APPENDIX B

PLAN FORMULATION PROCESS

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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 MEC;
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	MEC	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	MEC	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	MEC	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	MEC	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	MEC	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.

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

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 MEC (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 MEC	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 MEC	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 MEC	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/MEC 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).

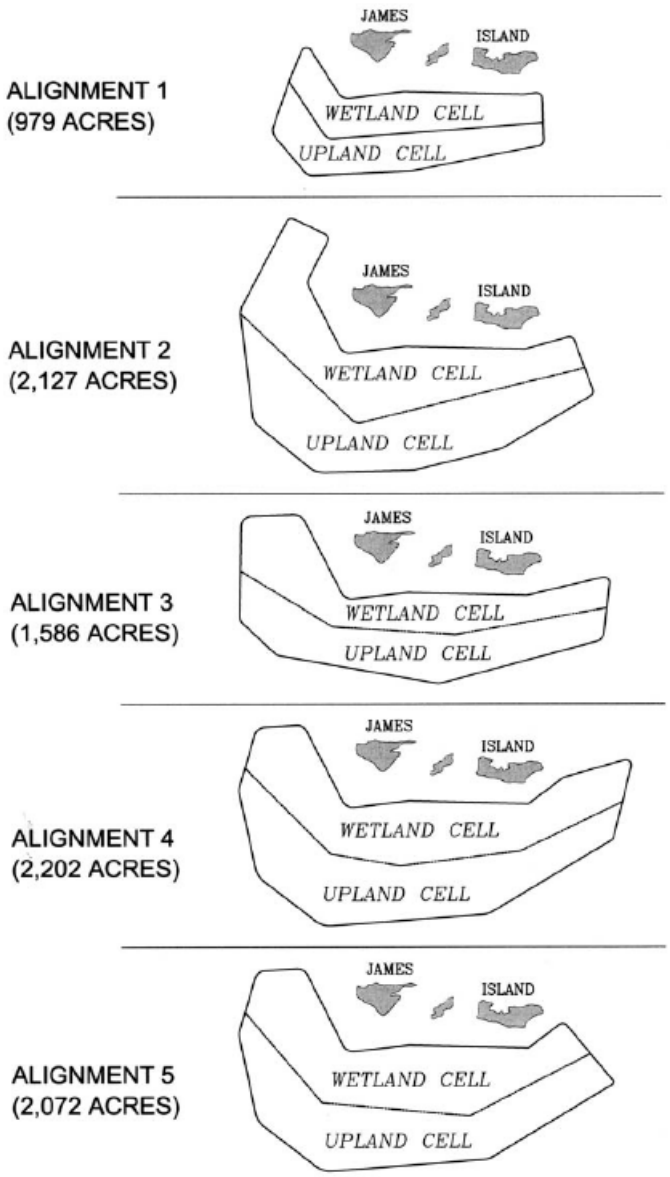


Figure B-1. Proposed Reconnaissance Level Alignments for James

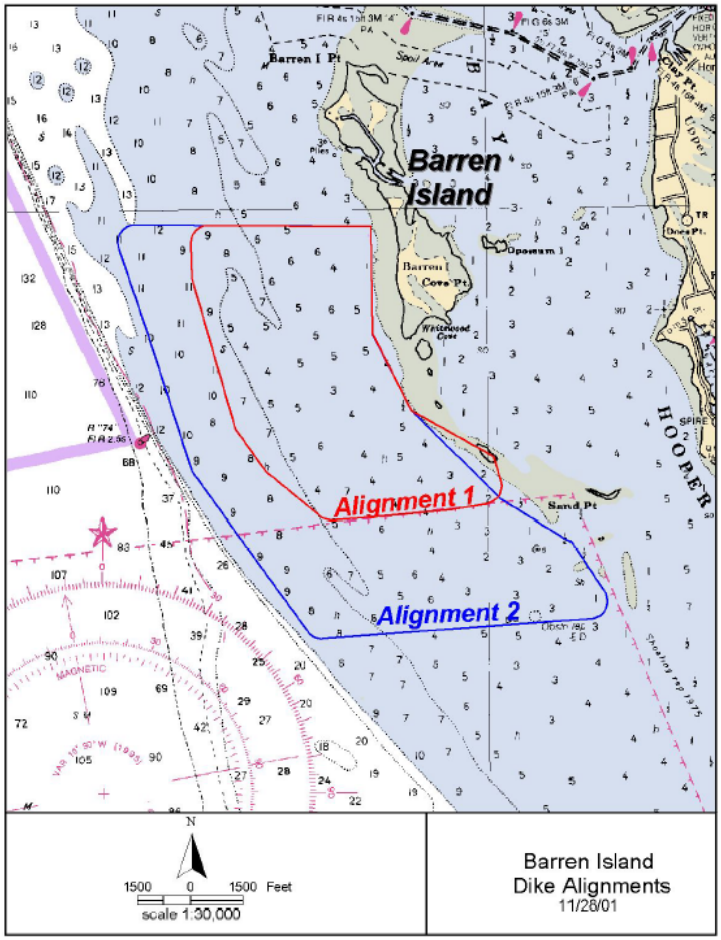


Figure B-2: Proposed Reconnaissance Level Alignments for Barren.

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).

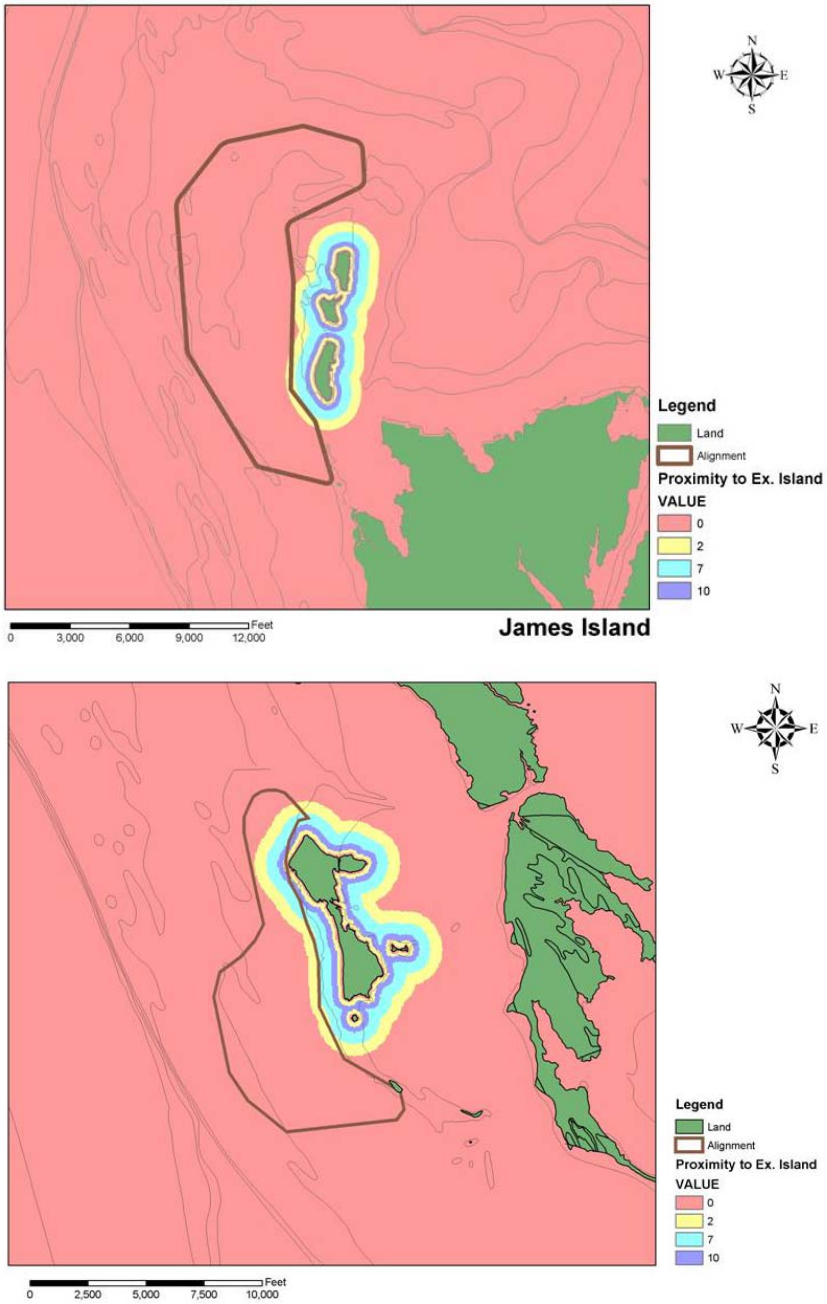


Figure B-3. Proximity of James (top) and Barren (bottom) Islands to Existing Island Remnants

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)*.

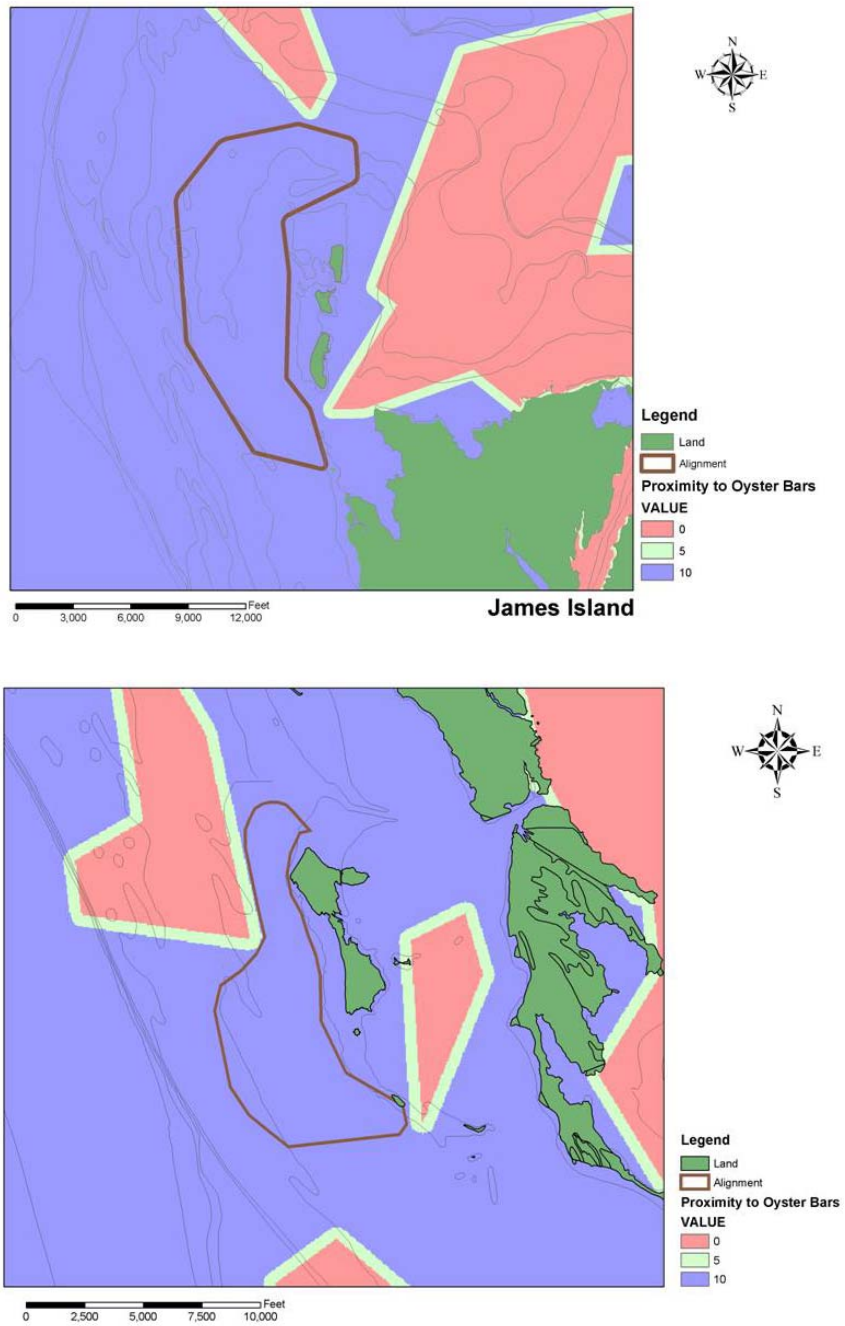
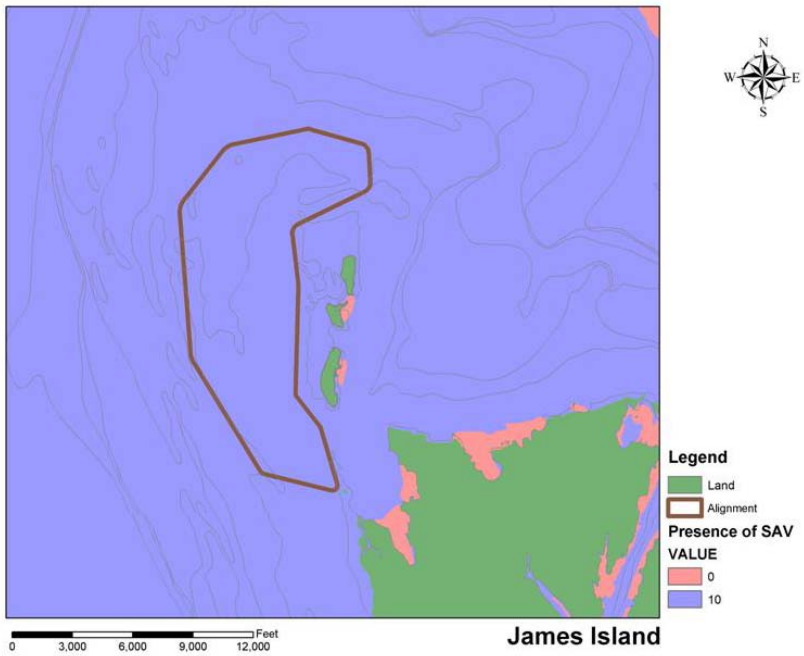


