Appendix B:

Draft Environmental Assessment

LOCK AND DAM 2 PROTECTIVE ISLAND PROJECT

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Draft Environmental Assessment

Lock and Dam 2 Protective Island Project

Pool 2, Upper Mississippi River
River Mile 815.2
Dakota County, Minnesota

US Army Corps of Engineers
St. Paul District

August 2020

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Table of Contents

List of Tables

List of Figures

Reference Appendices

Executive Summary – Lock and Dam 2 Protective Island Project

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 current embankment is being degraded due to erosion via wind-driven wave action, ice action and river currents. The goal of the Lock and Dam 2 Protective Island Project would be to protect the current embankment from erosive forces, while providing environmental benefits to the area through the beneficial use of dredged material.

To address the environmental effects associated with the proposed project and to ensure compliance with the National Environmental Policy Act of 1969, the Corps is preparing a draft environmental assessment with the following preliminary assessment results:

The Proposed Alternative (creating a protective island) would result in minor long-term benefits to noise levels, aesthetic values, commercial navigation, habitat diversity and biological productivity; and substantial benefits to recreation, terrestrial habitat and wetlands. The Proposed Alternative would result in temporary minor adverse effects on noise, aesthetics, air quality, and surface water quality; a one-time minor adverse impact to biological productivity and long-term minor adverse effects to aquatic habitat within the Project Area. The protective island would provide a diverse riparian habitat with the potential to attract natives species (e.g., nesting turtles, shorebirds, overwintering fish) while providing the required protection to the existing embankment at Lock and Dam 2.

The Corps' preliminary determination is that the Proposed Alternative would not have a significant effect on the quality of the human environment; therefore, this project will not require the preparation of an Environmental Impact Statement.

CHAPTER 1.

INTRODUCTION

1.1 Background

The St. Paul District U.S. Army Corps of Engineers (Corps) is proposing to implement a project to protect and stabilize the current earthen embankment at Lock and Dam 2 of the Upper Mississippi River (UMR). Lock and Dam 2 creates Pool 2 of the UMR, is located at River Mile 815.2, and is entirely within Minnesota. The current riprap on the Lock and Dam 2 embankment is becoming degraded due to erosion from long wind fetch, moderate ice action and a lack of protective vegetation. Wind fetch at Lock and Dam 2 is close to three miles in length, making the forces acting on the embankment some of the strongest in the St. Paul District. For this reason, increased protective measures at Lock and Dam 2 are required.

A summary of the repair needs at the Lock and Dam 2 embankment were determined through a Problem Appraisal Report (PAR) completed by the Corps in November 2017. This PAR focused on evaluating the embankments of Locks and Dams 2 through 10 on the UMR to assess condition, prioritize needs, and recommend protection strategies. Through the PAR there were a number of different options that were discussed that could provide protection for the UMR embankments. These options included adding additional riprap to the current embankment, constructing an offshore island, and/or building a riparian berm adjacent to the embankment (Figure 1-1). Offshore islands and riparian berms could be implemented as either a high or low elevation structure, with the high option demanding more dredged material. The construction option chosen by the Corps would need to provide sufficient erosion protection, thus ensuring embankment stability. In addition to providing protection to earthen embankments, the PAR considered the use of dredged material to provide environmental benefits. The environmental goal for embankment rehabilitation was to incorporate prudent measures that would advance the environmental sustainability of the UMR. Through the PAR, Lock and Dam 2 was deemed as a high priority.

1.2 Purpose and Scope of the Investigation

The goal of the Lock and Dam 2 Protective Island Project would be to protect the current earthen embankment and implement a beneficial use of dredged material. The earthen embankment along with Lock and Dam 2 maintains the water surface elevation in Pool 2, making it a vital structure within the area. As mentioned above, the major stressors acting on the embankment are long wind fetch and moderate ice action, resulting in reoccurring degradation and erosion. Lessening or eliminating these stressors on the earthen embankment would ensure the longevity of the structure.

This Environmental Assessment (EA) provides a concise study on the different Project Alternatives considered and the Proposed Alternative that was chosen to fulfill the purpose of the project. The project scope includes habitat within the immediate vicinity of the upstream side of the Lock and Dam 2 embankment, which is further described in chapter 1.3 (Project Location and Area). Any activities or potential impacts associated with using dredged material temporary placement sites within Pool 2, as

part of this project, will not be discussed. Activities or actions associated with the use of these temporary placement sites (e.g., removal or placement of dredged material) are covered under the 1997 Channel Maintenance Management Plan (see chapter 1.5.6 for more information) and subsequent updates. This report has been prepared to comply with the National Environmental Policy Act (NEPA) of 1969.

1.3 Project Location and Area

The Project Area is within the UMR outside of the 9-Foot Navigation Channel on the upstream side of the Lock and Dam 2 embankment. The Project Area is located at River Mile 815.2 and is depicted in Figure 1-2. This area includes the Corps' Lock and Dam facility, which the awarded contractor would utilized as a potential staging area for construction equipment and access to the project. 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). The Project 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. As such, governmental units within the corridor have comprehensive plans to account for planning and development activities. The MRCCA shares a boundary with the MNRRA corridor. The Project Area 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 geographic scope for this Environmental Analysis encompasses the immediate Project Area, the surrounding floodplain, and Lower Pool 2.

1.4 Authority

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 would be conducted as maintenance to structures or features, which are authorized through these acts.

1.5 Related Studies and Reports

There are a number of studies and reports that the Corps has completed or is in the process of completing that deal with repair or modification of Lock and Dam embankments throughout the UMR. There are also studies within Pool 2 of the UMR that deal with channel maintenance and have the potential to impact the use of dredged material for the Lock and Dam 2 Island Project.

1.5.1 MISSISSIPPI RIVER LOCKS AND DAMS 2-10 EMBANKMENT PROTECTION PROBLEM APPRAISAL REPORT

This document, completed in November of 2017, evaluated the embankments of Lock and Dams 2 – 10 to assess condition, prioritize which embankments require protection and offered protection strategies. This document indicated the need for added protection at the Lock and Dam 2 embankment.

1.5.2 LOCK AND DAM 2 PERIODIC INSPECTION NO. 10, PERIODIC ASSESSMENT NO. 1

This document is a requirement through ER 1110-2-1156 and consists of a Periodic Inspection and a facilitated Potential Failure Mode Analysis for Lock and Dam 2 embankment. This document is used by the Corps to make risk informed decisions on how to best repair and implement dam safety standards.

1.5.3 EMBANKMENT REHABILITATION, MAINTENANCE AND ENVIRONMENTAL RESTORATION: LOCK AND DAM 4 EMBANKMENT

This Environmental Assessment was completed for a similar embankment project at Lock and Dam 4, which resulted in the construction of two riparian berms adjacent to the earthen embankment. Construction of the riparian berms were completed in 2009, resulting in erosion protection and habitat benefits.

1.5.4 LOWER POOL 2 CHANNEL MANAGEMENT STUDY: BOULANGER BEND TO LOCK AND DAM NO. 2

This feasibility report focuses on how the Corps would manage the channel in Lower Pool 2 between River Miles 815.2 and 821. The coverage area for this report encompasses the Project Area for the Lock and Dam 2 Island Project; therefore, focuses on similar environmental and socioeconomic topics. This feasibility study also looked at the potential uses for dredged materials from channel maintenance at Boulanger Bend and where they could be utilized within Pool 2. As of February 2020, this project is partially constructed and slated completion once material from the channel widening can be placed.

1.5.5 POOL 2 DREDGED MATERIAL MANAGEMENT PLAN

This draft report is currently under development by the Corps. Long term planning for dredged material placement in the St. Paul District has been ongoing since the mid-1970's, starting with the Great River Environmental Action Team (GREAT) study from 1974 -1980, and followed by the Channel Maintenance Management Plan finalized in 1996. Issues to be addressed in the Pool 2 Dredged Material Management Plan (DMMP) include increased sedimentation throughout Pool 2 and the lack of long-term upland dredged material placement sites available.

The Pool 2 DMMP tentatively selected plan would include the continued use of existing placement site (Southport) and the creation of a new placement site within Lower Grey Cloud Island. Other temporary placement sites throughout Pool 2 would remain active; however, usage would be of a limited capacity or on a contingency basis. Material placed at Lower Grey Cloud Island would be placed permanently within a mining pit. The combined usage of Southport and Lower Grey Cloud Island would provide permanent dredged material placement for 40 years within Pool 2.

1.5.6 CHANNEL MAINTENANCE MANAGEMENT PLAN AND EIS

This 1996 plan and accompanying Environmental Impact Statement (1997) is the St. Paul District's plan for management of channel maintenance. Much of the plan is devoted to the designation and design of dredged material placement sites throughout the UMR. This plan discusses activities, actions and the potential environmental impacts associated with utilizing the temporary dredged material placement sites within Pool 2. The Pool 2 DMMP and CMS are supplements to the Channel Maintenance Management Plan (CMMP).

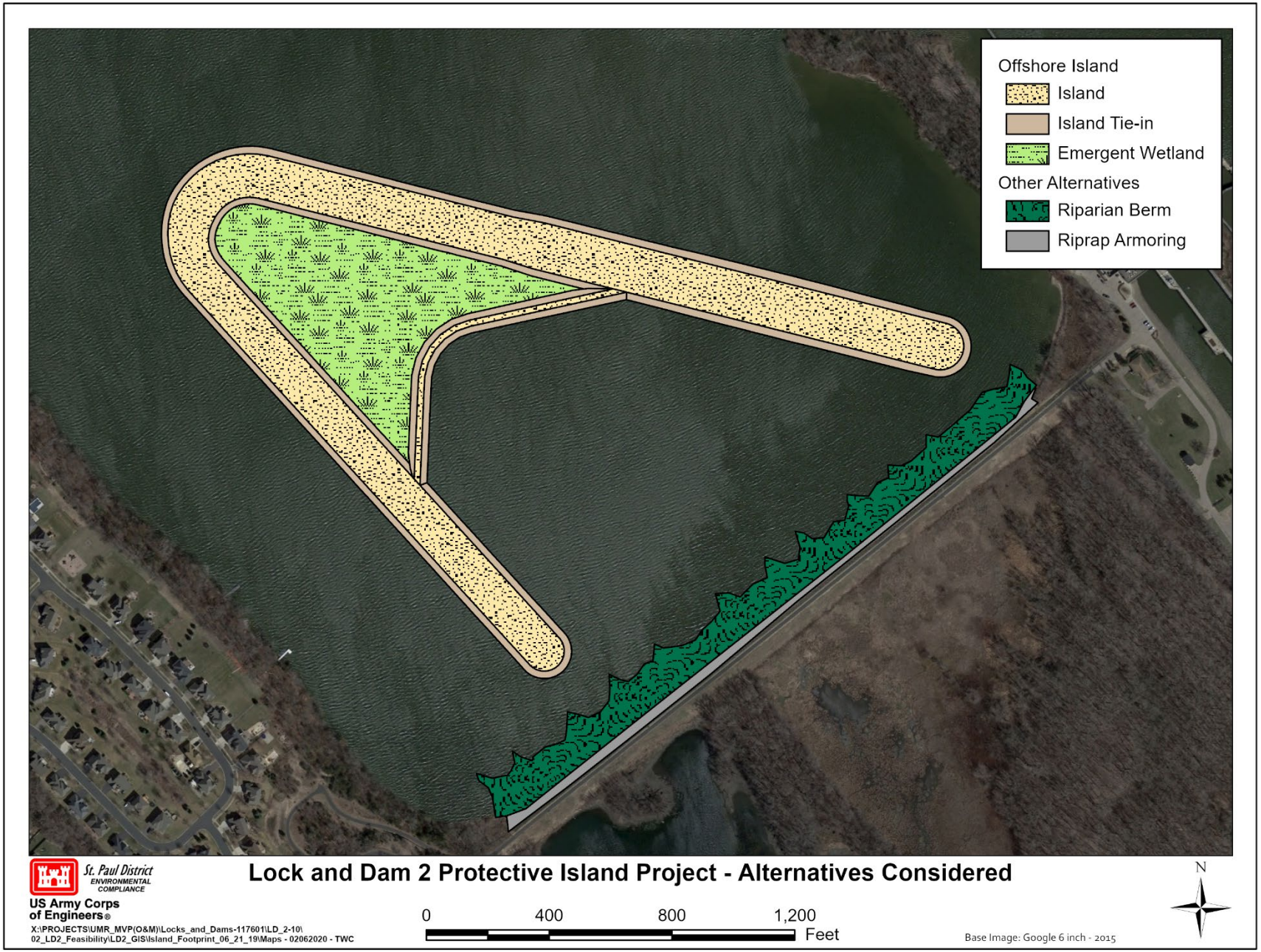


Figure 1-1. Alternatives considered for the Lock and Dam 2 Protective Island Project.

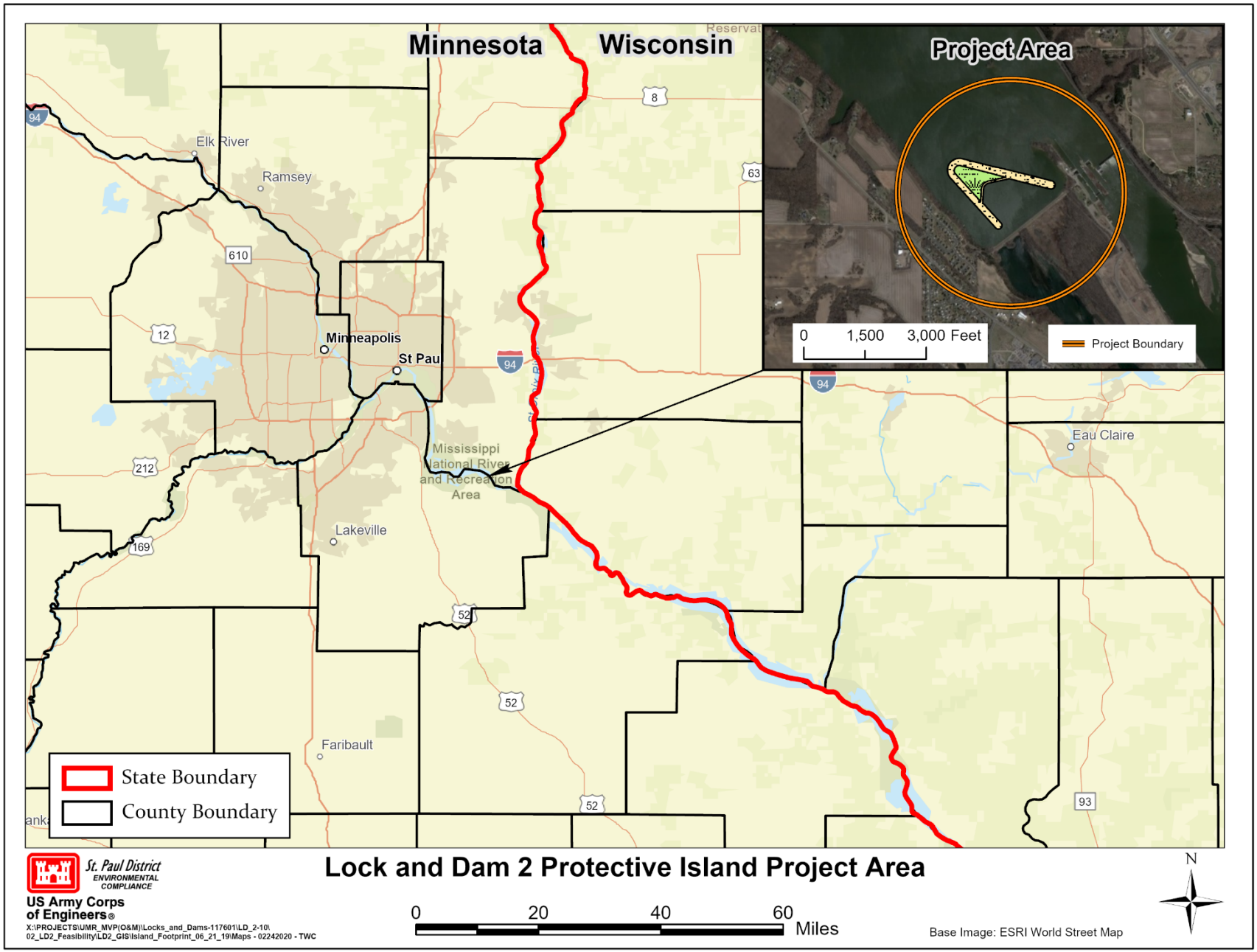


Figure 1-2. Lock and Dam 2 Protective Island Project Area.

CHAPTER 2.

PROJECT ALTERNATIVES

2.1 No-Action Alternative

The current approach toward embankment maintenance is to conduct preventative maintenance, repair, and rehabilitation to the embankment or embankment sections when deemed necessary by the Corps. As this action is currently in use at the Lock and Dam 2 embankment, this is considered the No-Action Alternative and would not result in a change from the present standard practice at the embankment. The embankment is inspected with sounding, diving and visual inspections to identify any areas in need of repair. This information is then processed into a Periodic Inspection or Periodic Assessment Report through the Corps' Dam Safety Program. Repair is typically limited to correction of erosion damage in localized areas. In the past, urgent or emergency repairs to the embankment were required when wave action from high water caused widespread erosion damage (i.e., 2001). Traditional Operation and Maintenance (O&M) repair has been the use of riprap to fix erosion damage due to its cost effectiveness and ease of installation. The use of riprap has often raised concerns by coordinating agencies due to its potential effect on wildlife. For this EA, repair of the embankment at Lock and Dam 2 will be used as a baseline to compare other alternatives, with the most logical repair method being re-riprapping the embankment.

2.1.1 RIPRAP ARMORING

Riprap armoring is an alternative option that was discussed within the PAR and is the traditional repair method chosen through O&M (Figure 1-1). Riprap armoring would have a reduced initial cost compared to other alternatives and be fairly simple to design and carry out. Disadvantages to re-armoring the embankment would be that it would not solve the problem of erosive forces acting on the embankment, which means the embankment would likely require additional re-armoring in the future. Riprap armoring was not viewed as the best option at Lock and Dam 2 through the PAR and therefore, was not chosen as the Proposed Alternative for this project. Riprap armoring would most likely be utilized for the No-Action Alternative, as some form of protection would be necessary at the embankment in the future.

2.2 Proposed Alternative

The primary goal of the Lock and Dam 2 Protective Island Project is to protect the embankment from the multiple erosive forces acting on it. A secondary goal of the project is to provide a beneficial use of dredged material within Pool 2. In order to accomplish this, an offshore protective island would be constructed upstream of the existing embankment using dredged material (sand) made up of conventional sand (granular) and fine-grained sand (silts and clays, fine fill or fines) from dredged material

placement sites within Pool 2 (Figure 2-1). The design of the protective island would diminish the erosive forces acting on the embankment and allow for a large quantity of dredged material from Pool 2 to be used in a beneficial manner.

An offshore protective island near the Lock and Dam 2 embankment would prevent erosion to the embankment during both low and high water conditions by reducing wind fetch and ice action. The island would be equipped with rock groins and a riprap bullnose structure to provide protection and stability, as the main erosive forces would be acting on the island instead of the embankment (Figure 2-2). The island would provide the necessary protection to the embankment without requiring additional work to the embankment itself (i.e., riprap armoring).

