developed in a manner similar to that for Poplar Island, we expect that a comparable level of trips to view wildlife will be generated as a result. The

project at Barren will directly protect the ability to view the diverse wildlife living on the island by preventing loss of island area and thus of species available for viewing.

Birding is likely to be the largest component of wildlife viewing trips to the islands. Roughly 22% of Maryland residents participate in birding (USFWS 2001). Continued interest in viewing waterbirds and shorebirds is likely to drive interest in viewing birds at both island locations into the future.

2.3.2.5 Educational Uses

Similar to wildlife viewing, educational opportunities would be expected to increase with the development of a publicly accessible island at James Island and by preserving educational opportunities at Barren Island.

2.3.2.6 Other Uses

The areas adjacent to James and Barren islands are promoted as scenic destinations by both state and county promotional materials. During construction, the project may detract from some types of sightseeing in the area, but may also draw different kinds of sightseers. Noise during rock placement may have an impact on outdoor social activities of residents and tourists such as outdoor dining and backyard picnics by introducing higher than normal background noise levels.

The long-term impact of the James Island restoration on sightseeing would be expected to be positive, using the experiences at PIERP as a model. The project at Barren will be preserving part of the diversity of views in the vista and is expected to enhance sightseeing in the long run.

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Appendix I

Executive Summaries
Of
Technical Reports

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James Island
Reports

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FINAL

JAMES ISLAND HABITAT RESTORATION EXISTING ENVIRONMENTAL CONDITIONS:

CONSOLIDATED REPORT

Prepared for

Maryland Port Administration
2310 Broening Highway
Baltimore, MD 21224

Prepared Under Contract to

Maryland Environmental Service
2011 Commerce Park Drive
Annapolis, MD 21401

MES Contract # 03-07-21
MPA Contract # 504804
MPA Pin # 52270020

February 2005
Prepared by

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90 Ritchie Highway
Pasadena, Maryland 21122

EXECUTIVE SUMMARY

James Island and the adjacent waters of the mid Chesapeake Bay were investigated during Fall 2001, Summer and Fall 2002 and Winter, Spring and Summer 2003 with one supplemental survey in Winter 2004. The purpose of the investigations was to document the existing environmental conditions on and adjacent to the Island remnants as part of the joint feasibility study, between the U.S. Army Corps of Engineers and the Maryland Port Administration (MPA), for the potential of James Island to be used as an island restoration project through the managed use of dredged material placement. This report contains the consolidated results from the four quarters of sampling. Both aquatic and terrestrial sampling were conducted, and included water quality and nutrient analyses, fishery and plankton sampling, benthic sampling and sediment testing, vegetation identification and mapping (both aquatic and terrestrial), submerged aquatic vegetation surveys, avian and other wildlife observations (both aquatic and terrestrial), horseshoe crab spawning surveys, diamondback terrapin nesting surveys, crab pot surveys and investigations of other resources (Table ES-1).

EA Engineering, Science and Technology, Inc. (EA) and Andrews, Miller and Associates with their subcontractor, Chesapeake Environmental Management, Inc. conducted the studies in Fall 2001 and Summer and Fall 2002. John E. Harms, Jr. & Assoc., Inc. (Harms) with sub-consultants Barry A. Vittor, & Assoc., Inc. (BVA) and Straughan Environmental Services conducted the studies in Winter, Spring and Summer of 2003 and the supplemental study in Winter 2004. All studies were conducted under contract to Maryland Environmental Service (MES) for the MPA.

TABLE ES-1. COMPONENTS OF SITE RECONNAISSANCE AND SAMPLING EFFORTS AT JAMES ISLAND

Type of Study Conducted
• Fisheries Studies • Commercial Utilization • Benthic Macroinvertebrate Studies • Plankton Studies • Nutrient Analysis • Sediment Quality • *In-Situ* Water Quality • Submerged Aquatic Vegetation (SAV) Surveys • Vegetation Identification and Mapping • Wildlife and Avian Observations • Horseshoe Crab Spawning Surveys • Diamondback Terrapin Nesting Survey

James Island currently consists of three eroding island remnants, referred to as the Northern, Middle and Southern remnants. Mixed forest stands of loblolly pine dominate the interior of the islands. Small remnants of high marsh can be found on all three remnants and the southern remnant has a fairly extensive marsh complex in the center. Historically, James Island was connected to the mainland at Taylor's Island. Over 800 acres of the island have eroded since

1847, leaving the island one mile offshore and in three remnants, totaling less than 100 acres (MES et. al., 2002). As late as November, 2002, the northern two remnants (Northern and Middle) were connected by a sand spit. By March, 2003, this sand spit was no longer visible during high tide. The northern and western shorelines of each remnant show the heaviest erosion and there are many downed trees in the water in these areas. The tidal marshes on the Middle remnant have almost disappeared, and those on the Northern and Southern remnants are diminishing quickly. The marshes have either eroded completely away or been covered by new sandy beaches. There was evidence of fire that killed many trees, impacted some of the marsh areas on the northern and southern remnants and left scorch marks on the trunks of the pine trees of all three remnants. The actual cause of the fire is unknown, but speculation at a public meeting on February 20, 2003 at the court house in Cambridge, Maryland, suggested either campfires or lightning storms (Boraczek, 2004).

Benthic community characterization indicated that there is low benthic diversity. All but one of the ten stations did not meet the Chesapeake Restoration Goal Index of 3.0. Benthic sampling determined that the area is stressed with low total abundance, diversity, low abundance of stress-sensitive taxa and low ratios of carnivores to omnivores.

The temperature, salinity, and pH levels recorded during the *in-situ* water quality surveys were all within the range expected for this region of the Chesapeake Bay during all seasons of sampling. Dissolved oxygen levels exceeded the criteria set by the EPA and adopted by the Chesapeake Bay Program; including those for migratory fish spawning and nursery use (instantaneous minimum of 5 mg/L from February through May) and shallow open-water fish and shellfish use (instantaneous minimum of 3.2 mg/L year-round) (EPA, 2003). Secchi depth readings exceeded EPA criteria depths for application to shallow-water bay grass habitat (EPA, 2003). Nutrient analyses of whole water and filtered water samples produced concentrations typical for this area, with the exception of Chlorophyll-a.

Fisheries investigations of the shorelines indicated that the remnants support a fairly diverse fish community, including juveniles of commercially important species such as red drum, bluefish and summer flounder. The presence of these three species indicated that the waters in the vicinity of James Island may provide essential fish habitat (EFH) for them as well as for seven other species which are all managed under the Magnasun Stevens Fisheries Conservation Act. A variety of forage species, which are important food sources for the managed species, was also present around the remnants. All species were typical of the region. Fisheries communities present around James Island vary greatly between seasons but were shown to be more abundant during the spring months.

Crab pots were surveyed from April through September and were present west and south of the remnants during the late spring and summer months. July through September exhibited the greatest number of pots to the west of the island remnants.

Clam surveys revealed a general lack of an appreciable number of clams and a lack of productive clam bar, per Maryland Department of Natural Resources (MDNR) definition, in the vicinity. The MDNR defines a productive natural clam bar as having an existing or potential harvesting rate of either 500 hard clams (*Mercenaria mercenaria*) per hour, 0.5 bushel soft-shell clams (*Mya arenaria*) per hour, or 1.5 bushels of razor clams (*Tagelus plebius*) per hour (COMAR, 2004). Razor clams were the most prevalent. A few individual soft shell clams were found but no hard shell clams were present.

According to a MDNR survey commercial fishermen are currently fishing 3 of the 9 licensed net locations within the project area. The 3 nets are fished from March to November and are not set within any of the proposed alignments. Pound net fishing is more opportunistic, rather then targeted for certain commercially important species, but all nets catch menhaden, striped bass and croaker in the fall.

SAV mapping from previous seasons (2001-2002) (EA, 2003) as well as the presence of SAV beds in the area directly south of this area, suggests that SAV beds were present along a considerable portion of the suitable habitat located east of the Northern remnant. In addition to the relatively dense beds located east of the Middle remnant, smaller less-dense beds were located east of the Southern remnant in Spring 2003 than were observed in Summer 2002. Although no SAV beds were observed during the Supplemental Survey conducted in August 2003. SAV mapping from previous years (1971-2002) suggests that SAV beds were never present along the western shores of the James Island complex during that time period (http://www.vims.edu/bio/sav/).

Of the 155 chemical constituents tested in the sediment, 57 were detected in the James Island sediments. The majority of these detected constituents were found in low concentrations and were representative of background concentrations. Semivolatile organic compounds (SVOCs), volatile organic compounds (VOCs), and organophosphorus pesticides were not detected in any of the sediment samples. One polynuclear aromatic hydrocarbon (PAH), acenaphthylene, exceeded the threshold effects level (TEL) value at one sampling station (JAM-002) by a factor of approximately 2.6 but did not exceed probable effects level (PEL) values. None of the other detected chemical constituents exceeded TEL values.

Wildlife surveys at the island indicated some utilization of the remnants by terrestrial mammals. River otter (*Lutra canadensis*) was observed and signs of raccoon (*Procyon lotor*), white-tailed deer (Odocoileus virginianus), sika deer (Cervus nippon) and muskrat (*Ondatra zibethicus*) were present. Avian utilization, however, was higher during spring surveys, due to migration and arrival of breeding summer residents. Winter waterfowl such as surf scoters (*Melanitta perspicillata*), bufflehead (*Bucephala albeola*) and long-tailed ducks (*Clangula hyemalis*), present in March and April, were gone by May, by which time the shorebirds had arrived, utilizing the marsh edges and beaches. Ospreys and bald eagles were breeding successfully and a barred owl was observed on the Northern Remnant.

Aquatic wildlife utilizing the shores included mollusks, bivalves, and crustaceans. Evidence of use was higher during late spring, summer and early fall surveys. Silversides were numerous at nighttime near the beaches. Cow-nosed rays swam frequently into the shallow coves to feed. A pod of bottlenose dolphins was spotted in the waters south of the Southern remnant during the Spring 2003 survey.

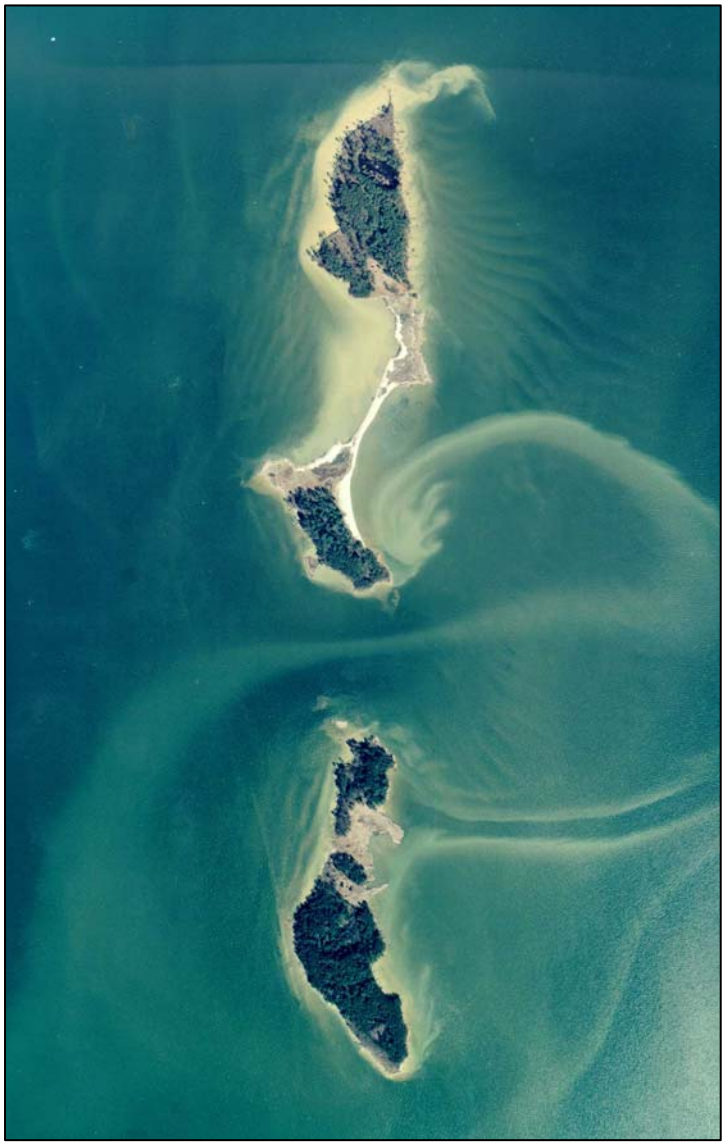
Horseshoe crabs and diamondback terrapins utilized the east beach of the Middle remnant for spawning and nesting, respectively, during the late spring.

Vegetation on the remnants remained consistent during all seasons of survey, with the exception of the northwest marsh on the Middle remnant. Strong storms washed significant sand onto the shore, covering the marshes with beach, filling in one of the marsh ponds, and eroding marsh vegetation during the Spring of 2003.

Archaeological and historical resources noted included some pottery shards along the eastern beach of the Middle remnant. There are also three to four foot tall and four to five foot wide berms reaching across both the Southern and Northern remnants. A long-time local resident waterman states that the berms were historically made to prevent water from reaching sika deer (*Cervus nippon*) forage fields, and to form ponds for duck hunting (Willey, 2003).

Final James Island
Beneficial Use of Dredged Material

Consolidated Reconnaissance Report



Prepared for

Maryland Port Administration
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MES Contract # 02-07-10
MPA Contract # 500912
MPA Pin # 600105-P
April 2003

EXECUTIVE SUMMARY

James Island is an eroding island that has been identified by the Maryland Port Administration's (MPA) Dredged Material Management Program (DMMP) process as a potential option for island habitat restoration through the beneficial use of dredged material. In addition, the Dorchester County Resource Preservation and Development Corporation (DCRPDC), a non-profit organization, had originally recommended and presently supports James Island as a possible habitat restoration project using dredged material. The DCRPDC is interested in stabilizing and protecting the Dorchester County shoreline, but does not have any ownership interest in James Island (MES 2002). In addition to support from DCRPDC, DMMP, and MPA, the private landowners of James Island indicate their support of the proposed habitat restoration project as well. Following the recommendation of James Island as a restoration project, reconnaissance level studies for evaluating the island as a potential beneficial use site were initiated in Spring 2001. The designation of James Island as a preferred option for habitat restoration using dredged material was the result of conceptual studies and evaluation by technical management and citizens in the DMMP process. Reconnaissance studies were then initiated on the option.

James Island currently consists of three eroding island remnants. The island remnants are located in Dorchester County, Maryland east of the mouth of the Little Choptank River. The existing remnant islands were formed as a result of natural processes of shoreline erosion that affect the Chesapeake Bay region. Historic and current mapping of the island has indicated that over 800 acres of the island have eroded away since 1847. James Island was estimated at 976 acres in 1847 and recent estimates from 1994 measure the island at 92 acres.

EA Engineering, Science, and Technology, Inc. (EA) was contracted by Maryland Environmental Service (MES) to complete a reconnaissance study and consolidated report that includes all current studies of James Island as a prospective habitat restoration area using dredged material from the outer approach channels to the Baltimore Harbor (east of North Point/Rock Point Line in the Patapsco River). These studies were conducted to support the MPA DMMP process. This consolidated report combines the findings of several separate investigations and includes the following studies: subsurface geotechnical investigations, coastal engineering investigations, hydrodynamic and sedimentation modeling, dredging and site engineering (including design and cost specifications), and the existing environmental conditions at James Island. This report includes investigations and modeling studies that have either been updated or completed since the Conceptual James Island Beneficial Use of Dredged Material Report was prepared by MES. A total of 5 alignments with two dike elevations and a 50 percent upland to 50 percent wetland ratio are currently being considered.

Site visits to James Island were conducted by MES in June 2001 and by EA in the Fall of 2001 and Summer of 2002, during the seasonal sampling surveys. Initial site visits and reconnaissance survey demonstrated that James Island is primarily forested. The shoreline consists of fringe marshes and eroding wooded banks lined with submerged snags in the adjacent waters. The shoreline elevations range from 5 to 10 feet (ft) in height on the northwestern shores and gradually decrease to the south. The surrounding waters are relatively shallow and range from 3-12 ft. Natural oyster bars (NOBs) are located in the general vicinity. The island is currently used for recreation such as hunting and fishing. Natural habitats include forested uplands, wet

meadows, submerged aquatic vegetation (SAV), tidal marshes, coves, and some sandy beach areas.

A Geotechnical Reconnaissance Study was conducted by Engineering, Construction, Consulting, and Remediation, Inc. (E2CR) to evaluate subsurface conditions along the five proposed dike alignments for construction at James Island. This geotechnical investigation focused on the suitability of foundation soils for supporting dike construction, the availability of suitable borrow to construct a dike system, and the development of a preliminary dike section. The foundation soils in most areas consisted of silty sand, which is suitable for supporting a dike. However, some soils were soft silty clays at the mud line that would require undercutting and backfilling with sand. The site contained a sufficient quantity of suitable borrow for constructing the perimeter dike to an elevation of 20+ ft. The net quantity of sand available was approximately 12+ million cubic yards (mcy). For this reconnaissance phase, it was assumed that the dike would be constructed by hydraulic dredging, and the slopes achievable would be 3H:1V above and below the water table.

A Coastal Engineering Reconnaissance Study was conducted by Moffatt and Nichol Engineers (MNE) to evaluate the five alignment options for beneficial use of dredged material at James Island. This investigation included an evaluation of existing physical site conditions, relevant bathymetry, wind, water level and geotechnical data for evaluation of wave height and dike construction requirements, and designs of proposed dike alignments and typical cross-sections. Waves were hindcast for eight directional windspeeds using methods recommended by the U.S. Army Corps of Engineers (USACE). The highest waves for the site approach from both the north and south. From these wave forecasts, seven preliminary cross-sections were developed for the containment dikes. The dike designs are based upon a 35-year return period. Dike heights are based on allowable overtopping for an unarmored crest and an allowance for settlement. The dike design also incorporates 3:1 side slopes, above grade toe protection, a core constructed of sand, and a crushed stone roadway on the structure crest. Overall, seven dike cross-sections were designed for the five proposed alignments. Each alignment would require four to five different dike cross-sections for construction. Should this study move forward to feasibility, recent bathymetric surveys conducted within the vicinity of James Island are recommended to be used.

A Hydrodynamics and Sedimentation Modeling Reconnaissance Study was conducted by MNE to evaluate the projected hydrodynamic changes at James Island if construction of the various alignments takes place. The MNE Upper Chesapeake Bay – Finite Element Model was used to predict existing conditions as well as with- and without-project hydrodynamics and sedimentation for each of the five proposed alignments (MNE 2000). The modeling results for the James Island habitat restoration project show minimal impacts on local tidal elevations, which are essentially unchanged. Current velocities are impacted following island construction, with a maximum increase or decrease in current velocity of about 0.4 ft/second (sec). The project construction at James Island would have beneficial effects on sedimentation rates and patterns, with less erosion of the James Island shoreline and the shallow areas surrounding the remnants. Some protection would also be afforded to the shoreline of Taylors Island from wind and waves coming from the N, NNW, and NW directions. This reduction in erosion would likely reduce suspended sediment and improve water quality in the surrounding area.

A Dredging and Site Engineering Reconnaissance Study was conducted by Gahagan and Bryant Associates, Inc. (GBA) to summarize the dredging and site engineering aspects of restoring and developing habitat at James Island using dredged material. The study presented five proposed alignments and their associated costs to assist decision-makers in selecting the site layout to be carried to the final design. Each of the five alignments included a wetland and upland cell designation, with a 50 percent upland to 50 percent wetland ratio. In addition, two different upland dike heights were examined for the five alignments and included a 10-ft and 20-ft dike height alternative for each alignment. For the 10-ft upland dike elevation alternative, the site capacity for the five alignments ranged from 23 to 52 million cubic yards (mcy). For the 20-ft upland dike elevation alternative, the site capacity for the five alignments ranged from 35 to 79 mcy. The total site areas for the alignments range from 979 to 2,202 acres. Alignment 1 is the smallest layout and would have a footprint of 979 acres, Alignment 2 would have a footprint of 2,127 and Alignment 3 would have a footprint of 1,586. Alignment 4 is the largest of the five site designs and is a variation of Alignment 2 that would have a footprint of 2,202 acres. Finally, Alignment 5 is a variation of Alignment 4 and would have a footprint of 2,072 acres. The site operational life of all five alignments is estimated between 13 and 15 years with respect to the 10-ft dike elevation, and between 20 and 23 years with respect to the 20-ft dike elevation.

The 10-ft mean lower low water (MLLW) dike elevation total estimated costs for the project range from $406 million to $759 million. The schedule for construction is 2.3 to 3.2 years and is dependent upon the borrow method used. The easiest, quickest, and least costly borrow source is onsite borrow. The total costs per cubic yard (cy) of site capacity range from $14/cy to $18/cy. The 20-ft MLLW dike elevation total estimated costs for the project range from $591 million to $1.106 billion. The time required for construction is 3.0 to 3.7 years and is dependent upon the borrow method used. The total costs per cubic yard (cy) of site capacity range from $14/cy to $17/cy.

The Existing Environmental Conditions Study investigated the current conditions and the potential impacts of the proposed project. This reconnaissance level study includes information obtained from conceptual studies, literature reviews, and observations from previous field investigations. Several site visits to James Island have been conducted to assess the environmental conditions of the island remnants and to document the terrestrial and aquatic resources present in and around the project area. This report includes observations from a site visit conducted by MES in June 2001 and two site visits conducted by EA in the Fall of 2001 and the Summer of 2002, as part of seasonal sampling for feasibility evaluations. Components of these investigations included vegetation identification and mapping, avian and wildlife utilization surveys, fisheries and plankton sampling, benthic invertebrate studies, sediment and water quality investigations, historic and recreational resource evaluations, and submerged aquatic vegetation (SAV) mapping.

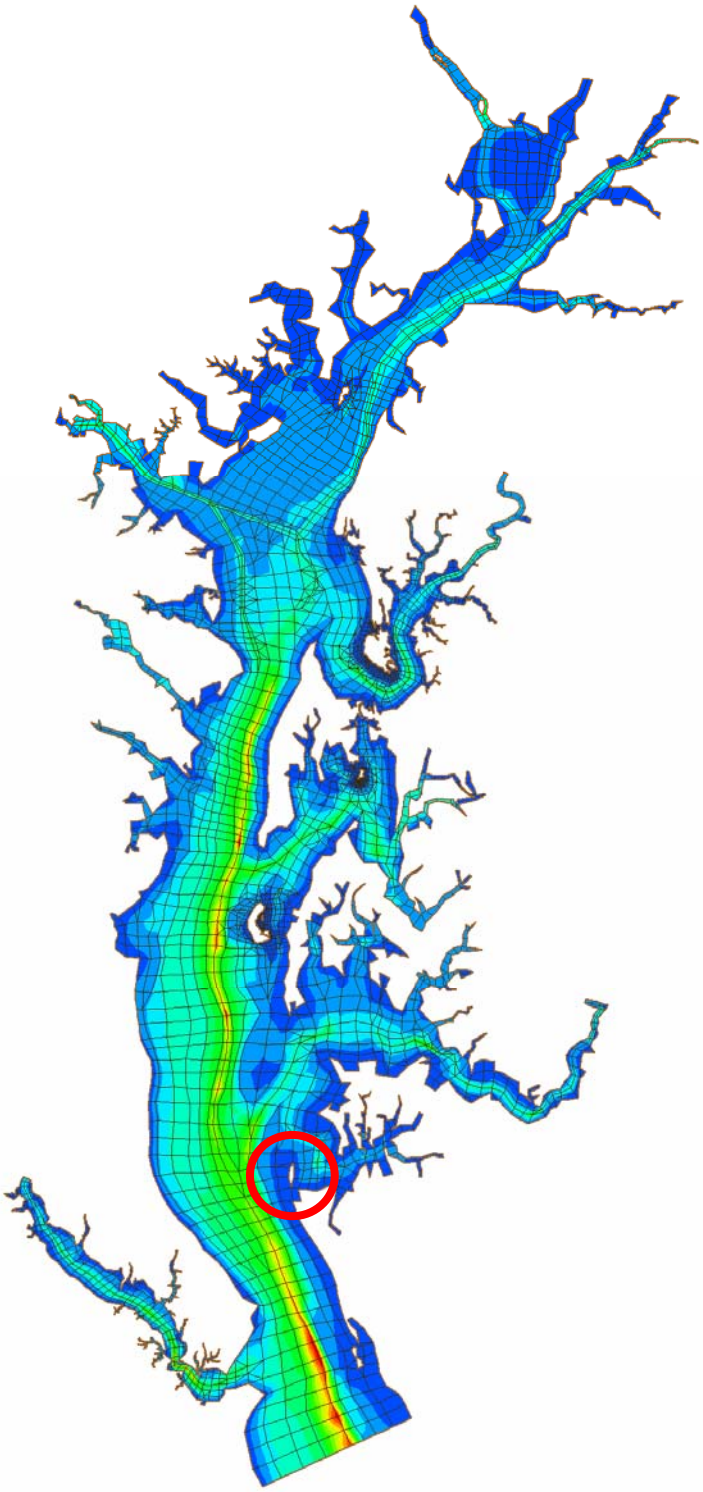
The current condition of James Island includes significant and severe erosion along the northern and western shorelines of the island remnants. The island remnants currently support SAV growth along the eastern shorelines and are composed of monotypic beds of widgeon grass (*Ruppia maritima*). The fisheries investigations of the island's shorelines indicated that the remnants supported a fairly diverse fish community, including juveniles of commercially

important species. All collected fish species were typical of the region. In addition, avian utilization of the island was typical for this area of the Bay as well, including the federal and Maryland state-listed threatened species, the bald eagle. Bald eagles were observed utilizing the area in and around James Island. Also, an active eagle nest with a fledgling was observed on the middle remnant of James Island. Several other avian species identified at James Island during the Fall 2001 and Summer 2002 surveys have conservation status determinations associated with their breeding status. However, avian utilization of the open water areas of the proposed alignments was minor compared to that of the wetland and forested areas of the island. Three NOBs are located in the vicinity of the island remnants but not within the concept areas. Ichthyoplantkton densities were relatively high and were dominated by the bay anchovy (*Anchoa mitchilli*). Zooplankton collected were typical of the region. In general, the benthic community was typical of this area of the Bay but was dominated by a single species at most stations, the gem clam (*Gemma gemma*). The majority of the benthic species found were stress-tolerant, resulting in low Benthic Index of Biotic Integrity (B-IBI) scores at most locations. B-IBI scores of 3.0 or greater are considered as meeting the Chesapeake Bay Restoration Goal. Total B-IBI scores were low (1.0 – 1.8) for 9 of 10 stations sampled at James Island in October 2001. One station had a total B-IBI score of 3.0, and was the only station sampled in the footprint area to meet the Chesapeake Bay Restoration Goal.

Additionally, archeological sites including an oyster shell midden and historic foundations are present on the island, but are not located in the concept areas. Potential impacts that may be a concern to the aquatic and terrestrial wildlife include short-term water and sediment quality effects, and the temporary displacement of wildlife. There is also a potential to displace some commercial crabbing within the proposed habitat restoration area.

This study and the analyses of its results were conducted at a reconnaissance level. Therefore, the following report, results, and conclusions should be considered preliminary. The completed construction of the facility should improve water quality in the area by reducing erosion and the resulting suspended solids, which may help sustain or improve the oyster and clam fisheries in the area. In addition, construction of a beneficial use of dredged material project at this site would be expected to provide additional natural habitat, including both wetland and upland areas.

JAMES ISLAND RECONNAISSANCE STUDY



HYDRODYNAMICS AND SEDIMENTATION MODELING

FINAL REPORT
NOVEMBER 15, 2002

Maryland Port Administration
MPA Contract Number: 500912
MPA Pin Number: 600105-P

Maryland Environmental Services
MES Contract Number: 02-07-49

Prepared by

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Executive Summary

The purpose of this Hydrodynamics and Sedimentation Modeling Reconnaissance Study is to evaluate the projected impacts due to construction of a Beneficial Use Habitat Restoration Site at James Island. Moffatt & Nichol Engineers' (MNE) Upper Chesapeake Bay – Finite Element Model (UCB-FEM) (MNE, 2000) was used to predict existing conditions and with- and without-project hydrodynamics and sedimentation. This report summarizes the calibration and implementation of the UCB-FEM two-dimensional numerical model of the Chesapeake Bay and evaluation of hydrodynamic and sedimentation output including time-varying flow velocity, water surface elevations, and patterns of erosion and accretion.

A summary of site conditions that are relevant to the project is provided below:

- **Bathymetry and Topography.** Water depths in the area where the dikes would be located range from –2 to –12 ft Mean Lower Low Water (MLLW), with an average depth along the exterior dikes ranging from –3 to –12 MLLW. Water depths in the deeper main stem portions of the Bay west of James Island are as great as –93 ft MLLW.

- **Freshwater Inflow.** The drainage area of the Chesapeake Bay is approximately 64,000 square miles and includes portions of Maryland, Virginia, West Virginia, Pennsylvania, New York and the District of Columbia. Freshwater enters the Chesapeake Bay via approximately 150 major rivers and streams at approximately 80,000 cubic ft per second (Schubel and Pritchard, 1987).

- **Tides.** Water levels in the Chesapeake Bay are dominated by a semidiurnal lunar tide. Tides enter the Bay via the Chesapeake Bay entrance and the Chesapeake and Delaware (C&D) Canal. The mean range of tides throughout the entire Chesapeake Bay is generally 1 to 3 ft (NOS, 1988). In the project vicinity, the mean tide level is 0.9 ft above MLLW; the mean tidal range is 1.3 ft and the spring tidal range is 1.8 ft (NOS 1997).

- **Currents.** In the project vicinity, approximately 2.5 miles west of James Island, peak flood currents are about 1.0 ft/sec, and peak ebb currents are about 0.8 ft/sec (NOS, 1996). Currents are not considered important for shore protection design at this project site.

- **Wind and Wave Conditions.** Design winds for the site were developed on the basis of data collected at Baltimore-Washington International (BWI) airport. These winds, which can exceed 90 miles per hour during a 100-year storm event, were used to develop design wave conditions. James Island is exposed to wind-generated waves approaching from all directions.

- **Site Soil Characteristics.** Results of the separate geotechnical preliminary study indicate that the underlying soil consists of silty sand, suitable for supporting the dike. Areas with soft silty clays at the mud line, however, would need to be undercut and backfilled with sand.

The numerical modeling system used in this study consists of the US Army Corps of Engineers finite element hydrodynamics (RMA-2) and sedimentation (SED-2D) models – collectively known as TABS-2 (Thomas, McAnally and Ademac, 1985). The numerical modeling system uses a bathymetric mesh of water depths, represented by nodes located in the horizontal plane that are interconnected to create elements.

Correlation of the hydrodynamic model calibration results to NOAA predicted data for tidal elevations and current velocities is generally better than 90%. Predicted percent error is typically less than 10% for tidal elevations and less than 15% for current velocity.
The non-cohesive sediment model was run using 0.1mm (.004 inch) sediment under no-wind conditions. Analysis of results shows negligible sand transport due to tidal currents. Modeled non-cohesive sediment transport for existing conditions is negligible for 4- and 13-mph winds for all directions. Sixteen-mph winds, when taken cumulatively with lower wind speeds, account for nearly 90% of the yearly wind occurrences and cause significant sediment transport for winds from the NNW and SSE directions with less sediment transport for winds from other directions.

The cohesive sediment model was run for a 6-month simulation period at which point the model achieved a dynamic equilibrium (average values and rates remain steady over time). The cohesive sediment model was then run for each of 16 wind directions for wind speeds of 4- and 13-mph.

Hydrodynamics and sedimentation numerical modeling for the James Island Reconnaissance Study show minimal impacts on local tidal elevations, which are essentially unchanged. Current velocities are impacted following island construction, with maximum increase or decrease in current velocity of about 0.4 ft/sec. Construction at James Island also would have beneficial effects on sedimentation rates and patterns, with less erosion of the James Island shoreline and the shallow areas surrounding the remnant James Islands. Some protection would also be afforded to the shoreline of Taylors Island from wind and waves coming from the N, NNW, and NW directions. This reduction in erosion would likely cause reduced suspended sediment and improved water quality.

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Barren Island Reports

Feasibility-Level Environmental Conditions Studies for a Potential Island Restoration Project at Barren Island, Dorchester County, MD

Final Consolidated Report

Prepared for:
Maryland Port Administration
2310 Broening Highway
Baltimore, MD 21224

Under Contract to:
Maryland Environmental Service
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MES Contract # 03-07-22
MPA Contract # 504804
MPA PIN # 52270020

February 2005

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Executive Summary

Barren Island is located in the Chesapeake Bay in Dorchester County, Maryland, immediately west of Hoopers Island at Fishing Creek and across the Bay from the mouth of the Patuxent River (Figure 1-1). Historical and current maps of Barren Island indicate that the island has lost about 78% of its acreage since 1848 (Figure 1-2) (Weston, 2002a). Currently, Barren Island consists of three island remnants that total approximately 180 acres (Figure 1-3) (Weston, 2002a). Two additional island remnants, Opossum Island and an unnamed island, are located due east and south of Barren Island, respectively. Barren Island is currently federally owned and managed by the U.S. Fish and Wildlife Service (USFWS) as a satellite refuge area to Blackwater National Wildlife Refuge (BNWR).

Environmental conditions studies prepared for the Maryland Port Administration (MPA) under contract to Maryland Environmental Service (MES) were conducted by Blasland, Bouck and Lee, Inc. (BBL), EA Engineering, Science & Technology, Inc. (EA), Chesapeake Environmental Management Inc. (CEM), and Weston Solutions Inc. (Weston) to support a planned feasibility study to evaluate Barren Island as a potential island restoration project. The proposed restoration project would beneficially utilize dredged material from the Port of Baltimore Chesapeake Bay shipping channels to construct, stabilize, and restore wetland and upland habitats in the vicinity of Barren Island. Two potential dike alignments were originally considered for the potential island restoration project (Figure 1-4). As part of the joint feasibility study between the U.S. Army Corps of Engineers (USACE) and the MPA, these alignments were refined. Four potential dike alignments lying to the north, west and south of Barren Island were advanced for consideration (Figure 1-5), as part of the joint feasibility study process between the USACE and the MPA. During this process, a fifth alternative for Barren, in conjunction with dredged material placement at James Island, was also considered (Figure 1-6).

To conduct a comprehensive assessment of the existing environmental conditions at Barren Island, field sampling events were completed on a seasonal basis in the Summer and Fall of 2002 and the Winter and Spring 2003. Additional aquatic investigations were also completed at various times at Barren Island from May 2003 to March 2004. The objectives of the environmental conditions studies at Barren Island and vicinity were to document the aquatic and terrestrial ecological resources that exist on the remnants of Barren Island, and within and adjacent to the proposed alignments. Aquatic surveys included water quality and nutrient analyses, sediment quality and geotechnical characterizations, benthic invertebrate surveys, ichthyoplankton and zooplankton surveys, fisheries surveys (bottom trawl, gillnet, beach seine, and pop net gear types), submerged aquatic vegetation (SAV) surveys, soft-shell and razor clam surveys, crab pot surveys, and pound net surveys. Terrestrial and wildlife surveys included terrain type and vegetation characterizations and avian and wildlife surveys.

In situ water quality measurements were taken during 2002-2004 aquatic investigations in the vicinity of Barren Island. Water depth, sampling depth, water temperature, salinity, pH, turbidity, Secchi depth, and dissolved oxygen (DO) were recorded at each location. Sampling depths ranged from 0.5 to 14.0 feet. Water temperatures recorded during sampling activities ranged from 1.7 to 25.8 ^{o}C. Salinity ranged from 9.0 to 18.7 ppt. Measurements of pH ranged from 7.5 to 8.8, which is typical of waters of this salinity regime. Secchi depths were measured

during the Winter and Spring 2003 surveys and ranged from 0.2 to 2.1 m. DO concentrations measured during various Barren Island aquatic surveys ranged from 6.1 to 15.2 mg/L. All DO measurements taken at Barren Island including the minimum recorded value (6.1 mg/L) in the Winter 2003 exceed anoxic and hypoxic levels and the Chesapeake Bay DO criteria (USEPA, 2003). Water samples were collected for laboratory analyses during the Summer and Fall 2002 and Winter and Spring 2003 seasonal field investigations and analyzed for dissolved inorganic nutrients, dissolved organic nutrients, particulate nutrients, chlorophyll-*a*, phaeophytin, and total suspended solids (TSS). Inorganics, organics and particulates were consistent among locations sampled around Barren Island. Chlorophyll-*a* and its degradation product, phaeophytin were somewhat high during the Spring 2003 survey. This is not unexpected, because algal blooms often occur in the late spring and early summer seasons. Higher TSS values were associated with locations with shallow depths that facilitated sediment suspension due to wave action. Overall, *in situ* water quality and nutrient data collected at Barren Island during the aquatic investigations fall within expected seasonal conditions and are representative for this portion of the Chesapeake Bay.

Sediment geotechnical characteristics were assessed during the Summer 2002 and Spring 2003 field investigations to determine bottom types of the surficial sediments surrounding Barren Island. Sediment geotechnical characteristics varied slightly in grain-size distribution between sampling locations. During both surveys, sediment sampling locations were primarily sand substrate with some silt/clay substrate composition variances between seasonal surveys. The minor differences recorded may be attributed to the normal variances between each sediment grab at a given location. The objective of the sediment quality assessment was to determine the presence and concentrations of chemical constituents in the surficial sediments surrounding Barren Island. Sediment samples were analyzed for a variety of organic compounds and inorganic chemicals during the Spring 2003 survey (BBL, 2004a). Chemicals detected in sediment samples were limited to metals, two individual polychlorinated biphenyl (PCB) congeners, and two polychlorinated dibenzo-*p*-dioxin (PCDD) congeners. The concentrations of these chemicals did not exceed available marine sediment quality guidelines (Buchman, 1999). This suggests that there are no contaminant risks to aquatic organisms in the project area.

Benthic invertebrate surveys were completed during the Summer and Fall 2002 and Spring 2003 field investigations to document existing (infaunal) communities of benthic invertebrates in sediments from the Chesapeake Bay surrounding Barren Island. Benthic invertebrates are used extensively as indicators of estuarine environmental status and trends. In total, 84 benthic invertebrate taxa were identified during the field surveys at Barren Island. The most dominant species identified during the combined 2002–2003 surveys representing 18.4% of the total count of benthic invertebrate taxa was the polychaete *Mediomastus ambiseta*. The benthic invertebrate data were evaluated by the use of the Chesapeake Bay Benthic Index of Biotic Integrity (B-IBI) developed by Weisberg et al. (1997), and other additional metrics to further characterize the benthic community. B-IBI metrics include total abundance, Shannon-Weiner Diversity Index, carnivore/omnivore abundance, percent stress-indicative taxa abundance, and percent stress-sensitive taxa abundance. Based on the calculated B-IBI scores, the majority of sampling locations yielded total B-IBI scores of 3.0 or greater, indicating that they meet the Chesapeake Bay Restoration Goal. Lower B-IBI scores associated with stations that did not meet the

Chesapeake Bay Restoration Goal may be related to environmental stresses such as wave action and sediment disturbance expected near the Chesapeake Bay channel.

Plankton surveys were completed during the Summer 2002 and Winter and Spring 2003 field investigations to characterize the existing seasonal communities of ichthyoplankton and zooplankton in the top and bottom of the water column of the Chesapeake Bay surrounding Barren Island. Bottom plankton tows captured a larger diversity and almost a four-fold greater density of zooplankton than surface tows across all seasonal surveys. Bay anchovy (*Anchoa mitchilli*) were the most abundant ichthyoplankton species identified during both bottom tows and surface tows. Fish eggs were not found in the Summer 2002 surveys, which is typical for late summer since most fish species begin spawning in early spring. The low densities of ichthyoplankton in the water column during the Winter 2003 survey indicate the low spawning activity that occurs in Chesapeake Bay fishes during this part of the year, and the increased densities of ichthyoplankton in the water column during the Spring 2003 supports the fact that the spawning activity occurs in Chesapeake Bay fishes during this part of the year (Murdy et al., 1997; NOAA, 1994). Several zooplankton taxa were identified during all seasonal field surveys (cnidaria, polychaeta, bivalvia, copepoda, mysidacea, cumaciea, isopoda, amphipoda, shrimp larvae), showing the seasonal consistency of these zooplankton taxa in the mid-Chesapeake Bay.

Fisheries surveys were conducted during the Summer and Fall 2002 and Winter and Spring 2003 field investigations to characterize the existing fish and blue crab (*Callinectes sapidus*) communities surrounding Barren Island. Several fisheries gear types were used during the various fisheries surveys: bottom trawls, gillnets, beach seines and pop nets. The beach seine sampling gear type represented 49% of the overall fish catch for the combined 2002–2003 fisheries surveys. In total, 15,689 individual fish were captured, 40 fish species were identified, and one unknown clupeid species was observed. Commercially and recreationally important finfish species that were identified during the fisheries surveys included American eel (*Anguilla rostrata*), Atlantic croaker (*Micropogonias undulate*), Atlantic menhaden (*Brevortia tyrannus*), bluefish, striped bass (*Morone saxatilis*), summer flounder (*Paralichthys dentatus*), white perch (*Morone americana*), and winter flounder (*Pleuronectes americanus*).

During the Summer 2002 fisheries survey, 30 fish species were identified and 13,069 individual fish and 135 blue crabs were captured. During the Fall 2002 fisheries survey, 12 fish species were identified and 154 individual fish and 4 blue crabs were captured. During the Winter 2003 fisheries survey, 8 fish species were identified and 178 individual fish were captured. As was expected due to this species' life cycle, blue crabs were absent from the shallow waters surrounding Barren Island during the Winter 2003 survey. During the Spring 2003 fisheries survey, 20 species were identified, one clupeid species was not identified, and 2,018 individual fish, 208 blue crabs, and 9 horseshoe crabs (*Limulus polyphemus*) were captured. As was expected due to this species' life cycle, horseshoe crabs were only present in the shallow waters surrounding Barren Island during the timeframe for expected spawning activities. During the Summer 2003 pop net fisheries survey, a total of 222 individual fish were captured and seven fish species were identified. In general, sampling areas to the west of Barren Island had the greatest abundances of fish across all seasons and gear types.

The highest combined abundance and species diversity was noted during the Summer 2002 field surveys, and the lowest combined abundance and species diversity was noted during the Winter 2003 survey. The following species were observed across seasonal surveys (gillnet, beach seine, and bottom trawl sampling gear types): Atlantic menhaden, Atlantic silverside (*Menidia menidia*), striped bass, striped killifish (*Fundulus majalis*), and white perch. The Atlantic silverside was the only species observed in all fisheries surveys (gillnet, beach seine, bottom trawl, and pop net sampling gear types). When the 2002–2003 fisheries data are combined, three of 41 observed species represented more than 88% of the 15,689 individuals captured: bay anchovy represented 73.5% of the catch with 11,531 individuals, Atlantic silverside represented 12% of the catch with 1,908 individuals, and striped killifish represented 3% of the catch with 419 individuals.

BBL conducted a monthly survey of crab pots from May through September 2003 to determine the approximate number of crab pots in the vicinity of the proposed alignments. During the May 2003 survey, approximately 850 crab pots were observed to the north, west, and south of Barren Island covering approximately 550.7 acres. During the June 2003 survey, approximately 700 crab pots were observed to the north, west, and south covering approximately 743.7 acres. During the July 2003 survey, approximately 700 crab pots were observed to the north, west, and south covering approximately 493.0 acres. During the August 2003 survey, approximately 1,500 crab pots were observed to the north, west, and south covering approximately 2,987.5 acres. During the September 2003 survey, only 70 crab pots were observed along three crab pot lines to the north of Barren Island. The probable cause of the decrease in crab pots in September was due to commercial watermen removing their crab pots prior to Hurricane Isabel.

A survey for soft-shell clams (*Mya arenaria*) and razor clams (*Tagelus plebius*) was conducted in March 2004 in the vicinity of Barren Island using a hydraulic clam dredge. Sampling was conducted along four transects: two transects located to the west and south of Barren Island within the proposed alignments, one transect located to the east of Barren Island, and a reference transect located to the west of the proposed alignments. At each transect segment, legal and sublegal clams were separated, enumerated, and volumes were measured to provide both actual volume of clams per hour (actual harvesting rate) and the potential volume of clams per hour (potential harvesting rate). In total, 3 legal and 14 sublegal soft-shell clams were identified, and 964 razor clams were identified. The Maryland Code of Regulations defines a productive natural clam bar as having an existing or potential harvesting rate of either 500 hard clams (*Mercenaria*) per hour, 0.5 bushels per hour of soft-shell clams, or 1.5 bushels per hour of razor clams (MDSD, 2004). Based on this definition, there were no observed transect locations with a productive natural clam bar.

Pound net owners licensed by the Maryland Department of Natural Resources (MDNR) were contacted in 2004 by the MDNR to confirm ownership and use of the licensed pound nets in the areas surrounding Barren Island. A telephone questionnaire was used to record this information. A summary of the survey results was provided to MES (and subsequently BBL) by MDNR for inclusion in this report (Section 3.1.9). In total, the 14 pound net license holders have 23 locations in the vicinity of Barren Island, of which 17 are actively being set and fished. Eight of the 14 pound net license holders conduct fishing activities daily from March or May through November or December. All of the fishermen surveyed responded that the following fish species

were typically caught: Atlantic croaker, Atlantic menhaden, striped bass, summer flounder, and weakfish (*Cynoscion regalis*).

SAV surveys were conducted during the Summer 2002 and Spring and Summer 2003 field investigations to identify areas of SAV growth, the density of SAV growth, and the types of SAV present in each area. The Summer 2002 and 2003 SAV surveys were conducted in September in order to document the potential presence of widgeon grass (*Ruppia maritina*) and other late season grasses (Bergstrom, 2002). The Spring 2003 survey was conducted in mid June to catch the potential presence of horned pondweed (*Zannichellia palustris*) and eelgrass (*Zostera marina*), as instructed in the *Draft Chesapeake Bay Submerged Aquatic Vegetation (SAV) Ground Survey Directions, revised June 21, 2002* developed by Dr. Peter Bergstrom of the USFWS (Bergstrom, 2002). Aquatic species observed at Barren Island include eelgrass, horned pondweed, and widgeon grass. During the Summer 2002 survey, widgeon grass was the only species identified, but the macroalgae sea lettuce (*Ulva lactuca*) and eelgrass were observed washed up on the beach. Horned pondweed was the only species found in the area surrounding Barren Island during the Spring and Summer 2003 surveys. However, shallow salt ponds that support dense growths of widgeon grass were noted during the Spring 2003 terrestrial surveys on the northern end of the northern remnant and southwestern end of the southern remnant of Barren Island. The absence of SAV along the majority of the Barren Island shoreline during the Summer (i.e., September) 2003 survey may be associated with the scouring effects of Hurricane Isabel. The presence of SAV appears to be dependent on the location around the island. SAV crown densities were highest along the northern and eastern shorelines of Barren Island. SAV was absent within the geotextile tube areas, and was absent or in very low densities along the western shoreline of Barren Island. The likely reasons for the absence of SAV along the western shorelines of Barren Island are the steep slopes of the shoreline, lower water clarity, and a higher exposure to wave action.