Figure B-4. Proximity of James (top) and Barren (bottom) Islands to Natural Oyster Bars (NOBs)

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)*



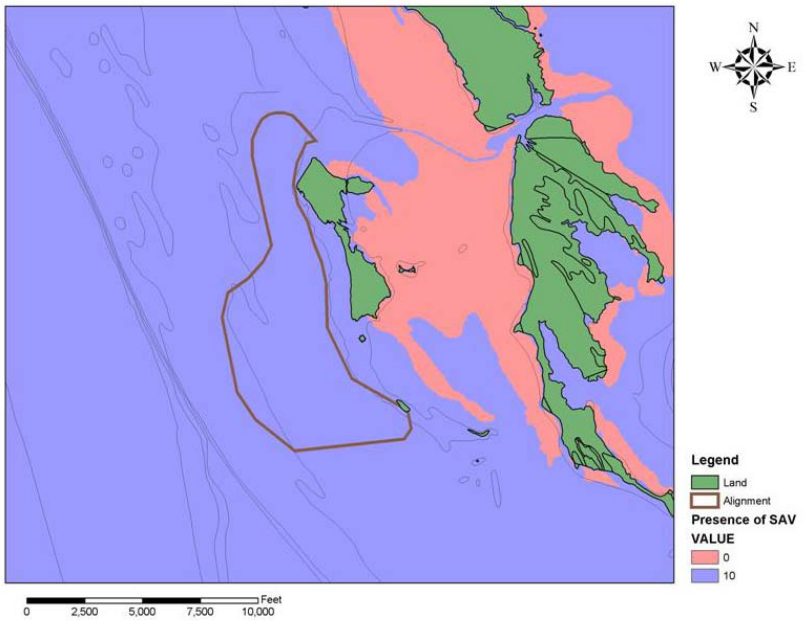
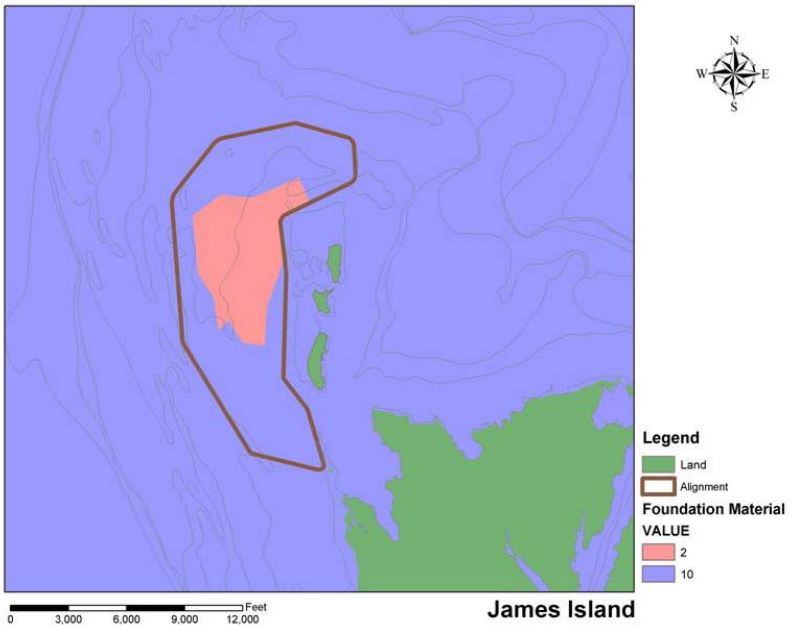


Figure B-5. Submerged Aquatic Vegetation (SAV) near James (top) and Barren (bottom) Islands

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)*



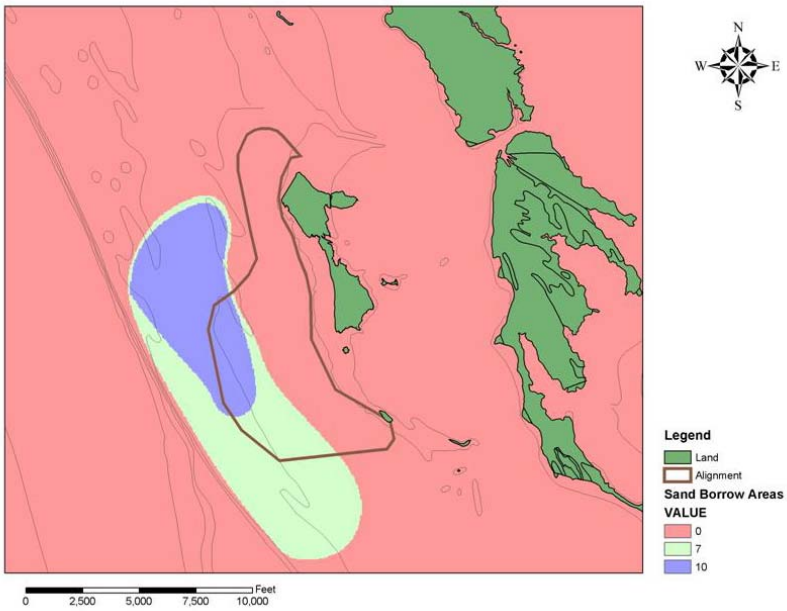


Figure B-6. Suitability of Foundation Material in the Vicinity of James (top) and Barren (bottom) Islands

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)

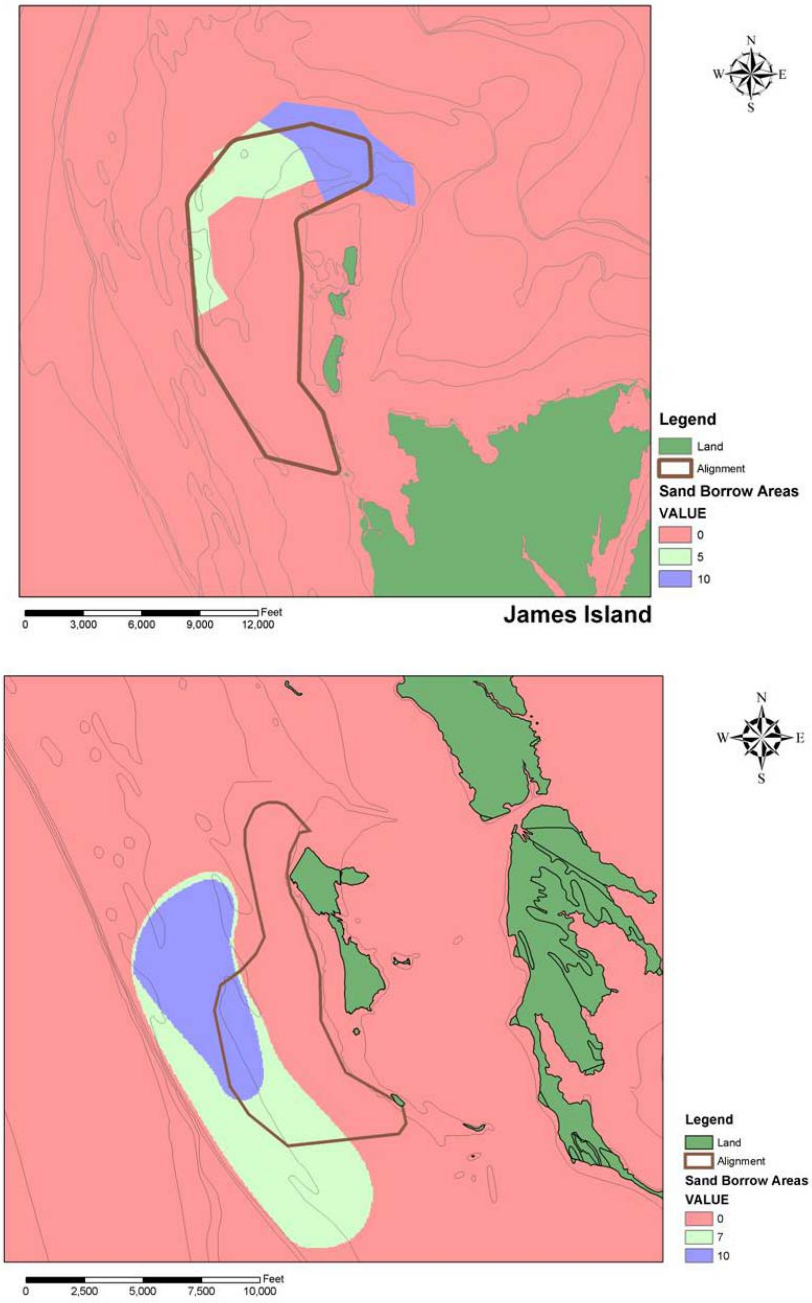


Figure B-7. Potential Sand Borrow Areas in the Vicinity of James (top) and Barren (bottom) Islands