In addition to embankment protection, a number of features would be implemented during construction to provide environmental benefits to the Project Area (Figure 2-2). These features would include an area of emergent wetland behind the island, an area of overwintering fish habitat, and varying elevations that would sustain different vegetation types (Figures 2-3, 2-4, 2-5). Varying vegetation types would result in different terrestrial habitat, which would allow for a greater variety of native species that could utilize these habitats. Higher elevations on the island would provide sustained protection to the embankment during severe flood events. For the collective reasons above, the protective island was selected as the Proposed Alternative by the Corps' Project Delivery Team.

2.2.1 PROTECTIVE ISLAND IMPLEMENTATION AND CONSTRUCTION

Construction of the protective island would utilize mostly granular dredged materials (sand) for the island base and fine fill for the top of the island (Figure 2-5). A fine fill mixture would be used as a turf to promote vegetation growth that would result in added erosion control, stability and habitat diversity (Figure 2-4). Fine fill material dredged from the access and overwintering cuts would be placed in the emergent wetland area. Prior to filling in the emergent wetland area with fines, part of the island and emergent wetland berm would need to be built in order to contain the fines procured from the access cuts and overwintering area. Granular material for the base of the island and the dry fines for the topsoil would come from dredged material placement sites throughout Pool 2 (Figure 2-1).

The Corps has evaluated the proposed island for general constructability, which includes building the island mechanically, hydraulically or a combination of both. The Corps is not restricting the awarded contractor's construction methodology; however, there would be stipulations in place that the contractor would have to follow. The sections below discusses the different construction option, features, best management practices and how the Proposed Alternative would potentially be implemented.

ISLAND CONSTRUCTION

As mentioned above, the Lock and Dam 2 Protective Island Project could be constructed using mechanical, hydraulic, or a combination of both construction options. During construction the awarded contractor would implement best management practices to reduce the negative impacts associated with the island construction (i.e., silt curtains, implement natural erosion control products, reduce the spread of invasive species). The

contractor would submit an environmental protection plan to demonstrate how best management practices would be used during the construction process. Any federal, state or local ordinances would be followed to minimize construction impacts. Finally, the contractor would follow any requirements established by the Minnesota Public Waters Work Permit or other required permits.

Mechanical construction would utilize barges, excavators and bulldozers to implement the Proposed Alternative. Granular sand would be excavated mechanically from dredged material placement sites (Figure 2-1) within Pool 2 and moved via barges to the Project Area to construct the island base. Once the necessary amount of material is excavated from the placement sites, the contractor would shape the finished stockpiles to provide positive drainage. The action of removing and placing sand at the temporary placement sites and any potential impacts attributed to those actions, are discussed and covered (NEPA compliance) under the 1997 CMMP. These actions are identified in the Minnesota Department of Natural Resources' (MnDNR) Public Waters Work General Permit for the 9-foot channel navigation project (See Chapter 5.3.3).

If necessary, the contractor would access the new island footprint by access dredging within the proposed access cuts and building construction pads to assist with the construction of the island base (Figure 2-6). Any access dredged material generated from this process would need to be handled in the proper manner (See Access Dredging section below). Granular fill would be placed in the island footprint using an excavator and shaped to the specified elevations, likely via a bulldozer (Figure 2-3). Once the emergent wetland berm and necessary island sections are constructed, fines from access cuts and the fish overwintering area could be dredged mechanically and placed within the emergent wetland area (Figure 2-2, 2-6). After the base of the island is constructed to match the necessary specifications, dry fines would be placed in the designated areas to provide a base for vegetation (Figure 2-5). Dry fines would be moved mechanically via barge from dredged material placement sites in the same fashion as granular material. Rock for the bullnose features and rock groins would be placed mechanically in a fashion to produce a well-graded mass with minimal void spaces.

The proposed island base could also be constructed using hydraulic dredging equipment. This would likely involve bringing dry granular material from the dredged material placement sites via barge and placing it into a hopper barge near the Project Area that can re-slurry granular material. This mixture of sand and water would then be pumped with hydraulic dredging equipment into the island footprint. During this process, parts of the island could be constructed from a distance. This process would provide the necessary containment needed for the placement of fine materials into the emergent wetland area by constructing the necessary berms around this area. Fines from the access cuts and the fish overwinter area could be placed within the emergent wetland area using hydraulic dredging equipment.

If the contractor has the capability, they could also construct the Proposed Alternative using a combination of mechanical and hydraulic construction equipment. As mentioned previously, the construction method would be left up to the contractor and likely driven by cost. The contractor would be responsible for providing the finished Proposed

Alternative in a manner that is best suited for their operation without causing environmental damage and adhering to any applicable permit requirements.

ISLAND CONSTRUCTION TIMING

Due to the project location and nature of the construction, nearly all the work would require the use of marine equipment, thus limiting construction to the open water season on the UMR. Construction in certain years can begin in April, but May is a more typical month for beginning construction due to the constraints associated with spring high water. The construction season usually lasts until late November when work must stop due to winter freeze-up. The implementation year for the Proposed Alternative would depend on the availability of funds. Based on the current O&M budget and project priorities within the St. Paul District, it is estimated that construction of this project would begin during the 2021 construction season. There is the possibility that the Proposed Alternative would take multiple field seasons to construct and fully implement.

ACCESS DREDGING

The Proposed Alterative has the potential to generate access dredged material (fines) that the contractor would need to store in the proper fashion. If the emergent wetland berm and the island around the emergent wetland area is completed, access dredged material could be placed within the emergent wetland area to begin the establishment of the emergent wetland. If this portion of the island is not constructed, access dredged material would need to be contained or stored in barges or moved to one of the authorized dredged material placement sites (Figure 2-1).

CONSTRUCTION STAGING AREAS

In order for the contractor to complete the Proposed Alternative, land within the Corps' Lock and Dam 2 facility would be provided as a construction staging area (Figure 2-6). This would provide the contractor with an area to get construction equipment and other necessary material to the Project Area in order to complete the proposed island. This area includes a barge loading and unloading area that would utilize the Corps' loading platform at the far south of the Lock and Dam 2 facility. The staging area would also provide space for parking and a construction trailer, if necessary. The contractor would provide signage indicating which areas would be closed off to the public for safety reasons. Any alterations or disturbances made to the staging area requiring a permit (i.e., Stormwater Pollution Prevention Plan), would be procured by the contractor prior to construction. This action would include best management practices (i.e., sandbags, silt curtains) to reduce the effects of stormwater runoff to the area. After construction, the contractor would restore the staging area to the original condition.

2.2.2 PROTECTIVE ISLAND CONSTRUCTION FEATURES

EMERGENT WETLAND CONSTRUCTION

The emergent wetland area would be positioned on the interior or embankment side of the island and be contained by the island and the emergent wetland berm. (Figure 2-2, 2-3). Fine fill material procured from the fish overwintering area and access dredging cuts (if applicable) would be placed within the wetland area to promote wetland growth. The

average elevation of the wetland would be set to 0.5 feet below Low Control Pool (LCP) or 658.6. The final elevation of the fine material would be variable by plus or minus one foot of elevation, which would provide varying habitat and promote a variety of wetland plants. Once finished, this area would be classified as either a Type 3 (shallow marsh) or Type 4 (deep marsh) wetland type. This emergent wetland would not be seeded, as it would likely be under water during construction. Instead, it is assumed that this area will self-vegetate with local emergent wetland plants. The elevation of the emergent wetland should discourage the establishment of invasive species (i.e., reed canary grass) due to the high likelihood of inundation throughout the growing season. After the emergent wetland area is constructed, the emergent wetland berm would be scored or breached in multiple places to the current pool level to promote the passage of water between the emergent wetland and the river. Granular material from the scoring or breaching process would be incorporated or spread into the emergent wetland area.

FISH OVERWINTERING AREA

The fish overwintering area would be used to procure the fine fill material necessary to fill in the emergent wetland area. This area would be dredged at two varying elevations, six and eight feet below LCP (Figure 2-2). Once completed, this dredged area would provide a unique habitat for fish that is currently not available within the Project Area. See Section 4.2.2 (Fisheries), for more information on the benefits the overwintering habitat would provide.

ISLAND SEEDING AND VEGETATION

Upon constructing the base of the island using granular sand, the contractor would bring in dry fines for soil and turf establishment from approved dredged material placement sites within Pool 2 (Figure 2-1). The depth of fines placed on the granular sand would be dependent on the elevation of the island and would vary between 24, 18 and 12 inches (Figure 2-5), which coincides with the seeding and vegetation plan (Figure 2-4). Seeding would involve the contractor covering all fine fill areas with either permanent native grasses or a winter wheat mixture. Winter wheat would be utilized if the permanent native grasses could not be established before the end of the growing season. The winter wheat mixture would provide winter erosion protection and temporary surface erosion control. If winter wheat is used, the contractor would establish native grasses the following construction season. Willow planting would be implemented on the exterior and interior of the 12 inch fine fill areas (Figure 2-4, 2-5). Planting would consist of 2 rows of willows, two feet apart and staggered. Once native grasses and willows are fully established, a mixture of native tree species would be planted within the 24 and 18 inch fine fill areas as part of a separate contract (Figure 2-4, 2-5). The exact composition and planting plan of these trees would be decided upon by the Corps' Environment Section located in La Crescent, MN.

ROCK GROINS

Rockfill for both the rock groins and bullnose structure would consist of R140 riprap from an authorized commercial quarry. Rock would not be placed until after the base of the island or the granular sand is in place. Rockfill could be barged to the island and placed using mechanical equipment (e.g., excavators) from the new island base or placed

from the water via excavator barge. Once complete the rock groins and bullnose structure would provide structural integrity to the island.

2.3 Other Alternatives Considered but Eliminated

2.3.1 RIPARIAN BERM

Riparian berms are earth features that are often attached to existing embankments and provide a direct barrier between erosive forces and embankments during low water conditions (Figure 1-1). During high water conditions woody vegetation growing on berms dissipates wave energy and lowers the chances that drifting ice sheets would reach the embankment during spring break-up. Riparian berms fulfill a similar role to that of a protective island; reducing erosive forces on embankments while providing habitat benefits and a beneficial use of dredged material. Berms also dissipate the zone of energy off of the embankment and onto the berm itself, resulting in less repair required for the embankment. This may result in the need to repair the berm; however, this will not constitute an emergency situation and repairs would be scheduled in a timely fashion.

Early on in the planning process the riparian berm was considered as a feasible alternative due to the protection and beneficial use of dredged material. A geological assessment determined that adding a riparian berm to the embankment would result in potential settlement of the embankment. Therefore, this alternative would require additional work to stabilize the embankment height. For this reason the alternative of adding a riparian berm adjacent to the Lock and Dam 2 embankment was eliminated from consideration for this project.

2.3.1 SECONDARY SPILLWAY

Within the PAR it was suggested that Lock and Dam 2 would be a good candidate for a secondary spillway. This spillway would incorporate a section of the embankment that is lowered 1 to 2 feet, which would reduce the head differential of the dam during overtopping. In doing so, this process would reduce through-seepage of the embankment. The addition of this feature was ultimately decided against as correcting the head differential is not viewed as a priority at this time. This action could be re-assessed and incorporated at a later date.

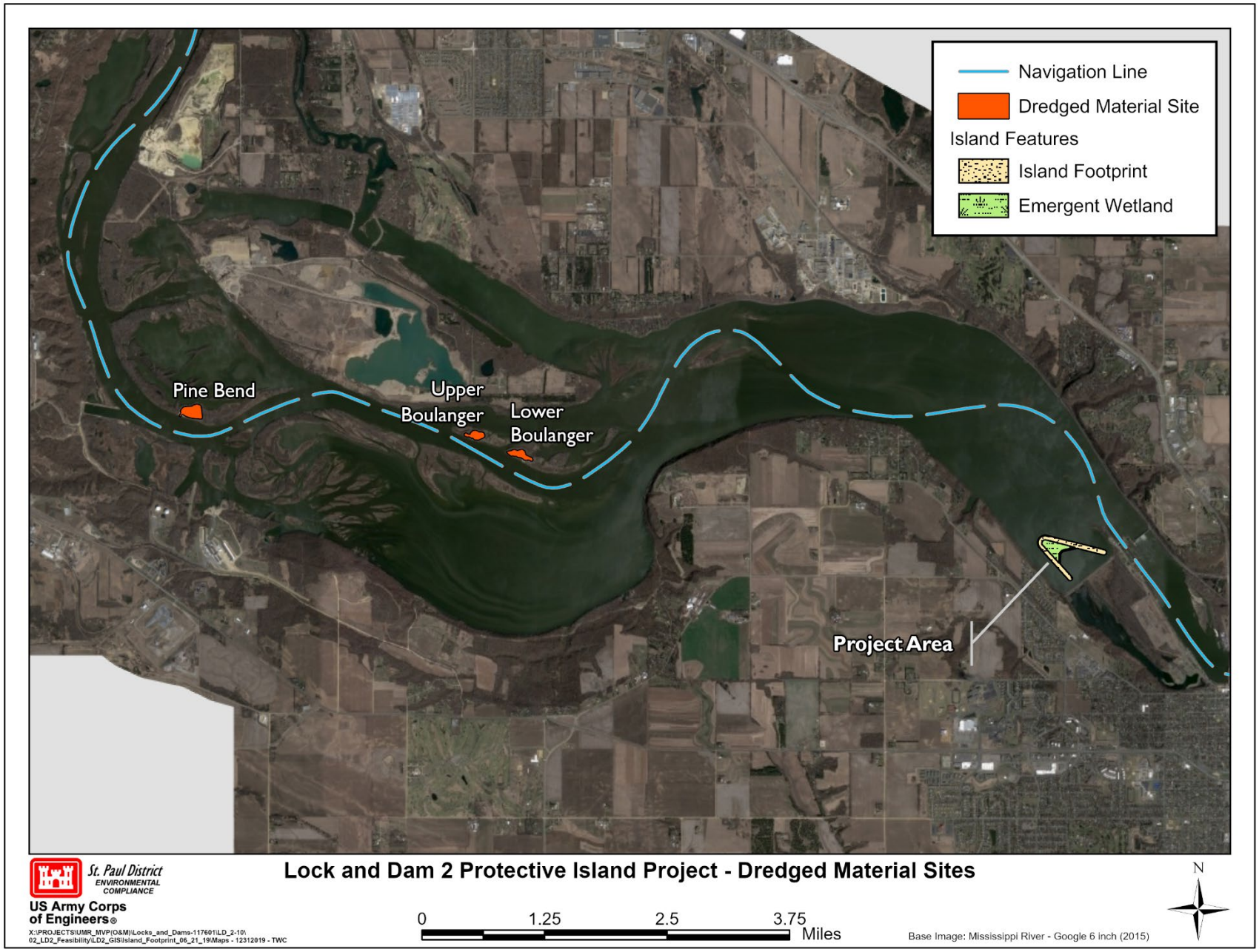


Figure 2-1. Locations of the dredged material placements sites that will be utilized to construct the protective island.

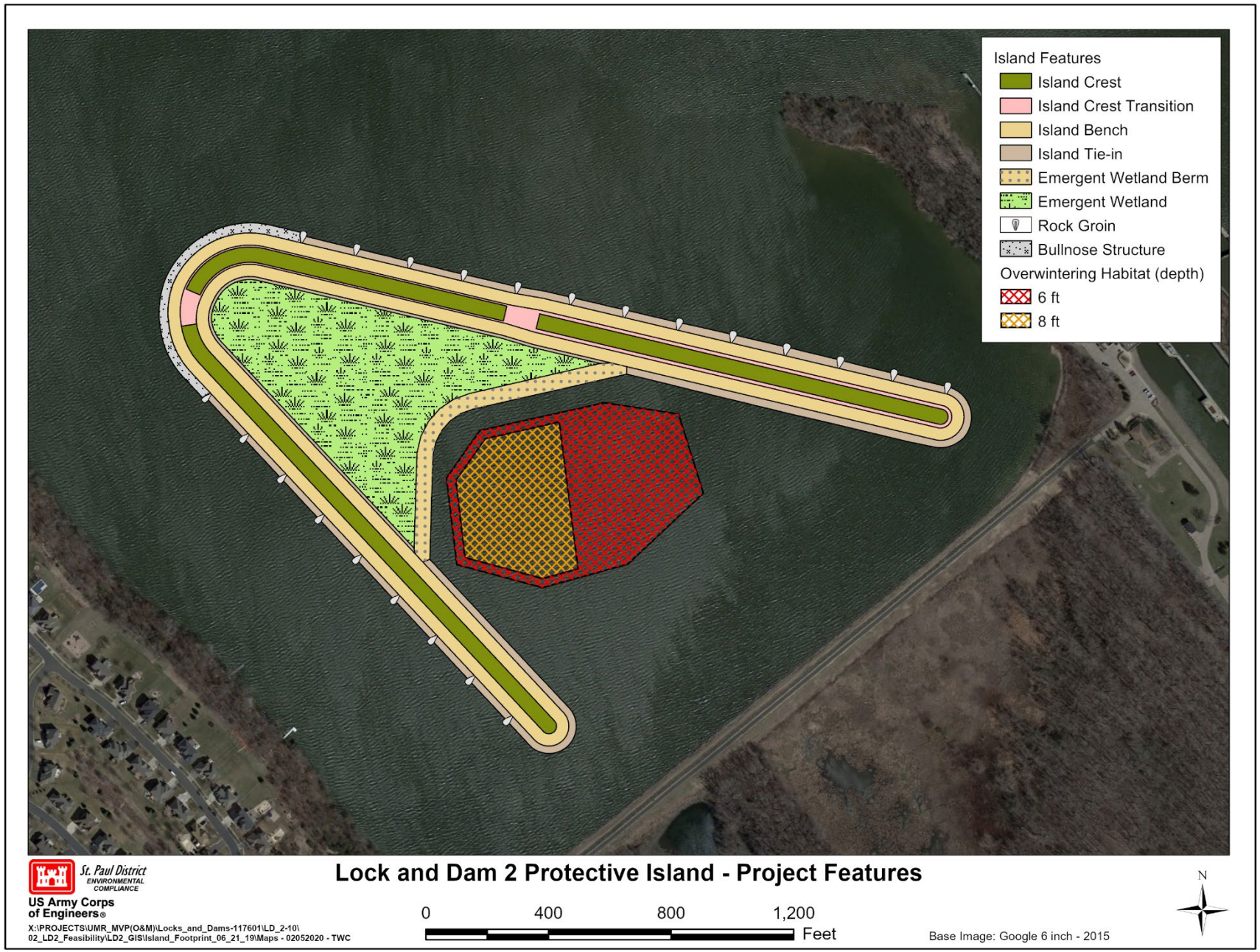
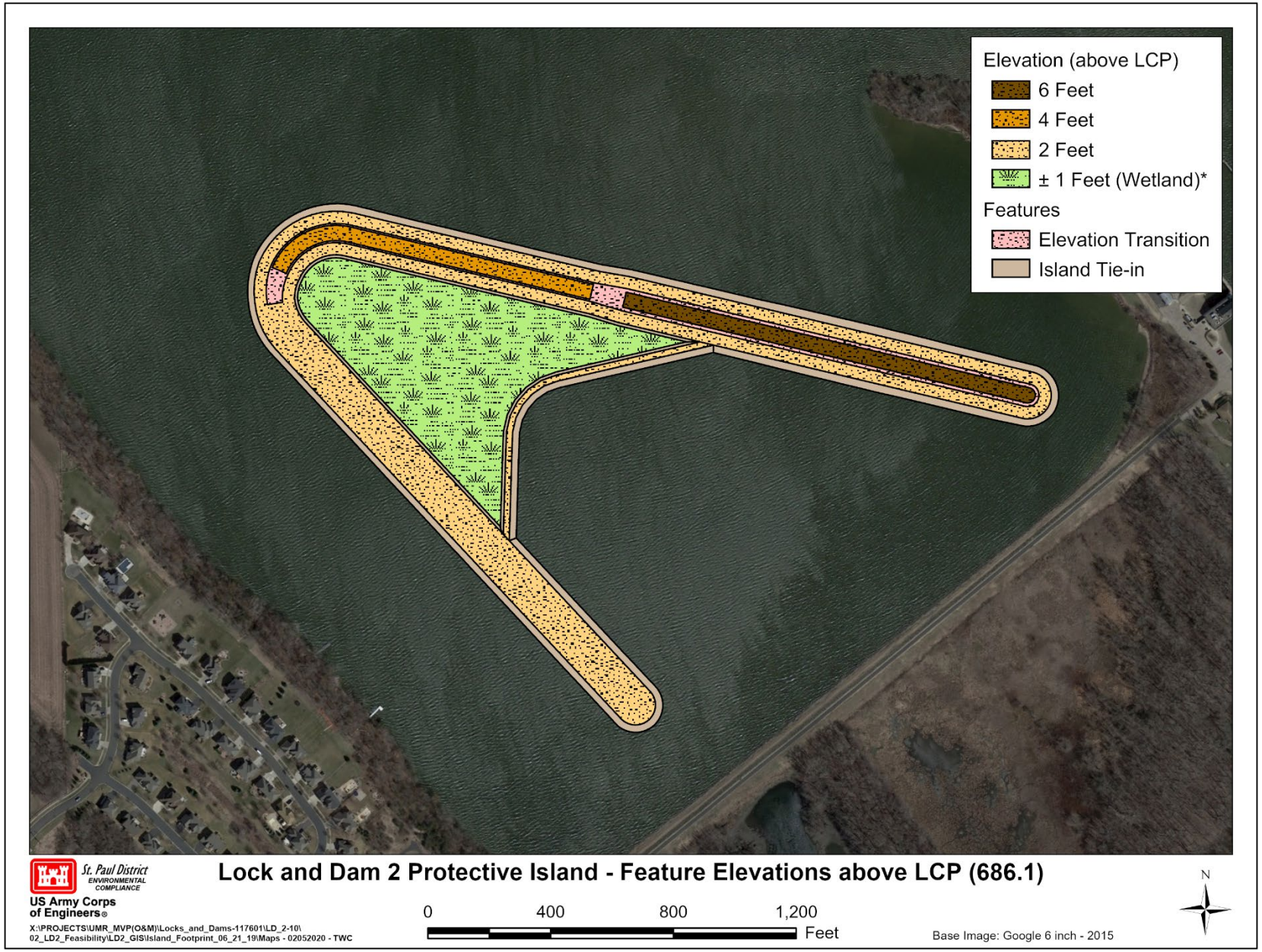


