

Appendix C:

404(b)(1) Clean Water Act Lock and Dam 2 Protective Island Project

I. Project Description

A. Location and General Description

The Lock and Dam 2 Project Area is within the UMR outside of the 9-Foot Navigation Channel on the upstream side of the Lock and Dam 2 embankment, at River Mile 815.2. The project is located near the southeastern edge of the Minneapolis–St. Paul Metropolitan area and is entirely within the boundaries of the Mississippi National River and Recreation Area (MNRRA) and Mississippi River Corridor Critical Area corridors (MRCCA). The proposed project lies within Nininger Township and Hastings, MN and is bordered by Denmark Township, MN to the northwest, and Cottage Grove, MN to the north.

The U.S. Army Corps of Engineers, St. Paul District is responsible for operation and maintenance of the 9-foot navigation channel within the Upper Mississippi River. One component of this effort is assuring that locks, dams and associated structures are properly maintained. One structure that is being considered for increased protection is the embankment at Lock and Dam 2. The embankment is being degraded due to erosion via wind-driven wave action, ice action and river currents. The proposed project's goal would be to protect the embankment from erosive forces, while providing environmental benefits to the area through the beneficial use of dredged material. In order to accomplish this, an offshore protective island would be constructed with material from dredged material placement sites within Pool 2, resulting in increased capacity for routine dredging operations.

In compliance with Section 404 of the Clean Water Act, this evaluation addresses the impacts resulting from the discharge of fill into approximately 30.2 acres of waters of the United States.

Detailed descriptions of the proposed project features and impact areas can be found in the Environmental Assessment.

B. Authority and Purpose

Congress first authorized the Corps to maintain navigation on the Mississippi River through removing sandbars, snags and other obstacles via the Rivers and Harbors Act (RHA) of 1824. A later revision to the RHA (1930), authorized the Corps to maintain a 9-foot navigable channel on the Mississippi River through the use of locks and dams. This project will be conducted as maintenance to structures or features authorized through these acts.

C. General Description of Dredged or Fill Material

1. General Characteristics of Material

The proposed protective island would be constructed using sand from dredged material placement sites within Pool 2. The exact physical characteristics of the sand (i.e., gradation, makeup) is dependent upon the dredge cut it would come from (Table 1). The base of the island would utilize conventional sand (granular fill) and be capped with fine-grained material (silts and clay, fine fill or fines) to prevent erosion and establish turf for vegetation. An emergent wetland area on the inside of the island would be filled with fine-grained material (fine fill) from the riverbed south of the island. The island would be further stabilized with rockfill in the form of rock groins and a bullnose structure at the northern tip of the island. Rockfill for both of these structures would consist of R140 riprap from an authorized quarry.

Table 1: Pool 2 dredge cut sediment quantities and physical characteristics. Sample results are taken from two random locations in each cut using a ponar dredge sampler.

Cut Name	Location (RM)	Annual Avg Qty: '70-'14	Year Last Tested	Avg. % Sand	Avg. % Silt	Avg. % Clay
Above+ Below Smith Ave	840-841.3	2,917	2013	45	.6	.5
Abv Wabasha Ave Br	839.5-839.6	25	2014	88	7	4
Small Boat Harbor - St. Paul	839.6	4,237	2013	58	40	2
St. Paul Barge Terminal	836.4-837.8	49,864	2013	92	5	3
Robinson Rocks/Gray Cloud	826.1-828.3	6,170	2013	97	1.0	1.5
Pine Bend Landing	824.3-824.6	5,551	2014	93	1	.2
Boulanger	820.3-821.4	20,315	2013	80	15	5
Boulanger/lower light	819.3-820.3	8,984	2013	35	51	14
Freeborn Light	818.0-819.3	10,110	2014	89	7	3
Upper Approach L/D 2	815.2-816.5	332	2014	61	29	8

2. Quantity of Material

Estimated quantities for fill material are:

Rock:

Rock groins – 1,265 Cubic Yards

Bullnose structure – 1,760 Cubic Yards

Total rockfill – 3,025 Cubic Yards

Granular sand fill:

Island Footprint – 285,378 Cubic Yards

Temporary construction pads (2) – 11,840 Cubic Yards

Total granular sand fill - 297,218 Cubic Yards

Fine fill

Island design (turf) – 15,300 Cubic Yards

Emergent wetland (wet fill) – 43,268.5 Cubic Yards

Access Dredging (wet fill, if necessary) – 12,330.5 Cubic Yards

Total fine fill – 70,899 Cubic Yards

Total fill material: 368,117 Cubic Yards

3. Source of Material

Rockfill: Riprap would be sourced by the contractor from an authorized gravel pit or quarry.

Granular and dry fine fill: The granular fill for the base of the island and the fine fill utilized for turf establishment would come from Corps authorized dredged material placement sites within Pool 2. The majority of the material from the dredged material placement sites would have been dredged at some point over the previous ten years. These sites include Pine Bend, Upper Boulanger and Lower Boulanger.

Wet fine fill: The fine fill necessary to construct the emergent wetland area would come from the riverbed from the access channels or the fish overwintering habitat south of the island. This material would either be hydraulically pumped to the emergent wetland area or placed mechanically. See the Environment Assessment for more details on location, process and purpose of the wet fine fill and the emergent wetland area.

E. Description of the Proposed Discharge Site

1. Location

The island and subsequent features would be constructed on the upstream side of the Lock and Dam 2 embankment, at River Mile 815.2. Figures detailing the locations of the proposed project features can be found in the Environmental Assessment.

2. Size of Fill

The protective island would consist of four primary features: the island top, the inner berm, outer berm, and emergent wetland. A fine fill layer would be included for all three features to allow for the establishment of native plant species. The protective island top would have a constant top width of 50' with a cross slope of 0.00%, and side slopes of 1V:3H. The side slopes would tie into the inner and outer protective island berms at elevation 688.10 (NAVD 88). The protective island top would include multiple elevation tiers that would be capped with fine fill and vegetation to provide both positive habitat and erosion protection. The inner and outer protective island berms would contain a 40' top width with a cross slope of 0.00%, a 20' wide fine fill top layer, and a side slope of 1V:4H that ties into the existing river bottom. The inner and outer island berms would have a top elevation of 688.10, which would be constant for the entire island alignment. The inner and outer

protective island berm fine fill layer would start at the toe of island top side slope and go to the berm center. Both berm centers are located 20' from the toe of the island top side slopes. The Emergent Wetland or "mudflat" would be constructed by filling in the 9.3 acre area between the emergent wetland berm and island layouts to a variable elevation of +/- 1.0 foot Low Control Pool (LCP), providing an average design elevation of 685.60. The overwintering fish habitat area, which would provide the majority of the fine fill required for the emergent wetland would be approximately 8.6 acres in size.

The size of the island footprint, including the emergent wetland and rockfill would be approximately 30.2 acres. Including the overwintering area and all potential access dredging routes (5.4 acres) would increase the footprint size to approximately 44.2 acres.

3. Site and Habitat Description

The Project Area is located at the downstream end of Pool 2 near the right descending bank at RM 815.2. The area upstream of the embankment where the protective island would be situated is relatively shallow in depth, as it is outside of the navigation channel. The project is located near the southeastern edge of the Minneapolis–St. Paul Metropolitan area and is entirely within the boundaries of the Mississippi National River and Recreation Area (MNRRA) corridor, a unit of the National Park Service (NPS). This area is also within the Mississippi River Corridor Critical Area (MRCCA), which is a joint state, regional and local program that provides coordinated planning and management for the 72 mile stretch of the UMR that lies within the seven-county boundary of the Minneapolis-St. Paul Metropolitan area. The MRCCA shares a boundary with the MNRRA corridor.