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)*

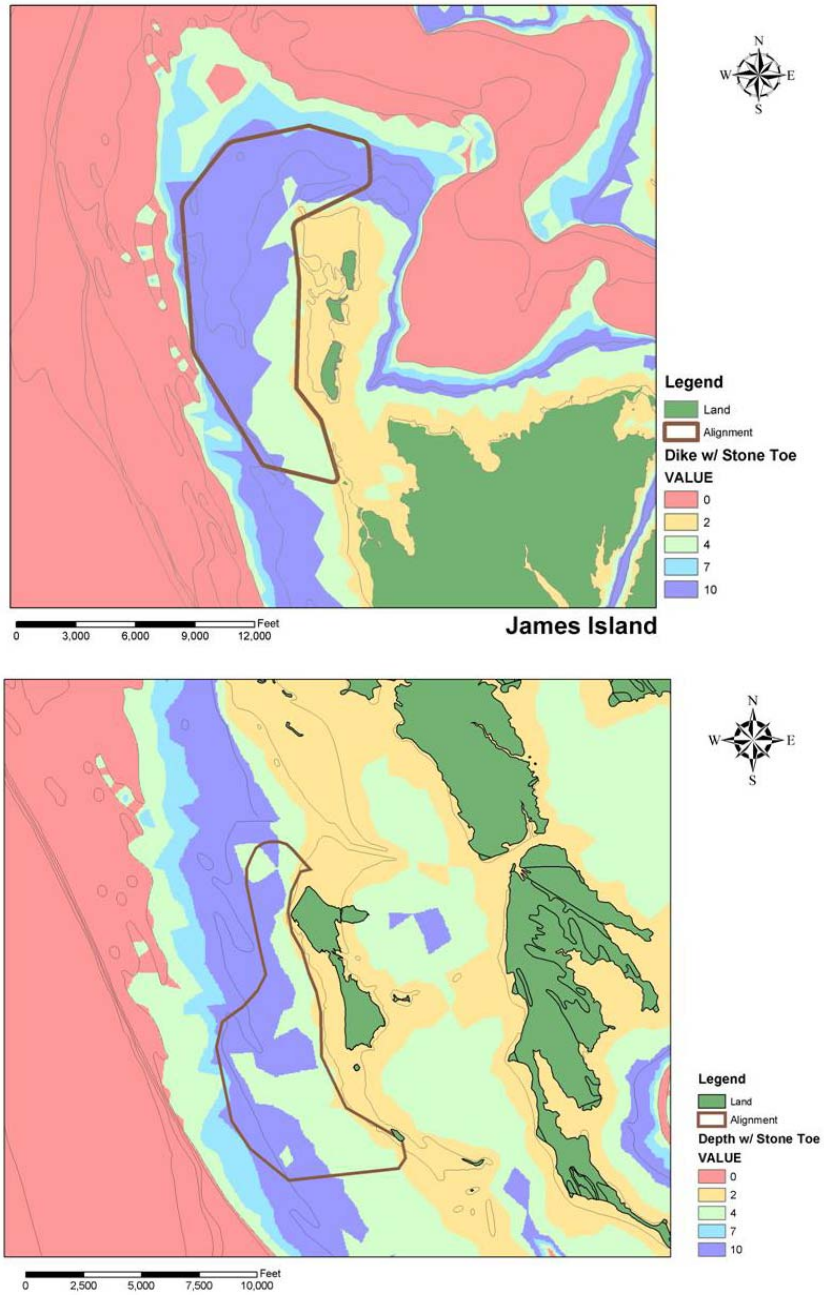
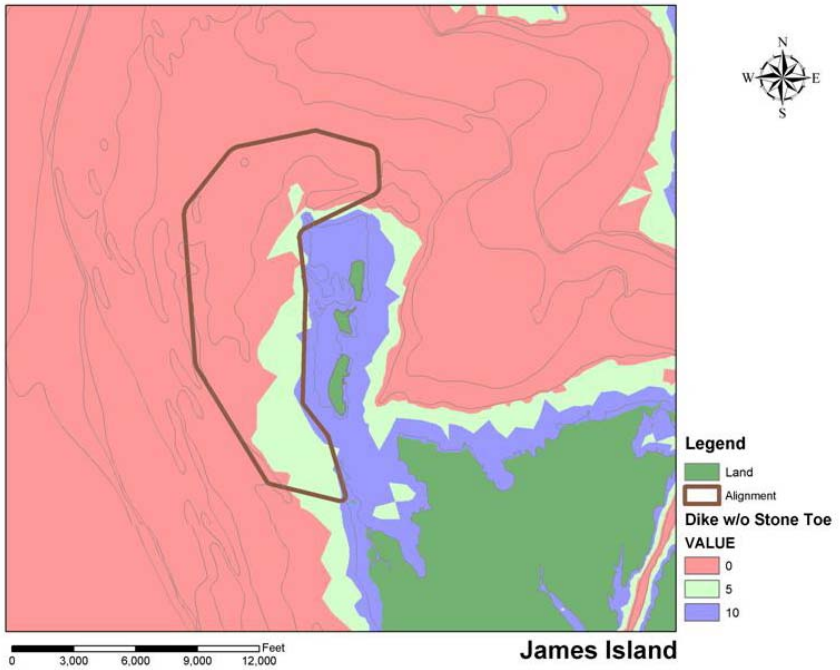


Figure B-8. Constructability of Perimeter Dike with a Toe Dike of James (top) and Barren (bottom) Islands

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)*



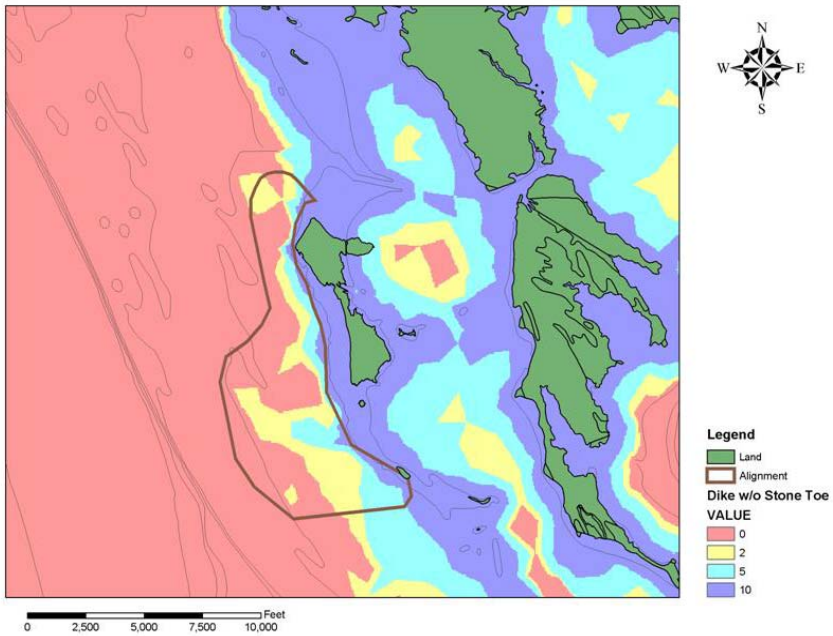


Figure B-9. Constructability of Perimeter Dike without a Toe Dike of James (top) and Barren (bottom) Islands

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)*

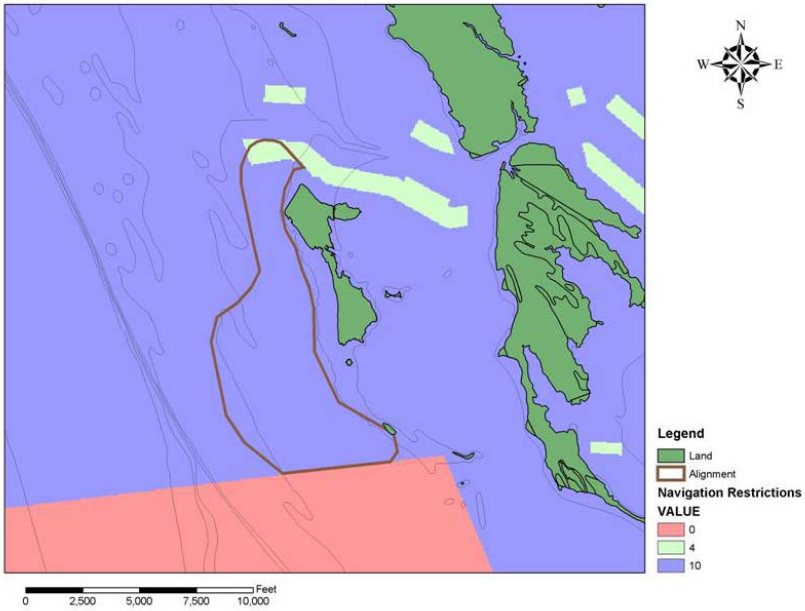


Figure B-10. Navigation Restrictions in the Vicinity of James (top) and Barren (bottom) Islands

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)*

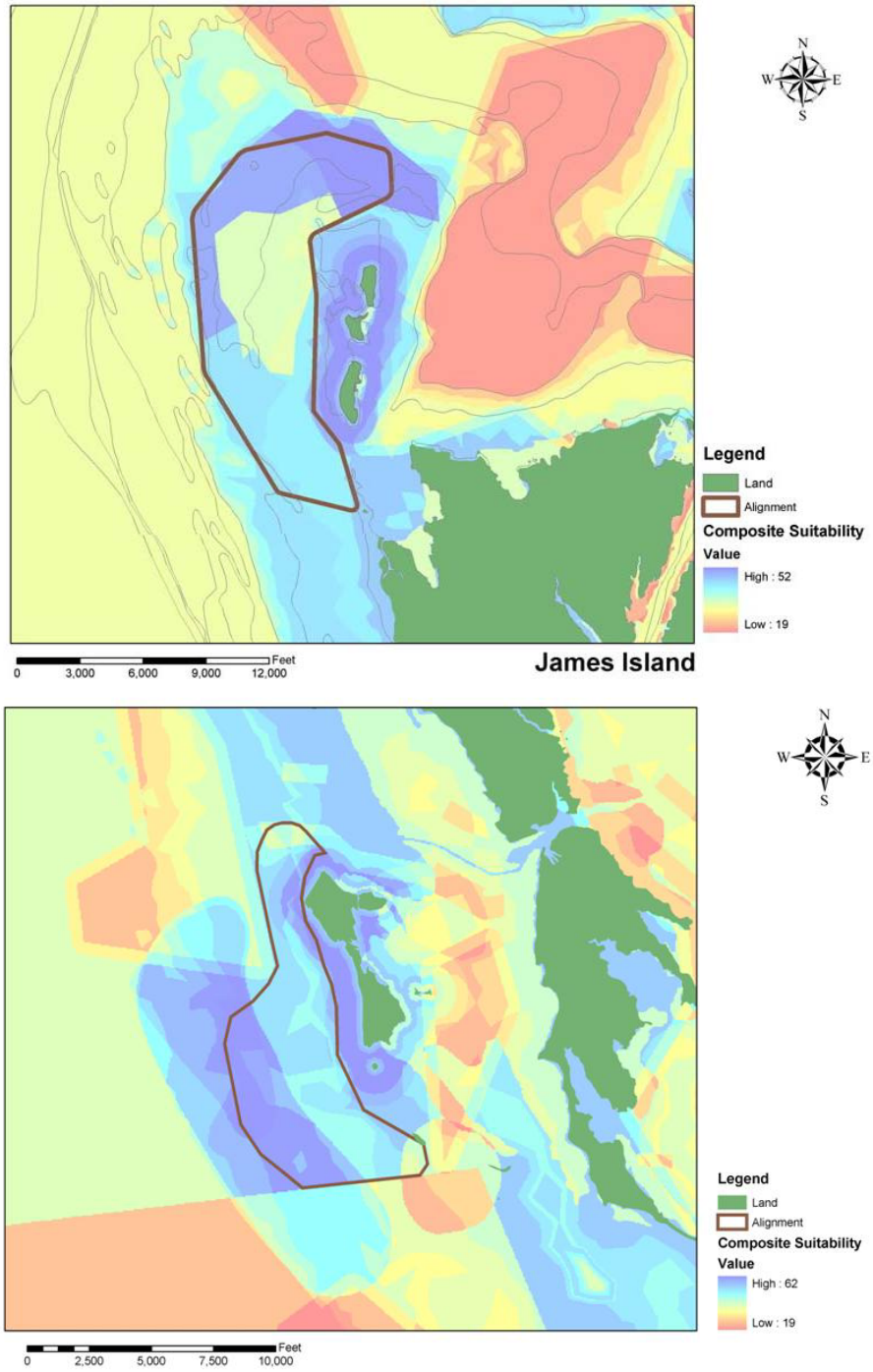


Figure B-11. Composite Suitability for Potential James (top) and Barren (bottom) Islands Restoration Alignments

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.