Figure 2-2. Lock and Dam 2 Protective Island Project Proposed Alternative, including the different features to be incorporated.



* The elevation of the emergent wetland is set at 0.5 feet below LCP or an elevation 685.6.

Figure 2-3. Lock and Dam 2 Protective Island Project proposed elevations and transition zones.

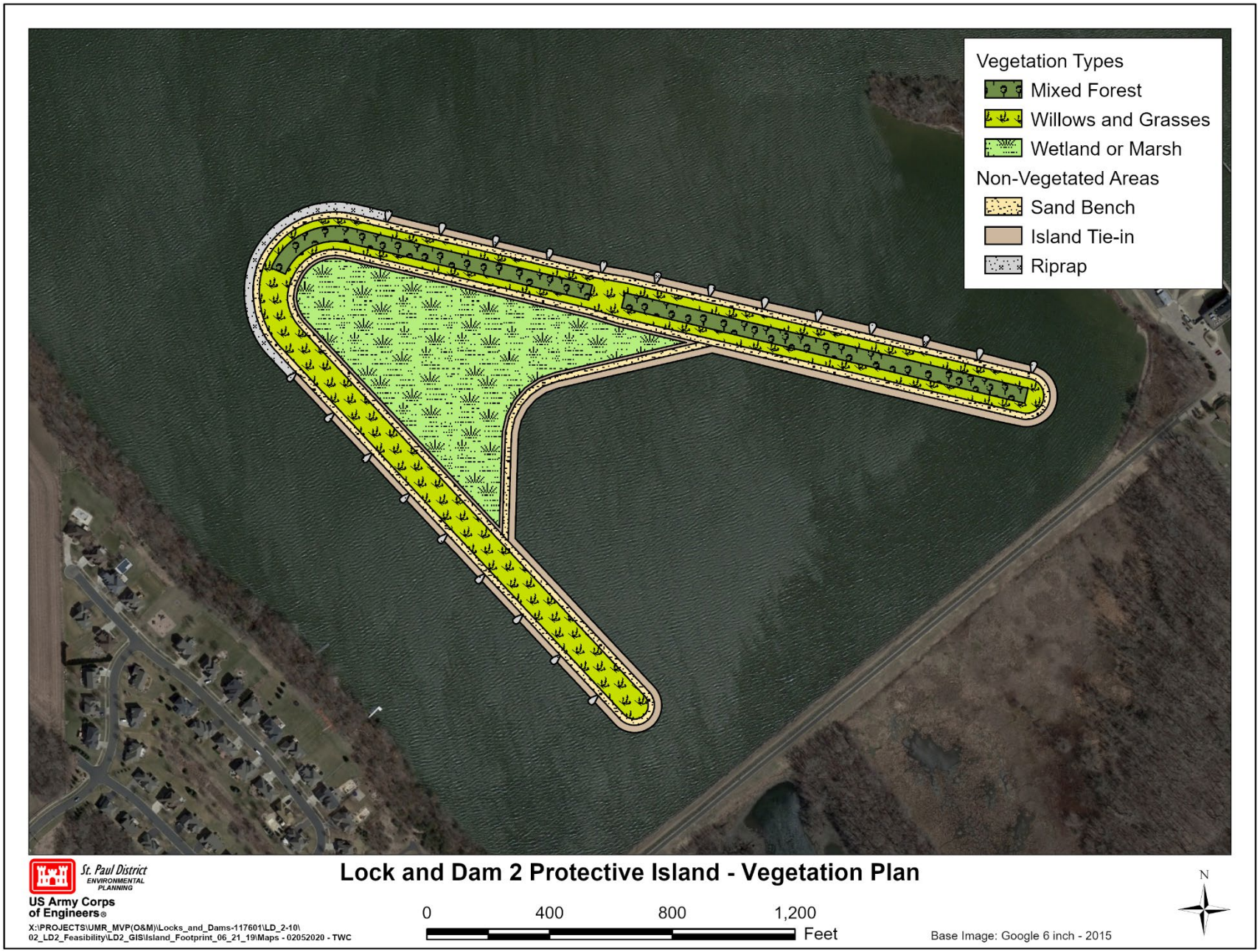


Figure 2-4. Lock and Dam 2 Protective Island Project proposed vegetation areas and vegetation types.

Figure 2-4. Lock and Dam 2 Protective Island Project material composition.

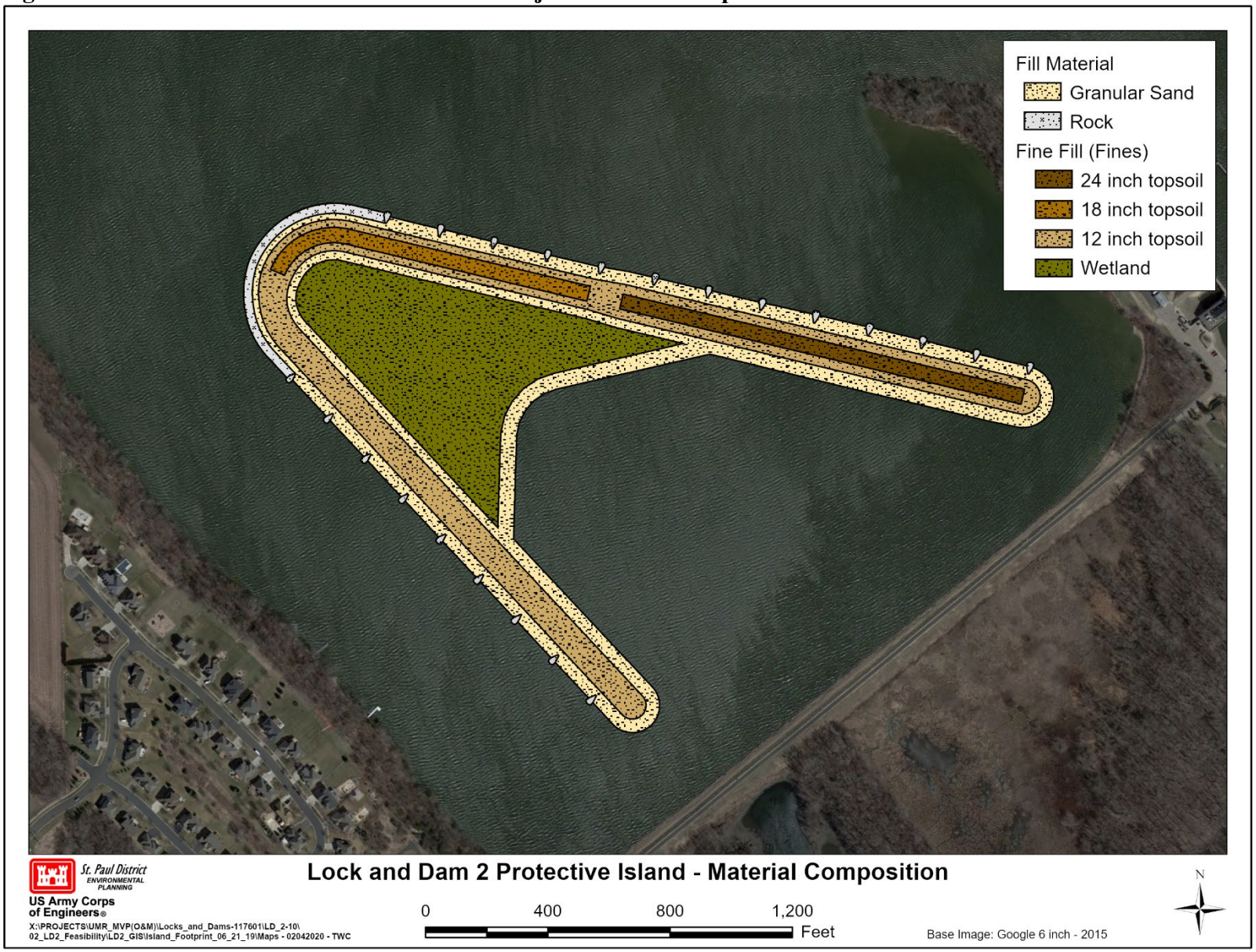


Figure 2-5. Lock and Dam 2 Protective Island Project material composition.

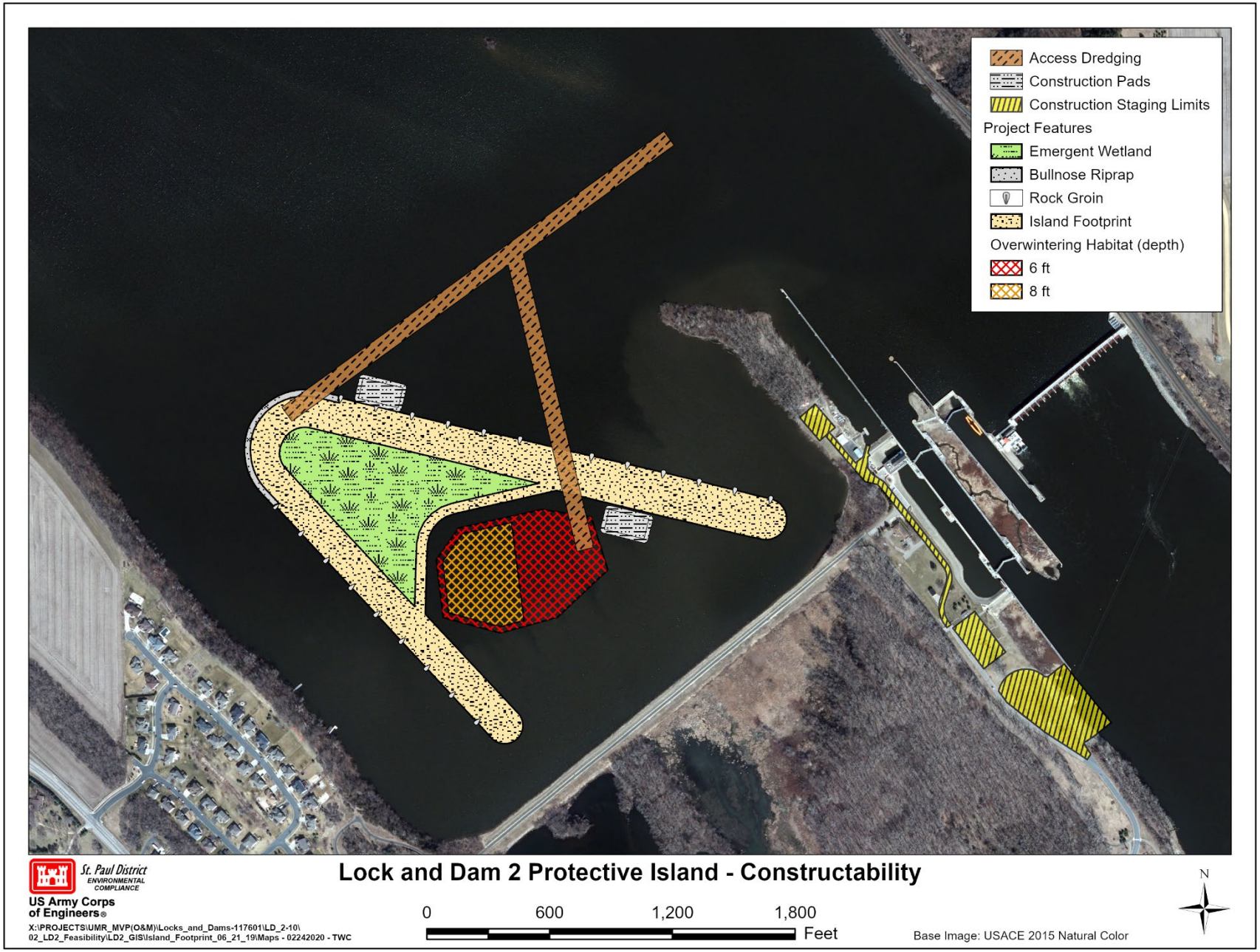


Figure 2-6. Lock and Dam 2 Protective Island Project constructability features.

CHAPTER 3.

AFFECTED ENVIRONMENT

3.1 Socioeconomic Conditions

The Project Area is located in Pool 2 of the UMR approximately 21 miles downstream of St. Paul, Minnesota and is within the 13-county Minneapolis-St. Paul-Bloomington, MN/WI metropolitan statistical area (MSA). The 2016 population for the area was 3,551,036, an increase of 6.1% from the 2010 population. The largest counties by population are Hennepin, Ramsey and Dakota Counties, with the most populated cities being Minneapolis, St. Paul and Bloomington, MN. MSA per capita household income in 2016 was $73,231 which is 11.6% greater than the state level and 27.1% greater than the nation as a whole. Important industries for employment include social services (includes education and health care – 23.3% vs. 22.9% ± 1.6% for the U.S.), manufacturing (13.2% vs.10.5% ± 2% for the US) and retail trade (10.8% vs. 11.3% ± 1.6% for the U.S.).

More precisely, the Project Area lies within the city limits of Hastings, MN, which in 2016 had of population of 22,501, an increase of 1.5% from the 2010 population. Hastings lies along the right descending bank of the Mississippi River within Dakota County. MSA per capita median household income for Hastings, MN in 2016 was $62,155 and median property value was $182,800, which is 5.3% and 13.7% (respectively) lower than the state average. As of 2016, Hastings has a poverty rate of 8.0%, 1.9% lower than the state average. The neighborhoods nearest the Project Area are Eagle Bluff and Featherstone Road, which would be most impacted by the Proposed Alternative. The neighborhood closest the Project Area, Eagle Bluff, contains around 80 homes, 13 of which contain land adjacent to the Mississippi River. This neighborhood is classified as a river neighborhood by the MRCCA district classification, while Featherstone Road is not visible from the river and classified as a district separated from the river.

3.1.1 NOISE

Noise levels within the Project Area are similar to that of other semi-populated UMR reaches or areas. Though the Project Area is not densely populated, there are a few neighborhoods within the vicinity that would receive noise pollution. The Project Area is also close to Lock and Dam 2, which generates noise pollution through the process of commercial navigation. Like other areas along the UMR, the Project Area has occasional to frequent commercial and recreational boat traffic. Noise levels increase as commercial and recreational watercraft move through the Project Area and decreases as watercraft depart from the area. In general, the Project Area experiences higher noise levels during daylight hours while boat traffic and recreational usage is typically higher.

3.1.2 AESTHETICS

The Project Area itself lies within the MNRRA and MRCCA corridors, making it an important natural area. In general, governmental plans in these areas are established to preserve and enhance the natural and aesthetic resources of the UMR. Any action that would result in the aesthetic enhancement of the area would align with these plans. The area surrounding the Project Area has a number of scenic lookouts that provide the opportunity to observe the unique landscape of the UMR. The embankment itself contains a walking trial that can be utilized to see the surrounding areas (i.e., Lake Rebecca, Pool 2). Areas outside of the Project Area includes the Spring Lake Park Reserve, which includes Schaar's Bluff Trail and lookout (Figure 3-1).

3.1.3 RECREATIONAL OPPORTUNITIES

In the past, poor water quality has limited the recreational value of Pool 2. Recent improvements and interest in the water quality of this region continue to increase the potential for recreational activities. As of 2004, there were 11 boat accesses and 5 marinas in Pool 2. The lower section of Pool 2 is less developed than the rest of the pool and offers fishing and boating opportunities. Private docks and accesses are also scattered throughout the region, including several docks at the southern end of the pool near the Lock and Dam 2 embankment. The Project Area encompasses several walking and biking trails, specifically the Mississippi River Regional Trail, which is a partially completed 27 mile trail within Dakota County. A section of this trail lies within the Project Area and crosses the Lock and Dam 2 embankment. Other recreation opportunities just south of the Project Area include Lake Rebecca Park and Jaycee Park. Lake Rebecca Park is situated around parts of Lake Rebecca and has a boat launch, fishing pier and picnic tables. Jaycee Park has a number of picnic tables and benches and includes a boat launch and dock, providing access to Pool 3 of the UMR (Figure 3-1).

3.1.4 COMMERCIAL NAVIGATION

The Project Area resides within Pool 2 of the UMR, which serves as a link between the Minneapolis-St. Paul Metro, Minnesota River and the remainder of the UMR downstream. Commercial navigation along the UMR is a large contributor to the country's transportation needs and generates a transportation cost savings of more than $1 billion annually (USACE 2008). On average, 11 million tons of cargo passes through Lock and Dam 2 annually. The main commodities of commercial navigation includes farm products, chemicals and crude/raw materials (Figure 3-2).

