

UPPER MISSISSIPPI RIVER RESTORATION
DRAFT FEASIBILITY REPORT
WITH INTEGRATED ENVIRONMENTAL ASSESSMENT

WEST ALTON ISLANDS HABITAT REHABILITATION AND ENHANCEMENT PROJECT

October 5, 2023



Mississippi River
Miles 203-215.5
St. Charles County, Missouri
Project Partners: Missouri Department of Conservation & U.S. Fish and Wildlife Service Acknowledgements

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UPPER MISSISSIPPI RIVER RESTORATION

FEASIBILITY REPORT

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WEST ALTON ISLANDS

HABITAT REHABILITATION AND ENHANCEMENT PROJECT

UPPER MISSISSIPPI RIVER MILES 203 THROUGH 215.5

ST. CHARLES COUNTY, MISSOURI

EXECUTIVE SUMMARY

Purpose of Report. The purpose of this integrated feasibility report with environmental assessment (EA), including the Finding of No Significant Impact (FONSI), is to document the decision-making process for the proposed U.S. Army Corps of Engineers (USACE) ecosystem restoration project in the West Alton Islands study area. The West Alton Islands Habitat Rehabilitation and Enhancement Project (HREP) focuses on aquatic backwater and side channel habitats in lower Pool 26 as well as terrestrial resources in the West Alton Bay, Luesse Lake, and Portage Island areas.

This report was developed by the USACE with the Missouri Department of Conservation (MDC) and the U.S. Fish and Wildlife Service (USFWS) acting as study sponsors and coordinating agencies. This report provides planning (including National Environmental Policy Act [NEPA] compliance), engineering, and sufficient construction details of the recommended plan to help inform the final recommendation.

Study Area Location. The West Alton Islands HREP consists of approximately 1,823 acres of backwater, wetland, side channel, sandbar, island, and floodplain forest areas. The study area is located in the Mississippi River floodplain on the right descending bank of the Mississippi River between River Miles (RM) 203 and 215.5 in St. Charles County, MO.

Problem Identification. Human alterations to the Upper Mississippi River (UMR) channel along with land use changes in the floodplain and UMR basin over the past two centuries have altered the hydrology in the study area. These alterations have decreased side channel, backwater, sandbar, island, and wetland habitat diversity and quality in the study area. The existing stressors are expected to remain, resulting in a continued decline in habitat quality. The proposed project outlines an opportunity to improve habitat quality and diversity in the study area. The specific problems as they relate to the study area include:

- Backwater sedimentation can affect the overall habitat quality through poor water quality, shallow depths, and loss of connectivity. Loss of connectivity can also result in fish entrapment.

- Loss of side channel flow and depth diversity decreases habitat function and availability for native riverine species.
- Loss of sandbars and islands reduce available habitat for aquatic and terrestrial species and accelerate bank and island erosion resulting from increased wind and wave action.
- Loss of topographic and hydrologic diversity reduces vegetative community diversity and wildlife resources (e.g. forage, invertebrate production, and nesting sites and resting sites).

Study Goal and Objectives. The goal of any potential project is to restore and improve the quality and diversity of backwater, side channel, sandbar, island, wetland, and floodplain forest resources within the study area. The objectives identified to meet this goal are to:

- Restore diversity of bathymetry, flow, and connectivity of aquatic areas throughout the potential project areas (side channels, main channel, off channel, backwaters, etc.)
- Restore diverse island mosaics throughout the potential project areas (sand bars, islands; reduce wind fetch and wave impacts)
- Restore native vegetation diversity and structural complexity throughout the potential project areas (wetlands, forests, etc.)

Plan Formulation, Evaluation and Comparison. The interagency planning team, which includes biologists, engineers, and planners from the USACE, MDC, and USFWS, developed a series of measures for consideration to address the identified objectives. Measures were then assessed for ability to address project problems, goals, and objectives. The final list of measures included:

- Excavation– Without Benching
- Island Creation
- Sandbar/Mudflat Creation
- Terrestrial Elevation Diversity
- Emergent Wetland Enhancement
- Sediment Deflection Dike
- Trail Dike
- Hard Points (Barb & Vane)
- Berm and Barb
- Bullnose
- Island Protection- Gradual Slope Revetment (GSR)
- Containment Berm
- Deep Water Pocket
- Woody Bundle
- Gravel Bar

Plan Selection. The Tentatively Selected Plan (Plan) for the West Alton Islands HREP

(Intermediate Alternative) is shown in Executive Summary ES Figure 1ES Figure 2 andES Figure 3. It consists of multiple measures to restore and improve the aquatic ecosystem structure and function by implementation of the following:

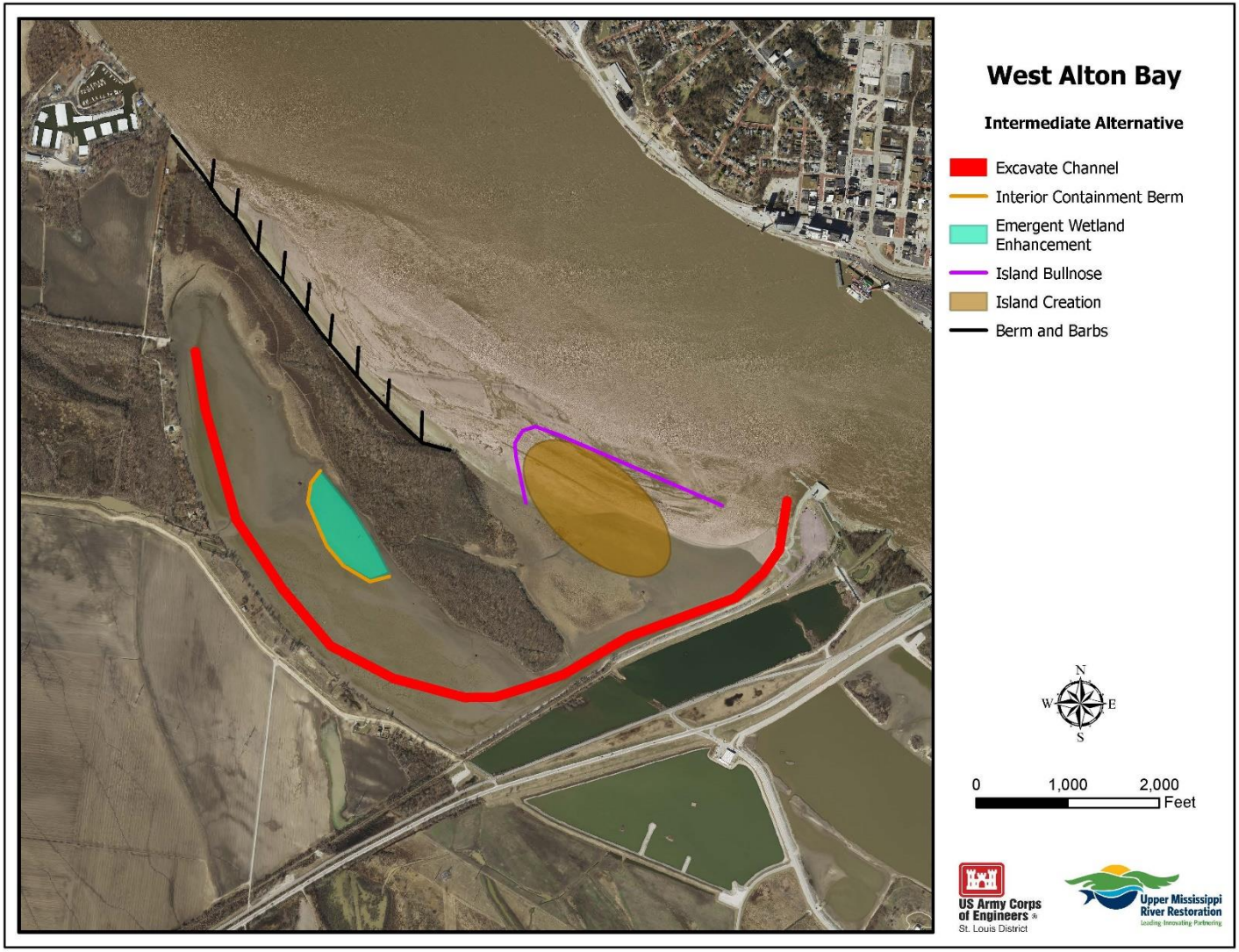
	Measures	West Alton Bay	Portage Island	Luesse Lake
1	**Excavation without Benching**	X	X	X
2	**Island Creation**	X	X	
3	**Gradual Slope Revetment (GSR) around Island**		X	
4	**Containment Berm**	X		
5	**Bullnose**		X	
6	**Sandbar/Mudflat Creation**		X	
7	**Emergent Wetland Enhancement**	X	X	
8	**Terrestrial Elevation Diversity**		X	
9	**Hard Points (Barb & Vane)**		X	
10	**Woody Bundle**		X	
11	**Trail Dike**		X	
12	**Sediment Deflection Dike**		X	
13	**Gravel Bar**		X	
14	**Berm and Barbs**	X		
15	**Deep Water Pocket**		X	X

The Plan was identified as the National Environmental Restoration (NER) Plan. For ecosystem restoration projects, the plan that maximizes ecosystem benefits compared to costs is selected as the NER Plan. The Plan is a best buy alternative that yields 425 net average annual habitat units (AAHUs) at an average cost of $2,839 per AAHU (FY2023 price level; FY2024 federal discount rate of 2.75%, 50-year period of analysis). It best meets the study objectives and has sponsor support from MDC and USFWS. Implementation of the Plan would increase the quality and quantity of ecosystem resources and meet the needs for a large variety of native aquatic species. The project outputs are also consistent with the goals and objectives of the Upper Mississippi River Restoration (UMRR) Program.

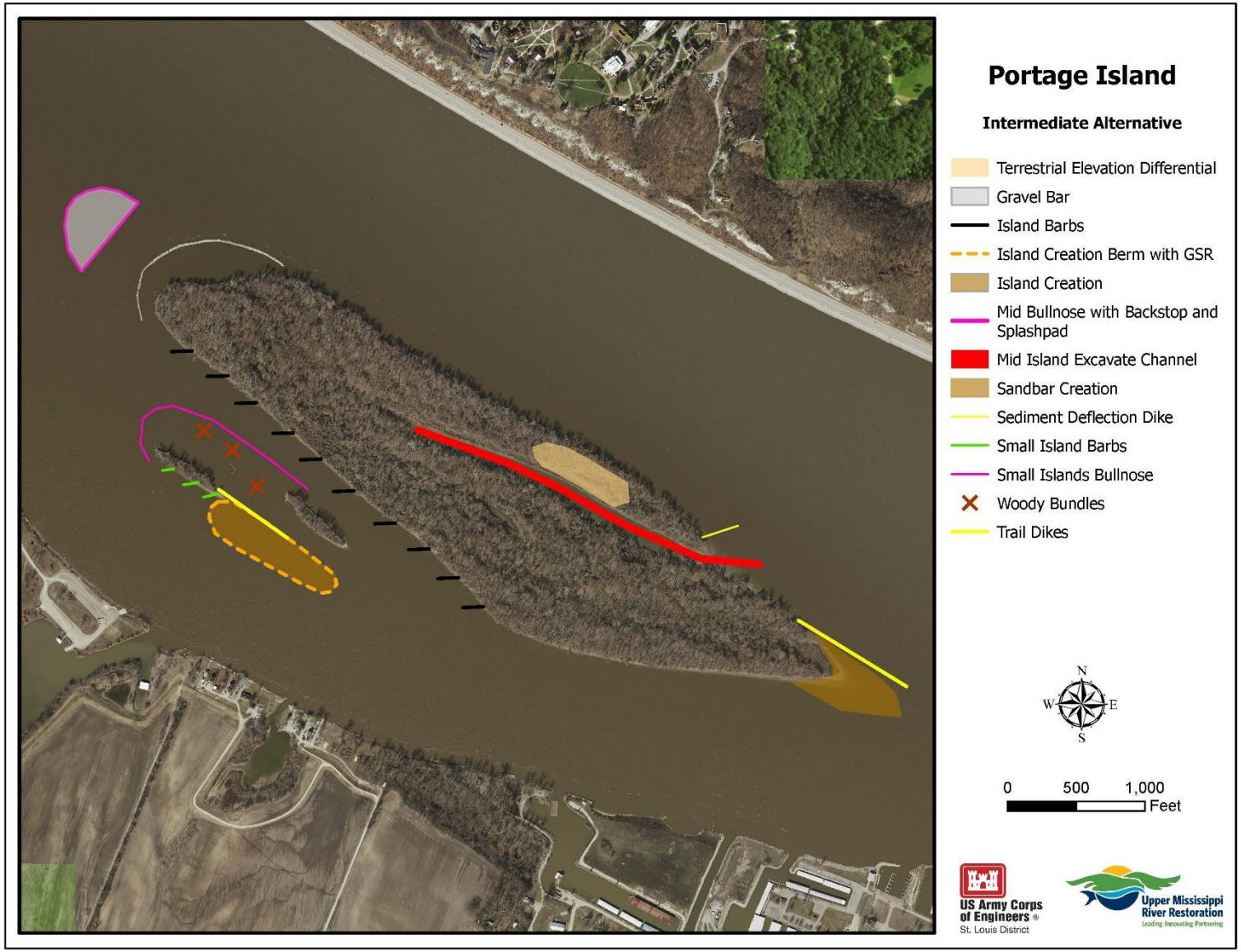
All project measures would be located within the lands and waters of the United States, are federally owned, and are managed either by MDC or the USFWS. As such, project first cost funding for restoration measures would be 100 percent federal; responsibility for the operation, maintenance, rehabilitation, replacement, and repair of the project would be the responsibility of MDC and USFWS depending on the specific location of project features.

The St. Louis District Engineer has reviewed the project outputs, a gain of 425 net AAHUs, and determined that the implementation of the Plan is in the federal interest. Therefore, the District Engineer recommends construction approval for the West Alton Islands HREP. The current estimated project first cost (FY2023 price level) of the project (including contingencies) is estimated at $29,294,000. The average annual cost based on the project first cost is $1,206,000. The fully funded project cost estimate is $32,954,000. MDC and USFWS would be responsible for project operation,

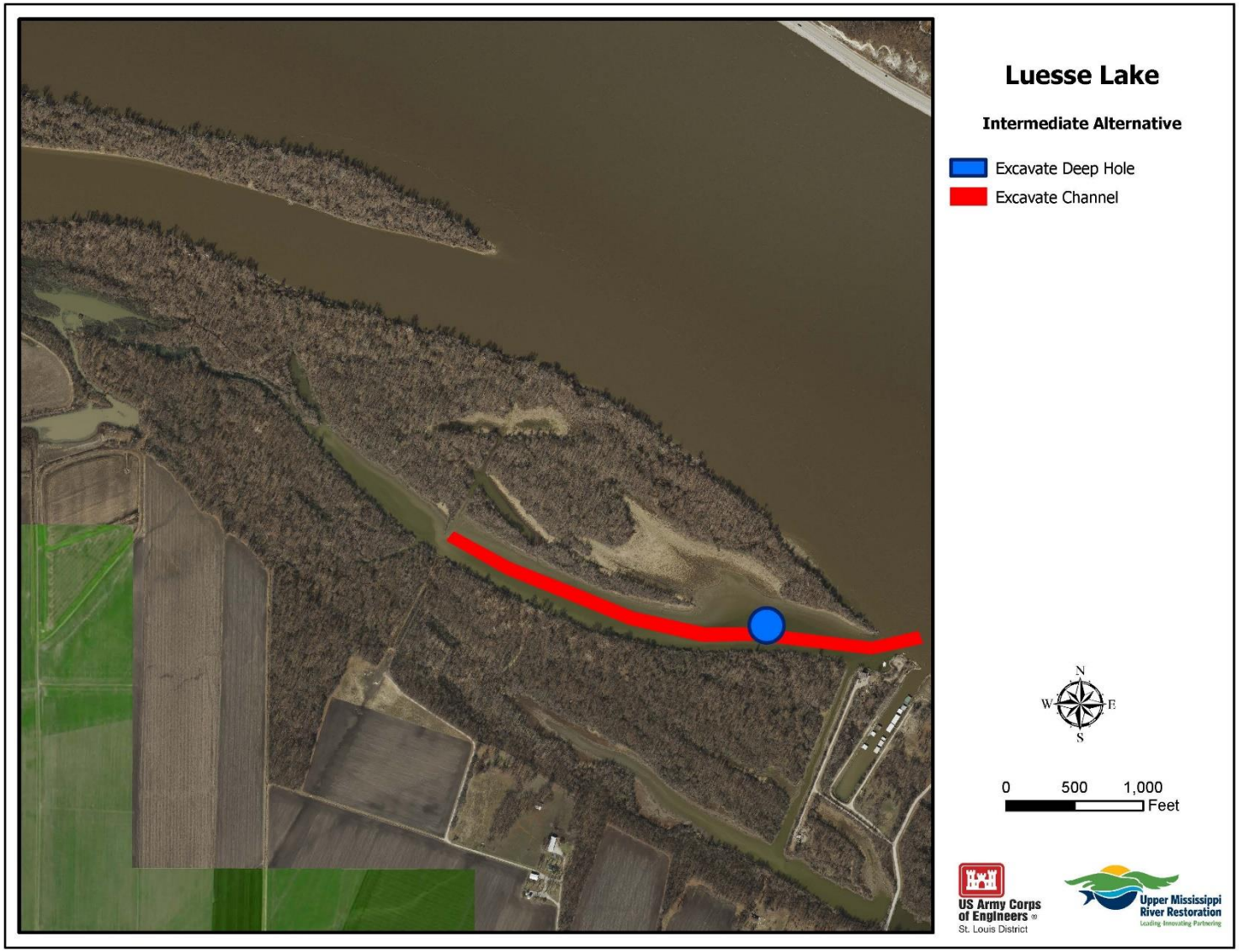
maintenance, repair, rehabilitation, and replacement (OMRR&R) at an estimated average annual cost of $1,200 (including contingencies).



ES Figure 1: West Alton Bay - Intermediate Alternative



ES Figure 2: Portage Islands - Intermediate Alternative



ES Figure 3: Luesse Lake- Intermediate Alternative

*Denotes National Environmental Policy Act required sections

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[1]1 STUDY BACKGROUND*

1.1 Purpose and Scope of Investigation

The scope of this study focuses on evaluating proposed management measures that would restore structure, function, and processes of the backwater, side channel, island, sandbar, floodplain wetland, and floodplain forest within the West Alton Islands Habitat Rehabilitation and Enhancement Project (HREP), (Figure 1). This study follows the U.S. Army Corps of Engineers' (USACE's) six-step planning process specified in Engineer Regulation (ER) 1105-2-100 and is consistent with agency goals. The process identifies and responds to problems and opportunities and provides a flexible and rational framework to make decisions. Additionally, the process allows the interested public and stakeholders to be fully aware of the basic assumptions employed, data analyzed, risks/uncertainties identified, and significant implications of each alternative plan (including the No Action alternative). The development and comparison of alternatives allows for the ultimate identification of the National Ecosystem Restoration (NER) Plan. The NER Plan reasonably maximizes ecosystem restoration benefits compared to costs. The NER Plan also considers information that cannot be quantified, such as environmental significance, scarcity, socioeconomic impacts, and historic properties.

[1] * Denotes National Environmental Policy Act required sections

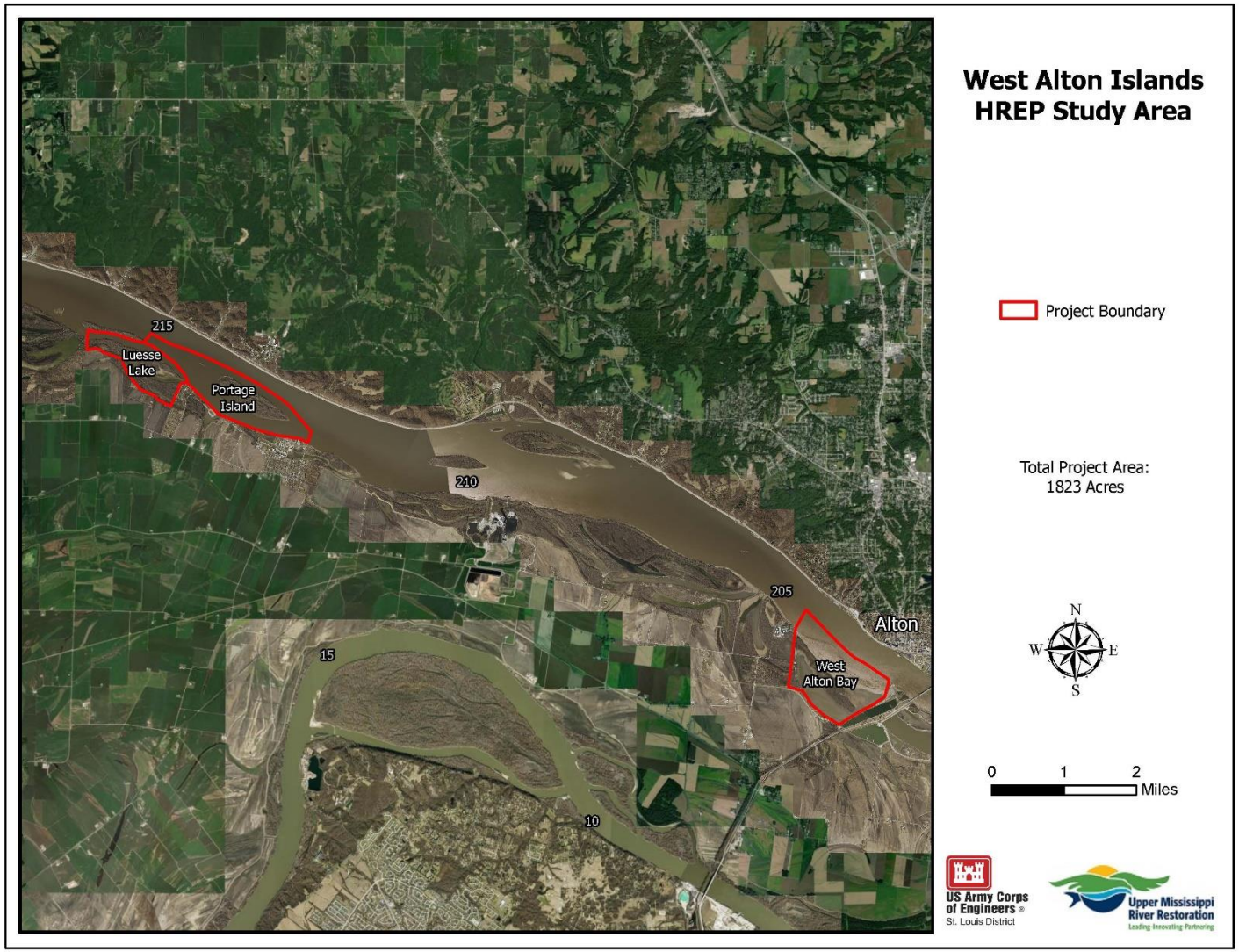


Figure 1. West Alton Is. Study Area

1.2 Authority

The Upper Mississippi River Restoration (UMRR) Program was authorized in the Water Resources Development Act (WRDA) of 1986 (P.L. 99-662), Section 1103, the Upper Mississippi River Plan. Section 1103(e) of WRDA 1986 outlines the following undertakings:

(A) a program for the planning, constructing, and evaluation of measures for fish and wildlife habitat rehabilitation and enhancement (UMRR-HREP);
(B) implementation of long-term resource monitoring program (LTRM); and
(C) implementation of a computerized inventory and analysis system.

UMRR's geographic extent encompasses 2.7 million acres of river floodplain along the Congressionally defined navigable portions of the Upper Mississippi River (from Lock and Dam 1 in Minneapolis, Minnesota to Cairo, Illinois) as well as the Illinois, Minnesota, Black, Saint Croix, and Kaskaskia Rivers. The UMRR Program mission is:

> *to work within a partnership among federal agencies, state agencies, and other organizations; to construct high-performing habitat restoration projects; to produce state-of-the-art knowledge through monitoring, research, and assessment; and to engage other organizations* (USACE 2016).

The original authorizing legislation has been amended several times since its enactment. The 1990 WRDA, Section 405, extended the original UMRR HREP and UMRR-LTRM authorization an additional five years to fiscal year 2002. The 1992 WRDA, Section 107, amended the original authorization by allowing limited flexibility in how funds are allocated between the HREP program and the LTRM element. In accordance with the 1992 WRDA, the sole responsibility for Operation and Maintenance, Repair, Replacement and Rehabilitation (OMRR&R) of habitat projects is assigned to the federal, state, or local agency owner that is responsible for management activities for fish and wildlife on project lands. The 1999 WRDA, Section 509, reauthorized HREP and LTRM as a continuing authority and changed the cost sharing percentage from 25 percent to 35 percent. The 2007 WRDA, Section 3177, allowed for the inclusion of water quality research in the applied research program for development of remediation strategies on the Mississippi River.

The study area is located on federally owned lands managed as part of the General Plan (GP) land agreement; therefore, pursuant to 1986 WRDA, Sections 906(e) (3), as amended, the project first costs are 100-percent federal funded. Included areas are part of the GP lands agreement between the USACE and the USFWS which was signed in 1961 as a result of the federal government acquiring lands as a part of building the dams. USFWS has a Cooperative Agreement for Management of USACE GP lands between the USFWS and MDC for all areas in the study area except Portage Island which is managed by the USFWS. As stated in these agreements, the lands and waters will be managed as a national wildlife refuge to enhance fish and wildlife. Responsibility for the operation, maintenance, rehabilitation, replacement, and repair of any potential project would be the responsibility of MDC, with the exception of Portage Island, which

will be the responsibility of USFWS.

1.3 Project Sponsors

The non-federal sponsor is the Missouri Department of Conservation (MDC), and the federal sponsor is the U.S. Fish and Wildlife Service (USFWS).

1.4 Study Area Description

The West Alton Islands study area is approximately 1,823 acres of island, side channel, backwater, and floodplain forest habitats located on the right descending bank of the Mississippi River in St. Charles County, Missouri between River Miles (RM) 203 and 215.5. The study area lies within Pool 26 of the Upper Mississippi River System, a reach beginning below Lock and Dam 25 (RM 241.4) near Cap au Gris, Missouri, and ending at Melvin Price Lock and Dam (L&D) (RM 200.8) at Alton, IL. The study area encompasses West Alton Bay, Portage Island and side channel, and Luesse Lake.

Figure *2* and Figure *3* provide a vicinity map and Pool 26 location map for the West Alton Islands HREP.

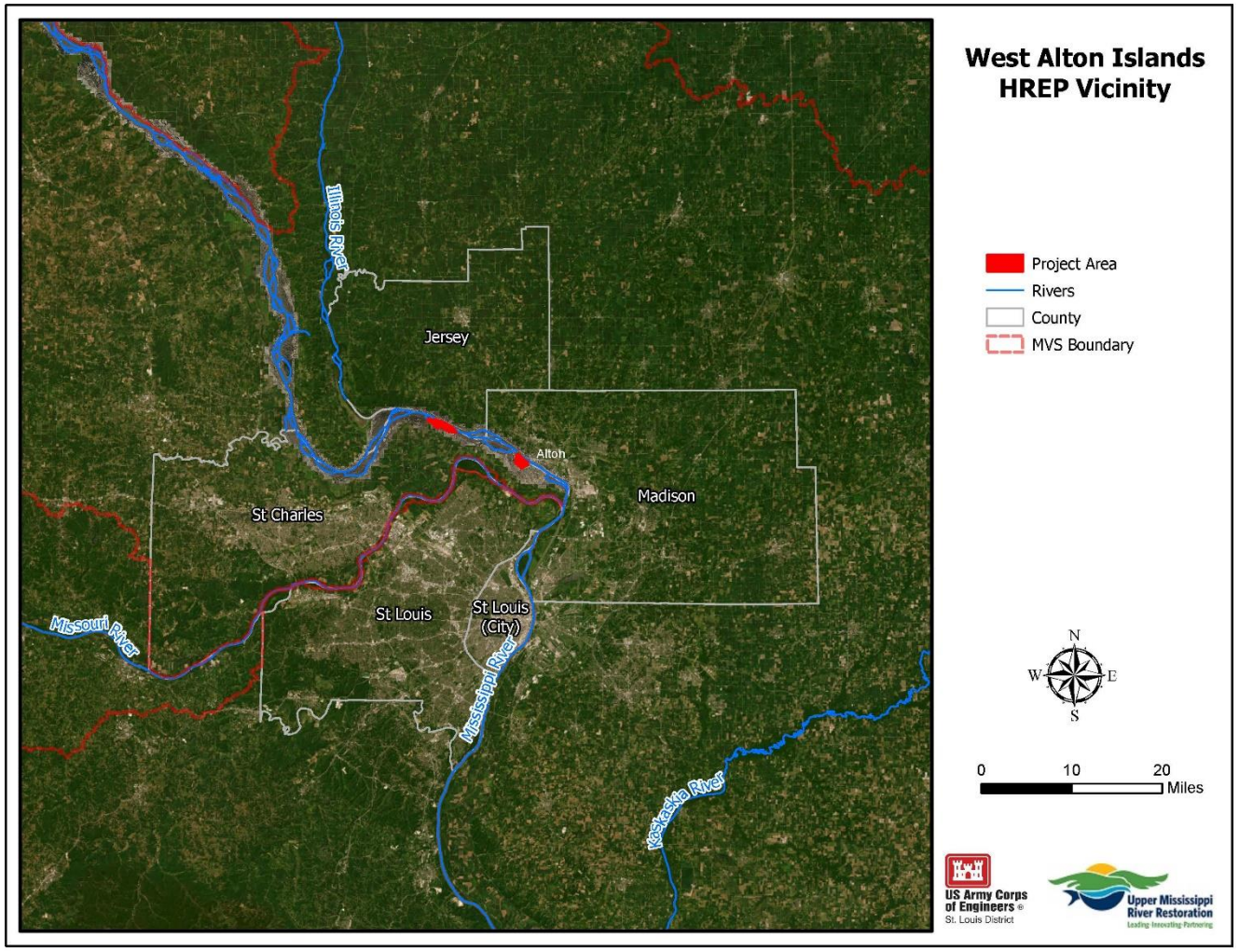


Figure 2: Project Vicinity Map

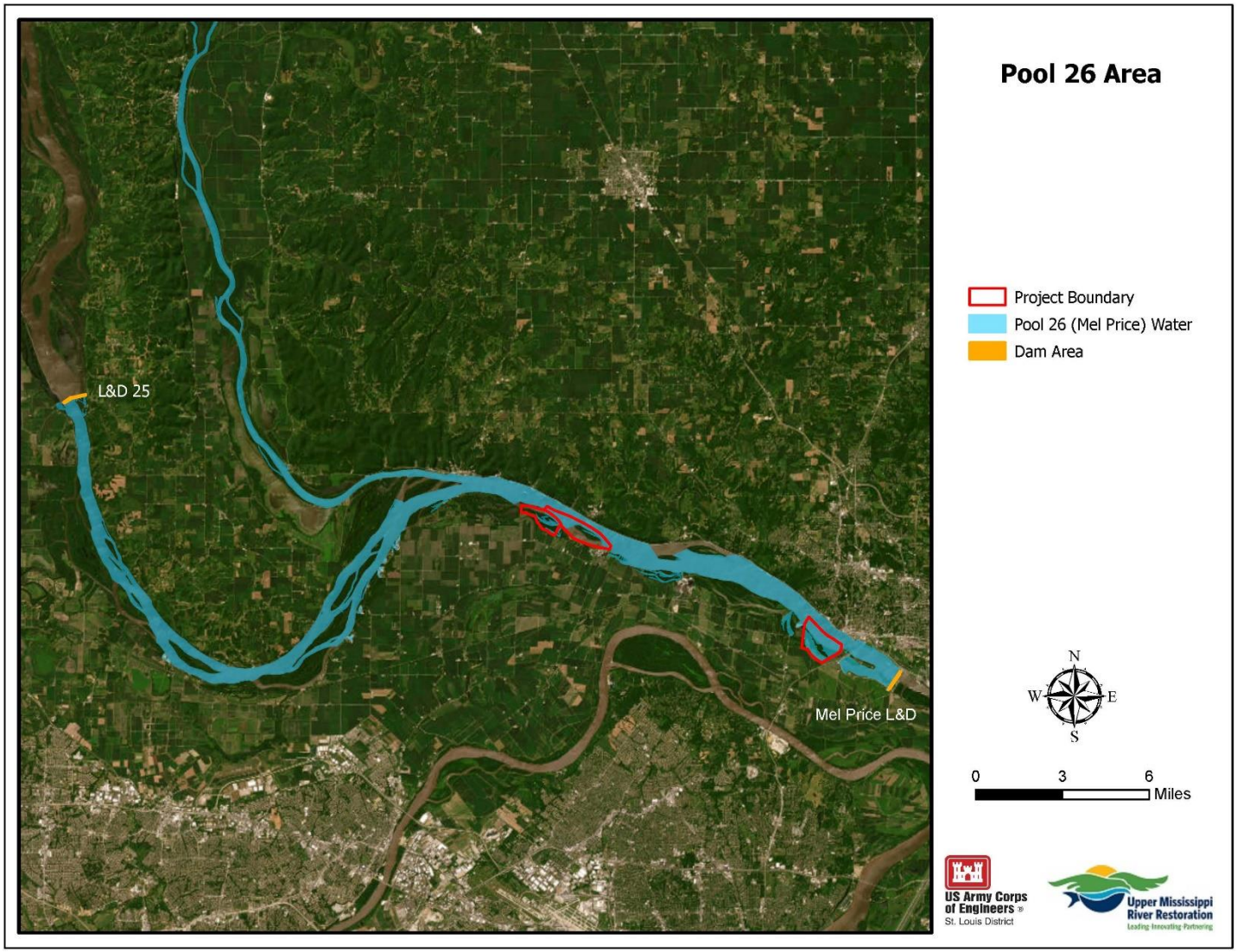


Figure 3: Pool 26 with Project Area

1.5 Purpose and Need

The purpose of this Draft Feasibility Report with Integrated EA, including the draft unsigned FONSI, is to evaluate a range of alternatives or actions and their environmental effects and to determine if there is a federal interest in constructing a project. Developed alternatives, including the no action plan, comply with current applicable laws, regulations, and policies.