Terrain type and vegetation characterizations including wildlife and avian surveys were conducted during the Summer and Fall 2002 and Winter and Spring 2003 field studies. Habitat types present on the Barren Island remnants include tidal flat, sand spit, beach, low and high salt marsh, freshwater marsh, salt panes, swale, upland forest, upland habitats on filled material, and smaller island habitat. A total of 78 plant species (21 tree species, 7 shrub species, 45 herbaceous species and 5 wood vine species) were observed during these habitats during the seasonal surveys. The most common invasive species on Barren Island is common reed (*Phragmites australis*), which is the dominant species and found throughout the island in any disturbed habitat, except the tidal flats and the low salt marshes.

There are several tidal flats associated with the various Barren Island remnants, covering approximately 17.3 acres. Invertebrates (including mud snail *Nassarius obsoletus* and blue crab) and fish are abundant in spring and summer months in this habitat. Beaches cover approximately 9.5 acres at Barren Island. Invertebrate, bird, and wildlife use of beaches is greatest during the warm seasons. Diamondback terrapin (*Malaclemys terrapin*) nesting activities observed along beaches appeared to increase the use of this habitat by predators, such as red fox (*Vulpus fulva*), raccoon (*Procyon lotor*), boat tailed grackle (*Quiscalus major*), and American crow (*Corcus brachyrynochos*). An observation of horseshoe crab spawning activity was followed by large schools of fish feeding on the dislodged eggs in the surf zone. The low salt marshes on Barren

Island remnants cover approximately 43.6 acres. The low salt marshes are dominated by monotypic stands of the tall form of common reed and changes to the short form before transitioning into high marshes.

In 2001, geotextile tubes were placed on the western shoreline of the Barren Island northern remnant, creating approximately 11 acres of low marshes. This area was planted with 100,000 plugs of saltmeadow cordgrass (*Spartina alterniflora*) in June 2001 and 50,000 plugs in May 2002. The created marsh appears to be successful and continued planting of marsh plant species is planned for September 2004 (Friends of BNWR, 2004).

The high salt marshes covering approximately 31.1 acres are more diverse floristically with respect to other terrain types at Barren Island and contain a mosaic of monotypic stands of individual species. Throughout the high marshes are shallow salt ponds that support dense growths of eelgrass. Bird and wildlife use of high marsh habitat is intense during the warm season. Salt pannes cover approximately 4.0 acres along the Barren Island northeastern remnant and behind the geotextile tube areas and are being used by several species for lofting and feeding as with the high marsh habitats. There are several freshwater (wetland) swales covering approximately 3.6 acres on Barren Island remnants as a result of anthropogenic alterations and natural effects. Freshwater marshes cover approximately 9.5 acres and are located in several areas on the northern and southern Barren Island remnants including depressions associated with the dredged material areas. Loblolly pine is the dominant tree species associated with the approximately 74.3 acres of forested terrain on both the northern and southern Barren Island remnants. During the spring and summer months, Opossum Island, located east of the Barren Island southern remnant and the small remnant island south of the southern Barren Island remnant is used as a nesting area by several species of birds.

Timed avian surveys were conducted at Barren Island during the Summer and Fall 2002 and Winter and Spring 2003 at five locations selected to represent the range of habitat types available around the island. In addition to the timed bird observations, qualitative surveys were conducted throughout the island remnants and adjacent aquatic areas. A total of 107 species of birds were observed during the seasonal field surveys. Of these, 45 species and 1,797 individuals were observed during the timed quantitative surveys. Of the 46 identified species, two species represented approximately half of all individuals recorded during all seasonal timed quantitative surveys: mute swan represented 30% of species with 531 individuals, and brown pelican represented 17% of species with 309 individuals. Diversity and abundance are highest in the shallow, sheltered aquatic ecosystems on the eastern shoreline of Barren Island. Location A-5 had the highest diversity across all seasonal field surveys, with 27 recorded species. The high densities of aquatic and upland birds are likely correlated to Barren Island's shelter, foraging, and breeding habitat, including nesting habitat for various rare and colonial nesting species. Three bird species observed at Barren Island are listed as rare, threatened, and endangered (RTE) species in Maryland (MDNR, 2004): the bald eagle (*Haliaeetus leucocephalus*), royal tern (*Sterna maxima*), and sedge wren (*Cistothorus platensis*). Based on these RTE-listed species and other avian resources such as colonial waterbird nesting sites, the Maryland Department of Natural Resources (MDNR) Wildlife and Heritage Service has designated Barren Island as part of the Sensitive Species Project Review Area (SSPRA) data layer (MDNR, 2005a,b).

Four mammal species were observed at Barren Island during the Summer and Fall 2002 and Winter and Spring 2003 surveys: muskrat (*Ondatra zibethica*), raccoon, red fox, sika deer (*Cervus nippon*), and whitetail deer (*Odocoileus virginianus*). Seven reptiles and two amphibians were also observed: diamondback terrapin, eastern box turtle (*Terrapene carolina*), eastern mud turtle (*Kinosternon subrubrum*), eastern painted turtle (*Chrysemys picta picata*), Fowler's toad (*Bufo fowleri*), narrow mouthed toad (*Gastrophryne carolinensis*), northern red bellied turtle (*Pseudemys rubriventris*), northern water snake (*Nerodia sipedon*), and spotted turtle (*Clemmys guttata*). Tiger beetle species (*Cicindela sp.*) were observed during the Summer 2002 survey on the sand spit located on the Barren Island northeastern remnant. Several tiger beetle species are listed as endangered species in Maryland (MDNR, 2004). No other mammal, macroinvertebrate, reptile, or amphibian species observed at Barren Island during any field survey activities are listed as rare, threatened, and endangered (RTE) animal species in Maryland (MDNR, 2004).

In addition, horseshoe crab and diamondback terrapin surveys were conducted during the Spring 2003 field investigation. These surveys were conducted for seven consecutive late night and early morning periods to try to capture horseshoe crab spawning activity and terrapin nesting activity along the shorelines of Barren Island at or near high tide. During the horseshoe crab survey, greater than 500 individuals were observed along the shorelines of Barren Island. Generally, beaches with a gradual slope up from the waters edge to the beach had the greatest observed usage as spawning habitat. The greatest horseshoe crab activity occurred along the shores of the southern geotextile tube area beach. During the terrapin survey, 141 individuals and 173 terrapin nests were recorded at Barren Island. The beach area on the northeastern shoreline of the Barren Island northeastern remnant accounted for 23% of all terrapin sightings on land or in the water near the shoreline of Barren Island. The northern beach of the northern remnant to the east of the old hunting lodge building remains and associated docks accounted for 29% of the observed nests. Generally, beaches with a gradual slope up from the waters edge to the beach had the greatest observed usage as a nesting habitat.

FINAL CONSOLIDATED REPORT

RECONNAISSANCE OF THE PROPOSED ENVIRONMENTAL RESTORATION PROJECT NEAR BARREN ISLAND DORCHESTER COUNTY, MARYLAND

Prepared for

MARYLAND ENVIRONMENTAL SERVICE
Annapolis, Maryland
Contract No. 01-07-30

Prepared by

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August 2002

EXECUTIVE SUMMARY

Barren Island is an uninhabited island owned by the United States Fish and Wildlife Service (USFWS) that is located in the eastern portion of the middle Chesapeake Bay, to the east of the mouth of the Patuxent River, 1 mile off the eastern shore in Dorchester County, MD. The Island is currently approximately 180 acres, and is a federal wildlife refuge. Barren Island also serves as a satellite refuge for the Blackwater National Wildlife Refuge, located in Dorchester County, Maryland. Barren Island consists of several different types of high quality habitat including low and high salt marsh, tidal flats, and forested upland habitat. Barren Island is used as nesting habitat by several federally listed bird species. According to estimates by the USFWS, Barren Island is eroding along its western shore at a rate of approximately 10 to 14 feet per year, which is equivalent to a loss rate of 2.4 to 3.4 acres per year. The Island has lost approximately 450 acres in the past 325 years as the result of erosion caused by rising sea levels.

Barren Island is under consideration for a habitat restoration and beneficial use of dredged material project under the Maryland Port Administration's Dredged Material Management Program (DMMP), formerly the Dredging Needs and Placement Options Program (DNPOP). Four separate studies were conducted to evaluate the use of dredged materials in this environmentally sensitive area in order to provide shoreline stabilization and restoration for the island as well as provide additional marsh and upland habitat areas around the island.

These four studies include:

1. *Preliminary Assessment of Environmental Conditions on Barren Island* (ECR) - An environmental conditions assessment to document (including site visits, agency consultation, and literature review) environmental resources in the project area and determine the potential impacts of the proposed dredged material placement alternatives.

2. *Geotechnical Reconnaissance Study for Barren Island* (GRS) - A study of the geotechnical conditions (including foundation and borrow source conditions at Barren Island) of the area proposed for dredged material placement.

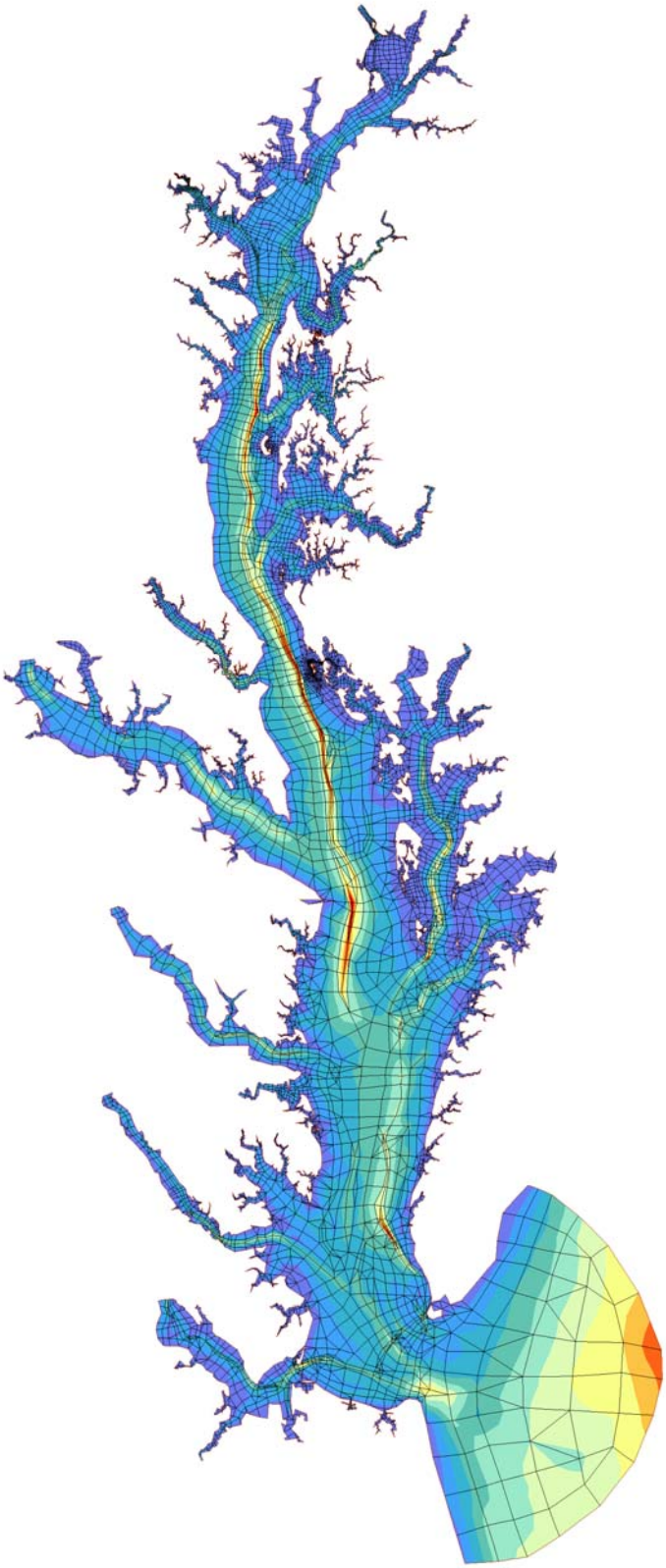
3. *Coastal Engineering Reconnaissance Study for Barren Island, Maryland* (CERS) - A preliminary coastal engineering analysis for use as a planning factor for dredging engineering and dike design.

4. *Reconnaissance Study of Dredging Engineering and Cost Estimate for Habitat Restoration at Barren Island* (*DECE)* – A study that provided a dredging engineering and cost analysis for each of the selected alternatives.

The two conceptual configurations assessed are an approximately 1,000-acre environmental restoration area (Alignment #1) and an approximately 2,000-acre environmental restoration area (Alignment #2). Both alignments are located in shallow water to the west and south of Barren Island. Both alignments would be constructed with stone armored sand dikes extending west and south from Barren Island towards the Chesapeake Bay mainstem and would include the generation of new habitat composed of 50% uplands and 50% wetlands. Both alignments would provide a tidal gut area between Barren Island proper and the environmental restoration area. For each alignment, two dike height options (10 and 20 feet) were assessed.

The results of these four reconnaissance studies are summarized in this consolidated report prepared for the Maryland Environmental Service on behalf of the Maryland Port Administration to evaluate the use of the area near Barren Island for habitat restoration and for shoreline stabilization of Barren Island.

BARREN ISLAND RECONNAISSANCE STUDY



HYDRODYNAMICS AND SEDIMENTATION MODELING

FINAL REPORT
SEPTEMBER 10, 2004

Prepared for

U.S. Army Corps of Engineers
Baltimore District

Contact No. DACW31-03-D-0002

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EXECUTIVE SUMMARY

The purpose of this Hydrodynamics and Sedimentation Modeling Reconnaissance Study is to evaluate the projected impacts due to proposed construction of a Beneficial Use Habitat Restoration Site at Barren Island. Moffatt & Nichol's (MN) Chesapeake Bay – Finite Element Model (CB-FEM) was used to predict existing (without-project) and with-project conditions hydrodynamics and sedimentation for four alternative project alignments. This report summarizes the calibration and implementation of the CB-FEM two-dimensional numerical model of the Chesapeake Bay and evaluation of hydrodynamic and sedimentation output including time-varying flow velocity, water surface elevations, and patterns of erosion and accretion.

Background

A summary of site conditions that are relevant to the project is provided below:

- **Alignments.** Four project alignments, shown in Figure 2-3, have been proposed for this study. All four proposed alignments are located to the west of Barren Island with one alignment, Alignment E, attached to Barren Island and the remaining three alignments separated from Barren Island by a 500 foot wide channel. Alignment A is approximately 1,325 acres and extends farthest to the south relative to the other alignments. Alignment C is approximately 1,125 acres and extends farthest west but not as far south as Alignment A. Alignment D is approximately 600 acres and is long and narrow with a typical width of 1,500 feet for wetland creation. Alignment E is attached to Barren Island and most closely resembles the historic 1860's shoreline. Alignment E is approximately 690 acres.
- **Bathymetry and Topography.** Water depths in the area where the dikes would be located range from –2 ft to –12 ft Mean Lower Low Water (MLLW), with a maximum depth along the exterior dikes of -10 ft MLLW. Water depths in the deeper main stem portions of the Bay west of Barren Island are as great as –155 ft MLLW. In the project vicinity, three natural oyster bars (NOBs) and a fertile aquatic nursery area have been identified as shown in Figure 2-3.
- **Freshwater Inflow.** The drainage area of the Chesapeake Bay is approximately 64,000 square miles and includes portions of Maryland, Virginia, West Virginia, Pennsylvania, New York and the District of Columbia. Freshwater enters the Chesapeake Bay via approximately 150 major rivers and streams at approximately 80,000 cubic ft per second (Schubel and Pritchard, 1987).
- **Tides.** Water levels in the Chesapeake Bay are dominated by a semidiurnal lunar tide. Tides enter the Bay via the Chesapeake Bay entrance and the Chesapeake and Delaware (C&D) Canal. The mean range of tides throughout the entire Chesapeake Bay is generally 1 to 3 ft (NOS, 1988). In the project vicinity, the mean tide level is 0.9 ft above MLLW; the mean tidal range is 1.3 ft and the spring tidal range is 1.8 ft (NOS 1997).
- **Currents.** In the project vicinity, peak flood currents are on the order of 0.7 ft/sec, and peak ebb currents approach 0.4 ft/sec (NOS, 1996). Currents are not considered the limiting factor for shore protection design at this project site.
- **Wind and Wave Conditions.** Design winds for the site were developed on the basis of data collected at Baltimore-Washington International (BWI) airport. These winds, which

can exceed 90 miles per hour during a 100-year storm event, were used to develop design wave conditions. Barren Island is exposed to wind-generated waves approaching from all directions.

- **Site Soil Characteristics.** Results of the separate geotechnical preliminary study (E2CR, 2002) indicate that the underlying soils consist mostly of loose silty sand, suitable for supporting the dike. Areas with soft silty clays at the mud line, however, would need to be undercut and backfilled with sand.

Numerical Model

The numerical modeling system used in this study consists of the US Army Corps of Engineers finite element hydrodynamics (RMA-2) and sedimentation (SED-2D) models – collectively known as TABS-2 (Thomas, McAnally and Ademac, 1985). The numerical modeling system uses a bathymetric mesh of water depths, represented by nodes located in the horizontal plane that are interconnected to create elements.

Calibration

Correlation of the hydrodynamic model calibration results to NOAA predicted data for tidal elevations and current velocities is better than 90%. Predicted percent error is less than 10% for tidal elevations and less than 20% for current velocity.
The non-cohesive sediment model was run using 0.1mm (.004 inch) sediment under no-wind conditions. Analysis of results shows negligible sand transport due to tidal currents. Non-cohesive sediment was then modeled non-cohesive for existing conditions under 4-, 13-, and 16-mph winds. Results show that sediment transport is negligible for 4- and 13-mph winds for all directions. Sixteen-mph winds, when taken cumulatively with lower wind speeds, account for nearly 90% of the yearly wind occurrences and cause sediment transport for winds from the north-northwest through to the south-southeast (counter-clockwise direction) directions with less sediment transport for winds from other directions. The results of the 16-mph wind modeling are discussed in this report.

The cohesive sediment model was run for a 6-month simulation period at which point the model achieved a dynamic equilibrium (average values and rates remain steady over time). The cohesive sediment model was then run for each of 16 wind directions for wind speeds of 4- and 13-mph. Sediment transport of cohesive sediment occurs for 13-mph winds from the north-northwest through to the south-southeast (counter-clockwise direction) directions with less sediment transport for winds from other directions, and the results of 13-mph winds are presented in this report.

Results

Hydrodynamics and sedimentation numerical modeling for the Barren Island Reconnaissance Study show no impacts on local tidal elevations, which are unchanged from existing to with-project conditions. Local current velocities are impacted following island construction, with typical maximum changes in current velocity on the order of 0.5 ft/sec which when taken with existing tidal currents are not sufficient to cause sediment suspension or shoreline erosion. The proximity of the southern tip of Alignments A and D to Upper Hooper Island cause a constriction

which increases current velocities locally and reduces overall flow between Barren Island and Upper Hooper Island. Alignments A, C, and D show areas of increased velocity in the gap between the proposed project and existing Barren Island. Alignment E shows the least changes to current velocity patterns and rates.

Alignments A and D have the longest north-south profiles and provide the most shoreline protection to Upper Hooper Island. Alignment C has a shorter north-south profile and provides less shoreline protection than A and D while Alignment E has the shortest north-south profile and results in the least shoreline protection to Upper Hooper Island.

Alignment C creates the largest sheltered areas and causes reduced erosion and accretion over the NOBs to the northwest and southwest and over the nursery area to the north of Barren Island. Alignment A creates smaller sheltered areas and provides less reduction over the NOBs and nursery area than Alignment C. Alignments D and E create limited sheltered areas and create almost no change in sedimentation rates and patterns over the NOBs northwest and southwest and the nursery area north of Barren Island.

Storm tides are projected to magnify the current velocity and sedimentation results presented in this report. Project construction would provide some sheltering by reducing wind fetches and the resulting waves. The long north-south profile of Alignments A and D would provide added protection to Barren Island, Upper Hooper Island, and Meekins Neck for winds and waves from the southwest through the southeast and existing Barren Island would be protected from winds and waves from the north-northwest through southeast. Alignments C and E provide additional protection to Barren Island, Meekins Neck, and Upper Hooper Island from erosion but the protection is not as extensive as for Alignments A and D due to the shorter north-south profile of Alignments C and E.

Recommendations

Alignment A provides the most increase in shoreline protection while providing beneficial changes to sedimentation by reducing erosion and accretion over the nursery area and the NOBs. Alignment A has a long north-south profile which protects the Upper Hooper Island shoreline. Alignment A also protrudes to the west which provides some sheltering to the nursery and NOBs from waves.

The Alignment which provides the most increase to shoreline protection with the least impacts to hydrodynamic and sedimentation is Alignment D. Due to its long, narrow profile, Alignment D acts more like a breakwater than an island. The narrow profile of Alignment D causes the least changes to current velocities and to sedimentation patterns and rates over the nursery to the north and the NOBs to the northwest and southwest of Barren Island.

Appendix J

Mid-Chesapeake Bay Island Feasibility Report
List of Preparers

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Name	Organization	Title
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Appendix K

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Appendix L

Recreation Justification

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MID-CHESAPEAKE BAY ISLAND ECOSYSTEM RESTORATION PROJECT RECREATION FEASIBILITY

REPORT ADDENDUM

MAY 2006

Updated June 2009

1. INTRODUCTION

The Mid-Bay Islands Restoration Project is an environmental project located in the Mid-Chesapeake Bay area, which spans north to south from the Chester River to the Maryland/Virginia state line, and along the eastern shore from Queen Anne's County to Somerset County, Maryland. James and Barren Islands are the two islands in the project area chosen for restoration. The project uses dredged material from the Upper Chesapeake Bay Approach Channels to the Port of Baltimore to beneficially restore 2,072 acres of wetland and upland habitat. By adding capacity to James and Barren Islands, the Mid-Bay Islands Restoration Project is planned to create approximately 932 acres of upland placement, and 1140 acres of wetland development (45% uplands / 55% wetlands). It is estimated that by 2021 the Mid-Bay Islands expansion alone will provide an additional 78 to 95 million cubic yards (mcy) of dredged material placement capacity.

This document contains a description of the conceptual plan that is being proposed for the recreation purposes on the Mid-Bay Islands. This analysis determines the net benefits for the recreation features proposed. Recreation features are being included in the Mid-Bay project as an additional project benefit, and are not part of the overall project benefit cost analysis. Therefore, recreation benefits will not be used in the justification of the recommended plan. Due to the incidental effect of these recreation elements, a determination of acceptable design to meet Corps standards has not been completed at this study phase. Based on a conceptual design for an existing tidal marsh cell, recreation costs are estimated at $204,000. Since recreational features must comply with the project purpose of remote island habitat, the actual location of the recreational features upon completion of the project will be restricted to the tidal gut area at James Island. This allows for passive recreation from the water (with possible time of year restrictions for nesting seasons, based on recommendations of local biologists). If deemed necessary, there is also the possibility of using of the dike areas for recreation, as no project benefits were claimed for habitat on the dikes themselves. In addition, if recreation were to expand to other restored areas outside of the dikes, the plan formulation section of the report would have to be updated and recalculated. This would lead to delaying finalization of the report.

Passive recreational and educational components considered in the plan formulation were very minimal. This was due to the fact that the project creates unique remote island ecosystem habitat which is fragile and very susceptible to human interference. It was determined that even passive recreation could negatively impact nesting habitats. And so, the intention of the project is to develop minimal low-impact recreational/educational spaces in a way that benefits the local jurisdictions and the State of Maryland, while still meeting the objectives of the restoration project. The majority of the passive recreational components are interpretive guidance and media, including: a self-guided/interpretive water trail in the tidal gut at James Island, informative signage, and avian observation from the water. Other components such as public tours of the islands, research opportunities for universities, and volunteer opportunities will be available during the construction of the project (estimated 30 years).

In 2000, the Chesapeake Bay Program (CBP) signed an agreement with the governors of MD, PA and VA, the mayor of DC, and the administrator of the EPA to increase the number of water trails in the Chesapeake Bay by 500 miles, by 2005. That goal has since been surpassed, and public awareness of the Bay's resources continues to grow. The additional 3.89 miles of water trail added at James Island will help to continue the CBP's mission of public education.

Recreational and educational features implemented at Mid-Bay will be consistent with the goals of the restoration project, and implementation will be coordinated with the sponsor, interested parties, and local jurisdictions.

2. AUTHORIZATION

In 1997, USACE-Baltimore and Maryland Port Administration (MPA) initiated the Mid-Bay Islands Expansion Study under Congressional Authorization to pursue the study through the Senate Committee on Environment and Public Works, in accordance with Section 905(b) of the Water Resources Development Act (WRDA) of 1996. The resolution which was proposed on June 5, 1997 reads:

> *Resolved by the Committee on Environment and Public Works of the United States Senate, That the Secretary of the Army is requested to review the report of the Chief of Engineers on the Chesapeake Bay, Maryland and Virginia, published as House Document 176, Eighty-eighth Congress, First Session, and other pertinent reports with a view to conducting watershed management studies, in cooperation with other federal agencies, the State of Maryland and the State of Delaware, their political subdivisions and agencies and instrumentalities thereof, of water resources improvements in the interest of navigation, flood control, hurricane protection, erosion control, environmental restoration, wetlands protection, and other allied purposes in watersheds of the Eastern Shore, Maryland and Delaware.*

The Maryland Port Authority (MPA), the non-Federal sponsor, will provide 35 percent of the cost associated with construction of the project, including provision of all lands, easements, rights-of-way, and necessary relocations; and will pay 100 percent of the operation, maintenance, replacement and rehabilitation costs associated with the project. For the recreational components, economically justified facilities will be cost shared 50 percent Federal and 50 percent non-Federal.

Authority to include recreational components as part of the project purpose is found in the Flood Control Act of 1944, as amended, the Federal Water Project Recreation Act of 1965 (PL 89-72) and the WRDA 1986. These acts each grant broad authority to include recreation as a project purpose; however USACE policy (ER1105-2-100) limits the exercise of these authorities.

3. STUDY AREA

The middle Chesapeake Bay, which encompasses the Mid-Bay Islands region, is a valued recreational resource used by many individuals for a variety of activities; the most

popular being swimming, boating, fishing, water sports, and wildlife viewing. Recreational activities are important to the local economy, and the recreational activities in the vicinity of the Mid-Bay Islands are typical of most Chesapeake Bay communities. In the Mid-Bay Islands project area, recreation opportunities will be toned down to "passive recreation" due to the restricted access planned after construction.

Recreation and education components suggested for inclusion in the future development of the Mid-Bay Islands Restoration are as follows:

3.1.1 During Construction (Est. 30 years)

- Research opportunities for educational institutions – Educational institutions would be provided opportunities and permitted to conduct scientific studies at James Island and at the proposed lateral expansions during site construction. Barren Island is owned by Fish and Wildlife Service (USFWS); research opportunities at Barren Island would be coordinated through by them.
- Volunteer opportunities – Volunteers would be invited to participate in both wetland and upland plantings, and various other activities that would aid in project creation / construction.
- Dock for visiting boats – A dock for visitors to tie-up boats will be located in the dike area. The main reasons for visitors during the construction phase would be construction, volunteer, or research. Upon completion of construction, the boat dock may remain in place if deemed necessary for additional project purposes such as O&M.
- Resting/viewing areas – Locations for resting on benches in the proposed dike areas would be in place during construction.

3.1.2 Upon Completion of Construction

- A self-guided/interpretive, low-impact water trial will be created through the main tidal gut area at James Island.
- Informative signage – Signs would be located at set areas along the water trail and other areas viewable by passive observance from the water. These signs would be intended to point out elements of viewable wildlife nearby and educate the public on the Mid-Bay Islands restoration. Other signage would be in place to indicate navigational warnings, land restrictions, tidal gut water trail directional signs, and time of year restrictions to tidal gut access if necessary.

Table 3-1: Preliminary cost estimate for proposed recreation features

FEATURE	QUANTITY	UNIT COST	TOTAL COST
Signs - frames	20	$200	$4,000
- graphics	2,000	$100	$200,000
Water Trail Construction, misc. cost	Existing tidal gut		$0
TOTAL			**$204,000**

4. RECREATION BENEFITS

The national economic development (NED) benefit evaluation procedures contained in ER 1105-2-100 (22 Apr 00), Appendix E, Section VII, include three methods of evaluating the beneficial and adverse NED effects of project recreation: travel cost method (TCM), contingent valuation method (CVM), and unit day value (UDV) method.

The UDV method was selected for estimating recreation benefits associated with the expansion of the Mid-Bay Islands. UDV was chosen because both TCM and CVM require extensive recreation surveys that were not feasible or justifiable. UDV relies on informed judgment, and is an acceptable method to approximate average willingness to pay for federally funded projects. The UDV approach consists of two parts: determining value per visit and estimating visitation user days.

4.1.1 Determining Value per Visit

When the UDV method is used for economic evaluations, planners select a specific value from the range of values provided annually by USACE, in Economic Guidance Memorandum (EGM) 06-03, Unit Day Values for Recreation, Fiscal Year 2006. The selected value is used to estimate annual use over the project life, in the context of both the with- and without-project framework. The difference between the with- and without-project conditions provides the estimate of recreation benefits.

The without-project condition in the analysis has limited recreation value since both Barren and James Islands currently have few recreation opportunities. The without-project condition is described in Appendix H of the main report. Appendix H explains that while both Barren and James Islands have a limited number of boat docks and marinas within 10 miles, they both have a higher than average boat usage when compared to other Mid-Bay islands. Therefore, even though they are not convenient to many boaters, their waters are still popular with boaters. Appendix H also determined that 50% of the boaters near James Island and 40% near Barren Island were likely to engage in fishing. Based on the number of registered motorboats and estimates of the number of annual boater user days, the recreational user days per year were also calculated in Appendix H. It was determined that the recreational user days in the vicinity of James Island were about 20,000, and about 8,000 of those were calculated to be primarily fishing days. At Barren Island, there were about 25,000 recreational user days, 11,000 being fishing recreation days. The without-project condition will be the expected value of the recreational activity based on the UDV method, when no recreation measures are planned. A detailed description of these statistics is documented in Appendix H.

Table 4-2 illustrates the method of assigning a point rating to a particular activity, both with and without recreation measures installed. The table also shows the point values assigned based on measurement standards described for the five criteria: Recreation Experience, Availability of Opportunity, Carrying Capacity, Accessibility, and Environmental.

Point value assignments for Table 4-2 are based on Economic Guidance Memorandum (EGM) 06-03, Unit Day Values for Recreation, Fiscal Year 2006. The Criteria and Judgment Factors for General Recreation were specifically used as the basis of the estimated point values for the proposed recreation area. Judgment factors were based on the ongoing public involvement of the island as well as coordination with local agencies and organizations.

4.1.2 Estimating Visitation

Visitation days without the project are approximated based on the aerial survey and model analysis of boaters conducted in 2002, and described in Appendix H. It is estimated that the number of visitor days at James Island would increase by at least 20% after the completion of construction of the recreation area through the main tidal gut at the island. Visitor days are not expected to increase at Barren Island as no additional recreation features are going to be added there during the construction of this project. Table 4-1 outlines visitation.

Table 4-1: Island Visitation With and Without the Project

ISLAND	BOATERS W/O PROJECT	BOATERS W/PROJECT
James	20,000	24,000
Barren	25,000	25,000
Total (Both Islands)	45,000	49,000

5. EXPLANATION OF RECREATION POINT VALUES

5.1.1 Recreation Experience

Recreation experience was assigned a point value of 2 without the project, and a point value of 12 with the project. Due to the deteriorating quality of the Mid-Bay Islands, it is assumed that currently, without the project, the Mid-Bay Islands can support very little recreation activity. This activity would most likely be bird watching, picnicking, or limited coastal fishing upon beach access. Based on the boat survey in Appendix H, it is assumed that 20,000 boaters a year currently use James Island for these purposes. Although the Mid-Bay Islands restoration would restrict island usage, recreation experience is still expected to be enhanced in the project area. It is assumed that additional activity, and specifically the construction of the boat trail, which is considered a “specialized recreation experience,” would raise the point value to 12 points and improve the overall recreation experience in the project area.

Table 4-2: Ranking Criteria and Judgment Factors for Water Trail at James Island

CRITERIA	JUDGMENT FACTORS				
Recreation Experience Total Pts: 30	Two general Activities	Several general activities	Several general activities: one high quality value activity	Several activities; more than one high quality high activity	Numerous high quality value activities; some general activities
Point Value Without-Project: 2 With-Project: 12	0-4	5-10	11-16	17-23	24-30
Availability of opportunity Total Pts: 18	Several within 1 hr. travel time; a few within 30 min. travel time	Several within 1 hr. travel time; none within 30 min. travel time	One or two within 1 hr. travel time; none within 45 min. travel time	None within 1 hr. travel time	None within 2 hr. travel time
Point Value Without-Project: 3 With-Project: 6	0-3	4-6	7-10	11-14	15-18
Carrying capacity Total Pts: 14	Minimum facility for development for public health and safety	Basic facility to conduct activity(ies)	Adequate facilities to conduct without deterioration of the resource or activity experience	Optimum facilities to conduct activity at site potential	Ultimate facilities to achieve intent of selected alternative
Point Value Without-Project: 2 With-Project: 12	0-2	3-5	6-8	9-11	12-14
Accessibility Total Pts: 12	Limited access by any means to site or within site	Fair access, poor quality roads to site; limited access within site	Fair access, fair road to site; fair access, good roads within site	Good access, good roads to site; fair access, good roads within site	Good access, high standard road to site; good access within site
Point Value Without-Project: 8 With-Project: 12	0-3	4-6	7-10	11-14	15-18
Environmental Total Pts: 20	Low esthetic factors that significantly lower quality[7]	Average esthetic quality; factors exist that lower quality to minor degree	Above average esthetic quality; any limiting factors can be reasonably rectified	High esthetic quality; no factors exist that lower quality	Outstanding esthetic quality; no factors exist that lower quality
Point Value Without-Project: 4 With-Project: 13	0-2	3-6	7-10	11-15	16-20

5.1.2 Availability of Opportunity

Availability of opportunity was assigned a point value of 3 without the project, and a point value of 6 with the project. Presently, the Chesapeake Bay Program estimates that there are roughly 650 miles of water trails in the Maryland waters of the Chesapeake Bay. However the James Island water trail will provide a one of a kind opportunity in terms of its restored island area and unique ecosystem habitat. The with-project condition of the Mid-Bay Islands restoration assumes that very few opportunities would be available to get the same level of recreational experience. The unique opportunities at the Mid-Bay Islands raise Mid-Bay's point value to 6.

5.1.3 Carrying Capacity

Carrying capacity was assigned a point value of 2 without the project; because currently there are "minimum facilities for development for public health and safety." As explained in the main report, Barren and James Islands are rapidly being depleted of precious land mass and animal habitat, and very limited recreation facilities currently exist there. With the current trends in the availability of land mass, the opportunity exists that additional recreation facilities such as the water trail can be added to the project, and raise the point value of this element to 12 with the project.

5.1.4 Accessibility

Accessibility was assigned a point value of 8 without the project because currently there is fair access to both James and Barren Islands. Presently, people are able to boat up to the islands and use them for general recreation. However, once the Mid-Bay restoration is in place, it is anticipated that on-island access will be closed to the public. Water trail access at James Island is expected to remain open during most times of the year. Factoring in the decrease of on-island access and the uniqueness of the added water trail feature, the with-project condition was assigned a point value of 12 for this element.

5.1.5 Environmental

The environmental element was assigned a point value of 4 without the project. This was due to the fact that the Mid-Bay Islands are currently experiencing a great deal of erosion that is leading to degraded environmental quality and loss of habitat. Ecosystem restoration elements such as increased habitat area and island species attraction are the main environmental goals of the Mid-Bay Island restoration project. These additional benefits are expected to enhance the general recreation experience at the islands and raise the point value with the project to 13.

6. RECREATION POINT VALUE CONVERSION

The Economics Guidance Memorandum, 06-03, Unit Day Values for Recreation, Fiscal Year 2006 also describes how to convert recreational point values to dollar values. The guidance provides a conversion table based on the Consumer Price Index, where as the recreation point values increase, the dollar values of recreation also go up. And recreation is categorized as either "general" or "specialized." Specialized recreation has

a higher point value because it includes activities that are unique and/or not readily available in the area.

In total, the without-project condition has a point value of 19. By using the conversion table, the value of general recreation without the project is $4.19 per user day, and specialized recreation is worth $14.75 per user day. With the project in place, the total point value is estimated to be 54, so the with-project condition is worth $6.78 per user day, and specialized recreation is worth $19.14 per user day.

7. SPECIALIZED RECREATION OPPORTUNITIES

The main recreation element of a "water trail" is considered general recreation according to Economics Guidance Memorandum 06-03. There are currently 1,804 miles of water trails in the Chesapeake Bay, approximately 650 miles in the Maryland waters alone. (Chesapeake Bay Program, 2006) However, since the water trail at James Island will have unique species habitat and restored island area, approximately twenty five percent of the recreational experience at the Mid-Bay Islands restoration could be classified as "specialized". The support for the specialized classification use is that the project will attract species with life requisites requiring island habitat. The Mid-Bay Islands will be part of a small group of islands in the Bay that will provide unique, remote island habitat. This habitat area currently provides nesting opportunities for island species, as well as sustains diamondback terrapin and bald eagle nests. It is expected that the restored island area will attract new species, including some rare and threatened. The restored area will also be much larger and thus provide increased habitat acreage.

8. ECONOMIC JUSTIFICATION OF RECREATION

The justification of incurring additional costs for recreation features is derived by utilizing a benefit to cost ratio. The tangible economic justification of the proposed ancillary recreation project component can be determined by comparing the equivalent average annual costs to construct the recreation facilities against the estimate of the equivalent average annual benefits, which would be realized over the period of analysis. The federally mandated project evaluation interest rate of 4.875 percent, an economic period of analysis of three years, and current prices were used to evaluate economic feasibility (see Table 8-1). A period of three years was used since, as stated in Section 7.3.3 of the main report, the recreation features are projected to be constructed in 2057 and the economic period of analysis for James Island goes to 2060.

Annual visitation was calculated with and without the project features. In the calculation, 25% of the UDV of recreation was considered specialized and 75% was considered general. The following is the estimated revenue.

8.1.1 Without -Project:

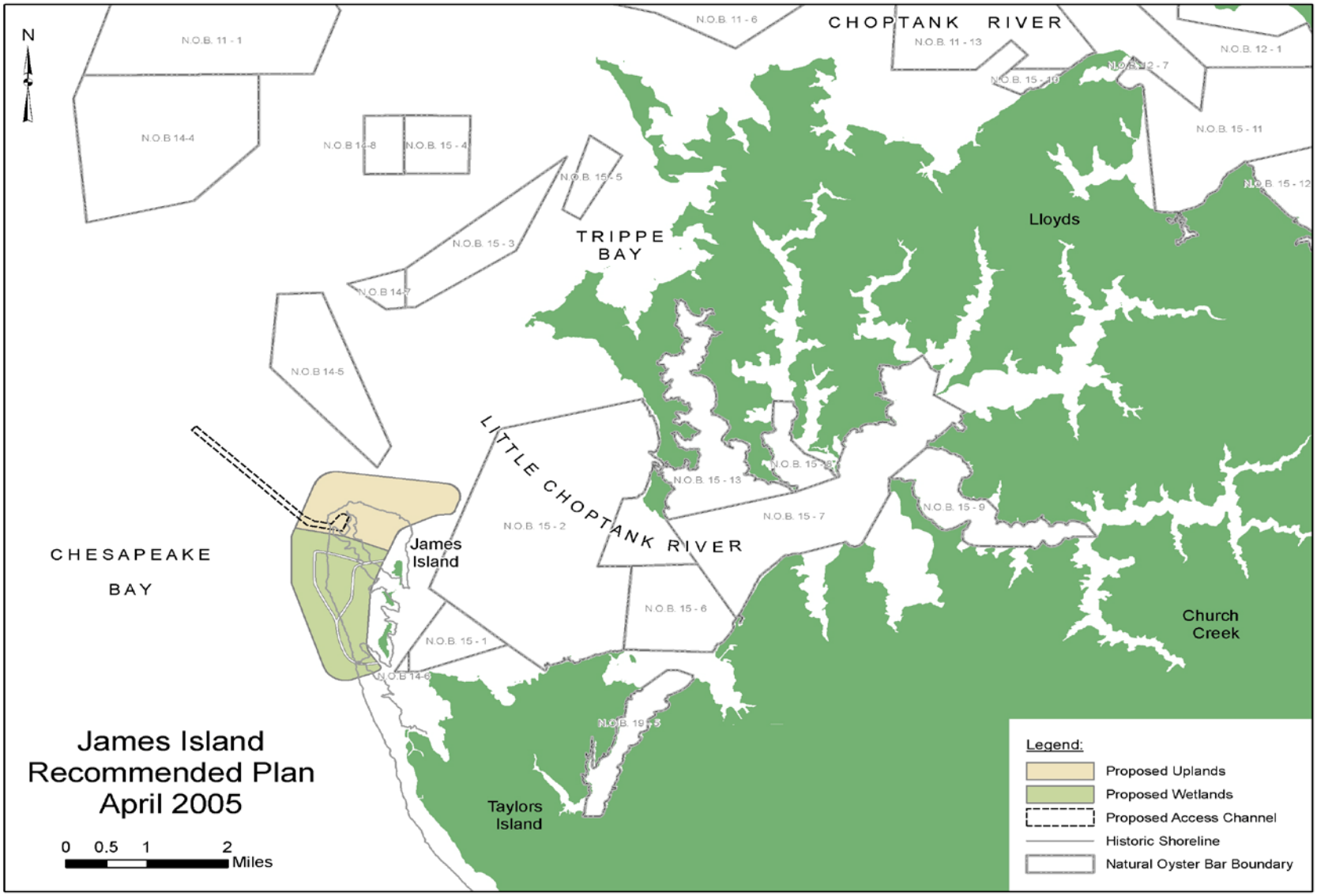
Annual Visitor Total	=	45,000
Cost per person/visit (general recreation)	=	$4.19
Cost per person/visit (specialized recreation)	=	$14.75
Total (75% general, 25% specialized)	=	$307,350/yr value

8.1.2 With -Project:

Annual Visitor Total	=	49,000
Cost per person/visit (general recreation)	=	$6.78
Cost per person/visit (specialized recreation)	=	$19.14
Total (75% general, 25% specialized)	=	$483,630/yr value

Table 8-1: Benefits and Costs of Recreation Elements

Annual Costs	
Total Recreation Costs	$204,000
Interest during PED and Construction (6 mos.)	$2,486
Total Investment Cost	$206,486
Average Annual Cost (3 years)	**$75,646**
Annual Benefits	
With-Project - Unit Day Value (75% general / 25% specialized)	$9.87
Daily Users	49,000
Annual Use (49,000 *$9.87) $9.87 = ($6.78*.75 + $19.14*.25)	$483,630
Without-Project - Unit Day Value (75% general / 25% specialized)	$6.83
Daily Users	45,000
Annual Use (45,000 *$6.83) $6.83 = ($4.19*.75 + $14.75*.25)	$307,350
Annual Benefit ($483,630 - $307,350)	**$176,280**
Benefit to Cost	
Net Annual Benefits	**$100,634**
Benefit Cost Ratio	**2.3 to 1**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CHOPTANK RIVER
N.O.B. 11 - 1
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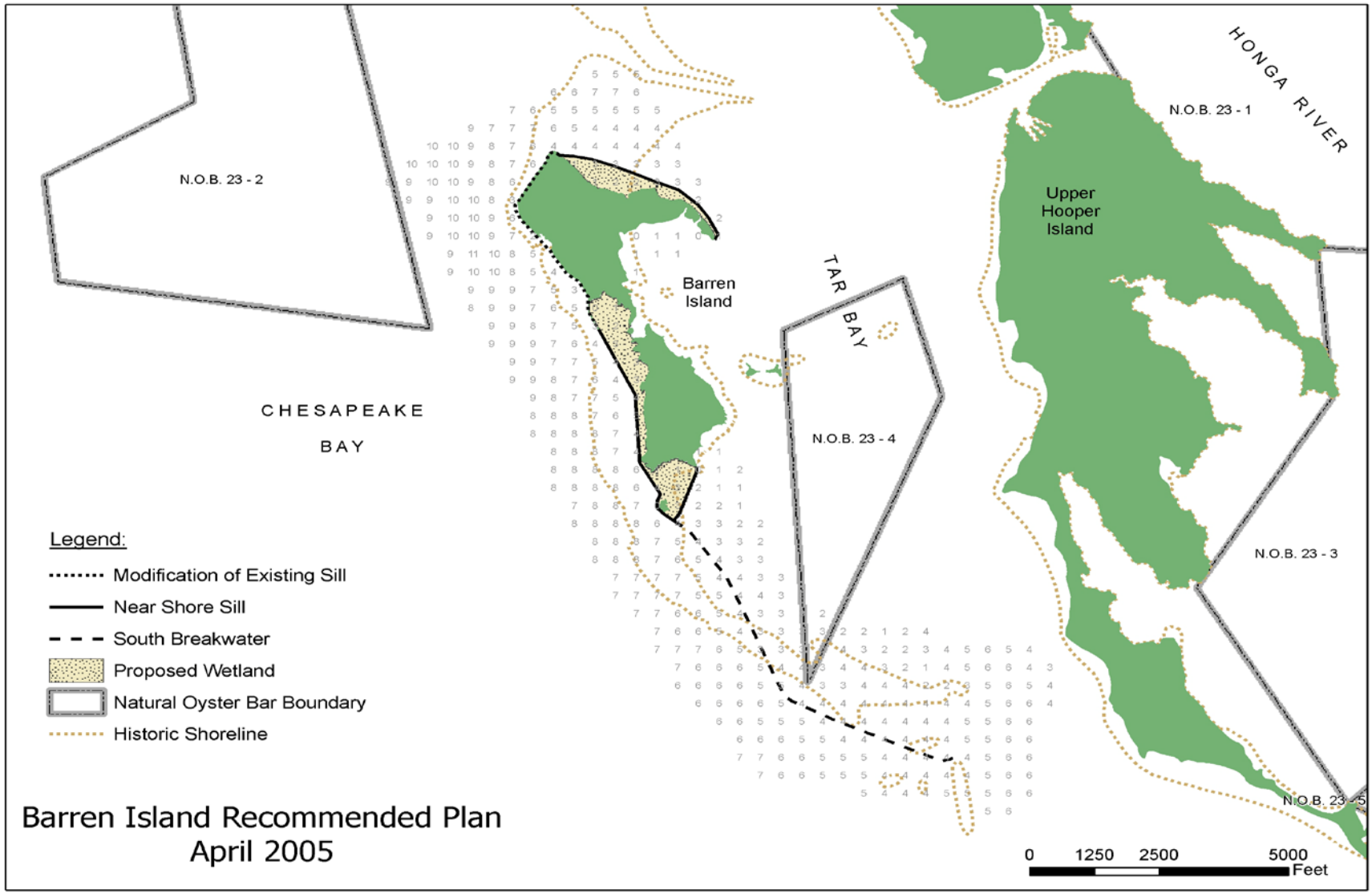
N.O.B. 15 - 11
N.O.B. 15 - 12
N.O.B 14-4
N.O.B 14-8
N.O.B. 15 - 4
N.O.B. 15 - 5
N.O.B. 15 - 3
N.O.B 14-7
N.O.B 14-5
TRIPPE BAY
Lloyds
LITTLE CHOPTANK RIVER
N.O.B. 15 - 13
N.O.B. 15 - 7
N.O.B. 15 - 9
N.O.B. 15 - 2
James Island
CHESAPEAKE BAY
N.O.B. 15 - 6
N.O.B. 15 - 1
N.O.B 14-6
N.O.B. 19 - 5
Church Creek
Taylors Island
James Island
Recommended Plan
April 2005
0 0.5 1 2
Miles
Legend:
Proposed Uplands
Proposed Wetlands
Proposed Access Channel
Historic Shoreline
Natural Oyster Bar Boundary



Barren Island Recommended Plan
April 2005

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Appendix M

Formal Response to Comments

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APPENDIX M – FORMAL RESPONSE TO COMMENTS

MID-CHESAPEAKE BAY ISLAND ECOSYSTEM RESTORATION INTEGRATED FEASIBILITY REPORT & ENVIRONMENTAL IMPACT STATEMENT (EIS)

July 2007

Prior to preparation of this Final EIS, public involvement was conducted throughout the NEPA process. The public involvement program was initiated at the beginning of the study process to provide opportunities for public participation during each stage of the project development. Additionally, consultation with resource agencies was conducted through agency coordination letters that solicited their input and through agency participation on the Project Delivery Team. Agencies, organizations, and members of the public with a potential interest in the proposed action were urged to participate in the decision-making process. Public involvement and agency coordination were integrated into each stage of project development. The stages of the Mid-Chesapeake Bay Island Ecosystem Restoration study included: 1) issue identification and project scoping, 2) additional studies to define existing conditions, 3) public update meetings, 4) alternatives comparison, 5) recommended plan development, 6) impact evaluation and draft EIS preparation, 7) responding to comments on the draft EIS, and 8) preparing the final EIS and completing the ROD. Agency coordination, public participation, and outreach efforts for each stage of the project are discussed in Chapter 9 and documented in Appendix G. Full transcripts of the public meetings are also included in Appendix G.