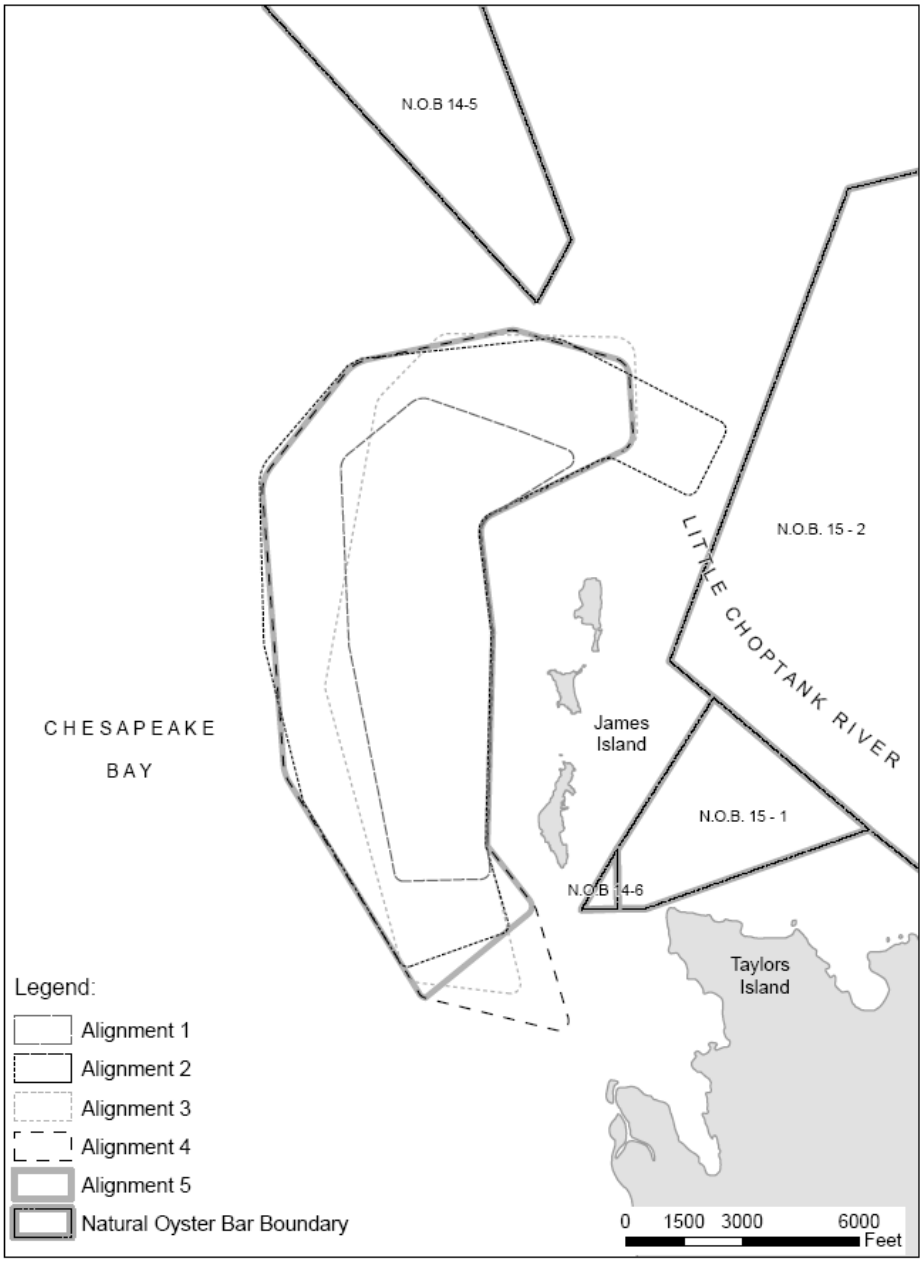


Figure B-12. James Island - Proposed Alignments

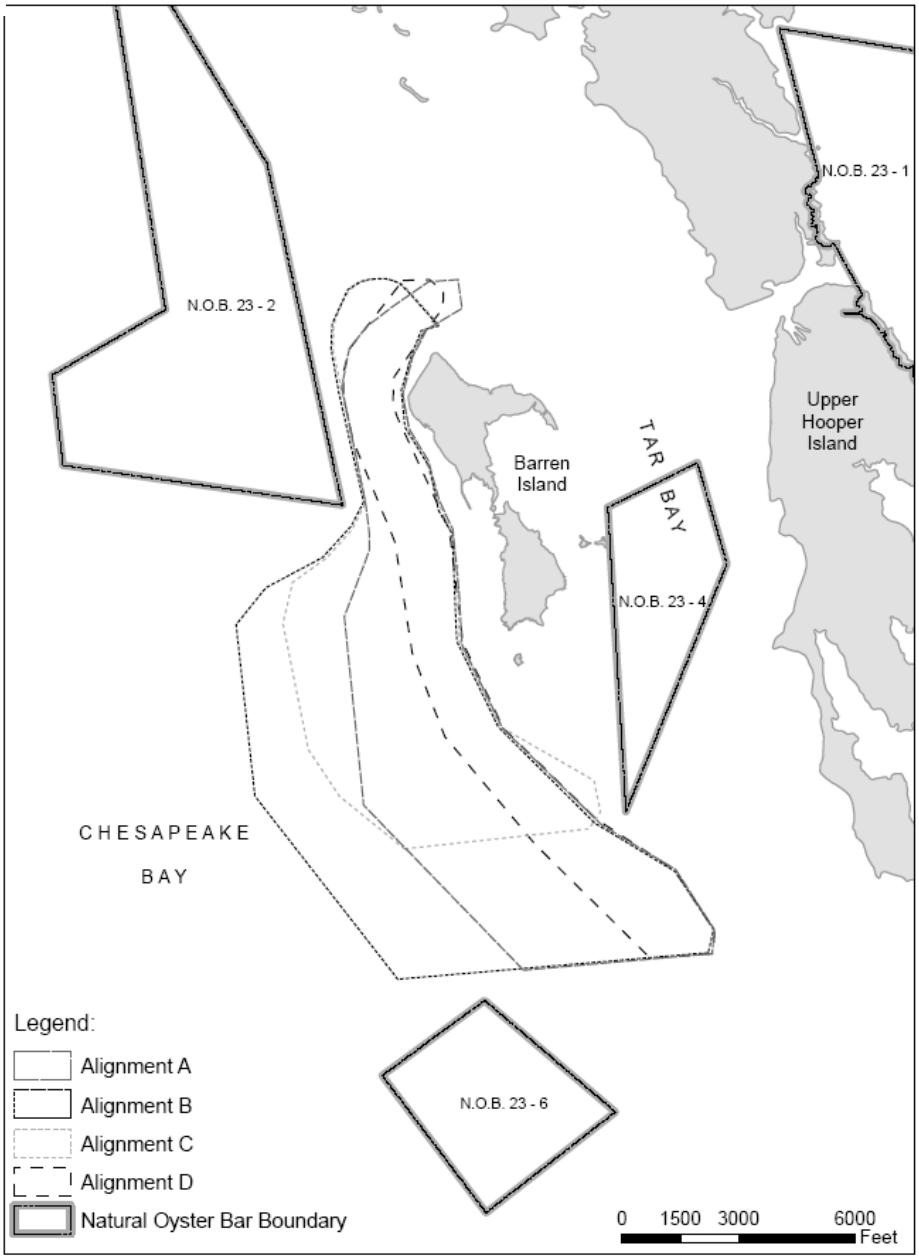


Figure B-13. Barren Island - Proposed Alignments

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	10 years
Intertidal (mudflats) (maintained as unvegetated)	10 years
Benthic invertebrate communities	10 years

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:

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

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 dwarf surf clam abundance criteria met.
colonial nesting waterbirds	12		0	
raptors	2		0	
shorebirds	14		0	
Reptile/herpetofauna	2	2	0	
benthic invertebrates	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 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		0.25	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	
reptile/herpetofauna	2	2	0	
benthic invertebrates	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

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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.

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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 following 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 following 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 size; 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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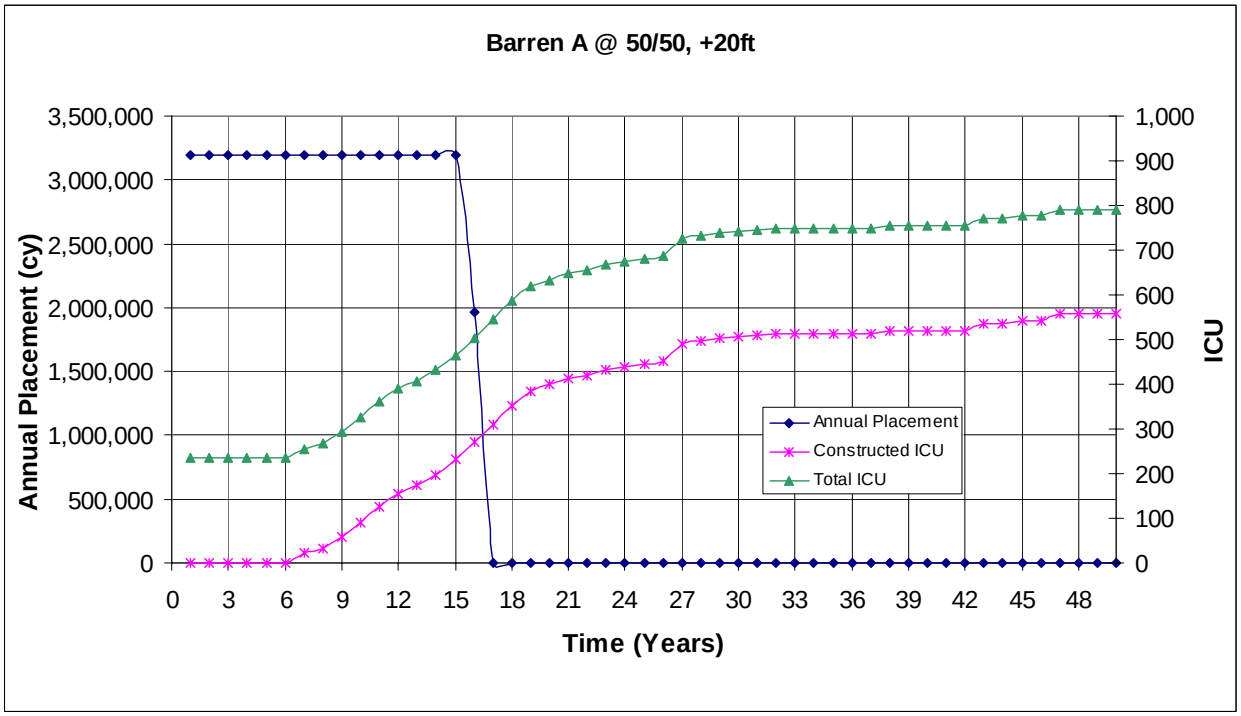

Figure B-10: ICU and Dredged Material Placement Analysis for Barren Island Alignment A Alternative (50% upland, 50% wetland, dike height +20 ft MLLW)

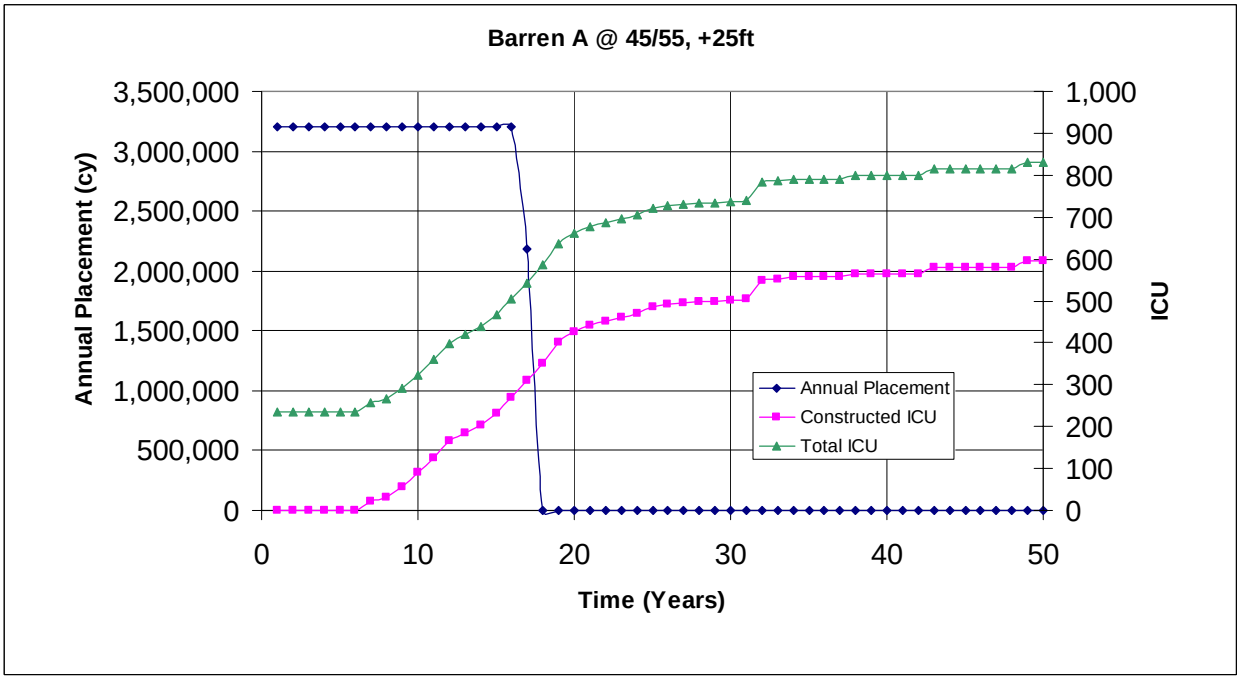

Figure B-11: ICU and Dredged Material Placement Analysis for Barren Island Alignment A Alternative (45% upland, 55% wetland, dike height +25 ft MLLW)

