Appendix I
Clean Water Act Section 404(B)(1) Evaluation

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UPPER MISSISSIPPI RIVER RESTORATION SYSTEM
FEASIBILITY REPORT
WITH INTEGRATED ENVIRONMENTAL ASSESSMENT

HARLOW ISLAND HABITAT REHABILIATION
AND ENHANCEMENT PROJECT

MIDDLE MISSISSIPPI RIVER MILES 140.5 THROUGH 144.0
JEFFERSON COUNTY, MISSOURI

APPENDIX I
CLEAN WATER ACT SECTION 404(B)(1) EVALUATION

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1 PROJECT DESCRIPTION

1.1 Location

The Middle Mississippi River National Wildlife Refuge (MMRNWR) is dispersed along 195 miles of the Mississippi River between the confluences of the Missouri and Ohio rivers; it includes approximately 7,000 acres of river islands and bottomland forest. The U.S. Fish and Wildlife Service (USFWS) manages the MMRNWR. The portion of the MMRNWR included in this Upper Mississippi River Restoration Program (UMRR) Habitat Rehabilitation and Enhancement Project (HREP) is Harlow Island (1,224 Acres). Harlow Island is located on the right descending bank of the Mississippi River between river miles 140.5 and 144.0, approximately 6 miles northwest of Crystal City, in Jefferson County, MO.

1.2 General Description

The need for rehabilitation of the Project is based on the following factors:

- The restoration and rehabilitation of these wetland and aquatic habitats would provide resting, feeding, nesting, breeding, and predator-escape cover for many forms of migrating and resident wetland wildlife. It would improve aquatic habitat for fishes and reptiles/amphibians, and improve woody and herbaceous plant diversity.
- The project would restore backwater habitat and improve the quality of existing secondary channel habitat, thus providing depth diversity and connectivity. It would also increase floodplain forest, bottomland hardwood forest, and emergent wetland habitat.

The following objectives and rehabilitation measures were considered in detail to achieve the project goal:

I. **Objective 1.** Increase connected aquatic backwater habitat with depth diversity for enhancement of fisheries habitat benefits
   - No action
   - Dredge backwater

II. **Objective 2.** Restore wetland ecosystem resources
   - No action
   - Excavate swale wetland habitat
   - Restore wetland habitat

III. **Objective 3.** Increase fine soil deposition within the Project Area suitable for hard mast forest
   - No Action
   - Construct sediment deflection berm

IV. **Objective 4.** Restore floodplain forest communities
   - No Action
   - Construct sediment deflection berm
   - Restore higher elevation ridge habitat for hard mast tree species
   - Reforestation

1.3 Authority and Purpose

The Corps proposes to rehabilitate Harlow Island through construction of measures which would increase floodplain forest community diversity, restore function of connected backwater, increase emergent wetland habitat, and improve the overall structure and function of Harlow Island habitat. The purpose of this draft Feasibility Report with Integrated Environmental Assessment (EA), is to evaluate the proposal for the UMRR-HREP at Harlow Island. The Feasibility Report with Integrated EA meets Corps of Engineers planning guidance and National Environmental Protection Act (NEPA) requirements. This report presents a detailed account of the planning, engineering, construction, and environmental considerations which resulted in the Tentatively Selected Plan (TSP) and is being developed by the Corps of Engineers with the U.S. Fish and Wildlife Service (USFWS) serving as the Federal project partner.

The purpose of the evaluation portion of this document is to comply with Section 404 of the Clean Water Act pertaining to guidelines for the placement of fill material into waters of the United States. This evaluation, in conjunction with the *Feasibility Report with Integrated Environmental Assessment, Upper Mississippi River Restoration Program, Harlow Island Habitat Rehabilitation and Enhancement Project, Jefferson County, Missouri* would assist in analysis of alternatives for the proposed project, resulting in a designated Tentatively Selected Plan. Further, this evaluation would provide information and data to the state water quality certifying agency demonstrating compliance with state water quality standards.