The USACE considered all comments received during preparation of the final EIS. Table M-1 of this appendix presents a summary of the substantive comments received from Federal agencies, State agencies, groups and associations, and the public following release of and regarding the draft EIS. Oral comments recorded at the public meetings conducted in October 2006 are also included. Formal responses to comments are also provided in Table M-1.

Comments were categorized by type of comment (i.e., Federal, State, Local, Group/Associations, Public, or Oral). Each comment received a comment code with a letter designating the type of comment (F=Federal, S= State, L=Local, G= Group/Association, O=Oral). In addition, each person or source providing a comment within a category was assigned a discrete number (i.e., 1, 2, 3, etc. Multiple comments received from a single person or source were numbered consecutively (i.e., 1.1, 1.2, 1.3, etc.).

Table M-1: Formal Responses to Draft EIS Comments.

Agency/Contact Name/Date	Comment Code	Comment	Response
Federal Government Comments			
U.S. Department of the Interior, Office of the Secretary, Office of Environmental Policy and Compliance / Michael Chezik / October 17, 2006	F-1.1	The report contains the Fish and Wildlife Coordination Act Report, dated May 24, 2005, produced by the U.S. Fish and Wildlife Service, which expresses general support for both the James Island and Barren Island components of the project. The DEIS adequately describes the project effects for which the Department has jurisdiction or special expertise. Certain points that appear to be inaccurate or in need of clarification are discussed below.	Comment noted. No response necessary.
U.S. Department of the Interior, Office of the Secretary, Office of Environmental Policy and Compliance / Michael Chezik / October 17, 2006	F-1.2	Pg ES-5, lines 2-3. The statement that "Barren Island is used as nesting habitat by several Federally listed threatened bird species" is incorrect. The bald eagle is the only such species.	Comment noted. Text revised to address comment.
U.S. Department of the Interior, Office of the Secretary, Office of Environmental Policy and Compliance / Michael Chezik / October 17, 2006	F-1.3	Pg ES-15, lines 5-6. The statement that "the proposed James Island restoration project would preserve approximately 100 acres of existing wooded, fringe marsh, and beach island habitat that is subject to rapid erosion" is misleading. Page 3-2 notes that the Island remnant acreage was only 92 acres in 1994. Page 3-75 notes that the Island erodes at a rate of 4.9 acres per year and is projected to disappear by 2021. According to the project implementation schedule, dike construction would not begin until fiscal year 2010. Since it appears that the amount of preserved island habitat would be considerably less than 100 acres, the statement should be appropriately qualified.	Comment noted. Text revised to address comment.

Table M-1. (continued)

Agency/Contact Name/Date	Comment Code	Comment	Response
U.S. Department of the Interior, Office of the Secretary, Office of Environmental Policy and Compliance / Michael Chezik / October 17, 2006	F-1.4	Pg 3-7, lines 31-32. The statement that "the salinity of the Chesapeake Bay water varies from 3.5 percent (seawater, 18ppt) at the mouth" is incorrect. It is true that the average salinity of the open ocean is approximately 3.5 percent (i.e., 35 grams of salt per liter of seawater). However, the salinity at the bay mouth is somewhat less and, while varying temporally and with depth, tends to be on the order of 3.0 percent with is equal to 30 ppt.	Comment noted. Text revised to address comment.
U.S. Department of the Interior, Office of the Secretary, Office of Environmental Policy and Compliance / Michael Chezik / October 17, 2006	F-1.5	Pg 3-9, lines 14-15. The statement that "the tides are greater at the mouth of the Chesapeake Bay [0.9 m (2.95 ft)] and decrease northward to ~0.3 m (1 ft) near the Fall Zone at the head of the head of the Chesapeake Bay" is not quite correct. The general pattern is that the tides decrease from the Bay mouth and reach a low of approximately 1 foot in the area near Annapolis, but then increase to nearly 2 feet at Town Point near the head of the Bay.	Comment noted. Text revised to address comment.
U.S. Department of the Interior, Office of the Secretary, Office of Environmental Policy and Compliance / Michael Chezik / October 17, 2006	F-1.6	Pg 4-31, line 4. The wetland/upland ration of the selected plan is not 45/55 as stated here, but rather 55/45.	Comment noted. Text revised to address comment.
U.S. Department of the Interior, Office of the Secretary, Office of Environmental Policy and Compliance / Michael Chezik / October 17, 2006	F-1.7	Pg 5-1, lines 21-22. The statement that the James Island proposal would be constructed to approximate the historic 1877 island footprint conflicts with previous information from the report (page 3-5) that states that the 1847 footprint consisted of only 976 acres, far smaller than the 2,072-acre proposal.	Comment noted. Text revised to address comment.

Table M-1. (continued)

Agency/Contact Name/Date	Comment Code	Comment	Response
U.S. Department of the Interior, Office of the Secretary, Office of Environmental Policy and Compliance / Michael Chezik / October 17, 2006	F-1.8	Pg 5-1, lines 38-39.The statement that the recommended alternative "includes the option to reconfigure the wetland and upland ratios" needs to be clarified since this is an important aspect of the project. From information presented on page 5-3, it appears that this refers to an option to increase the wetland portion of the project from 55 to 60 percent. It would improve clarity if this information was added to qualify the statement on reconfiguring the wetland and upland ratio.	Comment noted. Text revised to address comment.
U.S. Department of the Interior, Office of the Secretary, Office of Environmental Policy and Compliance / Michael Chezik / October 17, 2006	F-1.9	Pg 6-2, lines 25-26. The statement that Barren Island has lost 520 to 660 acres in the last 325 years is inconsistent with information presented on page 3-5 and Figure 3-4 which appears to calculate this loss of acreage from the 1848 footprint. Since erosion has been an ongoing process over the past few hundred years, there are various "historic" footprints for the islands depending on what dates are selected. To reduce confusion our suggestion would be to emphasize the 1847/48 footprint because this data is likely to be more reliable than the data from the 1600's. It should be evident that the farther back in time one goes, the larger will be the footprint.	Comment noted. Text revised to address comment.
US Environmental Protection Agency, Region III / William Arguto / October 23, 2006	F-2.1	While EPA clearly concurs with the need for protection and restoration of Barren and James Islands, there also needs to be a long-term management effort to protect and improve wetlands in the Blackwater Wildlife (BWR) Refuge in Dorchester County which must be considered for future restoration. The BWR needs millions of cubic yards of materials and while this alternative will require some major engineering and design, this site is of national aquatic significance and has the potential for large-scale wetlands creation.	Comment noted. Refer to Chesapeake Marshlands Restoration Study for further information.

Table M-1. (continued)

Agency/Contact Name/Date	Comment Code	Comment	Response
US Environmental Protection Agency, Region III / William Arguto / October 23, 2006	F-2.2	Based upon our review of the Draft EIS the project is rated as LO, Lack of Objections.	Comment noted. No response necessary.
State Agency and Official Comments			
Maryland Department of Agriculture, Office of the Secretary / Gloria Minnick / September 27, 2006	S-1.1	The Draft Mid-Chesapeake Bay Island Ecosystem Restoration Integrated Feasibility Report & Environmental Impact Statement has been reviewed and found to be within Maryland Department of Agriculture's plans, programs, and objectives.	Comment noted. No response necessary.
Maryland Department of the Environment, Technical and Regulatory Services Administration / Joane D. Mueller / September 28, 2006	S-2.1	Any above ground or underground petroleum storage tanks that may be utilized must be installed and maintained in accordance with applicable State and Federal laws and regulations. Contact the Oil Control Program for additional information.	Comment noted. No response necessary.
Maryland Department of Agriculture, Office of the Secretary / Gloria Minnick / September 29, 2006	S-3.1	The Draft Mid-Chesapeake Bay Island Ecosystem Restoration Integrated Feasibility Report & Environmental Impact Statement has been reviewed and found to be within Maryland Department of Agriculture's plans, programs, and objectives.	Comment noted. No response necessary.
Maryland Environmental Service, Technical and Environmental Services / Charles Madison / October 2, 2006	S-4.1	It is MES's position that the content of the Draft Feasibility Report for the Mid-Chesapeake Bay Island Ecosystem Restoration is consistent with the Agency's plans, programs, and objectives. While MES is pleased to have had the opportunity to participate in the completion of the Draft Feasibility Report for the Mid-Chesapeake Bay Island Ecosystem Restoration, the regulations affecting the proposed plan are regulated or enforced by other State and Federal agencies. Therefore, MES defers to each responsible agency for concurrence on these specific components.	Comment noted. No response necessary.

Table M-1. (continued)

Agency/Contact Name/Date	Comment Code	Comment	Response
Maryland Department of Natural Resources, Environmental Review Unit / Ray C. Dintaman, Jr. / October 31, 2006	S-5.1	The proposed island configuration at James Island would result in a section of the proposed outer perimeter dike being located within 500 yards of the boundaries of a charted natural oyster bar (NOB). The area within the boundaries of the NOBs is specifically established, reserved, and protected from activities and impacts considered detrimental to oyster populations or destruction of the bottom. Oysters spawn and subsequently set their spat during the period June through September in estuarine sections of rivers and the Bay. During this period dredge units can entrain and destroy oyster eggs and larvae. In addition, sediments resuspended by dredging activities may affect oysters. Potentially, ingesting sediment particles that are the same size as prey organisms could starve larval oysters. Larval oysters could also delay metamorphosis to spat because the substrate is covered with loose sediments and is therefore unsuitable. Oysters also become inactive during the colder months of the year and are more liable to burial (inability to clear themselves of deposited sediment) during this period of reduced activity. To minimize the potential impacts, any excavation of material or placement of unconfined dike material within 500 yards of the boundary of a designated NOB should not occur during the periods 16 December through 14 March or 1 June through 30 September of any year.	Comment noted. Comment clarification obtained via email; no changes to text necessary.
Maryland Department of Natural Resources, Environmental Review Unit / Ray C. Dintaman, Jr. / October 31, 2006	S-5.2	The locations of the oyster restoration sites shown on Figure 3-12 should be included on Figure 5-1. Any dredging for the access channel and/or the dike construction that would be within 500 yards of the oyster restoration sites would have the same oyster time-of-year restrictions as dredging within 500 yards of the NOB boundaries.	Comment noted. Figure revised to address comment.

Table M-1. (continued)

Agency/Contact Name/Date	Comment Code	Comment	Response
Maryland Department of Natural Resources, Environmental Review Unit / Ray C. Dintaman, Jr. / October 31, 2006	S-5.3	The document should provide additional discussion regarding the relationship of the proposed 2,072-acre island at James Island to the historic footprint of James Island and a figure showing the relationship of the proposed island footprint to the historical footprint of James Island.	Comment noted. Text revised to address comment.
Maryland Department of Natural Resources, Environmental Review Unit / Ray C. Dintaman, Jr. / October 31, 2006	S-5.4	The Corps should continue to work with the Department's Wildlife and Heritage Service staff to avoid impacts to sensitive species at James and Barren Islands through island design modifications and/or time-of-year restrictions on construction activity.	Comment noted. No response necessary.
Maryland Department of Natural Resources, Environmental Review Unit / Ray C. Dintaman, Jr. / October 31, 2006	S-5.5	If it becomes necessary to construct the breakwater extending to the south of Barren Island, the Department asks that all due consideration be given to incorporating the placement of one or more small (1-5 acres in size) islands in the breakwater design to serve as nesting sites for colonial waterbirds. Small islands surrounded by extensive areas of open water provide important predator-free nesting sites that are currently being lost in the Bay to erosion. In addition the island(s) would provide additional visual clues to the mariners of the location of the breakwater.	Comment noted. No response necessary.
Maryland Historical Trust, Office of Preservation Services, Review & Compliance / Elizabeth J. Cole / November 8, 2006	S-6.1	The Maryland Historical Trust has determined that there are no historic properties affected by this undertaking.	Comment noted. No response necessary.

Table M-1. (continued)

Agency/Contact Name/Date	Comment Code	Comment	Response
Local Agency and Official Comments			
Harford County Health Department, Office of Environmental Health / Susan Kelly / November 1, 2006	L-1.1	I recommend checking option #2 with the qualifying statement that the dredging process adheres to state of the art technology and the dredge material is monitored to minimize hazardous and toxic conditions.	Comment noted. The Project will operate under a State Water Quality Certificate.
Group and Association Comments			
Dorchester Citizens for Planned Growth / Fred C. Pomeroy / October 17, 2006	G-1.1	**Summary**: The group is in support of the project due to its potential to help reverse the loss of wetlands, which has negatively impacted marine resources in recent years. The group sees the project as a means to promoting sustainable economic development in Dorchester County and a complement to Blackwater National Wildlife Refuge. The group requests that efforts be made to enlist local residents in the construction work force. The group notes the success of the Poplar Island project and its benefits and believes the potential for the Mid-Bay Island project is at least as great. (Full text of comment can be found in Appendix G)	Comment noted. No response necessary.

Table M-1. (continued)

Agency/Contact Name/Date	Comment Code	Comment	Response
Sierra Club, Maryland Chapter / Margaret Carter / October 23, 2006	G-2.1	[The Sierra Club] is concerned that economic and political pressures can lead to decisions to re-build islands that are not always necessarily objectively justified, ecologically or scientifically. The apparent environmental success at Poplar Island, per se, has the potential to lead to a mindset that could be characterized as "let's just do it again" (a little farther down the Bay), as each new spoil island becomes full and additional disposal capacity is needed. This could lead to an effectively endless series of 1,00-2,000 acre construction works in Chesapeake Bay that are, for periods of 20 to 50 years each, essentially industrial sites with some ancillary environmental benefits. Indeed, Table 4-3 (p. 4-52), lists a number of other potential sites, such as Smith, Little Deal, Holland, South Marsh, Hoopers, and Ragged Island (s). Figure B-30 indicates that since James Island's 2072 acres of spoil receiving capacity will be filled after 24-27 years of use, yet another site must be ready by approximately year 2042-2045. Planning will have to begin by 2030. Already, 1140 acres are being filled at Poplar Island, with 575 acres of expansion planned there. Various "wetland and SAV protection" efforts at Smith, Tangier, and Taylor's Islands are planned (p. ES-15). 2142 acres of filling at James and Barren Islands are the subject of the present DIFR & EIS, and 101 acres of access channel into the re-built James Island will be dredged (Table ES-5, p. ES-9). (Please see complete letter outlining the Sierra Club's comments that follows this table.)	Changes made in Sections 3.1.6.c.5, 3.1.6.c.6 and tables 3-20, 3-21, 3-22, and 3-23. For detailed responses to these comments, please see comment response letter that follows this table.

Table M-1. (continued)

Agency/Contact Name/Date	Comment Code	Comment	Response
Sierra Club, Maryland Chapter / Margaret Carter / October 23, 2006	G-2.2	Tradeoffs between re-creating island wetland and terrestrial habitat and destroying productive shallow water aquatic habitat by filling with dredged spoil must take into careful consideration the values of the habitat that will be lost. It is in this area that we find the DIFR & EIS to be lacking as a decision-making document. (Please see complete letter outlining the Sierra Club's comments that follows this table.)	Changes made in Sections 3.1.6.c.5, 3.1.6.c.6 and tables 3-20, 3-21, 3-22, and 3-23. For detailed responses to these comments, please see comment response letter that follows this table.
Sierra Club, Maryland Chapter / Margaret Carter / October 23, 2006	G-2.3	While a great deal of thought and effort obviously went into the development of "island community units" ("ICU"'s) (cf. Fig. 4-7, p. 4-43; Fig. 4-9, p. 4-44) as a means of accounting the ecological benefits of re-building islands, we believe that techniques for characterization of the shallow aquatic habitat at James Island, where most of the loss will occur, may not have been executed properly. The shallow aquatic habitat at James Island has been characterized as "stressed" in the DIFR & EIS (Table ES-5, p. ES-9; p. 3-28; p. 3-31; p. 4-27; Table 4-33, p. 4-87.) We are concerned that a characterization of an existing situation as "stressed" implies that its loss is of relatively little importance, biasing a decision towards altering large areas of such a habitat, when in fact they are productive and valuable to Chesapeake Bay in their present condition. (Please see complete letter outlining the Sierra Club's comments that follows this table.)	Changes made in Sections 3.1.6.c.5, 3.1.6.c.6 and tables 3-20, 3-21, 3-22, and 3-23. For detailed responses to these comments, please see comment response letter that follows this table.

Table M-1. (continued)

Agency/Contact Name/Date	Comment Code	Comment	Response
Sierra Club, Maryland Chapter / Margaret Carter / October 23, 2006	G-2.4	Finally, we believe that habitat condition characterizations based on the Weisberg, et al, technique of computing B-IBI, while impressively objective in many ways, tend to ignore the benefits to Chesapeake Bay of high productivity. The Weisberg technique notes that very high abundance of some species can sometimes be attributed to somewhat stressful or marginally impaired conditions. This is due to the suppression of competition by other less-well adapted species. For example, the extensive semi-pure stands of *Spartina patens* (saltmarsh hay) and *Distichilis spicata* (salt grass) in high marsh are due to their ability to exploit a habitat type that is stressful to most other species. However, no one would argue that such a habitat was impaired or polluted. It simply has characteristics that some species have been able to adapt to, and some others have not: SAVs grow under water, oak trees do not. (Please see complete letter outlining the Sierra Club's comments that follows this table.)	Changes made in Sections 3.1.6.c.5, 3.1.6.c.6 and tables 3-20, 3-21, 3-22, and 3-23. For detailed responses to these comments, please see comment response letter that follows this table.
Sierra Club, Maryland Chapter / Margaret Carter / October 23, 2006	G-2.5	While we recognize that one of the IBI metrics, benthic organism abundance (no. per square meter) has a place in evaluating habitat, high abundance, such as occurs at James Island should not necessarily suggest that benthic habitat there is impaired. The year round abundance at James Island is some 82 times that at Barren Island. This is high productivity that is transferable to other, valued trophic levels, such as fish. This may be reflected in the estimate of some 8,000 recreational fishing days per year near James Island (p. 3-73). (Please see complete letter outlining the Sierra Club's comments that follows this table.)	Changes made in Sections 3.1.6.c.5, 3.1.6.c.6 and tables 3-20, 3-21, 3-22, and 3-23. For detailed responses to these comments, please see comment response letter that follows this table.

Table M-1. (continued)

Agency/Contact Name/Date	Comment Code	Comment	Response
Sierra Club, Maryland Chapter / Margaret Carter / October 23, 2006	G-2.6	In conclusion, we believe that in order to make the DIFR & EIS an adequate decision-making document, further attention should be paid in the Final EIS to long-term, future cumulative impacts and additional techniques besides the B-IBI should condition the characterization of habitats that will be lost should the decision to build be implemented. (Please see complete letter outlining the Sierra Club's comments that follows this table.)	Changes made in Sections 3.1.6.c.5, 3.1.6.c.6 and tables 3-20, 3-21, 3-22, and 3-23. For detailed responses to these comments, please see comment response letter that follows this table.
Public Comments			
Resident / Frank Bentz, Jr. / October 6, 2006	P-1.1	I think what you are doing is a great idea. It finds use for dredge spoil at the same time saving wildlife areas. If you stop the erosion of Barren Island it will also protect my property on the shore opposite it on Tar Bay. The island reduces the fetch of the wind from the Northwest and stops the waves from the bayside of Barren. Hooper Island is threatened by erosion and rising sea level. I am in favor of all steps to protect and prevent that erosion. I would like to see Barren started first as it protects more private property than James. Both islands are a huge benefit to wildlife.	Comment noted. No response necessary.
Taylors Island Resident / Anna Cutter / October 18, 2006	P-2.1	I support the James Island ecosystem restoration project. I am grateful for the top-notch public meeting presentation at TI [Taylors Island] on October 12, 2006.	Comment noted. No response necessary.
Taylors Island Resident / John Cutter / October 18, 2006	P-3.1	I'm in favor of the James Island Restoration Project. I feel it would benefit the environment, wildlife, and residents of Taylors Island and Dorchester County.	Comment noted. No response necessary.

Table M-1. (continued)

Agency/Contact Name/Date	Comment Code	Comment	Response
Dorchester County Resident / Arthur Boccuti / October 20, 2006	P-4.1	The shoreline along Ragged Point Rd. is washing away. The road washes out regularly and is in need of constant repair. We encourage the implementation of the ACOE [Army Corps of Engineers] plan. Thank you.	Comment noted. No response necessary.
Dorchester County Residents / Mark and Linda Wilson / October 22, 2006	P-5.1	We strongly support the proposed creation of upland and wetland habitat on the western side of James Island and the continued work at Barren Island. These projects will not only create new sub aquatic and terrestrial habitat, they will help protect existing shorelines that are being severely eroded. We live on Back Creek near the mouth of Hudson Creek on the Little Choptank River. We are both Eastern Shore natives and have lived in the Neck District of Dorchester County for almost thirty years. Having been a waterman in the 1980s, I am familiar with the erosion of James Island and its affects on the crab and oyster fisheries in the Little Choptank. The bottom line is that more open water means stronger tides and less suitable area for trot lining and hand tonging. Also, more open water means more shoreline erosion that causes increased turbidity, which negatively impacts aquatic life. As we have seen with the Poplar Island project, the concept appears to be a win/win situation for the environment and the Port of Baltimore. We would suggest that every effort be made to proceed with the proposed new project as soon as possible. We would also suggest that a real effort be made to employ watermen and other local people on this new project.	Comment noted. No response necessary.

Table M-1. (continued)

Agency/Contact Name/Date	Comment Code	Comment	Response
Oral Comments (Delivered at the October 11-12, 2006 public meetings)			
Maryland Port Administration / Stephen Storms / October 11, 2006	O-1.1	I'm a project manager for the Maryland Port Administration, which is a part of the Maryland Department of Transportation. The flow of international commerce through the Port of Baltimore is a major generator of jobs and revenue for the State of Maryland. The jobs of more than 136,000 Marylanders are in some way related to the movement of cargo across Baltimore's docks. The Port is the State's second largest economic engine, generating more than $1 billion in business and government revenues. Continued dredging of the approach channels in the Chesapeake Bay is an absolute necessity for maintaining the Port. And existing placement sites for approach channel dredged material will run out of space by 2014.The Port of Baltimore fully supports this project to provide continued efficient management of this dredged material. The Maryland Department of Transportation is a non-Federal sponsor for this project. The Maryland Port Administration, under the auspices of the Department of Transportation and acting through its office of Harbor Development, was involved in all of the coordination related to this study. The Port Administration has indicated their intent to proceed with the next phase of project implementation and to provide the non-federal cooperation required for the project implementation. Thank you.	Comment noted. No response necessary.

Table M-1. (continued)

Agency/Contact Name/Date	Comment Code	Comment	Response
Dorchester County Shoreline Erosion Group / Joe Coyne / October 11, 2006	O-2.1	My purpose in being here tonight is to urge approval of the Draft Integrated Feasibility Report and Environ-mental Impact Statement for the Mid-Chesapeake Bay Island Restoration Project in Dorchester County. Several years ago the then Dorchester County Commission had asked that I and my colleague, Bruce Coulson, representing the Dorchester County Resource Preservation Development Corporation, serve as Dorchester County's representatives on a relatively new committee that was formed in Baltimore. This committee was formed to get opinions and ideas on the Maryland Port Administration's plans to identify and implement a beneficial use plan for some of the almost 47 million cubic yards of dredged material it removes each year to ensure clear shipping lanes into Baltimore's harbor. The question is why is this so important to Dorchester County. Some of those questions were answered in Scott's presentation. You may remember Hurricane Fran back in 1996 and the damage that it did around here. What we learned in the immediate aftermath of that storm was that there was no support group to really assess damage, make fixes and plan for future remedies. Shortly after Fran, a group of citizens organized to try to correct those problems. A newly formed Shoreline Erosion Group was introduced to work, authorized by the Congress back in 1983. This authorization directed the U.S. Army Corps of Engineers to -- quote -- evaluate shoreline protection agents, which will protect both land and water resources of the Chesapeake Bay from the adverse effects of continued erosion. (continued on next page)	Comment noted. No response necessary.

Table M-1. (continued)

Agency/Contact Name/Date	Comment Code	Comment	Response
Dorchester County Shoreline Erosion Group / Joe Coyne / October 11, 2006	O-2.1 (Continued)	The final report of the study conducted by the Corps and issued in 1990 cited several areas as critical and in need of protection. Two of those areas cited were Barren and James Island. As a result of the DMMP we now have the opportunity to implement parts of those recommendations that relate to the preservation of Barren and James Island. Said preservation has been a major goal for our Dorchester Shoreline Erosion Group. The committee that I referred to in our introduction formed as a part of the Port Administration Dredged Material Management Program is called the Citizens Advisory Committee. The committee is composed of a cross-section of people representing government, non-government and private sector or-ganizations. We are regularly briefed on the work of the Maryland Port Administration and the Corps of Engineers, and we provide feedback to them as they go about the business of putting together the documents we are discussing tonight. So the point that I'm trying to make here is that at least a set of four eyes from Dorchester County have been through the process that Scott described here and seen all the information and data that's been gathered and presented to this particular committee. It's been intriguing to see the quality of the work performed, the quality of the people doing the work; quite high. So really this is a great opportunity to now see the results of the Corps at work in that very thick EIS that sits out in the waiting room, and to offer comments and suggestions that you may have. I want to take this opportunity to also thank the Port Ad-ministration for creating the structure where we all have the opportunity to participate; such a huge undertaking, when approved for construction will ultimately, I believe, make significant contributions to the health of our portion of the Chesapeake Bay. Again, I urge full support of the Report that's been presented by Scott. Thank you very much.	Comment noted. No response necessary.

Table M-1. (continued)

Agency/Contact Name/Date	Comment Code	Comment	Response
Maryland General Assembly / Delegate Jeannie Haddaway / October 11, 2006	O-3.1	My name is Jeannie Haddaway, and I'm a member of the Maryland House of Delegates, representing this area. And I want to thank the Army Corps for coming out tonight and doing this presentation here. A couple of things I just would like to mention quickly. First of all, the Port and its importance to Maryland's economy. We automatically think of Baltimore when we think of the Port, but honestly, there are hundreds of companies and businesses here on the Eastern Shore that rely on that Port to move goods for them, so it's important to the Eastern Shore's economy as well. And I know we are not here to talk about Poplar Island tonight, but I think it is a very successful model and we really from the State's perspective appreciate the way that the Army Corps and the Maryland Port Administration and the Department of Natural Resources have worked with us to get that project done, including working with the watermen to make sure that if some of the bottom is displaced there are other areas that are opened up that are comparable. And I would encourage the Army Corps to do the same with these projects. But certainly shoreline erosion is a very important issue particularly for Dorchester County, so thank you for the information you are presenting here tonight.	Comment noted. No response necessary.
Dorchester County Seafood Harvesters Association / Capt. Larry Powley / October 11, 2006	O-4.1	Living on Hoopers Island, just inside of Barren Island, we have seen this grass just leave very fast because the water is getting deeper, it's getting rougher into our bay. And by you all restoring Barren Island, it would really benefit the grasses in that bay. If we lose our grasses, ladies and gentlemen, our bay is going to be dead. And that was one of the most important grass beds that we had in lower Dorchester County. And just another thing I'd like to add, I hope that you'll employ some of the local watermen down there, and it would be a benefit to them to give them some jobs, plus some money in the local community.	Comment noted. No response necessary.

Table M-1. (continued)

Agency/Contact Name/Date	Comment Code	Comment	Response
Dorchester County Seafood Harvesters Association / Capt. Ben Parks / October 11, 2006	O-5.1	I'd like to thank you all for holding these public meetings. To date I have not had anyone call me in opposition to this project, either Barren or James. I'm not saying you won't find some resistance somewhere, but nobody contacted me. What he spoke about the grasses, you've got to remember when these islands erode they are also burying our oyster beds. Tarr Bay was probably one of the better oyster harvesting grounds that there was in the lower Dorchester area. On the inside of James Island, we had multiple oyster beds there everywhere, and they're all being silted over and it's all coming from erosion. And we thank you for what you are doing for us.	Comment noted. No response necessary.
Dorchester County Shoreline Erosion Group / Bruce Coulson / October 11, 2006	O-6.1	I came tonight to speak in favor of this project. I guess it's all been said about the environmental benefits we are going to gain out of this. And it's going to be a long-term economic benefit for the community also with the jobs it's going to create and the areas going to be utilized with the workers. And if you want to get an idea of what this project will look like when it's done, take a tour of Poplar Island. Poplar Island is a -- I've been out there twice myself, once on a tour and once planting grasses. It will give you a good idea what the finished product will look like once these islands are restored. I think what they have done is, as Joe said earlier, they have been dotting the i's and crossing the t's on everything on this project and they're overturning everything and creating models to see what will happen, and I think they've done a very good job on this, and I support it and urge you all to support it also.	Comment noted. No response necessary.

Table M-1. (continued)

Agency/Contact Name/Date	Comment Code	Comment	Response
Dorchester County Resident / Art Boccuti / October 11, 2006	O-7.1	I've come this evening primarily to encourage and urge the passage and approval of the plan that was shown tonight by the Corps of Engineers. I am a resident of Dorchester County; I'm also a resident of Ragged Point. I live on Ragged Point, which is directly leeward; we're behind the James Island complex. And from my perspective, which I get every day, I can continue to see the erosion of the mainland and, of course, the islands themselves. We frequently see the beach along the front of Ragged Point washed away; we frequently see the road washed out; and we frequently see the demise of the turtles that plant their eggs in the sand, and the run-off of eagles which live along the shoreline there. So I'm here to tell you that it would be greatly in favor of James Island and the mainland and the habitat, including us folks that live there.	Comment noted. No response necessary.

Table M-1. (continued)

Agency/Contact Name/Date	Comment Code	Comment	Response
Dorchester County Resident / Fred Pomeroy / October 11, 2006	O-8.1	I'd basically like to echo the comments of Mr. Parks and Mr. Powley. I, too, am a fisherman. I first caught crabs and fish at James Island -- I'm going to date myself now -- probably about 40 years ago, and in that time I've seen the mouth of the Little Choptank River change from a river habitat to what I would call an open-bay ecosystem and, as a result -- Mr. Parks is right on, the most beautiful oysters in the Chesapeake were to be caught between James Island and Taylors Island. We used to call that a creek. That was called Oyster Creek, aptly named because the oysters were so good there. And erosion has caused all those beds to silt over and the moving sand has cut the oysters and now there's just shell there, there are no oysters. But I would like to see the project done. And I would also like to echo Mr. Powley's comments that we should look into using our watermen to help with this project. There will be some watermen whose livelihoods are disrupted by this in the James Island area. I myself would benefit because I fish on the river side of James Island, so it would be more like it used to be, which was a protected area. Now it's an open-bay area and it's hard to work for me. But the ones who work outside James Island, perhaps if there was a way that the watermen could be used on some of this, that would, that would benefit us. And I see it as in the long-term as a great economic boon to our ecotourism, which is something we are trying to develop in Dorchester County. You know, that habitat would be just awesome for the people that come kayaking and canoeing and those kinds of things. So I'm in favor of the project.	Comment noted. No response necessary.

Table M-1. (continued)

Agency/Contact Name/Date	Comment Code	Comment	Response
Maryland General Assembly / Delegate Addie Eckardt / October 12, 2006	O-9.1	This issue has been very near and dear to my heart and I'm excited to see this. It takes long for things to happen in government. But I met with Joe Coyne and Bruce Coulson, I think it was back in 1996, '7 or '8, when I first learned about the Poplar Island project and the need to dredge the channels to maintain the Port and its viability. So we sat down and met with a number of folks out of the Port and the Department of Transportation and talked about the possibility of restoring James and Barren. So I am very excited to see something that looks like the reality of that moving forward. And without much information, it looked like all Alternative 3 was a good option to my way of thinking. Now, I know it's very expensive and that's going to be the issue. I also know that things take longer than we anticipate. And so, you know, my wish is that we could move this along pending, you know, the involvement and the comments that we hear from the folks here in Taylors Island and the rest of the community, because I think that's a very important part of this process. So thank you for bringing it this far, and I will do whatever I can to move it along as long as I know that I have the support of the community. Thank you.	Comment noted. No response necessary.
Maryland General Assembly / Delegate Jeannie Haddaway / October 12, 2006	O-10.1	I just would like to say how important the Port is, not only to Baltimore but also to the Eastern Shore, where we have hundreds of businesses that rely on the Port to move goods for them, and from the environmental standpoint of how important these projects can be, not only for landowners but also for the health of the bay. So if you have not been out to Poplar Island, I would encourage you to go, check it out. It's a very similar project, a very good model of how this can work. Again, we just appreciate the way the Army Corps and the Maryland Port Administration worked with us on that project, and we would anticipate the same level of cooperation on these projects as well. Thank you.	Comment noted. No response necessary.

Table M-1. (continued)

Agency/Contact Name/Date	Comment Code	Comment	Response
Dorchester County Council / Jay Newcomb / October 12, 2006	O-11.1	We had a problem, and Senator Sarbanes came down to Hoopers Island. We had a location we had to find a spoil site for. Mr. Sarbanes worked very hard to get to use Barren Island as a spoil site. And also we were looking at a place to save a -- a shore erosion group was trying to save James Island and Barren Island. So several meetings we come up and the Corps was interested in looking for another place to restore. Dorchester was not being represented right. At that time we had a person who was not showing up to the meetings. But at this time I think we need to give a hand to Mr. Joe Coyne and Bruce Coulson for attending these meeting, went to many meetings in Baltimore. They have done a outstanding job for this. I think we should give them a hand of applause right now because if it weren't for them we wouldn't be where we are today. So I think this is a win-win situation. We've got help with the port; we'll have the channel dredged out. We need placement for our local watermen, keep our local channels dredged out. Charley Wright's trying to get one dredged out today. He's still fighting finding a spoil site. And we need to save James Island and Barren Island, also save Taylors Island and Hoopers Island. So I'd like to thank the Corps, the Port Administration, and all the local people. We met with the watermen; most of them seemed be onboard. There were a few questions. Most of those have been ironed out. So I hope we can start this project even sooner than you projected, and I hope we can move quickly. Thank you.	Poplar Island tour information was made available at the meeting. Comment noted. No response necessary.

Table M-1. (continued)

Agency/Contact Name/Date	Comment Code	Comment	Response
Dorchester Shoreline Erosion Group / Joe Coyne / October 12, 2006	O-12.1	I wanted to spend a minute or two on the Citizens Advisory Committee that Jay talked about. Bruce and I have been members of the Citizens Advisory Group for four or five years. We were trying to remember just how long it's been and we couldn't come up with a firm time. Basically, people wonder what we have done and been doing on the Citizens Advisory Committee. It's as you pointed out earlier, it's a part of the dredged material management program, and I think a very important part because it kept the citizens, public interest groups, non-government and government agencies involved in the development of this plan, this report that you talked about, the one with the long name, and it kept the comments flowing back and forth from the people who were developing the plan and those who were interested in the plan and the impact of that report on the communities that it would be involved in. The other thing is that this report provides a culmination of many hours of work of really expert people, scientists, engineers, and technicians. They're a select group, and I've never seen quite so many good people working on a project with a single aim to produce a really good product. I think that stands on its own. The work of the Citizens Advisory Group was to review the work of that project draft and make comments in terms of what the impact might be if this project -- if this particular island or site were chosen for the selection of the beneficial use of dredged material, what would be the impact on that community and island and particularly on the environmental. I think the Citizens Advisory Group had a lot of good impact in making that happen. The other question, issue that I would like to mention is the impact of shoreline erosion in Dorchester County. We have this thing called the Dorchester Shoreline Erosion Group here in the county, and we're trying to identify problems that are… (continued on next page)	Comment noted. No response necessary.

Table M-1. (continued)

Agency/Contact Name/Date	Comment Code	Comment	Response
Dorchester Shoreline Erosion Group / Joe Coyne / October 12, 2006	O-12.1 Continued	…raised by shoreline erosion and that sort of thing. We really categorize them in three ways: The environmental side, which includes things like the submerged aquatic vegetation or the death thereof; excess nutrients; siltation causing problems for the oyster beds; and the economic side, which causes at least the loss of income, loss of land; and the social side, which includes loss of viable watermen community and loss of the seafood-packing community, those kinds of issues that have always been associated -- communities that have always been associated with the lower part of Dorchester County. The recommendation that Barren and James Islands be the next site chosen I believe is a very good one. In view of these documents, they address very serious issues, provide the best available solutions with regard to our concerns regarding James and Barren Islands. In closing, I strongly urge the acceptance of this document package reviewed by the U.S. Army Corps of Engineers, Chief of Engineers, April of 2007, followed by a positive Record of Decision no later than the fall of 2007. And of course if those dates could be moved up sooner, the better, we'd appreciate that. I'd also like to take this opportunity to commend the teams from both the Army Corps of Engineers and the Maryland Port Administration for their joint effort in bringing the overall project to this stage. Thank you very much.	Comment noted. No response necessary.

Table M-1. (continued)

Agency/Contact Name/Date	Comment Code	Comment	Response
Maryland Port Administration / Stephen Storms / October 12, 2006	O-13.1	As has been pointed out here earlier this evening, the flow of international commerce through the Port of Baltimore is a major generator of jobs and revenue for the State of Maryland. The jobs of more than 126,000 Marylanders are in some way related to the movement of cargo across Baltimore's docks. The Port is the state's second largest economic engine, generating more than a billion dollars annually in business and government revenues. Continued dredging of the approach channels in the Chesapeake Bay is an absolute necessity for maintaining this port. And existing placements sites for approach channel dredged material will run out of space by 2014. The Port of Baltimore fully supports this project to provide continued efficient management of this dredged material. The Maryland Department of Transportation is the non-federal sponsor for this project. The Maryland Port Administration, under the auspices of the Department of Transportation and acting through its Office of Harbor Development, was involved in all of the coordination related to this study. The Port Administration has indicated their intent to proceed with the next phase of the project implementation and to provide the non-federal cooperation required for project implementation. Thank you.	Comment noted. No response necessary.

Table M-1. (continued)

Agency/Contact Name/Date	Comment Code	Comment	Response
Dorchester County Shoreline Erosion Group / Bruce Coulson / October 12, 2006	O-14.1	I just wanted to say I support this project. It's a very good project and, as Joe said before, there's been a lot of time and effort put into this. Both the Port and the Corps should be commended for the work they've done on this project. They have dotted all the i's and crossed all the t's. A couple things I'd like to talk about. One is you should take a tour of Poplar Island to get an idea of what James Island will look like after it's done. I've been out there twice myself, and there was a time lag in between and I could see the differences out there. You can go out and you can see the water quality, how nice the water is on the leeward side of Poplar Island, and you can see the habitat that's out there. It's really, really amazing. I urge everybody to sign up and call that person and arrange a tour of Poplar Island. It would be very well worth your while. But as well as the environmental benefits that we in this area will receive out of this project, you will also see some economics impacts here, too, the local people, the jobs that this is going to create over a 30-year project. They're going to be using people from our area to do work on these types of projects, so it's going to help our local economies here and help some of the watermen here also that would want to use people -- to get jobs to be able to shuttle workers back and forth. The other thing I'd like to bring up -- and I don't know if everybody here knows what goes on in the Port -- I received this information packet from Jeannie Haddaway today that she got from the Port -- but the Port employs 42,400 Maryland citizens, and 900 of those citizens live on the Eastern Shore. There are 120 businesses on the Eastern Shore that use the Port as import and export, and they ship approximately 30 million tons -- I'm sorry -- 30 thousand tons of goods from the Port, which is about 3.7 percent. Just so you know, some of the local businesses in Cambridge that use this port: Cambridge Yacht Brokers, GKD, …	Comment noted. No response necessary.

Table M-1. (continued)

Agency/Contact Name/Date	Comment Code	Comment	Response
Dorchester County Shoreline Erosion Group / Bruce Coulson / October 12, 2006	O-14.1 Continued	…Interstate Container Cambridge, Interstate Corrpack; a person by the name of Jeffrey Debrine, Maryland Wire Belts, POK Firefighting, Regina Corporation and a person by the name of Reginald Bromwell; East New Market, a person by the name of Lisa Bracy; and in Hurlock, Defender Packaging. All these people use the Port. These are 2005 Eastern Shore importers and exporters. And close by to us, Federalsburg, would be -- I believe I'm pronouncing this right -- Faquir Farms, the Lafrance Corporation, M&M Consignment and Maryland Plastics and Solo Cups. You can see there are businesses around here that utilize the Port of Baltimore. I'd like to submit this, if I could, for the record.	Comment noted. No response necessary.
Taylors Island Resident / Ellie Polley / October 12, 2006	O-15.1	I've been a resident of Taylors Island for 33 years. I've seen such a drastic change in those years. When I first came down here, we had sailboats and boats went out towards James Island and we could never go all the way straight through because there was a bit of land that was attached to Taylors Island. And since that time it is long since gone. And I've also noticed that we're getting more water coming into our Slaughter Creek. And without this, I think we'd be really underwater here on Taylors island. So I definitely am for this project and I can't wait until we get started.	Comment noted. No response necessary.

Table M-1. (continued)

Agency/Contact Name/Date	Comment Code	Comment	Response
Dorchester County Seafood and Oyster Association / Ben Parks / October 12, 2006	O-16.1	To date, I haven't had anybody call me in opposition to this project, so we support it. You've got to remember, erosion is probably one of the biggest polluters that we have here that's destroying our oyster bars. They are being covered up all over the bay. Right out here inside James Island, Oyster Cove, Choptank, Peanut Hill, Ragged Point, Honga River is the same way, we've lost one of the biggest oyster bars probably through the seventies due to erosion of Barren Island, which was lower Tarr Bay, at times probably three or four hundred boats working in there. We don't have it any longer. So it's important to the watermen to protect what we have left and save the oyster industry and also the SAV beds that are all around the area.	Comment noted. No response necessary.
Blackwater National Wildlife Refuge / Glenn Carowan / October 12, 2006	O-17.1	I'm the manager of Blackwater National Wildlife Refuge, and I'd like to speak to this project in the context of the work that we've been doing working with the state and local government, as well as the Corps of Engineers and the Port restoring Barren Island, the 11 acres that we have done over there to date. And certainly my knowledge of the work that's been done at Poplar, it's been outstanding. We will continue to work with the various partners and hopefully make this project equally impressive as those are.	Comment noted. No response necessary.

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, U.S. ARMY CORPS OF ENGINEERS
P. O. BOX 1715
BALTIMORE, MARYLAND 21203-1715

REPLY TO
ATTENTION OF

May 7, 2007

Planning Division

Mr. W.R. Carter III
Sierra Club
14272 Draper's Mill Road
Greensboro, Maryland 21639

Dear Mr. Carter:

I am responding to your letter dated October 21, 2006, to Ms. Stacey Blersch of my staff, regarding the Baltimore District's Draft Integrated Feasibility Report and Environmental Impact Statement: Mid-Chesapeake Bay Island Ecosystem Restoration Study dated August 2006.

The concerns raised in your letter of October 21, 2006, focus on the benthic conditions at both James and Barren Islands, and how the existing benthic condition at each island was factored into the site selection process (alternatives analysis). To completely address your concerns, I would like to make two general points regarding the alternatives analysis while also specifically responding to each concern raised in your letter.