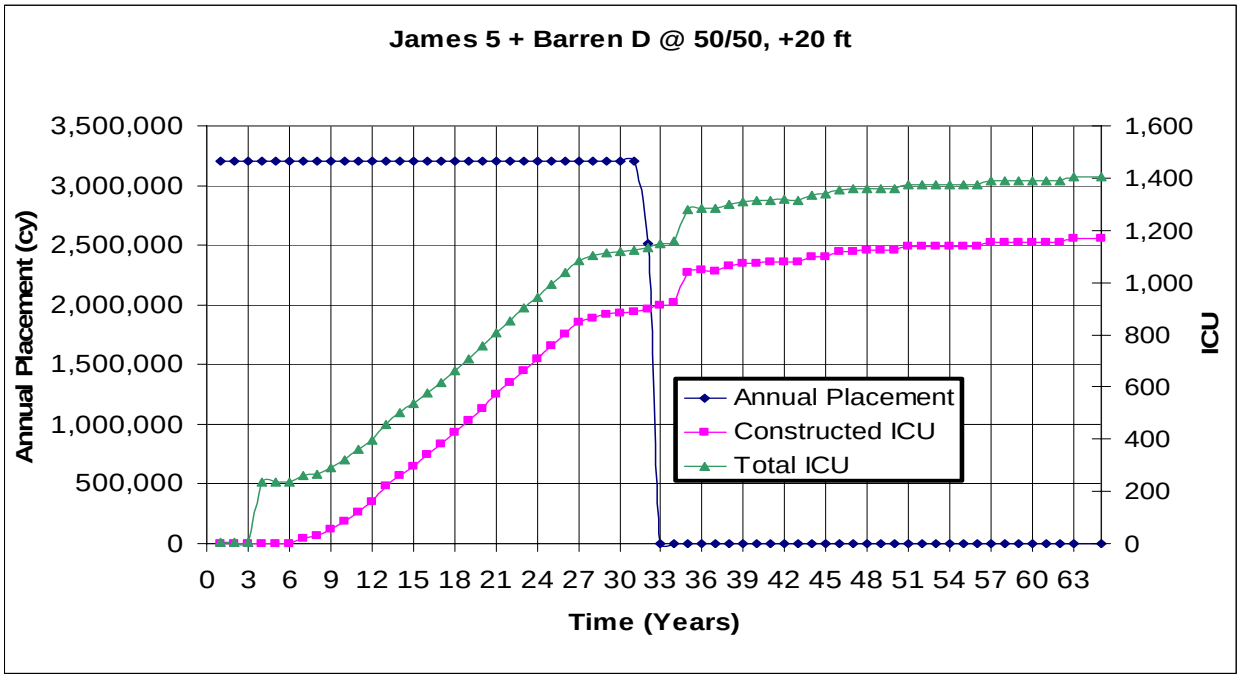

Figure B-12: ICU and Dredged Material Placement Analysis for James Alignment 5 plus Barren Alignment D Alternative (50% upland, 50% wetland, dike height +20 ft MLLW)

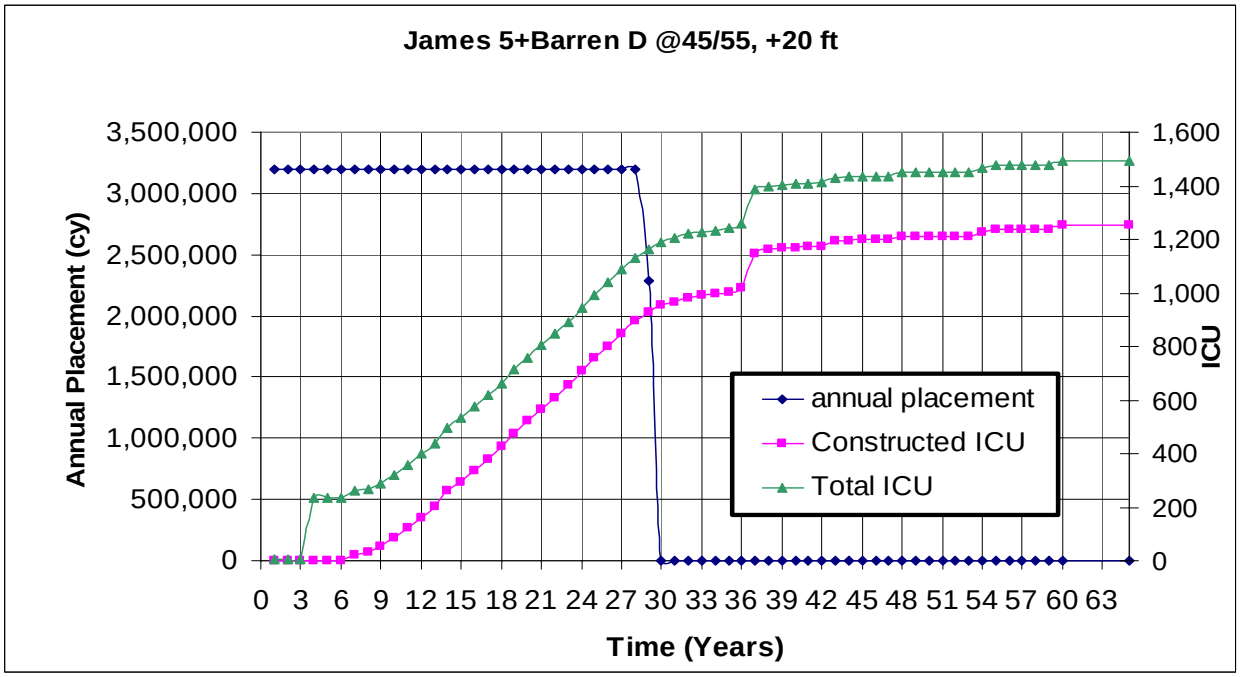

Figure B-13: ICU and Dredged Material Placement Analysis for James Alignment 5 plus Barren Alignment D Alternative (45 % upland, 55% wetland, dike height +20 ft MLLW)

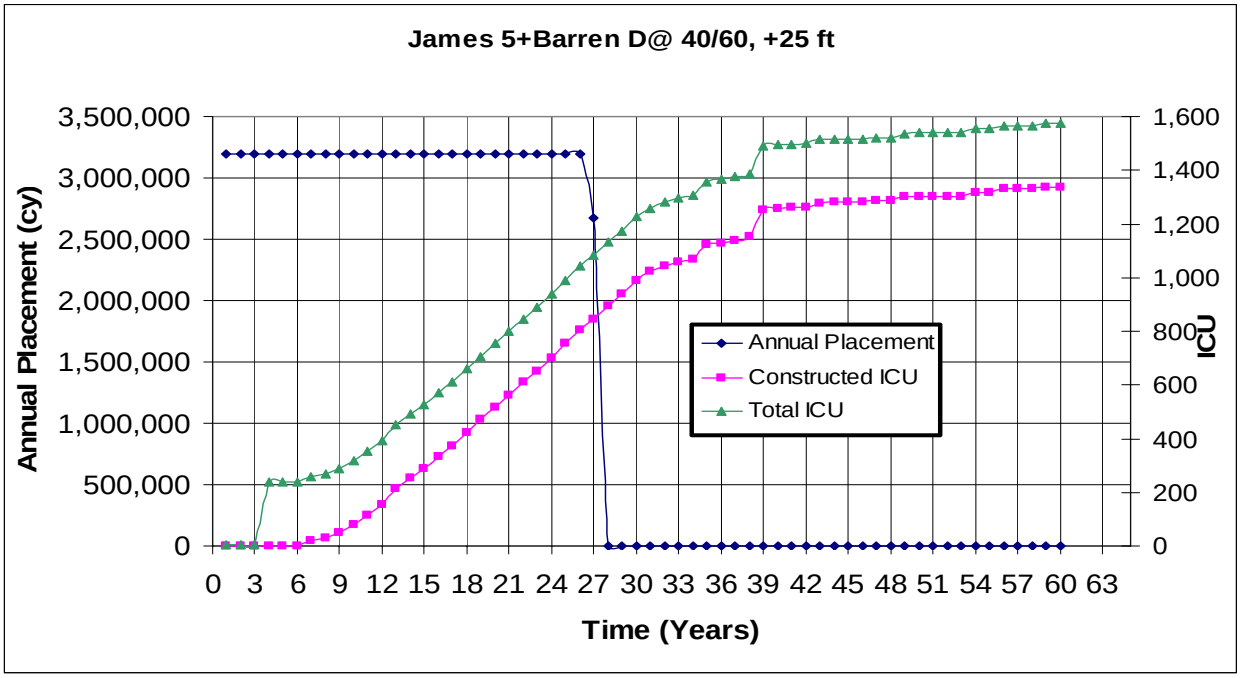

Figure B-14: ICU and Dredged Material Placement Analysis for James Alignment 5 plus Barren Island D Alternative (40 % upland, 60% wetland, dike height +25 ft MLLW)

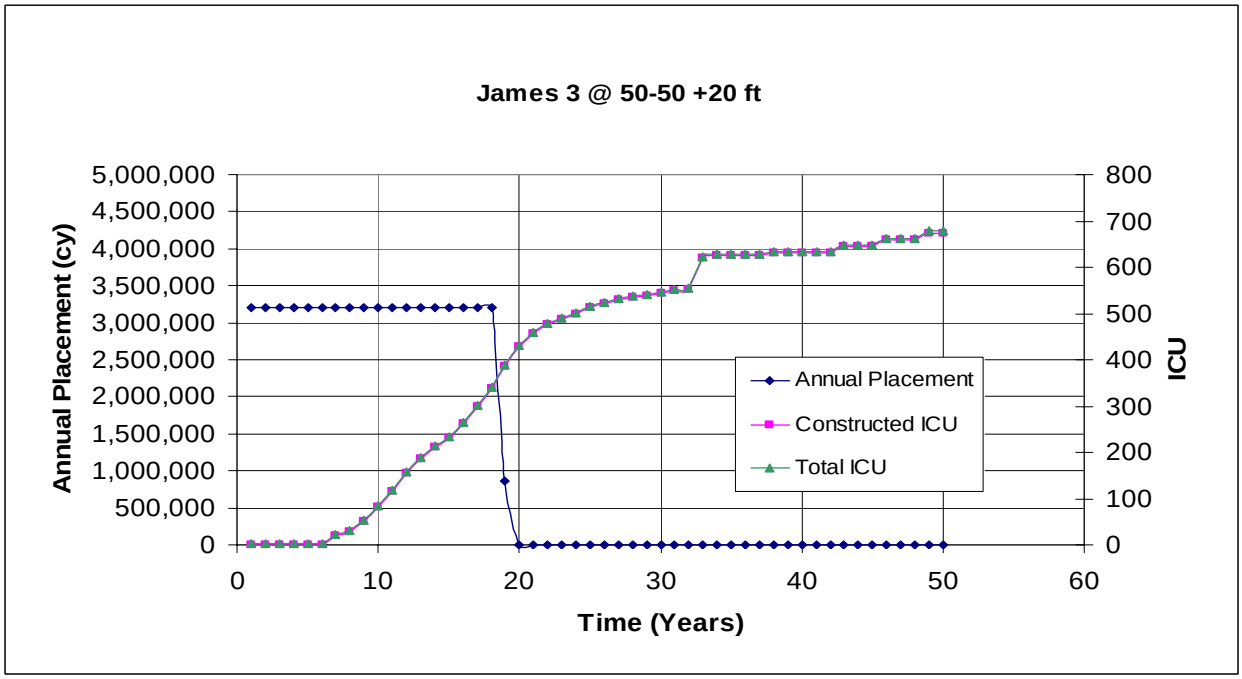

Figure B-15: ICU and Dredged Material Placement Analysis for James Alignment 3 Alternative (50 % upland, 50% wetland, dike height +20ft MLLW)