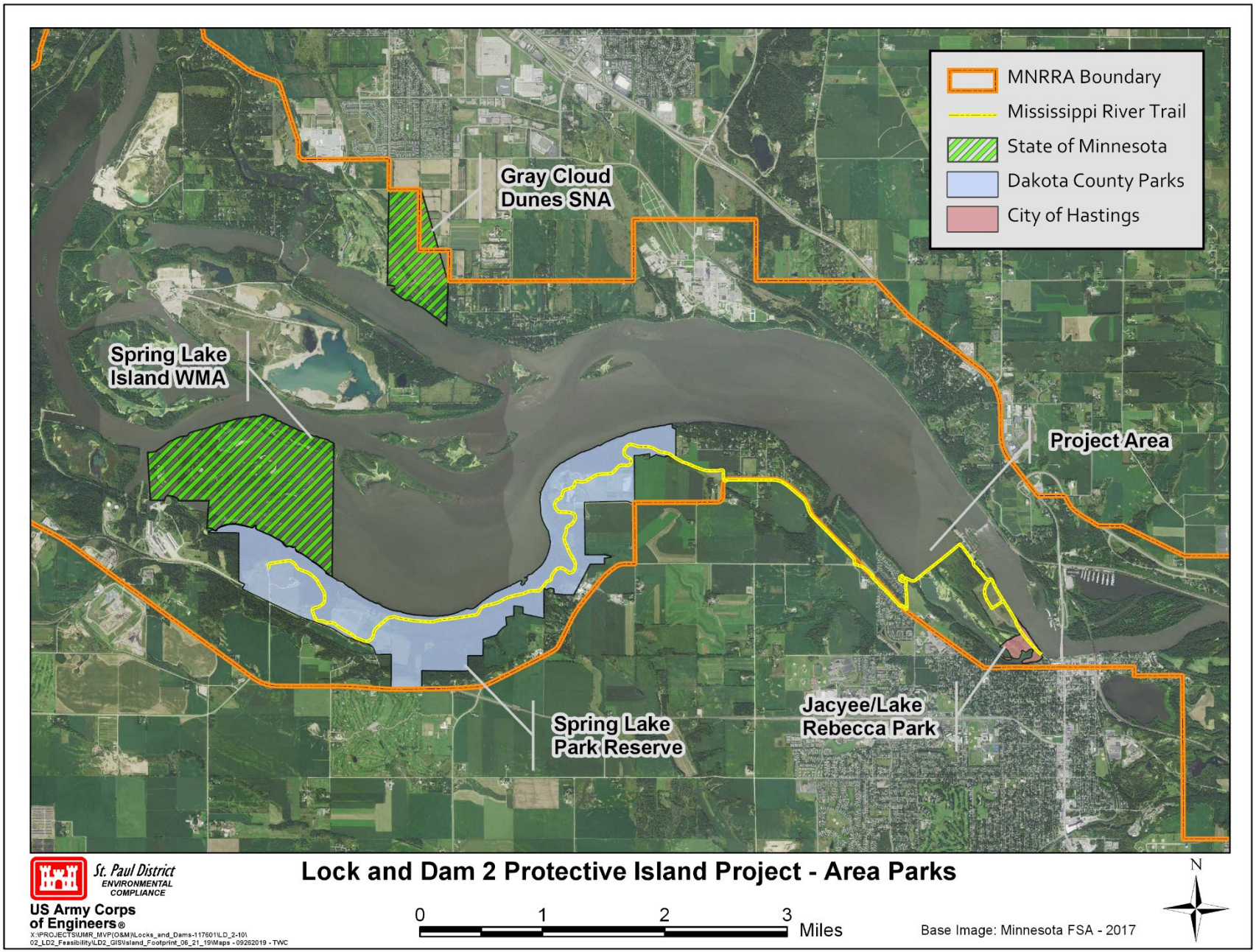


Figure 3-1. Recreation opportunities around the Lock and Dam 2 Protective Island Project Area.

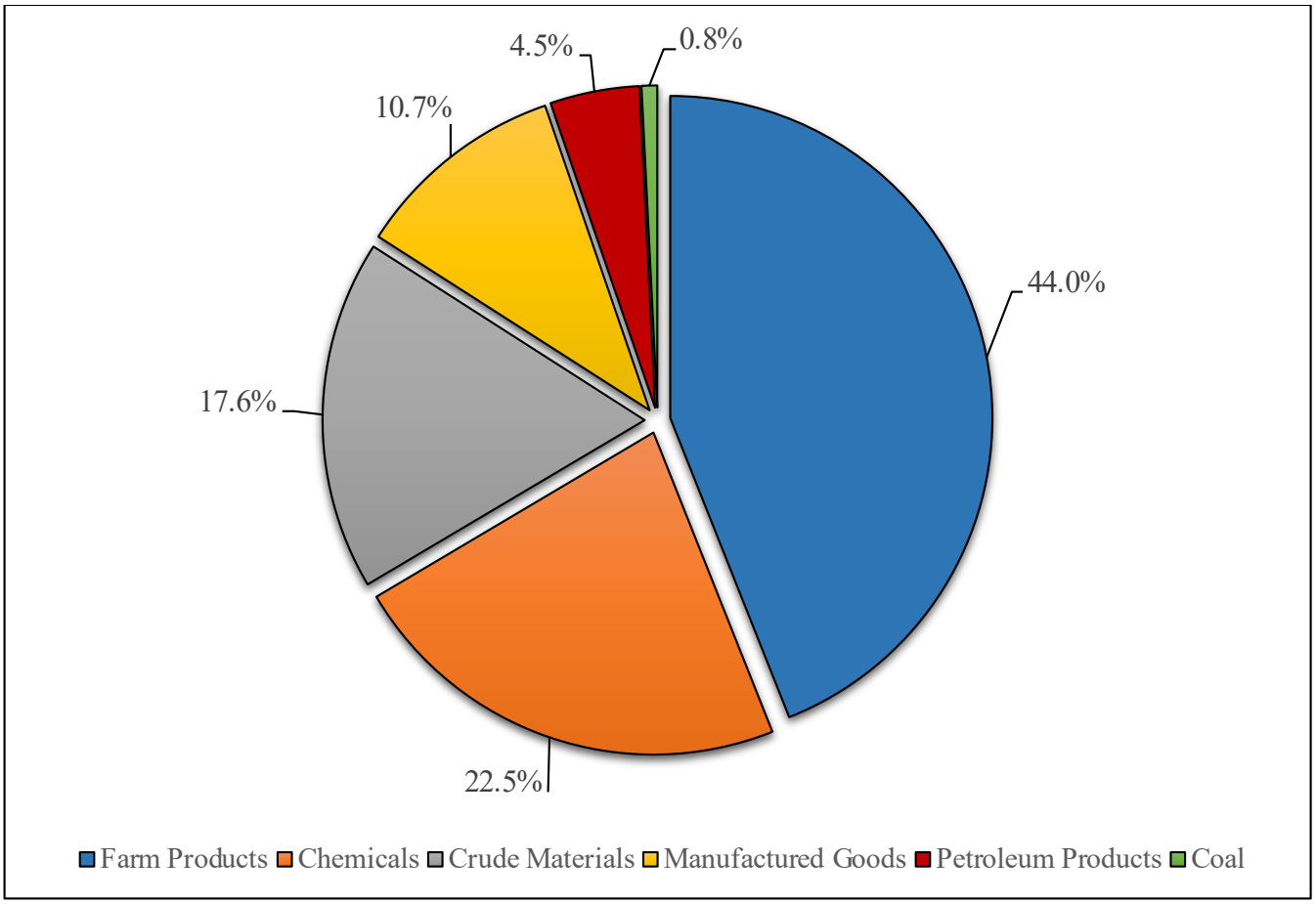


Figure 3-2. Lock and Dam 2 commercial commodities.

3.2 Natural Resources

3.2.1 PHYSICAL SETTING

The Lock and Dam 2 Protective Island Project Area is located at the downstream end of Pool 2 near the right descending bank at RM 815.2 (Figure 1-2). The existing embankment is roughly 2,500 feet in length with a shoreline of 2,200 feet. The Project Area on the upstream side of the embankment is relatively shallow in depth, as it is outside of the navigation channel (Figure 3-3). The proposed staging area for construction resides within land classified as Corps' project operations and is considered fully developed. The downstream side of the Project Area includes Lake Rebecca. This area includes wetland, floodplain forest and prairie habitats. The Project Area lies within the MNRRA corridor, an area that resides completely within the Minneapolis-St. Paul-Bloomington, MN/WI MSA, a 72 mile stretch of the UMR. Other important natural areas include Spring Lake Park Reserve, Grey Cloud Dunes Scientific and Natural Area (SNA) and Spring Lake Islands Wildlife Management Area (WMA), making this stretch of the UMR important from a natural resources standpoint (Figure 3-1).

LAND USE AND COVER TYPES

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, while the south side is classified as lake habitat (Figure 3-4). 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 there are both emergent wetlands and forested/shrub wetlands on the downstream side of the embankment (Figure 3-5). Using the Upper Mississippi River Restoration (UMRR) Program – Long Term Resource Monitoring (LTRM) data there are a total of seven different class description (15 class descriptions available) within the Project Area. These classifications include: open water, road/levee, developed, wet forest, shallow marsh, deep marsh, submersed aquatic vegetation, and upland forest (Figure 3-5). In general, adjacent to the Project Area is a mix of state, county and federal lands within the low-density residential area of Hastings and Nininger Township. Other natural areas around the Project Area including Lake Rebecca and Jaycee parks. A portion of the Mississippi River Regional Trail sits atop the embankment at Lock and Dam 2.

As the Project Area is within the MNRRA and MRCCA corridors, many of the surrounding government units have comprehensive plans to account for planning and development activities. As such, the government units of Dakota County, Hastings, and Nininger Township have management plans or comprehensive plans to address the important natural resources within these corridors. In general, these plans are in place to preserve and enhance the natural and aesthetic resources of the UMR and subsequent MNRRA and MRCCA corridors. Land adjacent to the Project Area is classified within the Dakota County Comprehensive Plan into two distinct MRCCA districts, Rural and Open Space (ROS) and River Neighborhood (RN). ROS districts are rural underdeveloped and developed low density residential land that is riparian or visible from the river and often contains tracts of high quality ecological resources; while RN is developed residential land and existing or planned parkland that is visible from the river or borders riparian parkland. Similarly, the Hastings Comprehensive Plan classified most of the land adjacent to the Project Area as an Urban Diversified District, meaning the lands and waters within this district should be developed to maintain the present diversity of commercial industrial, residential, and public uses of the land. These land classification should also protect historical sites, natural areas, environmental resources, and expand public access to and enjoyment of the river.

GEOMORPHOLOGY

The Lock and Dam 2 Embankment is situated on the UMR in a glacial valley, located in the Central Lowlands Physiographic Province. Regional topography in Dakota County is comprised of undulating till covered highlands with large outwash plains divided by modern streams. The UMR is entrenched in a glacial valley with steep riverbanks that can reach upwards of a few hundred feet in height. Upland areas on both banks of the river have a thin mantle of glacial soils overlying sedimentary rock, with bedrock consisting of alternating layers of limestone, siltstone, shale, and sandstone.

Lock and Dam 2 and the embankment are primarily situated on alluvial and lacustrine deposits consisting of poorly graded sands, sands/silts, and silts/gravels. The most recent sediments were predominantly deposited by modern streams during episodes of flooding. In the early Holocene (10,000 years ago), Lake Pepin formed as the Chippewa River Delta impounded the Mississippi River. Early Lake Pepin is thought to have existed upstream of the Project Area to St. Paul, MN. During the impoundment of Lake Pepin large amounts of clays were deposited within the Project Area. These deposits consisted of interbedded fat clays and silts up to 50 feet thick. The deposits of clay stratum have resulted in settlement and rotation of the original lock walls.

Soil borings taken near the Project Area indicate that near surface soils consist of alluvial sands or lacustrine clays. The alluvial sands are typically loose at the surface but increase in density with depth. Underlying the alluvial and lacustrine deposits is the bedrock unit known as the Franconia Formation,

which consists of fine grained sandstone approximately 60-80 feet thick. This formation can be found at varying elevations across the valley from 500 to 600 feet (NAVD88).

Soil borings were also used to determine the subsurface composition of the Project Area, which then helped determine island alignment (Figure 3-6). The alignment was chosen in an attempt to avoid the deepest and softest clay deposits to reduce island settlement and material displacement during construction. Though the thickest layer of clays would be avoided through the realignment, there would still likely be some settlement of sand with the construction of the Proposed Alternative. To compensate for settlement, material would be placed in a fashion that would build up the base of the island before the necessary allotment is placed to achieve the desired island elevations. The necessary fill to construct the island would be calculated to adjust for island settlement.

Due to the geomorphology of the Project Area, 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. The displacement of this material would only be expected to occur during sand placement or construction, and would result in a more variable substrate elevation around the islands. Additional information regarding geomorphology of the Project Area can be viewed within Appendix F, Geotechnical Design and Geology Report.

HYDROLOGY & HYDRAULICS

Pool 2 is viewed as a relatively stable pool in regards to water surface elevation. The minimum pool elevations, or LCP for the Project Area is 686.14 (NAVD 88) at the lock, and 686.84 (NAVD 88) at the control point. There is a 12-foot lift between Pools 2 and 3 at Lock and Dam 2, which means the gates are not lifted unless a discharge of 61,000 cubic feet per second (cfs) is reached (Table 3-1). Once the gates are raised above the water surface, open river conditions come into effect and water levels at the dam increase with increasing discharge. This discharge and open river condition is exceeded only 1.6% of the time on an annual basis, thus resulting in a stable water elevation for the Project Area.

3.2.2 AQUATIC HABITAT

U. S. Fish and Wildlife Service (USFWS) publication, "An Aquatic Habitat Classification System for the Upper Mississippi River System" (D.B. Wilcox 1993), has been used to classify aquatic areas within the UMR. A majority of the Project Area, specifically upstream of the embankments, is defined as impounded, which is a large, mostly open area that is located in the downstream portions of the navigational pool. Downstream of impounded habitat usually includes the navigational dam and connecting dike (Wilcox 1993). The impounded habitat at the Project Area is relatively shallow in depth (Figure 3-3). The shoreline classification of the Lock and Dam 2 embankment is classified as General Development (GD). Other classifications within the Project Area, mainly Lake Rebecca, can be classified as an artificial abandoned channel lake (Wilcox 1993). Lake Rebecca was once a side channel lake (King Lake) of the Mississippi River prior to the creation of the Lock and Dam 2 embankment in 1928. Lake Rebecca has a shoreline classification of Natural Environment (NE) and is listed as impaired for aquatic consumption due to Mercury. Other aquatic habitat on the downstream portion of the Project Area includes both deep and shallow marsh habitat with areas of submerged aquatic vegetation (Figure 3-5). The Project Area above the embankment has a Federal Emergency Management Agency (FEMA) designation of floodway Zone AE, while the area below the

embankment is outside of the floodway, but still in Zone AE, meaning the area is subject to a 1-percent-annual-chance flood event.

Table 3-1. River discharge conditions at Lock and Dam 2. Water surface elevation (WSEL) is based on the operating curve for Lock and Dam 2, except for the 1/100 annual chance exceedance flood, which is based on the Hydrologic Engineering Center – River Analysis System (HEC-RAS), Version 5.0.6 modeling done for this project.

Hydrologic Condition	Discharge (cfs)	WSEL at LD 2 (NAVD 88)	Comment
Low – 7% Duration	5,750	686.64	LD 2 in primary control – WSEL at LD 2 has been raised 0.5'
Medium- 25% Duration	22,500	686.14	LD 2 in secondary control
High – 5% Duration	46,075	686.14	LD 2 in secondary control
Transition to Open River (Gates out of water)	61,000	686.14	Discharge exceeded 1.6% of time annually. This is the transition to open river conditions
1/100 ACE Flood	151,000	694.75	Elevation is based on HEC-RAS modeling done for this project

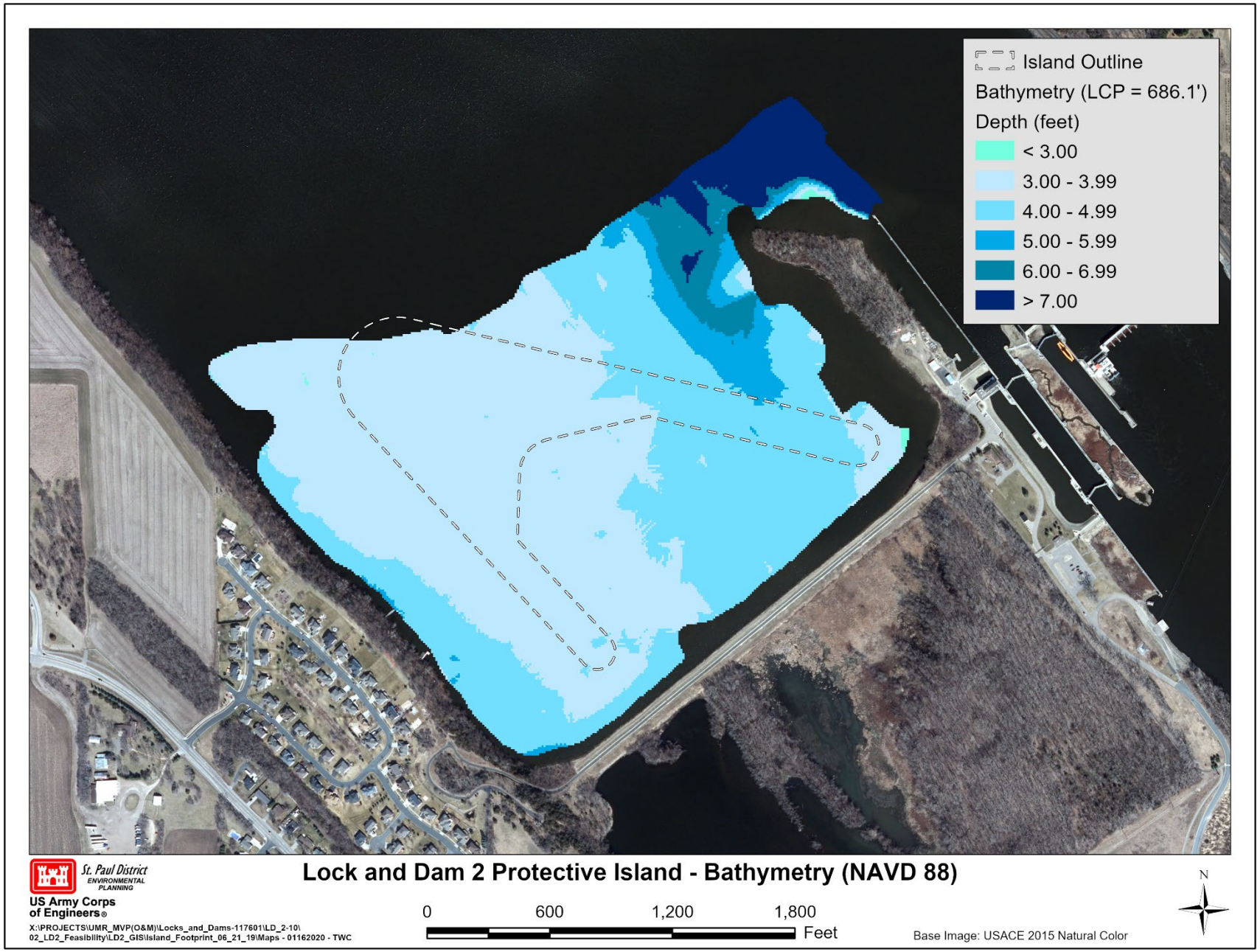


Figure 3-3. Bathymetry of the upstream portion of the Lock and Dam 2 Protective Island Project Area.