1.4 General Description of Excavated Material

Backwater:

- *Backwater material:* The total dredged material from the backwater would be approximately 415,000 CY.
- *Removing remnant structures:* The total excavated material from one remnant wood pile river training structure within the excavation is known to occur but the CY is unknown at this time.

Swale Wetlands:

- *Swale wetland material:* The total excavated material from the swale wetlands would be approximately 479,000 CY

Sediment Deflection Berm:

- *Sediment deflection berm material:* The sediment deflection berm would be constructed of 173,000 compacted CY of material dredged from the backwater.

Ridge Habitat for Reforestation:

- *Ridge habitat material:* The higher elevation ridge habitat would be constructed with approximately 625,000 compacted CY of material

1.5 Description of the Excavation and Placement Site

Material would be dredged from the existing backwater. This material would be placed into containment berms and used to construct the ridge habitat and a portion of the sediment deflection berm. See map at the end of this document.

Backwater: The proposed project feature is located along the Mississippi River on the right descending bank. Existing backwater bottom elevation is approximately 380 ft. NAVD88 and proposed excavated depth of the bottom of the backwater would be approximately 23.5 ft. deeper with a bottom elevation of 346.5ft NAVD88. The water depth of the proposed backwater would be at least 5 ft. deep 90% of the time and have water approximately 96% of the time. The bottom width would be approximately 40 ft. with side slopes of 1 ft. vertical on 3 ft. horizontal, extending approximately 90 ft. on each side. Two known river training structures will have to be excavated and cut to the

desired channel cross-section. The material would be let dry and be deposited on site. If the material would be deemed as having contaminants, the material would be disposed of off-site at an approved location. A total of approximately 415,000 CY of material would be excavated by land-based equipment and dredged from the backwater to achieve the above design. Clearing and grubbing of approximately 5.7 acres of riverfront forest would be required within the backwater footprint. The excavated material would be transported to the Sediment Deflection Berm construction site for later use. The backwater would be excavated in an area that is approximately 17.7 acres, with the placement of 3 structures to scour out the upper 21.1 acres during high flow events over the course of the following 5 to 10 years, depending on hydrology.

Swale Wetlands: Approximately 479,000 BCY of material would be excavated to create eight linear wetland features. These swales would have a bottom width of approximately 80 feet. They were designed to follow natural low elevations within the project area and would have a slope of approximately 20:1. Approximately 64.1 acres of forest would be cleared to construct these features.

Sediment Deflection Berm: Approximately 173,000 CY of excavated material from within the backwater and swale wetlands would be used to construct the sediment deflection berm. The material would be placed behind the existing remnant agricultural levee within the Project Area toward the upstream portion, then extending downstream along the landward side of the dredged backwater. The proposed feature would have a 3:1 slope on the exterior with a 6:1 slope on the interior to minimize scouring when overtopped by flood events. The top of the berm would be constructed to a 10-year flood frequency elevation of 377 to 379 NAVD 88 at a length of 14,000 feet long. The cross-sectional width of the sediment deflection berm would be approximately 90 feet wide at the base. The berm would be constructed on approximately 23.8 acres, of which is currently forested.

Ridge Habitat: Approximately 625,000 CCY of material would be used to construct five ridge features. The ridge features would be constructed to approximately 377 NAVD 88, a 10% annual chance of exceedance elevation, at the top with a side slope of 4:1 to a 20% annual chance of exceedance, and a 10:1 side slope from 20% annual exceedance to a 10% annual chance of exceedance elevation. In total these five ridges account for approximately 59.8 acres. To construct these features, approximately 60 acres of forest would be cleared.

1.6 Description of the Placement Method

Placement for the sediment deflection berm would be done with dozers, agricultural scrapers, and self-propelled sheepsfoot roller (to compact soil). Placement for the dredge disposal locations would be done with a flexible dredge pipe.

2 FACTUAL DETERMINATIONS

2.1 Physical Determinations

Elevation and Slope. Construction specifications are provided in the full report.