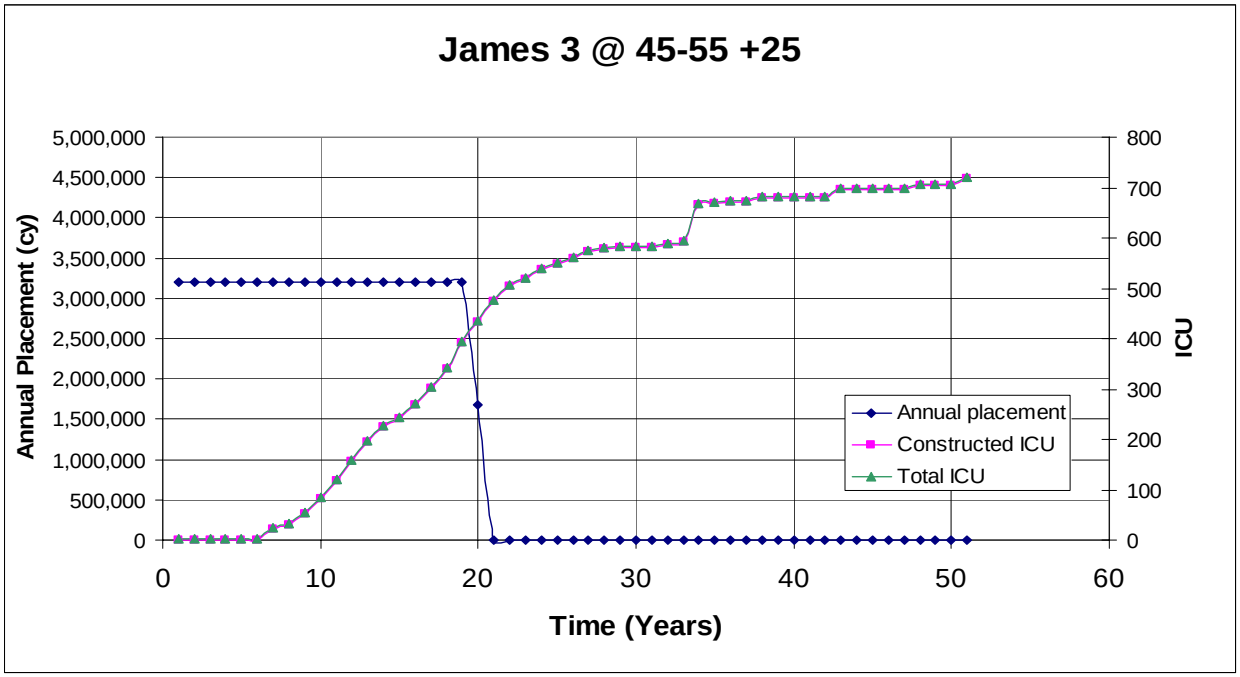

Figure B-16: ICU and Dredged Material Placement Analysis for James Alignment 3 Alternative (45% upland, 55% wetland, dike height + 25 ft MLLW)

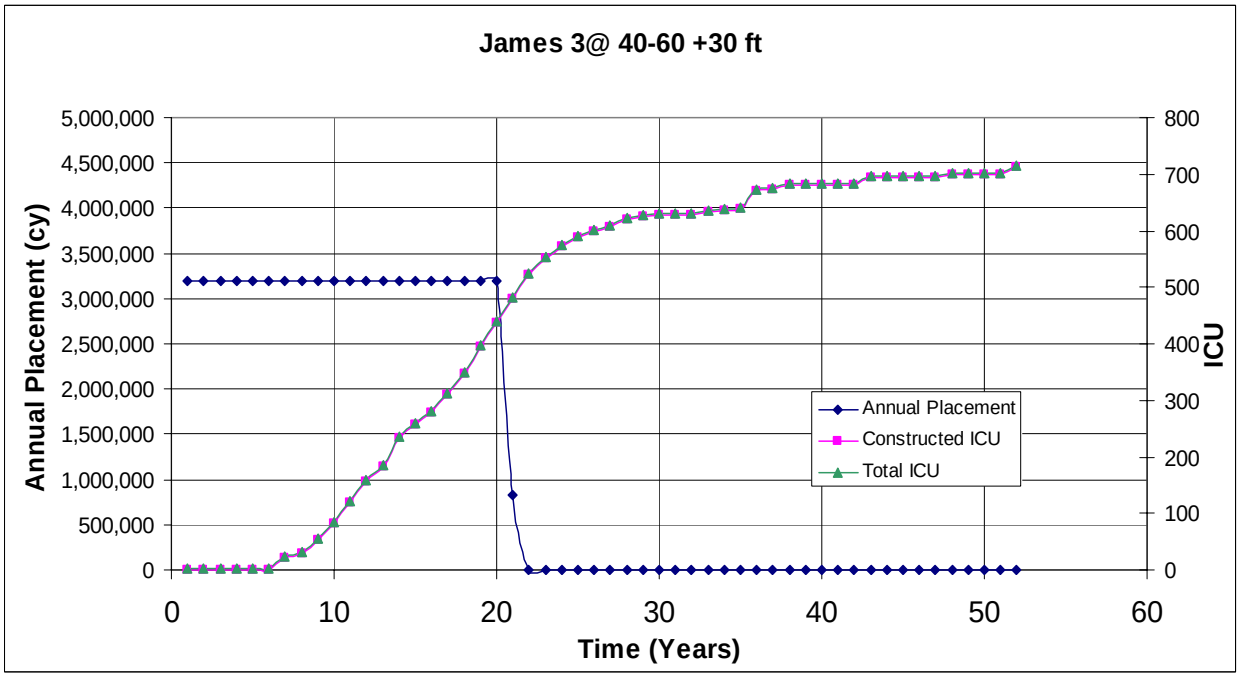

Figure B-17: ICU and Dredged Material Placement Analysis for James Alignment 3 Alternative (40 % upland, 60% wetland, dike height+30ft MLLW)

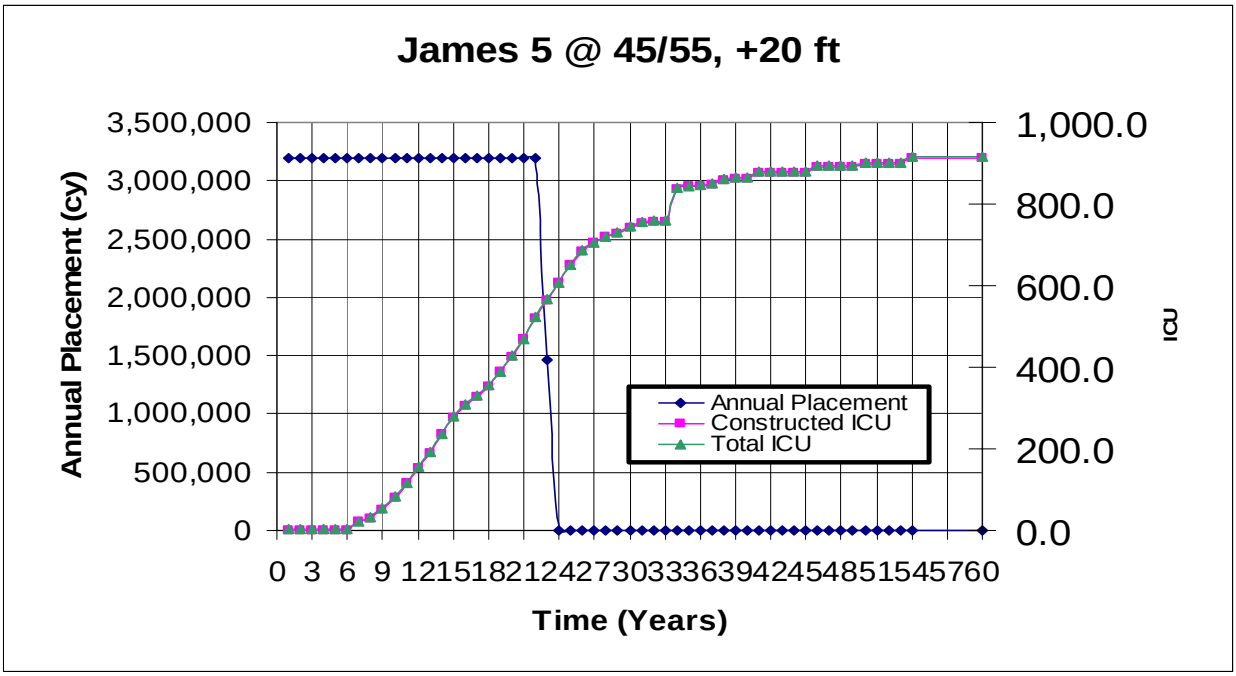

Figure B-18: ICU and Dredged Material Placement Analysis for James Alignment 5 Alternative (45% upland, 55% wetland, dike height +20 ft MLLW)

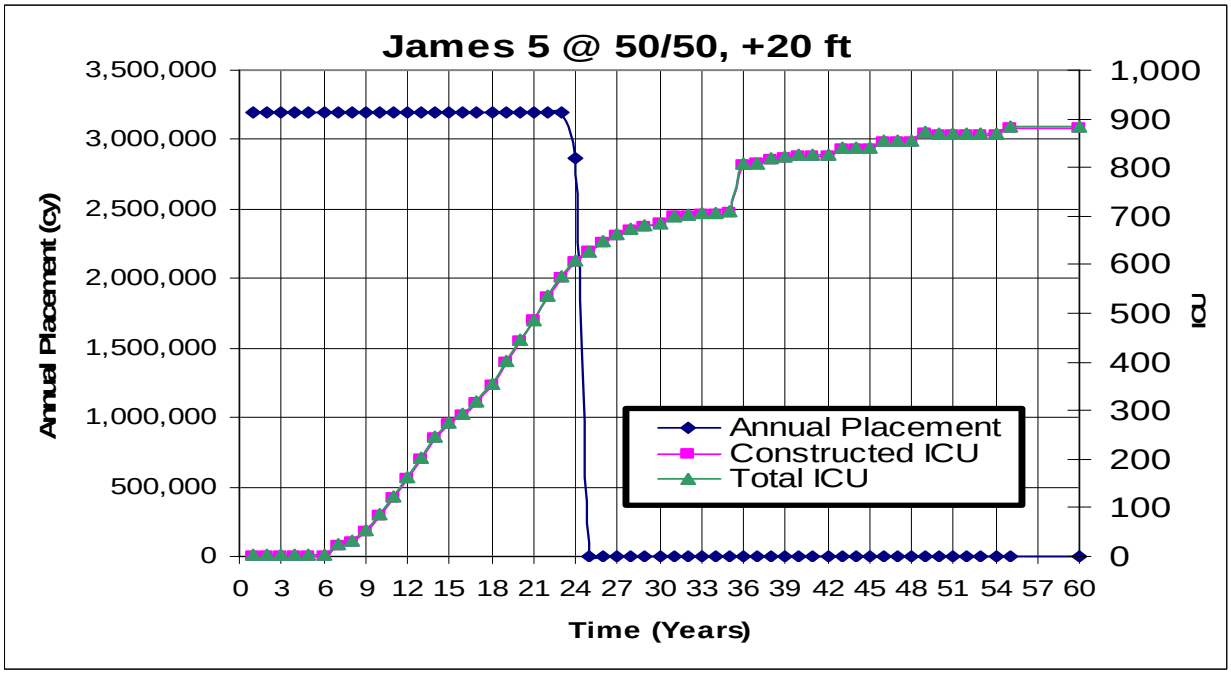

Figure B-19: ICU and Dredged Material Placement Analysis for James Alignment 5 Alternative (50 % upland, 50% wetland, dike height+20 ft MLLW)