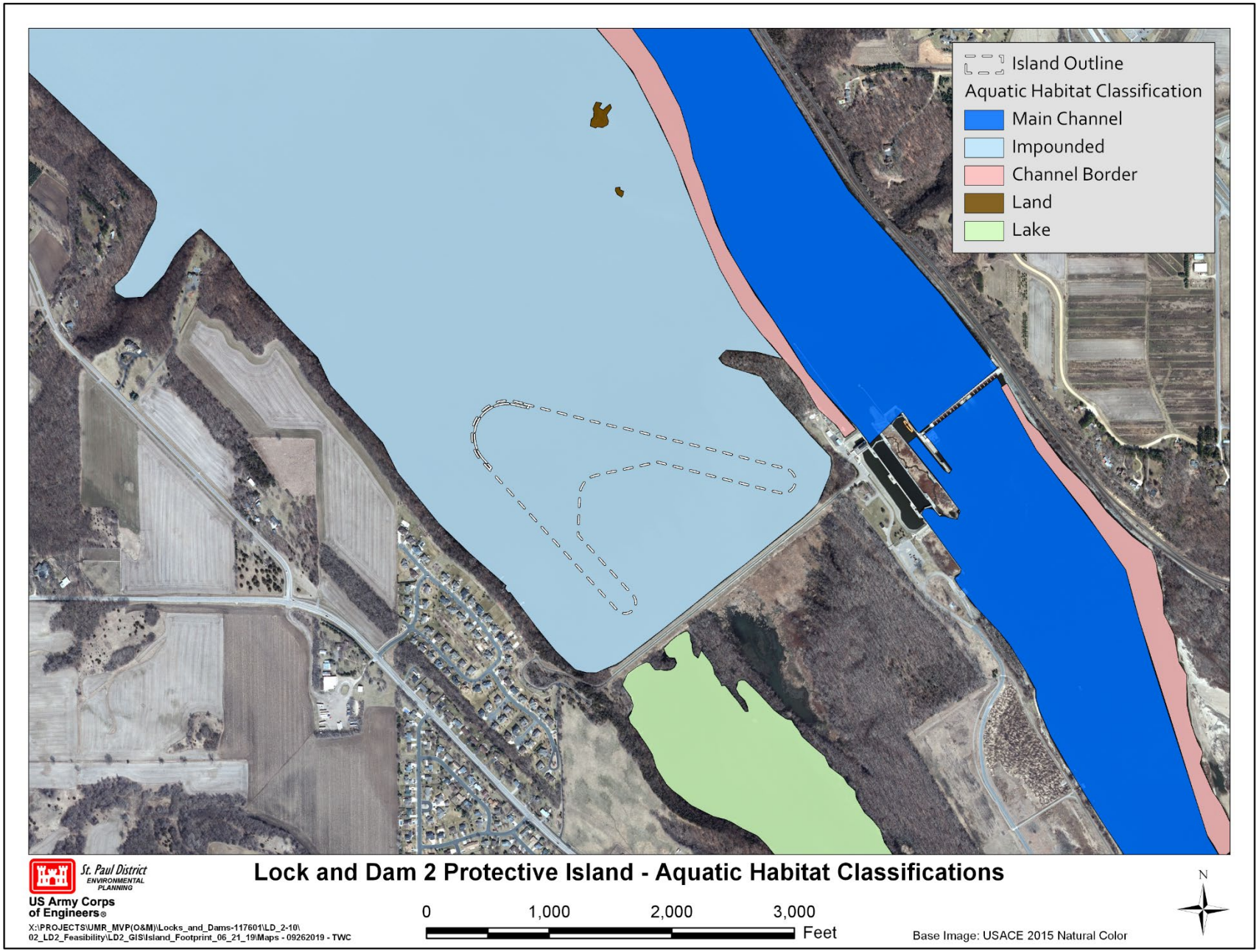


Figure 3-4. Aquatic habitat classification of the Lock and Dam 2 Protective Island Project Area.

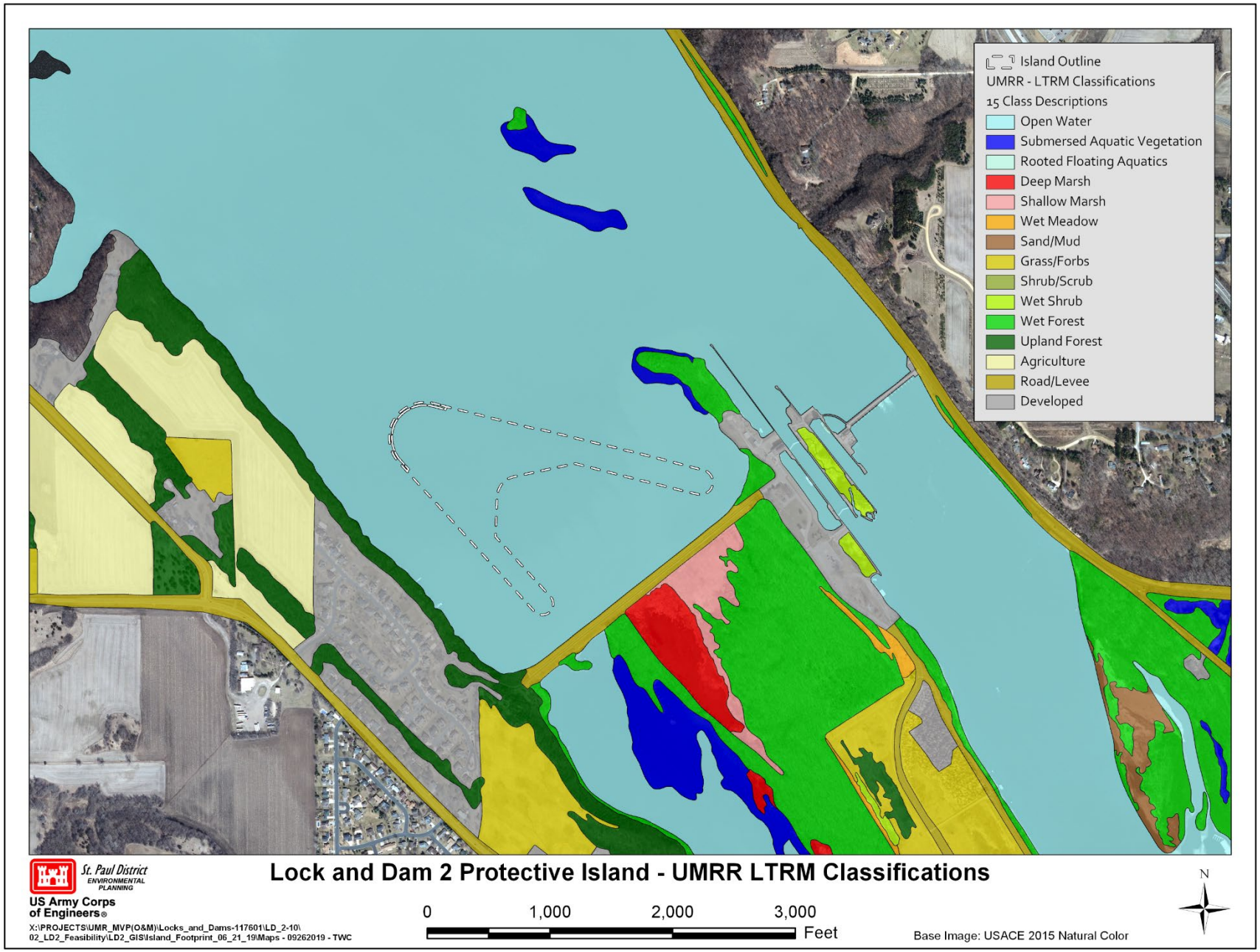


Figure 3-5. UMRR LTRM classifications of the Lock and Dam 2 Protective Island Project Area.

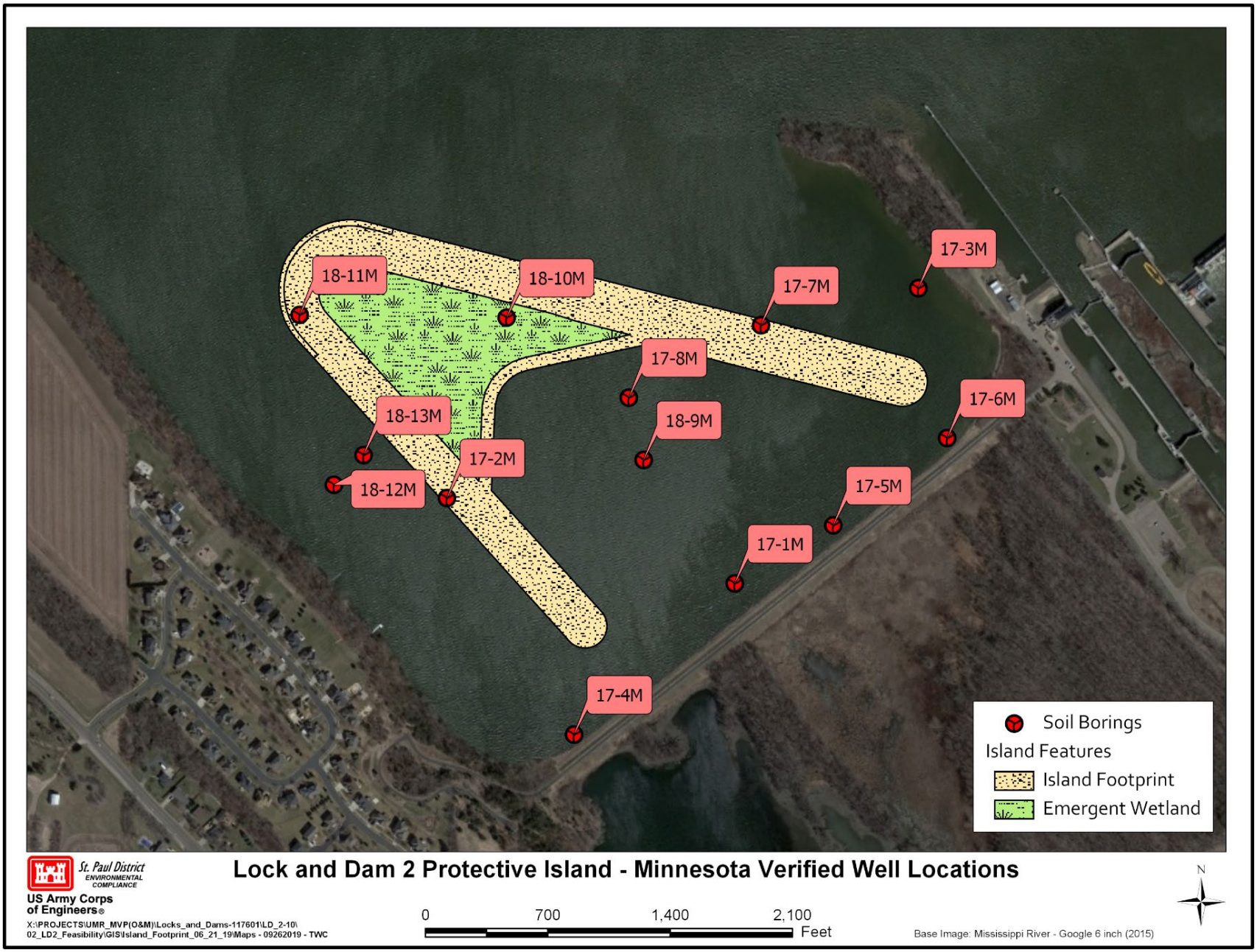


Figure 3-6. Soil boring locations for the Lock and Dam 2 Protective Island Project Area.

3.2.3 BIOLOGICAL RESOURCES (BIOLOGICAL PRODUCTIVITY)

FISHERIES

The quality of the fishery in Pool 2 is typically related to water quality within the pool, which has improved recently. As of 2010, 78 species of fish are reported to occur or have occurred in the past within Pool 2 of the UMR. Of these 78 species, 17 are classified as either abundant or common, 2 historic (not collected with last ten years) and 4 likely to occur through stray tributaries or inland stocking (Steuck et al. 2010, Table 3-2). These numbers are similar to the 1995 fish distribution assessment that was completed through the Upper Mississippi River Conservation Committee. That survey estimated that Pool 2 contains 74 total species, 20 of which are abundant or common, 3 historic and 4 likely to occur through stray tributaries or inland stocking (Pitlo et al. 1995). Surveys from the past 25 years would indicate that the fish diversity within Pool 2 is stable.

Fish species most likely to be impacted within the Project Area are those that utilize shallow, slack-water habitat. The Project Area downstream of the embankment includes Lake Rebecca, which the MnDNR identifies as an oxbow lake. Past surveys conducted by the MnDRN, 2012 and 2018, indicated that 17 and 8 fish species (respectively) were present within the lake. These survey efforts were completed with an emphasis on sport fish populations.

Table 3-2. Abundant and common fish species within Pool 2 (adapted from Steuck et al. 2010).

Common Name	Scientific Name	Species Abundance
Black crappie	*Pomoxis nigromaculatus*	Common
Bluegill	*Lepomis macrochirus*	Common
Channel catfish	*Ictalurus punctatus*	Common
Common carp	*Cyprinus carpio*	Abundant
Emerald shiner	*Notropis atherinoides*	Abundant
Freshwater drum	*Aplodinotus grunniens*	Abundant
Gizzard shad	*Dorosoma cepedianum*	Abundant
Quillback	*Carpiodes cyprinus*	Common
Sauger	*Sander canadensis*	Common
Shorthead redhorse	*Moxostoma macrolepidotum*	Common
Silver redhorse	*Moxostoma anisurum*	Common
Smallmouth bass	*Micropterus dolomieu*	Common
Sand shiner	*Notropis stramineus*	Common
Spotfin shiner	*Cyprinella spiloptera*	Common
Spottail shiner	*Notropis hudsonius*	Common
Walleye	*Sander vitreus*	Common
White bass	*Morone chrysops*	Common

MUSSELS

Mussel surveys compiled from Kelner (2017) for Pool 2 indicates there are 32 live and 9 historic species for a total of 41 potential mussel species within the pool (Table 3-3). Federally-listed endangered Higgins eye (*Lampsilis higginsii*), winged mapleleaf (*Quadrula fragosa*), and snuffbox (*Epioblasma triquetra*) mussels are rarely found within Pool 2. These three federally-endangered

species were re-introduced into Pool 2 by the Corps' beginning in 2001 and annually through 2012. Of these species, only Higgins eye has shown evidence of recruitment within Pool 2. Sheepnose (*Plethobasus cyphyus*) mussels, another federally-listed endangers species, have only been found historically (pre-1980) in Pool 2.

In September 2017, the Corps completed a pre-project mussel survey within potential impact areas (Project Alternatives) using a skimmer dredge designed for sampling the riverbed. (Figure 1-1, 3-7). During this survey a total of 12 mussel transects were completed, which yielded 48 live mussels encompassing 8 different species, with no additional dead specimens found. Of the mussels that were observed, over 77% were from transects in areas near the existing Lock and Dam 2 embankment (i.e., shoreline habitat). This indicated that the best mussel habitat within the Project Area is nearest the existing shoreline. Once Project Alternatives were further refined, an additional sampling effort was completed by the Corps in June 2018, which focused on evaluating the offshore island footprints. The 2018 sampling effort incorporated nine additional mussel transects, which yielded one live mussel (*Quadrual quadrula*). Combining all mussel data from 2017 and 2018 indicates that the four most abundant mussel species were *Fusconaia flava* (30.6%), *Amblema plicata* (22.4%), *Quadrula quadrula* (20.4%) and *Obliquaria reflexa* (10.2%, Table 3-4).

During the 2017 sampling event a single live individual of a Minnesota State-threatened species (*Quadrula* nodulata) was found; however, the 2018 surveys did not yield any additional state-threaten or endangered species (Figure 3-7). Although a *Quadrula nodulata* was found within in the Project Area, it is unlikely that the Proposed Alternative would have an adverse effect on this species as it is considered common in Pool 2 (Table 3-3). Additionally, no Federally-listed species, living or dead, were observed during mussel surveys. Mussel surveys conducted within the Project Area did not reveal any intact mussel beds and indicated relatively poor mussel habitat (Table 3-4).

Table 3-3. Known mussel species within Pool 2 of the UMR.

Species	*Scientific name*	Species Distribution
Threeridge	*Amblema plicata*	Abundant
Wabash pigtoe	*Fusconaia flava*	Common
Washboard	*Megalonaias nervosa*	Rare
Round pigtoe	*Pleurobema sintoxia*	Rare
Winged mapleleaf	*Quadrula fragosa*	*Re-established Rare
Monkeyface	*Quadrula metanevra*	Rare
Wartyback	*Quadrula nodulata*	Common
Pimpleback	*Quadrula pustulosa*	Abundant
Mapleleaf	*Quadrula quadrula*	Abundant
Pistolgrip	*Tritogonia verrucosa*	Rare
Elktoe	*Alasmidonta marginata*	Rare
Rock pocketbook	*Arcidens confragosus*	Common
White heelsplitter	*Lasmigona complanata*	Rare
Fluted shell	*Lasmigona costata*	Rare
Giant floater	*Pyganodon grandis*	Common
Strange floater	*Strophitus undulatus*	Common
Paper pondshell	*Utterbackia imbecillis*	Rare
Mucket	*Actinonaias ligamentina*	Rare
Butterfly	*Ellipsaria lineolata*	Rare
Snuffbox	*Epioblasma triquetra*	*Re-established Rare

Species	*Scientific name*	Species Distribution
Plain pocketbook	*Lampsilis cardium*	Common
Higgins eye	*Lampsilis higginsii*	*Re-established Rare
Fatmucket	*Lampsilis siliquoidea*	Rare
Fragile papershell	*Leptodea fragilis*	Common
Black sandshell	*Ligumia recta*	Con
Threehorn wartyback	*Obliquaria reflexa*	Abundant
Hickorynut	*Obovaria olivaria*	Rare
Pink heelsplitter	*Potamilus alatus*	Common
Pink papershell	*Potamilus ohiensis*	Rare
Lilliput	*Toxolasma parvus*	Rare
Fawnsfoot	*Truncilla donaciformis*	Rare
Deertoe	*Truncilla truncata*	Abundant

*Re-established Rare = Species that have been captured since 2005 and were once extirpated from the area, red font indicates recent collections by MNDNR since 2005 (Davis and Sietman unpublished data).

Table 3-4. Mussel species richness and abundance at Lock and Dam 2 Protective Island Project Area utilizing skimmer dredge surveys from September 2017 and June 2018.

		Offshore Island		Total	
Species	Common Name	No.	%	No.	%
Subfamily Ambleminae					
Amblema plicata	Threeridge	2	18.2	11	22.4
Fusconaia flava	Wabash pigtoe	3	27.3	15	30.6
*Quadrula nodulata**	Wartyback	1	9.1	1	2.0
Quadrula quadrula	Mapleleaf	3	27.3	10	20.4
Subfamily Anodontinae					
Pyganodon grandis	Giant floater			1	2.0
Subfamily Lampsinilinae					
Leptodea fragilis	Fragile papershell			3	6.1
Obliquaria reflexa	Threehorn wartyback	1	9.1	5	10.2
Potamilus ohiensis	Pink papershell	1	9.1	3	6.1
Total live		11		49	
Total species		6		8	
Sled transects (n)		12		21	
Mussels per transect		0.9		2.3	

* Represents Minnesota state threatened mussel species.