The need for rehabilitation of backwaters, side channels, emergent wetlands, floodplain forests, sandbars, and island habitats is based on information in the following reports:

- The *Upper Mississippi Conservation Area Ten-Year Management Plan FY 2016-2025* identifies a need to protect forest, wetland, and aquatic habitats in the study area for wildlife. The management plan identifies the need to address water level management issues, sedimentation, and tree recruitment/regeneration issues in the study area.
- The *Upper Mississippi River System Habitat Needs Assessment (HNA) II* (McCain, Schmueker, & De Jager, 2018)The HNA II summarized the desired future conditions in relation to high importance indicators for the Lower Impounded Mississippi River as: 1) improve gate management for native fish passage, 2) restore floodplain habitat and connectivity, 3) restore islands, 4) restore diversity of aquatic habitat types with desire for more lentic and backwater habitats, preferably shallow lotic areas and deep lentic areas, 5) restore aquatic vegetation in backwater areas, 6) restore floodplain forest diversity, including hard-mast, 7) enhance floodplain topographic diversity, 8) restore floodplain vegetation diversity in hand with diversifying floodplain inundation periods, 8) restore water level fluctuation to mimic pre-dam conditions, and 9) improve water clarity.
- *Two Rivers National Wildlife Refuge Habitat Management Plan* (2011) identifies a desire to protect a natural diversity of habitat types able to support healthy, native wildlife populations. An emphasis was placed on wetland resources and their associated migratory and resident wildlife species, patch size and structural diversity of floodplain forest resources, and to reduce impacts of sedimentation on fish and wildlife resources.
- Missouri Comprehensive Conservation Strategy (MDC, 2020) identifies the geographic areas of significant conservation potential throughout the state. The strategy identifies the need to protect and restore wetland habitats within the study area, including marsh and floodplain forests.

1.6 Project Selection

The MDC recommended the study area for potential inclusion in the UMRR Program. To ensure the UMRR Program leverages limited funds, as well as ensuring a watershed approach is taken, all HREPs are endorsed by interagency coordination teams composed of federal, state, and non-governmental organizations involved in the planning of ecosystem restoration.

Once the study area was endorsed by the interagency coordination team, a USACE-UMRR factsheet was developed identifying a federal interest to evaluate potential solutions to address the problems occurring within the study area.

The Mississippi Valley Division, the Major Subordinate Command for the St. Louis District, approved the West Alton Islands HREP factsheet on June 2, 2010 (*Appendix A – Coordination)*.

1.7 Resource Significance*

The Planning Guidance Notebook (2000) ER 1105-2-100 defines significance in terms of institutional, public, and technical recognition. See Table 1 for additional information on how different species and habitat types within the study area fall into these three categories.

1.7.1 Institutional Significance

Institutional recognition means the importance of an environmental resource is acknowledged in the laws, adopted plans, and other policy statements of public agencies, tribes, or private groups. Sources of institutional recognition include public laws, executive orders, rules and regulations, treaties, and other policy statements of the federal government; plans, laws, resolutions, and other policy statements of states with jurisdiction in the planning area; laws, plans, codes, ordinances, and other policy statements of regional and local public entities with jurisdiction in the planning area; and charters, bylaws, and other policy statements of private groups.

The formal recognition of the UMR Basin in laws, adopted plans, and other policy statements of public agencies and private groups illustrates the significance of the basin. The U.S. Congress recognized the UMR as a unique, "…nationally significant ecosystem and a nationally significant commercial navigation system…" in Section 1103 of the WRDA of 1986.

1.7.2 Public Recognition

Public recognition means that some segment of the general public recognizes the importance of an environmental resource, as evidenced by people engaged in activities that reflect an interest or concern for that resource. Such activities may involve membership in an organization, financial contributions to resource-related efforts, and providing volunteer labor and correspondence regarding the importance of the resource.

In 2007, the National Audubon Society designated much of the study area as a State Important Bird Area, which is a location identified for its importance to particular bird species or groups of bird species. Resources within the study area provide critically important habitat for waterfowl, wading birds, shorebirds, other wetland bird species, and migratory landbirds. As a result, the area is a popular destination for local, national, and international bird enthusiasts for wildlife viewing. Additionally, numerous organizations, including boat clubs, duck clubs, and environmental NGOs consisting of local members engage in a range of recreational activities that depend on resources in the study area.

1.7.3 Technical Recognition

Technical recognition means that the resource qualifies as significant based on its "technical merits", which are based on scientific knowledge or judgment of critical resource characteristics. Whether a resource is determined to be significant may vary based on differences across geographical areas and spatial scale. While the technical significance of a resource may depend on whether a local, regional, or national perspective is taken, typically a watershed or larger context should be considered. Technical significance should be described in terms of one or more of the following criteria: scarcity, representativeness, status and trends, connectivity, limiting habitat, and biodiversity.

Numerous scientific analyses and long-term evaluations of the UMRS have documented its significant ecological resources. Since the early 20th century, researchers, government agencies, and private groups have studied the larger river floodplain system and proposed ecosystem restoration in the UMRS. Numerous scientific analyses and long-term studies through USACE's UMRR-LTRM have documented the significance of the resources in the UMR basin.

In a 1995 report, the U.S. Department of Interior (DOI) listed large streams and rivers as endangered ecosystems in the United States. The DOI documented an 85 to 98 percent decline in this ecosystem type since European settlement. Large riverine and floodplain ecosystems have become increasingly rare worldwide. Two of the large riverine and floodplain ecosystems lay within the UMRS, namely the Upper Mississippi and Illinois Rivers. These two ecosystems still retain some seasonal flood pulses, and half of their original floodplains remains un-leveed and open to the rivers (Sparks R. N., 1998). The UMRS is one of the few areas in the developed world where ecosystem restoration can be implemented on large floodplain-river ecosystems (Sparks R. , 1995).

In addition, technical resource agencies (federal, state, and non-profit) view the resources in the Upper Mississippi River as significant, as reflected in the ongoing habitat restoration efforts in the region including completed HREPs at Dresser Island, Calhoun Point, Swan Lake, and Stump Lake; and current construction of an HREP at Piasa and Eagle's Nest Islands. The *Upper Mississippi River System Habitat Needs Assessment II* (McCain, Schmueker, & De Jager, 2018) has also technically recognized the need to restore floodplain habitat and connectivity to the main river channel, restore islands, restore diversity of aquatic habitat types (deep lentic backwaters and shallow lotic channel areas, restore aquatic vegetation in backwaters, restore floodplain forest diversity, restore floodplain vegetation diversity, enhance topographic diversity, restore water level fluctuation to mimic pre-dam conditions, and improve water clarity which are relevant to the project area.

Table 1 Resource Significance for West Alton Islands HREP

Resource	Institutional Recognition	Public Recognition	Technical Recognition
Protected Species	Fish and Wildlife Coordination Act, as amended (16 U.S.C.§ 661) Endangered Species Act (ESA) of 1973, as amended Mark Twain National Wildlife and Fish Refuge Comprehensive Conservation Plan (USFWS 2004).	Regularly occurring public events sponsored by local organizations around viewing the protected Bald Eagle. National Audubon Society has designated the Great Rivers Confluence Area an important bird area for wetland birds and migratory landbirds which provides a draw for public recreation opportunities.	*Representativeness:* The USFWS has identified the Indiana Bat, Northern Long-eared Bat, and Decurrent False Aster as federally endangered or threatened species that have the potential to occur within St. Charles County, MO.
Migratory Birds	Migratory Bird Conservation Act of 1929, and associated treaties Migratory Bird Treaty Act of 1918 EO 13186 – Responsibilities of Federal Agencies to Protect Migratory Birds Bald and Golden Eagle Protection Act of 1940 North American Waterfowl Management Plan Upper Mississippi Great Lakes JV (UMRGLJV) 2017 Waterfowl and 2018 Waterbird Habitat	Migratory birds provide the public with recreational opportunities, such as bird watching and waterfowl hunting. National Audubon Society has designated the Great Rivers Confluence Area an important bird area for wetland birds and migratory landbirds. The Upper Mississippi River Waterfowl Conservation Region (Region 19) is a level III Ducks Unlimited conservation priority area, providing a migration corridor waterfowl.	*Representativeness*: Knutson et al. (1998); found relative abundances of all birds and total numbers of neotropical migratory birds were almost twice as high in the UMR floodplain as in the adjacent uplands. Upper Mississippi River Great Lakes Joint Venture (UMRGLJV) (2018) identified the Mississippi River and Lower Illinois River aquatic habitat as highly important to nonbreeding waterbirds. *Limiting Habitat*: National Audubon Society designated the area an Important Bird Area for concentrations of wetland birds and migratory landbirds (Jensen & Forbes, 2006). Both groups are limited by suitable habitat on the landscape. *Status and Trend:* Forest and wetland habitat diversity in the Illinois and Mississippi River confluence have declined over time. These trends are likely to continue, and without

Resource	Institutional Recognition	Public Recognition	Technical Recognition
	Conservation Strategies UMRGLJV 2021 Landbird Conservation Strategy		intervention, the West Alton Islands project area will provide limited migration, dispersal, breeding, nesting, and cover habitat for a wide range of migratory birds.
Floodplain Forests	Fish and Wildlife Coordination Act, as amended (16 U.S.C.§ 661) ESA of 1973, as amended Mark Twain National Wildlife Refuge Comprehensive Conservation Plan (USFWS 2004). Two Rivers NWR Habitat Management Plan (USFWS 2011) National Wildlife Refuge Systems Biological Integrity, Diversity, and Environmental Health Policy UMRGLJV 2021 Landbird Conservation Strategy	The Upper Mississippi River Conservation Committee (UMRCC) recognized the importance of the floodplain forest to the fish and wildlife of the UMR (Urich et al., 2002). National Audubon Society has identified floodplain forests of the UMR as a focal area due to its importance for breeding and migratory landbirds.	*Scarcity*: Hard-mast forest resources have declined due to hydrologic changes and land use changes along the UMRS and in the study area (Nelson and Sparks, 1994; Cosgriff, Nelson, and Yin, 1999) *Biodiversity:* The study area is likely to continue to experience loss of forest resources and limited species and structural diversity. Neotropical and other migratory landbirds, Indiana bats, and the other floodplain species that rely on the forest resources will be severely impacted. *Representativeness:* Knutson et al. (1996) described the importance of floodplain forest in the conservation and management of neotropical migratory birds. Kirsch and Wellik (2017) describe the importance of oak and other declining species in UMR floodplain forests for neotropical migrant landbirds.

Resource	Institutional Recognition	Public Recognition	Technical Recognition
Wetlands	The 2018 *Waterbird Habitat Conservation Strategy Revision* – area of greatest biological importance for breeding and non-breeding waterbird habitats Executive Order No. 11990 of May 1977 (Protection of Wetlands) Water Resources Development Act of 1990, Section 307(a) Mark Twain National Wildlife and Fish Refuge Comprehensive Conservation Plan (USFWS 2004).	National Audubon Society has designated the Great Rivers Confluence Area an important bird area for wetland birds and migratory landbirds. The Upper Mississippi River Waterfowl Conservation Region (Region 19) is a level III Ducks Unlimited conservation priority area, providing a migration corridor waterfowl.	Connectivity: The Illinois and Mississippi River Confluence area contains a high concentration of public and private wetland resources (UMRGLJV, 2018) for migrating waterfowl. The UMR and Illinois River Valley provide valuable resources for migratory waterfowl in spring and fall (Stafford et al., 2007) *Scarcity:* Through land use changes, approximately 90% of pre-settlement wetlands were lost by the 1980's in Illinois. *Status and Trend:* Without the West Alton Islands HREP, the emergent wetland habitat extent and ability to provide quality habitat for wetland dependent species is expected to decline.

1.8 Proposed Federal Action*

The HREP focuses on the proposed restoration measures that would improve ecosystem resources (wetlands, floodplain forests, backwaters, side channels, and islands) within the UMR.

The federal action of selecting one of the alternatives for potential implementation will be determined by the USACE St. Louis District Engineer. The District Engineer will also determine, based on the facts and recommendations contained herein, whether this Environmental Assessment (EA) is adequate to support a Finding of No Significant Impact (FONSI) or whether an Environmental Impact Statement (EIS) will need to be prepared.

1.9 Scoping*

Scoping is an early and open process for determining the span of issues to be addressed and for identifying the significant issues related to a proposed action.

Scoping and coordination have been conducted with the following state and federal agencies, and other interested parties:

- Missouri Department of Conservation
- U.S. Fish and Wildlife Service
- Missouri State Historic Preservation Office
- U.S. Environmental Protection Agency
- Illinois Natural History Survey
- River Resources Action Team (RRAT)

The input received during scoping was incorporated in the process of making decisions for the project. *Appendix A – Coordination* documents the coordination.

1.9.1 Coordination Meetings

Numerous coordination and stakeholder meetings were held to discuss problems, opportunities, goals and objectives, potential restoration measures, and expected outcomes with and without a project. The following meetings demonstrated ongoing coordination:

A Virtual Planning Charrette was held over five sessions between January 19 and February 4, 2021, prior to the development of this report. Twenty technical experts from the U.S. Fish and Wildlife Service (USFWS) and US Army Corps of Engineers (USACE), Illinois Natural History Survey (INHS), and Missouri Department of Conservation (MDC) were in attendance. A participant from the Illinois Department of Natural Resources (IDNR) was invited but was not able to attend the workshop.

The team provided input on project objectives, potential project measures, future conditions of the site, and resource issues. In addition, development of this feasibility report was actively coordinated throughout the planning process with the project partner, USFWS, as well as other natural resource agencies.

A stakeholder information sharing session was held July 20, 2022, at Harbor Point Yacht Club in West Alton, MO to inform the local stakeholders of the potential project and gather input from the stakeholders about their ideas, concerns, and considerations. The approximately 25 attendees included members or representatives from the Alton Visitors and Convention Bureau, Harbor Point Yacht Club, Migratory Waterfowl Hunters, Illinois Federation of Outdoor Resources, Audubon Society, and USFWS. Also invited were members of Portage De Sioux Marina, Alton Motorboat Club, Anchor Yankers Club, Alton Marina, Mississippi Valley Duck Hunters Association, Ducks Unlimited, IL River Biological Station, American Rivers, East West Gateway, and MDC, but they did not attend.

1.10 Prior Studies, Reports, and Existing Water Projects

The following references provide further detail on the UMRS: formation over geological time; physical, environmental, and cultural characteristics; social and economic conditions; and multi-purpose management:

Upper Mississippi and Illinois River Floodplain Forests: Desired Future and

Recommended Actions. 2002. Upper Mississippi River Conservation Committee. This report highlights the ecological importance of floodplain forests in the Upper Mississippi (from the head of navigation at Minneapolis, MN to the confluence with the Ohio River at Cairo, Illinois) and Illinois Rivers (entire Illinois River) and provides management recommendations to achieve desired future conditions for those forests.

Houser, J. e. (2022). Ecological Status and Trends of the Upper Mississippi River and Illinois Rivers (ver. 1.1., Jul 2022): U.S. Geological Survey Open-File Report 2022-1039, 199 p., https://doi.org/10.3133/ofr20221039. This report describes the UMRS and includes discussions on the historic and existing conditions, river monitoring and management, and ecosystem goals and indicators. It also discusses the status and trends of biological, physical, and chemical indicators of system health developed through UMRR-LTRM.

USFWS. 2011. Two Rivers National Wildlife Refuge Habitat Management Plan. U.S. Fish and Wildlife Service. 138 pp. This plan provides guidance for implementation of habitat management strategies identified during comprehensive conservation planning.

Upper Mississippi River Restoration Environmental Design Handbook. 2012. USACE, Rock Island District, Rock Island, Illinois. The design handbook of the UMRR evaluates project features and incorporates lessons learned throughout the lifetime of the program.

McCain, K., Schmuecker, S., and De Jager, N. 2018. Habitat Needs Assessment-II: Linking Science to Management Perspectives. This report summarizes the second Habitat Needs Assessment of the UMRS and is intended to help inform the UMRR Program in selecting, designing, and evaluating future restoration projects to achieve the UMRR Program's vision. It describes and compares historical, existing, forecasted, and desired future conditions to identify habitat needs within the UMRS.

2.0 ASSESSMENT OF EXISTING RESOURCES*

Section 2 assesses the existing conditions of resources, organized by resource topic. This is not a comprehensive discussion of every resource within the study area, but rather it focuses on those aspects of the environment that were identified as relevant issues during scoping or may be affected by the considered alternatives. The environmental effects on these resources are described in section 7.

2.1 Resource History of the Study Area

The 1,823-acre study area begins two river miles upriver from Melvin Price Locks and Dam (L&D 26) and continues up the Missouri side of the Mississippi River to approximately three river miles downstream of the Mississippi and Illinois River

confluence. Prior to European settlement, the region supported a dynamic mosaic of braided channels, islands, bottomland prairies, shifting sandbars, bottomland lakes, backwaters, wetlands, savannas, bottomland hardwood forests, floodplain forests, and riverfront forests (Heitmeyer, 2012). The diverse assemblage of communities was the result of dynamic scouring and depositional events by the river.

Since European settlement, floodplain habitats have been altered and degraded through channel alterations, construction of levees, and change in land use from natural land cover types to agriculture, industry, and urban development. Starting in 1824, the Department of the Army was tasked with removing navigation impediments in the Mississippi River through actions such as snag removal and dredging. Later authorizations in 1866, 1878, 1907, and the 1930s charged the USACE with creating increasingly deep navigation channel conditions until the present 9-foot navigation channel depth requirement was authorized. A variety of methods have been used over this period of time to maintain navigation channel depth during low flow, including maintenance dredging, construction of dikes and closing structures, riverbank stabilization, and pool regulation through construction and management of the present-day lock and dam system on the Illinois and Upper Mississippi Rivers.

Levee construction began on the UMRS in the 1880s to provide flood protection. This action allowed conversion of formerly natural floodplain habitats to agriculture and development to occur. In the study area, 6.31 acres of land were converted to agriculture which included portions of Luesse Lake and Portage Island by the 1890s (Figure 4). However, widespread conversion from prairie and savanna to agriculture occurred to the south of the study area boundary. The rest of the landcover at Luesse Lake and West Alton Bay consisted of forest. Portage Island consisted of forest and mud/sand flats.

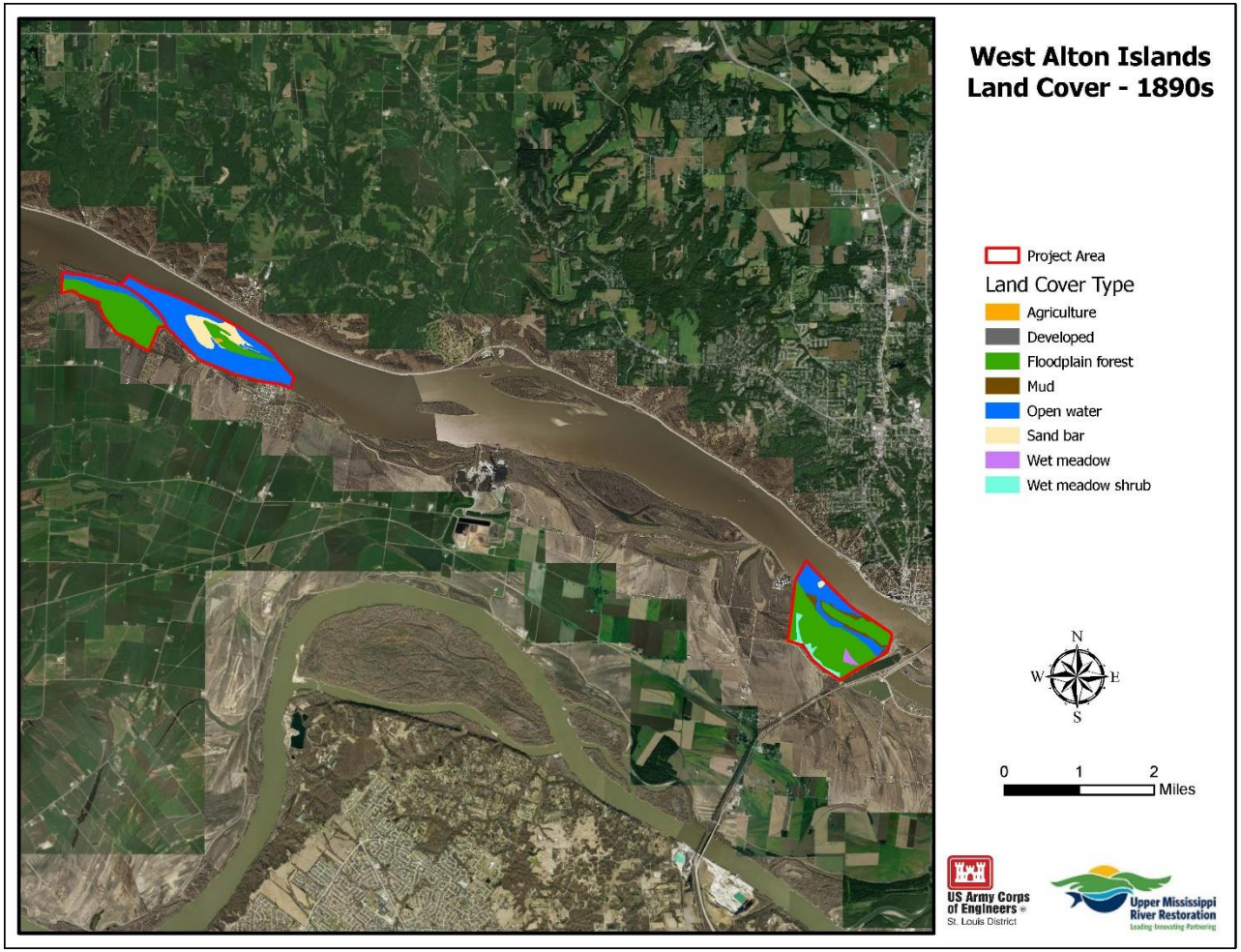


Figure 4: Study Area Land Cover from 1890s

Channel modifications and dam construction for the navigation channel had widespread implications for terrestrial and aquatic resources. The locks and dams on the UMRS turned the free-flowing river into a series of more lower velocity pools that increased baseline water elevations by approximately 8 feet (USACE, 2018a), and inundated lower elevation sandbars, islands, and forested areas; created new shallow wetland areas; and temporarily deepened pre-dam backwaters, side channels, and wetlands. The islands and other terrestrial habitats in the study area were acquired by the federal government as a result of Lock and Dam 26 construction and the corresponding increase in river elevations.

Forested areas that were inundated were harvested prior to impoundment. Aerial imagery (Figure 5,Figure 6,Figure 7,Figure 8) of the area from 1929-2020 illustrates the conversion of low elevation terrestrial areas to aquatic habitats. The increased river elevation also raised groundwater elevations, and this change continues to influence and impact tree species diversity, health, and distribution. These changes have occurred throughout the pool, but to a greater degree in the lower and middle sections of the pools where the study area occurs.

Initially, pre-dam backwaters, wetlands, and side channels were deepened, open water areas increased in extent, and new shallow wetland areas were created by the lock and dam system. These aquatic habitats have all degraded over time as increased sedimentation caused by lower flow velocities and land use changes in the watershed have filled in deep water areas with flocculent sediment. Areas formerly vegetated with aquatic plants no longer support these species due to unconsolidated sediments, high rates of turbidity, and rapid water fluctuations.

In the lower pool, raised post-dam water elevations frequently or permanently inundated parts of West Alton Bay, Luesse Lake, and the Portage Island complex in the study area, including sandbars around Portage Island and an island formerly located in the West Alton Bay area. The increased open water area, after impoundment, increased wind-fetch and boat-generated waves which have eroded island edges in the study area. Low water elevations in the Luesse Lake area were raised by approximately 8 feet, and the average annual fluctuation was reduced by 12 feet after construction of the lock and dam at Alton (USACE, 2018a).

In general, river levels within the portion of Pool 26 that encompass the study area fluctuates less similarly to historic water elevation fluctuations that occurred pre-impoundment. As a result of impoundment, larger magnitude fluctuations are observed in the lower portion of the pool, and within the study area when compared to historic water level fluctuations, which can undergo variations of up to six feet for weeks to months at a time (WEST Consultants, 2000).

Historical Imagery- West Alton Bay



1929 1931 1932

Figure 5: Historical Images- West Alton Bay 1929, 1931, & 1932



Figure 6: Historical Imagery: West Alton Bay 1971 & 2020

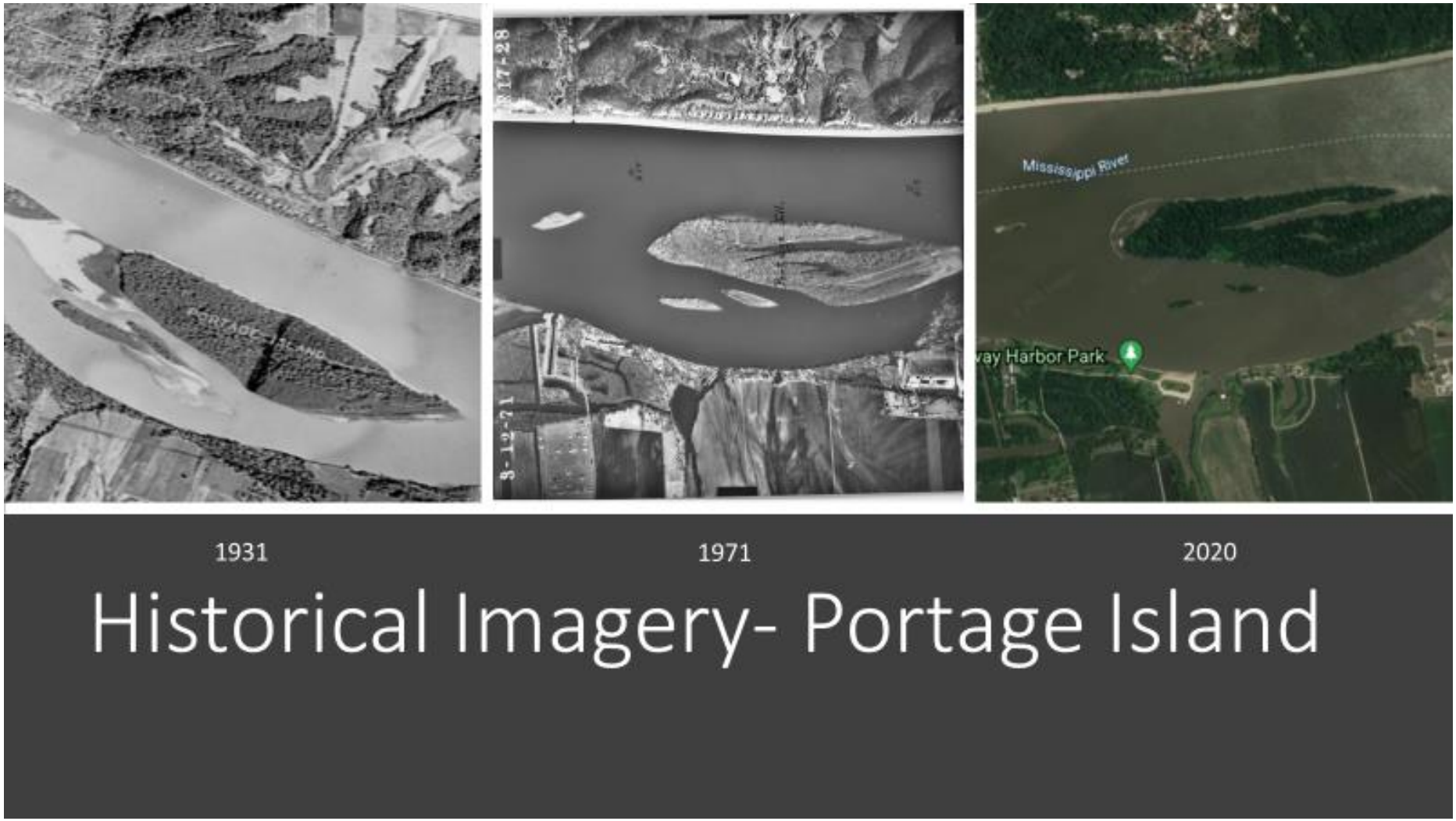


Figure 7: Historical Aerial Imagery- Portage Island 1931, 1971, & 2020



Figure 8: Historical Imagery- Luesse Lake 1931, 1971, & 2020

2.2 Description of Current Management

The study area (Figure 9Figure 10Figure 11) includes 1,823 acres of backwater, side channel, island, and floodplain forest habitat. Portage Island is the primary forested island within the study area, and additional forest habitat occurs within the West Alton Bay area and on the Missouri bank in the Luesse Lake area. Side channel habitat is associated with Portage Island. Backwater habitats are located near West Alton Bay, Luesse Lake, and Portage Island.