First, (as was noted in your letter), many islands were initially considered for habitat restoration through the beneficial use of dredged material. James Island was chosen for restoration based on a multitude of factors, including 52 environmental parameters and 10 engineering suitability criteria (Section 4.3.2 of the Draft EIS). Throughout the selection process, James Island was identified among the islands most in need of stabilization and habitat restoration. Of all of the islands examined for restoration, James Island has the highest current erosion rates and among the earliest predicted extinction dates. In terms of the need to preserve and restore wetlands in the Mid-Chesapeake Bay region, James Island was among the islands identified as having the greatest overall need.

Second, the benthic community condition was only one of the environmental factors that were considered in the alternatives analysis to determine the aquatic conditions in the vicinity of James and Barren Islands to assess the best potential area for island restoration. Many other factors, such as the presence or absence of submerged aquatic vegetation (SAV) and oyster bars, sediment chemistry, and fisheries utilization also factored into the analysis. The James Island area (particularly west of James Island) is stressed due, presumably, to the continually eroding shifting substrates and the turbidity in that area. This stress is not only reflected in the benthic community conditions analysis in the benthic index of biotic integrity (B-IBI), but also in other aspects of the benthic community. Even though few pollutants were found in the sediments at any station near James or Barren Islands, there were some significant differences in presence of SAV and oyster bars when comparing the two sites and especially when comparing the east and

west sides of the existing islands. The area west of James Island supported less of these other resources relative to the east side or even to the area west of Barren Island.

The Baltimore District's responses to the specific comments made by the Sierra Club are attached. To address the Sierra Club's comments, we have revised some of the benthic metric evaluations (to include calculations for metrics that previously had not been calculated at both Barren and James Islands) and has revised the report where needed. However, the analyses that we have performed do not significantly alter the findings in the draft report (that, based on the calculation of the B-IBI, the Barren Island area has a relatively healthy benthic community and the James Island area is classified as severely degraded). The additional calculations also do not alter the conclusions within the draft report regarding productivity and the shallow water conditions at James or Barren Islands.

The Corps has attempted to provide a holistic assessment of the conditions of the aquatic resources in the Mid-Bay area and specifically those in the vicinity of the islands that were found to rank highest in terms of restoration potential (i.e., James and Barren Islands). Although important, benthic condition was only one component of that assessment. The multi-agency Chesapeake Bay Enhancement Working Group has reviewed all of the data for these sites and concurs that the area west of James Island would be the least environmentally damaging practicable alternative for construction of a large island restoration project.

I believe the District's enclosed responses and the changes that have been made to the report will adequately address the Sierra Club's comments. We will finalize the report and submit it to our Headquarters for approval, after which it will be circulated to agencies and the public. Your letter dated October 21, 2006, this letter to you, and the attached responses will be included in the final document. The Comment and Response table will indicate sections in the report that were changed to respond to the Sierra Club comments.

We are willing to meet with you to further discuss the responses. Please contact Ms. Stacey Blersch, Study Manager, at (410) 962-5196 if you should have any question regarding this matter.

Sincerely,

Amy M. Guise
Chief, Civil Project Development Branch

Enclosure

ATTACHMENT

COMMENT 1.

"1. Page 3-28 notes that 100 species of benthic invertebrate species were collected at James Island and that the majority of species were stress-tolerant."

Response: Noted. Report changed to say: "were *not* stress-tolerant".

COMMENT 2.

"2. However, Table 3-20 (p. 3-122) shows, for 25 collections during 2002-2003 at 9 tabulated James Island stations, only one collection effort showed more than 10 % of the individuals were stress-indicative species. Two collections showed over 1 % (1.327 % and 1.44 %) stress indicative organisms, seven showed between 0.1% and 1 %, 4 showed between 0.01 % and 0.1 %, six had between 0.001 % and 0.01 %, and four had 0.0 % stress indicative organisms. The collections were dominated by the gem clam (*Gemma gemma)* (p.3-29) which is not listed by Llanso (2002) or Weisberg, et al (1997) as a stress indicative species."

Response: The statement that is being referenced in comment 1 is referring to the total numbers of species and the statement has been corrected. The metrics noted in Comment 2 are calculated based upon the actual abundances of organisms at each sampling location. As noted, the gem clam (*Gemma gemma*) dominated collections at most locations in most seasons, and drives the tremendous abundance numbers noted at the James Island locations. Gem clams are not a stress-indicative species and that is why the overall percentages of stress-indicative taxa (a metric that is based on abundances) are low and the associated metrics are high. However, benthic communities that exhibit low diversity, high abundance, and dominance by a single species are themselves indicators of stressed environments, regardless of whether the species in question is specifically classified as stress-indicative. Clarifications regarding the influence of single dominant species and the role of gem clams in the ecosystem have been added to the EIS text.

COMMENT 3.

"Further, whereas the benthic invertebrate habitat at Barren Island is characterized as 'healthy' (Table ES-5, et seq.), page 3-29 notes that a dominant organism there was the polychaete worm Mediomastus ambiseta, which both Llanso and Weisberg, et al, (both op. cit) do list as pollution indicative."

Response: The benthic conditions at Barren were very generally characterized as healthy based on a variety of factors including high diversity indices and relative high percentages of stress-sensitive taxa. *Mediomastus ambiesta* was collected around Barren Island and is characterized as pollution indicative. Although it was the most abundant species in most seasons, it constituted only approximately 18% of all collections (as noted by the commenter). The remaining 82% of the composition was dominated by taxa that do not tolerate stressors (such as pollution) in most seasons.

COMMENT 4.

"The characterization of the James Island benthic habitat as 'stressed' rests on the calculation of a benthic index of biotic integrity (B-IBI), which was developed by Weisberg, et al (1997) and the calculation of which was explicated by Llanso (2002). Both authors specify that the application of the B-IBI "...is limited to samples collected in summer, defined as July 15 through September 30." (Llanso, p.4). However, Tables 3-20 (p. 3-122) and 3-21 (p. 3-123) both utilize collections made in Summer, 2002, and Spring, 2003 to calculate B-IBI values. Table 3-20 (for stations at James Island) also utilizes collections in Fall, 2002. Further, although Weisberg, et al present techniques for computing B-IBI scores for stress-sensitive and stress-indicative organisms for mesohaline mud, Table 3-20 does not compute those B-IBI's for that habitat at James, noting that because that station was mesohaline mud, those scores were not calculated."

Response: The first sentence in this statement is not exactly accurate; as noted elsewhere; many other factors were considered. With respect to the B-IBIs calculated in all seasons: Tables 3-20 and 3-23 were derived for comparative purposes across stations and seasons, to completely evaluate the seasonal variability of the benthic community composition. Although total B-IBI scores were calculated for each of the sampling events, the source documents (seasonal survey data reports) caution the reader that only scores from the warmer months should be considered for comparable assessments of the community composition. The text was revised to reflect the fact that the classification of the benthic community as "stressed" was based only on the summer B-IBI scores. However, the benthic community data collected at both James and Barren Island indicated that there was little seasonal variability at each location.

In response to the mesohaline mud part of the comment: Weisberg et al. does present a technique for calculating the metrics for ***high*** mesohaline mud, defined as having salinities greater than 12 ppt. James and Barren Islands lie in an area that varies from low mesohaline (5-12 ppt) to high mesohaline (12-18 ppt) and the majority of the salinities recorded were greater than 12 ppt (across all seasons). [Specifically, (at James Island) salinities ranged from 12.4 to 16.8 ppt in the summer and fall and only fell to 10-11 ppt during the spring sampling period. At Barren salinities ranged from 12.8 to 18.7 ppt in summer and fall and ranged from 11-15 ppt in spring]. However, throughout the analysis, the B-IBI calculations followed the updated guidance in Llanso 2002 which indicates that stress-sensitive and stress-indicative taxa abundances are not indicated for mud in high mesohaline reaches. For consistency with other stations, these metrics were calculated at Stations JAM-004 and JAM-010 and added to the summary tables. The addition of these metrics did not change the total score at JAM-010 in fall and only elevated the total scores from 1 to 1.8 at JAM-004 in summer and fall and JAM-010 in summer and spring. Considering only summer (warmer season indicated by the B-IBI guidance), scores of 1.8 would still classify stations JAM-004 or JAM-010 as severely degraded.

The Corps acknowledges that the B-IBI has utility as one evaluation tool for benthic condition but it is only one measure of aquatic health and is somewhat limited. The high abundances of gem clams (*Gemma gemma*) do confound the evaluation in the ways noted

by the commenter and in the #2 response (above). Dominance of a single species (as noted by the commenter) can be indicative of marginally impaired conditions and the dominant species can exploit a niche to the exclusion of other species. This is likely what the gem clam is doing to the west of James Island and in similar areas throughout the mainstem of the Chesapeake Bay that are subjected to shifting (sandy) substrates. The gem clam does occur in large numbers and may be providing a food source that could be utilized buy other aquatic species such as fish and some birds. However, utilization of the western side of James Island by these groups was not found to be greater than at the eastern side of James Island or at the Barren Island area during existing conditions surveys of the islands. Timed bird observations found the area west of the James Island remnants to have fewer birds in most seasonal surveys than areas to the east and also relative to Barren Island in similar seasons. Also, although present, no large aggregations of diving ducks (that would be utilizing the clam resources directly) were noted to the west of James Island, even in winter.

In terms of fish utilizing the clam resources west of James Island, inferences can be made from the trawling and gillnet data collected during the existing conditions surveys. Trawling in the vicinity of James yielded far fewer fish in most seasons when compared to Barren Island (table 3-25). Examining the station-specific data, trawling west of James yielded few or no fish relative to the stations on the eastern side of the island. In terms of gillnetting, collections at James did yield higher numbers of fish than similar collections at Barren in most seasons; however, most were planktivores or piscivorous species and few-to-no species that would be expected to utilize clams as a food resource were collected. Further, little-to-no difference was noted in the composition of the gillnet collections among station (east or west of James Island) in the seasons that were sampled. While there is no doubt that recreational fishing activity is high in the vicinity of James Island, the estimates for Barren were even greater (p. 3-73) and much of that activity is likely focused on recreational species such as striped bass which are mainly piscivorous.

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APPENDIX N

PEER REVIEWS

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ATTACHMENT A:
EXTERNAL PEER REVIEW

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DEPARTMENT OF THE ARMY
MISSISSIPPI VALLEY DIVISION, CORPS OF ENGINEERS
P.O. BOX 80
VICKSBURG, MISSISSIPPI 39181-0080
http://www.mvd.usace.army.mil/

REPLY TO
ATTENTION OF:

CEMVD-PD-N

5 May 2008

MEMORAMDUM FOR Commander, North Atlantic Division (CENAD-PSD-P), 302 General Lee Avenue, Fort Hamilton Military Community, Brooklyn, NY 11252-6700

SUBJECT: ECO-PCX Endorsement of External Peer Review for the Middle Chesapeake Bay Islands Restoration Project.

1. The National Ecosystem Planning Center of Expertise (ECO-PCX) managed the External Peer Review (EPR) for the Middle Chesapeake Bay Island Restoration Project in the Baltimore District. The External Peer Review was conducted by Battelle Corporation through their contract with the Army Research Office. The EPR panel consisted of 4 individuals selected by Battelle with technical expertise in engineering (environmental, geotechnical); hydraulics/sedimentation; dredging and dredged materials management; economics and plan formulation; hydrology/coastal hydrology; biology/ecology with Chesapeake Bay/estuarine experience; habitat evaluation/ecological modeling; estuarine wetland restoration; coastal erosion/ shoreline protection; and experience with the review of EISs and Dredged Material Management Plans (DMMPs). Overall, 14 final EPR comments were identified and documented. Of the 14 final comments, 2 were classified as of high significance and 8 were categorized as medium significance. Four comments were identified as having a low level of significance. The report of the EPR panel is entitled, "Final External Peer Review Report for Mid-Chesapeake Bay Islands Ecosystem Restoration Final Integrated Feasibility Report and Environmental Impact Statement (EIS) and Supporting Documentation, January 23, 2008."

2. Responses to the EPR comments have been prepared by NAB and coordinated with the vertical team. Following signing of the Chief's Report, NAB should post the enclosed report and the coordinated responses on their website and the ECO-PCX, NAD, and CECW-P should establish links to this website.

Printed on Recycled Paper

CEMVD-PD-N 5 May 2008

SUBJECT: ECO-PCX Endorsement of External Peer Review for the Middle Chesapeake Bay Islands Restoration Project.

3. In summary, the EPR for the Middle Chesapeake Bay Islands Restoration Project was conducted in accordance with EC 1105-2-408, has been fully coordinated with the ECO-PCX, and the ECO-PCX endorses the "Final External Peer Review Report for Mid-Chesapeake Bay Islands Ecosystem Restoration Final Integrated Feasibility Report and Environmental Impact Statement (EIS) and Supporting Documentation, January 23, 2008."

Rayford Wilbanks

Encl

RAYFORD E. WILBANKS
Director, National Ecosystem
Planning Center of Expertise

CF:
CENAB-PL (Pace)
CENAB-PL-P (Guise)
CENAB-PP-C (Brennan)
CEMP-NAD (Jester)
CECW-PC (Ware)
CECW-CP (Kitch)
CEMVD-RB-T (Vigh)
CEMVR-PM-F (Staebell)

DEPARTMENT OF THE ARMY
NORTH ATLANTIC DIVISION, CORPS OF ENGINEERS
FORT HAMILTON MILITARY COMMUNITY
BROOKLYN, NY 11252-6700

REPLY TO
ATTENTION OF

CENAD-PDS-P

9 April 2008

MEMORANDUM FOR: Commander Baltimore District ATTN: CENAD-PL-P (Pace)

SUBJECT: Transmittal of Final Responses to the Mid-Chesapeake Bay Island Ecosystem Restoration, Maryland Final Peer Review (EPR) Review Report Comments

1. References:

a. Battelle Corporation memorandum, dated 23 January 2008, transmitting the Finals EPR Report for the Mid-Chesapeake Bay Islands Ecosystem Restoration Final Integrated Feasibility Report and Environmental Impact Statement and Supporting Documentation.

b. CENAB memorandum, dated 26 March 2008, transmitting the final responses to the EPR comments to CENAD for review and approval (enclosed).

2. As described in reference 1(b), the Baltimore district staff has prepared detailed responses to the fourteen EPR report comments. It is noted that particular attention has been made to provide background information regarding the analysis used and where applicable, providing additional information on the plan formulation rationale. As indicated in the cited reference, additional narrative discussion, along with information related to additional analyses, will be provided to better explain the plan formulation process selection process and conclusions. These changes will be fully incorporated in the project report as appropriate with text additions or amendments to the report.

3. Division staff has reviewed reference 1(b) and concurs that questions or issues raised by the EPR comments have been fully addressed by the district responses.

4. Please contact, Mr. Peter Doukas of my staff at 718.765.7068 should you have any questions require additional information.

Encl
as

JOSEPH R. VIETRI
Chief, Planning & Policy
Program Support Division
Programs Directorate

cc: CEMP-PC(Jester)
CEMVR-PM-P(Staebel)
CEMVD-PD-N(Wibanks)

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Final External Peer Review Report for Mid-Chesapeake Bay Islands Ecosystem Restoration Final Integrated Feasibility Report and Environmental Impact Statement (EIS) and Supporting Documentation

January 23, 2008

Prepared by

Battelle
505 King Avenue
Columbus, Ohio 43201

Prepared for
U.S. Army Corps of Engineers
North Atlantic Division
New England District
and
Mississippi Valley Division
Rock Island District

Contract Number: DACW33-03-D-0004

FINAL
EXTERNAL PEER REVIEW REPORT

for

Mid-Chesapeake Bay Islands Ecosystem Restoration
Final Integrated Feasibility Report and Environmental Impact Statement (EIS) and Supporting Documentation

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TABLE OF CONTENTS

Executive Summary iii

1. Introduction 1
   1.1 Background of Report Reviewed 1
   1.2 Purpose of External Peer Review 1

2. Methodology 2
   2.1 Planning and Schedule 2
   2.2 Identification and Selection of External Peer Reviewers 2
   2.3 Preparation of the Charge and Conduct of the Peer Review 4
   2.4 Review of Verbatim Comments 5
   2.5 External Peer Review Panel Consensus Discussion 5
   2.6 Preparation of Final Comments 6

3. Biographical Information on External Peer Reviewers 7

4. Results ─ Summary of Peer Review Comments 10

Appendix A. Final Peer Review Comments from the Mid-Bay Final Integrated Feasibility Report and EIS and Supporting Documentation A-1
Appendix B. Final Charge to the External Peer Reviewers B-1

LIST OF TABLES

Table ES-1. Overview of 14 Final Comments Identified by the Mid-Bay EPR Panel iv
Table 1. Schedule 3
Table 2. Technical Criteria/Areas of Expertise for Potential External Peer Reviewers 3
Table 3. EPR Panel: Technical Criteria and Areas of Expertise 8
Table 4. Overview of 14 Final Comments Identified by the Mid-Bay EPR Panel 11

FINAL
EXTERNAL PEER REVIEW REPORT

for

Mid-Chesapeake Bay Islands Ecosystem Restoration
Final Integrated Feasibility Report and Environmental Impact Statement (EIS) and Supporting Documentation

EXECUTIVE SUMMARY

The U.S. Army Corps of Engineers (USACE) has joined in an agreement with the State of Maryland Department of Transportation, Maryland Port Administration to conduct a feasibility study and prepare an Integrated Feasibility Report and Environmental Impact Statement (EIS) for restoration of islands and associated habitats through beneficial use of dredged material in the Mid-Chesapeake Bay. The Mid-Chesapeake Bay is located in the eastern half of Chesapeake Bay, from the Chester River to the Maryland/Virginia state line. In order to strengthen quality control processes and help ensure that the Mid-Chesapeake Bay Island Ecosystem Restoration Project (Mid-Bay) is supported by the best scientific and technical information, an external peer review (EPR) process has been implemented by USACE to complement the internal technical review (ITR). This final report describes the EPR process, summarizes final comments of the EPR panel, and describes the panel members and their selection. The results of this EPR report will be taken into consideration in preparation of the Chief of Engineer's Report.

Four panel members were selected for the EPR from nearly 25 identified candidates. The potential external reviewers were screened for potential conflicts of interest and expertise relative to predetermined technical criteria. These criteria focused on estuarine ecology, estuarine/coastal processes, engineering with expertise in placement of dredged material in a confined placement facility, and plan formulation. The reviewers selected were from academe or were independent engineering consultants. Corresponding to the technical content of the Final Integrated Feasibility Report and EIS, the areas of technical expertise of the selected peer reviewers included: engineering (environmental, geotechnical); hydraulics/sedimentation; dredging and dredged materials management; economics and plan formulation; hydrology/coastal hydrology; biology/ecology with Chesapeake Bay/estuarine experience; habitat evaluation/ecological modeling; estuarine wetland restoration; coastal erosion/shoreline protection; and experience with the review of EISs and Dredged Material Management Plans (DMMPs).

The peer reviewers were provided an electronic version of the Final Integrated Feasibility Report and EIS and supporting documentation (i.e., appendices and Issue Paper No. 1) on November 1, 2007, along with a charge that solicited their comments on specific sections of the documents that were to be reviewed. The peer reviewers had eight weeks for the review of the documents. Nearly 300 individual comments were received from the EPR panel in response to the charge questions.

Following the individual reviews of the Final Integrated Feasibility Report and EIS and supporting documentation by the EPR panel members, a consensus discussion was conducted to review key technical comments, discuss charge questions in which there were conflicting responses, and reach consensus on the final comments to be provided to USACE. The final comments were documented according to a five-part format that included, (1) nature of the comment, (2) basis for the comment, (3) significance of the comment (high, medium, and low), (4) comment cross-referencing if related to another comment, and (5) a recommendation on how to resolve the comment. Overall, 14 final EPR comments were identified and documented. Of the 14 final comments, two were classified as of high significance and eight were categorized as medium significance. Four comments were identified as having a low level of significance.

Table ES-1 summarizes the final comments by level of significance. Clarifications of each comment are contained in Appendix A of this report.

Table ES-1. Overview of 14 Final Comments Identified by the Mid-Bay EPR Panel

Significance – High	
#	Comment
1	The analyses of environmental benefits are biased by the failure to subtract quantitative habitat injuries (costs) arising from filling water column and especially benthic habitats, rendering the selection process and justification for the preferred island alignment unreliable.
2	Water quality impacts associated with construction and the potential negative impacts of resettled suspended sediment to submerged aquatic vegetation (SAV) and natural oyster beds (NOBs) were not addressed.
Significance – Medium	
3	The Preferred Alternative did not undergo the same level of rigor/review as the two original alternatives. The Preferred Alternative was added after the cost-effectiveness (CE) analysis and the incremental cost analysis (ICA) were completed, which theoretically casts doubt on its justification. The preferred alternative should be incorporated in the CE/ICA process.
4	It appears that the sensitivity analysis was not conducted, and sources of risk and uncertainty and their impact on plan formulation are not documented.
5	It is overly optimistic to assume that the marsh will be fully functioning in five years.
6	The report should make it clear that the “need” for the project and the final project scale are both determined by the need to dispose of a target volume of dredged material rather than based on the incremental cost and incremental benefits.
7	The design of the environmental monitoring to be conducted after initiation of the project is not described in sufficient detail to guarantee that the purposes of such monitoring can all be fulfilled.
8	Connectivity between the salt marsh and estuary is unclear both during and post construction.
9	The Adaptive Management Plan needs to include a discussion on how climate change, sea level rise, and invasive species will be addressed.
10	National Economic Development (NED) outcomes (e.g., Island Community Units, or ICUs) are not discounted over time like monetary costs. Yet the incidence of environmental benefits over the project lifetime may be uneven and should be considered in alternative plan formulation timelines.
Significance – Low	

11	Address how climate change will influence the engineering design.
12	To better illustrate the connectivity between the salt marsh and open water, duplicate Figures 10 and 16 of Appendix C in the appropriate section of the main body of the report.
13	Since this project is presented as a restoration, some attention needs to be paid to literature on the subject.
14	The "Most Probable Future Without-Project Conditions" (Section 3.5) does not specify where the dredged sediment will be placed if the project does not occur.

Overall, the external peer reviewers find the report to be well written and presented in a logical, thoughtful structure. Although cast as a restoration project, the report actually describes a beneficial use of dredged material important for Chesapeake Bay and surrounding regions, and this distinction should be made clear in the report. The analytic methods for the gross benefit approach used in plan formulation are carefully detailed and well documented. USACE policies and guidelines, however, require an analysis of net benefits, balancing habitat gains with habitat losses during construction. The EPR panel emphasized that more focused analyses of the turbidity and sedimentation generated during construction are needed to provide confidence that key estuarine habitats (submerged aquatic vegetation and natural oyster beds) will be safe from injury. Overall, the EPR panel felt these additional considerations are crucial to assure the maximum net environmental benefits per unit cost, and to justify the selection of the preferred alternative.

1. INTRODUCTION

1.1 Background of Report Reviewed

The U.S. Army Corps of Engineers (USACE) has joined in an agreement with the State of Maryland Department of Transportation, Maryland Port Administration to conduct a feasibility study and prepare an Integrated Feasibility Report and Environmental Impact Statement (EIS) for restoration of islands and associated habitats through beneficial use of dredged material in the Mid-Chesapeake Bay. The Mid-Chesapeake Bay is located in the eastern half of Chesapeake Bay, from the Chester River to the Maryland/Virginia state line. The proposed Mid-Chesapeake Bay Island Ecosystem Restoration Project (Mid-Bay) is intended to restore and protect valuable, but threatened Mid-Chesapeake Bay island ecosystems through the beneficial use of dredged material. There is also the opportunity to provide capacity for placement of dredged material.

As authorized by the Senate Committee on Environment and Public Works resolution, dated June 5, 1997, USACE has reviewed previous USACE reports on the Chesapeake Bay and other pertinent reports with a view to conduct watershed management studies of water resources improvements in the interest of navigation, environmental restoration, and other interests. The Eastern Shore, Maryland (MD) and Delaware (DE) Section 905(b) analysis concluded that a Federal interest existed to assess the needs and opportunities within the study area and recommended a variety of potential projects for further study including a study to evaluate protecting and/or restoring island habitat loss because of erosion and subsidence through the beneficial use of dredged material.

The recommended plan for the Mid-Bay project includes restoration at two islands – James Island and Barren Island – using dredged material from the Upper Chesapeake Bay Approach Channels to the Port of Baltimore. Some features of the recommended project include the following:

- Restore 2,072 acres of remote island habitat at James Island.
- Restore 72 acres of remote island habitat and protect 1,325 acres of submerged aquatic vegetation habitat at Barren Island.
- Provide 90 to 95 million cubic yards (mcy) of dredged material placement capacity.

The recommended plan would restore 2,144 acres of habitat. It would protect 623 acres of existing island ecosystem habitat, including 352 acres of critical submerged aquatic vegetation.

This report describes the external peer review (EPR) process that was conducted, and summarizes comments on the Final Integrated Feasibility Report and EIS and supporting documentation, including Issue Paper No. 1, that were received from the external peer reviewers. Detailed information on the comments is provided in Appendix A.

1.2 Purpose of External Peer Review

The purpose of EPR, in general, is to strengthen USACE's quality control processes for the development of decision documents in support of its Civil Works program. Independent,

objective peer review is regarded as a critical element in ensuring the reliability of scientific analyses.

To help ensure that USACE documents are supported by the best scientific and technical information, a peer review process has been implemented by USACE that utilizes EPR to complement the internal technical review (ITR), as described in the Department of the Army, U.S. Army Corps of Engineers, guidance *Peer Review of Decision Documents* (EC 1105-2-408) dated May 31, 2005, and CECW-CP Memorandum dated March 30, 2007. In this case, the EPR of the Mid-Bay Final Integrated Feasibility Report and EIS was conducted and managed using contract support from an independent 501(c)(3) organization (Battelle Memorial Institute; hereafter Battelle) to ensure independent objectivity, along with a high degree of flexibility and responsiveness, which was essential for USACE to meet deadlines.

2. METHODOLOGY

This section describes the methodology followed in selecting external peer reviewers, and in planning and conducting the EPR. The EPR was conducted following procedures described in USACE's guidance cited above (Section 1.2) and in accordance with the Office of Management and Budget's *Final Information Quality Bulletin for Peer Review*, released December 16, 2004. Supplemental guidance on evaluation for conflicts of interest used the National Academies' *Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports*, dated May 12, 2003.

2.1 Planning and Schedule

Table 1 defines the schedule followed in execution of the EPR.

2.2 Identification and Selection of External Peer Reviewers

Battelle initially identified nearly 25 potential peer reviewers, confirmed their availability, evaluated their technical expertise, and inquired about potential conflicts of interest. Of those initially contacted, 10 external peer review candidates confirmed their interest and availability, and 12 candidates declined either due to the schedule and anticipated level of effort, or because of disclosed conflicts of interest.

Preliminary information about the 10 available reviewers, including their expertise, level of previous engagement in applied evaluations, and requested rates of compensation, was evaluated in consultation with USACE. The reviewers were primarily from academic institutions, but consultants (company-affiliated and independent) or experts associated with industry, non-governmental organizations, and non-USACE government agencies were also considered.

Table 1. Schedule

Action	Completed by Date
Notice to proceed received	September 28, 2007
Potential external peer reviewers identified and screened	October 11, 2007
EPR panel selected and contracts completed	November 2, 2007
Final Integrated Feasibility Report and EIS, supporting documentation, and draft charge sent to EPR panel	November 1, 2007
Final charge sent to EPR panel	November 16, 2007
Individual comments from the EPR panel completed	December 31, 2007
EPR panel consensus meeting	January 7, 2008
Final EPR comments completed	January 14, 2008
Working draft peer review report completed	January 16, 2008
EPR panel provides comments on working draft peer review report	January 21, 2008
Final peer review report submitted to USACE	January 23, 2008

The credentials of the peer reviewers were evaluated according to the overall scope of the Mid-Bay Final Integrated Feasibility Report and EIS, focusing on two key areas: 1) dredged material placement and 2) habitat management and restoration. Detail on these technical criteria, as well as other areas of expertise considered, is provided in Table 2.

Table 2. Technical Criteria/Areas of Expertise for Potential External Peer Reviewers

Dredged material placement	Habitat Management and Restoration	Other Desirable Areas of Expertise
• Engineering (environmental, geotechnical) • Hydraulics/sedimentation • Dike construction • Dredging and dredged materials management	• Biology/ecology with Chesapeake Bay/estuarine experience • Habitat evaluation/ecological modeling • Estuarine wetland restoration • Submerged aquatic vegetation (SAV) restoration/protection • Natural oyster beds (NOBs)	• Economic analysis (resource economics) • Experience with review of Environmental Impact Statements and Dredged Material Management Plans • Coastal erosion/shoreline protection

The following additional factors were considered:

- Participation in previous USACE technical review committees;
- Other technical review panel experience; and
- Chesapeake Bay experience.

The peer reviewers were additionally screened for the following *potential* exclusion criteria or conflicts of interest:

- Involved in producing the Final Integrated Feasibility Report and EIS or supporting documentation;
- Current USACE employee;
- Involvement in any USACE projects in the Chesapeake Bay region or relating to the Mid-Bay Island restoration;
- Other USACE affiliation [Scientist employed by the USACE (except as described in NAS criteria, see EC 1105-2-4 section 9d)][a];
- Current or future financial interests in Chesapeake or Mid-Bay Island contracts/awards from USACE[a];
- Other possible perceived conflict of interest for consideration, e.g.,
    - Former USACE employee
    - Repeatedly served as USACE technical reviewer
    - A significant portion of personal or company revenues within the last 3 years came from USACE contracts
    - Made a publicly documented statement advocating for or against the subject project.

In selecting final peer reviewers from the list of potential peer review candidates, an effort was also made to select experts who best fit the criteria presented in Table 2 and the factors described above. Based on these considerations, four peer reviewers were selected from the potential list (see Section 3 for names and biographical information on the selected peer reviewers). Battelle established subcontracts with the peer reviewers indicating their willingness to participate and confirmed the absence of conflicts of interest (through a signed conflict of interest form).

2.3 Preparation of the Charge and Conduct of the Peer Review

A charge for peer review, which contained specific questions regarding the Final Integrated Feasibility Report and EIS and supporting documentation, was developed to assist the EPR panel. The draft charge was prepared by Battelle with input from USACE and guidance provided in USACE's guidance *Peer Review of Decision Documents* (EC1105-2-408) and the

[a] Note: Battelle evaluated whether scientists in universities and consulting firms that are receiving USACE funding have sufficient independence from USACE to be appropriate peer reviewers. See the OMB memo p. 18, "….when a scientist is awarded a government research grant through an investigator-initiated, peer-reviewed competition, there generally should be no question as to that scientist's ability to offer independent scientific advice to the agency on other projects. This contrasts, for example, to a situation in which a scientist has a consulting or contractual arrangement with the agency or office sponsoring a peer review. Likewise, when the agency and a researcher work together (e.g., through a cooperative agreement) to design or implement a study, there is less independence from the agency. Furthermore, if a scientist has repeatedly served as a reviewer for the same agency, some may question whether that scientist is sufficiently independent from the agency to be employed as a peer reviewer on agency-sponsored projects."

Office of Management and Budget's *Final Information Quality Bulletin for Peer Review*, released December 16, 2004. A draft charge was submitted to the USACE for consideration and evaluation. The USACE edited the draft questions and recommended eliminating some questions. The charge was finalized based on the USACE's input. The charge was presented in comment response table format, and was organized according to the order of the documents to be reviewed. The charge consisted of approximately 80 specific questions on the Final Integrated Feasibility Report and EIS and supporting documentation. The EPR panel was instructed to respond to the charge questions within the comment response form table. The final charge is shown in Appendix B of this report.

The peer reviewers were provided with electronic copies of the draft final charge, Final Integrated Feasibility Report and EIS and supporting documentation on November 1, 2007.[b] The peer reviewers had eight weeks for the review of the documents.

2.4 Review of Verbatim Comments

Nearly 300 verbatim (i.e., individual) comments in response to the charge questions were received from the individual EPR panel members. Battelle reviewed these comments to identify overall recurring themes, potential areas of conflict, and other impressions of the report. As a result of this review, Battelle developed a preliminary list of 28 overall comments and discussion points that emerged from the EPR panelists' verbatim comments. Each reviewer's verbatim comments were shared with the EPR panel.

2.5 External Peer Review Panel Consensus Discussion

Battelle convened a consensus discussion conference call with the EPR panel on January 7, 2008. The purpose of the consensus discussion was to allow the exchange of technical information among the panel experts, many of whom are from diverse scientific backgrounds. This information exchange ensured that the EPR report represents the synergy of the panel and avoided isolated or conflicting information and analyses. The main goal of the consensus discussion was to review the overall comments and ascertain and confirm their importance to the EPR panel, remove points having a lack of consensus, identify and add any missing issues of high-level importance to the EPR panel, and finally, reach consensus on the final comments to be provided to USACE.

The panel discussion resulted in 15 overall consensus comments. A summary explaining each consensus comment organized by level of significance, as defined by the EPR panel, was also prepared and distributed to the EPR panel by Battelle in a memorandum dated January 7, 2008. The memorandum provided a detailed approach for developing the final comments for the Final Integrated Feasibility Report and EIS and supporting documentation.

In addition to reaching consensus on the final comments to be provided to USACE, the EPR panel discussed responses to about a half-dozen specific charge questions where there appeared to be disagreement among the reviewers. The disagreement was resolved and the comment was

[b] The final charge was provided to the peer reviewers on November 16 after receiving comments from USACE.

either incorporated into the final comments or determined to stand as is (i.e., was not important enough to include as a final comment).

2.6 Preparation of Final Comments

The EPR panel used the 15 overall consensus comments as a basis for preparing the final comments. A memorandum was distributed on January 7, 2008, to the EPR panel providing detailed instructions on developing the final comments. A summary of the directive is provided below:

- Lead Responsibility: A lead reviewer was assigned for each consensus comment. A lead was responsible for coordinating the development of the final comment and submitting it to Battelle by January 14, 2008. Lead assignments were modified by Battelle at the direction of the EPR panel. To assist each lead in the development of the final comments, Battelle distributed individual verbatim comments in the comment response form table format, a summary detailing each consensus comment (in the memorandum), an example final comment following the five-part structure (described below), and a template for the preparation of the final comments.

- Directive to the Lead: Each lead was encouraged to communicate directly with other reviewers, as needed, to contribute to a particular consensus comment. If a significant comment was identified that was not covered by one of the original 15 overall consensus comments, the appropriate lead was instructed to draft a new consensus comment. For this EPR, no additional comments were identified by the EPR panel; however, two consensus comments were consolidated into one comment, resulting in 14 final comments. If a consensus comment was related to another consensus comment, the lead was to cross-reference them.

- Format for Final Comments: Each final comment was presented as part of a five-part structure, including:

    1. Nature of comment (i.e., succinct summary statement of concern)
    2. Basis for comment (i.e., details regarding the concern)
    3. Significance (high, medium, low) (see description below)
    4. Comment cross-referencing
    5. Recommendation (see description below).

- Criteria for Significance: The following were used as criteria for assigning a significance level to each final comment:

    - High — Describes a fundamental problem with the project that could affect the recommendation or justification of the project
    - Medium — Affects the completeness or understanding of the reports/project
    - Low — Affects the technical quality of the reports but will not affect the recommendation of the project.

- Guidance for Developing the Recommendation: The recommendation was to include specific actions that the USACE should consider to resolve the comment (e.g.,

suggestions on how and where to incorporate data into the analysis, how and where to address insufficiencies, areas where additional documentation is needed, etc.).

As a result of this process, 14 final comments were prepared. Battelle reviewed and edited all final comments for clarity and adherence to the requested final comment template format. The final EPR comments were assembled and are presented in Appendix A.

3. BIOGRAPHICAL INFORMATION ON EXTERNAL PEER REVIEWERS

Potential peer review candidates were identified through Battelle's EPR Database, targeted internet searches using key words (e.g., technical area, geographic region), search of websites of local universities or other compiled expert sites, and through referrals from candidates who declined. A draft list of screened (for availability, technical background, conflict) potential reviewers was prepared by Battelle and provided to USACE. The final list of peer reviewers was agreed upon based on Battelle recommendations and USACE input.

An overview of the credentials of the four reviewers selected for the EPR panel and their qualifications in relation to the technical evaluation criteria is presented in Table 3. Reviewer identities were unknown to the USACE authors of the Final Integrated Feasibility Report and EIS and supporting documentation during the EPR process. More detailed biographical information regarding each candidate and his or her technical areas of expertise is presented following the table.

Table 3. EPR Panel: Technical Criteria and Areas of Expertise

Name	Affiliation	Engineering				Biology/Ecology			Economics	
		Environmental, civil, geotechnical	Hydraulics/sedimentation	Dredging and dredged material management	Coastal erosion/shoreline protection	Biology/ecology with Chesapeake Bay/estuarine experience	Habitat evaluation/ecological modeling	Estuarine wetland restoration	Economic analysis	Plan formulation
	totals -->	1	1	1	1	1	2	2	1	1
Chris Craft	Indiana University				1		1	1		
Don Hayes	University of Louisiana at Lafayette	1	1	1						
Charles "Pete" Peterson	University of North Carolina at Chapel Hill					1	1	1		
Dan Smith	The Tioga Group, Inc.								1	1

Christopher B. Craft, Ph.D.
Role: This reviewer was chosen primarily for his expertise in estuarine wetland restoration.
Affiliation: Indiana University, Bloomington, IN

Dr. Craft is Associate Professor in the School of Public and Environmental Affairs at Indiana University Bloomington where he teaches courses in Wetlands Ecology, Restoration Ecology, and Applied Ecology. He has nearly 25 years of experience working in estuarine and freshwater wetlands, including tidal marsh creation on dredged material and eroding shorelines. Dr. Craft has published more than 60 peer-reviewed papers on creation and restoration of wetlands, wetland eutrophication and nutrient enrichment and effects of climate change and sea level rise on tidal wetlands. He is Associate Editor of the journals, *Wetlands* and *Soil Science Society of America Journal* and is President-elect (2007-2008) of the Society of Wetland Scientists, a 3500-member international organization that promotes sound wetland science, policy and management.

Donald F, Hayes, Ph.D., P.E., D.E.E.
Role: This reviewer was chosen primarily for his expertise in dredged material management and engineering.
Affiliation: University of Louisiana at Lafayette, Lafayette, LA

Dr. Hayes is Director, Institute for Coastal Ecology and Engineering and is UNOCAL/BORSF Professor of Civil Engineering at the University of Louisiana at Lafayette. His areas of expertise include the environmental impacts of dredging, managing contaminated sediments, use of dredged sediments for restoration, and engineering design of wetlands restoration projects. He has authored numerous technical reports and journal publications, refereed conference publications, and serves on several engineering committees and societies. He is also the author of several Automated Dredging and Disposal Alternatives Management System (ADDAMS) modules – software distributed by the USACE to manage dredging projects and dredged material placement. He serves on the editorial board of the Western Dredging Association's *Journal of Dredging Engineering*. With over 25 years of experience, Dr. Hayes has delivered presentations to the international community and is recognized as an expert in the remediation of contaminated sediments and dredged material management as indicated by his consulting work and testimony for industry and government. He received his M.S. in civil engineering from Mississippi State University and a Ph.D. in civil engineering from Colorado State University.

Charles H. (Pete) Peterson, Ph.D.
Role: This reviewer was chosen primarily for his expertise in estuarine biology/ecology.
Affiliation University of North Carolina at Chapel Hill, Morehead City, NC

Dr. Peterson has been a professor in academia for 36 years and is now Alumni Distinguished Professor at the University of North Carolina at Chapel Hill. He has over 160 peer-reviewed publications on marine and estuarine ecology and has done research on estuarine habitat valuation and compensatory restoration, on ecological responses to shoreline erosion and to engineering measures designed to stabilize estuarine shorelines, and on how flow regimes and sedimentation affect estuarine organisms and habitats. Dr. Peterson has served on several panels of the National Academy of Sciences, as editor of several ecological journals, and as reviewer of

many ecological restoration projects. He has testified before Congress and the North Carolina Legislature on environmental issues. He has been appointed to and provided 36 person-years of service on the North Carolina Environmental Management Commission, the North Carolina Marine Fisheries Commission, the North Carolina Sedimentation Control Commission, and the Steering Committee for the North Carolina Coastal Habitat Protection Plan.

Daniel S. Smith
Role: This reviewer was chosen primarily for his expertise in economics and plan formulation.
Affiliation: The Tioga Group, Inc., Moraga, CA

Mr. Smith is a Principal and Co-Founder of The Tioga Group, a consulting firm specializing in freight transportation and logistics whose clients include ports, railroads, shippers, leasing companies, industry organizations, and government agencies. Mr. Smith has over 25 years of consulting experience in freight transportation operations, economic, policy, and planning, with special emphasis on truck, rail, and marine intermodal transportation. He has authored numerous articles in trade journals, is a contributor to industry conferences and publications, and is a member of the Intermodal Association of North America. He has testified before Congress on the economic conditions in the world shipping industry. He received his M.S. from the Graduate School of Public Policy at the University of California at Berkeley and did further postgraduate work in transportation economics and policy.

4. Results – Summary of Peer Review Comments

Overall, the external peer reviewers find the report to be well written and presented in a logical, thoughtful structure. Although cast as a restoration project, the report actually describes a beneficial use of dredged material important for Chesapeake Bay and surrounding regions, and this distinction should be made clear in the report. The analytic methods for the gross benefit approach used in plan formulation are carefully detailed and well documented. USACE policies and guidelines, however, require an analysis of net benefits, balancing habitat gains with habitat losses during construction. The EPR panel emphasized that more focused analyses of the turbidity and sedimentation generated during construction are needed to provide confidence that key estuarine habitats (submerged aquatic vegetation and natural oyster beds) will be safe from injury. Overall, the EPR panel felt these additional considerations are crucial to assure the maximum net environmental benefits per unit cost, and to justify the selection of the preferred alternative.

As a result of the consensus discussion process, the EPR panel identified 14 final comments, segmented into rankings of high, medium, and low significance. In total, as shown in Table 4, two were classified as of high significance and eight were categorized as medium significance, while four comments were identified as having a low level of significance.

Table 4. Overview of 14 Final Comments Identified by the Mid-Bay EPR Panel

Significance – High	
#	Comment
1	The analyses of environmental benefits are biased by the failure to subtract quantitative habitat injuries (costs) arising from filling water column and especially benthic habitats, rendering the selection process and justification for the preferred island alignment unreliable.
2	Water quality impacts associated with construction and the potential negative impacts of resettled suspended sediment to submerged aquatic vegetation (SAV) and natural oyster beds (NOBs) were not addressed.
Significance – Medium	
3	The Preferred Alternative did not undergo the same level of rigor/review as the two original alternatives. The Preferred Alternative was added after the cost-effectiveness (CE) analysis and the incremental cost analysis (ICA) were completed, which theoretically casts doubt on its justification. The preferred alternative should be incorporated in the CE/ICA process.
4	It appears that the sensitivity analysis was not conducted, and sources of risk and uncertainty and their impact on plan formulation are not documented.
5	It is overly optimistic to assume that the marsh will be fully functioning in five years.
6	The report should make it clear that the "need" for the project and the final project scale are both determined by the need to dispose of a target volume of dredged material rather than based on the incremental cost and incremental benefits.
7	The design of the environmental monitoring to be conducted after initiation of the project is not described in sufficient detail to guarantee that the purposes of such monitoring can all be fulfilled.
8	Connectivity between the salt marsh and estuary is unclear both during and post construction.
9	The Adaptive Management Plan needs to include a discussion on how climate change, sea level rise, and invasive species will be addressed.
10	National Economic Development (NED) outcomes (e.g., Island Community Units, or ICUs) are not discounted over time like monetary costs. Yet the incidence of environmental benefits over the project lifetime may be uneven and should be considered in alternative plan formulation timelines.
Significance – Low	
11	Address how climate change will influence the engineering design.
12	To better illustrate the connectivity between the salt marsh and open water, duplicate Figures 10 and 16 of Appendix C in the appropriate section of the main body of the report.
13	Since this project is presented as a restoration, some attention needs to be paid to literature on the subject.
14	The "Most Probable Future Without-Project Conditions" (Section 3.5) does not specify where the dredged sediment will be placed if the project does not occur.

As indicated in Table 4, the majority of the comments focus on areas viewed by the reviewers as needing improvement. The final EPR comments in their entirety are included in Appendix A.

APPENDIX A

FINAL PEER REVIEW COMMENTS FROM THE MID-BAY FINAL INTEGRATED FEASIBILITY REPORT AND ENVIRONMENTAL IMPACT STATEMENT (EIS) AND SUPPORTING DOCUMENTATION

Comment 1:

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

Basis for Comment:

This comment is based upon (1) recognition that whereas gross benefits of island creation are assessed in a detailed set of analyses, which even include benefits of SAV protection in the nearby bay, the injuries (costs) of filling water column and benthic habitats are not included in these analyses and thus net environmental benefits of each alternative alignment are never computed, (2) information that the benthic habitat around James Island differs from that around Barren Island by containing much higher densities of a small bivalve of high value as fish and crab food, (3) existence of established, published methods of estimating such habitat injury of filling, and (4) recognition that without incorporating such injuries (costs) of filling and computing net environmental benefits, the method used to select the preferred alignment for the project is flawed by use of gross instead of net environmental benefits and thus produces unreliable outcomes.

Gross vs. Net Environmental Benefits. In conducting a very detailed analysis of environmental benefits using the ICU (Island Community Units) approach, this report includes only the positive (gross) environmental benefits of the project. Filling of water column and benthic habitats induces large injuries to existing environmental resources and ecosystem services that are completely ignored in the ICU method. This process must be redone to include these environmental costs of filling so as to produce a means of assessing net environmental benefits of the entire island restoration project and of each potentially viable alignment alternative that leads to an unbiased choice of the optimal alignment option.

USACE plan formulation guidelines emphasize net benefits, whether monetarized as National Economic Development (NED) benefits or otherwise quantified as National Environmental Resource (NER) benefits. Our review of project documentation to date indicates that the loss of existing marine (water column and benthic) or upland habitat resulting from project construction has not been quantified and that the project benefit analyses use gross rather than net restoration gains. The analysis must take explicit account of habitat lost as well as habitat gained. Even if the environmental value of the habitat lost was identical (as for the water column) for each alternative, the comparison must still be made to distinguish net from gross benefits. Where the environmental value of the habitat lost varies among alternatives (as for the benthic habitat), the analysis of net benefits may re-order the priorities.