Sediment Type. The soil in the project area has been characterized by the Natural Resource Conservation Service, Missouri as Haynie silt loam frequently flooded soils; Tice silty clay loam frequently flooded, long duration soils; and Waldron silty clay loam, frequently flooded soils. The soil is typically very deep, with moderately well drained to poorly drained permeability. Hydric soil characteristics were observed within the top 10 inches in various areas where the proposed land based activities would be occurring. The material would be used to construct the sediment deflection berm by using dozers and agricultural scrapers.

Actions Taken to Minimize Impacts. All excavated and filled areas would be planted with suitable native vegetation as soon as possible after disturbance. Additionally, Best Management Practices for construction would be enforced. Feature designs incorporated methods to reduce tree clearing where practicable. Beneficial reuse of all material was incorporated so soil balances for constructed features were met by excavated features. Therefore, no in-stream disposal of dredged or excavated materials is necessary.

2.2 Water Circulation, Fluctuation, and Salinity Determinations

Physical and Chemical Characteristics	N/A	No Effect	Negligible Effect	Minor Effect (Short Term)	Minor Effect (Long Term)	Major Effect
Substrate				X		
Suspended particulates/ turbidity				X		
Water				X		
Current patterns and water circulation				X		
Normal water fluctuations		X				
Salinity gradients	X					

Table 1 Potential Impacts on Physical and Chemical Characteristics

Water.

a. Salinity – Not applicable.
b. Water Chemistry - Mechanical excavation or hydraulic dredging is expected to have a short-term temporary effect on water chemistry. Increased turbidity in areas where dredging occurs is expected; however, turbidity levels are not expected to significantly affect any aquatic organisms or downstream habitat. The removal of material in the backwater area would improve depth and connectivity to the river, thus improving water chemistry. The backwater would have gradual side slopes of 1 ft. vertical on 3 ft. horizontal, and be dredged to a depth approximately 23 feet deeper than the existing ground elevation which would allow it to be self-maintaining into the future, limiting erosion, sedimentation, and woody debris deposition.
c. Clarity – Elevated suspended sediment levels are expected to occur in a localized nature within the backwater during dredging. Decreased water clarity is expected to be short-term.

d. Color – No change is expected.
e. Odor – The project is not expected to have an impact on water odors.
f. Taste – The project is not expected to impact water taste.
g. Dissolved Gas Levels – Construction activities associated with the project are not expected to have a significant adverse impact on dissolved gas levels.
h. Nutrients – Nutrients would be released to the water column during dredging; however, this would represent a temporary increase and is not considered significant.
i. Eutrophication – The project is not expected to contribute toward eutrophication of the water column.
j. Water Temperature – Temperatures are expected to improve with increased depth and flow, thus allowing for the backwater to support a larger diversity of aquatic life.

Current Patterns and Circulation. The main purpose of this project is to increase depth to the backwater and beneficially reuse the material to construct a sediment deflection berm. The sediment deflection berm would decrease sand deposition throughout the island and simultaneously increase the deposition of fine silt behind the sediment deflection berm with increased water backing during high water events. Overall, the project would slightly alter circulation and flow patterns; however, these alterations are not expected to significantly change river hydraulics.

a. Velocity – There should be no detectible changes in current velocity in the Mississippi River.
b. Stratification – Stratification does not occur within the project area because of shallow depths. Stratification may occur after construction completion with increased depths throughout the backwater. This would likely only occur during temperature extremes, i.e., hot ambient temperatures during the summer and cold ambient temperatures during the winter.
c. Hydrologic Regime – The project would not alter the hydrologic regime or the flood profile of the Mississippi River.

Normal Water Level Fluctuations. Normal water level fluctuations in the Mississippi River would be unaffected. Restoration features would not detrimentally increase flood heights or adversely affect private property or infrastructure. Refer to Appendix B2 - *Hydrology & Hydraulics* for details on 2-dimensional modeling.