The terrestrial habitats in the West Alton Bay, Portage Island and Luesse Lake are owned by the USACE and cooperatively managed with the MDC and USFWS through the GP lands agreement. Portage Island is managed by the USFWS for migratory and resident wildlife. West Alton Bay and Luesse Lake areas are popular recreation areas for waterfowl hunters, as well as other forms of recreation such as fishing, kayaking, and nature viewing.

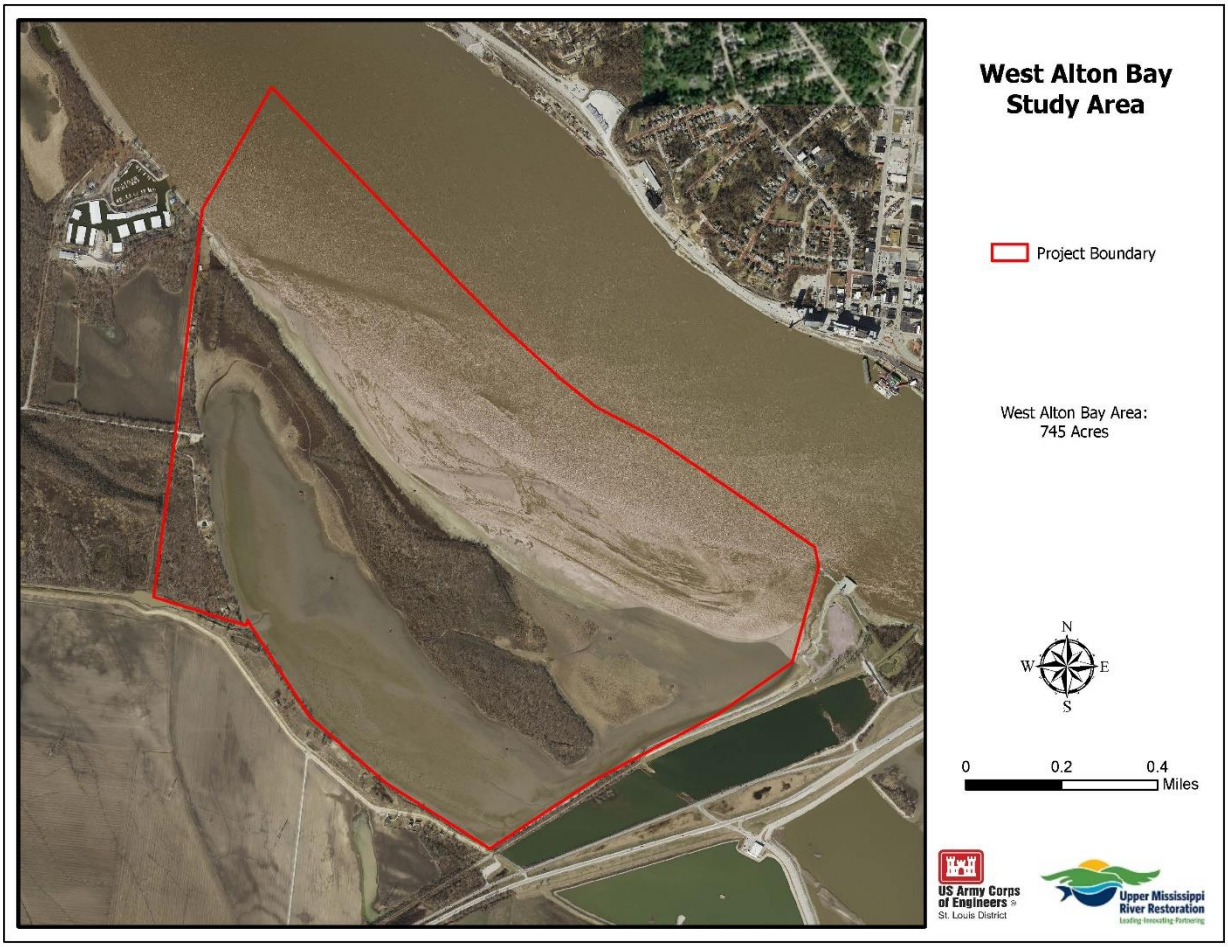


Figure 9: West Alton Bay Study Area

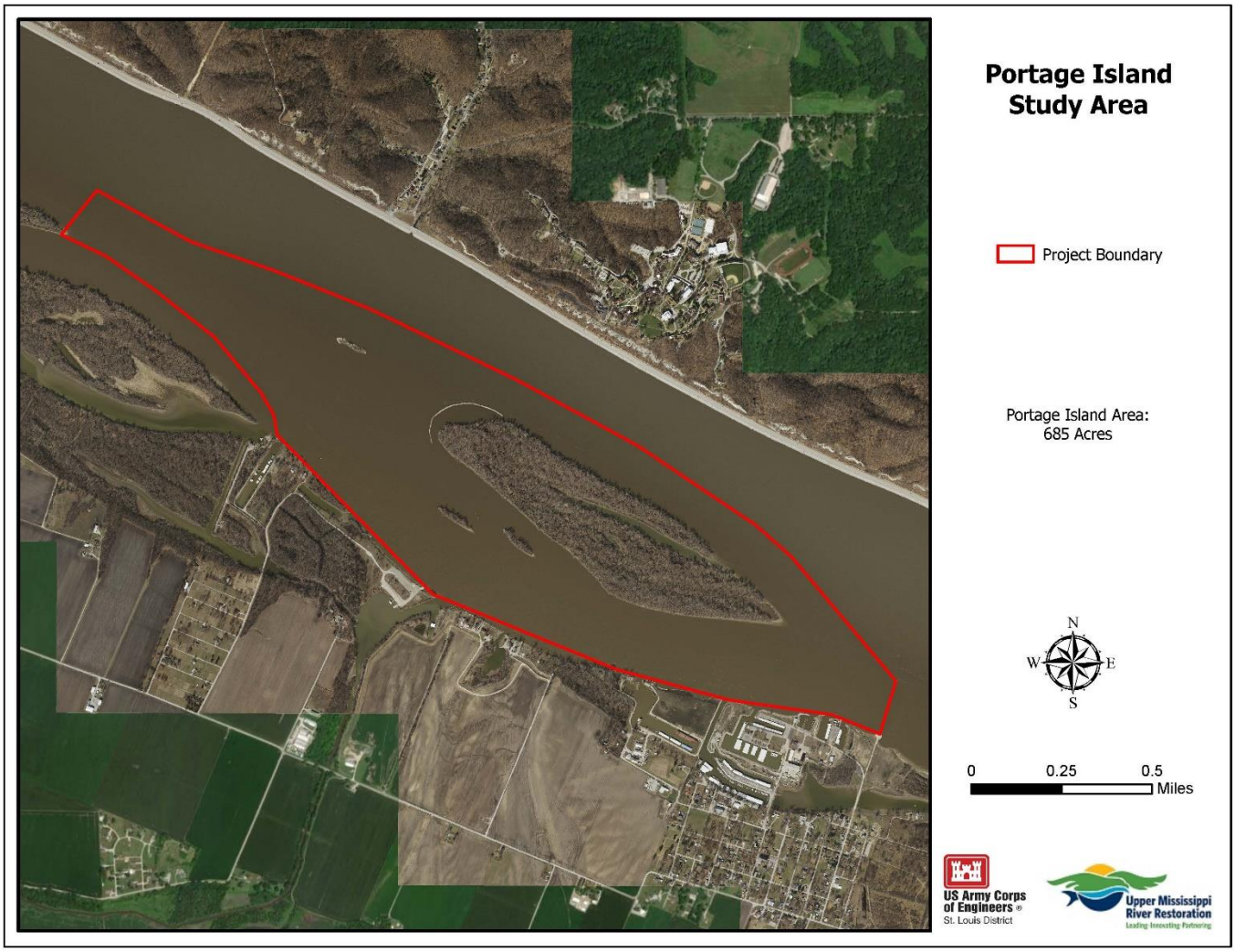


Figure 10: Portage Island Study Area

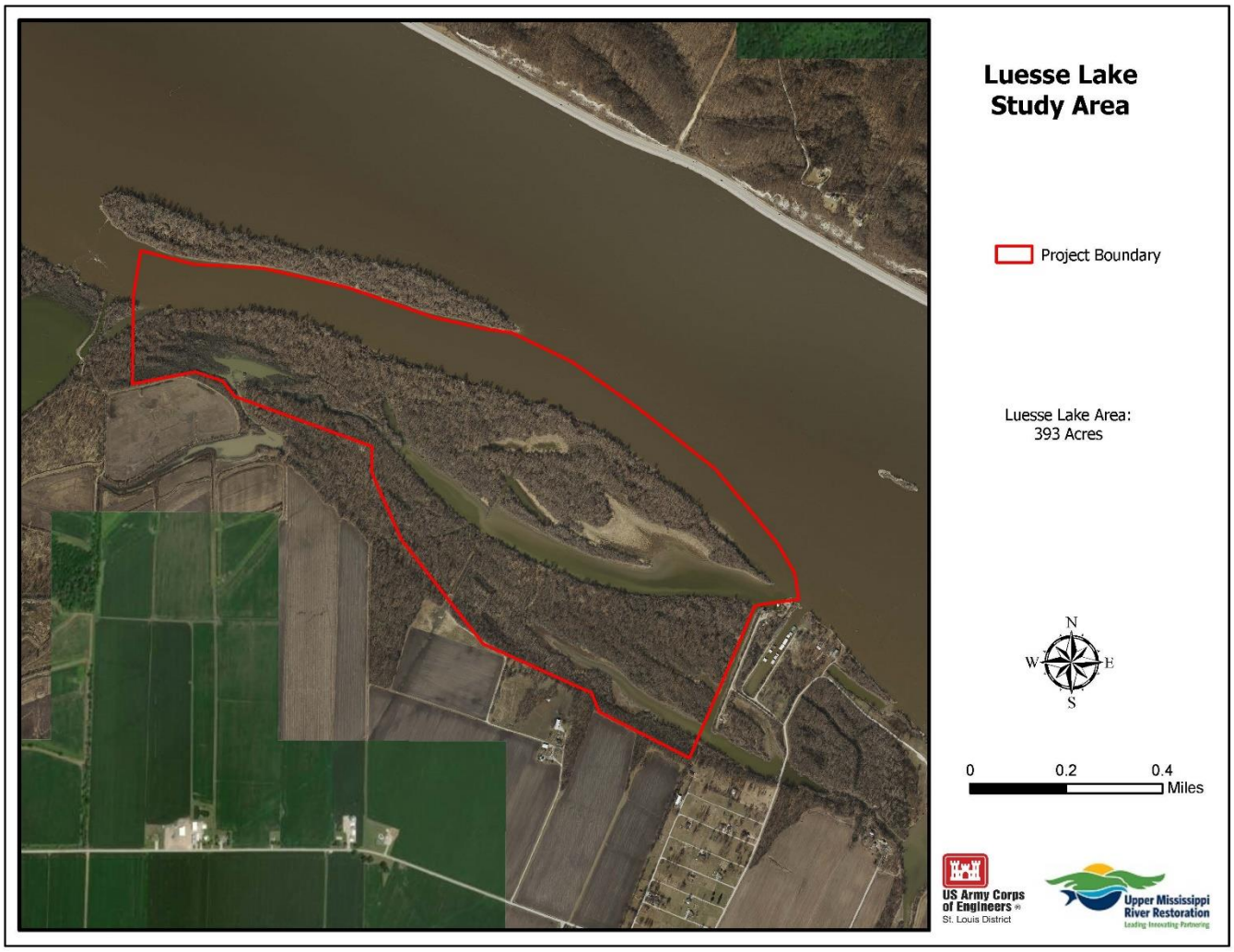


Figure 11: Luesse Lake Study Area

2.3 Hydrology and Hydraulics

The series of lock and dams on the UMRS were constructed for navigation purposes and not for flood storage; the river still experiences flood pulses during the spring, but the historic summer extreme low-flow conditions have been eliminated (Wlosinski, 1995). Consequently, surface water elevations within the UMRS, including Pool 26, are higher than they were historically, especially at low discharges.

Pool 26 water levels are managed by Mel Price L&D (RM 200.5) primarily for navigation; however, when conditions permit it is also managed for environmental benefit. During low to moderate flow periods (less than 210,000 cubic feet per second (cfs)), the gates of the dam are lowered into the flowing water, thus impeding the flow and backing water up on the pool side of the dam, maintaining a 9-foot navigation channel. The gates can remain in the water until flow rates increase to a stage of 16.2 on the Grafton gage. Elevations above this stage will cause pool levels to exceed the

limits of the real estate acquired for the Mel Price project. Once a stage of 16.2 or less on the Grafton gage can not be maintained, the gates on the dam are raised out of the river to allow for open river conditions.

As the flow rate continues to increase, the gates are lifted clear of the water simulating open river conditions. At a flow rate in excess of 210,000 cfs, a 9 foot channel exists naturally and there is no need for the dam. For receding flow rates, the gates are placed back in the water when the water on the poolside of the dam drops to stage 414.0. The gates are then adjusted uniformly according to the flow forecasts to keep the pool within limits by use of the pool regulation curve.

Environmental Pool Management (EPM) has been implemented since 1994 and attempts to create the hydraulic conditions to support thousands of acres of wetland vegetation within the navigation pools, while still maintaining a safe and dependable navigation channel. During early implementation of EPM, the navigation pool water level was held approximately one to two feet lower for a period of 30-45 days typically between May and July. In more recent implementation, EPM has been targeting a 90+ day drawdown in an attempt to promote growth of perennial aquatic plant species. The "drawdown" is then followed by a slow rise back to "flat pool" in late August or early September (Figure 12).

Figure 13 shows the location of the proposed project areas in reference to Mel Price L&D, L&D 25 and the gages used for analysis.

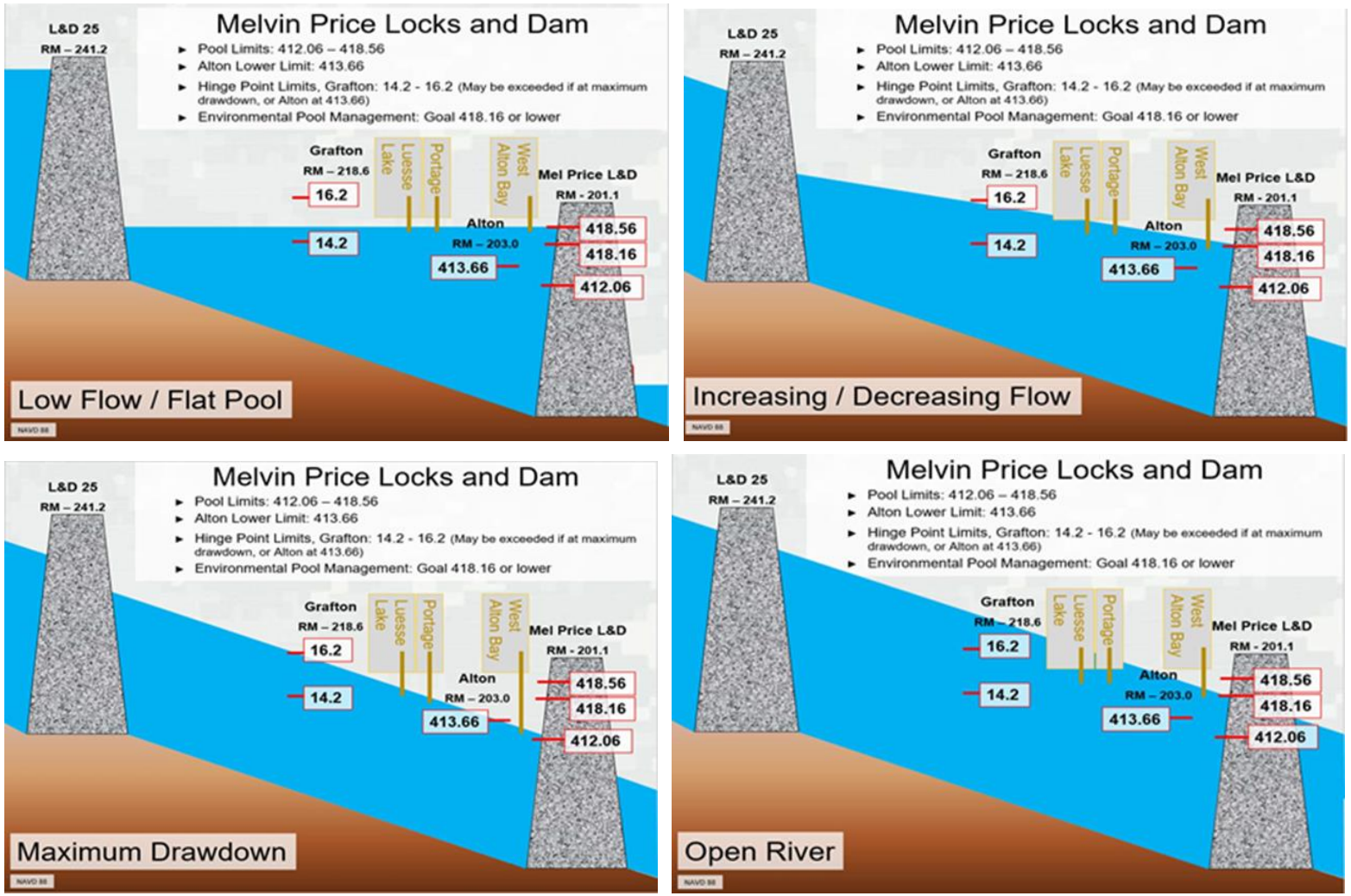


Figure 12: Illustration of Operation of Pool 26 at Melvin Price Lock and Dam

**** Water surface elevations shown in feet NAVD 1988.***

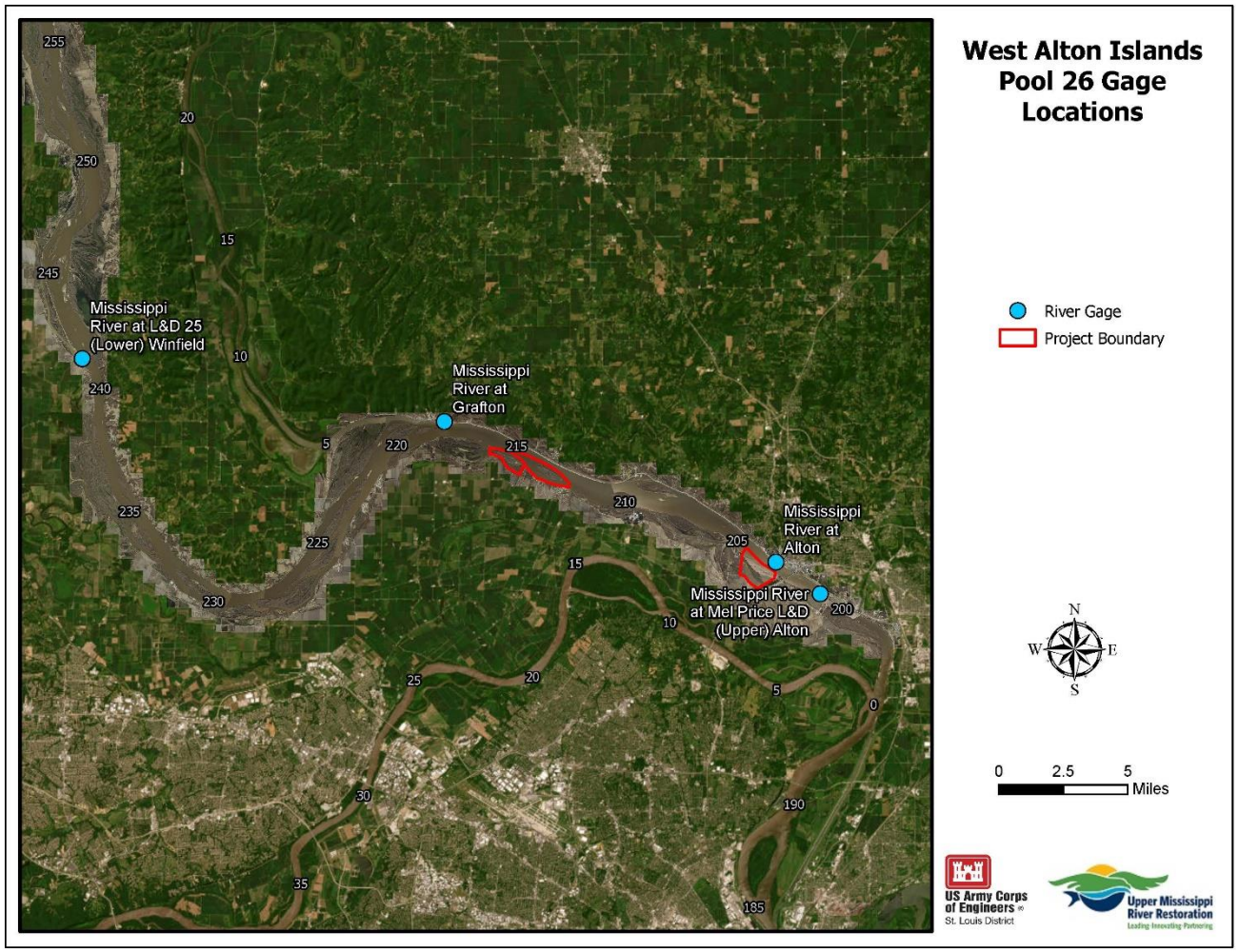


Figure 13: Mel Price Pool Gauge Locations

The usual results of EPM are an expanse of wetland vegetation that, when flooded, provides habitat for both fish and wildlife. The navigation pools are held either near the top of the operating range to improve fish spawning, held low to allow for maximum vegetation growth or somewhere in between depending on the determined needs and attainable river levels for that year.

For Pool 26, the operating pool limits range from 412.06 to 418.56 feet NAVD 88 (Figure 14). Even with EPM, the annual hydrograph for Pool 26 shows a spring rise followed by relatively stable water elevations the rest of the year. Figure 1515 shows the average daily stages for three periods of record (1941-1960, 1961-1980, and 1991-2020) on the Mississippi RM 218 at Grafton, Illinois. The plots show a general increase in stage during spring through early summer. Overall, average daily stages show a general increase with each period of record when considering the entire calendar year. The 1991-2020 period had higher average daily stages than both the 1941-1960 and 1961-1990 periods.

Sedimentation.

Within the study area, additional investigations have been performed to better understand the fluvial processes leading to shallowing in the Luesse Lake, Portage Island, and West Alton Bay backwater areas. Due to a lack of survey data in West Alton Bay, it was determined that Alton Slough (whose entrance is located immediately upstream of Mel Price L&D at Mississippi River Mile 201.4 and has similar backwater features as West Alton Bay) would be investigated for this study. The 2012 and 2022 hydrographic surveys of Alton Slough were compared in ArcGIS. The difference of these surveys was averaged over the 10 year span, resulting in an approximate sedimentation rate of 0.48 inches per year in Alton Slough, which is similar to sedimentation rates calculated in the Piasa side channel between RMs 208 and 210. In addition, further aerial imagery analysis and discussions with MDC, IDNR and USFWS have concluded that these backwaters have lost depth over time, which has led to reduced connectivity with the main channel and correlates to the findings from the Alton Slough sedimentation investigation.

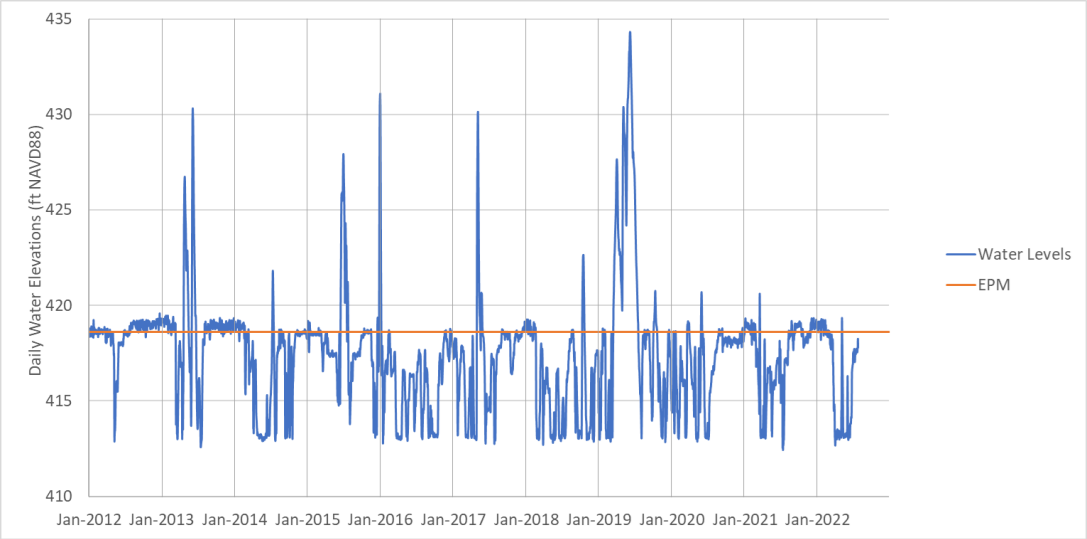


Figure 14: Daily Water Elevations for the Mississippi River at Melvin Price Lock and Dam (Including Maximum Environmental Pool Management Levels)

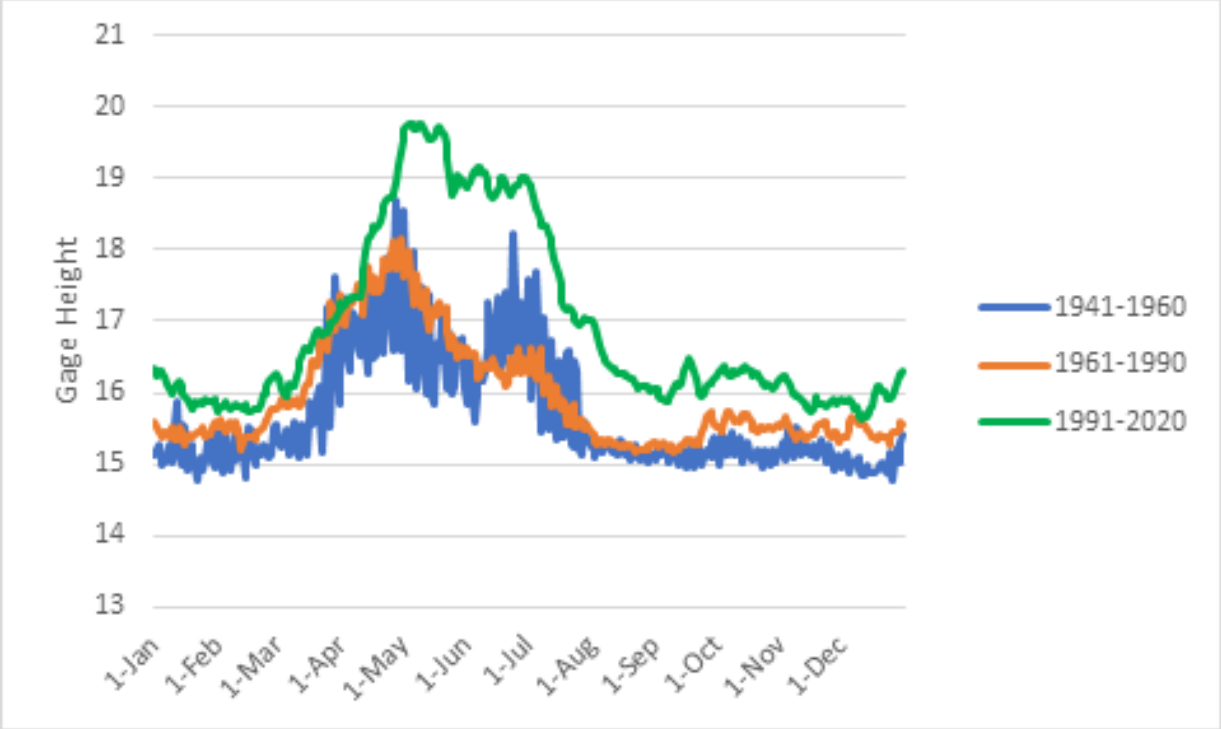


Figure 15: Daily Average Gage Height (feet) for Mississippi River at Grafton, IL (RM 218) in 20 Year Increments

2.4 Aquatic and Wetland Resources

The study area contains approximately 1,328 acres of aquatic habitat, which includes side channel, main channel, and backwater habitats (Figure 16). See *Appendix C-Biological Assessment*, for more detailed information on fisheries habitat described below.

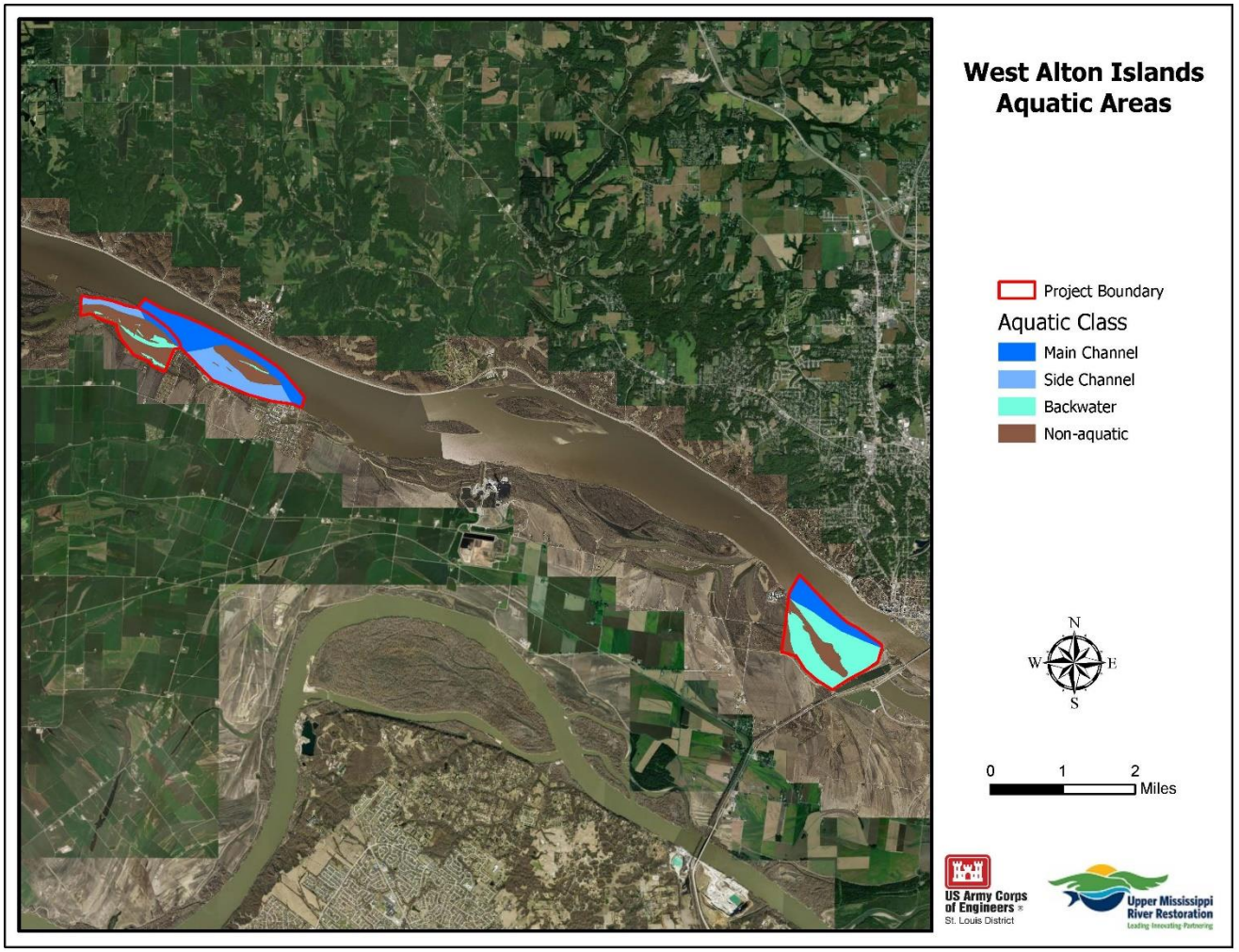


Figure 16: Aquatic Habitat Types Within Study Area (Source: LTRM Aquatic Vegetation Class 2 Data)

2.4.1 Backwater Fisheries

Backwater areas have been found to provide critical habitat for fish in large-river systems during the winter due to flow breaks, shelter from barge activity (Garvey, 2003), and as temperature refugia (Raibley, 1997). These areas provide critical spawning and nursery habitat for a range of lentic-dependent (i.e. low-flow habitats) fish species. Backwater fish habitat quality is influenced by temperature, depth, cover, oxygen availability, and water velocity. Sediment deposition within backwaters of the study area has led to a reduction in backwater depth, connectivity, and winter suitability for the lentic fish community. A loss of submersed aquatic vegetation, high turbidity, and increased water level fluctuations (Houser, 2022), coupled with decreased backwater connectivity, has been associated with lower habitat quality in backwaters (Johnson B. K., 1998). In general, there is a longitudinal decrease in backwater habitat extent and quality in southern pools of the Upper Mississippi compared to more northern pools (De Jager, 2018).