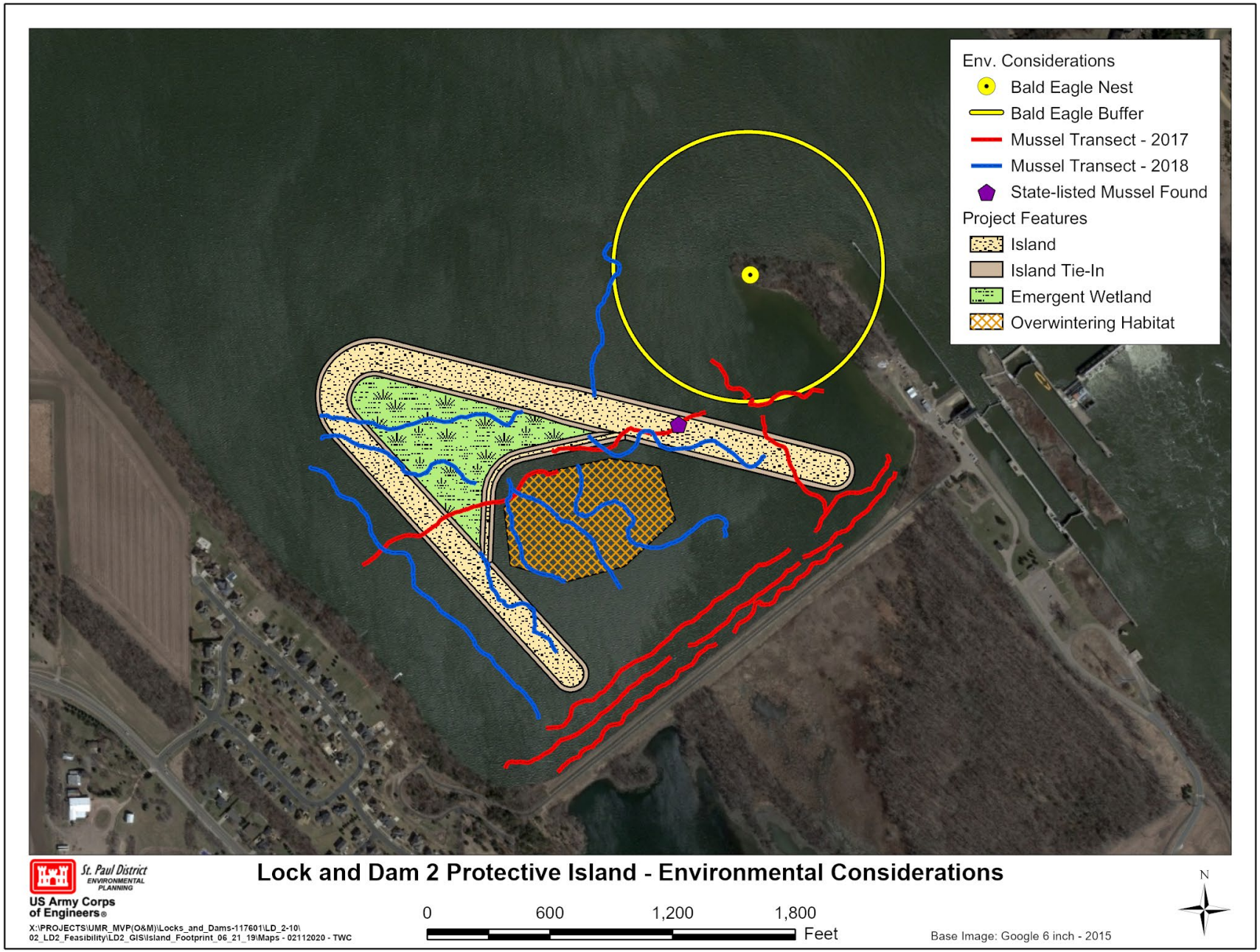


Figure 3-7. Environmental considerations for the Lock and Dam 2 Protective Island Project.

3.2.4 WETLANDS

Wetlands are areas that are inundated or saturated by surface and ground water at a frequency to support vegetation typically adapted to saturated soils, which include swamps, marshes, bogs and similar areas (Eggers 1997, MNDNR 2013). Most of the Project Area on the upstream side of the Lock and Dam 2 embankment is open water and inundated with water year round (Figure 3-5). The long wind fetch and current riprap on the upstream side is not conducive for plant growth, resulting in minimal wetlands, if any. The downstream side of the Lock and Dam 2 embankment contains wetlands around Lake Rebecca and the eastern side of the embankment. These wetlands include deep and shallow marsh wetlands, along with wet forest habitat (Figure 3-5).

3.2.5 THREATENED AND ENDANGERED SPECIES

FEDERALLY-LISTED THREATENED AND ENDANGERED SPECIES

Five federally-listed endangered or threatened species have been known to occur within or near the Project Area (Table 3-5). An endangered species list was generated using the USFWS' Information for Planning and Consultation (IPaC) website (07/31/2020). The USFWS' IPaC website was consulted to determine if any listed, proposed, or candidate species may occur in the Project Area, or if the area contains any designated or proposed critical habitats. No designated or proposed critical habitats were identified in the Project Area.

Table 3-5. Federally-listed species having the potential to be present within the Project Area.

Species	Scientific Name	Status	Group
Northern Long-eared Bat	*Myotis septentrionalis*	Threatened	Mammal
Higgins Eye	*Lampsilis higginsii*	Endangered	Mussel
Sheepnose Mussel	*Plethobasus cyphyus*	Endangered	Mussel
Snuffbox Mussel	*Epioblasma triquetra*	Endangered	Mussel
Prairie Bush-clover	*Lespedeza leptostachya*	Threatened	Plant

NORTHERN LONG-EARED BAT

Suitable habitat for northern long-eared bat (*Myotis septentrionalis*) is variable depending on the season and life stage. In the summer, bats often roost under the bark of tree species within diverse mixed-age and mixed-species tree stands, commonly close to wetlands. In the winter, the northern long-eared bat hibernates in caves and abandoned mines. During periods of migration and foraging, these bats tend to use edge habitat where a transition between two types of vegetation occurs (USFWS 2015).

HIGGINS EYE

Suitable habitat for Higgins eye (*Lampsilis higginsii*) includes deep water areas of various stable substrates in large streams and rivers with moderate current (USFWS 2004). Although rare, live specimens of the Higgins eye have been found recently in Pool 2 of the UMR (Kelner 2017). Higgins eye are most commonly associated with diverse, high-density mussel beds.

SHEEPNOSE

Suitable habitat for sheepnose (*Plethobasus cyphyus*) is typically shallow areas of large rivers and streams that contain moderate to swift currents with substrate containing coarse sand and gravel (USFWS 2012). Sheepnose have only been found historically in Pool 2 (pre-1980, Kelner 2017).

SNUFFBOX

Suitable habitat for snuffbox (*Epioblasma triquetra*) is usually small to medium-sized streams with swift current and some larger river systems (USFWS 2012). Snuffbox are recently re-established within Pools 2 (Kelner 2017).

PRAIRIE BUSH-CLOVER

Prairie bush-clover is a threatened plant species found only in the tallgrass prairie region of Wisconsin, Minnesota, Illinois and Iowa. It is a member of the bean family and holds a unique niche within the tallgrass prairie ecosystem. Prairie bush-clover provides habitat for tiny predatory insects that are specialized to live within seeds (USFWS 2009).

STATE-LISTED RARE SPECIES

In addition to federally listed species, there are a number of state-listed species and terrestrial communities that have the potential to reside within the Project Area (Table 3-6). These species were compiled through the Minnesota Natural Heritage Information System (NHIS) using a one-mile buffer within the Project Area (September, 2019). A status of when each species was last observed was also determined through the NHIS to better indicate the possibility of each species being present within the Project Area.

BALD EAGLES

The bald eagle (*Haliaeetus leucocephalus*), though no longer listed or protected under the ESA, is still protected under the Bald and Golden Eagle Protection Act (Eagle Act). This act prohibits anyone from taking or disturbing a bald or golden eagle or their nest. USFWS guidelines to comply with the act indicate that any construction activity shouldn't be within 660 feet of a visible bald or golden eagle nest in order to lower the chance of disruption, especially during the breeding season. If an eagle nest is within the area of proposed project, work would usually be postponed until after breeding season, which is from December through July for the Northern United States (USFWS 2007). There is at least one active eagle nest within the Project Area that was observed by the Corps in July 2019 (Figure 3-7).

Table 3-6. Minnesota state-listed species and communities within one-mile of the Project Area.

Scientific Name	Common Name	MN Status	Last Observed
Mussels			
Actinonaias ligamentina	Mucket	THR	2001
Alasmidonta marginata	Elktoe	THR	Pre-2000
Arcidens confragosus	Rock Pocketbook	END	2013
Cumberlandia monodonta	Spectaclecase	END	Pre-2002
Ellipsaria lineolata	Butterfly	THR	Pre-1944
Elliptio crassidens	Elephant-ear	END	2004
Epioblasma triquetra	Snuffbox	END	Pre-2002
Eurynia dilatata	Spike	THR	2003
Lampsilis higginsii	Higgins Eye	END	2010
Lampsilis teres	Yellow Sandshell	END	Pre-2001
Lasmigona costata	Fluted-shell	THR	Pre-2002
Ligumia recta	Black Sandshell	SPC	2009
Plethobasus cyphyus	Sheepnose	END	1988
Pleurobema sintoxia	Round Pigtoe	SPC	2013
Quadrula fragosa	Winged Mapleleaf	END	Pre-2002
Quadrula nodulata	Wartyback	THR	2011
Reginaia ebenus	Ebonyshell	END	2004
Simpsonaias ambigua	Salamander Mussel	END	2004
Theliderma metanevra	Monkeyface	THR	2008
Tritogonia verrucosa	Pistolgrip	END	2008
Venustaconcha ellipsiformis	Ellipse	THR	Pre-2002
Fish			
Acipenser fulvescens	Lake Sturgeon	SPC	2019
Polyodon spathula	Paddlefish	THR	2019
Amphibians			
Necturus maculosus	Mudpuppy	SPC	2016
Birds			
Falco peregrinus	Peregrine Falcon	SPC	1989
Lanius ludovicianus	Loggerhead Shrike	END	2012
Vireo bellii	Bell's Vireo	SPC	2007
Terrestrial Communities			
Red Oak - Sugar Maple - Basswood - (Bitternut Hickory) Forest			
White Pine - Oak - Sugar Maple Forest			
Southern Wet Cliff			
Dry Bedrock Bluff Prairie (Southern)			
Oak - (Red Maple) Woodland			

3.2.6 WATER QUALITY

The Environmental Protection Agency (EPA) through the Clean Water Act (CWA) has tried to reduce point and non-point source pollutants from contaminating the UMR. In general, areas of the UMR near

the Twin Cities have somewhat poor water quality, which can be attributed to nutrients inputs from the Minnesota River and urban runoff (National Research Council 2008). According to the Minnesota Pollution Control Agency's (MPCA) 'Impaired Waters Viewer' tool (accessible at: https://www.pca.state.mn.us/water/impaired-waters-viewer-iwav), the Mississippi River between Upper St Anthony Falls and the St Croix River (RM 854 to 811.4) is impaired for aquatic consumption, aquatic life and aquatic recreation (linked to a bacterial impairment, fecal coliform). Specifically, concentrations of mercury, polychlorinated biphenyls (PCBs), and perfluorooctane sulfonate (PFOS) are present within certain fish species along this stretch of the river, which has resulted in consumption advice by the Minnesota Department of Health (Table 3-7). Similarly, mercury, PFOS and total suspended solids (TSS) in the water column exceed the maximum amount of a pollutant a waterbody can receive and still meet water quality standards.

Currently, within the Project Area there are Total Maximum Daily Loads (TMDL) in place covering mercury within fish tissue and the water column, and TSS. TMDLs are used to assess water quality impairments in a comprehensive fashion. Within the Project Area there are TMDLs under development for additional impairments including: aluminum, fecal coliform, nutrients (turbidity), PCBs and PFOS in fish tissue, and PFOS within the water column.

Table 3-7. Fish consumption advice from Lock and Dam 1 to Lock and Dam 2 of the UMR.

	Meal Advice				
Fish Species	Unrestricted	1 meal/week	1 meal/month	Do Not Eat	Contaminants
bluegill	-	All sizes	-	-	PFOS
Buffalo	-	All sizes	-	-	PCBs
Common Carp	-	-	All sizes	-	PCBs, PFOS
Channel Catfish	-	All sizes	-	-	PCBs
Crappie	-	All sizes	-	-	PFOS
Flathead Catfish	-	-	All sizes	-	Mercury, PCBs
Freshwater Drum	-	All sizes	-	-	Mercury, PFOS
White Bass	-	-	All sizes	-	Mercury, PCBs, PFOS

*Adapted from the Minnesota Department of Health Fish Consumption Guidelines, April 2018.

SEDIMENT QUALITY

Mississippi River sediment tends to have low levels of contaminants, however, due to the urban location and higher silt content, sediment quality in Lower Pool 2 has higher levels of contaminants compared to sediment in other pools of the St. Paul District. Lower Pool 2 seems to be a sink for surrounding and upstream contaminate sources due to a decrease in water velocity and high silt content of the sediments. In general, clays and silts have a higher affinity to attach to contaminates than larger mineral sands (Rieuwerts et al 1998). That being said, sediment samples in more recent years have generally trended toward showing lower concentrations of contaminants. This is likely a result of the dramatic decrease in pollution inputs to the system due to increased environmental regulations. Sediment samples taken in areas of routine channel maintenance dredging in Pool 2 since 1985 have not exceeded the MPCA's Soil Reference Values (SRV). Since that time, the only exceedances detected were for the MPCA's Sediment Quality Targets (SQT).

Sand used to construct the proposed island (Figure 2-4) would come from dredged material placement sites throughout Pool 2 (Figure 2-1). 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 3-8). 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). Over the last ten years, sediment samples collected by the Corps in Pool 2 suggest that the Per- and Polyfluoroalkyl Substances (PFAS) associated with the river's sediment in Pool 2 are limited to a few PFAS chemicals, such as, Perfluorooctanesulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA), but are fairly ubiquitous (i.e., backwater, channel, above 3M plant or below). Furthermore, all detected concentrations were below 5 ppb, which are at least 100 times lower than the applicable MPCA Residential/Recreational SRVs (2016; Page 4, Appendix G). The results of the District's periodic sediment sample collection and analysis program for Pool 2 are summarized in the data tables in the Sediment Quality Appendix (G).

Sediment samples analyzing environmental characteristics within the Project Area were taken 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 MPCA's Sediment Quality Targets (SQT) or Soil Reference Value (SRV) guidelines. Sediments within the Project Area were primarily clays and fine sands with trace amounts of medium sands (Table 3-9).

Table 3-8. Sediment quantities and physical characteristics of dredge cuts within Pool 2 of the UMR.

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

3.2.7 TERRESTRIAL HABITAT

The Project Area is within the Eastern Broadleaf Forest province, which serves as a transition zone between the semi-arid regions to the west that were historically prairie and the mixed coniferous-deciduous forests of the northeast (Aaseng et al. 2011). Most of the vegetation within this province classification consists of forests of broad-leaved deciduous trees, including: oaks, maples, basswood, and elm with smaller areas of oak savanna and prairie (Marschner 1974). Terrestrial habitat closer to the Project Area includes upland forest, upland meadows, floodplain forests, wetlands, and areas disturbed by commercial and residential development (Figure 3-5). The land within the Lock and Dam 2 facility that would be utilized by the contractor for staging purposes is considered developed and would mostly be contained to existing parking lots and concrete surfaces. The minimal vegetation in this area is a mixture maintained grasses and some native plants and trees. The north side of the embankment closest to the Project Area has little to no vegetation, as it is mostly covered with rock riprap. The southern portion of the structural embankment contains a 15-foot vegetation free zone (applies to all vegetation except grasses) that is vegetated with a variety of grass species. This area

transitions into a mixture of marsh and wet forest habitats that contain plants typical to these environments.

3.2.8 AIR QUALITY/GREENHOUSE GAS EMISSIONS

The U.S. Environmental Protection Agency (EPA) is required by the Clean Air Act to establish air quality standards that primarily protect human health. These National Ambient Air Quality Standards (NAAQS) regulate six major air contaminants across the United States. These air contaminants include, ozone, particulate matter, sulfur dioxide, lead, carbon monoxide and nitrogen dioxide. When an area meets criteria for each of the six contaminants, it is called an 'attainment area' for that contaminant; those areas that do not meet the criteria are called 'nonattainment areas.' The Project Area near Lock and Dam 2 is designated as an attainment area for the six contaminates based on the U.S. EPA Green Book data (September 2017). There is a roughly 5 square mile nonattainment area for lead within Dakota County that is 11.5 miles northwest of the Project Area. This designation means that the Project Area has relatively few air pollution sources of concern.

3.3 Cultural Resources

The whole of Pool 2 and the surrounding landscape contains numerous historic properties indicating continual human occupation over approximately the last 12,000 years. Historic properties include a variety of pre-contact and historic archaeological sites. Pre-contact sites include lithic and artifact scatters, village sites, petroglyphs, and burial mounds. Historic sites include Dakota villages, trading posts and forts, early town sites, standing structures, shipwrecks, transportation corridors, bridges and river training structures. Several historic properties within this locality are listed on the National Register of Historic Places (NRHP) or are eligible for listing on the NRHP. In addition, the pool contains several historic districts.

Prior to construction of Lock and Dam 2, this stretch of the Mississippi River consisted of vast floodplains, side channels, sloughs, wetlands and natural levees. This area was similar to the current landscape below the Lock and Dam 2 embankment (i.e., Rebecca Lake Park). Much of the historic Project Area consisted of floodplain and historic King Lake (Figure 3-8). The lock and dam created a pool that submerged the floodplain just upstream of the embankment.

Lock and Dam 2, completed in 1930, was constructed under the six-foot channel project. It is unique in having all tainter gates and a Boule pass structure. A second landward lock was completed in 1948 to accommodate the 9-foot channel project specifications. Sometime after 1947 and before 1974 an oil tank field was established south of the lock. The tank field was removed in the 1990s and an above surface pipeline running along the toe of the downstream side of the embankment was removed in 1994.

Previous investigations proximal to the Project Area include exploration of burial mounds, identification of military roads, transportation features and standing structures. Previous consultations (i.e., 1981, 1986, 1993) with the Minnesota State Historic Preservation Office (SHPO) for hydroelectric installation and removal of the lock house determined that the complex was not eligible for listing on the NRHP. Other than Lock and Dam 2, no other cultural resources have been identified within one mile of the Project Area.

Table 3-9. Contaminate screening and sediment size results near the Project Area and MPCA standards.