The Project Area is located almost entirely within the UMR floodplain. According to the UMR aquatic habitat classification system (Wilcox 1993), the north side of the project area is impounded aquatic habitat. According to the Minnesota National Wetland Inventory (NWI) the Project Area has a mixture of riverine, lake and freshwater pond habitat. From a wetland standpoint the project site on the upstream side of the Lock and Dam 2 embankment is open water and inundated with water year round. The long wind fetch and riprap on the upstream side is not conducive for plant growth, resulting in minimal wetlands, if any. Using the Upper Mississippi River Restoration (UMRR) Program – Long Term Resource Monitoring (LTRM) data there are a total of seven different land use class descriptions (15 class descriptions available) within the Project Area. These classifications include: open water, road/levee, development, wet forest, submersed aquatic vegetation, and upland forest; however, the footprint of the proposed island is entirely within open water habitat.

Implementing the proposed project would result in a decrease in impounded aquatic habitat (-38.8 acres) and an increase in fish overwintering habitat (+ 8.6 acres), wetland (+ 9.3 acres), wooded/forest (+ 2.8 acres), brush/grassland (+ 7.6 acres), beach (+ 4.7 acres), littoral transition zone (+ 4.9) and riprap habitats (+ 0.9 acres). Any access dredging (up to

5.4 acres) necessary to construct the project would result in a habitat change, as it would remain as impounded aquatic habitat.

F. Description of Disposal Method

A majority of the fill required for the proposed island would be set in place via typical mechanical dredging equipment including barges and excavators. This includes the granular fill for the island footprint and riprap for the rock groins and bullnose structure. The fine fill for the emergent wetland and turf mixture to cap the island would likely be placed hydraulically; however, there is a chance that the contractor would choose to complete this work mechanically. See the Chapter 2.2 of the Environmental assessment for more details on how the proposed island would be constructed.

II. Factual Determinations

A. Physical Substrate Determinations

1. Substrate Elevation and Slope

The existing elevation of the project footprint varies throughout the Project Area, but in general the substrate elevation is between elevations 683.1 – 681.1 feet (water depth of 3 – 6 feet LCP, EL 686.1). As the channel borders approach the main channel, the slope increases sharply and the channel bottom is generally between 9 and 18 feet deep (EL 677.6 – 668.6 feet). Once completed the proposed island would tie into the existing river bottom with a side slope of 1V:4H and have varying top elevations of 692.1, 690.1 and 688.1 feet. The varying island elevations and purposes behind them are further explained within the Environmental Assessment.

2. Substrate Changes

Sediment borings conducted in 2017 and 2018 from the Project Area indicated that the near-surface substrate consists of mostly alluvial sands or lacustrine clays. The substrate is typically loose at the surface but increases in density with depth. The clay layer thickness throughout the Project Area is variable and typically greater than 3 feet. Underlying the alluvial and lacustrine deposits is the Franconia Formation, which is bedrock consisting of very fine grained sandstone. More information regarding the existing substrate of the Project Area can be found within Appendix F of the Geotechnical Design and Geology Report.

The proposed island and emergent wetland footprints would be overlain with varying elevations/depths of clean sand. The islands top elevation would be above the water surface most of the time, and covered with fine fill sand to mimic soil for vegetation. The area

where the island ties into the existing riverbed would likely be changed to sand, or a mixture of sand and the existing substrate. The tie-in of the rock groins would introduce a substrate type that is currently not present within the proposed island footprint.

3. Fill Material Movement

Some localized fill material movement and existing sediment resuspension is expected during project construction, depending on current and wind conditions. These effects would be temporary and would end following construction. Additionally, construction could cause lateral movement of the underlying (existing) substrate, often referred to colloquially as a “mud wave”. Lateral displacement could occur in a semi-liquid fashion, in which the material is simply “squeezed” outwards from beneath the fill in a plastic fashion, where soil masses or wedges of material would be displaced outwards from the fill. This movement would also only be expected to occur during construction, and would result in a more variable substrate elevation around the islands.