Backwater fisheries habitat within the study area is found at all three sites in the study area and includes approximately 507 acres in total. The largest backwater area is West Alton Bay (439 acres), followed by Luesse Lake (61 acres), and Portage Island (7 acres). UMRR LTRM data (stratified random sampling; UMRR LTRM Fisheries Manual; for details see (Gutreuter, 1995)) collected within the study area from 1993-2020 were summarized for backwater fisheries habitat, which included backwater offshore and backwater shoreline sites. Based on water quality data collected by UMRR LTRM (see Section 2.11 below), the average depth of the backwater ranges from 1.1-4.2 feet at Luesse Lake Area, 2.6-4.2 feet at Portage Island, and 2.2-4.8 feet at West Alton Bay, which is not adequate to sustain a healthy backwater fish assemblage. Depths of greater than 5 feet are typically desired to maintain conditions (e.g., water temperature and dissolved oxygen concentrations) required to sustain backwater fish communities throughout the year.

Backwater Offshore

For the backwater offshore habitat at West Alton, Gizzard Shad and Freshwater Drum accounted for nearly half the individuals caught during 44 sampling events. In addition, Gizzard Shad was the most frequently caught species at the Luesse Lake area -during a single sampling event. Both species display a preference for slow moving waters and are tolerant or moderately tolerant of silty and turbid conditions.

Backwater Shoreline

At West Alton and Portage Island backwaters, two species accounted for over 50% of the individual fish captured during 124 samplings events. Gizzard shad was the most abundant fish of the 58 species captured at West Alton and over 10% of captured fish were invasive, Silver Carp at this location. At Portage Island area, Emerald Shiner and Gizzard Shad were the two most abundant fish species. Emerald Shiner has a preference for slow to moderate currents and is tolerant of silty and turbid conditions. At Luesse Lake area, Western Mosquitofish was the most abundant species followed by Silver Carp over 72 sampling events. Western Mosquitofish are typically found in

shallow waters and have high turbidity tolerance. In addition, they can survive in relatively low oxygen conditions.

2.4.3 Riverine Fisheries

HNA II identified a need for more depth diversity in both lotic and lentic habitats (McCain, Schmueker, & De Jager, 2018). Lotic-dependent species require flowing water habitats for one or more critical life stages. A diversity of depths and structures can be important in supporting spawning, nursery, juvenile, and adult stages for a range of species. Shallow lotic habitat availability and flow diversity are limited in Pool 26. This includes areas like shallowly flooded sandbars and island banks that can provide critical resources for small-bodied fishes and developing young. Riverine fish habitat within the study area includes the side channel habitat in Portage Island area, as well as main channel border sites at Portage Island, West Alton Bay, and the exterior of Luesse Lake. Approximately 281 acres of side channels and 541 acres of main channel habitats provide important resources for lotic-dependent species (i.e. species dependent on flowing habitats). UMRR LTRM data collected within the study area from 1993 to 2020 for riverine fisheries habitat, which included side channel border and main channel border unstructured sites, at West Alton Bay, Portage Is., and Luesse Lake areas (Figure 16) are summarized below.

Side Channel Border Habitat

Fifty-eight species were collected over 95 sampling events in the Portage Island side channel. Gizzard Shad, Emerald Shiner, and Channel Shiner were the most abundant species sampled. All three species are tolerant of silty, turbid waters, but Channel Shiners also occur over shallow moving water along more sandy island edges and sandbars.

Main Channel Border Unstructured

For the main channel border unstructured habitat, 57 species were captured over 110 sampling events. Gizzard Shad, Emerald Shiner, Channel Catfish, and Common Carp accounted for 73% of fish caught during sampling. Channel Catfish are able to survive under a range of conditions, including tolerance to relatively poor water quality conditions (Hagerty & McCain, 2013).

2.4.5 Mussels

Up to 50 mussel species were documented utilizing habitats along the UMRS historically (Fuller, 1980), but the diversity and abundance of mussels has decreased as a result of overharvesting, pollution, construction of the lock and dam system, navigation, land use change, and invasive species such as the zebra mussel (*Dreissena polymorpha*) (USGS, 1999). A total of 34 mussel species were reported from Pool 26, but only 27 live species have been recorded in Pool 26 since approximately 1989.

(Ecological Specialists, Inc., 2014) compiled available mussel distribution data within the St. Louis District of USACE. In Pool 26, four previous mussel survey studies were summarized (Corgiat, 2008) (Ecological Specialists, Inc., 2003) (Ecological Specialists, 2005). Twenty-four sites along the Illinois side of the river channel border and side channels were sampled. Scattered individuals were found at the majority of sites, and two beds were identified with densities of 13.0/m^2 and 3.8/m^2. The Missouri endangered *Fusconaia ebena* was found in one of the beds (Ecological Specialists, 2005).

No quantitative surveys have been conducted within the study area in recent decades, although several locations overlap with formerly known mussel bed locations. In 2021 and 2022, MDC conducted braille sampling near the Portage Island and Luesse Lake areas and collected 121 shells of 16 species. 37 of the collected individuals were dead. Two Missouri state species of concern were collected and included Rock Pocketbook and Flat Floater. If a project is recommended, quantitative sampling in the study area would occur during pre-construction engineering and design prior to construction to identify mussel resources that may be near proposed project measures. Surveys will be used to inform design and avoid or minimize impacts to existing mussel resources.

2.5 Floodplain Habitat

2.5.1 Floodplain Forest

Floodplain forest communities are highly productive, provide valuable habitat for many species of wildlife (support plants and animals adapted to alternating wet and dry periods), improve water quality, control erosion (capture and disperse sedimentation), reduce flood damage by holding water, and contribute to local and regional commerce (Wiener, et al., 1998) (Johnson & Hagerty, 2008) as well as provide carbon sequestration (Guyon et al., 2016).

Existing Forest Resources

The study area contains forest resources on a higher elevation ridge located between West Alton Bay backwater and the main channel, on Portage Island, and on higher elevations within the Luesse Lake Area. In all, 572 acres of forested habitats occur in the study area. Table 2 summarizes USACE's High Intensity Forest Inventory data collected from 2009-2010 for the six stands located in the West Alton Bay area, four stands in the Portage Island area, and ten stands in the Luesse Lake area.

*Table 2: USACE's High Intensity Forest Inventory (*TPA = trees per acre, Snags = dead, standing trees, Species Richness = total number of unique tree species recorded, and Average Diameter = in the mean diameter at breast height).*

Stand (acres)	Average basal area (ft2/acre)	Average TPA*	Sapling TPA (1-5")	Pole TPA (5-12")	Sawtimber TPA (12-18")	Mature TPA (18-24")	Overmature TPA (24">)	Snags/acre	# Hard mast /acre	# Soft mast /acre	# Trees Sampled	Species Richness	Average Diameter
Rec Cabins 1	35.00	214.36	152.31	53.82	3.29	1.76	3.11	0.07	0.57	12.57	63.00	10.00	10.17
Rec Cabins 2	44.29	106.07	58.21	31.72	7.46	5.06	3.09	0.53	24.73	2.06	31.00	7.00	13.02
WACA 2	83.57	903.75	756.11	106.70	28.28	7.34	0.99	4.33	0.00	5.44	117.00	10.00	10.19
WACA 3	15.88	878.02	845.07	29.99	0.00	1.11	1.51	0.34	0.00	5.99	27.00	5.00	9.40
WACA 4	15.00	2.41	0.00	0.00	0.00	0.00	2.41	0.00	0.90	0.00	3.00	2.00	33.80
WACA 6	37.50	1019.40	862.77	155.59	0.00	0.00	0.00	1.04	0.00	34.91	15.00	8.00	6.63
WACA 7	64.83	659.82	514.12	120.22	15.60	2.52	1.18	6.17	0.38	0.99	188.00	8.00	9.03
Portage 1	134.5	77.8	9.4	24.98	13.78	8.79	16.15	4.70	0.0	0.0	269	7	18.99
Portage 4	123.57	135.0	53.44	35.52	17.27	10.76	11.91	6.09	0.0	8.25	346	13	16.67
Luesse Lake- 1	41.43	120.67	81.85	17.79	12.7	5.83	1.97	0.54	3.50	7.28	29	6	13.99
Luesse Lake-2	103.85	74.33	8.81	23.57	18.14	9.93	9.15	4.73	0.56	5.47	135	9	17.05
Luesse Lake-4	122.50	58.37	0.0	10.23	18.38	16.02	11.60	2.15	0.35	0.0	147	8	19.62
Luesse Lake-5	150.0	90.3	0.0	16.43	39.02	21.37	9.85	3.64	0.0	0	75	4	17.45
Mile 215-6	94.29	300.47	261.93	4.78	9.99	12.29	11.03	0.45	1.06	0.0	66	7	21.8
Luesse Lake—7	134	57.15	0	3.03	14.47	25.18	13.83	0.64	0	0	67	3	20.73
Luesse Lake-8	53.64	76.79	28.94	20.77	17.08	5.84	2.00	2.16	9.66	2.83	59	9	14.34
Luesse Lake-10	30	42.5	0	14.32	16.86	0	0	11.32	0	0	6	2	11.38
Luesse Lake-11	90	366.94	326.81	6.11	10.94	12.78	10.30	0	0	0	27	4	20.28
Luesse Lake-12	67.5	151.17	68.26	54.44	16.06	5.85	4.34	2.21	4.25	12..93	216	17	12.22

Forest resources in the West Alton Bay area have expanded over the past 25 years due to gradual accretion that has occurred along the channel border. The oldest trees in these stands appear to have established as early as the 1950s and 60s within emergent and submersed aquatic vegetation beds based on analysis of available aerial imagery. As vegetation helped to trap sediment and build up the elevation slightly, additional trees colonized and started to expand in this area. The forest community in the West Alton Bay tends to be relatively young and homogeneous in overall makeup. All stands located adjacent to the proposed project area are below the desired basal area target identified in the UMR Systemic Forest Stewardship Plan (UMR SFSP). Basal area is a measurement utilized by foresters to estimate how much area is occupied by tree stems and can be used to guide management when combined with other forest data. The forest resources in this area have relatively low species diversity and are limited to the two smallest size classes. Nearly 80% of the trees in this area are sapling size (< 5" in diameter) and 99% are pole size or smaller (< 12" diameter). The existing forest is described as maple-ash-elm and mixed forest communities.

The Portage Island stands have basal area values within the target range identified in the UMR SFSP, but forest resources could be improved across parts of the island. The existing forest community is described as uneven aged maple-ash-elm forest. Trees were evenly distributed among size classes and consisted of 30% saplings, 28% pole-size trees, 15% sawtimber (12-18" diameter) 9% mature (18-24" diameter), 13% overmature (>24" diameter), and 5% snags. Portions of the island are dominated by mature Cottonwood trees that are reaching the end of their lifespan. Cottonwood is an important tree species for wildlife, particularly for raptors, colonial waterbirds, bats, and others. Cottonwood is becoming less abundant in floodplain forests within this reach of the river and is not reestablishing at desired levels as a result of altered disturbance patterns in the floodplain. Portions of the island have relatively high species diversity, but invasive species such as Japanese Hops (*Humulus japonica*) and Wintercreeper (*Euonymus fortunei*) have established and could impact future tree development.

Overall, Luesse Lake forest basal area is within the target range for most forest stands, but four stands were below target values identified in the UMR SFSP. The existing forest communities in this area include uneven age maple-ash-elm and early successional maple-ash-elm forest at the lower elevation areas adjacent to the river, and mid-successional mixed forest at higher elevations. Most of the higher elevation sites are located on the southwest side of the Luesse Lake area, which overlaps with the mixed forest community distribution. This higher elevation area is high enough to support hard mast species such as oaks and hickories but is currently transitioning to maple-ash-elm forest. Active management measures would be needed to create suitable conditions to promote conditions for hard-mast regeneration.

2.5.2 Aquatic Vegetation/Emergent Wetland

Aquatic and emergent vegetation provide valuable resources for migratory waterfowl, fish, and other wildlife species by providing forage and habitat structure for various life stages. Prior to the flood of 1993, aquatic vegetation in Pool 26 was more common,

although not as abundant as in pools more upstream on the Upper Mississippi River. After the 1993 flood, aquatic vegetation suffered a significant setback and was unable to recover until over time it was virtually eliminated. From 1998 to 2004, the UMRR LTRM program collected aquatic vegetation samples in Pool 26 according to a standardized protocol and sampling method (Yin, 2000). Sampling was discontinued in Pool 26 after 2004 due to low frequency of occurrence by aquatic species. In all, 873 samples were taken in the project area between 1998 and 2004 and summarized by stratum (backwater contiguous; n=756, main channel border ; n=110, and side channel; n=7). In all, 81 species, including aquatic, emergent, shrub, and trees species, were recorded in the project area. 76 species were recorded in backwater contiguous sites, 25 species in main channel border sites, and 1 in side channel locations. Only five aquatic species were recorded in the project area and included American Lotus, Coontail, Leafy Pondweed, Big Duckweed, and Small Duckweed. No aquatic vegetation was encountered at the majority of sampling sites in the project area. When present, aquatic species had low cover values. The remaining species were all terrestrial species that grow in emergent wetland environments. Although aquatic vegetation was once found in numerous locations of Lower Pool 26, it is now limited to occasional immature plants of floating-leaf species (i.e. *Nelumbo lutea*) in areas directly connected to the river. For example, juvenile American Lotus were observed in West Alton Bay during several years of experimental long-duration EPM drawdowns (i.e. 90+ days during the growing season) (USACE, 2018b). Observations were limited to a few individuals, and no mature plants were observed. Aquatic vegetation is not expected to be a major habitat cover type in the future due to turbidity (Johnson and Hagerty, 2008), water fluctuation, growing season disturbance, and other potential factors.

Although aquatic vegetation is unlikely to be a major habitat cover type into the future within the project area, emergent vegetation still provides valuable resources for migratory waterfowl and fish. LTRM landcover data for Pool 26 illustrates the virtual elimination of aquatic vegetation in the past two decades, while emergent vegetation has remained relatively unchanged in extent (Figure 17). Emergent vegetation has been found to support higher macroinvertebrate diversity and abundance, nursery habitat for fish, and provide valuable habitat for waterfowl (Dugger & Feddersen, 2009).

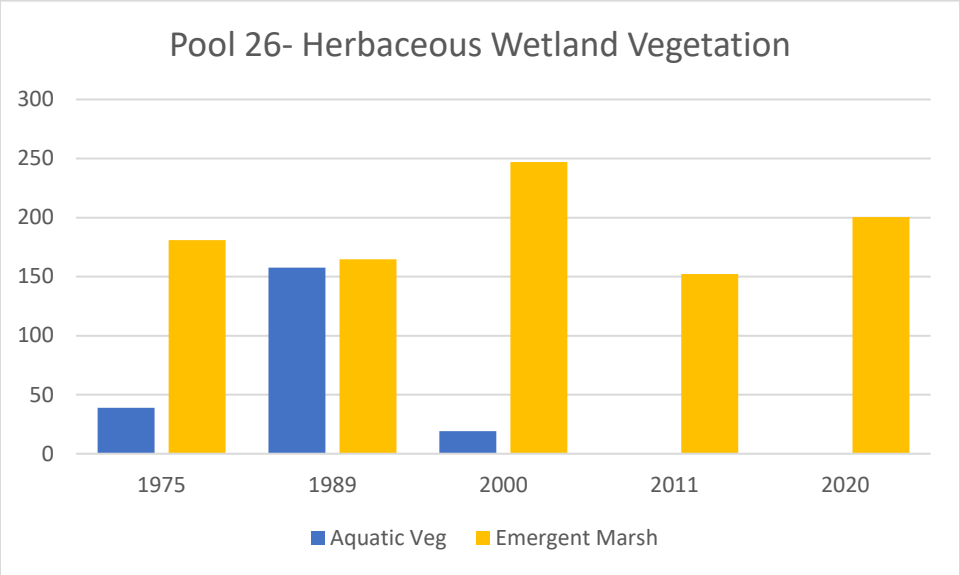


Figure 17: Pool 26 Herbaceous Wetland Vegetation

2.6 Geology and Soils

2.6.1 Soils

The soil in the proposed project area consists of silty loams, silty clays, and clay and have been characterized by the Natural Resources Conservation Service as including the following (Table 3):

Table 3: Project Area Soil Composition

Soil Name	Acres	Percent of Area
Blake silt loam, 0-2 % slopes, frequently flooded	1.6	0.10%
Carlow silty clay loam, 0 to 2% slopes, frequently flooded	120.9	7.40%
Sarpy-Treloar complex, 0 to 2% slopes, frequently flooded	0.6	0.00%
Chequest silt loam, 0 to 2% slopes, frequently flooded	94.5	5.80%
Portage clay, 0 to 2% slopes, frequently flooded, frequently ponded	0	0.00%
Carlow silty clay loam, 0 to 2% slopes, occasionally flooded	217.8	13.40%
Portage clay, 0 to 2% slopes, occasionally flooded, frequently ponded	27	1.70%
Sans Dessein silty clay, 0 to 2% slopes, frequently flooded	5.8	0.40%
Haynie-Treloar-Blake complex, 0 to 2% slopes, frequently flooded	1.4	0.10%
Water	1153.7	70.90%

2.6.2 Prime Farmland (Farmland Protection Policy Act, 7 CFR Part 658).

Prime farmland is land considered to have the best combination of physical and chemical characteristics for crop production. Lowmo silt loam, Peers silty clay loam, and drained Sans Dessein silty clay is considered to have prime farmland characteristics. These soils tend to be slightly acidic to alkaline, with pH ranging from 5.6 to 7.8 respectively (USDA Web Soil Survey, 2020). The areas classified as prime farmland in the study area are not currently in agricultural production.

2.7 Wildlife

Large river floodplains, such as the UMRS, provide a mosaic of forest, grassland, islands, backwaters, side channels, and wetlands. In all, the UMRS supports over 550 vertebrate species, and nearly 50 species of mussels (Guyon L. D., 2012). There are over 300 species of bird that migrate along the Mississippi Flyway. The study area is located near the confluence of the Mississippi, Missouri, and Illinois Rivers and is an important link along this migratory corridor. Recreational hunting opportunities are provided in portions of the study area for waterfowl, whitetail deer, and furbearing animals.

2.7.1 Birds

The Migratory Bird Treaty Act (MBTA) of 1918 regulates and protects most aspects of the taking, possession, transportation, sale, purchase, barter, exportation, and importation of migratory birds. As of April 26, 2020, the MBTA regulates and protects 1,093 species.

The study area has been designated a State Important Bird Area (IBA) for waterfowl, wading birds, and migratory landbirds; and by the Upper Mississippi River/Great Lakes Joint Venture as a wetland focus area for waterbirds and waterfowl.

2.7.1.1 Waterfowl

A wide diversity of waterfowl utilizes the important overwintering and migration wetland habitats in the vicinity of the study area (Soulliere, 2018). Emergent wetland vegetation produced as a result of EPM provides abundant seed for waterfowl in the fall/winter seasons. Seed head samples gathered in 2018 estimated that seed production in Pool 26 equaled approximately 3.4 million duck energy days (USACE, 2018b). A single duck energy day is the amount needed to support the metabolic needs of one Mallard for a single day.

2.7.1.2 Neotropical Migratory Birds

Neotropical migrants are bird species that breed in North America but migrate to wintering grounds in Mexico, Central and South America, and the Caribbean Islands. Floodplain complexes and the habitats provided are highly important to migratory bird species such as neotropical migrants. The diverse array of floodplain habitat types in close proximity tend to support a high abundance of species and individuals.

2.7.1.3 Shorebirds

Shorebirds are predominantly long-distance migrant species with diverse migration strategies. Many of the species have declining populations and are of conservation concern (Hamer, 2006). Adequate refueling stopover sites are crucial to migration success for many of the shorebird species that migrate through the interior portions of North America (Skagen, 2006). Suitable foraging habitat for shorebirds includes mudflats and shallowly flooded areas that are sparsely vegetated or bare. As a result of pool management for navigation, suitable habitat may not be available each year or may only be available for a small portion of the spring or fall migration in the region. Increased topographic diversity and inundation durations provides greater habitat development opportunities for this group of species as the necessary habitat components are produced over a wider range of water elevations. Over 20 species of shorebird have been recorded in the study area.

2.7.1.4 Landbirds

Despite extensive changes to UMRS floodplain landcover, remaining floodplain forests represent some of the largest contiguous tracts of forest in the region. These remaining tracts of forest provide valuable resources on the landscape for migrating and resident landbirds, many of which have undergone population declines over the past 50 years (Sallabanks, 2000). On the Upper Mississippi River, studies suggest that these floodplain locations provide migratory (Kirsch, Heglund, Gray, & Mckann, 2013) and breeding habitats (Knutson M. , 1995) for a high diversity of birds, including some nearctic-neoptropical migrant species of concern. Studies of avian use of bottomland forest habitats in other areas of the U.S. have also found that they are important breeding areas for migratory species (Sallabanks, 2000); (Buffington, Kilgo, Sargent, & CHapman, 1997); (Miller, 2004); (Bub, Flaspohler, & Huckins, 2004); (Hopps, 2012)). Bottomland habitats often support higher avifauna diversity compared to upland sites, and these bottomland habitats may act as source populations for birds in highly fragmented landscapes (Guifoyle, 2001). The natural edges and complex vegetation structure created by regular disturbances is thought to enhance bird community diversity and nesting success in other similar bottomland and floodplain habitats (Sallabanks, 2000); (Knutson M. G., 2000).

2.7.1.5 Wading Birds

The UMRS historically provided extensive habitat for wading birds. This group of birds is dependent on shallow areas with abundant food resources (i.e. amphibians, crustaceans, small fish, etc.) for foraging, and large, mature trees for nesting and roosting. Emergent cottonwood trees that extend above surrounding canopy trees are particularly valuable as nesting habitat in the floodplain of the UMR and Illinois River Valley. Shallow wetland habitats in backwaters and island edges in the study area still provide important food resources for a range of wading birds, primarily herons and egrets during the breeding and migratory seasons.

USFWS provided a species list for migratory birds of concern that may be affected by project measures implemented in the study area (Table 4). (IPAC Report dated October 30, 2019; *Appendix A- Coordination*).

Table 4: Migratory birds from USFWS Information for Planning and Consultation (IPAC) list

Common Name	**Scientific Name**	**Breeding Season**
American Golden Plover	*Pluvialis dominica*	Breeds elsewhere
Bald Eagle	*Haliaeetus leucocephalus*	Oct 15-Aug 31
Black-billed Cuckoo	*Coccyzus erythrocepthalmus*	May 15-Oct 10
Bobolink	*Dolichonyx oryzivorous*	May 20-Jul 31
Cerulean Warbler	*Dendroica cerulea*	Apr- 21-Jul 20
Chimney Swift	*Chaetura pelagica*	Mar 15-Aug 25
Eastern Whip-poor-will	*Antrostomus vociferus*	May 1-Aug 20
Golden Eagle	*Aquila chrysaetos*	Breeds elsewhere
Henslow's Sparrow	*Ammodramus henslowii*	May 1-Aug 31
Hudsonian Godwit	*Limosa haemastica*	Breeds elsewhere
Kentucky Warbler	*Oporornis formosus*	Apr 20-Aug 20
King Rail	*Rallus elegans*	May 1-Sept 5
Lesser Yellowlegs	*Tringa flavipes*	Breeds elsewhere
Prothonotary Warbler	*Protonotaria citrea*	Apr 1-Jul 31
Red-headed Woodpecker	*Melanerpes erthrocephalus*	May 10-Sep 10
Ruddy Turnstone	*Arenaria interpres morinella*	Breeds elsewhere
Rusty Blackbird	*Euphagus carolinus*	Breeds elsewhere
Short-billed Dowitcher	*Limnodromus griseus*	Breeds elsewhere

Upland Sandpiper	*Bartramia longicauda*	May 1- Aug 31
Wood Thrush	*Hylocichla mustelina*	May 10-Aug 31

2.8 Missouri Resources of Concern

The Missouri Natural Heritage Program reviewed the proposed study area on March 10, 2022. Eight state-listed endangered species were identified as being in the general vicinity of the proposed project area (Table 5).

Table 5: Missouri threatened or endangered species potentially occurring within the study area.

Common Name	**Scientific Name**	**State Status**	**Primary Habitat**
Lake Sturgeon	*Acipenser fulvescens*	Endangered	River/stream
Elephant Ear	*Elliptio crassidens*	Endangered	River/stream
Ebony Shell	*Reginaia ebenus*	Endangered	River/stream
American Bittern	*Botaurus lentiginosus*	Endangered	Marsh
King Rail	*Rallus elegans*	Endangered	Marsh
Central Mudminnow	*Umbra limi*	Endangered	Marsh
Interior Least Tern	*Sterna antillarum athalassos*	Endangered	Sand/gravel bars

2.9 Bald Eagle

Although the Bald Eagle (*Haliaeetus leucocephalus*) was removed from the federal list of threatened and endangered species in 2007, it continues to be protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act (BGEPA). The BGEPA prohibits unregulated take of Bald Eagles, including disturbance. The USFWS developed the National Bald Eagle Management Guidelines (USFWS 2007) to provide land managers, landowners, and others with information and recommendations regarding how to minimize potential project impacts to Bald Eagles, particularly where such impacts may constitute disturbance.

Bald eagles generally nest near coastlines, rivers, large lakes or streams that support

an adequate food supply. They often nest in mature or old-growth trees, snags (dead trees), cliffs, and rock promontories. They rarely nest on the ground, and nest with increasing frequency on anthropogenic structures such as power poles and communication towers. In forested areas, bald eagles often select the tallest trees with limbs strong enough to support a nest that can weigh more than 1,000 pounds (USFWS 2007). There is currently one known bald eagle nest near the study area, although mature trees fitting this description occur elsewhere in the study area.

2.10 Federally Threatened and Endangered Species

In compliance with Section 7(c) of the Endangered Species Act of 1973, as amended, the USFWS provided a list of six federally threatened and endangered species that could potentially be found in the study area (St. Charles County, MO) via a letter dated August 22, 2022 (IPAC report), and updated on September 25, 2023, (See *Appendix C - Biological Assessment).* The six species, federal protection status, and habitat can be found in Table 6. No critical habitat is located in the study area. USFWS Ecological Services Office provided a Draft Fish and Wildlife Coordination Act Report (FWCAR) for the proposed project that was reviewed and concurred by MDC and USFWS (*Appendix A - Coordination).*

Table 6. Federally listed threatened and endangered species potentially occurring in the Study Area

Species	Status	Habitat
Gray Bat (*Myotis grisescens*)	Endangered	Roost in caves or mines year-round. Use water features and forested riparian corridors for travel and foraging.
Indiana Bat (*Myotis sodalis*)	Endangered	Hibernates in caves and mines. Maternity & foraging habitat includes small stream corridors with well-developed riparian woods, upland & bottomland forests.
Northern Long-eared Bat *(Myotis septentrionalis*)	Threatened	Hibernates in caves and mines. Swarming in surrounding wooded areas occurs in autumn. Roosts and forages in understory of a wide range of forested habitats during spring and summer.
Tricolored Bat (*Perimyotis subflavus*)	Proposed Endangered	Hibernates in caves and mines in our region; found in forested habitats in spring, summer, and fall; generally roosts in canopy among leaf clumps/clusters.
Spectaclecase mussel (*Cumberlandia monodonta*)	Endangered	Large rivers where they live in areas sheltered from the main force of the river current. This species often clusters in firm mud and in sheltered areas, like beneath rock

		slabs, between boulders and even under tree roots.
Monarch Butterfly (*Danaus plexippus)*	Candidate	Grassland and other herbaceous dominated habitats with Milkweed resources during the breeding life stage and similar habitats with abundant nectar resources during breeding and migration life stages. Overwintering occurs outside our region and must provide specific roosting microclimate conditions.
Decurrent False Aster (*Boltonia decurrens*)	Threatened	Disturbed alluvial soils. Moist, sandy floodplains and prairie wetlands along the Illinois River and a small portion of the Mississippi River primarily above the Missouri-Mississippi River confluence.

2.11 Invasive Species

Invasive Species Executive Order 13112 aims “to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause”. To abide by this Executive Order, construction best management practices (BMP), such as cleaning equipment, would be in place and enforced to prevent the introduction of additional species to and transfer from any potential project.

Invasive Carp, including Bighead Carp (*Hypophthalmichthys nobilis*), Silver Carp (*Hypophthalmichthys molitrix*), Common Carp (*Cyprinus carpio*) and Grass Carp (*Ctenopharyngodon idella*), are found throughout the region and utilize habitats with low water velocity such as those found in the backwaters and refugia. Bighead and Silver Carp, species of particular management concern, were first documented in the UMRS in 1982 (Koel, Irons, & Ratcliff, 2000). Since then, populations have increased dramatically in the Upper Mississippi River (Koel, Irons, & Ratcliff, 2000) and Illinois River reaches (Irons, Sass, McClelland, & O'Hara, 2011).

Common invasive plant species likely to be present within the study area include: Reed Canary Grass (*Phalaris arundinacea*), Japanese Hops (*Humulus japonicus*), and Coffeeweed (*Sesbania herbacea*).

Reed Canary Grass is a variable species with circumpolar distribution (Steyermark, 1999). The Eurasian ecotype, originally planted for forage and erosion control, has spread throughout much of the United States and invades wetland communities and wet prairies (MDC, 2010). This cool-season grass forms dense clumps once established, and spreads aggressively through creeping rhizomes and an abundance of seed. Stems lodge by mid to late summer to form a dense mat that prevents other species from establishing. Seeds are dispersed within and between sites by waterways, animals, and on machinery primarily.

Japanese Hops is an herbaceous annual native to East Asia. The species is well adapted to disturbed, open floodplain habitats (MDC, 2012). The seed is dispersed primarily by water, wind, and machinery. Seed germinates in early spring but can also occur later in the season when suitable moisture and light are available. Frequent floods in floodplain habitats create ideal conditions for the spread and establishment of this species. Once established, this twining vine can quickly overtop, blanket, and outcompete surrounding herbaceous vegetation, woody shrubs, and trees up to about 10 feet in height.