Actions That Will Be Taken to Minimize Impacts. Best Management Practices for construction would be enforced. Refer to Chapter 7, Environmental Effects in the main report for more details.

2.3 Suspended Particulate/Turbidity Determinations

Expected Changes in Suspended Particles and Turbidity Levels in Vicinity of Placement Site. Increases in suspended particulates and turbidity due to construction activities are expected to be greatest within the vicinity of the backwater dredging and placement locations. This would cease after construction completion. Refer to Chapter 11 Schedule for Design and Construction in the main report for more details pertaining to the timeline. The improved backwater depth as well as the improved soil composition throughout the Harlow Island Project Area would increase benefits to fish and wildlife resources over the 50 year evaluation period. Stabilization of the backwater would be realized upon construction completion. Refer to Appendix F - *Habitat Evaluation and Quantification* for more details.

Effects on Chemical and Physical Properties of the Water Column

a. Light Penetration. There would be a temporary reduction until sediments suspended as part of the project activities settle out of the water column. Refer to Chapter 11, Schedule for Design and Construction in the main report for more details pertaining to the timeline of the construction activities.
b. Dissolved Oxygen. No adverse effects expected.
c. Toxic Metals and Organics. No adverse effects are expected. Hazardous material surveys would be completed during Plans & Specs.
d. Aesthetics. Aesthetics of work sites are likely to be adversely affected during construction, but are expected to be temporary and improve after construction. Increased aesthetics would likely be realized soon after construction when cleared areas have been revegetated. Refer to Chapter 11, Schedule for Design and Construction in the main report for more details pertaining to the timeline of the construction activities.

Effects on Biota. The project would likely result in some short-term displacement of biota in the immediate vicinity of construction activities due to temporary decreases in water quality and disturbance by construction equipment. Long-term beneficial effects should occur as aquatic species, especially riverine fishes, benefit from the improved habitat within Harlow Island. Bottomland and floodplain forests would also benefit in the long term with the improved soil composition, thus allowing the successful establishment of hard mast trees with regeneration occurring. Refer to Chapter 7, Environmental Effects and Chapter 8, Cumulative Effects for more details.

2.4 Contaminant Determinations

The Phase I Hazardous, Toxic, and Radioactive Waste survey conducted for this study did not identify contaminant sources or migration pathways from surrounding properties that would adversely impact surrounding environments (human and ecological receptors). The project is located in the unleveed portion of the Mississippi River floodplain, which is primarily natural habitat with minimal cropland. There is little evidence that the land has been used for purposes other than agriculture. It does not appear that there is a risk of HTRW contamination within the project area.

2.5 Aquatic Ecosystem and Organism Determinations

Biological characteristics	N/A	No Effect	Negligible Effect	Minor Effect (Short Term)	Minor Effect (Long Term)	Major Effect
Threatened and endangered species			X[1]			
Fish, crustaceans, mollusk, and other aquatic organisms				X		
Other wildlife				X		

[1]More information provided in Appendix N, *Biological Assessment* for species-specific determinations

Table 2 Potential Impacts on Biological Characteristics

Effects on Plankton. The project could have a temporary adverse effect on the plankton in the immediate vicinity of the project area. This would cease after construction completion.

Effects on Benthos. The dredging of the backwater area would temporarily disrupt the aquatic environment. Benthos present in these areas would be adversely affected by dredging during excavation. However, the benefits gained from improved aquatic habitat would far outweigh any loss in benefits during the time of construction.

Effects on Nekton. Temporary adverse effects may be experienced by free-swimming aquatic life during construction, as with the benthic community; the long-term impact would be beneficial.

Effects on Aquatic Food Web. The project would improve backwater habitat and increase habitat diversity (terrestrial and aquatic) throughout the Harlow Island Project Area which currently lacks backwater depth and topographic diversity. The increase in water transport capacity and habitat diversity would improve the overall health and food web of the Harlow Island Project Area. Fishery and forestry resources are expected to increase as habitat diversity is improved by the project.