Once material is in place, secondary movement of fill material used to construct the proposed island would be minimal because project features would be designed to discourage erosion. The sand that would make up most of the island would be capped with a mixture of fine sands and planted with vegetation. Also, rockfill structures would be incorporated to lower erosion and maintain island stability.

4. Actions Taken to Minimize Impacts

A number of procedures would be used to minimize impacts where needed. All work performed by a contractor will be subject to applicable agency permits. The contractor will also be required to submit an Environmental Protection Plan that will include best management practices designed to minimize the unintended movement of fill material.

B. Water Circulation, Fluctuation, and Salinity Determination

1. Water

Some minor, short-term decreases in water clarity are expected from the proposed fill action. The use of clean fill materials should preclude any significant impacts on water chemistry. If hydraulic dredging is used for any part of the project, the carriage return water would be taken from the Mississippi River to mix with the dredged material and allow hydraulic movement, and returned to the river after settling. Returning this water without the suspended sediments should not have any effect on water chemistry. The long-term effect from the proposed project features would likely be a minor improvement in water clarity in the study area over present conditions due to the reduction in wind-generated waves, especially south of the proposed island.

The proposed fill would have no measureable impact on salinity, color, odor, taste, dissolved oxygen levels, nutrients, eutrophication, or temperature.

2. Current Patterns and Circulation

a. Current Velocity and Patterns

The velocity of water movement throughout the project area is currently low as the area is outside of the thalweg and resides within the ineffective flow zone of the river. Any river current once acting on the embankment would be displaced by the proposed island.

b. Stratification

The proposed project would not affect stratification.

c. Hydrologic Regime

The proposed project would not alter the existing hydrologic regime within the project area.

3. Normal Water Level Fluctuations

The proposed activities would not have an effect on normal water level fluctuations in the project area.

4. Salinity Gradient

The proposed project would have no effect on the salinity gradient.

5. Actions Taken to Minimize Impacts

No special actions would be taken to minimize the effects of the proposed project on water circulation, fluctuation, or salinity.

C. Suspended Particulate/Turbidity Determination

1. Expected Changes in Suspended Particulates and Turbidity Levels in the Vicinity of the Disposal Site

Minor increases in suspended particulates and turbidity levels would occur from the construction activities in the immediate project vicinity. Being that the project area is close to the Lock and Dam 2 embankment and within the ineffective flow zone, suspended particulates would not travel downstream of the project area. The utilization of Best Management Practices (BMPs) during construction would minimize these potential effects. Potential BMPs could include turbidity sampling and silt curtains. When construction activities cease, suspended particulates and turbidity levels would return to pre-project conditions.

2. Effects on Chemical and Physical Properties of the Water Column

The minor increase in suspended particulates and turbidity. Related short-term effects of this would be decreased light penetration and reduced aesthetic qualities near the

construction site. Suspended particulates are not expected to cause a change in dissolved oxygen, toxic metals, organisms, or pathogens in the water column.

4. Actions Taken to Minimize Impacts

The discharge of dredged material would result in disturbance to the existing substrate, which would likely cause a temporary and localized increase in suspended sediment. Through the project the contractor would develop an Environmental Protection Plan that would include best management practices to minimize impacts of suspended particulates and turbidity created through the Project Area. Any requirements (e.g., turbidity sampling) necessary through the permitting process would be implemented to reduce the effects of suspended sediment.

D. Contaminant Determinations

Sediment samples from the Project Area were analyzed for environmental characteristics by the Corps in June 2017. The results of this analysis indicated that sediments were relatively clean and free of contaminants. No analytes were detected within project area in concentrations higher than Minnesota Pollution Control Agency's (MPCA) Sediment Quality Targets (SQT) or Soil Reference Value (SRV) guidelines. Results of these tests are further discussed in the Environmental Assessment.