Coffeeweed is a robust, annual herbaceous legume native to the southern United States, Mexico, and Central America. The plant has been used as a cover crop for its nitrogen-fixing ability (Sheahan, 2013) and mowed before reaching reproductive stage. Coffeeweed can tolerate flooding once in the seedling stage of growth and quickly grows up to 10 feet tall. Plants bloom over an extended period and are quick to set seed. The seeds, like many other legumes, have variable seedcoat thicknesses and permeabilities that allow for staggered seed dormancy and germination at a site. Seed from established plants may germinate over a several year period making control difficult. Additionally, herbicide control is required several times in a growing season as single applications do not provide sufficient efficacy to reduce spread.

Several additional species have increased in the project area over the past decade at some locations. Wintercreeper (*Euonymus fortunei*) is a perennial, woody vine that tolerates a range of light and soil conditions. In the floodplain, it is occasionally found along islands' edges and in canopy gaps but could increase in extent rapidly through vegetative spread or by bird-dispersed seed.

Purple Loosestrife (*Lythrum salicaria*) is a perennial wetland plant native to Europe and Asia (Munger, 2002). The species occupies a range of wetland habitats, including meadows, emergent marsh, and river and stream banks. The plant spreads rapidly due to its high seed production rate (up to 3 million seeds per plant) and ability to spread vegetatively through rapidly growing rhizomes (USDA, 2005). In addition, seed viability of up to twenty years results in a prolonged risk of establishment in natural communities. Increasingly, established patches of Purple Loosestrife have been identified in Pool 26 as well as Pools 24 and 25.

2.12 Water Quality

The Mississippi River within the vicinity of the study area in Missouri is listed in the Illinois 2018 (Assessment ID #:J-05) 303(d) list for impairment due to mercury and polychlorinated biphenyls (PCBs).

2.13 Air Quality

The Clean Air Act of 1963 requires the U.S. Environmental Protection Agency (EPA) to designate National Ambient Air Quality Standards (NAAQS). The EPA has identified standards for six pollutants: lead, sulfur dioxide, carbon monoxide, nitrogen dioxide, ozone, and particulate matter (at less than 10 microns and at less than 2.5 microns in diameter), along with some heavy metals, nitrates, sulfates, volatile organic and toxic compounds. EPA regulates these pollutants by developing human health-based or environmentally based permissible pollutant concentrations. EPA then publishes the results of air quality monitoring, designating areas as meeting (attainment) or not meeting (nonattainment) the standards or as being maintenance areas. Maintenance areas are those areas that have been re-designated as in attainment from a previous nonattainment status. A maintenance plan establishes measures to control emissions to ensure the air quality standard is maintained in these areas.

The region of St. Charles County, MO was not in attainment for 8-hour ozone in 2018, 2019, 2020, and 2021 for values exceeding standards in the St. Louis area (USEPA 2021). The county is in attainment for all other criteria pollutants.

2.14 Greenhouse Gas Emissions and Climate Change

Climate change is a fundamental environmental issue and is a particularly complex challenge given its global nature and inherent interrelationships among its sources, causation, mechanisms of action, and impacts. Analyzing a proposed management measure's greenhouse gas emissions (GHG) and how climate change may alter a management measure's environmental effects can provide useful information to decision makers and the public. Climate change science is evolving and is only briefly summarized here. In 1970, the Council of Environmental Quality estimated the level of atmospheric carbon dioxide to be 325 parts per million (ppm). Since 1970, the concentration of atmospheric carbon dioxide has increased at a rate of about 1.67 ppm per year (1970-2019) to approximately 407 ppm as of September 2019 (current globally averaged value).

Based on the United States Global Change Research Program as well as other scientific records, it is now well established that rising global atmospheric greenhouse gas emission concentrations are significantly affecting the Earth's climate (IPCC, 2014). A large body of scientific evidence indicates that increased GHG in the Earth's atmosphere are contributing to changes in national and global climatic conditions (Melillo, Richmond, & Yohe, 2014). These changes include such things as average temperature, changes in precipitation patterns, and increases in the frequency and intensity of severe weather events. These changes have the potential to impact a wide sector of the human environment including water resources, agriculture, transportation, human health, energy, and aquatic and terrestrial ecosystems. Therefore, it is important to understand the potential impacts of federal actions on GHG emissions and climate change as well as the potential changes that may occur to the human environment that could affect the assumptions made with respect to determining the impacts and efficacy of the federal action in question.

2.14.1 Upper Mississippi River Region Climate Trends

USACE is undertaking climate change preparedness and resilience planning and implementation in consultation with internal and external experts using the best available climate science and climate change information. USACE has prepared concise and broadly accessible summary reports of the current climate change science with specific attention to USACE missions and operations for the continental United States, Alaska, Hawaii, and Puerto Rico. Each regional report summarizes observed and projected climate and hydrological patterns cited in reputable peer-reviewed literature and authoritative national and regional reports. The following information on climate trends and future climate projections comes from the climate change and hydrology literature synthesis report for the Upper Mississippi River region (USACE, 2015).

Summary of Observed Climate Findings:

> *The general consensus in the recent literature points toward moderate increases in temperature and precipitation, and streamflow in the Upper Mississippi Region over the past century. In some studies, and some locations, statistically significant trends have been quantified. In other studies and locales within the Upper Mississippi Region, apparent trends are merely observed graphically but not statistically quantified. There has also been some evidence presented of increased frequency in the occurrence of extreme storm events* (Villarini, 2013)*. Lastly, a transition point in climate data trends, where rates of increase changed significantly, at approximately 1970 was identified by multiple authors.*

Summary of Future Climate Projection Findings:

> *There is strong consensus in the literature that air temperatures will increase in the study region and throughout the country over the next century. The studies reviewed here generally agree on an increase in mean annual air temperature of approximately 2 to 6 ºC (3.6 to 10.8 ºF) by the latter half of the 21st century in the Upper Mississippi Region. Reasonable consensus is also seen in the literature with respect to projected increases in extreme temperature events, including more frequent, longer, and more intense summer heat waves in the long-term future compared to the recent past.*
>
> *Projections of precipitation found in a majority of the studies forecast an increase in annual precipitation and in the frequency of large storm events. However, there is some evidence presented that the northern portion of the Upper Mississippi Region will experience a slight decrease in annual precipitation. Additionally, seasonal deviations from the general projection pattern have been presented, with some studies indicating a potential for drier summers. Lastly, despite projected precipitation increases, droughts are also projected to increase in the basin as a result of increased temperature and* [evapotranspiration] *rates.*

> *A clear consensus is lacking in the hydrologic projection literature. Projections generated by coupling* [Global Climate Models] *with macro scale hydrologic models in some cases indicate a reduction in future streamflow but in other cases indicate a potential increase in streamflow. Of the limited number of studies reviewed here, more results point toward the latter than the former, particularly during the critical summer months.*

Given the high degree of variability and uncertainty in weather patterns in general and in predictions of future weather patterns, quantifying future project impacts is inexact. As summarized above, there is no consensus with respect to forecasts for future streamflow in the basin.

2.14.2 Study Area Climate Trends and Greenhouse Gas Emissions

In terms of climate change, changes in the annual and long-term hydrologic cycles of the Mississippi River influence the study area. The two primary factors influencing hydrology in the vicinity of the study area include (1) snowmelt and precipitation events throughout the Upper Midwest, which includes the portions of the Mississippi River above St. Louis, Missouri, and the entire Missouri River watershed; and (2) local and regional precipitation. In general, there is a seasonal pattern to the river's hydrology with peak flows typically occurring in the spring and early summer associated with rain and snowmelt followed by declining flows from early summer through early fall. In addition to the annual seasonal pattern of the river's hydrology, historical data shows an 11 to 15-year cycle of increasing discharge and flooding followed by declining flows and drought (Knox, 1984); (Franklin et al. 2003). Changes in hydrology (e.g., wet vs. dry periods) ultimately influence what floodplain habitats establish and are able to persist (See *Appendix H-Climate Assessment* for more detailed discussion).

2.15 Hazardous, Toxic and Radioactive Waste

The U.S. Army Corps of Engineers regulations (ER-1165-2-132, ER 200-2-3) and Division policy requires procedures be established to facilitate early identification and appropriate consideration of potential hazardous, toxic, and radioactive waste (HTRW) in reconnaissance, feasibility, preconstruction engineering and design, land acquisition, construction, operations and maintenance, repairs, replacement, and rehabilitation phases of water resources studies or projects by conducting a Phase I Environmental Site Assessment (ESA). USACE specifies that these assessments follow the process/standard practices for conducting Phase I ESA's published by the American Society for Testing and Materials (ASTM).

The purpose of a Phase I ESA is to identify, to the extent feasible in the absence of sampling and analysis, the range of contaminants (i.e. Recognized Environmental Conditions, RECs) within the scope of the U.S. Environmental Protection Agency's (EPA) Comprehensive Environmental Response, Compensation and Liability Act

(CERCLA) and petroleum products. Current policy is to avoid known HTRW to the extent practicable or until hazard risks and potential liability are mitigated.

A Phase I ESA has been conducted for the West Alton Islands HREP area using methods outlined by ASTM E2247. This included a records review, physical site visit, and communications with persons knowledgeable of the project area and adjoining properties. Generally, the project area contains no major sites of interest which would impact the project's cost, design, or schedule. The environmental impact for the migration of off-site contaminants onto the project property is negligible. Therefore, no special considerations are being recommended for the project to proceed to construction. It is however recommended that a Site Health and Safety Plan, and a Quality Control Plan are submitted by the awarded contractor, discussed internally by USACE personnel, and implemented to prevent environmental hazards from being developed during construction. U.S. Army Corps of Engineers, Environmental Quality and HTRW Section, Environmental and Munitions Branch (CEMVS EC-EQ) should be contacted immediately if future development of the property discovers hazardous or toxic materials.

Complete documentation for the Phase I ESA can be reviewed in *Appendix F-Hazardous Toxic Radioactive Waste*.

2.16 Historical and Cultural Resources

A St. Louis District archaeologist performed a records review of the study area to determine if archaeological sites have been previously recorded in the study area and to determine if any cultural resource studies have been conducted in the study area. The records review found that there are no recorded archaeological sites in the study area. West Alton Bay has never been studied for cultural resources. One survey overlaps a small portion of Luesse Lake (Hood, 2018) One records study was performed for Portage Island (Rusch, 1999). The District performed a pedestrian survey and auger testing at Portage Island in 2018. The survey found the island is covered in recent extensive modern alluvium (Smith, 2018). No artifacts or evidence of an archaeological site was found in any of the previous surveys.

2.17 Socioeconomic Resources

The study area is located within St. Charles County, Missouri. St. Charles County has a population of 394,290 based on the American Community Survey (ACS 2015-2019) estimates. Fifty-one percent of the population were female, 87% white, and 14% of all individuals have income in the past 12 months below the poverty level. Median household income was $84,978 with an average household size of 2.69. The main industries providing employment in St. Charles County include educational services, health care and social services (23.3%), professional, scientific and management and administrative and waste management services (11.7%), retail trade (11%),

manufacturing (10.0%), arts, entertainment, and recreation, and accommodation and food services (9.4%). The unemployment rate for St. Charles County is 2.9% which was lower than the Missouri state average. Findings are summarized in Table 7.

Table 7: St. Charles County, MO Socioeconomic Resource Summary

	St. Charles, Co., MO
POPULATION	
Population Estimate	394,290
RACE AND HISPANIC ORIGIN	
White alone	87%
Black alone	4%
Hispanic or Latino	3%
Asian alone	3%
American Indian/Alaskan native	0.1%
Other Race Alone	0.1%
Two or More Races Alone	2%
INCOME & POVERTY	
Household income base	
Total households	146,631
< $15,000	4%
$15,000-25,000	6%
$25,000-50,000	17%
$50,000- 75,000	17%
$75,000 +	56%
BUSINESSES	
Unemployment Rate	2.9%

2.18 Aesthetic Resources

Aesthetic resources in the study area consist primarily of natural habitats. This includes forest, wetland, backwater, and riverine areas that serve as scenery for visitors. Additionally, the Illinois bluffs located north of the study area and across the Mississippi River channel provide scenic views for visitors.

2.19 Noise Levels

Noise levels surrounding the study area are varied depending on the time of day and season. The current human activities causing elevated noise levels in the vicinity of the study area include cars, trucks, highway traffic, boats, a power plant, several boat marinas, and a ferry. The Illinois State Highway 100 is located across the channel to the north of the study area. This road sees on average 5,100 vehicles per day near the study area. Highway route 94 is located near much of the southern boundary and sees on average 1,480 vehicles per day near the study area. The sound of firearms during hunting seasons within the study area is also prevalent.

A typical vehicle can produce 60-90 decibels (dB) at a distance of 50 feet (USEPA 1974). A public boat ramp exists in close proximity to the study area introducing noise from recreational boat traffic. A pleasure boat's noise range can typically be between 65-115 dB (USEPA, 1974)). Portage Island, part of the TRNWR, is open for hunting deer, turkey, waterfowl, upland game, and fishing according to state regulations. West Alton Bay area is a restricted area that is open to waterfowl hunting at preselected locations, as well as trapping and fishing. Waterfowl hunting is the primary public use and shotguns are used to harvest ducks. The noise from a typical 12-gauge shotgun is 130 dB. All of these sources may contribute to noise levels within the study area.

2.20 Environmental Justice (Executive Order 12898)

The U.S. Environmental Protection Agency (USEPA) online EJScreen mapping tool (Version 2.1, https://www.epa.gov/ejscreen) and the Council of Environmental Quality's Climate and Economic Justice Screen Tool (Version 1.0) (CEQ, 2022) were used to characterize existing conditions for communities of color and underserved populations. The area used in the analysis applied a 5-mile buffer to the study area boundary that includes portions of St. Charles County, MO; Madison and Jersey Counties, IL to determine the population most affected by the Project. The communities of comparison for this area are the Illinois counties of Madison and Jersey, and St. Charles County, MO, of which, the project lies within, respectively (**Error! Reference source not found.**8). National average values are provided for further context. The EJScreen tool estimated an approximate population of 82,163 in the analysis area. Neither the people of color nor the underserved populations are fifty percent or greater in the analysis area. The area of analysis was then assessed to determine if the people of color population or underserved population is meaningfully greater than that of the community of comparison. Both the underserved and people of color populations are above values found in the surrounding counties of comparison, yet below the national average. The CEQ Version 1.0 evaluates the proportion of the population that is disadvantaged within a census tract relative to eight categories of burden. The broad categories include metrics that are categorized under climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development factors. The tool identified the Alton tract within Madison County, located immediately adjacent to the West Alton Bay portion of the Project, as a disadvantaged community due to it meeting more than one burden threshold as well as the associated economic threshold for those burden thresholds.

Table 8: Population and environmental justice characteristics within the study area.

	*Analysis area	Madison County, IL	Jersey County, IL	St. Charles County, MO	USA avg.
Population	82,163	426,112	21,533	402,377	-
Demographic Index	27%	21%	13%	14%	35%
People of Color	24%	16%	5%	14%	39%
Underserved	30%	27%	21%	13%	31%
Unemployment Rate	5%	5%	5%	3%	6%
Limited English Speaking	0%	0%	0%	1%	5%
Less than High School Education	8%	7%	8%	5%	12%
Under Age 5	5%	6%	5%	6%	6%
Over Age 64	20%	17%	19%	15%	17%

**Analysis area included 5-mile buffer around the study area.*

3.0 Future Without Project Conditions

Forecasting the future is an essential part of the USACE planning process with the most important recurring forecasts being the future without project (FWOP) and future with project (FWP) conditions. The FWOP is the basis from which alternative plans are formulated and impacts are assessed and can be defined as “the most likely condition to exist in the future in the absence of a proposed water resources project” (ER 1105-2-100 p. 2-8). The FWOP, considered the No Action Alternative, would not include any USACE project measures, and no additional costs to USACE would be generated.

A 50-year period of analysis was used to forecast the FWOP and FWP conditions. The period of analysis was limited to 50 years in accordance with USACE regulations (ER 1105-2-100), even though project measures are anticipated to continue having beneficial effects beyond 50 years. The base year (the year when a proposed project is expected to be operational or, in this case, when construction is complete and benefits

begin accruing) considered for this study is 2027, and period of analysis continues until 2077.

Assumptions are one of the most common ways to address uncertainty in a planning study. Several assumptions have been made in forecasting the FWOP scenario:

1) Water management plan levels for Pool 26 would continue as it is now.
2) Aquatic habitat at West Alton Bay, Luesse Lake, and Portage Island would continue to degrade with sedimentation and reduced flow.
3) Backwaters in the study area would continue to lose depth, lose surface water area, and have reduced connectivity due to sedimentation. Current estimates forecast a sedimentation rate of approximately 0.5 inches per year.
4) Floodplain forest in the study area would continue to lose age, size, and species diversity.
5) No substantial change to current operation and maintenance budgets for sponsors. USFWS and MDC would continue to manage fish and wildlife in and on the waters in the study area as they do now.
6) The navigation channel would be maintained in its current location and depth.

3.1 Backwater

As described in Section 2.3, a recent evaluation of hydrographic surveys taken in 2012 and 2022 from a backwater just downstream of the West Alton Bay study area estimated a sedimentation rate of 0.48 inches per year. The PDT assumed that this rate was representative of the conditions in all three backwater areas in the study area. As a result, it is assumed that the West Alton Bay and Portage Island backwater will be almost completely converted to terrestrial habitats in the next 50 years. The Luesse Lake area is estimated to lose approximately half of its depth in the deepest areas and convert to scrub/shrub and forest in shallow areas currently supporting emergent vegetation. As a result, there will be a loss of backwater surface area, depth, and habitat quality for aquatic species during the 50-year period of analysis.

Various surveys are shown in Figure 18Figure 19Figure 20 that depict the elevation of ground/river bed in the project areas. The Figures below are a combination of bathymetric surveys, collected by boat, and a form of aerial surveys collected by an unmanned aerial vehicle (UAV) a type of drone. Areas that are depicted by the white, blue and light tan colors will always have water over them with white being the deepest. Green to yellow areas would have water over them at pooled conditions and orange to red would only have water over them at or near flood conditions. The UAV data over the landmasses are splotchy due to the tree canopy interfering with the survey collection. Areas showing no data between the bathymetry and UAV surveys were too shallow for data collection by boat but had water over them and were unable to be surveyed by the UAV.

West Alton Bay

The backwater at West Alton Bay is almost entirely a mudflat when the Mississippi River is at draw down and the water level is considered to be near minimum pool conditions (Figure 18). There are some isolated pockets, one to two feet in depth that exist at these conditions, but they are not connected to each other or the main river channel. During Flat or Full Pool conditions, this area would have an average water depth of 3.5 feet. Minimum Pool conditions at this location would have an approximate surface water elevation of 412.7 feet NAVD 88. Flat or Full Pool conditions at this location would be an approximate water surface elevation of 418.0 feet NAVD 88. Without a project, this area would continue to become more shallow, eventually converting into a terrestrial habitat.

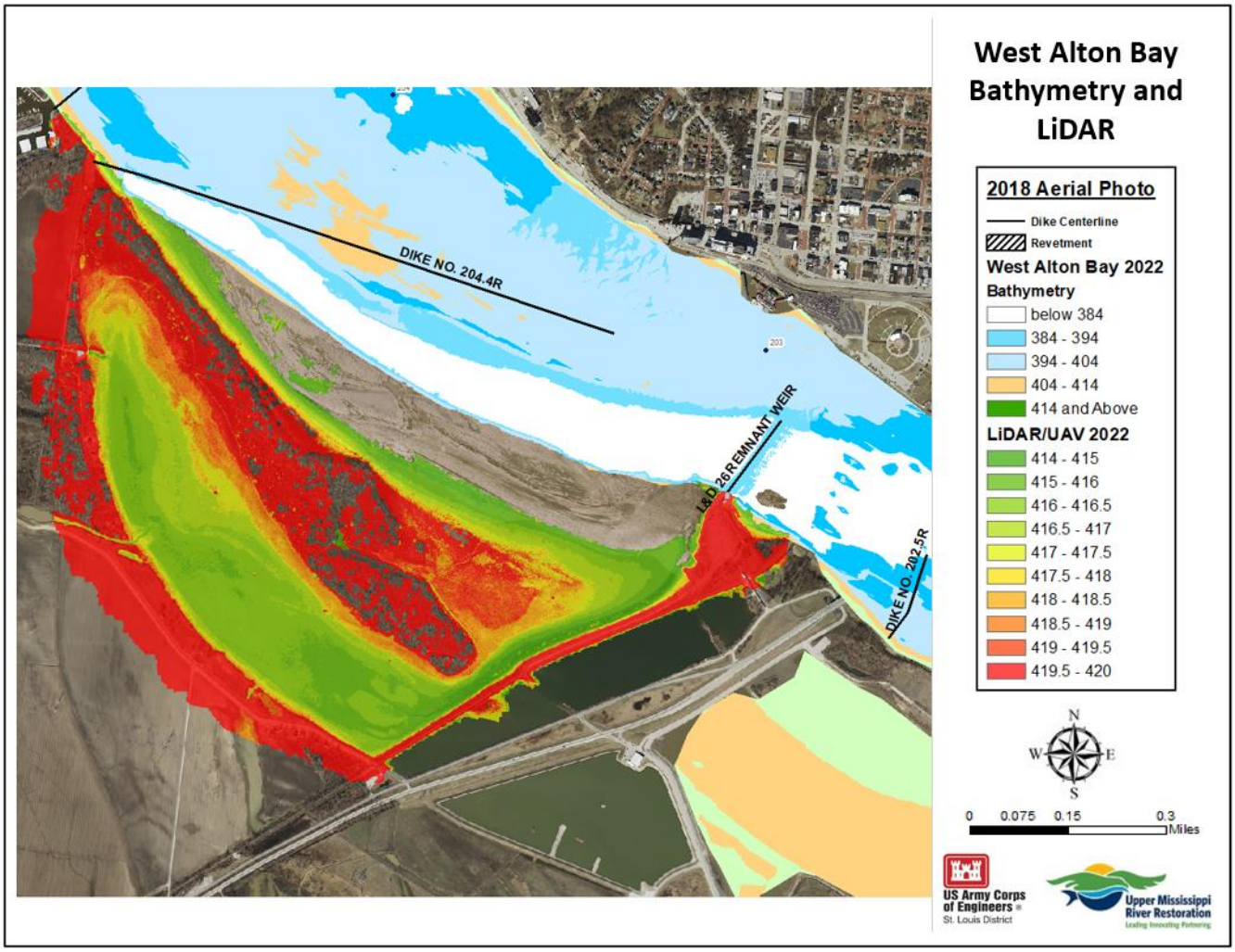


Figure 18: 2018 Aerial Photo with 2020 Surveys of the West Alton Bay Study Area

Portage Island

The backwater in Portage Island is a shallow channel when the Mississippi River is at draw down and the water level is considered to be near minimum pool conditions (Figure 19). The backwater area has one to two feet of depth during minimum pool conditions but becomes disconnected from the main Mississippi River channel. During Flat or Full Pool conditions, this backwater channel would have a water depth between two to three feet, and the entrance to the backwater would have a depth of 0.5 to 1.5 feet. Minimum Pool conditions at this location would have an approximate surface water elevation of 415.8 feet NAVD 88. Flat or Full Pool conditions at this location would be an approximate water surface elevation of 419.0 feet NAVD 88.

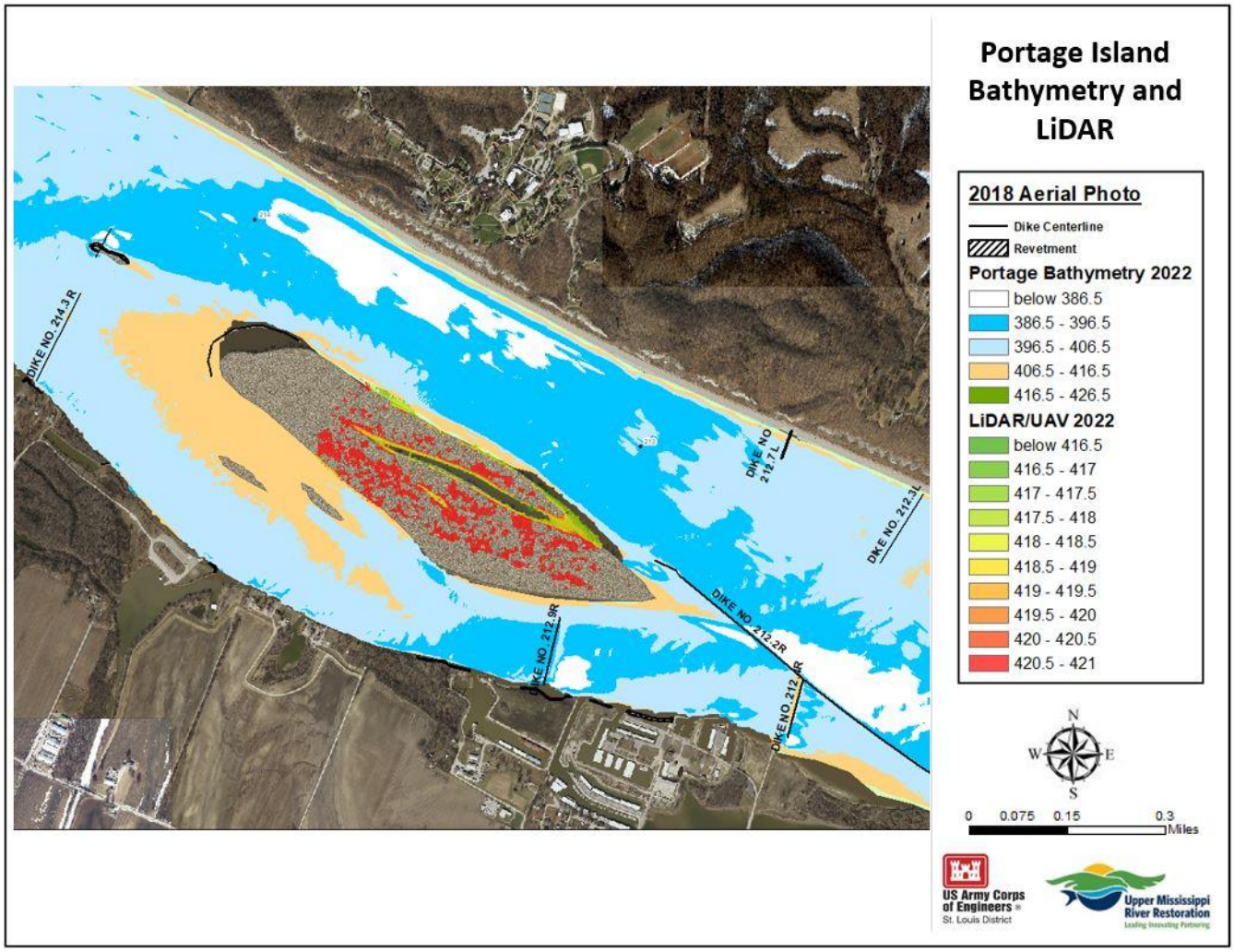


Figure 19: 2018 Aerial Photo with 2020 Survey of Portage Island Area

Luesse Lake

The backwater at Luesse Lake is a shallow channel when the Mississippi River is at draw down and the water level is considered to be near minimum pool conditions (Figure 20). The backwater area has two to four feet of depth during minimum pool conditions but is nearly disconnected from the main Mississippi River channel with only

a 0 to 0.5 feet of depth at the entrance. During Flat or Full Pool conditions, this backwater channel would have a water depth between 4 and 5 feet, and the entrance to the backwater would have a depth of 1 to 1.5 feet. Minimum Pool conditions at this location would have an approximate surface water elevation of 416.0 feet NAVD 88. Flat or Full Pool conditions at this location would be an approximate water surface elevation of 419.0 feet NAVD 88.

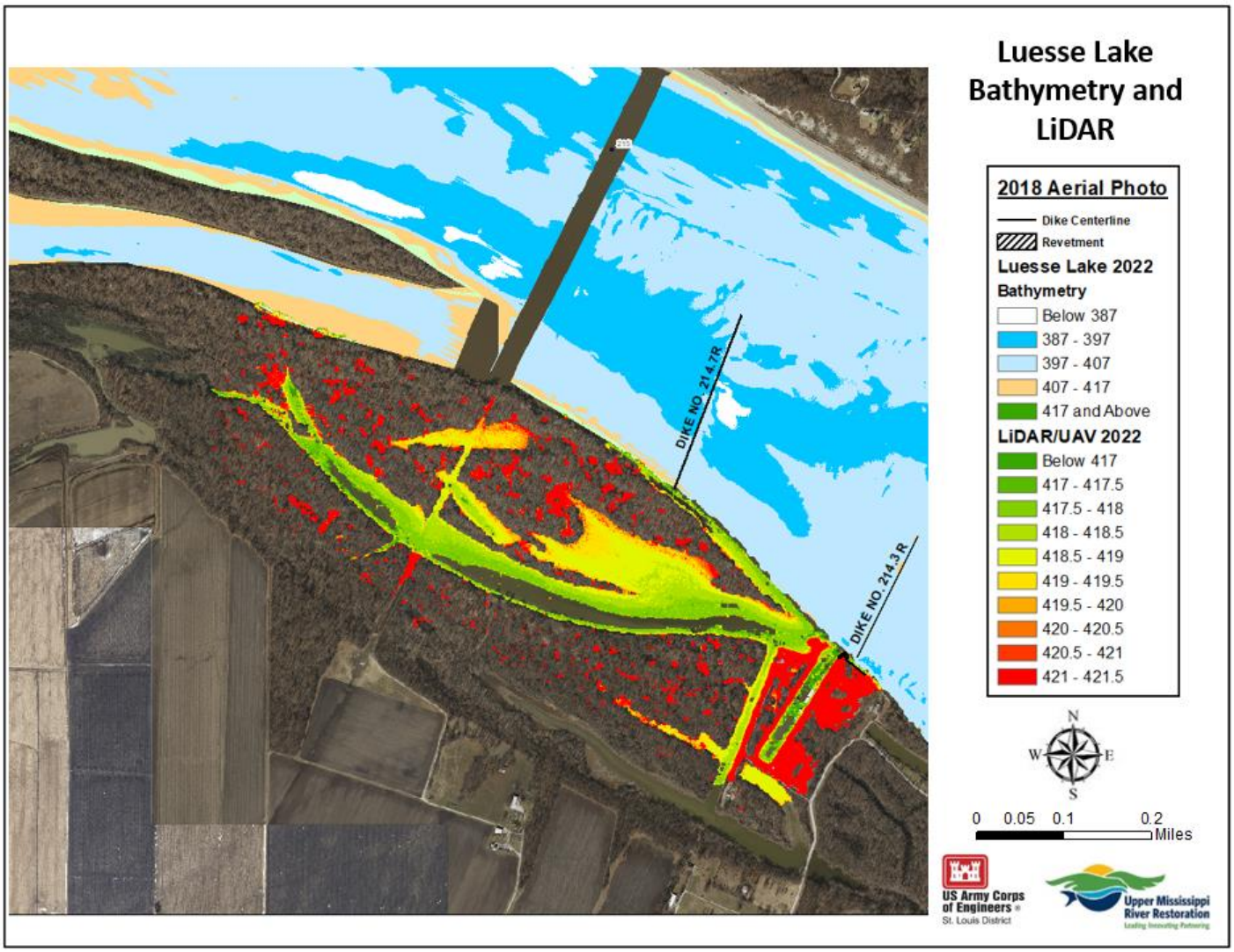


Figure 20: 2018 Aerial Photo with 2020 Surveys of the Luesse Lake Area

3.2 Channel and Side Channels

Approximately 675 acres of side channel and main channel border habitat occurs in the study area. Side channel and main channel border habitats within Pool 26 lack desired depth and flow diversity to support a healthy fish community. Resource professionals in the region have identified shallow lotic and overall increased diversity of aquatic habitats

within Pool 26 (McCain et al., 2018) as the desired conditions. The side channel at Portage Island has been stable with moderate levels of depth diversity, but flow diversity is not at the desired level. Under the FWOP condition, the study area is anticipated to remain approximately the same.