Effects on Special Aquatic Sites. Although wetlands within the Project Area would be impacted by one or more features, the impacts would be offset and considered self-mitigating. Overall, the wetland impacts would be outweighed by improvement within the Project Area that otherwise would continue to persist as degraded habitat. The wetland impacts and restoration are summarized in Table 1 and discussed below:

Special Aquatic Sites	N/A	No Effect	Negligible Effect	Minor Effect (Short Term)	Minor Effect (Long Term)	Major Effect
Sanctuaries and refuges				X		
Wetlands				X		
Mud flats				X		
Vegetated shallows				X		
Coral reefs	X					

Table 3 Potential impacts on special aquatic sites.

a. Sediment Deflection berm – The sediment deflection berm would include the reinforcement of the existing agricultural levee along the backside which accounts for 23.8 acres. This activity would be considered maintenance of existing structures under Section 404(f)(1). Therefore, this feature would have minor short term effects on wetlands.
b. River Training structure removal – One river training structure at the approximate middle of the dredging area of the backwater would be removed. This action is considered wetland restoration.
c. Forest Clearing – Approximately 158.7 acres forested area would be cleared for the backwater dredging, ridge habitat, reinforcing the agricultural levee, and the swale features. The forest community type in each of these areas is

composed of early successional, small diameter forest consisting of cottonwood (*Populus deltoides*), silver maple (*Acer saccarhinum*), and willow (*Salix nigra*). The forested areas are of 25 years of age or less since the Project Area was removed from agricultural production after 1993. Reforestation will occur on the sediment deflection berm (23.8 acres) and on the ridge features (59.8 acres). In addition, the forest community downstream of the sediment deflection area (849.9 acres) will be enhanced by the accelerated fine soil building as a result of the sediment deflection berm. This area will also benefit from the tree plantings on the ridges which will serve as a seed source to allow hard mast trees to reestablish and become a larger component of the forest community as they were historically. The tree clearing will be self-mitigating by the direct reforestation (83.6 acres) and indirect forest community enhancement (724.9 acres, net). Therefore, this feature would have a minor short term effect on wetlands.

d. Swale wetland – Approximately 65.2 acres of wetland would be restored within the Project Area. The swale wetlands were placed in areas that were historically lower elevation but had been drained or filled during agricultural use. Therefore the swale wetlands would be considered wetland restoration.
e. Backwater Habitat – Approximately 17.71 acres of backwater habitat would be restored by hydraulic dredging. In addition, approximately 21.09 acres would be scoured over time by placed grade-control structures. This area was historically a flow-through side channel that became disconnected on the upper end, continued to fill as sedimentation occurred, and as the entranced filled completely, disconnected from the main channel. Therefore, the dredging of the backwater is considered restoration of an aquatic site and would have a minor short term effect on wetlands.
f. Construction Access – A construction access is necessary for equipment to access and leave the Project Area during construction. The construction access would necessitate the crossing of an intermittent stream channel. This activity would fall under the purview of a Nationwide 27, *Aquatic Habitat Restoration, Enhancement, and Establishment Activities* or Nationwide 33, *Temporary Construction, Access, and Dewatering*. Therefore, this feature would have minor short term impacts to wetlands.
g. Ridge Habitat – Five elevated ridges totaling 59.8 acres would be constructed. The ridges were placed on higher elevations within the Project Area so less material would be needed in order to achieve the 20% annual chance of exceedance elevation. Although the ridges would be considered an impact to wetlands, they are offset by the swale feature, which accounts for 65.2 acres of wetland restoration. Therefore, this feature would have minor short term effects on wetlands.

Threatened and Endangered Species. Presence of, or use by, endangered and threatened species is discussed in the Feasibility Report with an integrated Environmental Assessment. No adverse impacts are expected to result from this project. Refer to Appendix N - *Biological Assessment* for more details.