Quantifying Environmental Injuries of Filling. Methods of quantifying habitat injury from filling exist and one of them, Habitat Equivalency Analysis (HEA), is described in published scientific literature (e.g., see pages 173-307 in Volume 264 of Marine Ecology Progress Series from 2003) and is widely used by NOAA and other federal agencies. In addition, Peterson & Associates (2003) provided an analysis of impacts and compensatory mitigation options using HEA to the Norfolk Office of the USACE through Craig Seltzer for a project involving expansion of the Craney Island port in the Elizabeth River of the Virginia portion of the

Basis for Comment (Continued):

Chesapeake Bay (copy of document included in individual review by Peterson). This method estimates the secondary production lost by filling and measures benefits by quantifying the secondary production gained through habitat restoration. The logical basis for choice of this production metric to quantify environmental gains and losses is that these estuarine habitats provide the ecosystem service of food chain support, which has acknowledged high value. Production of the invertebrates at the base of the estuarine food chain provides a means of quantifying the forage base that leads to valued higher trophic levels, such as blue crabs, demersal (bottom-feeding) fishes, birds, turtles, and mammals. The currently included analysis of gross benefits is based only on positive impacts (largely to birds), while ignoring negative injuries (largely to crabs and fishes). By doing an analysis on net environmental benefits, this bias of ignoring estuarine injuries to crabs and fishes would be removed.

Likely Outcome of Including Environmental Costs of Filling in the ICU Analysis. Sampling of the benthic invertebrates within the island fill footprint around the alternative James and Barren Island alignments revealed that the benthic macro-invertebrate communities differed between islands. The bay bottom in the fill footprint around James Island contained a benthic community that possessed a lower Benthic Index of Biological Integrity (B-IBI) than the analogous benthic community around Barren Island. On those grounds, this report concluded that the loss of benthos from filling would be greater if Barren Island received the bulk of the fill than if James Island were chosen for most of the fill. This use of the B-IBI fails to recognize that the benthic community in the James Island fill footprint had a lower B-IBI in large part because of high abundance and dominance of a small bivalve mollusk, *Gemma gemma*, which is highly productive and represents high-quality prey for blue crabs and bottom-feeding fishes. Consequently, if the secondary production method used widely in HEA analyses were employed here to quantify the losses of food for important fisheries, it is likely that environmental costs of filling would be greater at James Island than at Barren per unit of benthic habitat area covered by fill. Because the environmental injuries associated with loss of water column habitat would not be likely to differ much between islands, the analysis of benthic habitat injuries would likely be the primary contributor to differences in environmental costs associated with different project alignments. When the ICU analysis is redone to involve analysis of net (not gross) environmental benefits, the preferred option yielding the most environmental benefits may be different from the preferred option now indicated by using gross environmental benefits. Because filling around James Island removes production of an important food for blue crabs and demersal fishes, redoing the ICU analysis on net environmental benefits is likely to alter the choice of alignments in a way that fills more around Barren Island and less around James Island. Only upon completion of re-analysis will we know for sure.

Significance – High:
This comment is of High Significance because it addresses the very basis on which the entire island restoration project is justified and, even more critically, on which the preferred island alignment is selected. There is evidence from sampling the benthic habitat around James and Barren Islands that their benthic invertebrate communities differ in a fashion that makes filling around James Island more injurious to blue crab and demersal fish production than filling around Barren Island, the opposite of what is now assumed in the absence of quantification of environmental losses from filling. Computation of net environmental benefits, including costs of habitat filling, could lead to changing the preferred alignment such that more filling is done around Barren than James Island.
Comment Cross-referencing:
(10) Comment: *National Economic Development (NED) outcomes (e.g. ICUs) are not discounted over time like monetary costs. Yet the incidence of environmental benefits over the project lifetime may be uneven and should be considered in alternative plan formulation timelines.* This comment links to Consensus Comment #10 on how the flows of environmental benefits are projected out over the project lifetime. Specifically, all analyses of environmental benefits and how they accrue over years must use net, not gross, environmental benefits. This has not been done.
Recommendations for Resolution:
To resolve the concerns raised by this comment, the report would need to include: • Application of a rigorous quantitative method (probably HEA) to estimate environmental injuries (losses) that will arise from filling water column and benthic habitats for each alternative island alignment under careful consideration. • Inclusion of these environmental injuries into the ISU computation process such that analyses can be based on net environmental benefits, computed by subtracting the newly computed costs from the gross benefits, which are what the report now uses. This will result in analyses focused on net habitat gain, balancing habitat lost in project construction with habitat gained by restoration. • Re-assessment of the selection of the preferred island alignment so that it can be based upon maximizing net environmental benefits not gross benefits.

Comment 2:
Water quality impacts associated with construction and the potential negative impacts of resettled suspended sediment to submerged aquatic vegetation (SAV) and natural oyster beds (NOBs) were not addressed.
Basis for Comment:
The most significant water quality concerns will probably arise during construction when sediment releases to the water column due to placement activities or erosion from unprotected banks potentially threaten SAV and NOB in the vicinity. Unfortunately, the 2D hydrodynamic and water quality modeling consider only general sediment transport and flow regimes for pre- and post-construction conditions. Further, the reported 2D modeling efforts are probably inappropriate for evaluating these impacts. SAV increases flow resistance and results in significant non-uniform vertical velocity profiles. The reduced near-bottom velocities can increase settling and retention of solids.
Significance – High:
The potential for construction impacts could mitigate all other project benefits; thus, the resolution of this concern is essential to project selection and implementation.
Comment Cross-referencing:
No other related comments
Recommendations for Resolution:
To resolve these concerns, the report would need to be expanded to include: • A simplistic assessment of sediment resuspension, transport, and deposition during construction. • If the simplistic evaluation can not definitively prove that SAV and NOB impacts are manageable, 3D hydrodynamic and sediment transport modeling may be necessary.

Comment 3:
The Preferred Alternative did not undergo the same level of rigor/review as the two original alternatives. The Preferred Alternative was added after the cost-effectiveness (CE) analysis and the incremental cost analysis (ICA) were completed, which theoretically casts doubt on its justification. The Preferred Alternative should be incorporated in the CE/ICA process.
Basis for Comment:
The Mid-Chesapeake plan formulation, i.e. the choice of a preferred alternative, depends on cost-effectiveness (CE) analysis and incremental cost analysis (ICA) rather than the usual cost-benefit analysis. The CE/ICA approach is appropriate in this application since the project results cannot be readily monetarized. The Final Integrated Feasibility Report and EIS of July 2007 generally follows USACE guidelines for Cost Effectiveness and Incremental Cost Analysis (CE/ICA) as set forth in *Evaluation of Environmental Investment Procedures Manual* (IWR Report 95-R-1, May 1995). The guidelines encourage the development of new alternatives by combining features of existing options. To retain the integrity of the CE/ICA, however, such new alternatives must be evaluated side-by-side with existing alternatives and be subjected to the same analytic methods and scrutiny. The project development team appears to have had a very valuable "Hey, what if we…" moment, resulting in the James 5/Barren E alternative after the original CE/ICA analysis was complete. At a minimum, however, the Project Development Team (PDT) should re-formulate the CE/ICA analysis to include the new alternative. Otherwise throwing in another alternative at the end (however attractive it may be) voids the CE/ICA process. Report Appendix B notes *"Although James Alignment 5 plus Barren Alignment E was not evaluated during the incremental cost analysis, based on its average annual costs of $32,500,000 (total cost is $941,658,000) and 813 average annual ICUs (total ICUs of 40,650), it would have remained in the final array of cost effective plans."* (page B-70). Inclusion of the preferred alternative in the full CE/ICA process is therefore unlikely to change the plan formulation outcomes, but would strengthen the Plan Formulation.* Inclusion in the full CE/ICs process is fundamentally a procedural issue, but an important one than appears to be easily addressed. **** As Comment 1 indicates, however, consideration of net benefits after loss of existing habitat could conceivably change plan recommendations. This observation increases the need to incorporate the preferred alternative in the CE/ICA process on the same basis as the other options.***

Significance – Medium (assuming Comment 1 addressed)
Including the preferred alternative in the fill CE/ICA process would strengthen the plan formulation and project justification, but is itself unlikely to affect alternative rankings.
Comment Cross-referencing:
(1) Comment: *The analyses of environmental benefits are biased by the failure to subtract quantitative habitat injuries (costs) arising from filling water column and especially benthic habitats, rendering the selection process and justification for the preferred island alignment unreliable.* Comment 1 regarding net versus gross benefits should be addressed in conjunction with this comment (3).
Recommendations for Resolution:
To resolve these concerns, the report would need to be revised to include the preferred alternative in the CE/ICA Analysis and the appropriate report tables. • Reformulate the CE/ICA analysis to consider the preferred alternative alongside the other alternatives. • The preferred alternative should be incorporated in the CE/ICA analysis starting with Alternatives Formulation and Screening (Item B.4 in Appendix B). • The preferred alternative should be carried through the analysis up to the Re-Evaluation of the Two Island Alternative (Item B.10 in Appendix B, page B-70). The reevaluation section might be usefully moved forward to the Alternatives Formulation section. • Appropriate text and tables in the main report body and executive summary should be updated accordingly.

Comment 4:
It appears that the sensitivity analysis was not conducted, and sources of risk and uncertainty and their impact on plan formulation are not documented.
Basis for Comment:
Sensitivity analysis is required by USACE guidelines to assist the project team in identifying and assessing sources of risk and uncertainty. The reports reviewed to date reveal numerous sources of uncertainty regarding project costs, timing, or outcomes. Some sources of uncertainty are mentioned in the text. Other sources of uncertainty, such as the exact amount of dredging material to be placed or the time required for colonization of new habitat, are inherent in this or any similar project. Both types of uncertainty must be addressed. Risk and uncertainty are addressed in USACE's Economic And Environmental Principles And Guidelines For Water And Related Land Resources Implementation Studies, 1983. Section 1.4.13 Risk and Uncertainty—Sensitivity Analysis, notes, in part: *(a) Plans and their effects should be examined to determine the uncertainty inherent in the data or various assumptions of future economic, demographic, social, attitudinal, environmental, and technological trends. A limited number of reasonable alternative forecasts that would, if realized, appreciably affect plan design should be considered.* *(b) The planner's primary role in dealing with risk and uncertainty is to identify the areas of sensitivity and describe them clearly so that decisions can be made with knowledge of the degree of reliability of available information.* The Principles & Guidelines give additional detail.
Significance – Medium:
Sensitivity analysis is required by USACE guidelines to address issues of risk and uncertainty. Without a sensitivity analysis the project may be vulnerable to unanticipated outcomes, increasing costs or jeopardizing anticipated environmental benefits.
Comment Cross-referencing:
Comments 5, 9, 10, and 11 illustrate sources of unaddressed uncertainty that could affect project justification or realization of anticipated benefits. (5) Comment: *It is overly optimistic to assume that the marsh will be fully functioning in five years.* (9) Comment: *The Adaptive Management Plan needs to include a discussion on how climate change, sea level rise, and invasive species will be addressed.* (10) Comment: *National Economic Development (NED) outcomes (e.g. ICUs) are not discounted over time like monetary costs. Yet the incidence of environmental benefits over the project lifetime may be uneven and should be considered in alternative plan formulation timelines.* (11) Comment: *Address how climate change will influence the engineering design.*

Recommendations for Resolution:
To resolve these concerns, a four-step analysis is recommended: • Review of project plans and reports to identify and document all sources of uncertainty. • Screening (documented) to distinguish significant from insignificant sources of uncertainty. • In-depth analysis as required to establish the sensitivity of plan costs and outcomes/benefits to significant sources of uncertainty. • Follow-up research, data collection, etc., to assist the project team in analyzing and/or reducing sources of uncertainty. The Principles & Guidelines note that *"Methods of dealing with risk and uncertainty include:* *(1) Collecting more detailed data to reduce measurement error.* *(2) Using more refined analytic techniques.* *(3) Increasing safety factors in design.* *(4) Selecting measures with better known performance characteristics.* *(5) Reducing the irreversible or irretrievable commitments of resources.* *(6) Performing a sensitivity analysis of the estimated benefits and costs of alternative plans."*

Comment 5:

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

Basis for Comment:

Numerous published studies have shown that development of a fully functioning tidal marsh requires more than five years. While above ground biomass develops to levels found in natural marshes within 3-5 years, other biological components (belowground biomass, algae, benthic invertebrates, heterotrophic microbial activity) take longer and physical components (e.g. soils) take even longer (Craft et al., 2003).

Studies of tidal marshes created on dredge material in North Carolina indicate that algae, benthic and heterotrophic microbial activity take about 5 to 10 years to achieve equivalence to natural marshes in the area (Zheng et al., 2004; Craft et al., 2003; Cornell et al., 2007). Development of fully functioning benthic invertebrate communities requires as much as 20 years to become equivalent (Craft and Sacco, 2003).

We suggest that 10 years is a more realistic timeline for the development of (mostly) fully functioning tidal marshes at James Island.

References

Cornell, J.A., C. Craft and J.P. Megonigal. 2007. Ecosystem gas exchange across a created salt marsh chronosequence. *Wetlands* 27:240-250.

Craft. C.B. and J.N. Sacco. 2003. Long-term succession of benthic infauna communities on constructed *Spartina alterniflora* marshes. *Marine Ecology – Progress Series* 257:45-58.

Craft, C.B., J.P. Megonigal, S.W. Broome, J. Cornell, R. Freese, R.J Stevenson, L. Zheng and J. Sacco. 2003. The pace of ecosystem development of constructed *Spartina alterniflora* marshes. *Ecological Applications* 13:1417-1432.

Zheng, L., R.J. Stevenson and C. Craft. 2004. Changes in benthic algal attributes during salt marsh restoration. *Wetlands* 24:309-323.

Significance – Medium:

By using a *realistic* timeline of marsh development, accrual of environmental and ecological benefits can be accurately calculated over the life of the project.

Comment Cross-referencing:

(10) Comment: *National Economic Development (NED) outcomes (e.g. ICUs) are not discounted over time like monetary costs. Yet the incidence of environmental benefits over the project lifetime may be uneven and should be considered in alternative plan formulation timelines.* The incidence of environmental benefits over the project lifetime may be uneven and should be considered in alternative plan formulation timelines.

(13) Comment: *Since this project is presented as a restoration, some attention needs to be paid to literature on the subject.*

Recommendations for Resolution:
To resolve these concerns, the report would need to be modified by recalculating the rate at which environmental benefits accrue following creation of low marsh and high marsh in the tidal marsh cells using 10 years, rather than 5 years, as the time required for a fully functioning tidal marsh to develop. • This means that Island Community Units (ICU's) would need to be recalculated for the selected alternative (James 5/Barren E) in Section 4.5.4, Island Community Unit Incremental Calculation, but not for the other alternatives since recalculation of ICU's using (10 years rather than 5 years) will not alter the ranking of the sites. • The maturity dates for low and high marshes in table 4.21 also would need to be changed.

Comment 6:
The report should make it clear that the "need" for the project and the final project scale are both determined by the need to dispose of a target volume of dredged material rather than being based on the incremental cost and incremental benefits.
Basis for Comment:
Fundamentally, the project is driven by the amount of dredged material that needs to be placed. The use of CE/ICA presumes that the scope and scale of the project would be determined by a comparison of incremental costs and incremental outputs per *Evaluation of Environmental Investment Procedures Manual* (IWR Report 95-R-1, May 1995). As the procedures manual indicates, the issue of project need and of "where to stop" in project scale are ordinarily approached through a comparison of net incremental environmental benefits and net incremental costs for various alternative project configurations and plans. While the report follows that procedure in general, it does so to choose among alternatives for disposal of a fixed material volume. The analysis is generally valid (although see Comments 1 and 3), but diverges from the procedures manual. It would be more forthcoming (and less risky) to state up front that the habitat creation/restoration project is a secondary driver, and that the scale of the project is determined by the amount of dredging material to be placed.
Significance – Medium:
In the absence of this transparency, the project reports could be criticized as misleading, even though the recommendation may not change.
Comment Cross-referencing:
See Comments 1 and 3 regarding the use of net benefits and the CE/ICA process. (1) Comment: *The analyses of environmental benefits are biased by the failure to subtract quantitative habitat injuries (costs) arising from filling water column and especially benthic habitats, rendering the selection process and justification for the preferred island alignment unreliable.* (3) Comment: *The Preferred Alternative did not undergo the same level of rigor/review as the two original alternatives. The Preferred Alternative was added after the cost-effectiveness (CE) analysis and the incremental cost analysis (ICA) analysis was completed, which theoretically casts doubt on its justification. The preferred alternative should be incorporated in the CE/ICA process.*
Recommendations for Resolution:
To resolve these concerns, the report would need to be expanded to include a clear explanation of the motivation for the restoration efforts and the determinants of project scope and scale.

Comment 7:
The design of the environmental monitoring to be conducted after initiation of the project is not described in sufficient detail to guarantee that the purposes of such monitoring can all be fulfilled.
Basis for Comment:
This comment is based upon (1) recognition that environmental monitoring before and after such a project has several important roles and detailed information about the design is necessary to insure the usefulness of monitoring, (2) vagueness of the monitoring proposed, (3) failure to provide a clear commitment to monitoring of all biological response variables at reference sites, and (4) recognition that, without parallel monitoring at environmentally matching reference sites, adaptive management decisions would be compromised. **Project Monitoring to Assess Performance and Success**. Environmental monitoring represents a scientific enterprise that, when applied to environmental restoration, employs performance standards against which success of restoration is judged following restoration. To allow such measurement of environmental/ecological benefits and their development over time, the design of the monitoring must be carefully constructed. The monitoring must include all physical and biological components integrated in time and space so that inferences about mechanisms can be made. Details are required to confirm that such monitoring has sufficient depth and breadth to track accrual of benefits over the project lifetime. **Selection of Reference Sites**. Use of multiple reference sites is critical to allow evaluation of success or failure of an environmental restoration and to guide adaptive management. In this document, the methods for selecting reference islands and reference marshes for monitoring are not presented. Reference sites should be environmentally similar to the James and Barren Islands selected for restoration, but practicing this wisdom requires the development of criteria on which to judge similarity and prioritization of criteria. Presumably, selection of reference sites for environmental monitoring has been done for the Poplar Island restoration, yet the experience and lessons learned from that analogous project are not incorporated into this document. To track development of environmental/ecological benefits following restoration, integrated measures of many physical environmental variables and biological responses must be made. The monitoring design does not show that this will be done. Finally, before initiating adaptive management of the restoration project, it is important to know whether the failure to achieve any specific biological benchmark reflects regional changes. That inference is possible only if multiple, environmentally matching reference sites are also monitored along with the restoration sites themselves.
Significance – Medium:
This comment is of Medium Significance because it addresses the basis on which the degree of success or failure of the restoration will be evaluated and it determines to what extent project management adaptations will be needed.

Comment Cross-referencing:
(8) Comment: *Connectivity between the salt marsh and estuary is unclear both during and post construction.* This comment links to Comment 8 on how control structures at the constructed marsh outlets may inhibit the connectivity between marsh and estuary, producing environmental services that fall short of projected benchmarks, requiring consideration of management adaptations to enhance flows of organic detritus into the estuary and enhancing nekton access to and utilization of the restored marsh habitat.
Recommendations for Resolution:
To resolve the concerns raised by this comment, the report would need to include in Section 8 (Adaptive Management and Monitoring) and in Appendix F (Adaptive Management Plan) the following information, probably in a specific section on Selection of Reference Sites: • Detailed monitoring plans for all physical and biological environmental variables, including clear demonstrations that the monitoring design is sufficient to allow tests of alternative hypotheses explaining success or failure of restoration. • Explanation of the criteria on which reference islands and marshes will be chosen for monitoring. • Information about how monitoring designs have been constructed for the analogous Poplar Island restoration and what this previous experience has done to improve monitoring for the James and Barren Island projects. • Discussion of how the monitoring of reference sites will serve in the decision making process on whether to initiate management adaptations when performance thresholds are not met.

Comment 8:
Connectivity between the salt marsh and estuary is unclear both during and post construction.
Basis for Comment:
"Production export" from the proposed James island wetland complex to the estuary is assumed to provide measurable ecological benefits to the Chesapeake Bay ecosystem. The wetland cells would serve as highly productive and protected nursery grounds for a wide range of organisms (some nektonic and some not) that utilize the marsh during some or all of their life cycle. Recreational boat traffic through the tidal channel is also assumed to be beneficial, although the benefits are not assumed to be significant. Ostensibly, both of these benefits will require the salt marsh be connected to the estuary in manner that allows the exchange of organisms and boats between the two. Figure 10 in Appendix C shows a "culvert control structure" at each end of the tidal channel and nine (9) "spillways" along the perimeter dike. It seems that these structures would preclude boat flow and possibly impede the flow of organisms from the salt marsh to the estuary. However, no discussions of post-construction removal of these structures or operational changes that would facilitate connectivity between the salt marsh and the estuary were found in the document.
Significance – Medium:
The proposed control structures at the constructed marsh outlets may inhibit the connectivity between marsh and estuary, producing environmental services that fall short of projected benchmarks, requiring consideration of management adaptations to enhance flows of organic detritus into the estuary and enhancing nekton access to the marsh. Although these benefits might not change the final project decision, it is important to the assessment of the project benefits.
Comment Cross-referencing:
(11) Comment: *Address how climate change will influence the engineering design.*
Recommendations for Resolution:
To resolve these concerns, the report would need to be expanded to include: • A section on connectivity between the salt marsh and the estuary during and after construction, including how the control structures will be managed.

Comment 9:
The Adaptive Management Plan needs to include a discussion on how climate change, sea level rise, and invasive species will be addressed.
Basis for Comment:
The Adaptive Management Plan contains no discussion as to how climate change (i.e. sea level rise) and colonization of wetland and upland cells by invasive species will be addressed. For example, how will the monitoring plan be designed/used to detect encroachment by invasive species such as *Phragmites communis* into the wetland cells? How will it be eradicated and controlled? And, if herbicides are used, how will potential effects be on non-target species be minimized? Or, if the rate of sea level rise accelerates, how will surface elevations in the wetland cells be maintained to support the desired wetland vegetation? For example, will thin-layer placement of dredge material be used to maintain the appropriate elevation in the wetland cells so they will not be flooded/submerged?
Significance – Medium:
This is important because these stressors may adversely affect the development of environmental and ecological benefits over the 50 year life of the project. Inclusion of this information will help managers anticipate potential problems that may crop up during the 50 year life of the project
Comment Cross-referencing:
(7) Comment: *The design of the environmental monitoring to be conducted after initiation of the project is not described in sufficient detail to guarantee that the purposes of such monitoring can all be fulfilled.* (11) Comment: *Address how climate change will influence the engineering design.*
Recommendations for Resolution:
To resolve these concerns, the report would need to be modified by including a discussion of how the Adaptive Management Plan (section 8 of the Final Integrated Feasibility Report and EIS and Appendix F) will address the following issues: • Invasive species detection and control, including a list of known invasive species, including terrestrial, wetland and aquatic invasives, encountered at Poplar Island or that are problematic elsewhere in the Mid-Bay region. • Measures to address how surface elevation in wetland cells will be maintained if sea level rise accelerates during the 50 year life of the project.

Comment 10:
National Economic Development (NED) outcomes (e.g., Island Community Units, or ICUs) are not discounted over time like monetary costs. Yet the incidence of environmental benefits over the project lifetime may be uneven and should be considered in alternative plan formulation timelines.
Basis for Comment:
The Mid-Chesapeake plan formulation, i.e., the choice of a preferred alternative, depends on cost-effectiveness (CE) analysis and incremental cost analysis (ICA) rather than the usual cost-benefit analysis. The CE/ICA approach is appropriate in this application since the project results cannot be readily monetarized. The CE/ICA approach does, however, forgo the analytic convenience of monetary units that can be easily compared and discounted over time. Since the output units in a CE/ICA approach are not discounted, it is not clear that appropriate account been taken of potential changes in ICU value or equivalence over time. Per USACE CE/ICA guidelines, ICUs are not discounted over time as are monetarized costs and benefits. The analysis therefore implicitly treats an ICU in year one and in year 50 as equally valuable, and a year 10 ICU at one location equivalent to a year 20 ICU at another location. The monetary costs, however, are discounted per USACE guidelines and practice. It would be a reasonable precaution to try discounting the ICU outputs in parallel with the monetary costs to see if that comparison would shift the rankings of plan alternatives. Review team experience in other projects suggests that a 3% discount rate is appropriate for environmental outcomes. The literature (see Comment 13 should be consulted for best practices. While a definitive treatment of outcome timing may not be possible, the issue should be explored to avoid having project sponsors blindsided in the future.
Significance – Medium:
This may be regarded as a procedural step, but should be given serious consideration to ensure that benefit timing does not affect plan formulation and alternative choice.
Comment Cross-referencing:
(4) Comment: *It appears that the sensitivity analysis was not conducted, and sources of risk and uncertainty and their impact on plan formulation are not documented.* (13) Comment: *Since this project is presented as a restoration, some attention needs to be paid to literature on the subject.*
Recommendations for Resolution:
To resolve these concerns, the report would need to be expanded to include a discussion of environmental benefit (and environmental loss) timing issues and equivalence over the project lifetime.

Consensus Comment 11:
Address how climate change will influence the engineering design.
Basis for Comment:
Changing climatological conditions may impact some areas of the engineering design. Specific design details are not appropriate for this document, but there should be some discussion of the potential for climate change to influence the engineering design for the project.
Significance – Low:
The failure to address climate change leaves the reader uncertain as to whether the potential consequences of climate change will be considered in the engineering design, but the significance is low since it will not likely influence the final project decision.
Comment Cross-referencing:
(8) Comment: *Connectivity between the salt marsh and estuary is unclear both during and post construction.*
Recommendations for Resolution:
To resolve these concerns, the report would need to be expanded to include: • An acknowledgement of the potential for climate change and its influence on the engineering design process including statements about where and when it will be duly considered.

Comment 12:
To better illustrate the connectivity between the salt marsh and open water, duplicate Figures 10 and 16 of Appendix C in the appropriate section of the main body of the report.
Basis for Comment:
Nowhere in the Final Integrated Feasibility Report and EIS is there a diagram or schematic showing the layout or design of the wetland cells. One must go to Appendix C (Engineering Design Analysis) to find this information. This information is essential for evaluating the connectivity of the wetland cells to the Bay and connectivity is important for nekton (fish, motile invertebrates) to access the created wetlands.
Significance – Low:
Inclusion of these figures aids in understanding the connectivity between the wetland cells and the estuary since they clearly show the configurations of the tidal gut that the wetland cells connect to and creeks that connect each cell to the tidal gut.
Comment Cross-referencing:
(8) Comment: *Connectivity between the salt marsh and estuary is unclear both during and post construction.* It seems that the outstructure may be problematic.
Recommendations for Resolution:
These two figures need to be presented in Section 5.0 (Recommended Plan) of the Final Integrated Feasibility Report and EIS. Specifically, the figures should be presented and described in Section 5.4.2.a, James Island – Wetland Cell Development.

Comment 13:
Since this project is presented as a restoration, some attention needs to be paid to literature on the subject.
Basis for Comment:
The report/EIS contains almost no references pertaining to creation of tidal marshes using dredge material, of which here is a large body of published literature, papers and books. Cited below, are several books pertaining to tidal marsh creation and assessment of biological structure and function, including timelines and expectations for achieving equivalence to natural tidal marshes. See also journal articles cross-referenced in Comment 5. **References** Kusler, J.A. and M.E. Kentula (ed.). 1989. Wetland creation and restoration: the status of the science. EPA/600/3-89/038. U.S. Environmental Protection Agency, Environmental Research Laboratory, Corvallis, OR. Lewis, R.R. 1982. Creation and Restoration of Coastal Plant Communities. CRC Press. Boca Raton, FL. Weinstein, M.P. and D.A. Kreeger (ed.). 2000. Concepts and Controversies in Tidal Marsh Ecology. Kluwer Academic Publishers. Dordrecht., The Netherlands. Zedler, J.B. (ed.). 2001. Handbook for restoring Tidal Wetlands. CRC Press. Boca Raton, FL.
Significance – Low:
Inclusion of this material in report informs the reader that the project team is familiar with what is known (and not known) about tidal marsh creation using dredged material as well as the rate at which environmental/ecological benefits develop following creation of these wetlands.
Comment Cross-referencing:
(5) Comment: *It is overly optimistic to assume that the marsh will be fully functioning in five years.*
Recommendations for Resolution:
To resolve these concerns, the report would need to be modified by inclusion of a review of this literature in Sections 1 (Introduction, 1.5.2 – Beneficial Use of Dredged Material), 5 (Recommended Plan, 5.6 – Monitoring and Adaptive Management) and 8 (Adaptive Management and Monitoring, 8.3 – Monitoring Elements).

Comment 14:
The "Most Probable Future Without-Project Conditions" (Section 3.5) does not specify where the dredged sediment will be placed if the project does not occur.
Basis for Comment:
The report attempts to portray the project as an ecosystem restoration project rather than the dredged sediment placement and beneficial use project that it is. This appears in several places in the report, but the most significant omission is the failure to consider alternatives for dredged sediment placement in the absence of the project. This is a crucial omission for the proper analysis of project benefits.
Significance – Low:
Although important, this is considered of low significance because the additional benefits of dredged sediment placement will not change the final decision.
Comment Cross-referencing:
No other related comments
Recommendations for Resolution:
To resolve these concerns, the report would need to be expanded to include: • A discussion of dredged sediment placement options in the absence of any island creation project.

APPENDIX B

FINAL CHARGE TO THE EXTERNAL PEER REVIEWERS

Mid-Chesapeake Bay Islands Ecosystem Restoration
Final Charge and Specific Focus Questions

Charge and Specific Focus Questions for the Final Integrated Feasibility Report and Environmental Impact Statement (EIS)

Executive Summary

None.

1.0 Introduction

None.

2.0 Problem, Needs, and Opportunities

Please comment on whether or not the problems, needs, and opportunities are correctly defined in terms of environmental and economic considerations.

3.0 Existing Resources

Comment on whether you agree with the general analysis of the existing resources within the study area.

For your particular area of expertise, provide an in-depth review of whether the analysis of the existing resources (both physical and biological) within the project area is sufficient to support the impact analysis in Section 6.0 (and in general, the EIS embedded throughout the Feasibility Study (see Appendix A)).

Given your area of expertise, does this section appropriately address all existing conditions?

Were the surveys conducted to evaluate the existing resources (e.g., fish, avian, benthos, mammals) adequate? If not, what types of surveys should have been conducted?

Were socioeconomic conditions adequately addressed? Were specific socioeconomic issues not addressed?

Please comment on the conclusion of the most probable future without project condition. Do you envision other potential outcomes?

Does the analysis sufficiently describe resources with direct or indirect use values and resources with non-use values?

4.0 Plan Formulation

Comment on whether you agree or disagree with how the selected alternative was derived. Were key policies and guidelines included in the plan formulation?

Comment on the plan formulation. Does it meet the study objectives and avoid violating the study constraints?

Are the future conditions expected to exist in the absence of the proposed project logical and adequately described and documented?

Are the changes between the without and with project conditions adequately described?

Are risks and uncertainties of benefits, costs, and impacts adequately addressed and described?

Please comment on whether you feel the objectives and constraints developed by the PDT at the beginning of the feasibility plan formulation are adequate? Where are they lacking?

Please comment on the Island Ranking Process used to select the islands for restoration. Were the engineering and environmental suitability analyses appropriate? Why or why not?

Please comment on the engineering design and ecological design considerations and constraints used to develop island alignment alternatives. Are there additional factors that need consideration?

Please comment on the screening of the proposed alternatives. Are the screening criteria appropriate? In your professional opinion are the results of the screening acceptable?

Please comment on the adequacy of the Island Community Unit method for quantifying environmental benefits. Is the process adequately described?

Please comment on the Island Community Index (ICI) approach used to identify habitat requirements.

(The next three questions should be considered here and in consideration of the referenced Appendix B.)

Was the economic analysis used for this project consistent with generally accepted economic analysis methodologies? Why or why not?

Are the considerations in the screening phase likely to ensure inclusion of the "Best Buy" restoration alternatives for further planning and in-depth evaluation?

The cost-benefit considerations in this plan are limited to ICU creation/protection and direct restoration costs. Is this limitation appropriate and justified to select the most cost-effective restoration alternatives? If not, what other values might be included?

5.0 Recommended Plan

Please comment on the likelihood of the recommended restoration project to achieve significant ecosystem output.

Please comment on the appropriateness of location, sizing and design of restoration measures.

Please comment on the likelihood of the recommended restoration project to maintain existing submerged aquatic vegetation (SAV) beds and protect the extent of former SAV beds.

Please comment on whether the ICU model was appropriately applied to quantify benefits and whether this application appropriately incorporated the science of estuarine ecology.

In your opinion, are there sufficient analyses upon which to base a recommendation for construction authorization?

6.0 Impacts to Project Area

Are the impacts to the project area as defined in this section consistent with a project of this scope and size?

Please comment on whether the hydrodynamic modeling was sufficient to identify potential impacts.

Please comment on whether the sediment transport analyses conducted for this effort were sufficient to identify potential impacts.

In your professional opinion, do the stated impacts on water quality, sediment quality aquatic and terrestrial resources and rare, threatened and endangered species appear reasonable? Why or why not?

Do the stated socioeconomic, economic (e.g., fisheries), and other impacts appear adequate and reasonable?

Please comment on whether the effects/impacts of the alternative plans are sufficiently considered to allow identification of potentially significant short term and long term costs and benefits.

Please comment on whether any of the identified effects/impacts are of sufficient magnitude to suggest that the economic analysis used to identify the "Best Buy" plans described in Section 3 may be inadequate to select the plan with the greatest net benefit.

7.0 Plan Implementation

Is the total project cost and schedule for the recommended plan appropriate for a project of this scope and size, given the future escalation in fuel and construction costs during the construction of the project?

8.0 Adaptive Management and Monitoring

Based on your expertise, is the adaptive management strategy proposed for this project appropriate? Why or why not?

Are the objectives for the monitoring elements (sediment, wetland vegetation, water quality etc.) reasonable? Should additional monitoring be considered?

9.0 Public Involvement and Agency Coordination

NA

10.0 Recommendations

Is the recommended plan and associated requirements clearly described and consistent with the rest of the report?

Appendix A. Environmental Impact Statement Index

NA.

Appendix B. Plan Formulation Supporting Documentation

Are the site identification, ranking, screening, and selection processes appropriate, comprehensive, and consistent with project goals? In your professional estimation, are the chosen sites the most suitable?

Were engineering and environmental considerations appropriately and comprehensively applied when selecting the alignments for the two sites?

(The next three questions are considered here and in Section 4.)

Was the economic analysis used for this project consistent with generally accepted economic analysis methodologies? Why or why not?

Are the considerations in the screening phase likely to ensure inclusion of the "Best Buy" restoration alternatives for further planning and in-depth evaluation?

The cost-benefit considerations in this plan are limited to ICU creation/protection and direct restoration costs. Is this limitation appropriate and justified to select the most cost-effective restoration alternatives? If not, what other values might be included?

Appendix C. Engineering Design Analysis

Provide an assessment of the overall engineering analysis, including an assessment of its quality, completeness, and feasibility.

Comment on the island engineering ranking and its application to the site selection process.

Does the analysis demonstrate sufficient engineering understanding of the subsurface conditions and impacts, particularly related to foundations and settlement, and existing ecosystems?

Does the analysis demonstrate sufficient engineering understanding of the hydraulics, hydrodynamics, and potential sedimentation of the two study sites?

Comment on the construction sequences and their relation to successful completion of the project with minimal negative environmental impact.

Is the future design effort sufficiently and adequately described in order to clearly define the engineering analysis to be conducted during the preconstruction engineering and design phase?

Appendix D. Real Estate Plan

NA

Appendix E. Environmental Compliance

NA

Appendix F. Adaptive Management Plan

Please comment on the two components (restoration and cell development) in the Adaptive Management Plan. Is the review process and interrelationship between the two components sufficient? Why or why not?

Are the goals and subgoals for each of the two components adequate? Should others be considered?

Appendix G. Public Involvement

NA

Appendix H. Report on Existing Conditions and Impacts to Socioeconomics, Aesthetics, and Recreational Resources

NA

Appendix I. Executive Summaries of Technical Reports

NA

Appendix J. List of Preparers & Reviewers

NA

Appendix K. References

NA

Appendix L. Recreation Justification

Although recreation features are being included in the Mid-Bay project as an additional project benefit only (i.e., they are not part of the overall project benefit cost analysis), does the conceptual plan that is being proposed for recreation purposes on the Mid-Bay Islands appear reasonable?

Appendix M. Formal Response to Comments

NA

ISSUE PAPER No. 1
Mid-Chesapeake Bay Island Ecosystem Restoration
Integrated Feasibility Report and Environmental Impact Statement
Revised August 2007

The report recommends commencing placement of dredged material at James Island in 2018. Do you believe that this is the correct timing based on the pertinent elements of cost, ICU's, capacity requirements, and DMMP recommendations contained in the Issue Paper?

Does the issue paper accurately reflect the optimized use of Poplar and James Islands in terms of accommodating projected dredged material capacity requirements and maximizing ecosystem restoration benefits?

This project does not produce monetary benefits, but rather ecosystem restoration expressed in Island Community Units and therefore does not have a traditional benefit-cost ratio and net benefits. Based on Corps of Engineers guidance for this type of project, are the economic principles employed in the analysis appropriate to support the recommended plan and the conclusion of the Timing analysis?

Mid-Chesapeake Bay Islands Ecosystem Restoration
CENAB responses to EPR comments

High Significance

- Comment 1:

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

The team is working with fishery managers from the Plan Formulation Workgroup (Jane Boraczek of EA Engineering, Science, and Technology, and John Nichols of NOAA National Marine Fisheries Service) to quantify negative benefits from filling the water column and benthic habitats. The group is developing additional Island Community Indices (ICI) for the open water column (including benthic habitats) to add to the current Island Community Unit (ICU) methodology. Currently, the ICU method quantifies the benefit of creating island habitat and protecting SAV resources. ICUs will be calculated for the offshore area that would be filled at James and Barren Island. This will allow a net ICU to be calculated. The offshore areas that would be filled to restore an island with dredged material exist because previous islands have eroded. Similar water column and benthic areas are abundant in the Chesapeake Bay. The acreage to be filled is miniscule (2072 ac) compared to similar mesohaline acreage (1, 477, 638 ac).

The team will provide a discussion to support their conclusions produced by the plan formulation selection process. The team will use the net ICU calculation, monitoring data, and the written justification to support their recommended plan selection. Specific responses to issues such as the importance of particular ecosystem components (e.g. gem clams) will be included in the modified ICU analysis and supporting documentation.

At the beginning of the Mid-Bay project, the PDT decided that individual species would not be used to quantify environmental benefits. Rather than individual species, the team decided to base the evaluation of benefits on the fish and wildlife communities that would inhabit the restored island ecosystem. The ICU method was developed for Mid-Bay to capture the value of the island habitat diversity and the benefit to the communities that inhabit remote islands.

The ICU method was just one piece of the plan formulation process. ICUs were developed to assign a national ecosystem restoration (NER) benefit to the final set of alternatives. The plan formulation included a study area screening, an island ranking process based on engineering and environmental suitability, a GIS analysis based on engineering and ecological design considerations, a screening of proposed alternatives, and a refinement of the screening results, followed by assigning benefits using the ICU method. The benefits of ecosystem restoration projects can be quantified using a variety of measures, such as acres of habitat produced or miles of shoreline restored. Indices that combine separate measurements can also be used, and offer the advantage of lumping multiple types of benefits together into one unit. This ability of indices to capture

varying types of benefits into one comparable unit is what made this method suitable to evaluate the diverse island ecosystems being planned in the Mid-Bay project.

ICUs are similar in concept to the Habitat Evaluation Procedure (HEP) and its associated Habitat Units and Habitat Suitability Units developed by USFWS. Similar to HEP, the main foundation is quality (indices) multiplied by quantity. However, ICUs provide the advantage for this project by allowing quantification of benefits to communities of wildlife rather than an individual species. The PDT did not want to focus the benefits quantification on a single species as the remote islands provide benefits to a wide range of species. These benefits vary functionally and seasonally depending on the species or community. That is, some communities will use the islands for foraging habitat, some for mating/nesting habitat, and others for resting and refuge. Habitat use changes seasonally and is dependent upon the life cycles and migration patterns of species. Furthermore, the ICU method was able to account for changes to benefits as the project developed and habitats matured.

The development of the ICU and its associated Island Community Indices was performed with a work group involving regional agency resource managers. The process relied on the input and best professional judgment of a number of resource experts and available scientific literature. The ICUs were intended to estimate benefits, but were not meant to serve as a quantitative research project.

The EPR reviewers suggested using a Habitat Equivalency Analysis (HEA) or productivity model to quantify the environmental injuries of filling the offshore areas. Data requirements for the HEA method include net gain in primary production expected from restoration, the food web structure, energetic transfer efficiencies (McCay and Rowe 2003), and site-specific kinetic data (e.g. wet-dry ratios, average kcal/species). Some of the detailed data needed to run the HEA are not available for Mid-Bay such as the kinetic data. Efforts to use these methods in the Chesapeake Bay region (explained below) have shown these methods are of limited value if detailed information is not available, which is the case for Mid-Bay.

The Masonville Dredged Material Confined Facility (DMCF) Permit Application is one effort that attempted to use these methods in the Chesapeake Bay region. For the DMCF in the Baltimore Harbor of the Patapsco River, it was suggested that a productivity model (along the lines of that used for the Craney Island EIS in Virginia) be used to assess the functional losses of filling 130 acres of open water with approximately 0.5 Mcy of dredged material annually. (Craney Island is a DMCF in the Elizabeth River that is undergoing a 580 acre expansion to provide a marine terminal.) As a conservative assumption, the water column (zooplankton including icthyoplankton and invertebrates) productivity was assumed to be similar between the Masonville and Craney Island sites even though the Masonville site lies in an area with much lower salinity and lower overall plankton productivity. The resource agencies accepted this conservative approach for the water column losses. However, applying the productivity modeling to the epibenthic community met with professional criticism. The productivity calculations are based on ecosystem kinetics and are dependent upon a variety of factors, including

salinity, species-composition, and current patterns. Without site-specific kinetic data (e.g. wet-dry ratios, average kcal/species), the calculations must be done with surrogate species. The Craney Island model developers reviewed the calculations for the Masonville area and concluded that application of the Craney Island HEA model inputs to other areas of the Bay (particularly with lower salinities such as Masonville) would not be accurately predictive. Therefore, productivity modeling was abandoned. In summary, the lesson learned from Masonville was that reliable results are not achievable from the HEA without site-specific data, as would be the case in applying the HEA to Mid-Bay. Therefore, it was decided that this method was not applicable given the current level of information to the Mid-Bay project.

Although, HEA was not applicable, the Masonville DMCF project did utilize a site-specific modification of NOAA's Habitat Equivalency Analysis,that served as a justification for the compensatory mitigation options (to demonstrate sufficient replacement of ecosystem function). In order to demonstrate that the proposed mitigation options were replacing the values and functions lost to open water filling, a project-specific Habitat Condition Analysis, was developed (based on the NOAA HEA approach). This involved a multi-metric evaluation of the open water impacts and the benefits of the mitigation options based on standard measures of ecological value. The condition factors derived for the analysis came from standard regionally-appropriate and broadly-accepted measures of environmental quality (and were reviewed by local resource regulators/managers). To conduct the actual evaluation, an initial and final condition factor was assessed for the impacted area and the proposed mitigation options. The difference between the initial and final condition was scaled by the amount of acreage affected to yield the amount of compensation needed for the affected area. The same calculation was then completed for each of the mitigation options and the offsets from the mitigation options were balanced against the calculated loss. It was estimated that the aquatic projects generated more mitigation credits than were necessary to compensate for the wetland losses. However, although the Masonville methodology serves as an example the application of a method similar to what the EPR reviewers were suggesting and the method was reviewed by local resource agencies, it was, ultimately, a relatively qualitative approach that would not be compatible with the ICU outputs used to predict the benefits of habitat restoration of the Mid-Bay Islands.

In addition to the data limitations discussed, HEA or productivity methods are not consistent with the Island Community Unit methodology. That is, these methods would not have provided a means to calculate a 'net' ICU value as the output of the methods suggested by the EPR reviewers would not have been in units compatible with the ICU methodology. Further, the Mid-Bay project and the ICU methodology were formulated in conjunction with and have the support of the various resource agencies that ultimately have the responsibility for the island resources, NOAA NMFS, USFWS, MDNR, and MDE. A great deal of work was devoted to developing this project with the resource agencies. Modifying the ICU method that has the buy-in of the resource agencies is more favorable and timely than attempting a new method.

Literature Cited

McCay, Deborah P. and Jill J. Rowe. 2003. Habitat restoration as mitigation for lost production at multiple trophic levels. Marine Ecology Progress Series. 264: 233-247.

- Comment 2

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

The team prepared a "Simplistic Assessment" as suggested by the EPR reviewers considering sediment resuspension, transport, and deposition, and oyster and SAV requirments to assess construction impacts for both Barren and James Island. The team concluded that there will be no significant turbidity or environmental impacts to the oyster bars or SAV from construction at Barren or James Island. During the development of the Mid-Bay project Federal and State resource were involved in planning and in the assessment of impacts. Their opinions were heeded and their agencies agreed with our findings and decisions regarding the benefits and impacts of the proposed construction. No issues were raised by the assessment to warrant the 3D hydrodynamic and sediment modeling proposed as an additional tool by the EPR reviewers if the simplistic assessment was inconclusive.

The Simplistic Assessments are as follows:

BARREN ISLAND
Given:
1. Distance to SAV and Oyster Bars is approximately 2,500 ft and 2,000 ft, respectively.
2. Construction Technique is mechanical placement and there will be no dredging
3. Time of Year restrictions (1,500 ft during sensitive periods for SAV and Oysters) will apply.
4. Experience level is very high for this application (Poplar Island toe dike and north Barren Island dike construction).

Assumptions:
- Data from the Poplar Island toe dike indicates that sediment would drop out of the water column within 4 hours, prior to it reaching SAV beds and oyster bars (Mid-Bay Report 6-8).
- No dredging will occur at Barren Island to disturb sediments.
- Barges will be small and light-loaded from a larger barge moored offshore for Barren construction. Vessel speed will be low further limiting bottom disturbances.
- Construction will not occur during SAV growing season. It is not known at this time if there will be SAV in breakwater construction area, but SAV surveys performed in 2002 and 2003 did not detect any. Further, SAV surveys by the Virginia Institute of Marine Sciences (VIMS) have not identified any SAV in the breakwater construction area in the last ten years. It is unlikely that SAV would grow in the Phase 2 (9. 5 ac) footprint because of water depths which are deeper than the photic zone (6feet) Phase 1 is the proposed lateral expansion of an existing breakwater. It is possible that some

SAV may occur in the 1.1 acre footprint of Phase 1 which is in 4 foot water depths; however none has been identified.