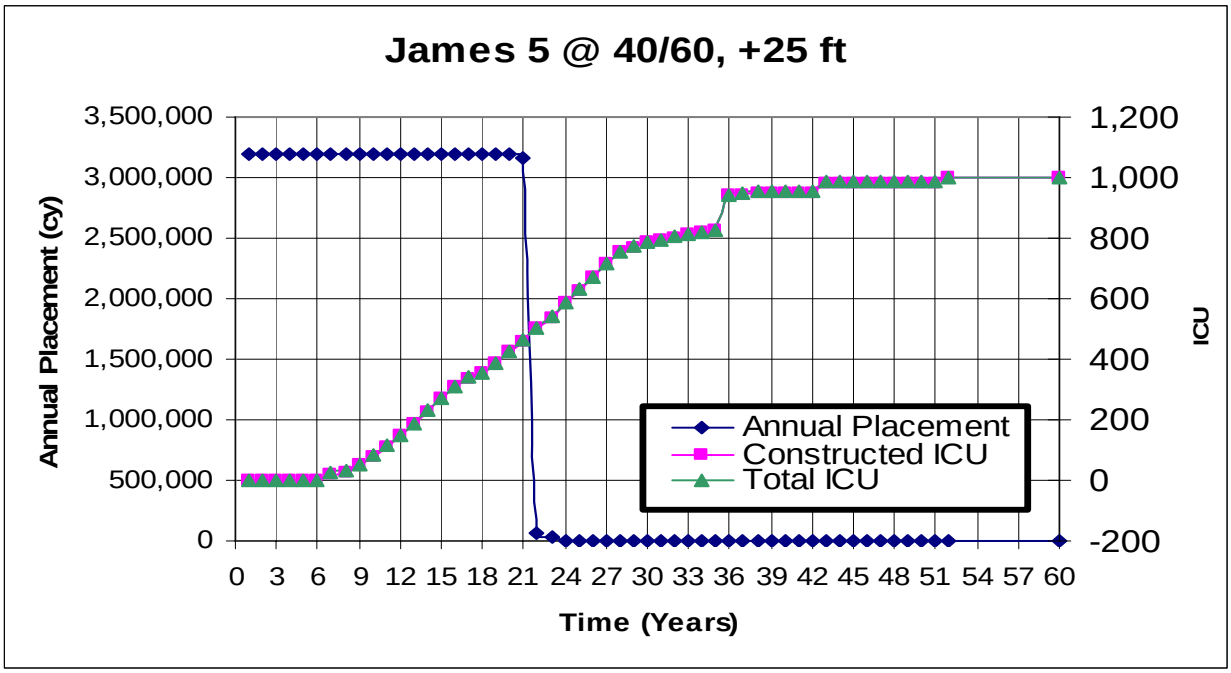

Figure B-20: ICU and Dredged Material Placement Analysis for James Alignment 5 Alternative (40 % upland, 60% wetland, dike height +25 ft MLLW)

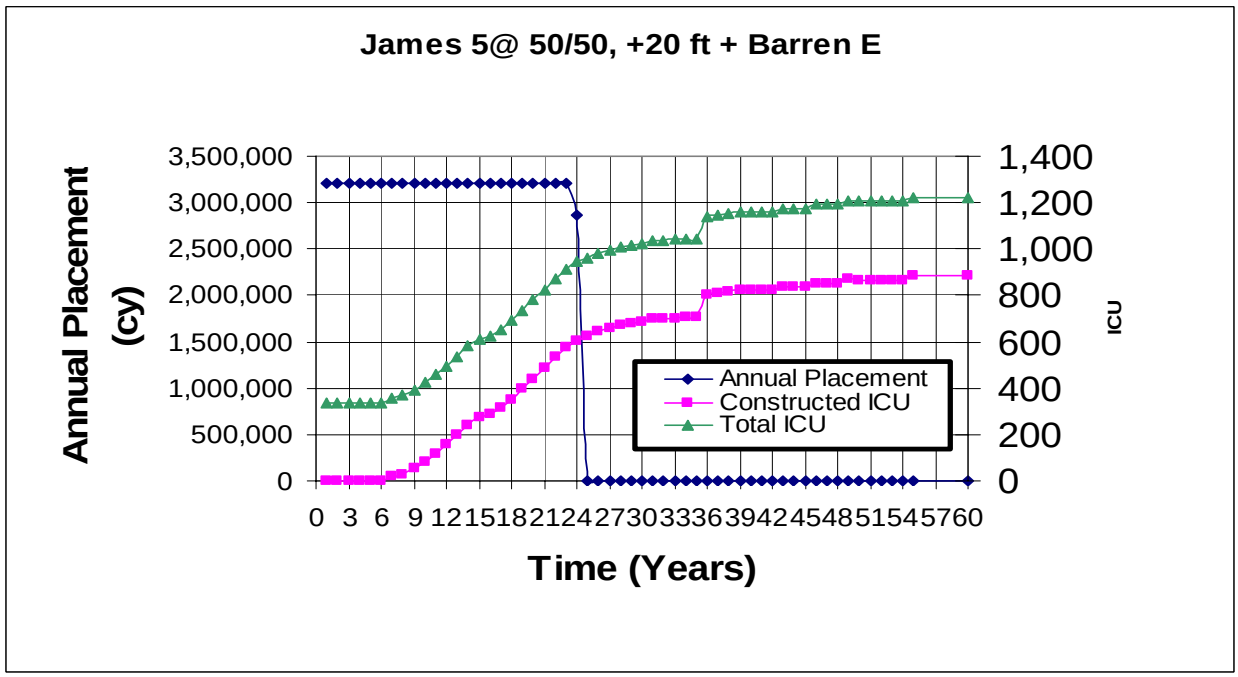

Figure B-21: ICU and Dredged Material Placement Analysis for James Alignment 5 plus Barren Alignment E Alternative (50 % upland, 50% wetland, dike height +20 ft MLLW)

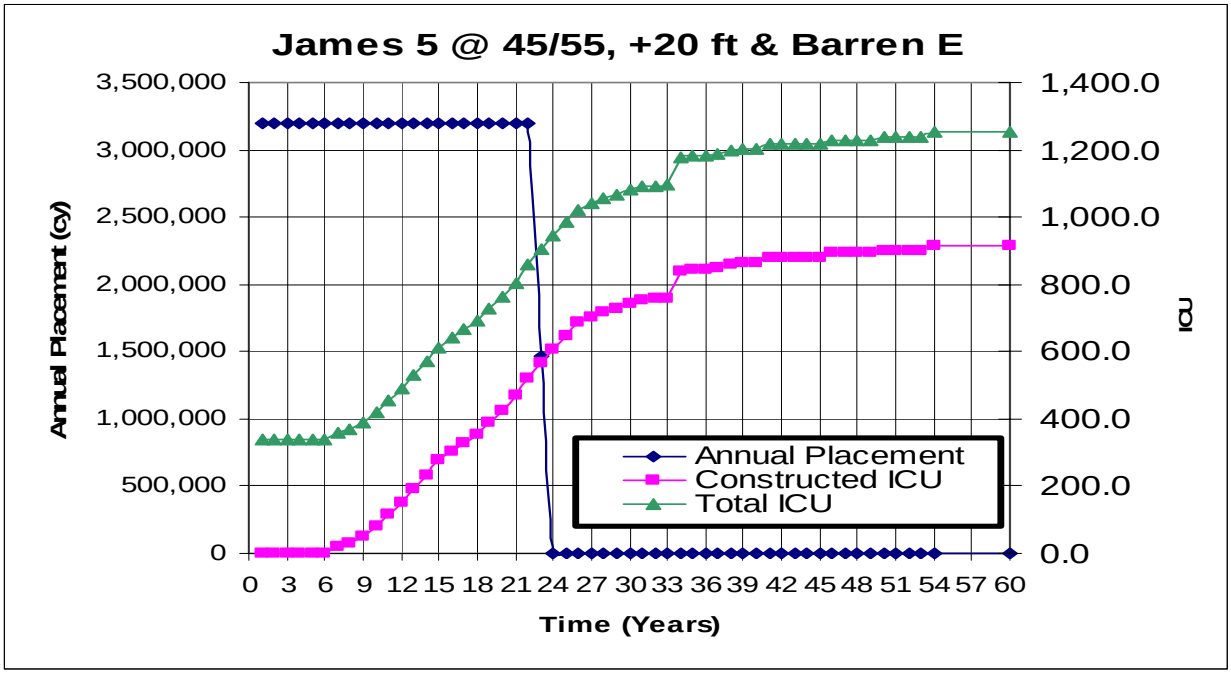

Figure B-22: ICU and Dredged Material Placement Analysis for James Alignment 5 plus Barren Alignment E (45% upland, 55% wetland, dike height +20 ft MLLW)

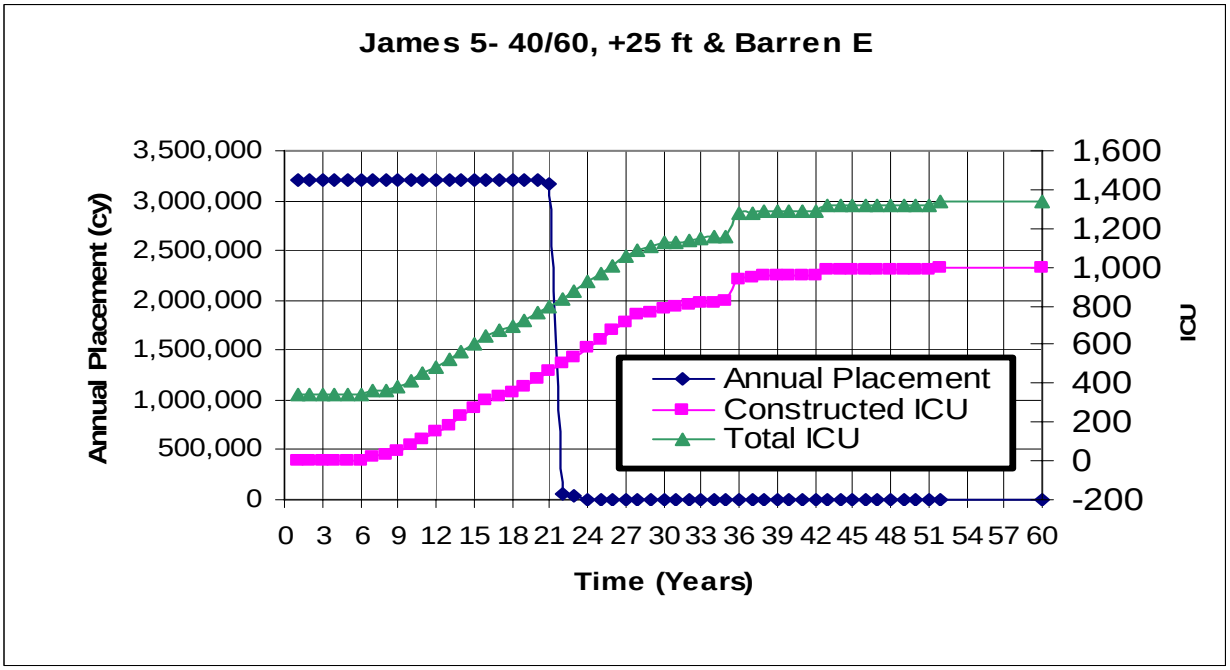

Figure B-23: ICU and Dredged Material Placement Analysis for James Alignment 5 plus Barren Alignment E (40% upland, 60% wetland, dike height +25 ft MLLW)