2.6 Proposed Placement Site Determinations

Mixing Zone Determinations. Suspended particulates and turbidity would increase during construction activities. These increases would be most evident at the point of excavation or dredging, and would quickly fall within baseline conditions in the mixing zone. Excavated or dredged material will be placed in upland confinement areas

designed during PED to ensure that the sediment is contained above the ordinary high-water mark. No significant adverse impacts to the chemical and physical properties of the water column are expected.

Determination of Compliance with Applicable Water Quality Standards. This Clean Water Act Section 404(b)(1) provides the necessary compliance required by law. Section 401 Water Quality certification in compliance with the Clean Water Act, and all other permits necessary for the completion of the project, would be obtained prior to project construction.

Potential Effects on Human Use Characteristics. No long-term adverse impacts to municipal and private water supplies; water-related recreation; aesthetics; or parks, national and historic monuments, national seashores, wilderness areas, research sites or similar preserves would occur. During construction the area would not be available for recreational and commercial fishing. Following construction, the proposed project would enhance fishing and hunting opportunities in the area and improve the overall condition of the Harlow Island Project Area. In addition, 2 dimensional modeling has shown that there would be no negative impacts to navigation and no impacts to flood heights. Refer to the Appendix B2 - *Hydrology & Hydraulics* for more details.

2.7 Determinations of Cumulative Effects on the Aquatic Ecosystem

Although minor short-term construction-related impacts to local fish and wildlife populations are likely to occur, no negative cumulative impacts to fish and wildlife are identified. From a systemic approach, the tentatively selected plan would result in positive long-term benefits to wetland, floodplain forest, bottomland hardwood, and aquatic habitats located in and around the Harlow Island Project Area and throughout the MMR. Refer to Chapter 8, Cumulative Effects in the Feasibility Report for more details.

2.8 Determinations of Secondary Effects on the Aquatic Ecosystem

No adverse secondary effects should result from the proposed action. Long-term benefits to aquatic habitat and wildlife are expected. Refer to Chapter 7, Environmental Effects and Chapter 8, Cumulative Effects in the Feasibility Report for more details.

3 FINDINGS OF COMPLIANCE OR NON-COMPLIANCE WITH THE RESTRICTIONS ON DISCHARGE

No significant adaptations of the 404(b)(1) guidelines were made relative to this evaluation.

Alternatives that were considered for the proposed action included fewer features than the tentatively selected plan. All feasible combinations of features, 9 final alternatives including the no action alternative were analyzed for environmental benefits and costs (Refer to Chapter 6, Alternative Plan Formulation and Evaluation and Chapter 9 Plan Selection for more details). The tentatively selected plan provided a large number of environmental benefits and best met project objectives and the four plan formulation criteria of completeness, effectiveness, efficiency, and acceptability.

1. Certification under Section 401 of the Clean Water Act would be obtained from the Missouri Department of Natural Resources where applicable.
2. Additional sampling and analysis will be completed for the proposed fill activity to determine whether or not it is in compliance with Applicable Toxic Effluent Standards of Prohibition under Section 307 of the Clean Water Act.
3. Prior to construction, full compliance with the Endangered Species Act would be documented.