- 1,300 lb armor stone at Barren will be individually placed. Fabric will be placed on bay bottom prior to placement.
- Very little turbidity will occur and will not disperse far (Mid-Bay p 6-8).
- Breakwaters will be in depths of 4 feet to 6 feet. The photic zone is considered to be from the water surface to approximately 6 feet in depth or 2 meters in the bay.
- Breakwaters would occupy 10.6 acres of Bay bottom if both Phase 1 and 2 are built (p 5-2) while construction would protect 1325 acres of SAV habitat (Mid-Bay p 5-3).
- Flow appears to be sufficient to keep leaves clean of sediment as indicated by thriving SAV in the area.
- Sediment resuspension naturally occurs in the area but the creation of stone breakwaters is not expected to add significantly to turbidity and will help to reduce sediment.
- The Poplar Island test toe dike construction was very similar and no adverse consequences resulted.
- Previous Barren Island construction activities have not produced SAV impacts.
- TOY restrictions would be followed.

Conclusion:
No significant turbidity or environmental impacts from construction at Barren are likely to result to oyster bars and SAV due to distance of project from SAV beds and oyster bars, time of year restrictions and construction techniques.

State and Federal resource agencies were on the Project Delivery Team (PDT) and provided expertise. (NOAA, USFWS, NMFS, USGS, Maryland Department of Natural Resources (MDDNR) Maryland Department of the Environment (MDE), Maryland Geological Survey (MGS), University of Maryland, and University of Virginia.)

JAMES ISLAND
Given:
1. Distance to SAV and Oyster Bars is approximately 1,750 to 2,000 ft, and 500 to 1,000 ft, respectively.
2. Construction Technique. Dredging will occur for the access channel which is 12,720 feet in length. Of the total length, 3, 070 would be within the diked foot print of the project. All dredging for dike construction material will be within the footprint. (Mid-Bay p.5-1). Stone will be mechanically placed over sand cored cloth covered dikes.
3. Time of Year restrictions apply (1,500 ft.?? during sensitive periods for SAV and Oysters).
4. Experience level is very high for this application (Construction of 1,140 acre Poplar Island and approximately 6 miles of dikes).

Assumptions:
- Data from the Poplar Island toe dike indicates that sediment would drop out of the water column within 4 hours, prior to it reaching SAV beds and oyster bars (Mid-Bay Report 6-8).

- Construction will not occur during SAV growing season.
- Turbidity will not disperse far (Mid-Bay p.6-8).

- . Time of Year (TOY) restrictions would be followed

State and Federal resource agencies were on the Project Delivery Team (PDT) and provided expertise. (NOAA, USFWS, NMFS, USGS, Maryland Department of Natural Resources (MDDNR) Maryland Department of the Environment (MDE), Maryland Geological Survey (MGS), University of Maryland, and University of Virginia.)

Other Significant Factors to Consider:
1. The Poplar Island Restoration Project has been under construction since 1999. This project is very similar and our experience with its relative absence of significant adverse consequences served as a basis (Poplar Island construction has not produced negative impacts to nearby SAV and oysters) for these assumptions.
2. TOY restrictions will be applied to protect SAV and oysters during sensitive periods.

Conclusion:
No significant turbidity or environmental impacts from construction at Barren are likely to result to oyster bars and SAV due to construction techniques, time of year restrictions, experience and distance from SAV beds and oyster bars.

Medium Significance

➢ Comment 3

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

The preferred alternative was originally included in the CE/ICA. Per HQUSACE guidance as documented in the Project Guidance Memorandum (PGM) of May 2007, the preferred alternative was removed from the CE/ICA as it was an iteration added after the CE/ICA. Section 4.7 was significantly changed, providing detailed information on how the recommended plan was selected. The entire comment from the PGM follows. Language specific to this decision is highlighted.

From p 26 of the May 2007 PGM:
1) HQUSACE Comment: Formulation Rationale. The rationale for linking the formulation of the two island features is not evident and results in some confusion in the incremental analysis. These islands are physically separated by about 14 miles, would utilize different navigation projects as a source of material, their scales and costs are vastly different (James Island restores 2072 acres, Barren Island restores 72), and their authorization is being sought under separate processes and authorities. Therefore, it is unclear why the formulation and CE/ICA analyses are linked and whether that linkage

affects the incremental justification of the features. Further rationale is needed to support the formulation of the islands, which appear to be separable increments. The scaling of the Barren Island project also needs clarification. The text notes that the scale is limited due to the impacts to the surrounding ecosystem, but it isn't evident how scaling of Barren Island alternatives was accomplished to determine the optimum investment. See section E-36.c. and E-14.g.(2) in ER 1105-2-100.

CENAB Response: (21 March 2006) Need further clarification from HQ at FRC to address comment appropriately. Formulation focused meeting dredged placement needs (3.2 mcy/year) while maximizing environmental benefits. Plans were formulated that were stand alone options, which were then combined to maximize potential benefits. Will review and clarify section 4.3.6.a which describes how scaling down of Barren Island project was accomplished.

Discussion at FRC: Need to ensure consistency among incremental analysis for one island and multiple island scenarios. Discussion on whether "If/Then" analysis should affect the incremental analysis. Best increment should be used for each island.

CENAB Revised Response: (11 May 2006) Formulation focused on meeting dredged placement needs (3.2 mcy/year) while maximizing environmental benefits. Plans were formulated that were stand alone options, which were then combined to maximize potential benefits. Will review and clarify section 4.3.6.a which describes how scaling down of Barren Island project was accomplished and remove Barren Island E from incremental analysis. "Best Buy" graph will be included in final draft if necessary to communicate results.

Action Required: The plan formulation and selection section of the report needs to be recast. HQ suggests that the text be reviewed and expanded to clearly explain the key assumptions and objectives for each step of formulation. The formulation and selection process needs to address the development of alternative Barren E as well as the timing for construction and filling of James Island, based on needs for dredged material disposal and ecosystem restoration. The If/Then analysis may be helpful to some extent in telling the story. Although linked to an extent by the formulation process and cumulative impacts, each feature must demonstrate that the formulation requirements are satisfied under the authority being recommended. The draft report should be revised to address these points and coordinated with HQ prior to its circulation for public review.

CENAB Response: (11 Aug 2006) Many changes were made to section 4 – Plan Formulation, in an attempt to address this comment. The final array of best buy plans was changed to not include Barren E alignment, as this was iteration after the CE/ICA was conducted (see response to comment B.3 above- 'Location and Timing' analysis). Section 4.7 was significantly changed, providing detailed information on how the recommended plan was selected. These changes include: 1) a more detailed description on the objective comparison in 4.7.2; and 2) an NED/NER trade-off analysis discussion (4.7.5);

HQUSACE Analysis (September 2006): The concern is partially resolved. The early cycle formulation rationale has been edited, but changes/discussion on timing of James need to be included. The revised section 4 text discusses James coming on line in 2018 and Barren ASAP, but the discussion/rationale needs to be expanded. James construction is completed in 2014/2015, but could be delayed three years to avoid overfilling or even longer (if overfilling is acceptable) to 2021. The text should present information on the cost effectiveness of the individual islands- what $/ICU results relative to the timing. Also, the recommendations and implementation sections indicate that materials from the northern shipping channels may be used to accelerate the habitat development at Barren. This would appear to constitute another alternative-the Barren E costs would have to reflect the increased haul costs of dredged material from the northern channels (not the base disposal plan as is the case for the Honga River materials) and the outputs would be accelerated leading to different annual costs and outputs. The outputs for James Island would be affected slightly as a result.

Discussion/Action Required (21 September 2006): HQ wants to compare the life cycle costs of the various start dates as indicated by the timing analysis of James. Inconsistencies between the MCACES for Barren and James led to questions about the incremental costs of outputs for each proposed project in the recommended plan. For example, wetland plantings are included at James but not at Barren. The district explained that wetland planting at Barren will be accomplished using volunteer efforts. The final text will strike language about using the material from upper bay channels at Barren Island. The incremental costs per output for the recommended plan at each island will be presented in the report. The analysis of timing for development of James Island will be addressed. See Comment 3.b.3 on Location and Timing.

CENAB Response (23 May 2007): Language referring to placement of material from the upper channels at Barren has been struck from the document. The wetland plantings for the stand alone Barren alternatives included in the CE/ICA are not different from those at James. The only difference in costs for the alternative analysis is the distance it takes to haul the material to Barren vs. James. In terms of benefits, there is no difference in the way benefits were calculated for James or Barren. The same method was applied, so no bias towards one alternative over another was made. The Barren Island E alignment was a reiteration of one of the best buy plans, James 5/Barren D. This iteration is explained in Section 4.6.9. Therefore, the volunteer planting option at Barren was not a part of the plans included in the CE/ICA, and would not be an option for any of the Barren Island alignments used in that phase of the plan formulation. Timing analysis is included in Attachment 1 of this PGM. The incremental costs per ICU and acre for the recommended plan at each island are included in the Executive Summary and in Section 4. See Attachment 2, Issue Paper No. 2, of this PGM for more documentation on the linking of these two sites and projects.

- Comment 4

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

Recent Corps guidance requires that any decision documents after 1 Oct 2007 which are over $40M that go to Congress for funding will require a risk analysis. To meet this new requirement the Corps has initiated a cost and schedule risk analysis. The project delivery team has met and brainstormed to identify project risk elements. Risk elements are any aspects of the project which could cause the cost and/or schedule to vary from the estimators' cost estimate and schedule. The cost and schedule risk assessment will utilize Crystal Ball software in order to conduct a risk analysis. Walla Walla District is performing the Crystal Ball analysis. Results are due on February 29, 2008.

In addition, risk and uncertainty was addressed in other comment-responses herein as it relates to the timeframe to develop a fully functioning marsh, sea level rise, and adaptive management.

- Comment 5

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

CENAB agrees fully with comment. The cited references provided by reviewers (and listed below) have been reviewed. Wetland cells, in fact, do continue to increase in value through 10 years in the current ICU quantification. Wetland maturity was not clearly communicated. The five year marker identified in the Feasibility Report was specific to vegetation development. In addition, the findings of Cornell et al. 2007 suggest that most major carbon fluxes are likely established in less than 5 years. However, additional wetlands function was accounted for and ICU increases do occur through year 10 as the benthic community develops. In the current formulation, the wetland cells gain nearly 20% of their value between years 5 and 10 as the benthic community matures. This was poorly communicated. The increase in benefits from benthic development was identified only in a footnote in Table B-17. Table B-17 will be corrected to state that wetlands mature fully in 10 years, not 5 years. No changes will be made to the ICU calculations as they do account for what the reviewers were requesting.

Cornell, J.A., C. Craft and J.P. Megonigal. 2007. Ecosystem gas exchange across a created salt marsh chronosequence. *Wetlands* 27:240-250.

Craft. C.B. and J.N. Sacco. 2003. Long-term succession of benthic infauna communities on constructed *Spartina alterniflora* marshes. *Marine Ecology – Progress Series* 257:45-58.

Zheng, L., R.J. Stevenson and C. Craft. 2004. Changes in benthic algal attributes during salt marsh restoration. *Wetlands* 24:309-323.

- Comment 6

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

The dredged material disposal 'need' for the project is quantified in Objective 3 which states: Provide capacity for placement of dredge material (3.2 mcy/y). (Federal DMMP identified a need to place 30 to 70 mcy of material over a 20-year period.) The placement

capacity was considered at two steps in the plan formulation, 1) during the island ranking process as an engineering suitability criteria (Section 4.3.2a) and 2) as an engineering design consideration when developing island alignments (Section 4.4.1).

CENAB will reiterate the placement capacity needed (3.2 mcy/y and 30-70 mcy) throughout the report and more adequately stress the need to provide a project that sufficiently provides the needed placement capacity. The sections to be updated include:

Report Summary- Study Objectives- Problems and Opportunities
- Planning Objectives

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

An explanation will also be added to the Recommended Plan sections of the Report Summary and main report to communicate why the recommended plan (28-30 mcy/y over 28-30 years) exceeds the projected placement capacity needs as identified in Objective 3. The reasons for recommending a project with the ability to handle a greater capacity of dredged material include the ability to accommodate risk and uncertainty surrounding annual dredging needs (3.2 mcy/y is an average), provide a factor of safety in the plans, and be able to manage increased placement needs if existing channels are enlarged to authorized widths (currently many channels are below authorized widths).

- Comment 7

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

USACE and the Maryland Port Administration have contracted with ARCADIS to develop Mid-Bay Island Ecological Design Criteria and a Habitat Development Work Plan in support of the Mid-Bay Adaptive Management Framework. The detailed monitoring plan will be based upon the selection of reference ecosystems within the similar environmental conditions as the constructed systems. A detailed monitoring plan will be developed at a later time and will rely upon review of published results dealing with the use of dredged material in wetland construction and wetland restoration. A large repository of literature related to dredged material as wetland substrate is at the U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, Mississippi in the 1980-1990's. The effort was directed by Dr. Mary C. Landin and her colleagues and is the basis of the effort being proposed around the nation. Over 100,000 acres have been created using dredged material over the last two decades (Landin 1997). Data from the Paul S. Sarbanes Ecosystem Restoration Project at Poplar Island (Poplar Island) will be utilized where acceptable. References associated with east coast marsh restoration will be reviewed and incorporated into the detailed monitoring plan as well as obtaining reference sites as close as possible to the site (Kusler and Kentula 1989, Craft et al 1999, Weinstein et al 2000).

The importance of the reference marshes is to identify naturally occurring changes in the environment that would affect restoration success; therefore the reference marshes have

to be subjected to similar conditions and the use of ecological benchmarks (Shisler 1989, Shisler et al 2007). The Poplar Island data will be reviewed to identify potential issues that will allow the development of strategies in the Adaptive Management Plan (AMP).

Literature Cited:

Craft, C., J. Reader, J.N. Sacco and S.W. Broome. 1999. Twenty-five years of ecosystem development of constructed *Spartina alterniflora* (Loisel) marshes. Ecological Applications 96:1405-1419.

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- Comment 8

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

The issue of connectivity also arises at the Poplar Island Environmental Restoration project and has been addressed by the Workgroup and the Habitat sub-group. Concur that connectivity, fish access, and climate changes are issues that need to be addressed and these issues are being considered by the Mid-Bay project. It should be noted that many of the members of the Mid-Bay team have worked to address these issues at Poplar.

Figures 10 and possibly 16 in the Engineering Appendix will be revised to clarify possible options for connectivity and will also be presented in the Main Report. The spillways shown on Figure 10 were misinterpreted as connection structures. These act only to decant water during filling of cells with dredge material. Cells may connect directly to estuary or the tidal gut(s).

Climate change is being addressed at Poplar by increasing the elevations of the wetlands planting.

The issue of inlet size and design is being worked on now at Poplar. Efforts are underway to maximize large fish ingress and egress while permitting wetlands establishment and construction activities at the site. The Poplar marshes have performed as well as reference marshes in terms of forage fish production and some predatory fish have started to utilize the marshes. It is expected that detrital export will occur from the marshes once the wetlands vegetation has really established. However, given the uncertain information on climate change the Poplar team is aiming for more of a flood dominated rather than an ebb dominated regime.

- Comment 9

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

Concur. The AMP will include a discussion on how these issues will be addressed. Titus (1990a, 1990b) identified the impacts of sea level rise as a documented factor affecting coastal areas as result of climate warming with documented loss of coastal wetlands (Gornitz et al 2002). The sea level rise impacts on salt marsh ecosystems have been identified to be most aggressive in the high marsh habitats (Warren and Niering 1993, Rogers et al 1998, Orson et al 1998, Donnelly and Bertness 2001, Miller et al 2001); therefore to address these impacts would be to adjust the proposed percentage of low to high marsh. The adjustment will have to be addressed in the evaluation of the engineering design. Marsh accretion is a method of addressing sea level rise which mostly occurs by mineral sedimentation (Callaway et 1996, Callaway et al 1997); therefore long range consideration would be the periodic application of a thin layer of approved dredged material to selected areas that are identified in the Adaptive Management Plan (AMP). The current draft ecological design criteria for the Adaptive Management Plan include attributes for meeting habitat goals and monitoring marsh accretion rates, elevation, and subsidence.

The AMP will be similar to the concept addressed in Weinstein et al (2000) that address methods of monitoring of salt marsh habitats and development of attainable objectives (Thom 2000, Teal and Weishar 2005). The construction of wetlands creates an opportunity for aggressive invasive species to dominate created systems over a period of time (Daiber 1986, Odum 1988). *Phragmites australis* (common reed) has become a major problem in constructed wetlands (Roman 1984, Havens et al 1997); therefore a *P. australis* component in the AMP will be to monitor the species colonization and implement control strategies on the site. One of the methods would be the application of glyphosate which has been demonstrated as an effective means of control with minimum impacts to the non-target species. The restoration of *P. australis* marshes have documented increased to the salt marsh ecosystem (Warren et al 2002, Seigel et al 2005). A number of plant and animal invasive species are documented in the area; the current

draft of the ecological design criteria for the AMP will address these species and make recommendations for control to insure long range success.

Literature Cited:

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Weinstein, M.P., J.M. Teal, J.H. Balletto and J.H. Strait. 2000. Restoration principles emerging from the world's largest tidal marsh restoration project. *Wetlands Ecology and Management* 8:1-21.

- Comment 10

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

USACE guidance states that environmental benefits are not to be discounted. In fact, guidance dictates that environmental benefits are to be averaged over the life of the project. Since the project alternatives generally has ever increasing ecosystem outputs as time goes on, and since they all had the same project start date, discounting benefits would not yield a change in the selected plan. Further, since the benefits are not monetary and there is to be no benefit-cost-ratio calculated discounting is not critical to determining an "apples to apples" benefit as compared to the monetary cost.

The study did not initially consider variation in the start date, or base year, of the project alternatives. The Federal Dredged Material Management Plan (DMMP) for the Port of Baltimore concluded that a new site would be required in 2018. It was not until after completion of the draft report and coordination with HQUSACE about the PGM that the issue of other base years was considered. Since a delay in project start will reduce the annual cost of a project due to discounting, but benefits are unaffected, a later start date compares unfairly to the earlier project. This is not logical since the earlier ecosystem benefits are realized, the better. During consideration of various project start dates, NAB was not able, due to the existing guidance, to discount benefits and allow for a fair comparison. That being stated, it would be improper to undergo this analysis unless directed by HQUSACE due to the implications to existing guidance.

Low Significance

- Comment 11

Address how climate change will influence the engineering design.

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

Clarifying question posed to reviewers: For climate change we will be considering sea level rise as a factor in our design of the wetlands during the Pre-construction Engineering and Design Phase. We are not sure if the comment is for us to consider climate change as it relates to the wetland designs; the dikes design; or both.

- Comment 12

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

Concur that Figures 10 and 16 should be shown in main body of the report. In addition, Figure 10 will be revised to better indicate the division of the salt marsh into cells that are connected either to tidal guts or directly to the bay.

Clarifying question posed to reviewers: You refer to a diagram in Appendix C of the Engineering Design Analysis for wetland cells. Are you interpreting the spillways shown in the diagram as the connection of the wetlands to the bay?

- Comment 13

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

Concur. There are numerous citations provided in Appendix K of the Feasibility Study. The development of the Ecological Development Criteria that will be used in island design and development of the AMP relies heavily on the scientific literature, but was not provided to the reviewers. This work cites over 200 scientific publications on ecology, engineering, macrofauna, microfauna, macroflora, microflora, soil, water quality, Chesapeake Bay flow dynamics, dredged material placement, and ecological restoration with dredged material. While the team feels that scientific literature has been considered,

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

- Comment 14

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

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

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ATTACHMENT B:
PLANNING MODEL INDEPENDENT TECHNICAL REVIEW

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DEPARTMENT OF THE ARMY
MISSISSIPPI VALLEY DIVISION, CORPS OF ENGINEERS
P.O. BOX 80
VICKSBURG, MISSISSIPPI 39181-0080
http://www.mvd.usace.army.mil/

REPLY TO
ATTENTION OF:

CEMVD-PD-N

MEMORAMDUM FOR HQUSACE (CECW-CP), WASH DC 20314-1000

SUBJECT: Summary of Model Review of the Island Community Units Model for Middle Chesapeake Bay Islands Restoration Project

1. The National Ecosystem Planning Center of Expertise (ECO-PCX) conducted review of the planning model used to quantify ecosystem outputs for the Middle Chesapeake Bay Island Restoration Project in the Baltimore District. The proposed Middle Chesapeake Bay Island Ecosystem Restoration Project is intended to restore and protect valuable, but threatened Middle Chesapeake Bay island ecosystems through the beneficial use of dredged material from the Upper Chesapeake Bay Approach Channels to the Port of Baltimore. The Island Community Units Model was used to evaluate and compare project alternatives. The model is not going to be recommended for certification as the Baltimore District does not plan to use it in the future. Rigorous Independent Technical Review of the model was conducted in accordance with EC 1105-2-407 and the Protocols for Certification of Planning Models (July 2007). This memorandum summarizes the findings of the model review.

2. The reviewers agreed that the project would create significant bird habitat and would be an overall benefit to the local fish assemblages, but the reviewers felt that more technical information was needed to support model assumptions. The review team concluded that the determinations and ultimate conclusions of the model may be accurate but there was no mechanism for assessing the model's validity. The model justifies the overall benefits of the proposed restoration, but it is not clear how useful it is in evaluating the cost-effectiveness of the project or in optimizing the project. The review identified several concerns with the technical quality of the model. Some of these concerns are not likely to affect identification of the National Ecosystem Restoration Plan or realization of restoration benefits.

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3. The ECO-PCX recommends approval of application of the Island Community Units model in the Middle Chesapeake Bay Islands Restoration Project with the acknowledgement of the model deficiencies described below. If the model is proposed for use on future projects, further coordination with the ECO-PCX is required. Prior to use on another project, the ECO-PCX would likely require preparation of additional documentation supporting model assumptions, justification of guild weightings, and sensitivity analysis of individual guild models and guild weighting. Issues identified in the model review should be considered in detailed project design.

4. The Island Community Units model is a regional model developed by an interagency PDT from the Baltimore District for use in the Poplar Island Expansion Project and the Middle Chesapeake Bay Island Restoration Project. Model documentation is included in enclosure 1. The model identified guilds which are a group of interacting animals that utilize the resources of a given habitat in a similar way. The following guilds were used:

- Colonial nesting wading birds (herons, egrets, and ibises)
- Waterfowl
- Colonial nesting waterbirds (gulls, terns, and skimmers)
- Raptors
- Shorebirds
- Herpetofauna
- Benthic invertebrates
- Resident/forage fish
- Commercial/predatory/higher trophic level fish

Ecosystem quality was estimated for 4 habitat types—upland, high marsh, low marsh, and intertidal.

The Delphi method was used to develop the model. The Delphi method is used for combining the knowledge and opinions of a group of experts. It was adapted by the USFWS to assist in developing habitat suitability curves for habitat evaluation procedures. Using the Delphi method, a panel of experts was polled on key habitat requirements by phone and email in

November 2003. The information gathered along with information gathered through a scientific literature search was used to develop the quality indices for each guild. A summary of the expert panel composition can be found in the table below.

	MDNR	USGS	USFWS	NFMS	USACE	NOAA	VERSAR[1]	VIMS[2]	CBF[3]	Total
Birds, general	1	1								2
Waterfowl	1									1
Raptors										0
Fish	1			1						2
SAV	1					1		1		3
Oysters	1								1	2
Reptiles			1		1					2
Benthic Invertebrates							1			1
TOTAL	5	1	1	1	1	1	1	1	1	13

[1] VERSAR – Versar, Inc.
[2] VIMS - Virginia Institute of Marine Science
[3] CBF - Chesapeake Bay Foundation

A weighting factor was assigned to each guild according to the extent to which the guild would utilize remote island habitat (See table below). Weights were determined by consensus of the Mid-Chesapeake Bay Island Plan Formulation Group which included representatives from MDE, USFWS, NOAA National Marine Fisheries Service, NOAA National Ocean Service, University of Maryland Center for Environmental Science, US Environmental Protection Agency, and Maryland Department of Natural Resources.

Table 5: Weighting Factors (W) Assigned to Each Guild/Community/Assemblage to Calculate ICUs

Colonial Nesting Wading Birds (herons, egrets, ibises)	12 %
Waterfowl	10 %
Colonial Nesting Waterbirds (gulls, herons, and skimmers)	12 %
Raptors	2 %
Shorebirds	14 %
Birds (total)	**50 %**
Resident Forage Fish	23 %
Commercial/Predatory/Higher Trophic Level Fish	5 %
Fish (total)	**28 %**
Herpetofauna	**2 %**
Benthic Invertebrate	**20 %**

5. The review was conducted by a team of ERDC scientists and was led by Dr. Morris Mauney. The review team included experts in avifauna, herpetofauna, submersed aquatic vegetation, fish and benthic macroinvertebrates. The team was asked to address the technical and system quality of the model and was not asked to review the application of the model to the Mid-Bay project. Review comments are included in enclosure 2.

6. The primary criteria for model review is technical soundness with the performance metrics being theory and computational correctness. Below is a summary of the major findings. The detailed comments and responses from DrChecks are found in enclosure 3.

a. Delphi Method. The major assumptions were clearly stated; however, the reviewers questioned the use of the Delphi Method for model development. The Delphi Method relies on professional judgment of experts rather than definitive supporting evidence. The review team concluded that the resulting determinations and ultimate conclusions of the model may be accurate but there was no mechanism for assessing the model's validity.

b. Submerged Aquatic Vegetation. The reviewers specifically questioned the theoretical correctness of the model for Submerged Aquatic Vegetation (SAV) because the model does not have the ability to adequately address the potential for both positive and negative effects that may occur as a result of

project construction. The SAV component of the model was added later in the study to capture one of the benefits of island structures - the ability to provide the conditions suitable for SAV to grow. The model used recent historic SAV acreage (based on SAV mapping) as an indicator of the suitability of the site for SAV if the protection of the island was restored. Current theory would consider water velocity, sediment quality and water clarity in evaluating the suitability of the area for SAV.

The model deficiency is unlikely to affect the identification of the recommended plan, but could potentially negatively affect realization of benefits of the project on SAV. If wave energy is the primary limiting factor, the islands could cause a decrease in wave height and energy on their lee side, facilitating expansion of SAV in some areas. The proposed project could also have detrimental effects on SAV, particularly during the construction phase. Wave reflection in the vicinity of breakwaters and hardened shorelines could result in SAV declines. An increase in turbidity and sedimentation during and post-construction would likely cause SAV declines in the affected areas. Hydrologic modeling was performed for design of breakwaters off the southern tip of Barren Island to ensure this area had suitable water velocity, sediment quality and water clarity for SAV growth. The PDT indicated that previous construction activities at Barren Island had no detrimental impacts on the SAV resources.

c. Benthic Macroinvertebrates. The review team was concerned with the assumption of a single maturity rate for benthic macroinvertebrates in three habitat types—high marsh, low marsh and intertidal. Current theory recognizes that the rate of benthic community development differs substantially across habitat types especially where there are differences in sediment type, degree of immersion, presence and nature of vegetation, and salinity regime. The reviewers stated that the assumption of a single, conservative rate might be appropriate if sufficient evidence were provided to support the decision but in the absence of any supporting evidence which they felt was inherent in use of the Delphi Method, it was impossible to evaluate the adequacy of model's theoretical basis. The reviewers did not think this potential model deficiency would

significantly impact the selection of a recommended plan or the realization of project benefits to benthic macroinvertebrates.

d. Model Sensitivity. A sensitivity analysis was not conducted by model developers or model reviewers. However, the reviewers concluded that the model structure does not provide a capability to discern subtle functional differences across a wide spectrum of island configuration. The reviewers thought that the community model would have the same outcome if used on any generic island construction project in open-waters of Mid-Chesapeake Bay. It appeared that the ability of this model to distinguish among alternatives was based on differences in acreage, not habitat quality. The model *justifies* the project i.e., the model is useful in documenting that significant ecosystem benefits would result from project construction. However, it is unclear how useful the model output is of comparing the alternatives using cost-effective and incremental cost analyses to identify an optimal project alternative.

e. Weighting among guilds. Reviewers concluded the assignment of weights among guilds appeared arbitrary. The weights assigned to the fish guilds were considered within the bounds of professional judgment, but lacked a true means of model validation and verification. The relative weighting among waterfowl, shorebirds and raptors seemed appropriate. Greater weighting on Colonial Nesting Waterbirds and a lower weighting to Colonial Nesting Wading Birds would be more appropriate based on published waterbird conservation prioritization information and considering the greater difficulty in providing and maintaining habitat for Colonial Nesting Waterbirds. Weighting justification could have been further substantiated by including additional information on relative abundance of CNWT and CNWB in the area. The sensitivity of model outputs to the distribution of weights between Colonial Nesting Waterbirds and Colonial Nesting Wading Birds was conducted using data from the Mid-Bay Project. Changing the weighting from 12% Wading Birds/ 12% Waterbirds to 4% Wading Birds/20% Waterbirds did not result in a change in the recommended plan. For both scenarios, the recommended plan was the lowest cost, best buy plan.

f. Fisheries. The reviewers stated that the assumption that high marsh derives less habitat value for fish than low

marsh is defensible. While the determination of weights assigned to the fish guilds appeared arbitrary and lacked a true means of model validation and verification, the weights were considered within the bounds of professional judgment. The reviewers stated that the model structure did not provide a technically defensible rationale for quantitative comparisons of habitat value for fishes among alternatives.

g. Colonial Nesting Waterbirds. The reviewers felt that the Colonial Nesting Waterbirds model did not give adequate attention to the need for early succession sand habitat, the value of which degrades quickly for Colonial Nesting Waterbirds. Reviewers commented that the model, as applied, did not adequately address how early successional habitat would be maintained into the future for Colonial Nesting Waterbirds. This comment addressed application of the model, not the technical soundness of the model. The Mid-Bay PDT stated that early successional habitat would be maintained on the cross dikes and interior sand areas as has been documented at Poplar Island. In final design, the Mid-Bay PDT may incorporate islands at tidal inlets or breakwaters. The islands would be maintained as unvegetated habitat for Colonial Nesting Waterbirds. The reviewers appeared satisfied that Mike Erwin (USGS Patuxent Wildlife Research Center and Department of Environmental Sciences, University of Virginia), a recognized expert on Colonial Nesting Waterbirds along the mid-Atlantic coast, would be consulted in the detailed design of islands for waterbird nesting habitats for the Mid-Bay project.

h. Computational Accuracy. Island Community Units calculations were conducted using Excel spreadsheets. The reviewers found that the calculations for Island Community Units and the guide weighting appeared to be accurate.

i. Corps Policies and Requirements. Following is a description of how the model incorporates key Corps policies and requirements. The model is strictly ecosystem-based and does not include inappropriate factors. The model outputs are strictly related to the aquatic ecosystem. While one habitat type is labeled "upland", it is interior island habitat which is considered part of the aquatic ecosystem. A sensitivity analysis and risk and uncertainty analysis were not conducted.

A sensitivity analysis could be conducted on various model components including sensitivity of guild weighting. Risk and uncertainty are not addressed by the model, but can be addressed qualitatively in the model application. The model relies on the professional judgment of experts in the ecology of Chesapeake Bay to identify the key drivers of ecosystem quality and estimate the relationship between these drivers and the quality component of ecosystem output.

7. In summary, the ECO-PCX recommends approval of application of the Island Community Units model in the Middle Chesapeake Bay Islands Restoration Project with the acknowledgement of the model deficiencies described above. Additional supporting documentation would likely be required if the model is proposed for use on future projects.

3 Encls

RAYFORD E. WILBANKS
Director, National Ecosystem
Planning Center of Expertise

CF:
CENAD-PSD-P
CENAB-PL
CENAB-PL-P
CENAB-PP-C (Brennan)
CEERD-EE (Tazik)
CEERD-EP-W (Deliman)
CEERD-EE-W (Mauney)
CEMVR-PM-F (Staebell)
CECW-PC (Carlson, Ware, Matusiak)
CEMVD-RB-T (Vigh)

Mid-Chesapeake Bay Islands
Model Reviewers Comments and Team Responses

Comment Report: All Comments
Project: Mid-Chesapeake Bay Island Restoration
Review: Island Community Index Model
Displaying 41 comments for the criteria specified in this report.

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Id	Discipline	Section/Figure	Page Number	Line Number
1835270	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Supporting Documentation)

The model documentation does not fully describe the decision process. Additional explanations are needed as to why or how the other species listed in the various appendices (particularly herps) were either excluded or included in values for this model.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** The species listed in the various appendices were summary lists of species identified in the area and at James and Barren Islands. These species lists were used to identify the guilds and communities to be targeted- colonial nesting waterbirds, colonial nesting wading birds, waterfowl, raptors, shorebirds, resident/forage fish, herptofauna, invertebrates, and commercial/predatory/higher trophic fish. The focus of the Mid-Bay habitat restoration is to provide remote island habitat for birds and not mammals or reptiles with the exception of the diamondback terrapin. The terrapin was given additional protection by MD DNR in 2007 and commercial harvesting has been banned. Nesting areas that have few predators are scarce and Poplar Island is one of the most successful nesting areas in the Maryland part of the Bay. According to Dr. Willem Roosenburg (personal communication with Mark Mendelsohn March 10, 2008) the terrapins would likely use the proposed project for nesting. A decision was made by the PDT to not include mammals as they are predators of many of the bird species desired. In fact, much effort is devoted to preventing mammal colonization and removing mammals from the restored islands. Deer browsing would be detrimental to planted trees, shrubs, and marsh plants. The creation of habitat suitable for fox, raccoon, and opossum is not considered desirable because of their potential impacts on birds (Erwin et al. 2001). The threat of mammalian predators on colonial nesting wading birds (Williams et al. 2007), Black ducks, other groundnesting avian species, and Diamondback terrapins (Costanzo and Hindeman 2007), and on seabirds (including shorebirds and colonial nesting waterbirds) (Brinker et al 2007. 2007) has been recently documented and is summarized in Erwin et al. 2007. With respect to the herptofauna, it is not that one species was targeted, but that the diamondback terrapin is the only species desired on the restored island habitat due to the predatory nature of snakes and the reality that the area is likely to be too saline for most amphibians for many years. Snake populations can be detrimental to birds and terrapin populations. In fact, an Eastern Kingsnake has been sighted taking terrapin eggs at Poplar Island. Black racers are also known predators of avian species. Sediment characteristics will likely limit amphibians. Freshwater habitat suitable for them may develop in the upland area once the salinity of the sediments is reduced through rainfall or sediment treatment. Literature Cited is attached. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08 (Attachment: Response1.doc)
1-1	Backcheck Recommendation **Close Comment** Response is adequate Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835271	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Supporting Documentation)

Due to the inherent limitation of this modeling approach whereby general assumptions are made with little or no supporting documentation or rationale for decisions or assigned values, it is impossible to assess the values provided for a given guild (or a single species) such as weighting of guilds, Island Community Index (ICI), habitat maturity dates, and Island Community Units (ICU). Without this information, it is impossible to evaluate the adequacy of the model's

theoretical basis.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** The weights were assigned through a series of meetings in the spring of 2004 with regional resource managers that participate on the PDT team. These weights were based on what communities would benefit the most from the restoration of island habitat and were largely a compromise between the managers. For instance, managers focused on nesting birds preferred completely upland islands that would provide nesting habitat. However, fisheries managers preferred all wetlands to contribute to fishery resources. After many discussions and iterations (characteristic of the Delphi method), consensus was obtained on the weights used in the model. The final weights are a reflection of how the group expects the restored island to benefit the various guilds. The weights of the bird guilds sum to 50% due to the heavy reliance avian species have on remote islands as a sanctuary from predators. Dave Brinker of MD DNR recommended the distribution of this 50% between the 5 bird guilds- waterfowl, shorebirds, raptors, colonial wading birds, and colonial nesting birds. John Nichols of NOAA NMFS provided the distribution of weights between resident/forage fish and commercial/predatory/higher trophic fish. From his experience, the islands will only provide a small benefit to higher trophic species. Most benefit to fisheries resources will be to the resident/forage fish that can enter the marsh through tidal guts. All groups agreed that the benthic invertebrates were an important component of the island ecosystem and that no habitat would provide its full benefit if this ecosystem component were missing. Therefore, the group decided to assign the benthic invertebrates a weight of 20% to reflect its importance to all species and habitats. During the discussions, the group did recognize that typically benthic invertebrates are not recognized with such a high proportion of the community, but felt it was appropriate in this situation because if the benthics do not colonize the marsh and intertidal habitats, they will provide a much reduced resource to foraging avian and fishery species. A small portion of the weight was assigned to herptofauna because only one species, the diamondback terrapin, would benefit from the restored island. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08
1-1	Backcheck Recommendation **Close Comment** This comment does a reasonable job of addressing weights. But what about maturity dates, guilds, ICI, and ICU? Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835274	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Supporting Documentation)

The ICI scores of zero, 0.25, 0.50, 0.75, or 1.0 were assigned with no explanation of technical justification. A 2% weighting factor was assigned to the herpetofauna guild with no explanation (e.g. based on species diversity or percent total species). As related to testing and evaluation the documentation does not address this certification criterion.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** ICI scores were assigned based on the following considerations: habitat quality, and characteristics expected at the evaluation time (year 1, year 5, year 10 or year 25) based on habitat maturity; habitat features as outlined by the panel of experts; experience at Poplar Island; and the highest quality habitat that could be designed. The indices were developed based on the input received from the panel of experts. Indices were additionally reviewed by regional resource managers on the PDT to identify inconsistencies and improvements that could be made. The model was applied to the Poplar Island Expansion which has since received a Chief's Report. No other testing or evaluation was performed. There was not a requirement at the time to carry out testing and there appeared no scientifically sound way to do this that would have benefited the exercise. That is, there are no restored islands in the Chesapeake Bay region old enough to use as a reference.

	Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08
1-1	Backcheck Recommendation **Close Comment** It would be helpful to know the difference between habitat quality at year 1 and at year 25. It is difficult to tell what habitat quality means with out some upper and lower limit. What is habitat quality based on? Is it diversity, composition, stem counts, etc. Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835275	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Technical Information)

There is very a limited amount of technical information provided in the report, to the extent that it is impossible to evaluate the reasonableness of the conclusions reached by applying the model. It appears that the model simply constructs a framework around a professional judgment-driven decision system. The review team unanimously agreed that this was a major constraint in adhering to guidance on how the certification process findings were to be based.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** At the time of model development in 2003 and 2004, the development team tried to incorporate all available supporting scientific literature. A list of scientific literature used in model development is provided in the attachment, but there were limited sources specific to remote island habitat and their communities. At the time of model development the team requested supporting documentation from the expert panel, but found that they did not have much to provide. In fact, Erwin et al. (2007) recognized that there have been relatively few reports published in peer-reviewed literature specifically on waterbird populations or their habitats. It is interesting to note that many of the contributors to the recent Special Publication of the Journal of Waterbird Society focused on Waterbirds of the Chesapeake Bay have been consulted for input by the Mid-Bay project (Erwin, Haramis, Hindman, Therres, and Brinker) either as members of the PDT, a participant on the expert panel, or through NEPA consultation. Due to this recognized shortage of peer-reviewed literature, the model does rely heavily on professional judgment. At the time of development, there were no specific standards to state that this was unacceptable. The District does not believe the reliance on best professional judgment to be inadequate as internationally recognized experts were involved along with many resource managers familiar with Chesapeake Bay were involved. Additionally, it should be recognized that from the Poplar Island Restoration Project, USACE-Baltimore is at the forefront of environmental restoration using dredged material within the Mid-Atlantic region. Poplar Island is recognized by Brinker et al. (2007) as a promising model essential to maintaining some seabird populations. Much information and experience specific to building islands within the Chesapeake Bay has been achieved through that project that is not available through any other sources of scientific literature. Finally, many members of the PDT and participants on the expert panel that represent the various resource agencies were also members of the Poplar Island PDT. Their expert knowledge therefore captures all the lessons learned and experiences of the planning and construction at Poplar Island. An additional source of information was the multi-seasonal environmental monitoring performed for James and Barren Island and Poplar Island monitoring reports. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08 (Attachment: Response#4.doc)
1-1	Backcheck Recommendation **Close Comment** Although technical information may not be available specific to remote island habitat, information should be available for similar types of habitat in the area (benthic, avian, etc.). This information could be used to develop a range of values expected. Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835277	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Sensitivity)

A general consensus was reached that the models lack sensitivity to distinguish among various alternatives based on qualitative indices. The reviewers fail to see how the model itself lends credence to the assertion that one scenario or alternative is better (more optimal?) than any other. The model structure simply does not provide a capability to discern subtle functional differences across a wide spectrum of island configurations. In our opinion, any generic island construction project in open-waters of mid-Chesapeake Bay would have the same outcome if this community model approach were used. By running the community model in a sensitivity analysis mode, i.e. determine which input factors most heavily influenced the output, we suspect that altering the input values by large amounts would not appreciably alter the prioritization of alternatives. Therefore, it seems that the ability of this model to distinguish among alternatives is based on differences in acreage, not habitat quality. If this is the case, there is clearly no need for the construction of a "community model" and decisions can be based on acreage of the various alternatives alone.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** No sensitivity analyses were performed on the weights assigned to guilds or the Island Community Indices as these were agreed upon values and definitions between the resource agencies. Although acreage is a major driver of the model, habitat maturity as well as gain and loss of benefits from habitat features that change with maturity is an important component of the model. The ICU method was able to account for changes to benefits as the project developed and habitats matured that would not have been possible by basing the formulation strictly on acreage. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08
1-1	Backcheck Recommendation **Close Comment** It would be helpful if you would demonstrate how maturity is an important component of this model. Acreage is the only quantitative component of the model. Run some numbers and show why maturity is important. Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835278	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Arbitrariness)

The determination of weights assigned to the fish guilds is one example of arbitrariness, certainly within the bounds of professional judgment, but lacking a true means of model validation and verification. For example a Fish Total weight of 28% seems entirely reasonable based on a general allocation of 23% to resident fishes and 5% to commercially important predatory fishes. Nevertheless, one might speculate that 20% and 8% respectively would be just as reasonable. That is impossible to determine given the lack of documentation provided.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** See response #2 that explains development of weights. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08
1-1	Backcheck Recommendation **Close Comment** This question was not addressed. Why is one percentage preferred over another? Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835280	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Arbitrariness)

Another example is that various measures of percent cover and habitat use/value are assigned indices ranging from 1.0 to 0. Although these numbers seem reasonable, no rationale or documentation for assigning these indices is provided.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** ICI scores were assigned based on the following considerations: habitat quality, and characteristics expected at the evaluation time (year 1, year 5, year 10 or year 25) based on habitat maturity; habitat features as outlined by the panel of experts; experience at Poplar Island; and the highest quality habitat that could be designed. The indices were developed based on the input received from the panel of experts and any available supporting literature. Indices were additionally reviewed by regional resource managers on the PDT to identify inconsistencies and improvements that could be made. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08
1-1	Backcheck Recommendation **Close Comment** What is the difference between a score of 1 and a score of .25. What is it about habitat features that make a 1 a 1 and a .25 a .25. Is it number of species, canopy height, diversity, stem density? Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835281	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Arbitrariness)

The benthic macroinvertebrate model is based on the assumption of a single maturity rate in all habitats and scores community development in five year intervals. As a result there are only two possible habitat quality scores, 0 and 1. Although the assumption of a single, conservative maturity rate may be appropriate there is no supporting documentation to indicate why that rate was chosen.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** The PDT did simplify benthic invertebrate guild by assuming a single maturity rate of 10 years in all habitats. Although, this is an assumption and the scientific literature provides a range of maturity dates, the 10 year maturity date is scientifically reasonable and supported by scientific literature for marsh systems (see below). The development team agreed to include this 'catch-all' invertebrates guild because of the importance of the benthics to the quality of high marsh, low marsh, and intertidal habitat. At the planning level that this model was developed at, it did not seem necessary to go into more detail. It was recognized that the inclusion of a benthics group was not typical of comparable analyses, but the team included them as the suitability of the habitats for various guilds largely depends on the quality of the benthic community. However, there were not just two possible habitat quality scores assigned to benthic invertebrates. A score of 1.0 was assigned to mature communities, a 0.5 was assigned to immature communities, and a score of 0.25 was assigned to newly established communities. Benthic invertebrates were not included as part of the uplands, and therefore only formulated as part of the high and low marsh, and intertidal habitat. Cornell, J.A., C. Craft and J.P. Megonigal. 2007. Ecosystem gas exchange across a created salt marsh chronosequence. Wetlands 27:240-250. Craft. C.B. and J.N. Sacco. 2003. Long-term succession of benthic infauna communities on constructed Spartina alterniflora marshes. Marine Ecology – Progress Series 257:45-58. Zheng, L., R.J. Stevenson and C. Craft. 2004. Changes in benthic algal attributes during salt marsh restoration. Wetlands 24:309-323. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08
1-1	Backcheck Recommendation **Close Comment** What are the components of this system at maturity and why is it reasonable. How do you

	identify a mature community? What makes it a 1 or a .25? Is it based on number of species present, diversity, organisms per square foot? There should be benthic data available that could be used to describe the difference between mature and disturbed habitat. Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835283	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Arbitrariness)

Finally, it does not appear that the model development team effectively utilized all the information available to them. For example, a panel of three SAV experts made a number of recommendations, presented in table form in the documentation package. However, it appears that these suggestions were disregarded. There was no explanation as to why these recommendations were not used.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** The SAV component of the ICU model was added in a second phase to capture one of the great benefits of island structures- the ability to provide the conditions suitable for SAV to grow. The information provided by the SAV experts was not utilized in the SAV ICU development because the team agreed that the project did not have the responsibility or objective of creating SAV habitat, but rather protecting what was currently in existence. The presence of the islands provides conditions suitable for SAV survival. Therefore, if the islands go, the SAV will go. Energies associated with winds and currents, substrates, and water depths all change as islands erode. This effect has been a reality for the Mid-Bay island chain as islands have eroded during the past century. The SAV ICU was, therefore, added to account for the benefit the islands provide by merely being present in the estuary. It was not the objective of the project to design the correct velocities, sediment quality, or water clarity for SAV. This specificity was taken into consideration in the hydrologic modeling performed to evaluate constructing breakwaters off the southern tip of Barren Island, but for ICU purposes an indices based on past acreage that is reflective of the protection the islands provide was viewed as a more suitable measure by the team. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08
1-1	Backcheck Recommendation **Close Comment** How can you be sure that you are "protecting" what currently exists if you do not consider potential impacts to the SAV community. How do you know that the benefits to the SAV component will be realized if it was not the objective of the project design to correct velocities, sediment quantity, or water quality? Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835284	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Avian Component)