The proposed fill material would include rock, and dredged material. The rock used in the construction of rock groins and bullnose structure would be clean and come from a sourced quarry. Sand (granular and fines) that would be utilized for the construction of the proposed island would come from dredged material placement sites in Pool 2. The St. Paul District has implemented a standard operating procedure to evaluate the sediment in dredge cuts, which calls for periodic sediment sample collection and analysis for a standard set of chemical and physical characteristics (Table 1). To date, the St. Paul District has completed 15 sediment surveys of the dredge cuts in Pool 2 (1974, 1975, 1978, 1981–1985, 1989, 1992, 1994, 2002, 2008, 2013 and 2014). Fill material for the emergent wetland would come from the fish overwintering area and access dredge cuts (if necessary). A further description of the dredged material used for fill is discussed in Appendix G.

E. Aquatic Ecosystem and Organism Determination

1. Effects on Plankton

During construction, increases in turbidity and suspended solids near the dredged and filled areas would have a localized suppressing effect on phytoplankton productivity. However, these local effects would be short-term and minor. The plankton populations would recover quickly once construction activities have ceased.

2. Effects on Benthos

Any benthic organisms within the fill and dredged areas of the project would likely be destroyed during construction, which would equate to approximately 44.2 acres of benthic habitat. Mussel surveys were conducted within the Project Area to determine potential impacts of the proposed island. These surveys indicated that the Project Area does not contain any known mussel beds and is poor mussel habitat. The proposed island construction would likely not have a lasting impact on the native mussel population within the Project Area and greater Pool 2. After project completion, benthic organisms would colonize the new littoral transition zone and rockfill structures created through the proposed island construction. These areas would create substrate diversity that currently is not available within the Project Area.

3. Effects on Nekton

During construction, increases in turbidity and suspended solids near the dredged and filled areas would have a localized suppressing effect on nekton productivity. Nekton would most likely leave or avoid the area while construction is occurring. These effects would be local, short-term, and minor and the nekton populations would quickly recolonize the area once construction activities have ceased. The constructed fish overwintering habitat would provide a unique habitat for nekton that is currently not available within the Project Area and would provide long-term nekton benefits.

4. Effects on Aquatic Food Web

The covering (burial) and dredging of existing benthos and localized impacts on plankton productivity would cause a temporary, minor, adverse impact on the local food web. However, these organisms would be expected to recover quickly following the completion of the project, and there would likely be no long-term negative effects to the aquatic food web.

5. Effects on Special Aquatic Sites

The proposed project would not impact any special aquatic sites.

6. Threatened and Endangered Species

The proposed action would not affect any federally-listed species. The only federally-listed species that would have the potential to be affected by the proposed island project would be Higgins eye, snuffbox and sheepnose mussels. These mussel species were not found during mussel surveys within the Project Area and are usually found in a high quality mussel bed, which the Project Area does not have.

State-listed threatened and endangered species populations would likely not be affected under the proposed project. There was one state-listed mussel that was observed during the 2017 sampling event. Though a single *Quadrula nodulata* was observed it is unlikely that

the project would have an adverse effect on this species as it is considered common in Pool 2. Though there is a possibility that other state-listed mussels may be present, the Project Area is not deemed as favorable mussel habitat or does not contain any known mussel beds.

7. Other Wildlife

The proposed project would likely have a positive long-term effect on other wildlife such as waterfowl, shorebirds, and other wildlife species that would utilize the unique habitats that would be created within the Project Area.

8. Actions Taken to Minimize Impacts

Due to what was observed and found during mussel surveys, no action or mitigation would be completed to preserve benthic organisms within the Project Area. There is an active bald eagle nest (2019) found near the vicinity of Project Area. Prudent avoidance measures would be taken to insure that construction complies with the Bald and Golden Eagle Protection Act.