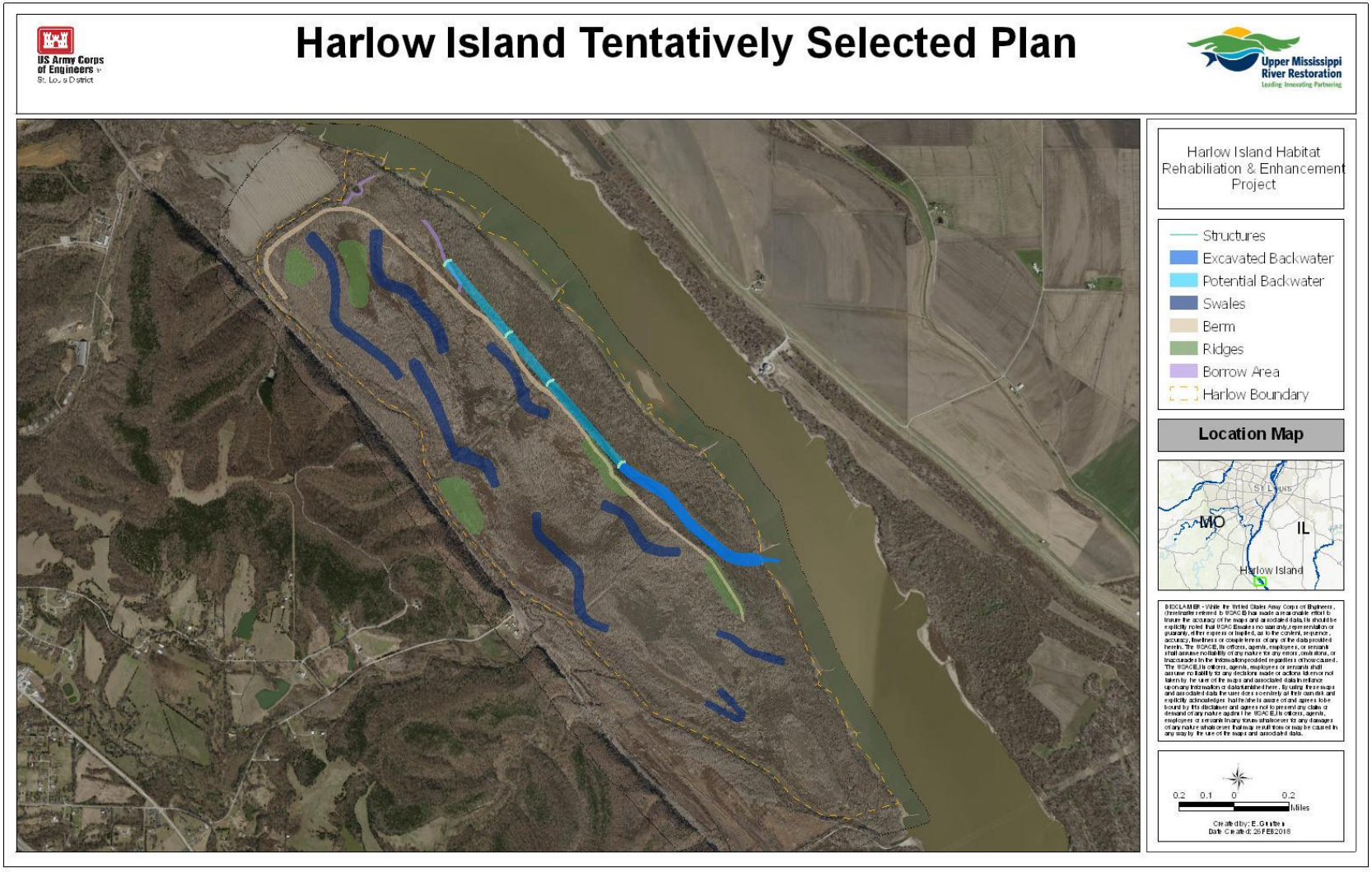
4. The project is situated along an inland freshwater river system. No marine sanctuaries are involved or would be affected by the proposed action.
5. No municipal or private water supplies would be affected by the proposed action, and no degradation of waters of the United States is anticipated to result from the proposed action. The proposed construction activity would not have a significant adverse effect on human health and welfare, recreation and commercial fisheries, plankton, fish, shellfish, wildlife, or special aquatic sites. No significant adverse effects on life stages of aquatic life and other wildlife dependent on aquatic ecosystems are expected to result. The proposed construction activity would have no significant adverse effects on aquatic ecosystem diversity, productivity, and stability. No significant adverse effects on recreational, aesthetic, and economic values would occur.
6. The materials used for construction would be chemically and physically stable and non-contaminating.
7. No other practical alternatives have been identified. The proposed action will be in compliance with Section 404(b)(1) of the Clean water Act, as amended prior to construction. The proposed action would not significantly impact water quality.

_____ _____

(Date)

Bryan K. Sizemore
Colonel, U.S. Army

District Commander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