This model fails this certification criterion primarily due to the lack of adequate attention paid to the need for early-successional sand habitat, how this habitat will be maintained into the future for Colonial Nesting Waterbirds (CNWT), and (if not maintained) how habitat value in the model will quickly degrade for this guild

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** Early-successional sand habitat for CNWT was valued in the first 5 years within the upland habitat. After that, this type of habitat in the upland cells was considered lost due to the successional growth of vegetation. However, the sand interior and cross dikes would maintain

	their suitability to CNWT nesting in perpetuity. Also, sand beach habitat was incorporated as a feature of the intertidal/unvegetated mudflat habitat. Although included in this intertidal category, some of this sand beach habitat is specified to be above the tidal range. This was a second way that sand beach habitat provided value to CNWT. At Poplar Island, sand and gravel 'bird islands' were included in the formulation as a feature within each wetland cell. These 'bird islands' are surrounded by a tidal channel and are maintained as unvegetated areas for CNWT nesting. Similar islands were not included in the formulation of Mid-Bay because the PDT thought there were better ways of providing this habitat that would be more isolated from predators. Also, there is a great deal of maintenance required to maintain the suitability of the Poplar 'bird islands' for CNWT nesting. A larger single island at the mouth of the tidal inlet has been discussed with regional resource managers for Mid-Bay. This island would be maintained as unvegetated specifically for CNWT. However, as it is unsure how this would be constructed at this time and it would be included with any island alternative selected, the 'bird island' was not included in the ICU quantification. Additionally, not included in the ICU quantification is the possibility of incorporating bird islands into the breakwater system that is being considered off the southern tip of Barren Island. These breakwaters are to be further evaluated and if determined to be beneficial to SAV, would be constructed in a second phase of construction. The idea has been proposed to make some of the breakwaters into unvegetated islands for CNWT nesting. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08
1-1	Backcheck Recommendation **Close Comment** Response is adequate. Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835285	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Benthic Component)

The chief theoretical problem with the benthic macroinvertebrate model is the assumption that the communities of all habitat types will develop at the same rate. The rate of benthic community development differs substantially across habitat types especially where there are differences in sediment type, degree of immersion, presence and nature of vegetation, and salinity regime. Assumption of a single, conservative rate might be appropriate if sufficient evidence were provided to support the decision but in the absence of any supporting evidence, as seems inherent in use of the Delphi Method, it is impossible to evaluate the adequacy of model's theoretical basis.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** See response to comment #8. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08
1-1	Backcheck Recommendation **Close Comment** It would be helpful to have an explanation as to why communities of all habitat types will develop at the same rate. Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835287	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Fish Component)

Attempting to use a guild approach to quantifying habitat for resident/transient fishes based upon a high marsh/low marsh/open water habitat breakdown is inherently weak as determined by logistics and the factual reality that species-specific relationships within the appropriate assemblages are notoriously variable. That fish species will occupy the created habitat is a given. Associations of fish with physical marsh structure and their movements in tidally influenced systems have been examined in numerous studies spanning wide geographic settings. Thus the assumption that high marsh derives less habitat value than low marsh, for example, is defendable. The stated theory and assumptions of the

model, however, do not detail those attributes of the habitat treatments that account for the assigned values. The incremental values incorporated into the analyses are therefore arbitrary. Those involved in the exercise certainly followed the dictates of the mandated model construction process, however the results consequently suffered.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** The attributes of the 2 fish indices were developed in cooperation with the model development group. Specifically, John Nichols of NOAA NMFS, Roland Limpert of MD DNR, and Jane Boraczek of EA Engineering, Science, and Technology provided a lot of input and review. John Nichols provided the following habitat features for various species: Menhaden- -important food for herons, egrets, ospeys, and eagles -DO is critical -no specific need for structure Bay anchovy- -DO critical (>3 for eggs and larvae; <2 is critical) -specific habitat features, structure, and shoreline development not important, but hydrographic features that affect water quality are -rarely in water depths >24 m Alewife and Blueback herring (important forage species) -important forage species for birds (blueback- seabirds, alewife- osprey and green heron), fish, amphibians, reptiles, and mammals Spot- -few measures available to increase population- increase summer DO -absent during winter for most part -little preference for specific habitats except substrate- muddy/mud-sand -feed primarily on organisms found in depths (< 10m) -DO > 4 mg/L -most concentrate in 6-10 m zone in mainstem and 3-6 m in tribs except during fall months White Perch- -DO > 6 mg/L -spend entire life in Bay -open water close to shore and deeper channel areas where they overwinter -bottom-oriented; older become piscivourous -commonly found near underwater structures, but prefer mud, sand, or clay bottoms with little or no cover -older prefer 4.6-9 m during day and move in shore to ~1m at night Striped Bass- -sandy beaches, rocky shorelines, shallow water, deep trenches, bays, and rivers -winter depths > 9m Summer Flounder- Able and Kaiser (1994) -young-of-year exhibit a preference for tidal guts and marsh edge. -Tidal gut widths from 40-50 ft to 10-12 ft, with a depth of 0.4 to 1.8' at mlw. -Spartina is critical component of adjacent marshes. -Mud substrate, but as they age there is a gradual shift in preference for sand. -Mudflats are used. The important habitat features for resident/forage fish are access to high and low marsh, and proximity to SAV, and the presence of sand beaches cut with channels. These features would provide resident/forage fish with the greatest access into the low and high marsh. Features specific to commercial/predatory/higher trophic level are the presence of channels to provide access, and close proximity to SAV and sand beaches. In further discussions since model development, John Nichols has identified a need for wide tidal guts into wetland cells that are at least 6 feet deep to permit access to the wetlands by predatory fish. The other key features are adequate flushing to provide suitable dissolved oxygen levels (important to menhaden especially) and the transfer of marsh productivity into the surrounding waters. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08 (Attachment: Response#12.doc)
1-1	Backcheck Recommendation **Close Comment** Still need an explanation as to how the differences between incremental values are identified. Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835289	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: SAV Component)

The package narrative states that existing SAV beds occur on the wave-protected side of the island. An increase in the size of the island footprint will affect waves, currents, and sediment processes, which in turn will affect SAV distribution and growth. For example, a decrease in wave height and energy could enhance growth and facilitate expansion of SAV in some areas, but only if wave energy is the primary limiting factor. In fact, one could equally argue that the proposed project would have detrimental effects on SAV in the project vicinity, particularly during the construction phase. Wave reflection in the vicinity of breakwaters and hardened shorelines could result in SAV declines. An increase in turbidity and sedimentation during and post-construction would likely cause SAV declines in the affected areas.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** SAV beds are typical on the wave-protected side of remote islands in the Chesapeake Bay. Just as typical is the loss of these SAV resources as the islands erode and are loss. This is clear at James Island where extensive island erosion has occurred and negligible SAV beds exist. The islands provide the conditions favorable for SAV growth. The recommended plan took this into consideration. One of the many reasons the proposed plan recommends protection of Barren Island and large-scale restoration through dredged material placement at James Island is to prevent the further loss of Barren Island and subsequent loss of the dense and widespread SAV beds. The other benefit of doing the main construction at James Island is that it minimizes any potential impacts to current SAV beds. SAV beds are currently very minimal at James due to the extensive erosion of that island compared to the SAV resources at Barren that are still quite extensive. The possible construction of extended breakwaters from the southern tip of Barren would not occur during Phase I construction. These efforts have been studied through hydrologic modeling, are to be further evaluated, and if deemed to be beneficial to SAV resources would occur as a Phase II construction. Previous construction at Barren Island, similar to what is being proposed, had no detrimental impacts on the SAV resources. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08
1-1	Backcheck Recommendation **Close Comment** The impact of detrimental effects has not been addressed. Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835290	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Herpetological Component)

The chief theoretical problem with the herptofauna model is that the assumptions given throughout the Mid-Chesapeake Island model report appear to be solely based on one species (diamondback terrapin) (see page14, paragraph 3) instead of a guild of herp species as defined by the model's method. A list of 9 herp species (7 turtles, 2 snakes) were given in Appendix A-1 as faunal species identified for the Mid-Bay region. It was not made clear how this list was derived since there are 58 species/subspecies of reptiles and 11 species of amphibians documented from the Chesapeake Bay area. However, as stated on page 14, the diamondback terrapin was identified as the target species for values used in this model. Additional explanations are needed as to why or how the other species listed in Appendix A-1 were either excluded or included in values for this model. Because the model itself relies upon general assumptions with no supporting documentation or rationale for decisions or assigned values, it is impossible to assess the values provided for a given guild (or a single species) such as weighting of guilds, Island Community Index (ICI), habitat maturity dates, and Island Community Units (ICU). Without this information, it is impossible to evaluate the adequacy of the model's theoretical basis.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** See response to comment 1. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08
1-1	Backcheck Recommendation **Close Comment** Response is adequate. Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835294	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Adequacy of Assumptions: Avian Component)

This effort would certainly have more merit (and hence, the model more validity) if more attention had been paid to various prioritization schemes for birds listed within the various guilds. These prioritization schemes provide information on relative conservation needs for management of declining species. This would likely have at least a marginal effect

on the weighting factors that were listed in the report. Based on conservation needs and likelihood of providing suitable habitat for waterfowl, shorebirds, and raptors, the relative weightings for these guilds seem appropriate. However, I suggest that a much greater weighting score should have been placed on Colonial Nesting Waterbirds (CNWT) (especially terns and skimmers), and a lower score given to Colonial Nesting Wading Birds (CNWB). I base this on the waterbird prioritization information (http://www.waterbirdconservation.org/assessment.html) that provides guidance on conservation priorities of CNWT (i.e., High Concern – Black Skimmer, Gull-billed Tern, Least Tern; Moderate Concern – Forster's Tern, Royal Tern) relative to CNWB (High Concern – Snowy Egret, Little Blue Heron). Furthermore, provision and maintenance of upland nesting habitat for CNWB is much easier than for CNWT, since the latter require vegetated habitats that are much more abundant than early-successional sandy habitats required for nesting CNWB.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** See response to comment #2 that explains how weights were determined. Additionally, The Waterbird Conservation for the Americas was used as a reference and resource managers familiar with the assessment served on panel of experts and on the PDT group that assigned weights. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08
1-1	Backcheck Recommendation **Close Comment** District response adequately describes how prioritization was conducted and the expert who made the recommendation. I still feel that there should be a reevaluation for CNWT and CNWB. Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835295	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Adequacy of Assumptions: Avian Component)

Although an extensive species list for the area was provided as an appendix, it would have been helpful to have more in-depth information on relative abundance of these species on islands and other coastal habitats within the region. This is particularly true for the situation on Poplar Island (and perhaps Craney Island) where good information on relative abundance and habitat use of various species should be available. This would provide very important input to weighting factors of CNWT and CNWB.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** The requested information is documented in the Mid-Bay Integrated Feasibility Report and EIS in Section 3.1.9.d Avifauna. This section is attached as well as an excerpt from the 2006-2007 avian monitoring report at Poplar Island. This information is very familiar to the resource agency representatives that provided input to determine weighting factors and was therefore, used indirectly in that exercise. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08 (Attachment: Response#16.doc)
1-1	Backcheck Recommendation **Close Comment** District response is adequate. Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835296	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Adequacy of Assumptions: Avian Component)

To be more specific regarding guild prioritization relative to conservation needs, I raised the issue in earlier comments regarding the model development team only paying cursory attention to open sand habitats for colonial nesting

waterbirds (i.e., specifically terns and skimmers). Open sandy habitats that are void of disturbance and high predation rates are in very short supply, and hence, the lack of these habitats is negatively impacting Atlantic coast populations. The District response suggested that Mike Erwin's research and input was used to determine appropriate size(s) of open, sandy habitats in uplands, and that additional attention should be paid to the topic in the Feasibility Report/EIS. Mike Erwin is the recognized expert on these species along the mid-Atlantic coast and his input was of critical importance to this effort. Given that, open sandy habitats in the upland cells should be in abundant supply during project construction and particular attention should be paid to avoid making these habitats too large or small. What was unclear to me was the long-range plan to maintain open areas by additional deposition of material. The report clearly states that open, unvegetated habitat for CNWT will be available during year 1, but there is little or no mention of the fact that this habitat will quickly degrade and lose value as nesting habitat when vegetation encroaches during the second year and beyond. As I understand the model, there appears to be a long-term benefit to CNWT on the project site and in the model without a clear plan to maintain this type of critical nesting habitat into the future. Open sand habitats will quickly undergo succession and eventually become more favorable for CNWB. This topic should be explicitly addressed in model construction

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** See response # 10 that explains CNWT quantification in model. Additionally, this issue of maintaining areas for CNWT will be addressed by the Adaptive Management Plan that is being developed for Mid-Bay. Although, the Mid-Bay project proposes to incorporate this habitat in new ways, much experience and information is available on this topic from USACE's experience at Poplar Island that will be applied to Mid-Bay. Michael Erwin is closely involved with Poplar Island and will be invited to provide his expertise in the design of CNWT nesting habitat. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08
1-1	Backcheck Recommendation **Close Comment** District response is adequate and satisfies the concern. Dr. Erwin is the leading expert on this topic and should be involved where possible and appropriate. Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835298	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Adequacy of Assumptions: Benthic Component)

The key assumption in the model is the determination of the maturity date. As previously stated, this value was arrived at by best professional judgment using the Delphi Method without any supporting evidence. As a result, it is impossible to evaluate the adequacy of the underlying assumptions and therefore the ability of the model to accurately predict habitat quality. While this renders the model inadequate in its present form, the problem could easily be rectified by providing the theoretical background for the assumptions. Examination of the other models suggests this problem is common throughout the island model.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** See response to comment #8. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08
1-1	Backcheck Recommendation **Close Comment** Maturity date addressed in a prior comment. Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835301	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Adequacy of Assumptions: Fish Component)

The mandated model structure simply does not provide a technically defensible rationale for quantitative comparisons of habitat value for fishes among alternatives. The underlying approach may yield qualitative estimates of habitat value, but to conclude that comparisons so derived are anything other than extremely qualitative would be misleading.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** The model development group worked to find as much scientific information as was available to base an island community model on and make it as technically defensible as possible, but peer-reviewed documentation was limited (as highlighted in Erwin et al. (2007)). The process relied on the input and best professional judgment of a number of resource experts and available scientific literature. The ICUs were intended to estimate benefits and be used as a planning tool. The ICU method was just one piece of the plan formulation process. ICUs were developed to assign a national ecosystem restoration (NER) benefit to the final set of alternatives. The plan formulation included a study area screening, an island ranking process based on engineering and environmental suitability, a GIS analysis based on engineering and ecological design considerations, a screening of proposed alternatives, and a refinement of the screening results, followed by assigning benefits using the ICU method to the final array of alternatives. The benefits of ecosystem restoration projects can be quantified using a variety of measures, such as acres of habitat produced or miles of shoreline restored. Indices that combine separate measurements can also be used, and offer the advantage of lumping multiple types of benefits together into one unit. This ability of indices to capture varying types of benefits into one comparable unit is what made this method preferred for the evaluation of the diverse island ecosystems being planned in the Mid-Bay project. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08
1-1	Backcheck Recommendation **Close Comment** This was more of an observation on the process. Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835302	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Adequacy of Assumptions: SAV Component)

Table 3 in the report lists a number of factors that were recommended as SAV parameters by the expert panel, all of which were apparently disregarded. The SAV index is based solely on average percent SAV cover during the period from 1994 to 2003. Various measures of percent cover are assigned indices ranging from 1.0 to 0. Although these numbers seem reasonable, no rationale or documentation for assigning these indices is provided.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** The percent cover ranges were adopted from VIMS monitoring (VIMS, 2008). These classifications are how the densities are portrayed on the annual VIMS SAV monitoring maps and provided a consistent data set for use in development of the SAV indices. See further discussion on development of SAV formulation in comment response #9 and #21. Literature Cited: Virginia Institute of Marine Sciences (VIMS). 2008. SAV in Chesapeake Bay: Monitoring-Historical Report [Online.] Accessed March 20, 2008 at http://www.vims.edu/bio/sav/sav06/HistoricReports.html. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08
1-1	Backcheck Recommendation **Close Comment** As in similar cases why is a 1 a 1 and a .25 a .25. What characteristics does a unit of SAV have to display to be called a 1. Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258

	Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835303	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Adequacy of Assumptions: SAV Component)

If the intent is to characterize SAV in the vicinity of the proposed project under pre-project conditions, then this seems a reasonable approach. However, no evidence is presented that would support or refute the next leap of logic, e.g. that the proposed project will "protect" and maintain existing SAV. Logic would require that in order for this assumption to be valid, it must be conclusively demonstrated that: 1) there has been a steady long-term decline in SAV in the vicinity of the proposed project areas, AND 2) that this decline can be clearly linked to an increase in wave energy caused by the progressive deterioration of the island (as opposed to a host of other factors known to cause declines in SAV, such as nutrient loading, sediment resuspension, decreased water clarity). The package does not support either of these assumptions.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** See response to SAV comment #20. In response to issue (1), a steady long-term decline in SAV has been documented Bay-wide using SAV seeds preserved in sediment cores (Brush and Hilgartner, 2000). However, detailed Bay-wide annual SAV monitoring by VIMS was only started in 1994. Information prior to that, and in particular, prior to Bay-wide water quality degradation and the dramatic Bay-wide decline of all SAV species in the late 1960s and 1970s are rare. A description of the SAV resources currently at James and Barren Island as well as a summary of the VIMS monitoring since 1994 is provided in the response to Comment #25. Maps provided by MDNR from the early 1950s identify more widespread and extensive SAV beds in the James and Barren Island vicinities as well as larger island structures. In response to issue (2), the team is not aware of documentation that conclusively links SAV loss in these areas to island loss. There are a number of changes that occur when islands are loss including an increase in energy from waves and currents, water depth alterations, and changes in substrate with erosion of the island. The VIMS mapping of the past 14 years it is clear that there are currently no SAV beds present in the mesohaline region of the Bay in open water. That is, SAV beds exist along shorelines and in waters surrounding islands in the mesohaline region. Literature Cited Brush, G.S., and Hilgartner, W.B. 2000. Paleoecology of Submerged Macrophytes in the Upper Chesapeake Bay. Ecological Monographs. 70(4): 645-667. Virginia Institute of Marine Sciences (VIMS). 2008. SAV in Chesapeake Bay: Monitoring- Historical Report [Online.] Accessed March 20, 2008 at http://www.vims.edu/bio/sav/sav06/HistoricReports.html. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08
1-1	Backcheck Recommendation **Close Comment** No further comment. Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835304	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Adequacy of Assumptions:Herpetological Component)

The adequacy of the assumptions cannot be assessed due to the limited or lack of supporting documentation or rationale for the process used in this model or the values selected for the herpetological guild. The process used by the Delphi Method relies on "best professional judgment" rather than more defined supporting evidence. The resulting assumptions and ultimate conclusions of this process may not be incorrect or invalid but it is difficult to assess given the nature of this process.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve**

	See previous responses discussing why best professional judgment was used (#4 and #19), and how weights (#2) and indices were developed (#3). Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08
1-1	Backcheck Recommendation **Close Comment** This has been addressed in prior comments. Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835305	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Adequacy of System Description: Avian Component)

There is a somewhat reasonable description of the project and "system", but enough shortcomings in the detail on juxtaposition and maintenance of various habitat components (and how they will differ among different model runs) to warrant an inadequate rating. This could be improved by providing a more solid description of how upland cells would be constructed (including sizes important for CNWT breeding occupancy), and then maintained over time with additional deposition. Providing more input on relative abundance of species in the region and how they used other island habitats (e.g., Poplar and Craney Islands) would also bolster the system description.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** During model development, it was assumed that given the acreage of a dredged placement cell, the most suitable features and characteristics would be included in the design to enable the habitat to provide the maximum use possible. The team saw no benefit to designing island habitat that provided a lower suitability when it was feasible to construct more suitable habitat. This assumption was consistent through all scenarios considered. Additional information on CNWT habitat, relative abundance of species in region and how species use other (Poplar) Island habitats has been provided in previous comments. Uplands cells are developed over many years. The uplands at James Island are expected to be divided into 4 cells of equal size although sizes could change upon further analyses and experience. It is likely that a particular cell will not be used for placement for two consecutive years. It is desirable from a dredged material management perspective to allow one and preferably two years for a cell to dry out to optimize capacity before the placement of more material. Consequently, it is likely that each cell could be in a different stage of dewatering and that there will be extensive mudflats and ponded water during placement and dredged material management activities up to the very end of material placement. It is unlikely that all the cells will reach their final elevation at the same time. Once a cell has reached its final elevation and sediment salinity and other conditions are suitable then planting will begin. It is possible that a cover crop will be planted or the soil amended prior to planting of woody vegetation. It is likely that there will be some permanent ponding in the cells after placement is completed due to the size of the cells. As defined in the CNWT index with input from Michael Erwin, preferred size of islands for nesting is 2.5 to 5 ac. The reality of upland construction is that it takes years to fully fill an upland cell. Poplar Island has been under construction since 1999 and still does not have a finished upland cell. Due to this fact, all of the CNWT nesting at Poplar has occurred on interior dikes and the bird islands. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08
1-1	Backcheck Recommendation **Close Comment** District response is adequate and satisfies the concern. Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835306	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Adequacy of System Description: Benthic Component)

The model is based on assumption of a single maturity rate in all habitats and scores community development in five

year intervals. As a result there are only two possible habitat quality scores, zero or one. The scores are then multiplied by the associated acreage and weighted as 20% of the total habitat score. The benthic macroinvertebrate model, its application, and the structure of the overall island model are adequately described however there is no explanation for why the other invertebrate models (Crabs and oysters) were not employed.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** See response to comment #8. The benthic invertebrates model was simplified and specific to invertebrates that would serve as the food web foundation for the birds and fish resources. Oysters were not addressed because oyster resources are not present within the project footprint. The oyster objective for the project was to avoid impacts to any existing oyster habitat in the vicinity of the project. The project did not have an objective of creating new oyster reefs. Crabs were not specifically addressed because it was the view of the group that structure-whether the submerged rock of the dikes, the low marsh habitat, or via the protection of the SAV beds, that is the important feature of crab habitat. Additionally, crabs use many diverse habitats and are highly mobile. This concept was separate from the target of providing a diverse benthic invertebrate community to fuel the avian and fish species. Crabs have been widely using the dikes and low marsh habitat at Poplar Island. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08
1-1	Backcheck Recommendation **Close Comment** District response is adequate. Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835307	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Adequacy of System Description: SAV Component)

The report does not describe the SAV beds that currently exist adjacent to the proposed island construction site (species composition, total area, density), nor the environmental conditions relevant to SAV growth (sediment type, waves and currents, salinity, etc. Furthermore, the document does not describe how any of these factors may change as a result of project construction, and how these changes could be expected to affect SAV distribution and cover.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** A description of the SAV resources currently at James and Barren Island as well as a summary of the VIMS monitoring since 1994 is provided in the attached excerpt from Section 3 (Existing Conditions) of the Mid-Bay Islands Integrated Feasibility Report and EIS. The conditions required for SAV growth are provided in Table 3 of the model documentation. No monitoring was done on conditions within the current SAV beds targeted at SAV other than coverage. However, at Barren there was one substrate and water quality sampling point within the SAV beds east of the island (WB-10). Substrate sampling identifies a fines content (silt/clay % in summer 2002 of 33.7 and in spring 2003 of 41.1) greater than the 30% limit identified as suitable for SAV growth in Table 3. Additionally, the organic matter content slightly exceeded the 5% limit identified by the SAV experts (5.8% in Spring 2003 sampling). Secchi depths at this site (0.6 m in Spring 2003) did not meet the standard of >1.9 m. There was no water quality or sediment sampling performed in the vicinity of James Island SAV beds. Hydrologic modeling (Dinicola et al. 2006) was performed by ERDC to evaluate changes in conditions to SAV resulting from construction of the project including the construction of various lengths of breakwaters from the southern tip of Barren Island. The summary conclusions are provided in the attachment. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08 (Attachment: Response#25.doc)
1-1	Backcheck Recommendation **Close Comment** Do SAV beds currently exist in the area of or adjacent to the proposed island? Submitted on

	behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835308	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Adequacy of System Description: Herpetological Component)

The variables used within the equations for the model are adequately described; however, no explanation is given for the values used in the calculations for the herpetofauna guild. The ICI scores of zero, 0.25, 0.50, 0.75, or 1.0 were assigned to the herp guild (or diamondback terrapin species) with no explanation of rationale. A 2% weighting factor was assigned to the herpetofauna guild with no explanation (e.g. based on species diversity or percent total species). The ICU's are calculated by multiplying the ICI values for each guild by the quantity (acreage) of habitat to be created. A major fallacy of this model system is the assumption that bigger is better and that all acreage created is actually suitable habitat for a target species or designated guild. No accountability is given for quality of habitat. The model and formula being used for the Mid-Chesapeake Bay Islands Environmental Restoration Project is adequately described in the supporting document but the values used in the calculations are not adequately described.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** See responses that explain why herpetofauna indices are specific to diamondback terrapin (#1), how indices were developed (#2), and weighting factors were assigned (#3). The model does not assume the bigger is better in all situations. This is a true statement is some situations such as intertidal mudflats and high and low marsh for foraging avian species. Where available, the team included most suitable habitat ranges such as for upland nesting acreage for CNWT, and the minimum intertidal acreage for waterfowl. In the absence of scientific literature, the team depended on the opinions of the resource managers and experts from the various agencies. The team made every effort to identify the most suitable habitat ranges and critical habitat sizes. However, there was minimum data available for these communities. In many cases, the panel of experts provided a minimum acreage needed, but could provide not cap. All acreages whether a range or a quantification of 'bigger is better' were defined in discussions with our expert panel. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08
1-1	Backcheck Recommendation **Close Comment** How will you ensure that the acreage created will be suitable habitat for the target species? Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835309	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Limitations and Capabilities:Avian Component)

The model's limitations and capabilities clearly relate to the assumption that species within selected guilds will use habitats as expected in the system description. I believe most bird experts would agree that significant bird habitat will be created, but more technical information and attention to species of conservation priority would bolster model capability.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** The model was developed as a planning tool, not an absolute research project. Assumptions were made about habitat use based on the scientific literature available and best professional judgment of regional resource agency representatives. Dave Brinker (MD DNR) and Mike Erwin (USGS) provided as much specificity as they could to refine the model indices. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08

1-1	Backcheck Recommendation **Close Comment** District response is adequate and satisfies the concern. Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835311	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Limitations and Capabilities:Benthic Component)

The choice of the five year time interval for estimating community development simplifies the calculations but limits model sensitivity to an "all or none" evaluation. It is likely that this lack of sensitivity will limit its application to other projects. Likewise, the assumption of a single maturity rate for all benthic habitats will limit its usefulness.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** An 'all' or 'none' evaluation was not performed. Additional clarification is provided in comment #8. Further, benefits were interpolated between years 1 and 5 to reflect increasing benefit as the habitats developed. With regards to the limit on usefulness, the model was developed specifically for this project and Poplar Island Expansion. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08
1-1	Backcheck Recommendation **Close Comment** The district response indicates that benefits were interpolated within the five year time frame. Was this based on a straight line? Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835313	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Limitations and Capabilities:Fish Component)

Although the model as constructed places the project in a context that most experts on fish ecology would agree would be an overall benefit to the local fish assemblages, there is no justification to conclude that the model itself lends credence to the selection of alternatives.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** See response to Comment #5 and #19. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08
1-1	Backcheck Recommendation **Close Comment** This has been addressed elsewhere. Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835315	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Limitations and Capabilities:SAV Component)

The SAV model as constructed does not have the ability to adequately address the potential for both positive and negative effects that may occur as a result of project construction.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** See comment #25 for a description of current SAV resources at Barren and James Island. The model was not intended to address the potential for positive and negative effects to SAV that may result from construction. An evaluation of impacts was made elsewhere in the Mid-Bay Islands Integrated Feasibility Report and EIS. The Mid-Bay team has addressed a comment raised through our External Peer Review regarding construction impacts to SAV that is provided below. The team's response is attached. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08 (Attachment: Response#30.doc)
1-1	Backcheck Recommendation **Close Comment** If you do not address the potential for negative effects how do you know that projected benefits will be realized? Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835319	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Limitations and Capabilities:Herpetological Component)

The application of this model in predicting actual utilization of habitat by herps is severely limited given that all values appear to be based on one species and no consideration is given to quality of habitat created. Herpetofauna are a highly diverse group occupying a wide range of habitats which may not be reflected in this model or the application of this model. This review has identified numerous limitations and deficiencies in the model presented. This review only reflects an evaluation of the model and does not present a review of the proposed Mid-Chesapeake Island Environmental Restoration Project. The proposed project cannot be fairly and adequately assessed through the model presented.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** See responses that explain why herptofauna indices are specific to diamondback terrapin (#1), how indices were developed (#2), and weighting factors were assigned (#3). Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08
1-1	Backcheck Recommendation **Close Comment** No further comment. Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835321	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Double Check Equations: Avian Component)

The equations themselves are not necessarily inadequate, but the weighting factors need additional technical input to improve validity.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** See response to comment #2 above that explains how weighting factors were developed. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08
1-1	Backcheck Recommendation **Close Comment** No further comment. Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258

	Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835326	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Double Check Equations: Benthic Component)

The structure of the model limits its response to values of either zero (0) or one (1). The habitat unit and habitat weighting calculations appear to be accurate.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** See response to comment #7 above that explains that the index values were not limited to 0 or 1. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08
1-1	Backcheck Recommendation **Close Comment** No further comment. Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835327	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Double Check Equations: Fish Component)

The equations incorporated into the modeling exercise are not necessarily erroneous, but they definitely lack substance.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** See previous responses discussing how weights (#2) and indices (#3) were developed. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08
1-1	Backcheck Recommendation **Close Comment** No further comment. Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835331	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Double Check Equations: Herpetological Component)

The calculations presented in the tables appear to be correct for the formulas presented. The accuracy and validity of the values used in these calculations are unknown.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** See previous responses discussing the development of herpetological guild (#1), and weights (#2) and index (#3) development. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08
1-1	Backcheck Recommendation **Close Comment**

	No further comment. Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835337	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Evaluate Testing and Validation: Avian Component)

To my knowledge, no testing and validation on the model was performed

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** The model was used for the Poplar Island Expansion Project. That application was reviewed by the Poplar PDT as was the Mid-Bay evaluation reviewed by the Mid-Bay PDT. As there are no mature, restored islands in the region to use as a reference, the team did not see that there was a beneficial way to test and validate the model. Additionally, the weights and indices were developed based on the available scientific literature and the resource agency representatives. The weights were based on the professional experience of the resource managers and were partly a consensus agreed upon between often conflicting interests of the resource agencies. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08
1-1	Backcheck Recommendation **Close Comment** No further comment. Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835350	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Evaluate Testing and Validation: Benthic Component)

There does not appear to have been any testing or validation.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** See response to comment 36. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08
1-1	Backcheck Recommendation **Close Comment** No further comment. Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835351	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Evaluate Testing and Validation: Fish Component)

The documentation does not address this certification criterion. However, to do so would largely be an irrelevant, impossible task. The model is based on generalities that do not lend themselves to comparison to empirical data. Although monitoring and results of the Poplar Island project should yield many powerful insights into the likely outcome of the present project, those data, if they exist, were not utilized.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** See response to comment 36. Additionally, the knowledge, data, and lessons learned from Poplar Island Project is information very familiar to members of the PDT and expert panel, and was therefore considered in development of this model. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08
1-1	Backcheck Recommendation **Close Comment** No further comment. Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835353	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Evaluate Testing and Validation: SAV Component)

No testing and validation performed. Inadequat

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** See response to comment 36. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08
1-1	Backcheck Recommendation **Close Comment** No further comment. Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835354	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Evaluate Testing and Validation: SAV Component)

No testing and validation performed.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** Duplicate comment (#39). See response to comment 36. Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08
1-1	Backcheck Recommendation **Close Comment** No further comment. Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

1835357	Biology-Ecology	n/a'	n/a	n/a

(Document Reference: Evaluate Testing and Validation: Herpetological Component)

No evidence of testing or validation was discussed in this report.

Submitted By: Camie Knollenberg (309-794-5487). Submitted On: 17-Mar-08

1-0	Evaluation **Check and Resolve** See response to comment 36.

	Submitted By: angela sowers (410-962-7440) Submitted On: 20-Mar-08
1-1	Backcheck Recommendation **Close Comment** No further comment. Submitted on behalf of Morris Mauney, CEERD-EE-W, 601-634-4258 Submitted By: Jodi Staebell (309.794-5448) Submitted On: 03-Apr-08
	Current Comment Status: **Comment Closed**

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Response #1

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Response #4

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Response 16:
Excerpts from relevant reports.

Existing Conditions discussion of avian resources from Section 3 of Mid-Bay Islands Integrated Feasibility Report and EIS:

3.1.9.a Avifauna

The Chesapeake Bay provides valuable and diverse habitat for avian species. Seasonal surveys conducted in the Chesapeake Bay have identified five major groups of inhabiting birds—colonial waterbirds, shorebirds and marsh birds, waterfowl, predatory and scavenging birds (raptors), and other land birds.

Six species of colonial nesting waterbirds inhabit the Chesapeake Bay region: great blue heron (*Ardea herodias*), the great egret (*Ardea alba*), the snowy egret (*Egretta thula*), the little blue heron (*Egretta caerulea*), the green-backed heron (*Butorides striatus*), and the night heron (*Nycticorax nycticorax)*. Colonial waterbirds hunt in shallow water habitat, feeding mainly on small fish, amphibians, and arthropods. They nest in tall trees in mainland areas, but can nest on shrubs and even dense grassy vegetation on islands isolated from terrestrial predators. Colonial waterbirds concentrate their reproductive energies in colonies at just a few locations.

Shorebirds, marsh birds, and waterfowl are common residents throughout the Chesapeake Bay. Other common avians are gulls, terns, brown pelicans (*Pelecanus occidentalis*), and the cormorants (*Phalacrocorax* sp.). Wading birds include the sandpipers, sanderlings, willet (*Cataoptrophorus semipalmatus*), black-bellied plover (*Pluvialis squatarola*), dowitchers (*Limnodromus* sp.), and glossy ibis (*Plegadis falcinellus*). Dozens of species of waterfowl (i.e., ducks and geese) inhabit or migrate to the Chesapeake Bay region, including the commonly sighted mallard (*Anas platyrhynchos*), wood duck (*Aix sponsa*), and red-breasted merganser (*Mergus serrator*) (CBP, 2004j).

The American bald eagle and osprey are the Chesapeake Bay's most familiar raptors. The osprey is tolerant of human activity, and it builds its nests along the shoreline and on navigation markers, utility poles, dead trees, and manmade structures near the water. The American bald eagle nests, roosts, and perches at the top of tall trees in upland areas, often in loblolly pine stands. The trees must be in areas where human activity is limited because bald eagles have little tolerance for human activity.

Land birds include birds typically present in upland habitats in the mid-Atlantic region, such as American robin (*Turdus migratorius*), northern cardinal (*Cardinalis cardinalis*), blue jay (*Cyanocitta cristata*), and various species of finches and sparrows.

The diversity of avian fauna in the Chesapeake Bay is largely affected by the number of migratory species. The Chesapeake Bay is located along the Atlantic Flyway, a major migration route for neotropical migrants and migrating waterfowl. Waterfowl and other birds migrating along the Flyway find food and shelter in the Chesapeake Bay's many coves and marshes. The Chesapeake Bay also serves as one of the most heavily used wintering areas for waterfowl. On average, nearly a million waterfowl winter each year on the Chesapeake Bay; more than 35 percent of all the waterfowl using the Atlantic Flyway (NPS 2003). Waterfowl staging and concentration areas have been identified in Maryland by MDNR throughout Chesapeake Bay. These areas are typically afforded additional protection from activities that could disrupt waterfowl concentrations. Surveys suggest that unvegetated island habitats are preferentially selected by many migratory bird species because of their relative lack of human disturbance and predators (USACE-Baltimore, 2004c).

Loss of habitat along waterways poses the biggest threat to many bird species in the Chesapeake Bay watershed. Deforestation, shoreline development, and shoreline erosion disrupt nesting activities, and chemical contaminants in the water damage the food source of many Chesapeake Bay birds. The Chesapeake Bay's vast tidal marshlands are important nesting, nursery, and wintering areas for colonial waterbirds, wading birds, and several Federally listed and state-listed endangered species. Rare, threatened, and endangered species found in the Chesapeake Bay are discussed in Section 3.1.9.

One goal of the Chesapeake Bay Program is to restore avian populations in the Chesapeake Bay to levels measured in the 1970s. In order to assess the status of Chesapeake Bay avian fauna, state biologists and USFWS count at least 20 species or species groups of waterfowl each winter in the watershed. Although waterfowl populations are variable because of their migratory nature and the effects of factors outside the basin, these annual counts provide an estimate of trends in Chesapeake Bay waterfowl.

As of September 2004, ten of the 20 monitored waterfowl species have met their goals and are showing improving trends in populations: mallard, gadwall (*Mareca strepera*), American widgeon (*Mareca Americana*), northern shoveler (*Anas clypeata*), northern pintail (*Anas acuta*), green-winged teal (*Anas crecca*), scaup (*Aythya affinis*), ring-necked duck (*Aythya collaris*), bufflehead (*Bucephala albeola*), and ruddy duck (*Oxyura jamaicensis*). Ten of the 20 monitored waterfowl have not met their goals. Four of these 10 species have shown improving trends (but have not met goals): black duck, redhead, scoters, and Canada goose (migratory). The remaining six species have shown declining trends: canvasback (*Aythya valisineria*), common goldeneye (*Bucephala clangula*), long-tailed duck (*Clangula hyemalis*), mergansers sp., brant (*Branta bernicla*), and tundra swan (*Cygnus columbianus*) (CBP, 2004k).

3.1.6.a.1 James and Barren Avian Surveys

Qualitative and quantitative avian surveys were performed during the four quarters of study at James Island and Barren Island. The qualitative surveys consisted of identifying bird species encountered while conducting the terrestrial portion of each quarterly survey, and noting the habitats in which they occurred. Quantitative bird surveys were conducted as part of the quarterly survey sampling at five locations at James Island and five locations at Barren Island. The quantitative survey methods consisted of observing all avifauna within a 180° arc of a set location for 15 minutes, and noting the species, habitat, and number of individuals observed. Observations were repeated twice at each station. The quantitative surveys provide bird species information primarily from the intersection of the aquatic and terrestrial habitats, which captures shorebirds, wading birds, and waterfowl (MPA, 2005a).

The quantitative surveys at James Island detected 41 different species during all four seasons of surveys. Table 3-37 presents the bird species and number of individuals counted during the James Island timed surveys for each location and season, and also includes a combined total number of individuals. Surf scoter (*Melanitta perspicillata*) (179), bufflehead (*Bucephala albeola*) (177), common grackle (*Quiscalus quiscula*) (58), osprey (*Pandion haliaetus*) (32), and herring gull (*Larus argentatus*) (29) had the highest total number of individuals from all the stations and seasons during the timed surveys (MPA, 2003e; MPA, 2003f; MPA, 2004g; MPA, 2004h). Osprey (10) was the most abundant species detected in the Summer 2002 survey. Brown pelican (*Pelecanus occidentalis*), mute swan (*Cygnus olor*), great blue heron (*Ardea herodias*), great egret (*Ardea albus*), American bald eagle (*Haliaeetus leucocephalus*), Forster's tern (*Sterna forsteri*), pine warbler (*Dendroica pinus*), and red-winged blackbird (*Agelaius phoeniceus*) were observed four or fewer times during the Summer 2002 timed surveys (MPA, 2003e). Bufflehead (76), herring gull (29), and black scoter (*Melinitta nigra*) (17) were most abundant in the Fall 2002 survey (MPA, 2003f). Surf scoter (176), bufflehead (101), common grackle (48), osprey (12), ring-billed gull (*Larus delawarensis*) (12), and sanderling (*Calidris alba*) (12) were the most abundant during Winter 2003 (MPA, 2004g). No bird species was observed

more than nine times during the Spring 2003 timed surveys; osprey (9) and common grackle (7) had the highest number of observations during this survey (MPA, 2004h).

The qualitative bird surveys at James Island detected a total of 71 different species during all quarterly surveys. Table 3-38 lists the species observed and the season in which they were observed at James Island. Double crested cormorant (*Phalacrocorax auritus*), mute swan, Canada goose (*Branta canadensis)*, osprey, American bald eagle, American crow (*Corvus brachyrhynchos*), and Carolina chickadee (*Poecile carolinensis*) were observed in all four seasons at James Island. MPA (2004h) notes that osprey, northern cardinal, Eastern kingbird (*Tyrannus tyrannus*), northern flicker (*Colaptes auratus*), and red-winged blackbird were nesting on James Island during Spring 2003.

James Island is located within a MDNR Sensitive Species Project Review Area noted to feature waterfowl, wading bird, and shorebird use (MDNR, 2004e). Waterfowl such as scoters, mallards, geese, and swan were documented utilizing James Island during the environmental surveys; and shorebirds such as terns, sandpipers, and yellowlegs were documented on James Island during one or more quarters of study (MPA, 2003e; MPA, 2003f; MPA, 2004g; MPA, 2004h). The island is less than one mile north of an area known as a colonial waterbird nesting site (MPA, 2003i), and the quarterly survey results document green heron (*Butorides virescen*s), great egret, great blue heron, brown pelican and cormorant on James Island. Section 3.1.10 details the State and Federally listed rare, threatened, and endangered species observed at James Island.

The quantitative avian surveys at Barren Island detected a total of 45 different bird species during four seasons of surveys. Table 3-39 presents the bird species and number of individuals counted during the Barren Island timed surveys for each location and season, and also includes a combined total number of individuals. Mute swan (531), brown pelican (309), double crested cormorant (170), turkey vulture (*Cathartes aura*) (136), and great black-backed gull (*Larus marinus*) (127) had the highest count of individuals as a combined total over all the stations and seasons during the timed surveys. Mute swan (110), double crested cormorant (30) and herring gull (36) were the most abundant species detected in the Summer 2002 survey. Mute swan (356), brown pelican (293), double crested cormorant (79), turkey vulture (136), and great black-backed gull (114) were most abundant in the Fall 2002 survey. Mute swan (60) followed by semi-palmated sandpipers (15), great blue heron (12), and herring gull (10) were the most abundant during Winter 2003. The combined seasonal and sampling location totals of great blue heron and great egret individuals were 70 and 74 respectively; these species were detected in the greatest numbers (55 and 70, respectively) during the Spring 2003 survey (MPA, 2005a).

The qualitative bird surveys at Barren Island detected a total of 107 different species during all four seasons of sampling. Table 3-40 lists the species observed at Barren Island, the season and habitat they were observed in, and their probable residency status. Mute swan, herring gull, great blue heron, American bald eagle, northern cardinal, American crow, Carolina chickadee, Carolina wren (*Thryothorus ludovicianus*), and double-crested cormorant were observed during all four seasons of Barren Island surveys, and are believed to be resident species. Migrant species observed include tundra swan (*Cygnus columbianus*), bufflehead, scoter species, ruby throated hummingbird (*Archilocus colubris*), sanderlings, sandpipers, plovers, gulls, terns, yellowlegs, sharp-shinned hawk, northern harrier, loons, thrushes, warblers, kinglets, and wrens (MPA, 2005a). Bird species diversity and abundance were highest at quantitative sampling stations that consisted of shallow, sheltered, aquatic ecosystems. The presence of the Barren Island remnants appear to be partially responsible for maintenance of the sheltered shallow water habitat, and it is expected that the avian utilization of these habitats would be affected as Barren Island continues to erode (MPA, 2005a).

Barren Island is located within a MDNR Sensitive Species Project Review Area noted to feature colonial water bird nesting. Two colonial water bird nesting sites are noted on the southern remnant (MDNR, 2004e; MPA, 2005a). Brown pelican, double crested cormorant, and herring gull were

observed nesting on a small remnant islet just south of the main southern remnant. During the Winter 2003 survey, great blue heron nesting activity was noted in the forested areas of the southern remnant (MPA, 2005a). State and Federally listed rare, threatened, and endangered species observed at Barren Island are discussed in Section 3.1.10a.

A letter received from MDNR (Byrne, 2004; Appendix G) mentions historic waterfowl concentration and staging areas known to occur along the open water that is part of or adjacent to the shorelines of both James and Barren Islands. Additionally, Barren Island supports a breeding colony of waterbirds.

Additional information on RTE from the Mid-Bay Integrated Feasibility Study and EIS-
The only Federally listed avian RTE species identified in recent years at James and Barren was the American bald eagle. Additional state listed avian RTE species at James Island include sharp-shinned hawk (highly state rare to rare for breeding); spotted sandpiper (state rare on watch list for breeding); northern harrier, golden-crowned kinglet, and dark-eyed junco (state rare for breeding); laughing gull, brown pelican, and double-crested cormorant (highly state rare for breeding); yellow-billed sapsucker (historically from State for breeding); least tern (state rare for breeding/threatened); and royal tern (highly state rare for breeding/endangered). State listed avian species identified at Barren Island include sharp-shinned hawk (highly state rare to rare for breeding); northern harrier, golden-crowned kinglet, gadwall, winter wren, and dark-eyed junco (state rare for breeding); laughing gull, brown pelican, and double-crested cormorant (highly state rare for breeding); saltmarsh sharp-tailed sparrow and American oystercatcher (watch list- rare to uncommon for breeding); American bittern (highly state rare to rare for breeding/in need of conservation); hermit thrush, black-throated blue warbler, and magnolia warbler (watch list-rare to uncommon to apparently secure for breeding); Wilson's plover (highly state rare for breeding/endangered); Swainson's thrush (believed extirpated in state for breeding); sedge wren (highly state rare for breedng/endangered); peregrine falcon (state rare/in need of conservation); and royal tern (highly state rare for breeding/endangered).