			Sample 1	Sample 2	Sample 3	MPCA			
Latitude Longitude Date Samples			44.7569 -92.87436 6/13/2017	44.76018 -92.87149 6/13/2017	44.757847 -92.87887 6/13/2017	MPCA SQT 1	MPCA SQT II	Res/Rec Soil Reference Value (SRV)	Comm/Ind Soil Reference Value (SRV)
Pesticides	ug/kg	2,4'-DDD	<0.87	<1.1	<0.74	-	-	-	-
	ug/kg	2,4'-DDE	<1.1	<1.4	<0.97	-	-	-	-
	ug/kg	2,4'-DDT	<0.86	<1.0	<0.73	-	-	-	-
	ug/kg	4,4'-DDD	<1.5	<1.9	<1.3	-	-	19000	100000
	ug/kg	4,4'-DDE	<1.6	<2.0	<1.4	-	-	22000	28000
	ug/kg	4,4'-DDT	<2.4	<3.0	<2.1	-	-	7300	86000
	ug/kg	Hexachlorobenzene	<1.6	<1.9	<1.4	1.9	62	110	1500
	ug/kg	Hexachlorobenzene	<1.0	<1.3	<0.88	-	-	-	-
	ug/kg	alpha-Chlordane	<0.84	<1.0	<0.72	-	-	-	-
	ug/kg	gamma-Chlordane	<0.97	<1.2	<0.83	-	-	-	-
PAHs	ug/kg	Acenaphthene	<5.9	<10.0	<5.7	6.7	89	1300000	19000000
	ug/kg	Acenaphthylene	<5.0	<8.5	<4.9	5.9	130		
	ug/kg	Anthracene	<8.6	<14.7	<8.4	57	850	6500000	97000000
	ug/kg	Benzo(a)anthracene	<4.8	<8.2	14.3J	110	1100	1000	14000
	ug/kg	Benzo(a)pyrene	<3.8	<6.5	15.1	150	1500	-	-
	ug/kg	Benzo(b)fluoranthene	<4.3	<7.3	8.9J	-	-	-	-
	ug/kg	Benzo(g,h,i)perylene	<3.1	<5.2	4.7J	-	-	-	-
	ug/kg	Benzo(k)fluoranthene	<3.8	<6.5	11.4J	-	-	-	-
	ug/kg	Fluoranthene	<7.9	<13.4	22.1J	420	2200	510000	6700000
	ug/kg	Pyrene	<6.8	<11.6	28.2	200	1500	44000	44000
Metals	mg/kg	Arsenic	4.4J	3.8J	2.2J	9.8	33	9	9
	mg/kg	Cadmium	0.55J	1.1	<0.16	0.99	5	1.6	23
	mg/kg	Chromium	23.2	31.3	14	43	110	23000	100000
	mg/kg	Copper	13.7	21	5.9	32	150	2200	33000
	mg/kg	Lead	10.7	17.4	4.9	36	130	300	700
	mg/kg	Manganese	509	851	657	-	-	2100	21000
	mg/kg	Nickel	16.5	18.2	9.9	23	49	170	2600

	mg/kg	Zinc	62.4	87.1	28.7	120	460	4600	70000
	mg/kg	Chromium, Hexavalent	< 1.94	< 2.32	< 1.59	-	-	11	57
	mg/kg	Mercury	0.044J	0.094	0.018J	0.18	1.1	3.1	3.1
158	ug/kg	PCB, Total	<37.9	53.8J	<32.3	60	680	810	10000
	ug/kg	PCB-1016 (Aroclor 1016)	<37.9	<46.4	<32.3	-	-	-	-
	ug/kg	PCB-1221 (Aroclor 1221)	<37.9	<46.4	<32.3	-	-	-	-
	ug/kg	PCB-1232 (Aroclor 1232)	<37.9	<46.4	<32.3	-	-	-	-
	ug/kg	PCB-1242 (Aroclor 1242)	<37.9	<46.4	<32.3	-	-	-	-
	ug/kg	PCB-1248 (Aroclor 1248)	<37.9	<46.4	<32.3	-	-	-	-
	ug/kg	PCB-1254 (Aroclor 1254)	<37.9	53.8J	<32.3	-	-	-	-
	ug/kg	PCB-1260 (Aroclor 1260)	<37.9	<46.4	<32.3	-	-	-	-
Misc	%	Percent Moisture	34	46.1	22.7	-	-	-	-
	% (w/w)	Total Volatile Solids	4.9	6	2.7	-	-	-	-
	mg/kg	Nitrogen, Ammonia	108	232	69.7	-	-	-	-
	mg/kg	Nitrogen, Kjeldahl, Total	1530	1710	512	-	-	-	-
	mg/kg	Phosphorus	550	838	447	-	-	-	-
	mg/kg	Cyanide	0.47	<0.23	<0.13	-	-	-	-
	%	Total Solids	64.3	53.4	78.2	-	-	-	-
	mg/kg	Phenolics, Total Recovered	0.559	1.44	0.877	-	-	-	-
	mg/kg	Total Organic Carbon	16300	21400	4580	-	-	-	-
	mg/kg	Total Organic Carbon	18200	21500	4670	-	-	-	-
	mg/kg	Total Organic Carbon	16700	21500	4860	-	-	-	-
	mg/kg	Total Organic Carbon	16700	21900	4960	-	-	-	-
	mg/kg	Mean Total Organic Carbon	17000	21600	4770	-	-	-	-
PARTICLE SIZE % FINER		Coarse 4	100.0	100.0	100.0	-	-	-	-
		10	100.0	100.0	100.0	-	-	-	-
	Sand	Medium 20	100.0	100.0	98.0	-	-	-	-
		40	100.0	100.0	88.0	-	-	-	-
		Fine 60	99.0	100.0	70.0	-	-	-	-
		140	92.0	99.0	53.0	-	-	-	-
	Silt	Clay 200	83.0	99.0	50.0	-	-	-	-

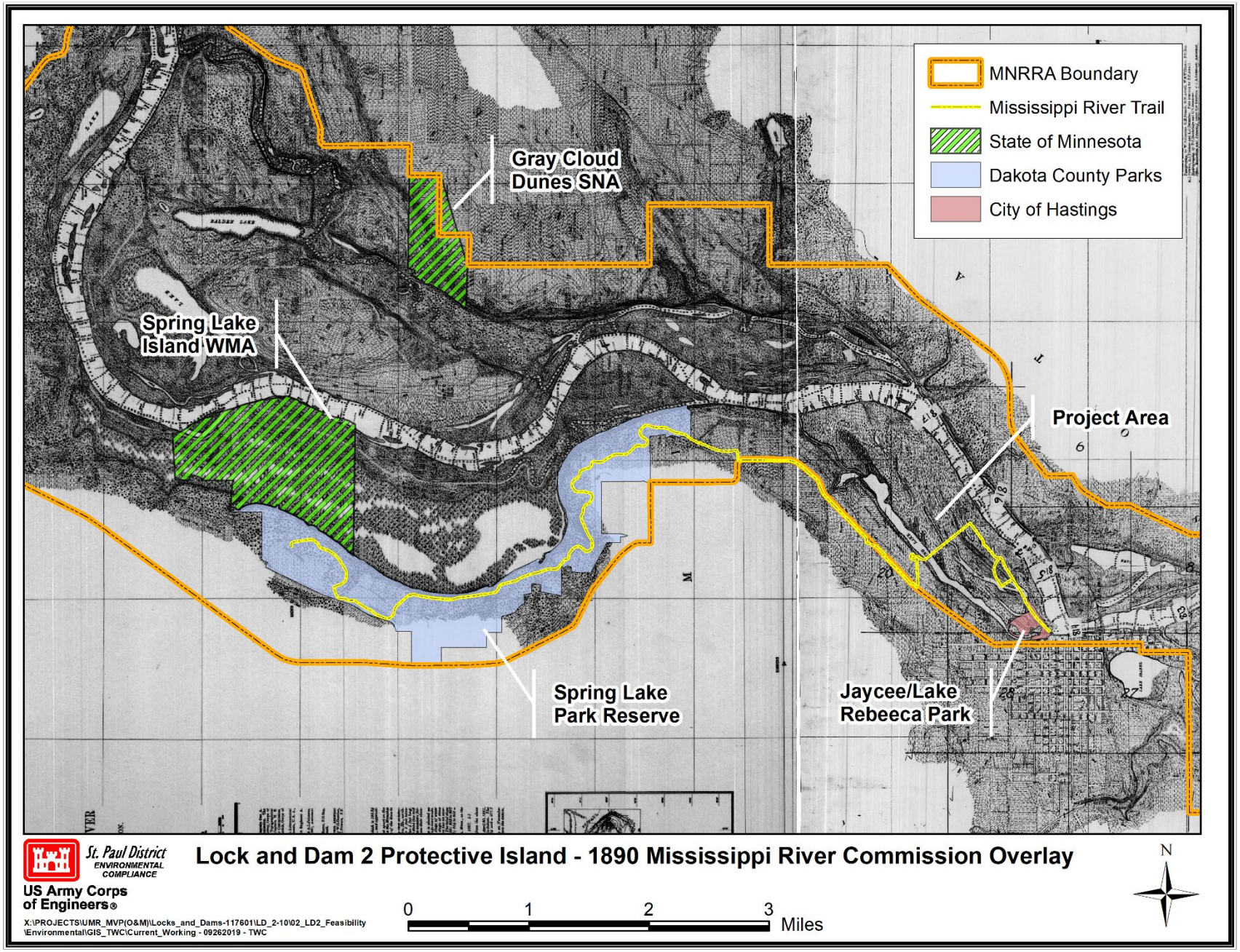


Figure 3-8. Depiction of the Project Area in the 1890s overlaid with current state, county and city parks.

CHAPTER 4.

EVALUATION OF ENVIRONMENTAL EFFECTS

An Environmental Analysis has been conducted for the No-Action Alternative and Proposed Alternative and is presented in the following paragraphs. The effects of the No-Action Alternative are those expected to occur in the near-term and future in the absence of a project. The No-Action Alternative serves as the base condition against which the Proposed Alternative is compared for evaluating effects. The effects of the Proposed Alternative are the results of the expected differences, in short and long term conditions, between the No-Action Alternative and the Proposed Alternative. The environmental effects of the No-Action Alternative and Proposed Alternative are summarized in Table 4-1 at the end of this chapter.

4.1 Socioeconomic Effects

4.1.1 NOISE

The No-Action Alternative would have a temporary minor negative effect on the noise level throughout the Project Area. If the embankment at Lock and Dam 2 were to be degraded to the point of needing repair, noise would increase during the timeframe of applying riprap or necessary repair through the use of mechanical excavation equipment.

The Proposed Alternative would have a temporary minor negative effect on the noise level within the Project Area in the short-term compared to the No-Action-Alternative. Noise levels would increase during the construction of the Proposed Alternative, specifically affecting the homes east within Eagle Bluff and Featherstone Road neighborhoods. In order to minimize noise within the Project Area, the awarded contractor would comply with any state regulations and/or local ordinances regarding to construction operations. This limitation would reduce noise pollution for the neighborhoods closest to the Project Area. The Proposed Alternative in the long-term would result in less of a need to repair the embankment due to the protective benefits the island would provide. Therefore, in the long-term the Proposed Alternative would have a beneficial effect on noise within the Project Area when compared to the No-Action Alternative.

4.1.2 AESTHETICS

The No-Action Alternative would have no effect on the aesthetic value of the Project Area in the short or long-term, as there would be no visual changes.

The Proposed Alternative would have a temporary minor adverse effect on aesthetics within the Project Area during construction. This would be due to construction equipment and unfinished work, which may be unsightly to local residents. The construction process could take multiple

construction seasons, prolonging the impacts on the aesthetics of the Project Area. Once the proposed island is completed and the vegetation develops, the Proposed Alternative would provide substantial aesthetic benefits to the Project Area compared to the No-Action Alternative. The overall aesthetic enhancement the proposed island would align with the different governmental MNRRA and MRCCA comprehensive plans that are currently in place for this stretch of the river.

4.1.3 RECREATIONAL OPPORTUNITIES

The No-Action Alternative would likely not have a long-term effect on recreational opportunities within the Project Area. If the embankment were to become degraded enough it would need to be re-riprapped, which would result in a temporary minor adverse effect on recreation within the Project Area. This would be due to construction equipment impeding the walking path located on the embankment.

The construction of the Proposed Alternative would likely not impact recreational opportunities within the Project Area, as construction would take place in-water. Upon completion, the Proposed Alternative would result in a substantial benefit toward recreational opportunities within the Project Area and Lower Pool 2. Creation of the fish overwintering habitat (Figure 2-1) would allow for better fishing opportunities, specifically during the winter months via ice fishing. Spring and summer months could see an increases in recreational boaters, kayakers and canoers due to the aesthetics and beach habitat the island would provide. The completed island would provide an increase in recreational opportunities for local and visiting residents, which aligns with the goals of the MNRRA and MRCCA comprehensive plans currently in place.

4.1.4 COMMERCIAL NAVIGATION

The No-Action Alternative would have no effect on commercial navigation of the UMR, as the Project Area does not lie within or near the 9-foot Navigation Channel.

The barges necessary to move material to the Project Area from the temporary placement sites is not anticipated to deviate from normal commercial barge traffic within Pool 2. Construction of the Proposed Alternative would result in the beneficial use of roughly 355,000 cubic yards of dredged material from Pool 2 of the UMR, as dredged material from Pool 2 temporary placement sites would be used to construct the island. Dredged material placed on temporary placement sites usually needs to be moved to permanent placement locations. Using the material for the Proposed Alternative would allow for more capacity at temporary or permanent placement sites within Pool 2, thus benefiting the operation and maintenance of the 9-Foot Navigational Channel within Pool 2. For the reasons above, the Proposed Alternative offers a minor benefit to commercial navigation when compared to the No-Action Alternative.

4.2 Natural Resource Effects

4.2.1 AQUATIC HABITAT

The No-Action Alternative would have no effect on aquatic habitat, as it would not alter the current state of the aquatic habitat within the Project Area.

All of the aquatic habitat that would be converted in the Project Area is considered impounded aquatic habitat (Wilcox 1993) and is fairly homogenous throughout. The construction of the offshore island would result in the conversion of 16.0 acres of impounded aquatic habitat to terrestrial habitat. Additionally, some impounded aquatic habitat would be converted to other aquatic habitat. The project would convert 9.3, 8.6 and 4.9 acres of impounded aquatic habitat to emergent wetland, fish overwintering (habitat deepening) and littoral transition, respectively. This action would be viewed as an improvement, as these converted areas would provide more habitat diversity. The Proposed Alternative would result in minor adverse effect towards aquatic habitat, as it would result in an overall loss of total acres; however, no unique aquatic habitat would be lost within the Project Area.

WETLANDS

The No-Action Alternative would have no effect on wetlands, as the footprint of riprap replacement does not currently contain any wetland habitat.

Currently, the area on the upstream side of the embankment is impounded aquatic habitat that is inundated throughout the year and does not contain any wetlands. The Proposed Alternative includes implementing an emergent wetland area on the south end of the island (Figure 2-2). The emergent wetland would be completed using fine materials from the fish overwintering area and access dredging cuts, if necessary. This action would create roughly 9.3 acres of emergent wetland within the Project Area, resulting in a substantial benefit for wetlands within Lower Pool 2.

FLOOD-STAGE IMPACTS

Hydraulic modeling for the Project Area was performed using Corps' HEC-RAS 5.0.6 to determine the impact of Proposed Alternative on flood stages. The HEC-RAS model was used to simulate the effects of the Proposed Alternative on the 1/100 annual chance exceedance (ACE) event (151,000 cfs) and the 1/590 ACE event (210,000 cfs). The resulting flood stage impact for the 1/100 ACE event meets FEMA's no rise constraint. This constraint is based on the Minnesota DNR's definition of zero, which is a rise of less than 0.005 on the 1/100 ACE event throughout and upstream of the Project Area. The HEC-RAS model indicates that the Proposed Alternative would not increase flood-stage impacts within the Project Area or upstream and downstream areas.

4.2.2 BIOLOGICAL RESOURCES (BIOLOGICAL PRODUCTIVITY)

Due to the fact that the Proposed Alternative would take place completely in water, terrestrial species (biological resources) within the Project Area are not given a dedicated section in this EA. Any species that occupy terrestrial habitat surrounding the proposed island (i.e., the embankment) would not be impacted because construction would take place in water. The only federal action on terrestrial land would be construction staging and parking within the Corps' Lock and Dam 2 facility. The provided staging area consists mostly of concrete and asphalt surfaces and other developed areas. Any areas that could provide terrestrial habitat for animal and plant species consist of lands maintained (i.e., mowing) by Lock and Dam 2 personnel.

FISHERIES

The No-Action Alternative would have no effect on the current fisheries resource within the Project Area.

The construction of an offshore island under the Proposed Alternative would result in the loss of aquatic habitat and substrate that could be utilized for fish as habitat. Though habitat would be lost, most of the habitat in this area has similar depth and is homogeneous in nature, resulting in a minimal loss of unique habitat. During the construction of the Proposed Alternative, fish overwintering habitat south of the island would be created to attain fine materials for the emergent wetland. This action would result in roughly 5.1 acres of 6-foot-deep habitat and 3.5 acres of 8-foot-deep (LCP) habitat, for a total overwintering habitat area of 8.6 acres (Figure 2-1). Overwintering habitat would provide a unique habitat for fish within the Project Area that is currently non-existent. This habitat would specifically provide centrarchid fish species an area to occupy in the winter months. Centrarchids prefer overwintering habitat with deep, slow-moving water, which provides cover and shelter from excessive flow, thus minimizing energy expenditure (Suski and Ridgway 2009). This dredging effort would also increase depth heterogeneity and habitats diversity, which, in theory, would increase fish species richness within the Project Area (Gratwicke and Speight 2005, Guegan et al. 1998). Overall, the Proposed Alternative would result in a minor benefit toward the fisheries within the Project Area and their biological productivity.

MUSSELS

There is a chance under the No-Action Alternative that new riprap would need be placed on top of the existing embankment riprap. This action would result in a minor impact to mussels that reside near the embankment. During mussel surveys the highest abundance of mussels were found nearest the embankment among shoreline habitat. The overall mussel impact linked to re-armoring the embankment would depend upon how far into the existing riverbed the new riprap would be placed. For this reason, the No-Action Alternative would likely lead to a minor adverse effect towards mussels.

Any native mussels within the fill and dredging footprint of the Proposed Alternative would likely be destroyed, resulting in a single minor adverse impact to the native mussel population within the Project Area. Once fully implemented, the Proposed Alternative would provide additional shoreline habitat within the Project Area. As mentioned above and in Section 3.2.2, most of the mussels within the extant Project Area were found along the shoreline habitat of the embankment. This is likely due to the granular sand and rock-riprap that the shoreline contains, which is a substrate type that is favorable for many mussel species. The completed offshore island would greatly increase this habitat type within the Project Area. The shoreline habitat at the completed Proposed Alternative would remain relatively free of fine-grained sand due to wave action. For these reasons, the Proposed Alternative would likely result in a minor long-term benefit towards the biological productivity of native mussels within the Project Area.

4.2.3 THREATENED AND ENDANGERED SPECIES

FEDERALLY-THREATENED AND ENDANGERED SPECIES

The St. Paul District has determined that the No-Action and Proposed Alternatives would have no effect on federally-listed threatened or endangered species. The construction of the proposed island would fall within impounded open-water river habitat and; therefore, would not impact terrestrial species (i.e., northern long-eared bat, prairie bush-clover). Only aquatic species (mussels) would have the potential to be affected by the Proposed Alternative. Federally-listed mussel species were not found during surveys of the Project Area and surveys, in general, indicate the Project Area is relatively poor mussel habitat. Work within the Project Area would comply with the Eagle Act and would not have an effect on known bald eagles within the Project Area.