F. Proposed Disposal Site Determinations

1. Mixing Zone Determination

Fill material placement and dredging to construct the proposed project would cause a minor increase in turbidity levels in the immediate project vicinity. However, no long-term adverse impacts to water quality would likely occur from any of the proposed project features/activities.

2. Determination of Compliance with Applicable Water Quality Standards

It is not anticipated that the proposed project would violate Minnesota's water quality standards for toxicity. Material from dredge cuts within Pool 2 are periodically analyzed for specific chemical and physical characteristics to assure dredged material within placement sites are relatively clean and free of contaminants. Fill material to construct the island would be sourced from authorized dredged material placement sites that are permitted through the MPCA. Rockfill used for rock groins and the bullnose structure would come from approved quarries within the area. Water quality certification would be obtained from Minnesota prior to project construction.

3. Potential Effects on Human Use Characteristics

a. Municipal and Private Water Supply

No municipal or private wells would be impacted by the proposed project.

b. Recreational and Commercial Fisheries

Fish within the Project Area would be temporarily displaced during the proposed construction, but this effect would be temporary and minor. The proposed project

would likely have a long-term positive impact on the local fishery through the construction of the fish overwintering habitat south of the proposed island.

c. Water Related Recreation and Aesthetics

The completion of the proposed project would result in a benefit toward recreational opportunities within the area. Creation of the fish overwintering habitat would allow for better fishing opportunities, specifically during the winter months via ice fishing. Spring and summer months could see an increase in recreational boaters, kayakers and canoers due to the aesthetics and beach habitat the island would provide.

d. Cultural Resources

The potential for the Project Area to contain intact, significant cultural resources is remote. Construction of the proposed island would partially mimic past floodplain landforms. The Corps has determined that the project will have no adverse effect to historic properties within the Project Area. A synopsis of the cultural resources investigations for the project can be found in Chapter 4.3 of Environmental Assessment. See Appendix H for Section 106 correspondence and Native American consultation.

G. Determination of Cumulative Effects on the Aquatic Ecosystem

A number of factors would impact the future environment of the UMR, specifically within Pool 2. Some of those factors include the continued operation and maintenance of the navigation system, hydrologic and hydraulic processes in an altered environment, commercial traffic, public use, point and nonpoint source pollution, commercial and residential development, agricultural practices and watershed management, and exotic species. The factors most likely to affect the future of the Lock and Dam 2 Protective Island area are those related to public use, shoreline erosion, and turbidity effects due to wind-generated waves. The completed project would provide a recreational benefit that would likely increase public use of the area. The proposed project would decrease the erosion rate on the Lock and Dam 2 embankment and increase and enhance the habitat diversity within the Project Area, resulting in a positive effect on the UMR ecosystem.

H. Determination of Secondary Effects on the Aquatic Ecosystem

No significant secondary effects on the aquatic ecosystem would be expected from the proposed action.

III. Finding of Compliance With Restrictions on Discharge

1. No significant adaptations of the guidelines were made relative to this evaluation.

2. The proposed fill activity would comply with the Section 404(b)(1) guidelines of the Clean Water Act. The proposed project is the least environmentally damaging practicable alternative.
3. There are no practical and feasible alternatives to the placement of fill in the proposed areas that would meet the objectives and goals of this project.
4. The proposed fill activity would comply with State water quality standards. The disposal operation would not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.
5. The proposed projects would not harm any endangered species or their critical habitat.
6. The proposed fill activities would not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreation and commercial fishing. The proposed activities would not adversely affect plankton, fish, shellfish, wildlife, and special aquatic sites. The life stages of aquatic life and other wildlife would not be adversely affected. Significant adverse effects on aquatic ecosystem diversity, productivity, and stability and on recreational, aesthetic, and economic values would not occur.
8. On the basis of this evaluation, I have determined that the proposed discharge complies with the requirements of the guidelines for discharge of dredged or fill material.

Date

Karl D. Jansen
Colonel, Corps of Engineers
District Engineer