Table 3-37: Results of James Island Timed Avian Surveys

Avian Station Location		B-1					B-2				
Common Name	**Scientific Name**	Total	Summer 2002	Fall 2002	Winter 2003	Spring 2003	Total	Summer 2002	Fall 2002	Winter 2003	Spring 2003
Common Loon	*Gavia immer*	1		1			0				
Horned Grebe	*Podiceps auritus*	0					1		1		
Brown Pelican	*Pelecanus occidentalis*	6	3	3			0				
Great Blue Heron	*Ardea herodias*	0					3	1		1	1
Great Egret	*Ardea alba*	1	1				0				
Double-Crested Cormorant	*Phalacrocorax auritus*	1		1			0				
Mallard	*Anus platyrhynchos*	0					3				3
Mute Swan	*Cygnus olor*	2				2	2			2	
Canada Goose	*Branta canadensis*	0					2			2	
Surf Scoter	*Melanitta perspicillata*	3		3			0				
Black Scoter	*Melanitta nigra*	8		8			1		1		
White Winged Scoter	*Melanitta fusca*	0					2			2	
Bufflehead	*Bucephala albicollis*	16			16		63		28	35	
Long Tailed Duck	*Clangula hyemalis*	2			2		1			1	
Bald Eagle	*Haliaeetus leucocephalus*	3	1	1	1		1				1
Osprey	*Pandion haliaetus*	9	3		4	2	8	3		3	2
Sharp-Shinned Hawk	*Accipiter striatus*	1			1		0				
Laughing Gull	*Larus atricilla*	0					0				
Great Black-Backed Gull	*Larus marinus*	1		1			3		1	2	
Herring Gull	*Larus argentatus*	13		13			1		1		
Ring-Billed Gull	*Larus delawarensis*	1			1		5			5	
Sanderling	*Calidris alba*	0					12			12	
Royal Tern	*Sterna maxima*	2		2			0				
Common Tern	*Sterna hirundo*	0					0				
Forster's Tern	*Sterna forsteri*	1				1	0				
Spotted Sandpiper	*Actitis macularia*	0					1				1
Brown Creeper	*Certhia americana*	1		1			0				
American Crow	*Corvus brachyrhynchos*	2	1		1		3	1		2	
Tree Swallow	*Tachycineta bicolor*	4				4	1				1
Barn Swallow	*Hirundo rustica*	2				2	0				
Carolina Chickadee	*Poecile carolinensis*	1	1				0				
Brown Headed Cowbird	*Moluthrus ater*	0					0				
Eastern Bluebird	*Sialis sialis*	1			1		0				
Eastern Kingbird	*Tyrannus tyrannus*	1				1	0				
American Robin	*Turdus migratorius*	0					0				
Pine Warbler	*endroica pinus*	5	2		3		0				
Northern Cardinal	*Cardinalis cardinalis*	1	1				0				
Red-Winged Blackbird	*Agelaius phoeniceus*	0					1	1			
Common Grackle	*Quiscalus quiscula*	2				2	54	2		48	4
European Starling	*Sturnus vulgaris*	1				1	0				
Northern Flicker	*Colaptes auratus*	1			1		1		1		
TOTALS		**93**	**13**	**34**	**31**	**15**	**169**	**8**	**33**	**115**	**13**

Table 3-37: Continued.

Avian Station Location		B-3					B-4				
Common Name	**Scientific Name**	Total	Summer 2002	Fall 2002	Winter 2003	Spring 2003	Total	Summer 2002	Fall 2002	Winter 2003	Spring 2003
Common Loon	*Gavia immer*	0					0				
Horned Grebe	*Podiceps auritus*	0					1			1	
Brown Pelican	*Pelecanus occidentalis*	0					3		3		
Great Blue Heron	*Ardea herodias*	0					0				
Great Egret	*Ardea alba*	0					0				
Double-Crested Cormorant	*Phalacrocorax auritus*	0					0				
Mallard	*Anus platyrhynchos*	0					0				
Mute Swan	*Cygnus olor*	4	2			2	0				
Canada Goose	*Branta canadensis*	4			4		0				
Surf Scoter	*Melanitta perspicillata*	18			18		1			1	
Black Scoter	*Melanitta nigra*	0					2		2		
White Winged Scoter	*Melanitta fusca*	0					0				
Bufflehead	*Bucephala albicollis*	48		8	40		49		40	9	
Long Tailed Duck	*Clangula hyemalis*	0					4			4	
Bald Eagle	*Haliaeetus leucocephalus*	2	1	1			2		2		
Osprey	*Pandion haliaetus*	8	3		5		5				5
Sharp-Shinned Hawk	*Accipiter striatus*	0					0				
Laughing Gull	*Larus atricilla*	0					1	1			
Great Black-Backed Gull	*Larus marinus*	1		1			2	1	1		
Herring Gull	*Larus argentatus*	3		3			3		3		
Ring-Billed Gull	*Larus delawarensis*	4			4		0				
Sanderling	*Calidris alba*	0					0				
Royal Tern	*Sterna maxima*	2		2			0				
Common Tern	*Sterna hirundo*	2	1		1		0				
Forster's Tern	*Sterna forsteri*	0					2	2			
Spotted Sandpiper	*Actitis macularia*	0					2				2
Brown Creeper	*Certhia americana*	0					0				
American Crow	*Corvus brachyrhynchos*	0					0				
Tree Swallow	*Tachycineta bicolor*	0					0				
Barn Swallow	*Hirundo rustica*	3	1			2	2				2
Carolina Chickadee	*Poecile carolinensis*	0					0				
Brown Headed Cowbird	*Moluthrus ater*	1			1		0				
Eastern Bluebird	*Sialis sialis*	1	1				0				
Eastern Kingbird	*Tyrannus tyrannus*	0					3				3
American Robin	*Turdus migratorius*	0					0				
Pine Warbler	*Dendroica pinus*	0					0				
Northern Cardinal	*Cardinalis cardinalis*	0					0				
Red-winged Blackbird	*Agelaius phoeniceus*	3	3				0				
Common Grackle	*Quiscalus quiscula*	1	1				0				
European Starling	*Sturnus vulgaris*	0					0				
Northern Flicker	*Colaptes auratus*	0					1			1	
TOTALS		**105**	**13**	**15**	**73**	**4**	**83**	**4**	**51**	**16**	**12**

Table 3-37: Continued.

Avian Station Location		B-5					Combined Locations				
Common Name	**Scientific Name**	Total	Summer 2002	Fall 2002	Winter 2003	Spring 2003	Total	Summer 2002	Fall 2002	Winter 2003	Spring 2003
Common Loon	*Gavia immer*						1		1		
Horned Grebe	*Podiceps auritus*						2		1	1	
Brown Pelican	*Pelecanus occidentalis*						9	3	6		
Great Blue Heron	*Ardea herodias*						3	1		1	1
Great Egret	*Ardea alba*						1	1			
Double-Crested Cormorant	*Phalacrocorax auritus*						1		1		
Mallard	*Anus platyrhynchos*						3				3
Mute Swan	*Cygnus olor*						8	2		2	4
Canada Goose	*Branta canadensis*						6			6	
Surf Scoter	*Melanitta perspicillata*	157			157		179		3	176	
Black Scoter	*Melanitta nigra*	6		6			17		17		
White Winged Scoter	*Melanitta fusca*						2			2	
Bufflehead	*Bucephala albicollis*	1			1		177		76	101	
Long Tailed Duck	*Clangula hyemalis*	2			2		9			9	
Bald Eagle	*Haliaeetus leucocephalus*	2				2	10	2	4	1	3
Osprey	*Pandion haliaetus*	2	1	1			32	10	1	12	9
Sharp-Shinned Hawk	*Accipiter striatus*						1			1	
Laughing Gull	*Larus atricilla*						1	1			
Great Black Backed Gull	*Larus marinus*	1		1			8	1	5	2	
Herring Gull	*Larus argentatus*	9		9			29		29		
Ring-billed Gull	*Larus delawarensis*	2			2		12			12	
Sanderling	*Calidris alba*						12			12	
Royal Tern	*Sterna maxima*	2		2			6		6	0	
Common Tern	*Sterna hirundo*						2	1		1	
Forster's Tern	*Sterna forsteri*						3	2			1
Spotted Sandpiper	*Actitis macularia*						3				3
Brown Creeper	*Certhia americana*						1		1		
American Crow	*Corvus brachyrhynchos*						5	2		3	
Tree Swallow	*Tachycineta bicolor*						5				5
Barn Swallow	*Hirundo rustica*						7	1			6
Carolina Chickadee	*Poecile carolinensis*						1	1			
Brown Headed Cowbird	*Moluthrus ater*	1			1		2			2	
Eastern Bluebird	*Sialis sialis*						2	1		1	
Eastern Kingbird	*Tyrannus tyrannus*						4				4
American Robin	*Turdus migratorius*	2			2		2			2	
Pine Warbler	*Dendroica pinus*	1	1				6	3		3	
Northern Cardinal	*Cardinalis cardinalis*						1	1			
Red-Winged Blackbird	*Agelaius phoeniceus*						4	4			
Common Grackle	*Quiscalus quiscula*	1				1	58	3		48	7
European Starling	*Sturnus vulgaris*						1				1
Northern Flicker	*Colaptes auratus*	2			2		5		1	4	
TOTALS		**191**	**2**	**19**	**167**	**3**	**641**	**40**	**152**	**402**	**47**

Table 3-38: Bird Species Observed during Site Visits to James Island

Common Name	Scientific Name	Season and Number Observed			
		Summer 2002	Fall 2002	Winter 2003	Spring 2003
Common Loon	*Gavia immer*		X		X
Horned Grebe	*Podiceps auritus*		X	X	
Brown Pelican	*Pelecanus occidentalis*	X	X		X
Double-Crested Cormorant	*Phalacrocorax auritus*	X	X	X	X
Green Heron	*Butorides virescens*	X			
Great Egret	*Ardea alba*	X			
Great Blue Heron	*Ardea herodias*	X		X	X
Mute Swan	*Cygnus olor*	X	X	X	X
Snow Goose	*Chen caerulescens*				X
Canada Goose	*Branta canadensis*	X	X	X	X
Mallard	*Anas platyrhynchos*				X
Black Scoter	*Melanitta nigra*		X		
White-Winged Scoter	*Melanitta fusca*		X	X	
Surf Scoter	*Melanitta perspicillata*		X	X	X
Long-Tailed Duck	*Clangula hyemalis*			X	
Bufflehead	*Bucephala albeola*		X	X	X
Red-Breasted Merganser	*Mergus serrator*		X		
Turkey Vulture	*Cathartes aura*		X		
Osprey	*Pandion haliaetus*	X	X	X	X
Bald Eagle	*Haliaeetus leucocephalus*	X	X	X	X
Sharp-Shinned Hawk	*Accipiter striatus*		X	X	
American Kestrel	*Falco sparverius*			X	
Semi-Palmated Plover	*Charadrius semipalmatus*				X
Killdeer	*Charadrius vociferus*	X	X		
Greater Yellowlegs	*Tringa melanolueca*				X
Spotted Sandpiper	*Actitis macularia*				X
Ruddy Turnstone	*Arenaria interpres*				X
Sanderling	*Calidris alba*			X	
Dunlin	*Calidris alpina*				X
Least Sandpiper	*Calidris minutilla*				X
Laughing Gull	*Larus atricilla*	X			X
Ring-billed Gull	*Larus delawarensis*			X	X
Herring Gull	*Larus argentatus*		X		X
Great Black-Backed Gull	*Larus marinus*	X	X	X	
Royal Tern	*Sterna maxima*		X		X
Forster's Tern	*Sterna forsteri*	X	X		X
Common Tern	*Sterna hirundo*	X		X	X
Least Tern	*Sterna antillarum*				
Mourning Dove	*Zenaida macroura*			X	
Barred Owl	*Strix varia*				X
Northern Flicker	*Colaptes auratus*		X	X	X
Downy Woodpecker	*Picoides pubescens*		X		
Hairy Woodpecker	*Picoides villosus*		X		
Eastern Phoebe	*Sayornis phoebe*		X	X	

Table 3-38: Continued.

Eastern Kingbird	*Tyrannus tyrannus*	**X**			**X**
Blue Jay	*Cyanocitta cristata*		**X**		**X**
American Crow	*Corvus brachyrhynchos*	**X**	**X**	**X**	**X**
Tree Swallow	*Tachycineta bicolor*				**X**
Northern Rough-Winged Swallow	*Stelgidopterix serripennis*				**X**
Barn Swallow	*Hirundo rustica*	**X**			**X**
Tufted Titmouse	*Baeolophus bicolor*		**X**		
Carolina Chickadee	*Poecile carolinensis*	**X**	**X**	**X**	**X**
Brown Creeper	*Certhia americana*		**X**	**X**	
House Wren	*Troglodytes aedon*				**X**
Carolina Wren	*Thryothorus ludovicianus*	**X**		**X**	
Golden-Crowned Kinglet	*Regulus satrapa*			**X**	
Eastern Bluebird	*Sialia sialis*	**X**		**X**	**X**
American Robin	*Turdus migratorius*			**X**	
Gray Catbird	*Dumetella carolinensis*				**X**
European Starling	*Sturnus vulgaris*				**X**
Yellow-Rumped Warbler	*Dendroica coronata*			**X**	
Pine Warbler	*Dendroica pinus*	**X**		**X**	**X**
Yellow Warbler	*Dendroica petechia*				**X**
Louisiana Waterthrush	*Seiurus motacilla*			**X**	
Song Sparrow	*Melospiza melodia*			**X**	
Swamp Sparrow	*Melospiza georgiana*			**X**	
Northern Cardinal	*Cardinalis cardinalis*			**X**	**X**
Red-Winged Blackbird	*Agelaius phoeniceus*				**X**
Common Grackle	*Quiscalus quiscula*			**X**	**X**
Brown-Headed Cowbird	*Molothrus ater*			**X**	**X**
American Goldfinch	*Carduelis tristis*				**X**
TOTAL NUMBER OF SPECIES	**72**	**21**	**29**	**35**	**44**

Table 3-39: Results of the Barren Island Avian Quantitative Surveys (MPA, 2005a)

Avian Location	A-1					A-2				
Year	Total	2002		2003		Total	2002		2003	
Common Name **Season**		Summer	Fall	Winter	Spring		Summer	Fall	Winter	Spring
American Goldfinch	**2**		2							
American Crow										
Bald Eagle	**1**	1				**3**	1	2		
Barn Swallow										
Boat Tail Grackle										
Brown Pelican	**14**		14			**20**		17		3
Bufflehead	**17**		17			**7**		7		
Canada Goose	**3**		3							
Carolina Chickadee										
Carolina Wren						**1**		1		
Common Egret										
Common Grackle										
Common Loon	**4**		3	1		**2**		2		
Common Tern	**10**				10	**1**				1
Double Crested Cormorant	**22**	4			18	**15**	11			4
Downy Woodpecker						**1**		1		
Dunlin										
Fish Crow						**1**				1
Forster's Tern	**2**	1			1	**2**	1			1
Gadwall										
Golden Crowned Kinglet										
Great Black Backed Gull	**2**		2			**7**	1	4	2	
Great Blue Heron	**2**		1		1	**9**				9
Great Egret						**2**	1			1
Herring Gull	**9**	9				**26**	11	8	4	3
Laughing Gull	**1**	1								
Mute Swan	**2**				2					
Northern Cardinal										
Northern Gannet	**5**		5							
Oldsquaw	**1**			1						
Osprey						**3**				3
Peregrine Falcon						**1**	1			
Red-Throated Loon	**1**		1							
Ring-Billed Gull										
Red-Winged Blackbird										
Royal Tern	**1**				1					
Semipalmated Sandpipers										
Surf Scoter										
Tree Swallow						**2**				2
Tundra Swan										
Turkey Vulture										
Willet										
Winter Wren										
Yellow-Rumped (Myrtle) Warbler										
Yellow-Shafted Flicker						**2**				2
Unidentified ducks	**20**		20							
Unidentified shorebirds										
Species Count	**17**	5	10	2	6	**17**	7	8	2	11
TOTAL	**119**	16	68	2	33	**105**	27	42	6	30

Table 3-39: Continued.

Avian Location	A-3					A-4				
Year	Total	2002		2003		Total	2002		2003	
Common Name Season		Summer	Fall	Winter	Spring		Summer	Fall	Winter	Spring
American Goldfinch										
American Crow						**3**			2	1
Bald Eagle	**5**	2		2	1	**2**	1	1		
Barn Swallow						**1**				1
Boat Tail Grackle						**2**				2
Brown Pelican	**274**	4	262		8					
Bufflehead	**14**		14			**5**		5		
Canada Goose						**11**		11		
Carolina Chickadee						**1**			1	
Carolina Wren						**3**	1		2	
Common Egret										
Common Grackle	**4**				4					
Common Loon	**2**		1	1						
Common Tern	**5**				5					
Double Crested Cormorant	**118**	3	77	2	36	**4**	1	2		1
Downy Woodpecker						**1**	1			
Dunlin										
Fish Crow						**1**				1
Forster's Tern	**8**		8			**2**	2			
Gadwall										
Golden Crowned Kinglet						**1**		1		
Great Black Backed Gull	**10**	1	9			**15**	9	6		
Great Blue Heron	**14**			6	8	**34**			6	28
Great Egret						**58**	1			57
Herring Gull	**9**	7		1	1	**11**	9			2
Laughing Gull						**1**	1			
Mute Swan						**377**	106	270		1
Northern Cardinal						**1**			1	
Northern Gannet										
Oldsquaw										
Osprey	**1**				1	**2**				2
Peregrine Falcon										
Red-Throated Loon										
Ring-Billed Gull										
Red-Winged Blackbird										
Royal Tern	**1**				1	**3**	3			
Semipalmated Sandpipers										
Surf Scoter	**7**		7							
Tree Swallow	**2**				2					
Tundra Swan	**7**		7							
Turkey Vulture						**100**		100		
Willet						**2**			2	
Winter Wren						**1**		1		
Yellow-Rumped (Myrtle) Warbler						**1**		1		
Yellow-Shafted Flicker										
Unidentified ducks						**5**	5			
Unidentified shorebirds										
Species Count	**15**	5	8	5	10	**26**	12	10	6	10
	481	17	385	12	67	**648**	140	398	14	96

Table 3-39: Continued.

Avian Location	A-5					Combined Locations				
Year	Total	2002		2003		Total	2002		2003	
Common Name Season		Summer	Fall	Winter	Spring		Summer	Fall	Winter	Spring
American Goldfinch						**2**		2		
American Crow	**10**	7			3	**13**	7		2	4
Bald Eagle	**2**		2			**13**	5	5	2	1
Barn Swallow						**1**				1
Boat Tail Grackle	**10**				10	**12**				12
Brown Pelican	**1**					**309**	5	293		11
Bufflehead	**3**		3			**46**		46		
Canada Goose	**2**		2			**16**		16		
Carolina Chickadee						**1**			1	
Carolina Wren						**4**	1	1	2	
Common Egret	**3**				3	**3**				3
Common Grackle	**14**				14	**18**				18
Common Loon						**8**		6	2	
Common Tern						**16**				16
Double Crested Cormorant	**11**	11				**170**	30	79	2	59
Downy Woodpecker						**2**	1	1		
Dunlin	**5**			5		**5**			5	
Fish Crow	**4**				4	**6**				6
Forster's Tern	**5**	1	4			**19**	5	12		2
Gadwall	**2**		2			**2**		2		
Golden Crowned Kinglet						**1**		1		
Great Black Backed Gull	**93**		93			**127**	11	114	2	
Great Blue Heron	**11**	1	1		9	**70**	1	2	12	55
Great Egret	**14**	2			12	**74**	4			70
Herring Gull	**21**		16	5		**76**	36	24	10	6
Laughing Gull	**2**	2				**4**	4			
Mute Swan	**152**	4	86	60	2	**531**	110	356	60	5
Northern Cardinal						**1**			1	
Northern Gannet						**5**		5		
Oldsquaw						**1**			1	
Osprey	**2**				2	**8**				8
Peregrine Falcon						**1**	1			
Red-Throated Loon						**1**		1		
Ring-Billed Gull	**1**			1		**1**			1	
Red-Winged Blackbird	**10**				10	**10**				10
Royal Tern	**1**	1				**6**	4			2
Semipalmated Sandpipers	**15**			15		**15**			15	
Surf Scoter						**7**		7		
Tree Swallow	**3**				3	**7**				7
Tundra Swan	**5**		5			**12**		12		
Turkey Vulture	**36**		36			**136**		136		
Willet						**2**			2	
Winter Wren						**1**		1		
Yellow-Rumped (Myrtle) Warbler						**1**		1		
Yellow-Shafted Flicker						**2**				2
Unidentified ducks						**25**	5	20		
Unidentified shorebirds	**6**		6			**6**		6		
Species Count	**27**	9	11	5	11	**45**	16	23	16	20
TOTAL	**444**	30	256	86	72	**1,797**	230	1,149	120	298

Table 3-40: All Bird Species Observed at Barren Island. (MPA, 2005a)

Order	Common Name	Scientific Name	Status	Habitat	Summer 2002	Fall 2002	Winter 2003	Spring 2003
Anseriforms	Mallard	hos	R	O,S,FW			X	X
	American Black Duck	*Anas rubripes*	WR,R?	O,M		X		
	Gadwall	*Anas streptera*	WR?	O		X		
	Canada Goose	*Branta Canadensis*	WR,R?	O		X		
	Bufflehead	*Bucephala albeola*	WR,M	O		X		
	Oldsquaw	*Clangula hyemalls*	WR,M, R*	O,FO		X	X	X
	Tundra Swan	*Cyngus columblanus*	WR,M	O		X		
	Mute Swan	*Cyngus olor*	R	O	X	X	X	X
	Black Scoter	*Melanitta nigra*	WR,M	O		X		
	Surf Scoter	*Melanitta perspicillata*	WR,M	O		X	X	
Apodiformes	Ruby Throated Hummingbird	*Archilochus colubris*	M	F	X			
Charadriformes	Sandering	*Caildris alba*	M	SH	X	X		
	Dunlin	*Caildris alpina*	W,M	MF			X	
	Western Sandpiper	*Caildris mauri*	M	SH	X			
	Least Sandpiper	*Caildris minutilla*	M	SH	X			
	Semi-Palmated Sandpiper	*Caildris pusilla*	M	SH,MF	X		X	
	Willet	*Catoptrophorus semipalmatus*	R	MF,SH, FO			X	X
	Semi-Palmated Plover	*Charadrius semmipalmatus*	M	SH	X			
	Wilson's Plover	*Charadrius wilsonia*	M	SH	X			
	American Oystercatcher	*Haematopus pallatus*	R	SH,MF				X
	Herring Gull	*Larus argentatus*	R	S,MF,SH	X	X	X	X
	Laughing Gull	*Larus atricilla*	R	SH,O	X		X	
	Ring-Billed Gull	*Larus delawarensis*	W,M	O,FO			X	
	Great Black-Backed Gull	*Larus marinus*	R	SH,O,FO	X	X	X	
	Black-Bellied Plover	*Pluvialis squatarola*	M	SH	X			
	Caspian Tern	*Sterna caspia*	SR/M	SH,O	X			
	Forster's Tern	*Sterna fosteri*	SR/R	SH,O	X	X		X
	Common Tern	*Sterna hirundo*	S	O,SH				X
	Royal Tern	*Sterna maxima*	SR	S,FW,SH,O	X			X
	Lesser Yellowlegs	*Tringa flavipes*	M	SH	X			
	Greater Yellowlegs	*Tringa melanoleuca*	M	SH	X			
Clconiformes	Great Egret	*Ardea albus*	R	SH,MF,S	X			X
	Great Blue Heron	*Ardea herodias*	R	F,S,MF,SH	X	X	X	X
	American Bittern	*Botaurus lentiginosus*	WR,R?	M		X		
	Green Heron	*Butorides virescens*	S,R?	SH,FW	X			X
	Turkey Vulture	*Cathartes aura*	SR/R	FO	X	X		
	Snowy Egret	*Egretta thula*	R	S,FW,SH	X			X

Table 3-40: Continued.

Order	Common Name	Scientific Name	Status	Habitat	Summer 2002	Fall 2002	Winter 2003	Spring 2003
Coraciformes	Belted Kingfisher	*Ceryle alcyon*	R?,M?	M		X		
Cucuiformes	Yellow-Billed Cukoo	*Coccyzus americanus*	S	F				X
Falconiformes	Sharp-Shinned Hawk	*Accipiter striatus*	R/M	F,FO	X			
Falconiformes	Northern Harrier	*Circus cyaneus*	WR,M	M		X		
	Peregrine Falcon	*Falco peregrinus*	M	SH,FO	X			
	Bald Eagle	*Halliaeetus leucocephalus*	R	SH,F,FO	X	X	X	X
	Osprey	*Pandlon hallaetus*	R	SH,F,FO	X		X	X
Gaviformes	Common Loon	*Gavia immer*	WR,M	O		X	X	
	Red-Throated Loon	*Gavia stellata*	WR,M	O		X		
Gruiformes	Clapper Rail	*Rallus longirostris*	R	SH				X
Passeriformes	Red Winged Blackbird	*Agelaius phoeniceus*	R	FW,SH,F			X	X
	Saltmarsh Sharp-Tailed Sparrow	*Ammodramus caudacutus*	R	S			X	
	Seaside Sparrow	*Ammodramus maritimus*	R	M,S	X		X	
	Northern Cardinal	*Cardinalis cardinalis*	R	F	X	X	X	X
	American Goldfinch	*Carduelis tristis*	R	FO,F		X	X	X
	Veery	*Catharus fuscescens*	M	F	X			
	Hermit Thrush	*Catharus guttatus*	M	F	X			
	Swainsons Thrush	*Catharus ustulatus*	M	F	X			
	Sedge Wren	*Cistothorus platensis*	W	FW				X
	American Crow	*Corvus brachyrhynchos*	R	F,SH,FO	X	X	X	X
	Fish Crow	*Corvus ossifragus*	R	S,F,FW				X
	Black Throated Blue Warbler	*Dendroica caerulescens*	M	F	X			
	Yellow-Rumped Warbler	*Dendroica coronata*	WR,M,	F		X		X
	Magnolia Warbler	*Dendroica magnolia*	M	F	X			
	Yellow Warbler	*Dendroica petechia*	SR/M	F,S,FW	X			X
	Pine Warbler	*Dendroica pinus*	SR/R	F	X			
	Gray Catbird	*Dumetella carolinensis*	R	F	X			X
	Acadian Flycatcher	*Empidonax virescens*	SR/M	F	X			
	Common Yellowthroat	*Geothlypis trichus*	SR/R	M,SH,F	X			X
	Barn Swallow	*Hirundo rustica*	SR/M	O,SH,FW	X			X
	Wood Thrush	*Hylocichla mustelina*	M	F	X			
	Yellow-Breasted Chat	*Icteria virens*	M	F	X			
	Dark-Eyed Junco	*Junco hyemalis*	WR,M	M,F		X	X	
	Swamp Sparrow	*Melospiza georgianna*	WR,M	F		X		
	Song Sparrow	*Melospiza melodia*	R?, WR	F		X		
	Northern Mockingbird	*Mimus polyglottos*	R	F				X

Table 3-40: Continued.

Order	Common Name	Scientific Name	Status	Habitat	Summer 2002	Fall 2002	Winter 2003	Spring 2003
	Black-And-White Warbler	*Mniotilta varia*	M	F	X			
	Tufted Titmouse	*Parus bicolor*	R	F			X	X
	Fox Sparrow	*Passerella iliaca*	WR,M	F		X		
	Eastern Towhee	*Pipilo erythrophthalmus*	R	F				X
	Carolina Chickadee	*Poecile carolinensis*	R	F	X	X	X	X
	Blue-Gray Gnatcatcher	*Polioptila caerulea*	SR/M	F	X			X
	Boat-Tailed Grackle	*Quiscalus major*	R	F,S,SH	X		X	X
	Common Grackle	*Quiscalus quiscula*	R	SH,F				X
	Ruby-Crowned Kinglet	*Regulus calendula*	WR,M	F		X		
	Golden-Crowned Kinglet	*Regulus satrapa*	WR,M	F		X		
	Eastern Phoebe	*Sayornis phoebe*	SR/M	F	X			
	Ovenbird	*Seiurus aurocapillus*	M	F	X			
	Louisiana Waterthrush	*Seiurus motacilla*	M	F	X			
	American Redstart	*Setophaga ruticilla*	M,S	F	X			X
	Eastern Bluebird	*Sialis sialis*	R	F		X		

Notes:
Status/Habitat Key:
M = migrant; R = year-round resident; S = summer resident; W = winter resident; ? = uncertain classification;
F=Forest; S=Salt Marsh; FW=Freshwater Marsh; M = Marsh; O=Open Water; FO=Fly Over; MF=Mud Flat;
SH=Shore.
* – injured wing

From the 2006-2007 annual bird monitoring report for Poplar Island:

Bird monitoring at PIERP the past year continues to find occurrence of new, unusual or rare species and/or numbers at the site. Highlights of south transients in 2006 include Hudsonian Godwit on 5 October; Pied-billed Grebe, late Short-billed Dowitcher, Western Sandpiper, the first project site Redhead, Ruby-crowned Kinglet and Chipping Sparrow on 19 October; late Baird's Sandpiper and Snow Bunting on 31 October; while a Cooper's Hawk on 15 November, and Snow Goose and Golden-crowned Kinglet on 27 November are new species for the site. A total 194 American Black Duck and 873 Mallard on 27 November are noteworthy.

Wintering species of interest include on 29 December an American Coot a new species for the project site, and on 12 January Red-throated Loon, Northern Gannet, Brown Pelican, Double-crested Cormorant, 113 Gadwall, 283 Greater Scaup, Black-bellied Plover, and Belted Kingfisher.

North transient highlights include American Widgeon, Canvasback, Red-tailed Hawk and Horned Lark on 1 March; Common Snipe and Boat-tailed Grackle new for the project site plus Great Egret and Dark-eyed Junco on 14 March; 64 Horned Grebe, 300 Mallard and 28 Bonaparte's Gull on 28 March; Virginia Rail on 23 April; Cooper's Hawk and Blue-winged Teal on 2 May; Wilson's Phalarope and late Purple Sandpiper on 15 May; late White-rumped Sandpiper on 31 May; and very late Black-bellied Plover, Semipalmated Plover, Semipalmated Sandpiper, Least Sandpiper and Dunlin on 18 June.

A total of 19 species are confirmed nesting within the project site in 2007 with an unidentified Crow species being the only species not previously found nesting there. In 2007 potential nesting species such as Virginia Rail, Laughing Gull, Purple Martin, Seaside Sparrow and Boat-tailed Grackle were found within the project site during the nesting season, while May-July Purple Martin occupying the nest box in Cell 4DX and Seaside Sparrow singing from the Cell 3D wetlands suggest these two species may be confirmed nesting in the near future. Unusual summering and/or vagrant species include Horned Grebe, Caspian Tern, and Black Tern on 18 June; Brown Pelican on 12 July and thereafter; and 23 Caspian Tern on 4 September.

South transient highlights include early Greater Yellowlegs, Lesser Yellowlegs, Semipalmated Sandpiper and Least Sandpiper on 29 June; Western Sandpiper, Stilt Sandpiper; American Avocet and Chimney Swift on 24 July; Black-crowned Night Heron, Red-necked Phalarope and six species of terns on 8 August; Tri-colored Heron on 20 August and thereafter; Palm Warbler on 4 September; 73 Blue-winged Teal, Peregrine Falcon, Ruby-throated hummingbird, Blue-gray Gnatcatcher and Savannah Sparrow on 17 September; Cooper's Hawk on 1 October; and Semipalmated Plover, American Avocet, Common Snipe, Royal Tern, Blue Jay, Horned Lark, Golden-crowned Kinglet, Ruby-crowned Kinglet, Swainson's Thrush, Hermit Thrush, Yellow-rumped Warbler, Common Yellowthroat, Swamp Sparrow and White-throated Sparrow on 15 October. The thrushes are new for the project site.

Perhaps two of the most exciting species occurrence at the site to date happened in 2007. Both species are normally found in coastal dune habitats. A south transient Ipswitch race of the Savannah Sparrow was observed on the barren substrate of the Cell 2 dike roadway on 27 November. This race of the Savannah Sparrow was previously considered a separate species, is the only land bird that nests on Sable Island a sand bar 100 miles east of Nova Scotia, and commonly winters only on coastal dunes south to Georgia. A north transient Piping Plover observed and photographed in Cell 4A-B on 23-24 April is a globally threatened and North American highly endangered species that migrates, inhabits and nests along Atlantic Coast beaches with its nearest regular occurrence at Assateague Island where it is afforded Federal protection.

Response 25:

As stated in the Mid-Bay Integrated Feasibility Report and EIS:

3.1.6.a.1 James and Barren Island SAV Resources

SAV surveys were conducted at James Island during Summer 2002, Spring 2003, and Summer 2003. During the Summer 2002 (June) field survey, a qualitative SAV survey was performed which indicated that widgeon grass (*Ruppia maritime*) was the dominant species along the eastern shorelines of James Island. The four SAV beds identified (Figure 3-10) ranged from 91.4 to 137.2 m (100 to 150 yards) from the eastern shoreline of all three-island remnants (MPA, 2003e). During the Spring 2003 (May) field survey, transects were performed in those areas where SAV beds had been reported in previous qualitataive surveys conducted in 2001 and 2002, as well as several areas in the immediate vicinity where SAV beds had not been reported. SAV gathered from each rake throw was recorded and all SAV collected consisted of horned pondweed (*Zannichellia palustris*). Dense beds were noted to the east of the northern remnant and smaller less-dense beds to the east of the southern remnant (MPA, 2004h). Figure 3-10 illustrates the extent of SAV at James Island found during the spring 2003 survey. During the Summer 2003 (August) sampling event, transects with rake throws were performed in the same areas as the spring survey and a diver also entered the water to make visual observations. A single blade of SAV was collected off the eastern shore of the northern remnant, and identified as horned pondweed, by Dr. Peter Bergstrom of NOAA's Chesapeake Bay office. Dr. Bergstrom commented that much of the widgeon grass on the Eastern Shore of Maryland had died back during the 2003 season. Widgeon grass is the species most likely to be present during the summer months, whereas both horned pondweed and sago pondweed (*Potamogeton pectinatus*) are usually only present during the spring to early summer months (MPA, 2004i).

A review was performed on SAV bed location maps from 1994 through 2000 of James Island and its immediate surrounding waters produced by VIMS. The VIMS aerial SAV maps showed no SAV beds located around James Island prior to 1999; the closest SAV beds in these years were adjacent to the northeastern shores of Taylors Island, one mile south of James Island. VIMS surveys showed James Island to have 18.1 ac in 1999, no SAV in 2000, 22.6 ac in 2001, 7.0 ac in 2002, and no SAV in 2003. Recently, two small beds periodically occur along the eastern shore of the James Island remnants, averaging 10 ac between 1999 and 2003. Both beds were reportedly dominated by widgeon grass. Neither bed was present in 2003 surveys.

SAV surveys were conducted around Barren Island during Summer 2002, Spring 2003, and Summer 2003. During the Summer 2002 (September), a qualitative survey described monotypic (containing only one species) beds of widgeon grass. These beds were predominantly located adjacent to the eastern shoreline of the remnants of Barren Island in waters of about 3 feet in depth. Eelgrass (*Zostera marina*) and the macroalgae sea lettuce (*Ulva lactucna)* were also observed washed up on the beach of the northern tip of the northern remnant (MPA, 2003g).

During the Spring 2003 and the Summer 2003 a total of seven transects and three locations within the geotextile tube areas (located along the western shoreline of the Barren Island northern remnant) were surveyed (156 total stations). At each station, a rake throw was performed to collect SAV for identification. During the Spring 2003 survey, there were 113 observations of SAV in all transects, with the exception of the geotextile tube areas (MPA, 2004b) where no SAV

was present. SAV crown densities were highest along the northern and eastern shorelines (MPA, 2004b). During the Summer 2003 survey, there were only 12 observations of SAV. During these observations only horned pondweed was found and it was always located in shallow waters, approximately 0.4 to 2.1 m (1.2 to 6.9 ft) in depth. Dense growths of eelgrass were also observed in shallow salt ponds on the northern end of the northern remnant and southwestern end of the southern remnant (MPA, 2004c). During the Spring 2003 surveys, visual diving surveys revealed that horned pondweed was present in varying densities in most of the shallow water areas surrounding the east, northeast, and southeast areas of the island (MPA, 2004b). Figure 3-11 shows SAV bed crown density found during the Spring 2003 survey.

Annual SAV monitoring by VIMS has shown that SAV beds have made a resurgence since 1999 in the waters on the eastern side of Barren Island. An average of 695 ac of SAV beds was present between 1999 to 2003, peaking at 1,325 ac in 2001. Minimal beds of SAV were found prior to 1999, averaging 1.3 ac between 1994 and 1998. No SAV was documented by the VIMS maps off the western shoreline of Barren where the project would be primarily constructed. However, SAV has been intermittently present along the northern shoreline (VIMS, 2004a). The northern SAV bed has ranged in size from 3 ac in 2003 to 4.9 ac in 1997 to approximately 25 ac in 2001 and 2002. This bed was identified as widgeon grass *(Ruppia maritima)* in 1997 and 2001. The most recent SAV maps of the Barren Island vicinity were generated based on aerial photographs taken on July 26, 2003, and on October 25, 2003 by VIMS. 2003 SAV beds were greatly reduced in size and density compared to 2001 and 2002; and were even smaller than 1999 and 2000 SAV beds. 2003 mapping shows that there are three SAV beds in the vicinity of Barren Island: a SAV bed with 0 to 10 percent cover located along the northern shoreline of Barren Island; a SAV bed with 0 to 10 percent cover located approximately 2,000 ft to the north of Opossum Island; and, a SAV bed with 10 to 40 percent cover located along the southern shoreline of Barren Island and extending for approximately 914.4 m (3,000 ft) along the eastern side of the sand bar that extends southward (MPA, 2005a).

The Chesapeake Bay Program has defined Tier I, II, and III SAV recovery zones. The Tier I SAV distribution restoration target is the restoration of SAV to areas currently or previously inhabited by SAV as mapped through regional and baywide aerial surveys from 1971 through 1990 (Batuik *et al.* 1992; Dennison *et al.* 1993). The Tier II and Tier III distribution restoration targets are the restoration of SAV to all shallow water areas identified as existing or potential SAV habitat, down to the 1- and 2-meter (3.3 and 6.6 feet) depth contours, respectively. Tier 1 areas surround all James Island remnants. Tier I areas have been delineated to the northeast, east, and southeast of Barren Island. Tier II and Tier III zones surround both islands. It is estimated that 298.8 ac of bottom less than 2 m in depth exist within the project footprint at James Island. All of the Barren project area, approximately 92 ac, is less than 2 m in depth.

The summary of the H&H modeling follows:

Results from wave, hydrodynamic, and sediment transport numerical simulation models were analyzed to evaluate the performance of James Island and Barren Island plan view alternatives from engineering assessments. For the James Island alternatives, the wave height reduction was found to be approximately 1-2 ft on the lee of the island, as compared to the existing configuration and future without-project condition, for four severe storms. With respect to current velocity and sediment transport, no major performance differences were found among the alternatives (Alts JI-1 to JI-6). In the absence of protective structures (such as riprap dikes), significant erosion can occur at the southeast corner of the alternative island and at the

south end of the existing island in a hurricane. If a bird island is present at the tidal gut south entrance, erosion under a hurricane was predicted to be greater at the bird island (Point 16) for a narrow tidal channel (Alt JI-3) as compared to a wider tidal channel (Alt JI-6).

Bed erosion of as much as 10 to 20 cm was calculated to occur in the local channel (Points 1 and 12) for all alternatives in a hurricane because of the increased gradients in current velocity. Similarly, channel erosion of 10 to 20 cm can occur at the narrower tidal gut in a hurricane for Alts JI-1 to JI-3 because of increased current magnitude. For all alternative configurations, accretion of 20 to 60 cm was calculated to occur at the tidal gut south entrance (Point 5) under a hurricane as a result of scour of the tidal gut channel and erosion at the south end of the existing island, as well as erosion at the southeast corner of the island alternative. Sediment accumulation at the tidal gut south entrance can be minimized by reducing the erosion at the south end of the existing island and southeast corner of the island alternative with protective structures.

For the Barren Island alternatives, Alts BI-1 and BI-3 have a longer south breakwater and provide the greatest wave height reduction, reaching 2-3 ft in the lee of the island for the four storms evaluated. The future without-project condition results in a 2-4 ft increase in wave height at the mainland nearshore. With respect to current velocity and sediment transport, no significant performance differences were found among the existing configuration and alternatives (Alts BI-1 to BI-6) at locations distant from the site (Points 6 to 13). The influence of the alternatives is localized in the area at and near the south breakwater (Points 1 to 5).

For the four storm conditions, the maximum current velocity at the Honga River Tar Bay entrance (Point 12) was always strong, approximately 3.3 ft/sec, regardless of the existing configuration or future without-project or the island alternatives. As a result, the Honga River Tar Bay entrance usually experiences bed erosion of 10 to 50 cm during severe storms. The predicted erosion is slightly greater for the future with-project condition than for the existing configuration and the alternatives. Alts BI-3 and BI-4, with a low-crest south breakwater, are likely to induce relatively greater current velocities during storms, causing potentially significant temporary erosion at the breakwaters. Segmented breakwaters (Alts BI-5 and BI-6) can create a similar condition with strong current around the segmented breakwater element, causing either sediment deposition or erosion at the structures, depending on the direction of the current. The strong current at the north island cut (Points 14 and 15) in a hurricane can also cause extensive bed erosion or accretion at various locations along and near this cut.

Literature Cited:

Walter J. Dinicola, Edward T. Fulford, Mathew R. Henderson, Nicholas C. Kraus, Lihwa Lin, Ram K. Mohan, Mark Reemts, Ann R. Sherlock, Jane M. Smith, and Oner Yucel. 2006. Mid-Bay Islands Hydrodynamics and Sedimentation Modeling Study, Chesapeake Bay. ERDC/CHL TR-06-X.

Response #30

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

Response: The team prepared a "Simplistic Assessment" as suggested by the EPR reviewers considering sediment resuspension, transport, and deposition, and oyster and SAV requirements to assess construction impacts for both Barren and James Island. The team concluded that there will be no significant turbidity or environmental impacts to the oyster bars or SAV from construction at Barren or James Island. During the development of the Mid-Bay project Federal and State resource were involved in planning and in the assessment of impacts. Their opinions were heeded and their agencies agreed with our findings and decisions regarding the benefits and impacts of the proposed construction. No issues were raised by the assessment to warrant the 3D hydrodynamic and sediment modeling proposed as an additional tool by the EPR reviewers if the simplistic assessment was inconclusive.

The Simplistic Assessments are as follows:

BARREN ISLAND
Given:
1. Distance to SAV and Oyster Bars is approximately 2,500 ft and 2,000 ft, respectively.
2. Construction Technique is mechanical placement and there will be no dredging
3. Time of Year restrictions (1,500 ft during sensitive periods for SAV and Oysters) will apply.
4. Experience level is very high for this application (Poplar Island toe dike and north Barren Island dike construction).

Conclusion:
No significant turbidity or environmental impacts from construction at Barren are likely to result to oyster bars and SAV.

Assumptions:
- Data from the Poplar Island toe dike indicates that sediment would drop out of the water column within 4 hours, prior to it reaching SAV beds and oyster bars (Mid-Bay Report 6-8).
- No dredging will occur at Barren Island.
- Barges will be small and light-loaded from a larger barge moored offshore for Barren construction. Vessel speed will be low.
- Construction will not occur during SAV growing season. It is not known at this time if there will be SAV in breakwater construction area, but SAV surveys performed in

2002 and 2003 did not detect any. Further, SAV surveys by the Virginia Institute of Marine Sciences (VIMS) have not identified any SAV in the breakwater construction area in the last ten years. It is unlikely that SAV would grow in the Phase 2 (9. 5 ac) footprint because of water depths which are deeper than the photic zone (6feet) Phase 1 is the proposed lateral expansion of an existing breakwater. It is possible that some SAV may occur in the 1.1 acre footprint of Phase 1 which is in 4 foot water depths; however none has been identified.

- 1,300 lb armor stone at Barren will be individually placed. Fabric will be placed on bay bottom prior to placement.
- Very little turbidity will occur and will not disperse far (Mid-Bay p 6-8).
- Breakwaters will be in depths of 4 feet to 6 feet. The photic zone is considered to be from the water surface to approximately 6 feet in depth or 2 meters in the bay.
- Breakwaters would occupy 10.6 acres of Bay bottom if both Phase 1 and 2 are built (p 5-2) while construction would protect 1325 acres of SAV habitat (Mid-Bay p 5-3).
- Flow appears to be sufficient to keep leaves clean of sediment as indicated by thriving SAV in the area.
- Sediment resuspension naturally occurs in the area but the creation of stone breakwaters is not expected to add significantly to turbidity and will help to reduce sediment.
- The Poplar Island test toe dike construction was very similar and no adverse consequences resulted.
- Previous Barren Island construction activities have not produced SAV impacts.
- TOY restrictions would be followed.

State and Federal resource agencies were on the Project Delivery Team (PDT) and provided expertise. (NOAA, USFWS, NMFS, USGS, Maryland Department of Natural Resources (MDDNR) Maryland Department of the Environment (MDE), Maryland Geological Survey (MGS), University of Maryland, and University of Virginia.)

JAMES ISLAND

Given:

1. Distance to SAV and Oyster Bars is approximately 1,750 to 2,000 ft, and 500 to 1,000 ft, respectively.
2. Construction Technique. Dredging will occur for the access channel which is 12,720 feet in length. Of the total length, 3, 070 would be within the diked foot print of the project. All dredging for dike construction material will be within the footprint. (Mid-Bay p.5-1). Stone will be mechanically placed over sand cored cloth covered dikes.
3. Time of Year restrictions apply (1,500 ft. during sensitive periods for SAV and Oysters).
4. Experience level is very high for this application (Construction of 1,140 acre Poplar Island and approximately 6 miles of dikes).

Conclusion:

No significant turbidity or environmental impacts from construction at Barren are likely to result to oyster bars and SAV.

Assumptions:

- Data from the Poplar Island toe dike indicates that sediment would drop out of the water column within 4 hours, prior to it reaching SAV beds and oyster bars (Mid-Bay Report 6-8).
- Construction will not occur during SAV growing season.
- Turbidity will not disperse far (Mid-Bay p.6-8).
- TOY restrictions would be followed.

State and Federal resource agencies were on the Project Delivery Team (PDT) and provided expertise. (NOAA, USFWS, NMFS, USGS, Maryland Department of Natural Resources (MDDNR) Maryland Department of the Environment (MDE), Maryland Geological Survey (MGS), University of Maryland, and University of Virginia.)

Other Significant Factors to Consider:

1. The Poplar Island Restoration Project has been under construction since 1999. This project is very similar and no significant adverse consequences have resulted.
2. Poplar Island construction has not produced negative impacts to nearby SAV and oysters.
3. Time of Year (TOY) restrictions will apply to protect SAV and oysters during sensitive periods.