STATE-LISTED RARE SPECIES

State-threatened and endangered species would likely not be affected under the No-Action Alternative and the Proposed Alternatives. One state-listed mussel (*Quadrula nodulata*) that was observed during the 2017 sampling event. Though a single *Quadrula nodulata* was observed it is unlikely that the Proposed Alternative would have an adverse effect on this species as it is considered common in Pool 2 (Table 3-3). There is a possibility that other state-listed mussels may be present; however, the Project Area is not deemed as favorable mussel habitat and does not contain any known mussel beds. Another State-listed species, mudpuppy (*Necturus maculosus,* special concern), has the potential to exist near the Project Area, as it is fully aquatic. The Proposed Alternative is not anticipated to impact the mudpuppy, as they prefer rivers with rock and gravel substrate. As mentioned in Section 3.2.1 (Geomorphology), the Project Area substrate is primarily made up of interbedded fat clays and silts, which would not represent optimal mudpuppy habitat. Other state-listed species would not be impacted by the Proposed Alternative due to their life strategies and ability to move out of the area during construction (i.e., fish and birds, Table 3-6).

4.2.4 WATER QUALITY

The No-Action Alternative would involve re-armoring the embankment at some point in the future, which would result in a temporary negative impact on water quality within the Project Area. Placing riprap on the embankment and tying in the toe of the embankment with riprap would result in increased turbidity around the Project Area. Applying a silt curtain around the Project Area during this activity would reduce the negative effects on water quality.

The Proposed Alternative would involve placing dredged material within the aquatic habitat near the Lock and Dam 2 embankment. This action would result in a temporary negative impact on water quality within the Project Area due to increased turbidity from sand placement and sediment being re-distributed into the water column. The action of placing material can often result in the creation of a mud-wave, which deceases water quality through increased turbidity. This would be true for both mechanical and hydraulic construction options. Due to the fact that the island placement is within the ineffective flow zone, this increase in turbidity would like remain localized. Once complete, the protective island would limit the extent of the current windfetch actin gon the project area. Reducing the windfetch in this area would result in an

overall benefit for water quality due to the lowering the turbidity associated with windfetch, especially for the project area behind the protective island. Overall, the Proposed Alternative would have a temporary negative impact and long-term benefit on the water quality of the Project Area compared to the No-Action Alternative.

SEDIMENT QUALITY

The No-Action Alternative would have no effect on sediment quality within the Project Area, as no sediment would be added or altered.

The Proposed Alternative would involve bringing dredged material from dredged material placement sites for the creation of the proposed island. The St. Paul District routinely collects sediment samples from all dredge cuts within the navigation channel and analyzes them for chemical and physical characteristics. The addition of dredged material to the Project Area would not benefit or negatively impact the current sediment quality as it is quite similar throughout Pool 2. Material from the Project Area (overwintering habitat and access dredging if applicable) would be placed within the emergent wetland habitat of the proposed island. The material within the Project Area is relatively clean and meets the MNPCA's Sediment Quality Targets (Table 3-9). Overall, the Proposed Alternative would not adversely impact sediment quality in the Project Area when compared to the No-Action Alternative.

4.2.5 TERRESTRIAL HABITAT

The No-Action Alternative would have no effect on the current terrestrial habitat of the Project Area, as that work would be done over the existing riprap on the embankment, which does not provide a unique habitat for animal and plant species.

The Proposed Alternative would likely not impact any existing terrestrial habitat or vegetation within the Project Area, as the majority of construction process would take place within the impounded aquatic habitat north of the embankment. Construction staging would take place within the Lock and Dam 2 facility and not impact any meaningful terrestrial habitat. Also, any alterations or disturbances made by the contractor within the staging area would be resorted to the original condition. Construction of the offshore island would result in the conversion of roughly 16 acres of aquatic habitat to land that is at least two feet above low control pool. The Proposed Alternative would contain woody vegetation, which could provide cover and nesting opportunities for wading birds or birds that utilize aquatic habitat (NRCS 2005). The construction of the island would also provide beach habitat for nesting turtles. The current embankment setup (armored riprap) can negatively affect turtle nesting by limiting access to nesting sites and trapping newly hatched turtles (Braun and Phelps 2016). The Proposed Alternative would provide substantial benefits to terrestrial habitat within the Lower Pool 2 and the Project Area when compared to the No-Action Alternative.

4.2.6 AIR QUALITY/GREENHOUSE GAS PRODUCTION

VEHICLE EMISSIONS

The No-Action Alternative would result in a minor adverse impact on air quality and a slight increase in greenhouse gas production during the placement of riprap on the embankment. This effect would be due to the increase in construction equipment and would be temporary in nature.

The Proposed Alternative would require the use of construction equipment. This action would result in a minor adverse impact on air quality and an increase in greenhouse gas production throughout the Project Area. The No-Action Alternative would have similar effects; however, the Proposed Alternative would result in larger effects due to the larger scope required to construct the island compared to re-riprapping the embankment. For this reason, the Proposed Alternative would have a minor adverse effect on air quality within the Project Area compared to the No-Action Alternative. This effect would be temporary in nature and air quality would return to normal conditions once construction ceases.

DUST AND ODORS

The No-Action Alternative would have a marginal impact on dust and odors within the Project Area, as re-riprapping would result in impacts that are non-quantifiable.

The construction of the Proposed Alternative would require the placement of dredged material into water, which would likely not create dust emissions within the Project Area. In a similar fashion, riprap for the bullnose feature and rock groins would either be placed in water or from the island once the required portions are constructed. The placement of riprap would likely not generate a noticeable amount of dust. The top of the island would be capped with fine-material that is wet in nature, making dust emissions minimal. In general, dust emissions generated from the Proposed Alternative would be negligible. There is a chance that the fine-material and construction equipment would generate unpleasant odor within the Project Area.

4.3 Cultural Resource Effects

Prior to construction of Lock and Dam 2, this stretch of the Mississippi River floodplain once consisted of side channels, sloughs, wetlands and natural levees. From west to east, the dam embankment transects a slough (King Lake, Lake Rebecca) running along the western edge of the valley and a series of swales and ridges (natural levees) before encountering the lock structure and associated improvements (e.g., control house, parking lot, comfort station, Electronic Communication Center). The embankment cut off the slough and truncated relict natural levees while the landward lock removed or otherwise altered most of a natural levee formed along the right descending bank of the main channel.

An analysis of the pre-inundation landforms in the Project Area uses the MRC 1895 chart as a proxy for elevations. Low lying areas (e.g., swales and wetlands) average approximately 680 feet above mean sea level (amsl). Areas thought to coincide with natural levees approach elevations of approximately 690 feet amsl. Pool 2 is currently maintained with a water surface elevation of approximately 687 feet amsl, equating to a water level rise of approximately 12 feet since 1930. By 1937, much of the floodplain was inundated, although narrow islands along the main

channel-the tops of natural levees-remained. By 1953 these features are absent. Recent bathymetry indicates that the depth of the river bottom just upstream of the embankment ranges between approximately three to four feet. From this information, it appears that approximately a minimum six to seven feet of the natural levees have eroded across the area. In other areas, approximately three to four feet of overburden/sedimentation blankets the pre-lock and dam land surfaces. Any cultural resources that may have existed proximal to the upstream side of the embankment would have been destroyed by fluvial action or deeply buried from subsequent silt deposition.

In addition to inundating the floodplain, embankment construction during the 1920s involved clearing vegetation, stripping the topsoil and stockpiling the spoil on the upstream and downstream aspects of the embankment corridor. The space between the spoil piles was then dredged. Dredging depths are uncertain, although deep enough to reach solid sand. Next, fill material was hydraulically placed to create the earthen embankment and the removed topsoil presumably placed over the sand fill. Finally, stone rip-rap was placed over the embankment. As a result, the cut and fill activities would have destroyed cultural resources that may have existed along the embankment and adjacent areas.

The lock complex, including the embankment, has been determined not eligible for listing on the NRHP. Construction of the protective island from dredged material would partially mimic past floodplain landforms. The Corps has determined that the Proposed Alternative will have no adverse effect to historic properties. See Appendix H for Section 106 correspondence, concurrence, and Native American consultation.

4.4 Cumulative Effects

Cumulative effects are defined by the Council on Environmental Quality as, "[T]he impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

4.4.1 SCOPE OF CUMULATIVE EFFECTS ANAYLSIS

The construction of the Proposed Alternative can be linked to plans and actions that involve the maintenance of the 9-foot Navigation Channel in Pool 2. Specifically, the proposed action is tied to dredged material management within Lower Pool 2. This project would not be possible without the past modifications that made navigation possible on the UMR.

The Proposed Alternative would utilize dredged material from Pool 2 in order to complete construction. For this reason, the Proposed Alternative is linked to other projects within Pool 2 that are linked to the actions and maintenance of the 9-Foot Navigation Channel.

4.4.2 ACTIONS IDENTIFIED WITHIN THE PROJECT AREA

The following past, present, and reasonably foreseeable future actions taken by government and private entities were identified as having the potential to interact with or have impacts related to those of the Proposed Alternative.

PAST ACTIONS

MODIFICATIONS TO THE UPPER MISSISSIPPI RIVER FOR NAVIGATION

The floodplain geomorphology, stream hydraulics, and water levels of the UMR have been modified by impoundment and other navigation features since the 1820s. The most relevant navigation improvement actions within the project impact area are likely the construction of hundreds of channel training structures placed between 1866 and 1907 as part of the 4-foot, 4.5-foot, and 6-foot navigation channel projects. Following the construction of these structures was the construction of Lock and Dam 2 in 1930, which raised water levels by several feet in the immediate Project Area and allowed for a 9-foot-deep navigation channel. Without the construction of Lock and Dam 2 and the subsequent embankment, the Proposed Alternative would not be necessary. The cumulative effect of these actions has played a large role in the development of the habitat that currently exists in the Project Area.

CONCURRENT AND ONGOING ACTIONS

NAVIGATION OF THE UMR VIA THE 9-FOOT NAVIGATION CHANNEL

The operation, maintenance, and navigation of the main channel of the UMR at its current authorized level is expected to continue into the known future. This action and the attributed cumulative effects are covered within the CMMP and subsequent EIS. The Pool 2 Dredged Material Management Plan (covered below) is a tiered document to the CMMP.

POOL 2 CHANNEL MANAGEMENT STUDY

The Lower Pool 2 Channel Management Study's recommended plan is to excavate and maintain a wider channel that is still within authorized dimensions and put into place two new training structures (rock sills)--one on the right descending bank and one on the left descending bank. These minor changes would improve navigability, safety, and reduce channel maintenance requirements within the project vicinity. Dredging to restore the channel to wider dimensions would produce approximately 350,000 cubic yards of material, which is currently planned to be placed on temporary placement sites within Pool 2. Some or all of the material could also be used for construction of the Pigs Eye Lake CAP section 204 project, or the construction of the proposed Lock and Dam 2 Protective Island Project. There is a possibility that dredged material at the temporary placement sites would be moved for permanent placement through the Pool 2 DMMP, reducing handling costs. Phase I of the Pool 2 Channel Management Study, which involved the construction of the west rock sill training structure, was completed in 2018 and construction of the east rock sill training structure was completed in 2019. Project completion would happen once the 350,000 cubic yards of material from the channel widening would be placed at an approved site.

REASONABLY FORESEEABLE FUTURE ACTIONS

POOL 2 DREDGED MATERIAL MANAGEMENT PLAN

The Pool 2 DMMP tentatively selected plan would include the continued use of existing placement site (Southport) and create a new placement site within Lower Grey Cloud Island. Other temporary placement sites throughout Pool 2 would remain; however, usage would be of a limited capacity or on a contingency basis. Material placed at Grey Cloud Island would be placed permanently within a mining pit. The combined usage of Southport and Lower Grey Cloud Island would provide permanent dredged material placement for 40 years within Pool 2.

PIGS EYE LAKE RAMSEY COUNTY, MN SECTION 204

Pigs Eye Lake is a 628-acre, shallow backwater lake, situated southeast of St. Paul, Minnesota, within Pool 2 of the Mississippi River. The Corps of Engineers, in partnership with Ramsey County, MN, investigated and approved the feasibility of constructing islands and other habitat enhancement features in the lake to improve habitat. The project would be implemented under the Section 204 authority, which targets the beneficial use of dredged material. As such, material dredged from the Pool 2 in support of the 9-Foot Navigation Project would be used to construct the proposed features. The feasibility report and environmental assessment was approved in September 2018. Construction of the project is anticipated to being sometime during the 2021 construction season.

4.4.3 CONSEQUENCES OF CUMULATIVE EFFECTS

The construction of the protective island described within the Proposed Alternative would result in a benefit to environmental resources through the beneficial use of dredged material. The Project Area where the island would be constructed is outside of the ineffective flow zone, and therefore would not result in flood stage impacts. Combining the Proposed Alternative with the past, present and foreseeable projects in Pool 2 (described above) would not have a significant impact on social or environmental resources throughout the area of influence.

COMMERCIAL NAVIGATION

The Proposed Alternative for the Lock and Dam 2 Protective Island Project, in combination with the Pool 2 CMS, and Pool 2 DMMP would have a combined beneficial effect to commercial navigation within Pool 2. The proposed island would provide a beneficial use of dredged material, the Pool 2 CMS would and the DMMP would provide dredged material placement for the next 40 years.

4.5 Summary of Environmental Effects

The Environmental Assessment Matrix below indicates the adverse and beneficial effects of the Proposed Alternative when compared to the No-Action Alternative for the proposed protective island project. The No-Action Alternative is considered to be the base condition, and includes those actions expected to be undertaken in the future in the absence of an additional project. Therefore, the impacts to each of the resource categories under the No-Action Alternative are in

general the impacts that would occur without the implementation of the proposed island. The impacts listed under the Proposed Alternative are those discussed in detail within Chapter 4.

Table 4-1. Environmental Assessment Matrix: provides a summary of the environmental consequences of the No-Action Alternative and the potential effects of the Proposed Alternative.

	No-Action Alternative							Proposed Alternative						
	BENEFICIAL				ADVERSE			BENEFICIAL				ADVERSE		
PARAMETER	SIGNIFICANT	SUBSTANTIAL	MINOR	NO EFFECT	MINOR	SUBSTANTIAL	SIGNIFICANT	SIGNIFICANT	SUBSTANTIAL	MINOR	NO EFFECT	MINOR	SUBSTANTIAL	SIGNIFICANT
A. Social Effects														
1. Noise Levels					T					X		T		
2. Aesthetic Values				X						X		T		
3. Recreational Opportunities					T				X					
4. Transportation				X							X			
5. Public Health and Safety				X							X			
6. Community Cohesion (Sense of Unity)				X							X			
7. Community Growth and Development				X							X			
8. Business and Home Relocations				X							X			
9. Existing/Potential Land Use				X							X			
10. Controversy				X							X			
B. Economic Effects														
1. Property Values				X							X			
2. Tax Revenue				X							X			
3. Public Facilities and Services				X							X			
4. Regional Growth				X							X			
5. Employment				X							X			
6. Business Activity				X							X			
7. Farmland/Food Supply				X							X			
8. Commercial Navigation				X						X				
9. Flooding Effects				X							X			
10. Energy Needs and Resources				X							X			
C. Natural Resource Effects														
1. Air Quality					T							T		
2. Terrestrial Habitat				X					X					
3. Wetlands				X					X					
4. Aquatic Habitat				X								X		
5. Habitat Diversity and Interspersion				X						X				
6. Biological Productivity					X					X		X		
7. Surface Water Quality					T							T		
8. Water Supply				X							X			
9. Groundwater				X							X			
10. Soils				X							X			
11. Threatened or Endangered Species				X							X			
D. Cultural Resource Effects														
1. Historic Architectural Values				X							X			
2. Prehistoric & Historic Archeological Values				X							X			

CHAPTER 5.

ENVIRONMENTAL COMPLIANCE AND REVIEW

5.1 Applicable Environmental Laws and Executive Orders

The Proposed Alternative would comply with federal environmental laws, Executive Orders and policies, and applicable state and local laws including but not limited to the Clean Air Act, as amended; the Clean Water Act, as amended; the Endangered Species Act of 1973, as amended; the Fish and Wildlife Coordination Act of 1958, as amended; the Land and Water Conservation Fund Act of 1965, as amended; the National Historic Preservation Act of 1966, as amended; the National Environmental Policy Act of 1969, as amended; Executive Order 11990 - Protection of Wetlands; Executive Order 12898 - Environmental Justice; the Farmland Protection Policy Act of 1981 (the Proposed Alternative would not result in the conversion of farmland, as defined by the Farmland Policy Act, to non-agricultural uses); and Executive Order 11988 - Floodplain Management.

5.2 Public Involvement

A public notice of availability of the Draft Environmental Assessment was published on ____, 2020 on the Corps website:).
The public comment period will end on ____, 2020 and all comments received, including Corps responses will be included in the Public Review Comments (Appendix D).

5.3 Coordination

Planning for the overall project has been coordinated with the public, state and federal agencies, and other interested parties. Detailed descriptions of compliance efforts for certain regulations can be found in the coordination appendix (Appendix E).

5.3.1 CLEAN WATER ACT

The activities associated with the Proposed Alternative and the construction of the protective island would result in the placement of fill into waters of the United States. For this reason, a Clean Water Act Section 401 Water Quality Certification from the State of Minnesota would be requested by the Environmental Compliance Branch of the Corps, which would be based on the Corps' 404(b)(1) evaluation of the Proposed Alternative (Appendix C).

5.3.2 FISH AND WILDLIFE COORDINATION ACT, ENDANGERED SPECIES ACT

In compliance with the Fish and Wildlife Coordination Act, project plans and potential impacts were coordinated with the Minnesota/Wisconsin Ecological Services Field Office on March 9th, 2020 via telephone call. During this conversation the USFWS concurred with the Corps' determination that the Proposed Alternative would have no effect on Federally-listed threatened and endangered species within the Project Area. Federal and state agencies will have the opportunity to review and comment on the project during the public review of the EA.

5.3.3 STATE PERMITS

The Corps would coordinate with the MnDNR for coverage of this project through a Public Waters Work Permit. The project as planned would exceed the threshold requiring preparation of a Minnesota Environmental Assessment Worksheet (EAW), as defined in Minnesota Rules, part 4410.4300, subpart 27, item A. The Corps has worked with the Responsible Government Unit (the Minnesota DNR) to ensure that the federal EA will fulfill the requirements of the EAW. A supplement has been prepared to assist reviewers in locating sections which pertain to EAW requirements (see Appendix B). State permitting agencies would have the opportunity to review and comment on the project prior to it being issued for public review. The action of removing and placing any dredged material (granular or fine sand) on temporary placement sites during the Lock and Dam 2 Protective Island Project is covered under a MnDNR Public Waters Work General Permit (General Permit Number: 1994-5082). Some additional permits and environmental planning may fall under the responsibility of the contractor conducting the Proposed Alternative. The contractor would be responsible for construction permits as necessary, such as a National Pollution Discharge Elimination System permit. These responsibilities would be detailed in the Specification document provided to the contractor.

5.4 Distribution of Draft Environmental Assessment

This Environmental Assessment has been provided on the following website: http://www.mvp.usace.army.mil/Home/PublicNotices.aspx. A notice of availability was sent to interested citizens near the Project Area, Dakota County and the following agencies:

Federal	State
Environmental Protection Agency	Minnesota Department of Natural Resources
U.S. Fish and Wildlife Service	Minnesota Pollution Control Agency
U.S. Geological Survey	

We request and welcome written comments on the Environmental Assessment. Please provide written comments by 20 November, 2017, to the St. Paul District, U.S. Army Corps of Engineers, ATTN: Mr. Trevor Cyphers, CEMVP-PD-E, 180 Fifth Street East, Suite 700, St. Paul, Minnesota 55101, or by email to: Trevor.W.Cyphers@usace.army.mil.

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