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	10	11	12	13
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	1,188,363	1,404,866	1,796,477	1,688,886
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**	23.6	24.2
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	16.1	**18.1**	18.9	19.7
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	14.0	16.1	**18.1**	18.9
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	14.0	16.1	**18.1**	18.9
W-5	35.625	32.6	368,127	**525,896**		0	0	368,127	110,438	33,131	14,199	Grade	Plant	**0.5**	7.3	14.0	16.1	**18.1**
W-6	35.625	32.6	368,127	**525,896**		0	0	368,127	110,438	33,131	14,199	Grade	Plant	**0.5**	7.3	14.0	16.1	**18.1**
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**	7.3	14.0	16.1
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**	7.3	14.0	16.1
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**	7.3	14.0
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**	7.3	14.0
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**	7.3
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**	7.3
W-13	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
W-14	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
W-15	35.625	32.6	368,127	**525,896**		0	0	0	0	0	0	0	0	0	368,127	110,438	33,131	14,199
W-16	35.625	32.6	368,127	**525,896**		0	0	0	0	0	0	0	0	0	368,127	110,438	33,131	14,199
W-17	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
W-18	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
W-19	35.625	32.6	368,127	**525,896**		0	0	0	0	0	0	0	0	0	0	0	262,948	131,474
W-20	35.625	32.6	368,127	**525,896**		0	0	0	0	0	0	0	0	0	0	0	262,948	131,474
W-21	35.625	32.6	368,127	**525,896**		0	0	0	0	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	0	0	0	0
W-23	35.625	32.6	368,127	**525,896**		0	0	0	0	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	0	0	0	0
W-25	35.625	32.6	368,127	**525,896**		0	0	0	0	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	0	0	0	0
W-27	35.625	32.6	368,127	**525,896**		0	0	0	0	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	0	0	0	0
W-29	35.625	32.6	368,127	**525,896**		0	0	0	0	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	0	0	0	0
W-31	35.625	32.6	368,127	**525,896**		0	0	0	0	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	0	0	0	0
Barren Island D																		
Upland	171	156	6,058,325	**8,654,750**								500,000	400,000	400,000	500,000	500,000	400,000	400,000
W-1	36.64	33.5	270,462	**386,374**								270,462	81,139	24,342	10,432	Grade	Plant	**20.9**
W-2	36.64	33.5	270,462	**386,374**								270,462	81,139	24,342	10,432	Grade	Plant	**0.5**
W-3	36.64	33.5	270,462	**386,374**								0	0	270,462	81,139	24,342	10,432	Grade
W-4	36.64	33.5	270,462	**386,374**								0	0	270,462	81,139	24,342	10,432	Grade
W-5	36.64	33.5	270,462	**386,374**								0	0	0	0	270,462	81,139	24,342
W-6	36.64	33.5	270,462	**386,374**								0	0	0	0	270,462	81,139	24,342
W-7	36.64	33.5	270,462	**386,374**								0	0	0	0	0	0	270,462
W-8	36.64	33.5	270,462	**386,374**								0	0	0	0	193,187	96,594	48,297
W-9	36.64	33.5	270,462	**386,374**								0	0	0	0	0	0	193,187
W-10	36.64	33.5	270,462	**386,374**								0	0	0	0	0	0	193,187
W-11	36.64	33.5	270,462	**386,374**								0	0	0	0	0	0	0
W-12	36.64	33.5	270,462	**386,374**								0	0	0	0	0	0	0
W-13	36.64	33.5	270,462	**386,374**								0	0	0	0	0	0	0
W-14	36.64	33.5	270,462	**386,374**								0	0	0	0	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	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	3200000	3200000	3200000	3200000
constructed ICU					0	0	0	0	0	0	0	21	29	51.1	81.9	116.7	154.3	213.9
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
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	319.2	354.0	391.6	451.2

Cell No.	14	15	16	17	18	19	20	21	22	23	24	25	26	27
James Island 5					James Island									
Upland	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	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	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	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	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	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	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	**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	**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	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	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	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	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	**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	**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	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	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	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	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	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	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	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	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	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	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	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	**0.5**	7.3
W-26	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	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant	**0.5**
W-28	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	262,948	131,474	65,737	32,869	16,434	16,434	Grade	Plant
W-30	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	262,948	131,474	65,737	32,869	16,434	16,434	Grade
W-32	0	0	0	0	0	0	0	262,948	131,474	65,737	32,869	16,434	16,434	Grade
Barren Island D														
Upland	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	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	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	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	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	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	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	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	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	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	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	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	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	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	193,187	96,594	48,297	24,148	12,074	12,074	Grade	Plant	**0.5**	9.5	14.4
Total	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	2677109
constructed ICU	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
Total (Constructed and protected) ICU	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	**150.4**	150.4	150.4	**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				**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	**150.4**	150.4	150.4	**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				**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	**150.4**	150.4	150.4	**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				**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	**150.4**	150.4	150.4	**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				**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	**175.44**	175.44	175.44	**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				**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	**154.5**	154.5	154.5	154.5	154.5	154.5	154.5	**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								**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	**180.3**	180.3	180.3	180.3	180.3	180.3	180.3	**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								**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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
W-21	36.0	33.0	372,467	**532,096**		0	0	0	0	0	0	0	0	0	0	266,048	133,024
W-22	36.0	33.0	372,467	**532,096**		0	0	0	0	0	0	0	0	0	0	266,048	133,024
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
constructed ICU					0	0	0	0	0	0	0	21	29	51	81.6	116.7	154.3
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
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

Cell No.	13	14	15	16	17	18	19	20	21	22	23	24
Upland	2,933,766	3,066,769	3,133,260	3,166,485	3,199,704	3,199,664	857,520					
W-1	24.5	25.2	25.8	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
W-2	19.9	20.7	21.5	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3
W-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
W-4	19.1	19.9	20.7	21.5	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3
W-5	18.3	19.1	19.9	20.7	21.5	22.3	22.3	22.3	22.3	22.3	22.3	22.3
W-6	18.3	19.1	19.9	20.7	21.5	22.3	22.3	22.3	22.3	22.3	22.3	22.3
W-7	16.1	18.3	19.1	19.9	20.7	21.5	22.3	22.3	22.3	22.3	22.3	22.3
W-8	16.1	18.3	19.1	19.9	20.7	21.5	22.3	22.3	22.3	22.3	22.3	22.3
W-9	13.9	16.1	18.3	19.1	19.9	20.7	21.5	22.3	22.3	22.3	22.3	22.3
W-10	13.9	16.1	18.3	19.1	19.9	20.7	21.5	22.3	22.3	22.3	22.3	22.3
W-11	7.2	13.9	16.1	18.3	19.1	19.9	20.7	21.5	22.3	22.3	22.3	22.3
W-12	Plant	0.5	7.2	13.9	16.1	18.3	19.1	19.9	20.7	21.5	22.3	22.3
W-13	Grade	Plant	0.5	7.2	13.9	16.1	18.3	19.1	19.9	20.7	21.5	22.3
W-14	Grade	Plant	0.5	7.2	13.9	16.1	18.3	19.1	19.9	20.7	21.5	22.3
W-15	16,628	Grade	Plant	0.5	7.2	13.9	16.1	18.3	19.1	19.9	20.7	21.5
W-16	16,628	Grade	Plant	0.5	7.2	13.9	16.1	18.3	19.1	19.9	20.7	21.5
W-17	16,628	16,628	Grade	Plant	0.5	7.2	13.9	16.1	18.3	19.1	19.9	20.7
W-18	16,628	16,628	Grade	Plant	0.5	7.2	13.9	16.1	18.3	19.1	19.9	20.7
W-19	33,256	16,628	16,628	Grade	Plant	0.5	7.2	13.9	16.1	18.3	19.1	19.9
W-20	33,256	16,628	16,628	Grade	Plant	0.5	7.2	13.9	16.1	18.3	19.1	19.9
W-21	66,512	33,256	16,628	16,628	Grade	Plant	0.5	7.2	13.9	16.1	18.3	19.1
W-22	66,512	33,256	16,628	16,628	Grade	Plant	0.5	7.2	13.9	16.1	18.3	19.1
Total	3,200,000	3,200,003	3,200,003	3,200,002	3,200,002	3,200,002	857,906	428	455	477	488	0
constructed ICU	186.3	210.1	230.3	261.0	297.7	337.2	386.3	427.6	455.4	476.8	488.4	498.6
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
Total (Constructed and protected) ICU	189.2	213.0	233.1	263.8	300.5	340.1	389.2	430.4	458.2	479.7	491.3	501.5

Cell No.	25	26	27	28	29	30	31	32	33	34	50	Total Placed Quantity
Upland												**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	**532,254**
W-2	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	177.6	177.6	177.6	**532,191**
W-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				**532,171**
W-5	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3				**532,152**
W-6	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3				**532,134**
W-7	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3				**532,096**
W-8	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3				**532,096**
W-9	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	177.6	177.6	177.6	**532,323**
W-10	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3				**532,323**
W-11	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3				**532,300**
W-12	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3				**532,256**
W-13	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3				**532,233**
W-14	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3				**532,233**
W-15	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3				**532,212**
W-16	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	177.6	177.6	177.6	**532,212**
W-17	21.5	22.3	22.3	22.3	22.3	22.3	22.3	22.3				**532,191**
W-18	21.5	22.3	22.3	22.3	22.3	22.3	22.3	22.3				**532,191**
W-19	20.7	21.5	22.3	22.3	22.3	22.3	22.3	22.3				**532,171**
W-20	20.7	21.5	22.3	22.3	22.3	22.3	22.3	22.3				**532,171**
W-21	19.9	20.7	21.5	22.3	22.3	22.3	22.3	22.3				**532,152**
W-22	19.9	20.7	21.5	22.3	22.3	22.3	22.3	22.3				**532,152**
Total	0	0	0	0	0	0	0	0	0	0	0	**58,457,824**
constructed ICU	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	
Total (Constructed and protected) ICU	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
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
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
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
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
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
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
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
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
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
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
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
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
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
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**
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**
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
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
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
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
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**
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**
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
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
W-23	0	0	255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	**0.5**	6.9	13.1
W-24	0	0	255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	**0.5**	6.9	13.1
W-25	0	0	0	255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	**0.5**	6.9
W-26	0	0	0	255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	**0.5**	6.9
W-27	0	0	0	0	255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	**0.5**
W-28	0	0	0	0	255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant	**0.5**
W-29						255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant
W-30						255,050	127,525	63,763	31,881	15,941	15,941	Grade	Plant
W-31							255,050	127,525	63,763	31,881	15,941	15,941	Grade
W-32							255,050	127,525	63,763	31,881	15,941	15,941	Grade
W-33								255,050	127,525	63,763	31,881	15,941	15,941
W-34								255,050	127,525	63,763	31,881	15,941	15,941
W-35									255,050	127,525	63,763	31,881	15,941
W-36									255,050	127,525	63,763	31,881	15,941
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
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
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
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

Cell No.	23	24	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	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	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	21.0	21.0	**121.5**	**121.5**	**121.5**	**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	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	21.0	21.0				**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	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	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	21.0	21.0	**145.8**	**145.8**	**145.8**	**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	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	21.0	21.0				**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	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	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	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	21.0	21.0	**145.8**	**145.8**	**145.8**	**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	21.0	21.0				**510,358**
W-15	**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	**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	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	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	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**	**145.8**	**510,253**
W-20	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	**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	**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	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	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	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**	**145.8**	**510,191**
W-26	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	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	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	**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	**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	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**	**145.8**	**510,137**
W-32	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	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	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	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	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**
Total	31,881	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**67,259,758**
constructed ICU	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	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	2.8	2.8	
Total (Constructed and protected) ICU	540.4	589.4	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
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
U-1	Grade	Grade	Plant	Plant	**3.2**	2.8	2.4	2.0	**1.6**	3.2	4.7	6.3	7.9
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
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
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
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
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
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
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
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
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
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
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
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
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**
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**
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
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
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
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
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**
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**
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
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
W-23	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.4	14.2
W-24	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.4	14.2
W-25	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.4
W-26	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**	7.4
W-27	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**
W-28	0	0	0	0	273,097	136,549	68,274	34,137	17,069	17,069	Grade	Plant	**0.5**
Barren- Protection/Wetlands													
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
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
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
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
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

Cell No.	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	60	Total Placed Quantity
Upland	3,199,924	2,867,160															**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	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	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	22.6	22.6	**130.3**	130.3	130.3	**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	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	22.6	22.6				**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	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	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	22.6	22.6	**156.4**	156.4	156.4	**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	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	22.6	22.6				**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	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	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	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	22.6	22.6	**156.4**	156.4	156.4	**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	22.6	22.6				**546,515**
W-15	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-16	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	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				**546,425**
W-18	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				**546,425**
W-19	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	**156.4**	156.4	156.4	**546,402**
W-20	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	**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-22	**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	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	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	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	**104.2**	104.2	104.2	**546,334**
W-26	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				**546,334**
W-27	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				**546,312**
W-28	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				**546,312**
Barren- Protection/Wetlands																	
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	16.6	16.6	
Total	3,199,924	2,867,160	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**76,472,232**
constructed ICU	574.4	605.6	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	338.5	338.5	
Total (Constructed and protected) ICU	912.8	944.0	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				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				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	150.4	150.4	150.4	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				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	150.4	150.4	150.4	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				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	150.4	150.4	150.4	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				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	150.4	150.4	150.4	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
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			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	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	21.0	121.5	121.5	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	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	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	21.0			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	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	145.8	145.8	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			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	145.8	145.8	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			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	145.8	145.8	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			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	145.8	145.8	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			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	145.8	145.8	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**

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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											
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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

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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.

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