3.3 Emergent Wetland

Zones of emergent wetland in backwater habitats at West Alton Bay, Portage Island, and Luesse Lake area would be expected to shift based on continued sedimentation in backwater areas. The current zone of emergent vegetation would continue to gradually increase in elevation and significant portions would convert to shrub-scrub and early successional forest over the next 50 years. Site visits to these locations have noted tree establishment of sufficient size to survive common flood events around the periphery of emergent wetland areas. Areas less than two feet deep that are currently open water would be expected to convert to emergent vegetation with some scrub/shrub establishment at the highest elevations. Scour events resulting from periodic floods may reduce expansion of areas suitable for emergent wetland growth to some degree.

3.4 Island and Sandbar Habitat

From 1890 to 2022, island and sandbar habitat within the study area has declined by 98 and 115 acres, respectively. This equates to a 45% reduction in island area and complete loss of sandbar habitat within the study area, although sandbar habitat has developed at two other locations in lower Pool 26 in recent decades. The majority of island and sandbar habitat loss in the study area was due to the construction of the locks and dam at Alton. Further loss near Portage Island is due to erosion caused by wind- and vessel-related wave action. Without the proposed project, it is expected that both island and sandbar landcover in the study area would remain nearly stable. Therefore, sandbar dependent species would not be supported in the study area. In addition, forest dependent wildlife species would be limited by lower forest species and structural diversity compared to historical conditions.

4.0 Problems and Opportunities*

Section 4 identifies the West Alton Islands HREP area resource problems, opportunities, objectives, and constraints. Problem statements are concise characterizations of the broad issues occurring in the study area. Opportunities are either related to solving the problem at hand or are ancillary benefits. From the list of problems and opportunities, objectives for the study are drafted, and study-specific constraints for the study are identified. The success of project planning is determined by the fulfillment of the objectives through identified alternatives.

4.1 Conceptual Model

Past and present watershed land use change has directly altered hydrology by raising

water elevations and sedimentation rates compared to historic levels and through the loss of backwater depth and side channel bathymetric diversity in the study area. The altered hydrology has resulted in inadequate water supplies during critical life history stages for fish and aquatic vegetation. This has altered wildlife and plant communities in favor of species with broad environmental tolerances due to frequent disturbances, and has led to an overall reduction in diversity (i.e. fish, mussels, and floodplain habitat).

A conceptual model was constructed to illustrate the interactions amongst resource problems and stressors, drivers (i.e., altered hydrology, watershed land use, and navigation infrastructure), primary stressors (sedimentation, water flux, and increase wind fetch/wave action) and primary resources of concern (fish, mussels, sandbars and islands, emergent wetland and forest) (Figure 21).

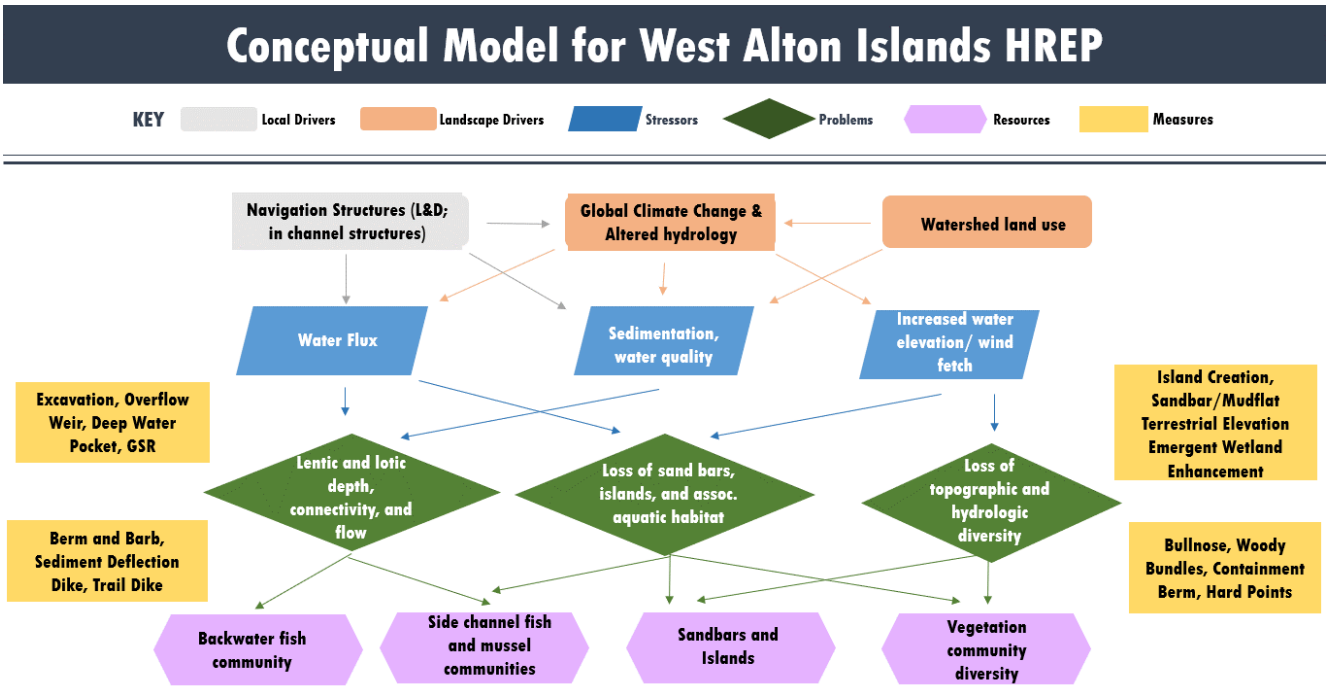


Figure 21: Conceptual Model for West Alton Islands HREP

Past and present watershed land use change has directly altered hydrology by raising water elevations and sedimentation rates compared to historic levels and through the loss of wetland habitat and ridge and swale topography in the study area.

4.2 Problem Identification and Opportunities

Human-induced physical modifications over the past two centuries within the UMRS floodplain have altered hydrology, topography, and biotic communities historically

present within the proposed project area. These alterations have degraded aquatic resources (i.e. side channel, fisheries, and wetland habitat), reduced forest community diversity (i.e. age, structure, and species composition), impaired ecosystem functions, and threatened the future sustainability of the river-floodplain ecosystem.

4.2.1 Problems

The following problems have been identified:

- Backwater sedimentation can affect the overall habitat quality through poor water quality, shallow depths, and loss of connectivity. Loss of connectivity can also result in fish entrapment.
- Loss of side channel flow and depth diversity decreases habitat function and availability for native riverine species.
- Loss of sandbars and islands reduce available habitat for aquatic and terrestrial species and accelerate bank and island erosion resulting from increased wind and wave action.
- Loss of topographic and hydrologic diversity reduces vegetative community diversity and wildlife resources (e.g. forage, invertebrate production, and nesting sites and resting sites).

4.2.2 Opportunities

Opportunities exist to restore wetland and floodplain forest habitat, function, and process. Within the study area, there are opportunities for additional beneficial outcomes beyond solving the stated problems related to wetland and floodplain forest habitats.

Opportunities for the study include:

- Improve the resiliency of the habitats to potential climate change impacts;
- Support local community by improving nature based tourism and recreation opportunities;
- Enhance partnerships with organizations for monitoring and education;
- Use dredged material more effectively to benefit or create habitats;
- Improve water quality;
- Use innovative solutions to create sustainable habitat conditions; and,
- Reduce the quantity of invasive species.

4.3 Goals and Objectives

4.3.1 UMRR Program Mission and Vision

The UMRR program vision and mission statements were integral components of the strategic planning efforts of an interagency UMRR Coordinating Committee. The strategic plan sets a clear direction for the program in federal fiscal years 2015 to 2025. The overarching program mission is:

> *to work within a partnership among federal agencies, state agencies, and other*

> *organizations; to construct high-performing habitat restoration projects; to produce state-of-the-art knowledge through monitoring, research, and assessment; and to engage other organizations to accomplish the Upper Mississippi River Restoration Program's vision.*

The overarching program vision is as follows:

> *A healthier and more resilient Upper Mississippi River ecosystem that sustains the river's multiple uses.*

4.3.1.1 Upper Mississippi River System (UMRS) Ecosystem Goals

The goal and vision statement imply conserving the UMRS's remaining structure and function while restoring the degraded components to realize a sustainable UMRS. Five system-wide objectives have been identified (Galat, et al., 2007):

- Manage for a more natural hydrologic regime;
- Manage for processes that shape a physically diverse and dynamic river-floodplain system;
- Manage for processes that input, transport, assimilate, and output material within the UMR basin river-floodplains;
- Manage for a diverse and dynamic pattern of habitats to support native biota; and
- Manage for viable populations of native species within diverse plant and animal communities.

4.3.1.2 UMRR Reach Objectives

Reach planning for the UMRS was undertaken to support an anticipated $100 million per year ecosystem restoration program authorized in WRDA 2007 but was subsequently expanded to apply to all UMRS ecosystem restoration programs, including the UMRR program. Reach planning relied on state and federal partners to refine ecosystem restoration objectives based on the longitudinal differences that exist over the 1,100 river miles of the UMRS. The UMRS was divided into four floodplain reaches (USACE 2009) to identify reach-specific objectives in order to maximize the benefits of individual projects within a given reach.

The study area is located within the Lower Impounded Reach. Documented below are the objectives for the Lower Impounded Reach that apply to West Alton Islands HREP.

4.3.2 Study Goal and Objectives

The goal of any potential project would be to restore and improve the quality and diversity of wetland, aquatic, and floodplain forest ecosystems within the study area.

Study Objectives

Based on the study goal, specific study objectives were established and are listed below. These objectives are interrelated and together will assist in meeting the overall study goal. The guidance for developing study objectives is provided in USACE planning guidance ER 1105-2-100 and specifies that objectives must be clearly defined, must provide information on the effect desired, and must include the subject of the objective, the location where the effect will occur and the timing and duration of the

effect. For the purpose of the Feasibility Report, the location for all objectives is generally defined as the study area. The timing and duration of the objectives is assumed to be the 50-year period of analysis starting in 2027 and continuing until 2077. The objectives for the West Alton Islands HREP are as follows.

a. Restore diversity of bathymetry, flow, and connectivity of aquatic areas throughout the potential project areas (side channels, main channel, off channel, backwaters, etc.)
b. Restore diverse island mosaics throughout study area (sand bars, islands; reduce wind fetch and wave impacts)
c. Restore native vegetation diversity and structural complexity throughout study area (wetlands, forests, etc.)

The relationship between objectives and the criteria to determine achievement of those objectives is summarized in *Appendix E - Monitoring and Adaptive Management Plan*, and Table 9 below summarizes objectives, performance criteria, and rationale for each. It should be noted that not all criteria must be met in order to achieve the objective; the criteria are indicators of ideal conditions.

Table 9: West Alton Islands Objectives and Performance Criteria

Objective	Performance Criteria	Rationale
Restore diversity of bathymetry, flow, and connectivity of aquatic areas throughout the potential project areas (side channels, main channel, off channel, backwaters, etc.) during the 50-year period of analysis.	Increased bathymetric diversity as acres deeper than five feet in backwater habitats. Increased connectivity of backwaters to lotic habitats as measured by width of connection greater than five feet in depth. Increased flow diversity in Portage Island side channel as measured by flow profiles across side channel habitat. Increase in the side channel habitat at West Alton Bay area as measured in acres. Increase in flow diversity in lotic habitats at West Alton Bay as measured in flow profiles in the channel border habitat. Maintain or improve existing mussel beds.	The performance criteria described is meant to restore bathymetric and flow diversity within backwaters at West Alton Bay, Portage Island, and Luesse Lake area as well as side channel habitat at Portage Island and main channel border habitat at West Alton Bay. Increased deep water area and connectivity of backwaters to lotic habitats is expected to improve habitat quality for fishes. Increased flow and bathymetric diversity in lotic habitat at Portage Island and West Alton Bay is expected to increase acreage of habitat available for lotic dependent species that utilize these particular habitats.
Restore diverse island mosaics throughout study area (sand bars and islands) and reduce wind fetch and wave impacts during the 50-year period of analysis.	Increase acres of island/sandbar habitat as measured by area, percent vegetation, and vegetation type.	The performance criteria described is meant to restore island/sandbar habitat that is able to undergo successional processes from scattered herbaceous to forested island in the study area.
Restore native vegetation diversity and structural complexity throughout study area during the 50-year period of analysis.	Increase vegetation diversity and complexity in study area as measured by change in percent vegetation type, vegetation type area, and diversity.	The performance criteria described is meant to restore vegetative diversity that historically occurred within the study area.

4.4 Planning Constraints and Considerations

The following constraints and concerns were considered in plan formulation:

4.4.1 Constraints

- Avoid or minimize negative impacts to navigation and flood stages.
- Avoid or minimize negative impacts to current Pool 26 water level management activities.
- Avoid or minimize negative impacts to utilities within the proposed project area.

4.4.2 Considerations

Environmental Considerations:

- Avoid and minimize impacts to Threatened & Endangered Species.
- Avoid and minimize impacts to cultural resources,
- Avoid and minimize negative impacts to Waters of the United States (WOTUS),

Cost Considerations:

- UMRR project cost limitations
- Minimize Sponsor Operation & Maintenance

Construction Considerations:

- Accessibility for construction (seasonal high and low water, closed areas, nesting/ roosting, etc.).
- MDC Waterfowl Blind Program has a biennial blind draw program within the backwaters and will need coordination during construction.
- Avoid or minimize impacts to existing hard mast resources.

5.0 PLAN FORMULATION

The USACE planning process, as well as NEPA, requires the USACE to evaluate a range of reasonable alternatives.

5.1 Management Measures

A management measure is a feature (such as a structural element that requires construction or assembly on-site) or an activity (a non-structural action) that can be combined with other management measures to form alternative plans.

Management measures were developed to address project problems, meet study goals and objectives, and to capitalize on study area opportunities outlined in Section 4. Management measures were derived from a variety of sources including prior studies, existing projects, and the interdisciplinary team. These measures have been implemented successfully throughout the UMR and are based on the Upper Mississippi

River Restoration Program – Environmental Design Handbook (December 2012) and lessons learned from other large river ecosystem restoration projects including those designed and constructed in the UMRR program.

In the initial planning charette meetings held in January and February of 2021, 8 potential project areas and measures were developed for consideration. Due to estimated rough order of magnitude cost exceeding the authorized cost for UMRR, it was necessary to rescope the project to adhere to the parameters of the program. Working with the PDT and Sponsors, a number of the potential sites and measures were screened to bring the project within the acceptable cost parameters of the UMRR program. A complete list of the initial proposed project areas and measures can be found in *Appendix A - Coordination*.

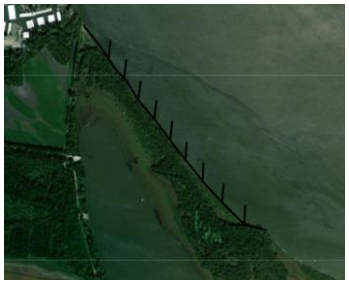
After screening, three focal areas (West Alton Bay, Portage Island and Luesse Lake) and nineteen measures were prioritized and retained for consideration. The measures are discussed in section 5.1.1 below and the arrangement of those measures into Alternatives within each area will be discussed in section 6.0.

Table 5 presents the remaining measures (after the initial study scoping) that were considered for implementation of the West Alton Islands HREP.

5.1.1 Measures

Type of Measure	Representative Photograph	Description	**Obj.1** Restore diversity of bathymetry, flow, and connectivity of aquatic areas	**Obj 2** Restore diverse island mosaics - reduce wind fetch and wave impacts	**Obj 3** Restore native vegetation diversity and structural complexity
Excavation (with and without benching and at opening of backwater only)	 Beaver Island HREP. Source: USACE, 2021	Dredge Cut: Creation of bathymetric diversity (benching) and deeper seasonal habitat conditions for aquatic species. Material excavated could be used for beneficial purposes such as island construction and sandbar creation.	X	X	X
Hard Points (Barb/Vane)	 USACE- UMRR Environmental Design Handbook, 2012	Placement of rock angled upstream to catch sediment, creates diverse aquatic habitat and bathymetric diversity. Woody material can also be utilized.	X	X	

Type of Measure	Representative Photograph	Description	**Obj.1** Restore diversity of bathymetry, flow, and connectivity of aquatic areas	**Obj 2** Restore diverse island mosaics - reduce wind fetch and wave impacts	**Obj 3** Restore native vegetation diversity and structural complexity
Island creation	 Source: UMRR-EMP Environmental Design Handbook, 2012	Rock berm and land created in the river from dredged material. Rock berm reduces flow and creates a barrier to wind driven waves, holding material in place.	X	X	X
Gradual Slope Revetment	 Huron Island HREP. Source: USACE, 2020	Island Protection -material placed along island shoreline: Gradual Slope Revetment (GSR)- shields islands and habitat from eroding and to provide habitat for aquatic species.	X	X	
Overflow Weir	 Source: klinger.com	Structures made of stone or concrete- allow water to enter backwater during high flow events creating a scouring effect to prolong the life of the excavated area.	X		

Type of Measure	Representative Photograph	Description	**Obj.1** Restore diversity of bathymetry, flow, and connectivity of aquatic areas	**Obj 2** Restore diverse island mosaics - reduce wind fetch and wave impacts	**Obj 3** Restore native vegetation diversity and structural complexity
Deep Water Pocket	 Harlow Island HREP. Source: USACE, 2023	Areas dredged deeper within the backwater to create deep pockets for aquatic species to have during seasonal temperature fluctuations.	X		
Berm and Barb	 USACE Rendering - 2023	Stone placement approximately 1 -2 feet higher than adjacent terrestrial area to prevent water from entering backwater during lower flood events to prolong the life of the excavated area. The barbs provide additional habitat and bathymetric diversity.	X	X	X
Containment Berm	 USACE- NESP Engineering Pamphlet,2023	Rock placed to contain excavated materials for emergent wetland enhancement	X	X	

Type of Measure	Representative Photograph	Description	**Obj.1** Restore diversity of bathymetry, flow, and connectivity of aquatic areas	**Obj 2** Restore diverse island mosaics - reduce wind fetch and wave impacts	**Obj 3** Restore native vegetation diversity and structural complexity
Bullnose	 USACE- NESP Engineering Pamphlet, 2023	Bullnoses can be constructed to protect existing islands, create new islands, and as flow deflection structures to reduce velocities downstream during certain conditions. Can also be used as wave breaks.	X	X	
Woody Bundle	 USACE- UMRR Environmental Design Handbook, 2012	Installing separate woody bundles in pools or incorporating dead wood into stone structures dissipate flow energy, resulting in channel stability and improved fish mitigation.	X		X
Sandbar/Mudflat Creation	 USACE- NESP Engineering Pamphlet, 2023	Beneficial use of dredged material for the creation of transitional sandbar habitat. The area is expected to transition over time to forested habitat.	X	X	X

Type of Measure	Representative Photograph	Description	**Obj.1** Restore diversity of bathymetry, flow, and connectivity of aquatic areas	**Obj 2** Restore diverse island mosaics - reduce wind fetch and wave impacts	**Obj 3** Restore native vegetation diversity and structural complexity
Dike (Sediment Deflection Dike and Trail Dike)	 USACE- 2023	Sediment deflection dikes move sediment downstream and prevent deposition at the opening of backwater areas, while trail dikes deflect flows and prevents erosion of the island/sandbar measure.	X	X	X
Terrestrial Elevation Diversity	 USACE- NESP Engineering Pamphlet, 2023	Diversify terrestrial/floodplain habitat to have varying elevations to support different wetland and floodplain forest habitat.			X
Emergent Wetland Enhancement	 USACE- NESP Engineering Pamphlet, 2023	Removal of or addition of a thin layer of sediment to create conditions suitable for native emergent wetland vegetation to establish.			X

Type of Measure	Representative Photograph	Description	**Obj.1** Restore diversity of bathymetry, flow, and connectivity of aquatic areas	**Obj 2** Restore diverse island mosaics - reduce wind fetch and wave impacts	**Obj 3** Restore native vegetation diversity and structural complexity
Gravel Bar	 Photo: Roger Tabor / USFWS	Rounded river stone that will be placed behind the bullnose to provide aquatic structure and diversity for fish.	X		
Water Level Management		Manipulation of Pool 26 water levels to increase depth of the side channel and backwater	X		X

5.2 Evaluation and Screening of Measures

Measures were screened and eliminated throughout the plan formulation process based on the Principles and Guidelines criteria (Table 10).

• **Completeness**: Extent to which the measure provides and accounts for all necessary investments or actions to ensure realization of the planning objectives.

• **Effectiveness**: Extent to which the measure contributes to achieving the planning objectives.

• **Efficiency**: Extent to which the measure is the most cost-effective means of addressing the specified problems and realizing the specified opportunities, consistent with protecting the nation's environment.

• **Acceptability**: Workability and viability of the measure with respect to acceptance by federal and non-federal entities and the public, and compatibility with existing laws, regulations and public policies.

One non-structural measure (below) was considered but not selected for alternative formulation because it was found to be ineffective.

- Water Level Management- measure screened due to effectiveness at meeting study objectives. Pool 26 is under environmental pool management and is expected to be into the future. The pooled area is already capitalizing on environmental benefits through water level management.

Table 10: Table of Measures and Screening Criteria

Measure Category	Considered Management Measure	Screening Criteria/ Design Considerations						Measure Retained
		Effective			Complete	Efficient	Acceptable	
		Obj 1: Restore diversity of bathymetry, flow, and connectivity of aquatic areas	Obj 2: Restore diverse island mosaics - reduce wind fetch and wave impacts	Obj 3: Restore native vegetation diversity and structural complexity				
Backwater Connectivity and Bathymetric Diversity	Excavation – With Benching	X	X	X	X		X	YES
	Excavation – Without Benching	X	X	X	X	X	X	YES
	Excavation – at mouth of backwater only	X	X	X	X	X	X	YES
Beneficial use of Excavated Material	Island creation	X	X	X	X	X	X	YES
	Sandbar/Mudflat creation	X	X	X	X	X	X	YES
	Terrestrial Elevation Diversity			X	X	X	X	YES
	Emergent Wetland Enhancement			X	X	X	X	YES
River Training Structures	Sediment Deflection Dike	X	X	X	X	X	X	YES
	Trail Dike	X	X	X	X	X	X	YES
	Berm and Barb	X	X	X	X	X	X	YES
	Bullnose	X	X		X	X	X	YES
	Overflow Weir	X			X	X	X	YES
	Gradual Slope Revetment (GSR)	X	X		X	X	X	YES
	Containment Berm	X	X		X	X	X	YES
	Hard Points (Barb & Vane)	X	X		X	X	X	YES
Gravel Bar	Gravel placement	X			X	X	X	YES
Overwintering Habitat	Deep Water Pocket	X			X	X	X	YES
Woody Structure	Woody Bundle	X		X	X	X	X	YES
Non Structural	Water Level Management	X		X	X	X		NO

5.3 Summary of Retained Measures

The final array of retained measures includes:

- Excavation– With Benching
- Excavation– Without Benching
- Excavation – At mouth of backwater only
- Island creation
- Sandbar/Mudflat creation
- Terrestrial Elevation Diversity
- Emergent Wetland Enhancement
- Sediment Deflection Dike
- Trail Dike
- Hard Points (Barb & Vane)
- Berm and Barb
- Bullnose
- Overflow Weir
- Gradual Slope Revetment (GSR)
- Containment Berm
- Deep Water Pocket
- Woody Bundle
- Gravel Bar

Table 11 shows how the measures align with the problems, opportunities and objectives identified in Section 4.

Table 11: Alignment of final array of measures with Problems, Opportunities, and Objectives

Problems	Opportunities	Objectives	Measures Considered
Backwater sedimentation can affect the overall habitat quality through poor water quality, shallow depths, and loss of connectivity. Loss of connectivity can also result in fish entrapment.	○ Improve the resiliency of the habitats to potential climate change impacts ○ Support local community by improving nature based tourism and recreation opportunities ○ Enhance partnerships with– organizations for monitoring and education ○ Use dredged material more effectively to benefit or create habitats ○ Improve water quality ○ Use of innovative solutions to create sustainable habitat conditions ○ Reduce the quantity of invasive species	Restore diversity of bathymetry, flow, and connectivity of aquatic areas throughout study area (side channel, main channel, off channel, backwaters, etc.) during the 50-year period of analysis.	Excavation (Mechanical or Dredge) – With Benching, Without Benching, At Mouth Only Sediment Deflection/Trail Dikes Hard Points Island Creation Containment Berm Bullnose Woody Bundles Sandbar/mudflat Creation Berm and Barbs Overflow Weir Gradual Slope Revetment (GSR) Gravel Bar Deep Water Pocket
Loss of side channel flow and depth diversity decreases habitat function and availability for native riverine species.			
Loss of sandbars and islands reduce available habitat for aquatic and terrestrial species and accelerate bank and island erosion resulting from increased wind and wave fetch.		Restore diverse island mosaics throughout study area (sand bars and islands) and reduce wind fetch and wave impacts during the 50-year period of analysis.	Excavation (Mechanical or Dredge) – With Benching, Without Benching, At Mouth Only Hard Points Island creation Sandbar/Mudflat creation Bullnose Sediment Deflection/Trail Dikes Gradual Slope Revetment (GSR) Berm and Barb Containment Berm
Loss of topographic and hydrologic diversity reduces vegetative community diversity and wildlife resources (e.g. forage, invertebrate production, and nesting sites and resting sites)		Restore native vegetation diversity and structural complexity throughout study area during the 50-year period of analysis.	Excavation (Mechanical or Dredge) – With Benching, Without Benching, At Mouth Only Terrestrial Elevation Diversity Emergent Wetland Enhancement Island Creation Sandbar/Mudflat Creation Berm and Barbs Woody Bundles Sediment Deflection/Trail Dikes

5.4 Development of Initial Array of Alternatives

Measures deemed feasible were carried forward for consideration in the development of alternatives. Alternatives are combinations of measures that will contribute to attaining the planning objectives. This section describes considerations that led to the development of an initial array of alternatives for this project and the evaluation of alternative plans ability to meet project objectives.

Formulation strategies, defined by Planning Manual Part II: Risk-Informed Planning 2017, are a set of conditional decisions that shape and guide the development of alternatives.

The formulation strategies combine measure(s) together into alternatives based on the study goal, objectives, planning criteria, and opportunities, while avoiding constraints. Measures were combined based on appropriate dependencies and exclusivities. West Alton Islands HREP formulation strategies were based on the following:

- **No Action Alternative**: This alternative is defined as the alternative in which no federal action takes place. The FWOP condition would be anticipated as a result of no federal action.
- **Minimum Alternative**: This alternative strategy identifies the smallest (least cost) plan resulting in minimal improvements towards each project objective while making a measurable and cost-effective improvement to existing conditions.
- **Intermediate Alternative**: This alternative strategy focuses on measures that improve the structure and function of the existing conditions while prioritizing measure configurations that have the most efficient use of unit size to realize benefits.
- **Maximum Alternative**: This is the alternative that maximizes habitat improvements and gets the habitat closest to optimal functionality in both aquatic and terrestrial areas. Measures included in this strategy address project problems statements to the greatest extent.
- **Sustainability Alternative**: This alternative strategy prioritized the development of the most sustainable measure for long term project success. This was intended to be self-sustaining and require minimal modifications over time.
- **Habitat Diversity Alternative**: This alternative strategy focused on prioritizing the most critical measures only to ensure connectivity and sustainability of the backwaters.

Table 12 shows the initial array of measures and the alternative formulated.

Evaluation and Screening of Alternatives

Table 12: Initial Array of Alternatives

		Alternatives Retained				Alternatives Screened	
#	Measure Retained	No Action	Minimum	Intermediate	Maximum	Sustainability	Habitat Diversity
1	Excavation with Benching				X	X	
2	Excavation without Benching		X	X			X
3	Excavation of opening to backwater only		X				
4	Overflow Weir				X	X	X
5	Island Creation		X	X	X	X	X
6	Gradual Slope Revetment (GSR) around Island			X	X	X	
7	Containment Berm			X			
8	Bullnose			X	X	X	
9	Hard Points (Barb & Vane)				X	X	
10	Sandbar/Mudflat Creation		X	X	X	X	
11	Emergent Wetland Enhancement		X	X	X	X	
12	Terrestrial Elevation Diversity			X	X		
13	Woody Bundle			X	X	X	
14	Trail Dike		X	X	X	X	
15	Sediment Deflection Dike			X	X	X	
16	Gravel Bar		X	X	X	X	
17	Berm and Barb			X			
18	Deep Water Pocket		X	X	X		

Upon review, the PDT screened two alternatives. The Sustainability Alternative was almost exactly the same as the Maximum Alternative with the exception of a single measure (terrestrial elevation diversity). It was decided it was not efficient to have two alternatives nearly duplicative of each other for evaluation purposes. The team chose to retain the Maximum Alternative in order to keep the terrestrial elevation diversity measure for evaluation. The Habitat Diversity Alternative was also screened because the alternative lacked sufficient overall benefits for the project.

Figure 22 - Figure 30 show the proposed arrangement of the measures within the study areas within the focused array of alternatives.

Minimum Alternative:

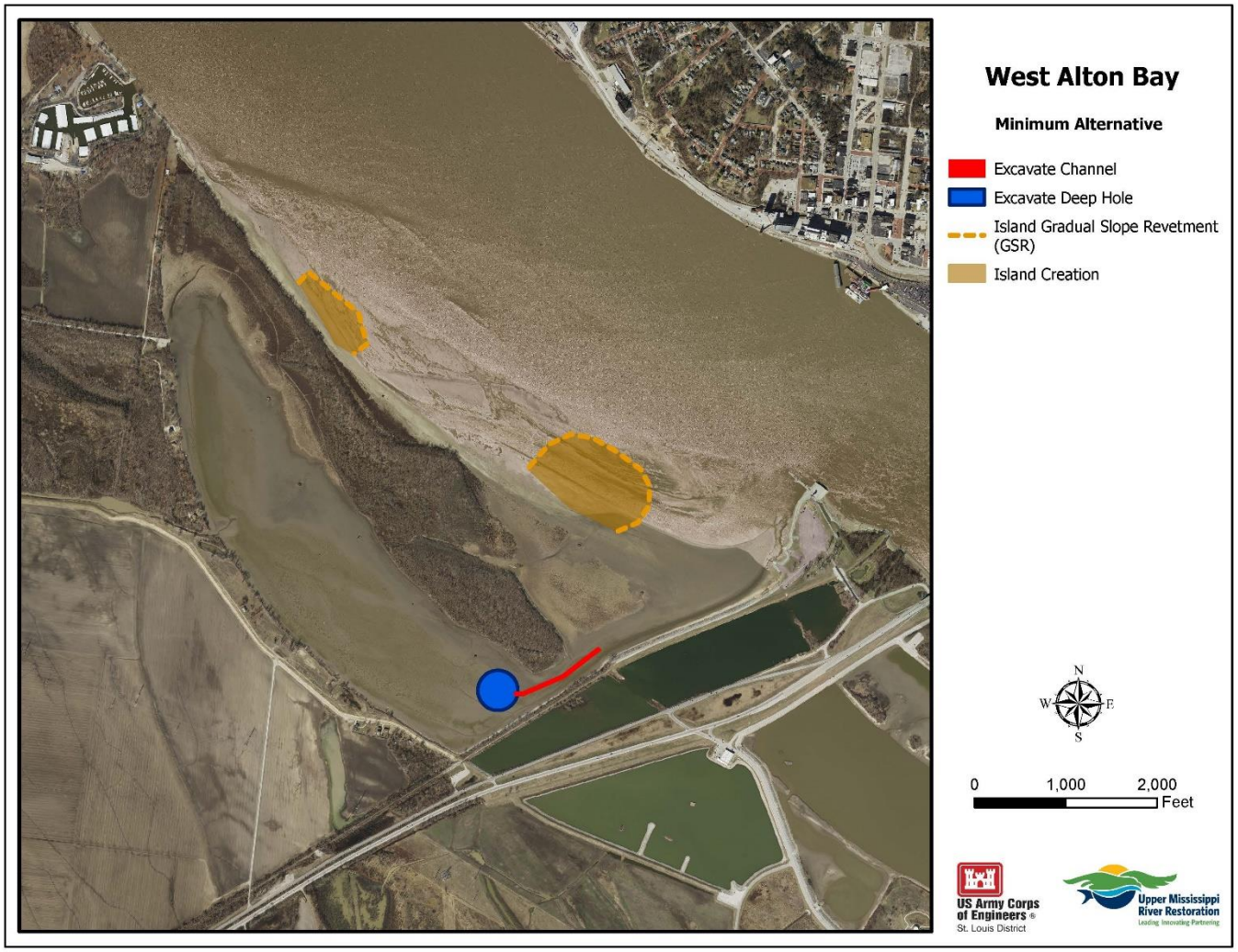


Figure 22: Minimum Alternative- West Alton Bay

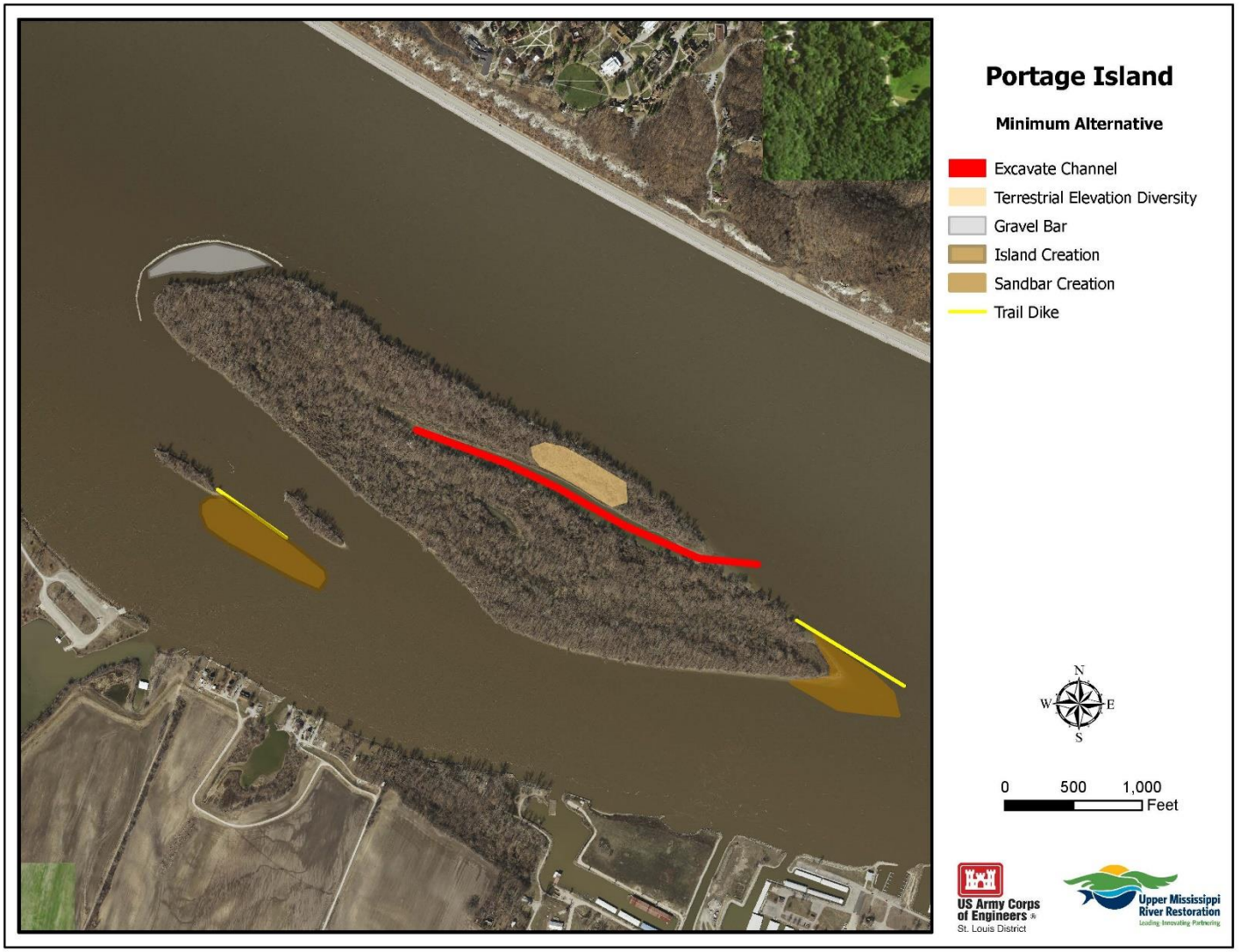


Figure 23: Minimum Alternative- Portage Island

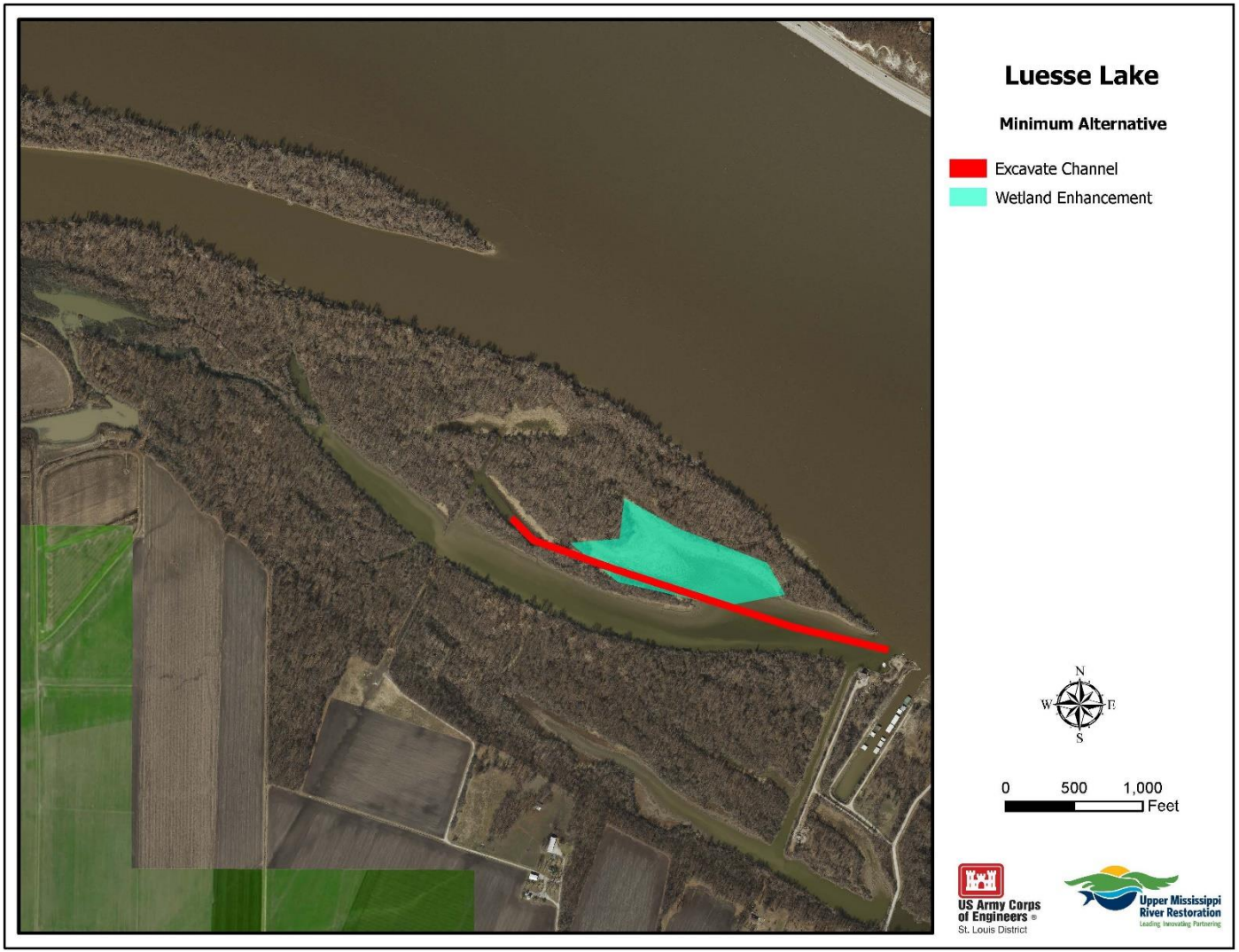


Figure 24: Minimum Alternative- Luesse Lake

Intermediate Alternative:

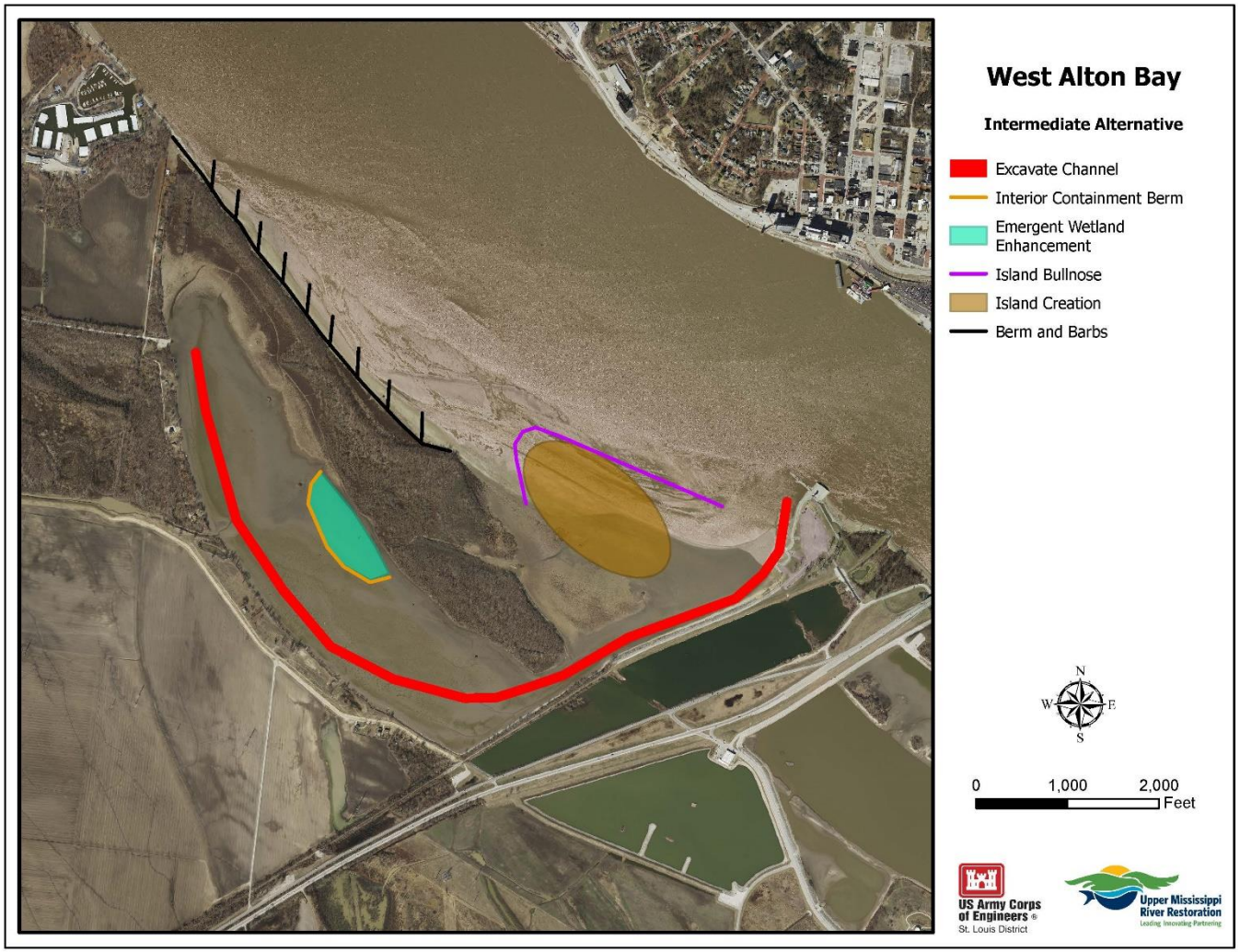


Figure 25: Intermediate Alternative- West Alton Bay

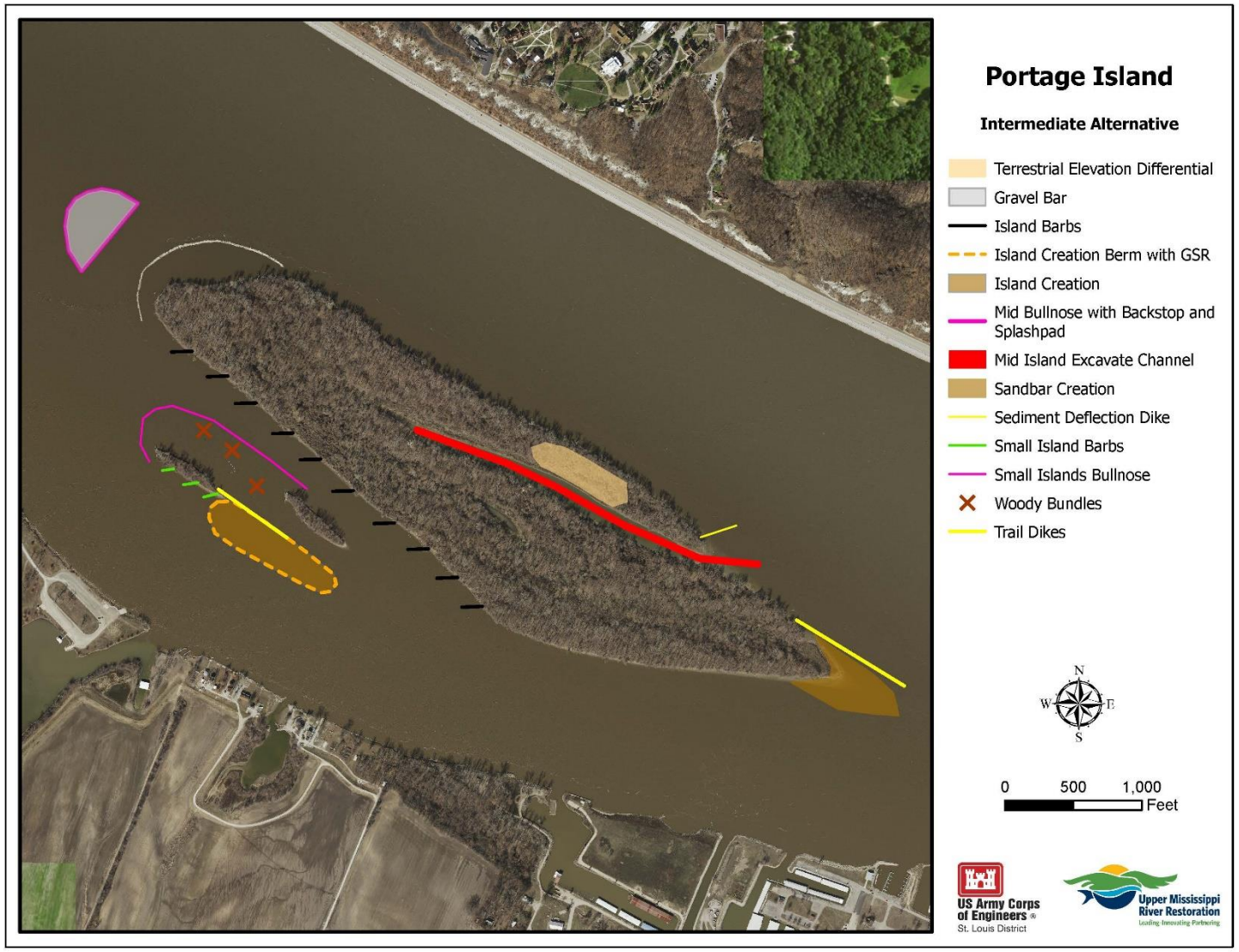


Figure 26: Intermediate Alternative- Portage Is.

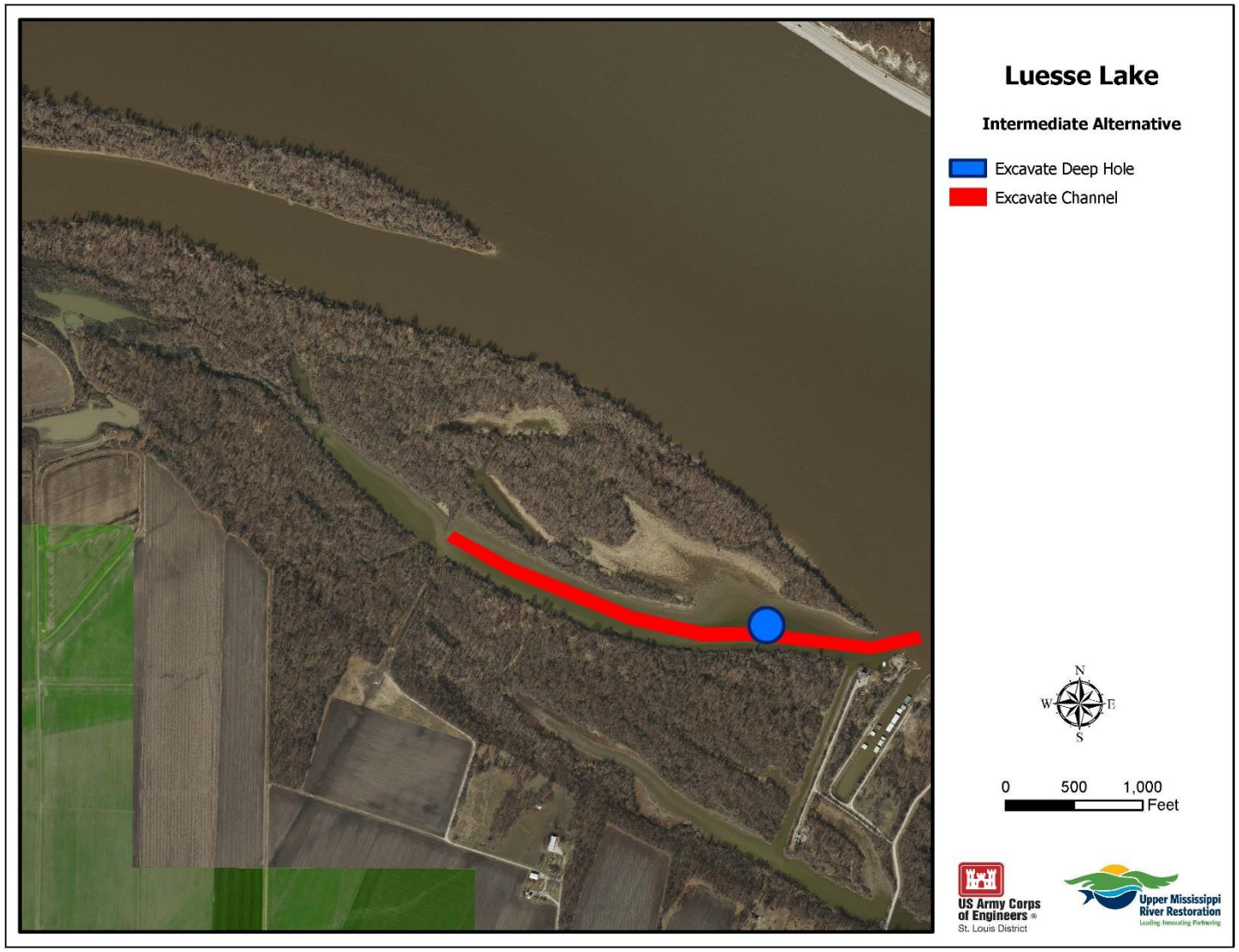


Figure 27: Intermediate Alternative - Luesse Lake

Maximum Alternative:

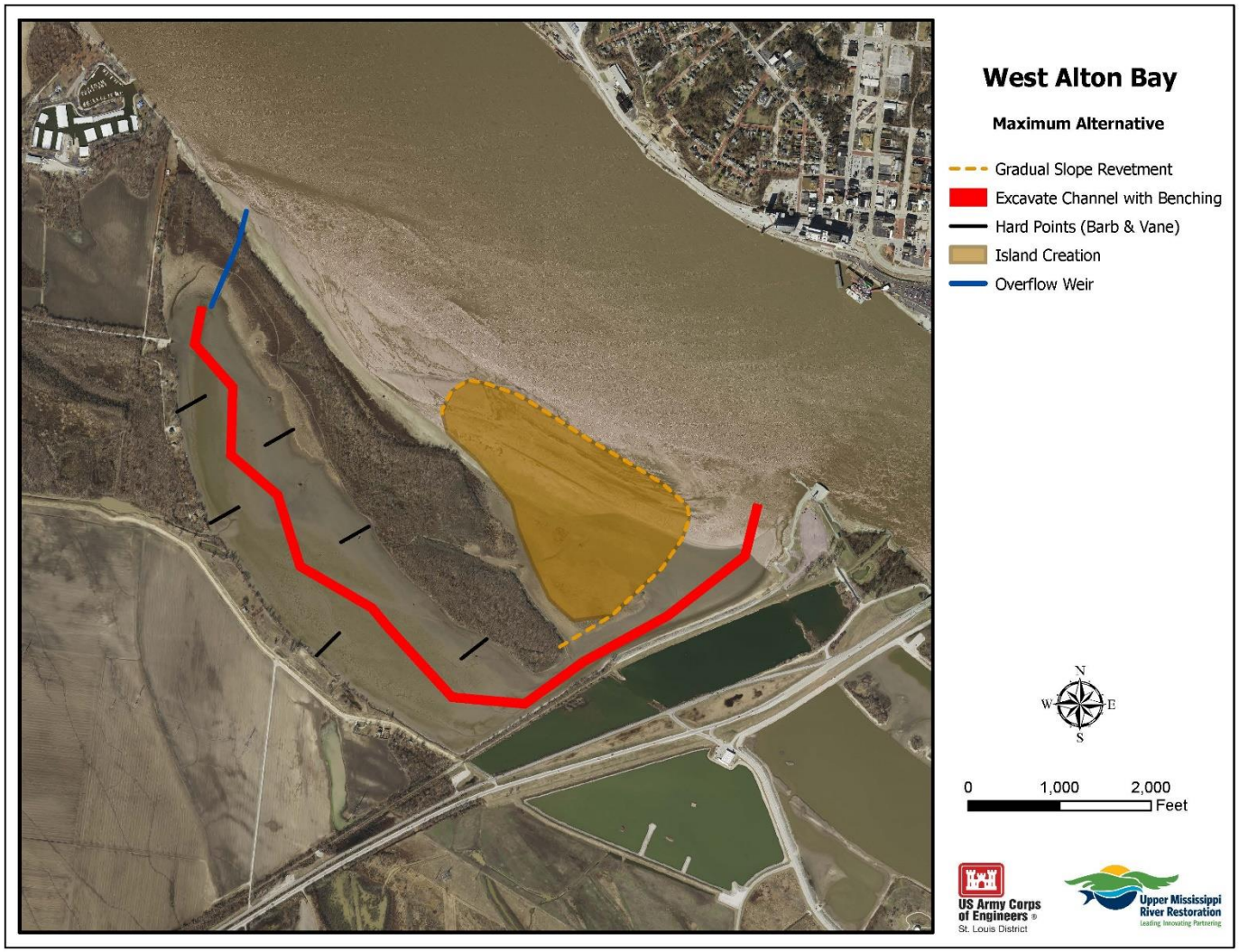


Figure 28: Maximum Alternative- West Alton Bay

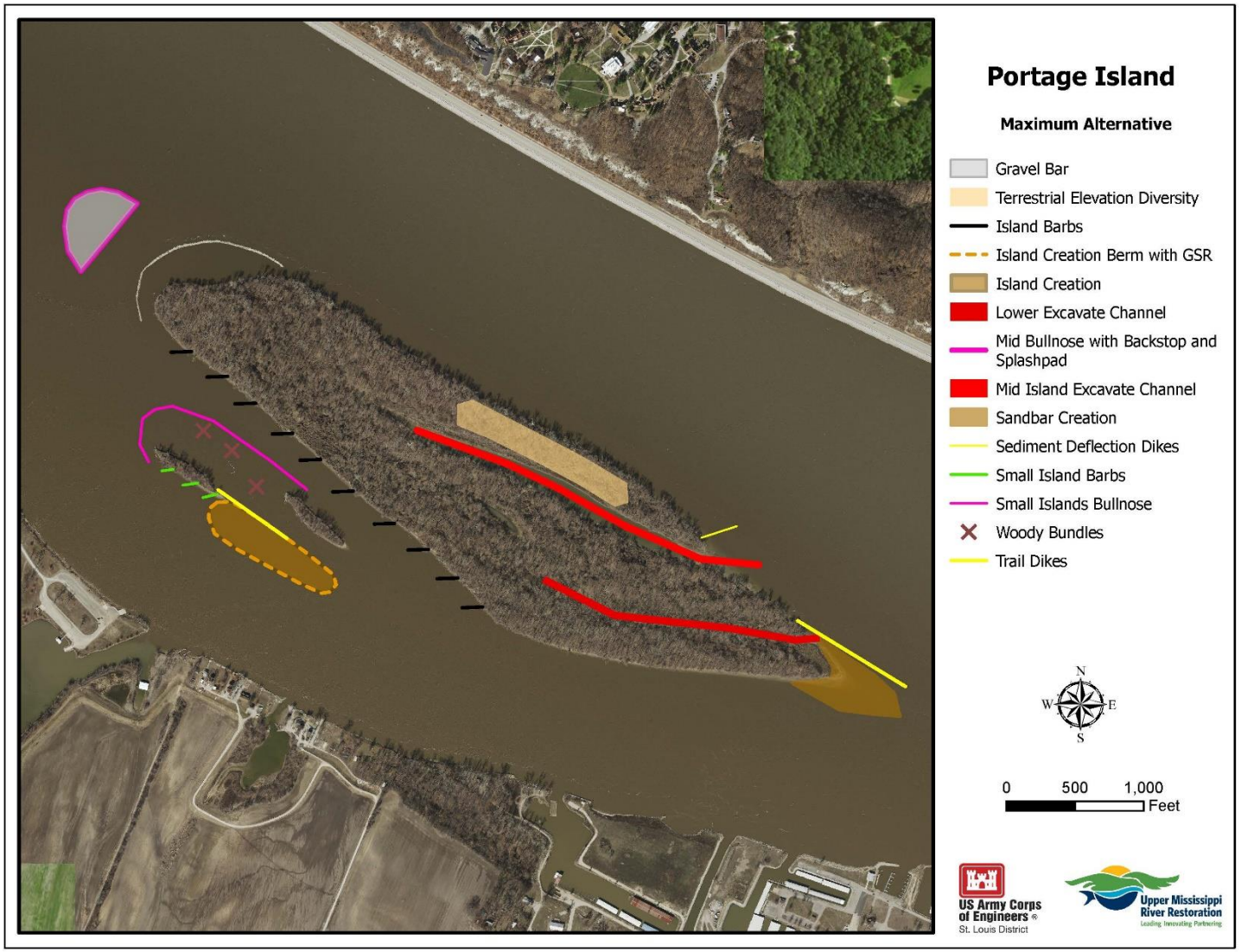


Figure 29: Maximum Alternative- Portage Island



Figure 30: Maximum Alternative- Luesse Lake

Further screening of the remaining focused array of alternatives was based on Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (1983, referred to as P&G for the remainder of this report).

The PDT gave each alternative a qualitative metric (high/moderate/low) and a quantitative score for tallying. A qualitative score of "high" signifies the metric was met considerably, a score of "moderate" denotes the metric was met moderately, and a score of "low" indicates the metric was minimally met, if at all. The metrics are described below. Table 13 provides the evaluation for each alternative.

Acceptability: In order to measure the acceptability of each alternative, the study team created the metrics described below. All the alternatives in the final array are in accordance with federal law and policy so all alternatives scored high.

> USACE Policy Compliant – This metric evaluated the magnitude of potential policy concerns for each alternative.
>
> Complements the larger federal, state and local objectives – This metric provided how well each alternative complemented other USFWS and MDC management objectives in and adjacent to the study area, showing the alternatives' viability for acceptance by non-federal entities and the public.

Completeness: The study team evaluated future potential investments, state investments, non-governmental investments, and land use changes to determine if these activities were necessary to or would prohibit achievement of this study's planning objectives. The study team determined that at this stage of the planning process, no additional investments were needed to obtain benefits so all alternatives are considered "complete".

Efficiency: The efficiency metric used to compare the initial array included whether Construction, and Operation, Maintenance, Repair, Replacement & Rehabilitation (OMRR&R) costs are anticipated to be high in comparison to the predicted benefits.

Effectiveness: In order to measure the effectiveness of each alternative, the study team created metrics for the project objectives and opportunities:

> Bathymetric flow and connectivity diversity –This metric documents how well each alternative improves bathymetric flow and connectivity within the study area.
>
> Diverse island mosaics –This metric documents how well each alternatives improves the diversity of island and sandbar mosaics within the study area.

Native vegetation diversity and structural complexity – This metric documents how well each alternative improves both terrestrial and aquatic native vegetation and structural complexity in the study area.

Opportunity metrics include improvement of water clarity, use of innovative solutions, beneficial use of dredge material and resiliency.

Table 13: Evaluation of Focused Array of Alternatives

Alternative	Acceptable	Complete	Efficient	Effective			Maximize Opportunities			
High – Green - Metric met considerably Moderate- Yellow – Metric met moderately Low- Red -Metric met minimally or not at all				**Restore diversity of bathymetry, flow, and connectivity of aquatic areas**	**Restore diverse island mosaics throughout study area (sand bars and islands)**	**Restore native vegetation diversity and structural complexity**	**Improve water clarity**	**Innovative solutions**	**Beneficial use of excavated material**	**Resiliency**
No Action	No	No	No	No	No	No	No	No	No	No
Minimum	High	Low	High	Moderate	Low	Low	Low	Low	Low	Low
Intermediate	High	High	Moderate	High	High	High	Moderate	High	High	High
Maximum	High	High	Low	High	High	High	Low	High	High	High

5.5 Final Array of Alternatives

The final array of alternatives include:

- No Action
- Minimum Alternative
- Intermediate Alternative
- Maximum Alternative

The measures included in each Alternative are listed by area:

Minimum Alternative: These measures were identified as some of the simplest and most cost-effective ways to address the objectives.

- West Alton Bay: excavation (at mouth of backwater), island creation, gradual slope revetment, deep water pocket
- Portage Island: excavation (existing backwater), island creation, terrestrial elevation diversity, sandbar/mudflat creation, trail dike, gravel bar
- Luesse Lake: excavation (at mouth of backwater into wetland area), emergent wetland enhancement

Intermediate Alternative: These measures improve the structure and function of the existing conditions while configurations that have the most efficient use of size to realize benefits.

- West Alton Bay: excavation (without benching), island creation, bullnose, emergent wetland enhancement (using excavated material), berm and barbs
- Portage Island: excavation (existing backwater), island creation, barbs, gradual slope revetment, woody bundles, sandbar/mudflat creation, trail dike, bullnose, sediment deflection dike, gravel bar, terrestrial elevation diversity
- Luesse Lake: excavation (south of pipeline), deep water pocket

Maximum Alternative: These measures were identified as a unique combination that would maximally address all three objectives.

- West Alton Bay: excavation (with benching), island creation, hard points, gradual slope revetment, overflow weir
- Portage Island: excavation (existing backwater – without benching), excavation (remnant backwater- without benching), island creation, barbs, gradual slope revetment, woody bundles, terrestrial elevation diversity, sandbar/mudflat creation, trail dike, sediment deflection dike, bullnose, gravel bar
- Luesse Lake: excavation (with benching), emergent wetland enhancement

6.0 EVALUATION AND COMPARISON OF FINAL ARRAY OF ALTERNATIVES

This section describes the process and methods utilized to evaluate the final array of alternatives for West Alton Islands HREP. The evaluation included use of Habitat Evaluation Procedures (HEP) and development of parametric cost estimates. HEP outputs and costs were entered into IWR Planning Suite Cost Effective/Incremental Cost Assessment (CE/ICA).

6.1 Habitat Benefits Evaluation

This assessment includes a summary of the existing biological conditions used in the evaluation, as well as a forecast for future conditions under the No Action Alternative and each potential project alternative. The evaluation was conducted by a multi-agency team that included representatives from the District, Sponsor, and project partners. Aquatic and floodplain benefits were quantified using the Habitat Evaluation Procedures (HEP; USFWS 1980a), a habitat-based evaluation methodology used in project planning. The procedure documents the quality and quantity of available habitat for selected wildlife species. The HEP assume that habitat for selected wildlife species can be described by a Habitat Suitability Index (HSI). This index value (from 0.0 to 1.0) is multiplied by the area of applicable habitat to obtain Habitat Units (HUs).

Changes in HUs will occur as a habitat matures naturally or is influenced by development. These changes influence the cumulative HUs derived over the period of analysis (50 years). HUs are calculated for select target years and annualized using the IWR Planning Suite II annualizer tool over the period of analysis to derive a net Average Annual Habitat Unit (AAHU) quantity. By using target years, AAHUs were annualized using a linear interpolation approach, essentially drawing a straight line between target years, and then calculating the area under the curve for the resulting planning horizon benefit curve. Resulting net AAHUs are used as the output measurement to compare alternatives for the proposed project.

The PDT used four USACE – certified or approved (per EC 1105-2-412) habitat evaluation methodologies in their analyses:

- Smallmouth Buffalo Habitat Suitability Index
- White Bass Habitat Suitability Index
- Yellow Warbler Habitat Suitability Index
- Floodplain Forest (FF) Habitat Model

Three of these models are FWS approved blue book models, while the Floodplain Forest Habitat Model has been certified for regional use in the Upper Mississippi River System until September 8, 2028.

A summary of the habitat analysis is provided in Table 14; additional details, methods and model assumptions are provided in *Appendix B- Habitat Evaluation and Quantification*.

Table 14. Habitat Types and Areas Evaluated

Habitat Type	Evaluation	Area (acres)	Habitat Suitability
Backwater	Luesse Lake	52	Smallmouth Buffalo HSI
	Portage Island	8.5	Smallmouth Buffalo HSI
	West Alton Bay	200	Smallmouth Buffalo HSI
Island Creation	Luesse Lake	n/a	n/a
	Portage Island	17	Yellow Warbler HSI / FF
	West Alton Bay	46	Yellow Warbler HSI
Side Channel	Luesse Lake	n/a	n/a
	Portage Island	389	White Bass HSI
	West Alton Bay	288	White Bass HSI

Table 15 summarizes the benefits for each alternative to be carried forward for CE/ICA. Complete documentation of the habitat benefits analysis is provided in *Appendix B-Habitat Evaluation and Quantification*.

Table 15: Environmental Outputs

Alternative Name	Area (acres)	Total NET AAHU
No Action Alternative	-	-
Minimum Alternative	982	348
Intermediate Alternative	1000	425
Maximum Alternative	1052	470

6.2 Cost Estimates

Cost estimates for alternative comparison were prepared using 2023 price levels; annualized costs include construction costs, contingency costs, adaptive management costs and OMRR&R costs. Project measures are on federal lands; consequently, there are no lands and damages or relocation costs. Total project costs were annualized based on the Fiscal Year 2024 discount rate of 2.75% and a 50-year period of analysis. Interest During Construction (IDC) was calculated using end of year compounding based on a two year period of construction, using the Fiscal Year 2024 discount rate of 2.75%. Table 16 shows the estimated cost of project alternatives as of completion of the habitat analysis and for use in the comparison of alternatives, prior to selection, refinement, and developing a full cost estimate of the Tentatively Selected Plan (TSP).

Table 16: Summary of Alternatives Annual Average Costs and AAHUs

Name of Alternative	First Cost	Interest During Construction	Average Annual Construction	Average Annual Cost per AAHU	AAHUs	Cost Effective
No Action	$ -	$ -	$ -	$ -	-	Best Buy
Minimum	$ 12,202,000	$ 307,000	$ 560,000	$ 1,610	348	Best Buy
Intermediate	$ 26,465,000	$ 666,000	$ 1,206,000	$ 2,839	425	Best Buy
Maximum	$ 42,444,000	$ 1,068,000	$ 1,931,000	$ 4,108	470	Best Buy

- These are Class 4 cost estimates. Figures are rounded to the nearest thousand.

6.3 Comparison of Final Array of Alternatives

IWR Planning was used to complete a Cost Effective and Incremental Cost Analysis (CE/ICA) for the number alternatives (including the No Action Alternative), using the AAHUs and annualized costs described in this section. The CE/ICA is used when project benefits are not measured in dollars and is used to ensure the least cost alternative is identified for each possible level of environmental output, and the maximum level of output is identified for any level of investment. Cost Effectiveness evaluation is used to identify the least costly solution to achieve a range of project benefits; the Incremental Cost Analysis identifies the subset of cost-effective plans that are superior financial investments, called “Best Buys,” through analysis of the preliminary incremental costs. Best Buys are the plans that are the most efficient at producing the output variable or provide the greatest increase in AAHUs for the least increase in preliminary cost. The first Best Buy is the most efficient plan, producing output at the lowest incremental cost per unit. If a higher level of output is desired than that provided by the first Best Buy, the second Best Buy is the most efficient plan for producing additional output, and so on.

The CE/ICA analysis evaluated four possible plan combinations. Figure 31 show the resulting alternatives differentiated by cost effectiveness. From this list of four alternatives, all were identified as Best Buy Plans.

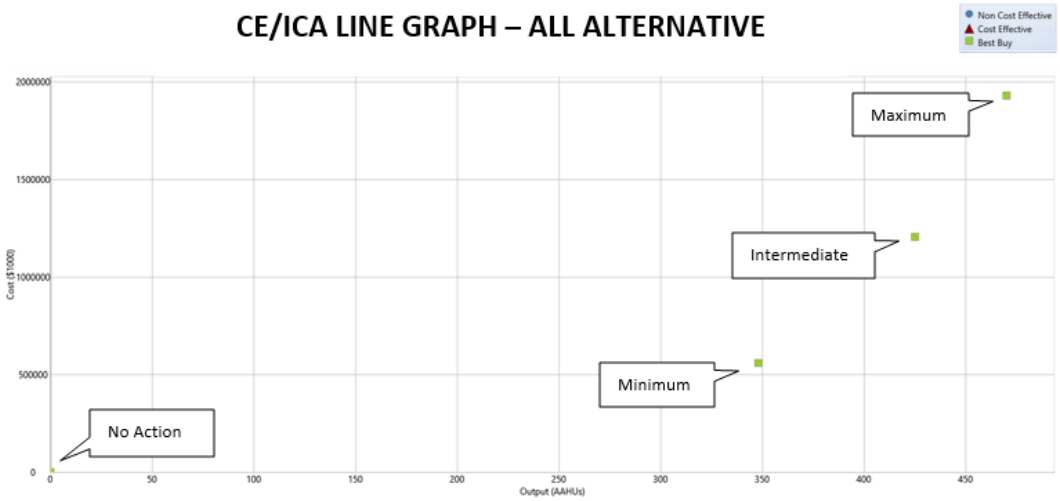


Figure 31: Cost Effectiveness Graph for Final Array of Alternatives

The four Best Buy alternatives (including No Action) were carried forward for further analysis; these were analyzed to determine which had the lowest incremental cost for each additional increment of output. Table 17 and Figure 32 present the alternatives' incremental cost and benefit information.

The first Best Buy, No Action Plan, is the lowest average annual cost but produces no benefit. The next Best Buy is the Minimum Alternative, which has an average annual cost of $1,610 per AAHU. The next Best Buy is Intermediate Alternative, which has an average annual cost of $2,839 per AAHU. The last Best Buy is the Maximum Alternative, which has an average annual cost of $4,108 per AAHU.

The No Action Alternative does not include any measures or provide any additional AAHUs. The No Action Alternative would have no financial cost to the federal government but does not meet any of the project objectives. The study area would continue to degrade as discussed in section 3.0.

The Minimum Alternative would provide a net of 348 AAHU gain over the No Action alternative. While this alternative has a low incremental cost of $1,610 per AAHU, this alternative would only contribute minimally to the three objectives. It is expected this plan would not meet long term desired impacts on backwater areas. The excavation work is minimal only and will leave those areas vulnerable to transitioning to terrestrial forested areas over the life of the project. There is minimal benefit for feeding, resting and reproduction areas for aquatic species.

The Intermediate Alternative would provide a net of 425 AAHU over the No Action. A gain of 77 AAHUs when compared to the Minimum Alternative. The intermediate alternative will extend the life of the backwaters areas which is a desired habitat

currently in decline within the Upper Mississippi River Area. The added measures such as the barbs, bull nose and woody bundles in the intermediate also increase the critical feeding, resting and reproductive habitats for aquatic species which is not seen in the minimum alternative. The incremental cost to capture the additional 77 AAHUs is $8,391 per unit. This alternative would contribute meaningfully to all of the objectives, is a Best Buy plan, and has a relatively low incremental cost, and would be worth the investment.

The Maximum Alterative would provide a total of 470 AAHU, a net gain of 45 AAHUs when compared to the Intermediate Alternative. The incremental cost to capture the 45 additional AAHUs is $16,093 per unit. This alternative represents the maximum contribution towards meeting the objectives but there is a relatively high incremental cost to capturing the benefits above those in the Intermediate Alternative. The maximum alternative comes with a lot of risk without much habitat benefit gain, however. The overflow weir might not perform as intended and might allow sediment into the backwater and not have sufficient velocity to keep it scoured out. The excavation with benching is a very costly alternative without providing significant habitat gain.

The study team and the Sponsor felt that the large increase in federal costs and the minimal increase in habitat benefits were not worth the investment.

Table 17: Table of Incremental Cost and Output Results for Best Buy Plans

Name of Alternative	Net AAHUs	Annualized Cost	Incremental Average Annual Cost	Incremental Output (AAHUs)	Incremental Cost/ AAHU
No Action	-	$ -	$ -	-	$ -
Minimum	348	$ 560,361	$ 560,361	348	$ 1,610
Intermediate	425	$ 1,206,476	$ 646,115	77	$ 8,391
Maximum	470	$ 1,930,651	$ 725,175	45	$ 16,093

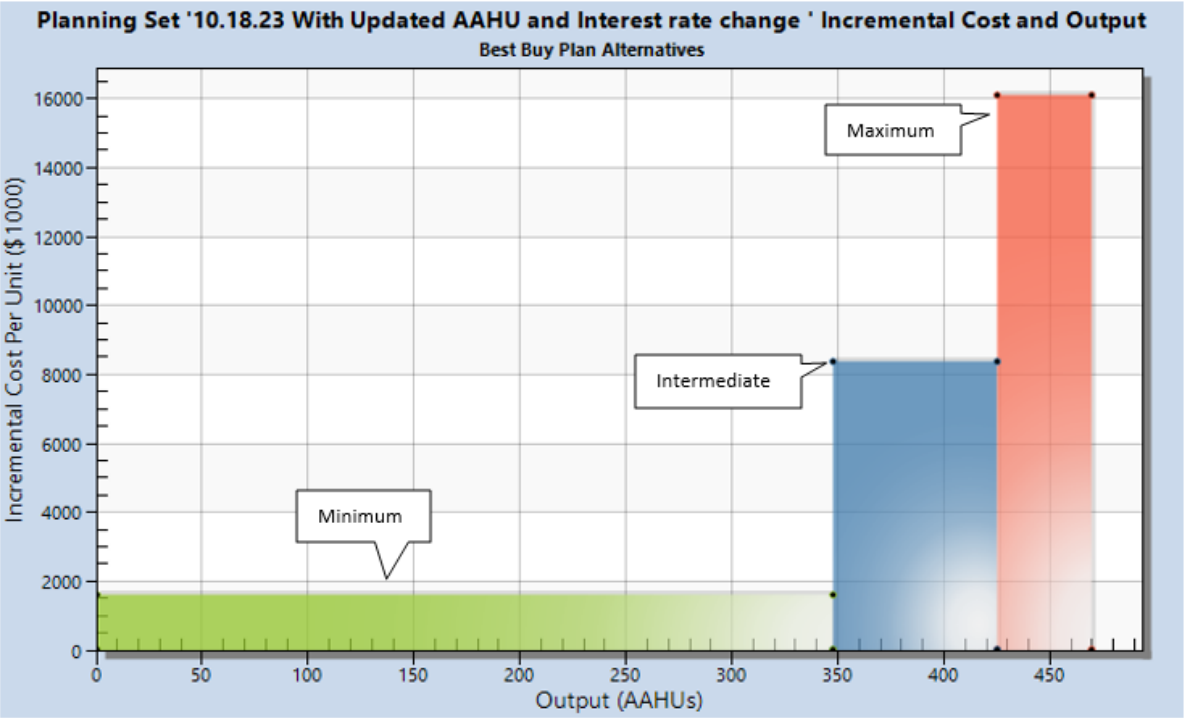


Figure 32: Graph of Incremental Cost and Output Results for Best Buy Plans

Comprehensive Benefits

USACE is required to comprehensively evaluate and provide a complete accounting, consideration, and documentation of the total benefits of alternative a full array of benefit categories: NER/NED, regional economic development, other social effects, and environmental quality (ASA(CW)Memorandum, SUBJECT: POLICY DIRECTIVE – Comprehensive Documentation of Benefits in Decision Document, January 5, 2021). Alternatives were assessed to determine if they have net benefits in total and type in each benefit category. Analysis was made in coordination with the Sponsor using professional judgement using available data and analysis. The Maximum Alternative was identified as the plan that maximizes net total benefits across all benefit categories. Table 18 presents a summary of the comprehensive benefits evaluation across these four categories for each of the alternatives.

Table 18: Summary of Comprehensive Benefits Across P&G Accounts

Alternative	NER (Presented as Average Annual Cost per AAHU)	RED (Presented as local impact of the regional investment and jobs)	EQ (Presented as AAHUs)	OSE
No Action	-	-	-	-

Minimum	$1,610/AAHU	$10.3 Million 242 Jobs	348	Increased recreational opportunities for fishing, boating, canoeing, and bird watching. Recreation benefits increase respective to habitat unit gain.
Intermediate	$2,839/AAHU	$22.3 Million 525 Jobs	425	
Maximum	$4,108/AAHU	$35.7 Million 842 Jobs	470	

National Ecosystem Restoration (NER) Account

The National Ecosystem Restoration (NER) account identifies quantified habitat benefits against project costs to determine cost per AAHU; this is determined via alternatives found to be Best Buy under the CE/ICA analysis as described in the **Cost Effectiveness Incremental Cost Analysis** section. The NER plan is the alternative plan that reasonably maximizes ecosystem restoration benefits compared to cost. Based on the cost benefit analysis, the PDT identified the Intermediate Alternative as the NER Plan as it reasonably maximizes the average annual cost per habitat unit benefits over the 50 year period of analysis over the Minimum and Maximum Alternatives.

Regional Economic Development (RED) Account

The RED account is intended to illustrate the effects the alternatives will have on regional economic activity, specifically, regional income and employment. While a detailed regional economic development analysis was not performed for any of the alternatives, it is generally accepted that the ecosystem restoration projects that are part of the HREP have contributed RED benefits in small ways as each project is constructed. Over a longer term, ecosystem restoration projects contribute to RED benefits on a larger scale by creating added eco-tourism opportunities and increasing economic opportunities in local communities along the entire UMR system. UMRR, through its 35-year history, has created thousands of employment opportunities related to HREP planning, construction, and evaluation; Long Term Resource Monitoring (LTRM) and research. Once completed, habitat projects create new or improved outdoor recreation opportunities, further stimulating local and regional expenditures.

The USACE regional economic model, RECONS (Regional ECONomic System), was run for all Best Buy alternatives. This modeling tool automates calculations and generates estimates of jobs and other economic features such as income and sales associated with USACE's annual Civil Works program spending. The current first cost

was used but without interest during construction, Preconstruction Engineering and Design (PED), or Supervision & Administration (S&A) costs to approximate a more accurate representation of total regional investment. Total regional investment (Local Total Impact in Table 19) was $10.3 million for the Minimum alternative, $22.3 million for the Intermediate alternative, and $35.7 million for the Maximum alternative. Construction funds expended on various services and products are expected to generate additional economic activity featured in both output and jobs (Table 19). All action alternatives would positively impact the regional economy and increase respective to each alternative relative to the number and size of the measures implemented.

Table 19: Summary of Regional Economic Impact for Best Buy Alternatives

Minimum Alternative					
Area	**Local Capture**	**Output**	**Jobs***	**Labor Income**	**Value Added**
Local					
Direct Impact		$10,265,950	183.5	$8,663,369	$3,780,853
Secondary Impact		$9,989,353	58.6	$3,058,217	$5,447,961
Total Impact	$10,265,950	$20,255,303	242.1	$11,721,585	$9,228,814
State					
Direct Impact		$10,896,028	202.9	$9,818,560	$4,873,719
Secondary Impact		$15,049,786	81.0	$4,828,585	$8,190,252
Total Impact	$10,896,028	$25,945,815	284.0	$14,647,145	$13,063,972
US					
Direct Impact		$12,195,664	285.4	$11,106,788	$7,108,846
Secondary Impact		$26,770,777	118.6	$8,349,563	$14,469,469
Total Impact	$12,195,664	$38,966,441	404.0	$19,456,351	$21,578,314

Intermediate Alternative					
Area	**Local Capture**	**Output**	**Jobs***	**Labor Income**	**Value Added**
Local					
Direct Impact		$22,266,800	398.1	$18,790,809	$8,200,653
Secondary Impact		$21,666,862	127.1	$6,633,258	$11,816,603
Total Impact	$22,266,800	$43,933,662	525.2	$25,424,067	$20,017,256
State					
Direct Impact		$23,633,437	440.2	$21,296,413	$10,571,075
Secondary Impact		$32,642,920	175.8	$10,473,180	$17,764,621
Total Impact	$23,633,437	$56,276,357	616.0	$31,769,593	$28,335,696
US					
Direct Impact		$26,452,341	619.0	$24,090,575	$15,419,055

Secondary Impact		$58,065,697	257.2	$18,110,165	$31,384,213
Total Impact	$26,452,341	$84,518,039	876.2	$42,200,740	$46,803,268

Maximum Alternative					
Area	**Local Capture**	**Output**	**Jobs***	**Labor Income**	**Value Added**
Local					
Direct Impact		$35,710,217	638.4	$30,135,621	$13,151,737
Secondary Impact		$34,748,071	203.9	$10,638,039	$18,950,790
Total Impact	$35,710,217	$70,458,288	842.3	$40,773,660	$32,102,528
State					
Direct Impact		$37,901,951	705.9	$34,153,966	$16,953,284
Secondary Impact		$52,350,843	281.9	$16,796,286	$28,489,881
Total Impact	$37,901,951	$90,252,794	987.8	$50,950,252	$45,443,165
US					
Direct Impact		$42,422,748	992.7	$38,635,082	$24,728,196
Secondary Impact		$93,122,435	412.4	$29,044,044	$50,332,202
Total Impact	$42,422,748	$135,545,183	1,405.2	$67,679,127	$75,060,397

Environmental Quality (EQ) Account

The EQ account measures effects on ecological, cultural, and aesthetic resources. For ecosystem restoration projects such as this one, contributions to the EQ account are detailed both through NEPA compliance and through calculation of net ecosystem benefits. Here, NEPA compliance is achieved by integrating an EA into this feasibility report, with a qualitative summary of environmental effects detailed in section 7 of this report. A calculation of net ecosystem benefits was completed through the use of HEP and HSI models. The quantitative results of the evaluation are contained in *Appendix B – Habitat Evaluation* and *Quantification*. The credit for the EQ account is the quantified benefits resulting from the project (AAHUs). Intangible and or non-quantifiable environmental benefits associated with the alternatives are assumed to increase proportionally relative to the AAHU outputs associated with each alternative.

Other Social Effects (OSE) Account

The OSE account is intended to illustrate the effects the alternatives will have on lives of residents and the social fabric of communities in the study area. The OSE account assists in plan formulation and in choosing an alternative that maximizes social benefits. Ecosystem restoration projects such as this one typically have positive net effects on the OSE account. Quality of life variables such as health and safety, material well-being, and social connectedness are improved as a result of HREP projects. Some individual

surrounding communities to the study area meet the criteria of being considered disadvantaged and could benefit from habitat improvements (ie. subsidence fishing, access to backwaters for fishing, etc.) Recreational opportunities would be improved in the study area because of improved habitat diversity for wildlife and hunting under any of the action alternatives. While the OSE benefits may be slight or difficult to measure for any individual HREP project, taken as a whole, the numerous completed restoration projects over 35 years of the UMRR program have greatly enhanced social factors in the UMR system. All action alternatives considered would contribute positively and somewhat similarly to social benefits and as such, OSE is not a useful metric for comparison of the final array of alternatives.

6.4 Selection of the Tentatively Selected Plan

Federal planning for water resources development was conducted in accordance with the U.S. Water Resources Council's P&G.

"For ecosystem restoration projects, a plan that reasonably maximizes ecosystem restoration benefits compared to costs, consistent with the federal objective, shall be selected. The selected plan must be shown to be cost effective and justified to achieve the desired level of output. This plan shall be identified as the National Ecosystem Restoration (NER) Plan."

Review of the CE/ICA analysis, the four P&G criteria (completeness, effectiveness, efficiency, and acceptability), and the comprehensive benefits were used to aid the selection of the Tentatively Selected Plan (TSP).

As a result of the discussions above and review of the evaluation criteria, the PDT and sponsor recommend that the Intermediate Alternative be the TSP. This alternative best meets the study goal and objectives, is cost effective and justified as a best buy alternative. The Intermediate Alternative is the NER plan and yields an overall output of 425 net AAHUs.

The preliminary estimated total first costs of the study were updated after the Intermediate Alternative was identified as the TSP. While refining the cost estimates for the TSP, the biggest change between the alternative phase (Class 4) and the TSP (Class 3) involved the assumptions of what was included in the mobilizations and demobilizations for each location. In the alternative phase cost development, three mobilization and demobilizations were assumed, one for each location, and each included a dredge. In the refined TSP, there are two mobilization and demobilizations (one for each phase), but only one requires a dredge. This change would have been the same for all of the alternatives and would not have affected which alternative was selected. The updated detailed project first cost of the Tentatively Selected Plan is $29,294,000 and is anticipated to yield 425 net AAHUs annually. Using the Fiscal Year 2024 federal discount rate of 2.75%, this results in an average annual cost of $2,839 per AAHU.

7.0 Tentatively Selected Plan

7.1 Description of Tentatively Selected Plan – National Ecosystem Restoration Plan

The alternative plan that reasonably maximizes benefits in relation to cost and meets the overall planning objectives is the Intermediate Alternative, which was selected as the NER Plan and approved by Mississippi Valley Division during the TSP milestone briefing held on September 19, 2023. When viewed relative to the preliminary costs of similar ecosystem restoration projects, the cost per AAHU of the Intermediate Alternative is efficient in achieving the ecosystem restoration objectives. The Tentatively Selected Plan (Plan) is supported by MDC and the USFWS and is consistent with regional plans for the area.

After the Intermediate Alternative was selected as the TSP, a more refined plan was developed and is documented in greater detail in this section of the report. The Tentatively Selected Plan is shown in Figure 33, Figure 34, and Figure 35, and includes the following components that comprise the measures (Table 20).

Table 20: Summary of measures at each location for the Intermediate Alternative

	Measures	West Alton Bay	Portage Island	Luesse Lake
1	**Excavation without Benching**	X	X	X
2	**Island Creation**	X	X	
3	**Gradual Slope Revetment (GSR) around Island**		X	
4	**Containment Berm**	X		
5	**Bullnose**		X	
6	**Sandbar/Mudflat Creation**		X	
7	**Emergent Wetland Enhancement**	X	X	
8	**Terrestrial Elevation Diversity**		X	
9	**Hard Points (Barb & Vane)**		X	
10	**Woody Bundle**		X	
11	**Trail Dike**		X	
12	**Sediment Deflection Dike**		X	
13	**Gravel Bar**		X	
14	**Berm and Barbs**	X		
15	**Deep Water Pocket**		X	X

(The following measures were not carried forward with the TSP selection: excavation with benching, excavation at mouth of backwater only, and overflow weir)

Construction of the Tentatively Selected Plan offers an opportunity to more closely mimic the historic conditions. As a result, the quality and quantity of terrestrial and aquatic habitat would increase through project measures. Study area habitat restoration through the Intermediate Alternative is preferred compared to other alternatives due to the degree of improvements to significant resources (institutional, public, and technical) in comparison to cost.

The proposed measures for backwater habitat improvement include excavation and deep-water pockets to create bathymetric diversity; deeper seasonal habitat that would lend itself to overwintering refugia for aquatic species; and, emergent wetland enhancement that would excavate excessive sediments to elevations more conducive to herbaceous backwater wetlands that work in congruence with Environmental Pool Management. Excavation would result in an overall increase in backwater habitat function such as increased water depths, cooler summer water temperatures, increased capacity for dissolved oxygen, improved water clarity and lower turbidity.

Proposed side channel measures will accomplish several means of habitat benefits. Increased flow diversity throughout the side channel will offer various flow regimes in multiple locations for aquatic organisms to spawn, forage, rear offspring, and find flow refugia. Other locations will experience higher velocities that would be conducive to sediment and detritus transport and assist with side channel connectivity throughout the new features over the life of the project.

The team assumed that the newly restored islands, sandbars and mudflats would initially be bare and made of the excavated sediments from the backwater areas in the project. It was recognized that through time vegetation would establish on the islands, providing the anticipated early successional forest habitat.

The Intermediate Alternative would optimize aquatic and terrestrial conditions in the area. These anticipated improvements would help the sponsors meet agency management goals as well as interagency management goals for UMRS forests (Guyon, Deutsch, Lundh, & Urich, 2012), habitat management for forest landbird species of continental or regional concern (Rosenberg, et al., 2016); (PIF 2020), and maintenance, diversification (structure and species) and expansion of forest area (Soulliere, et al., 2020). Collectively, the changes in forest and woodland conditions are expected to increase habitat suitability and resiliency for a wide diversity of migratory landbirds in an area that has been identified for its importance to migratory landbirds in the state (NAS, 2009).

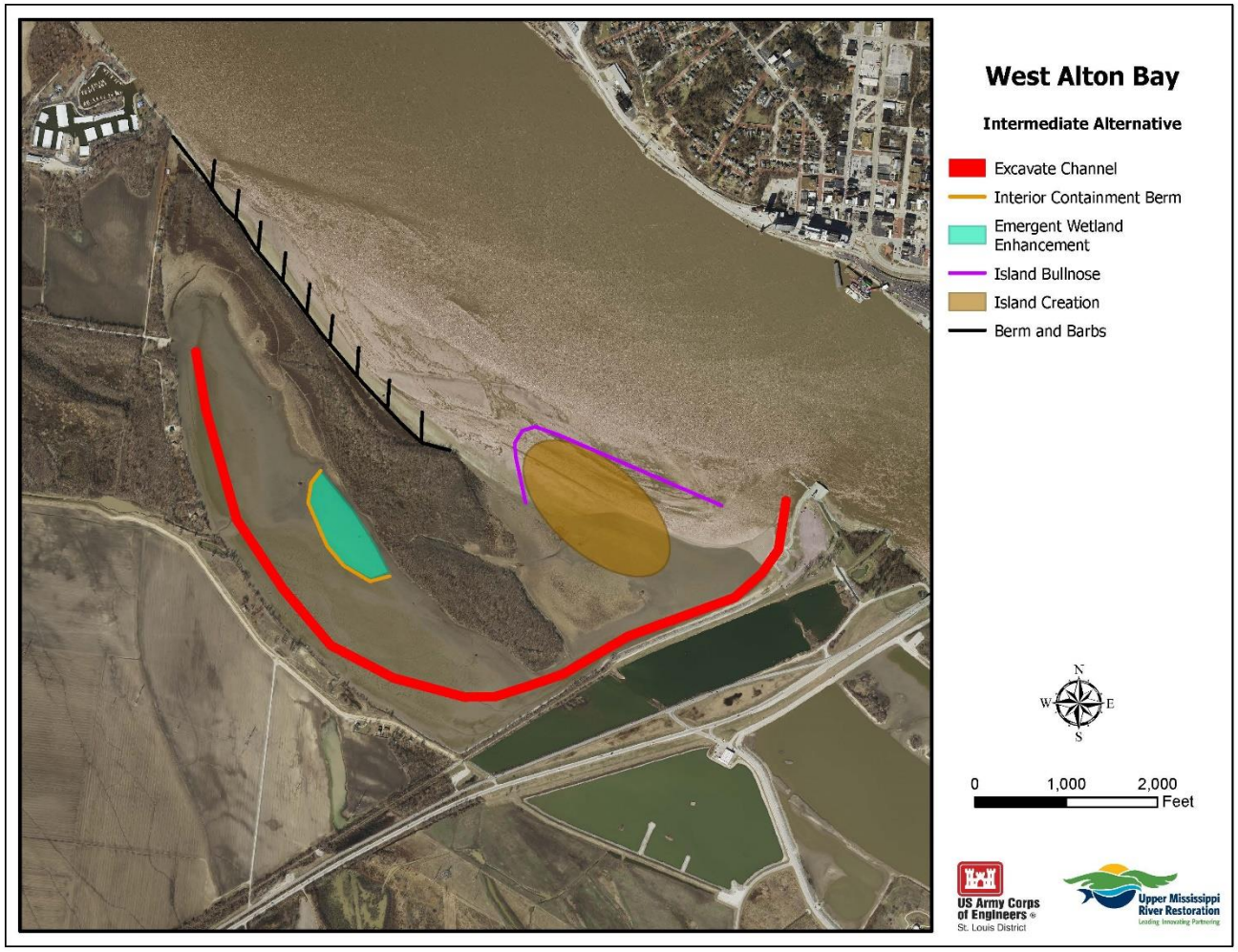


Figure 33: Intermediate Alternative- West Alton Bay

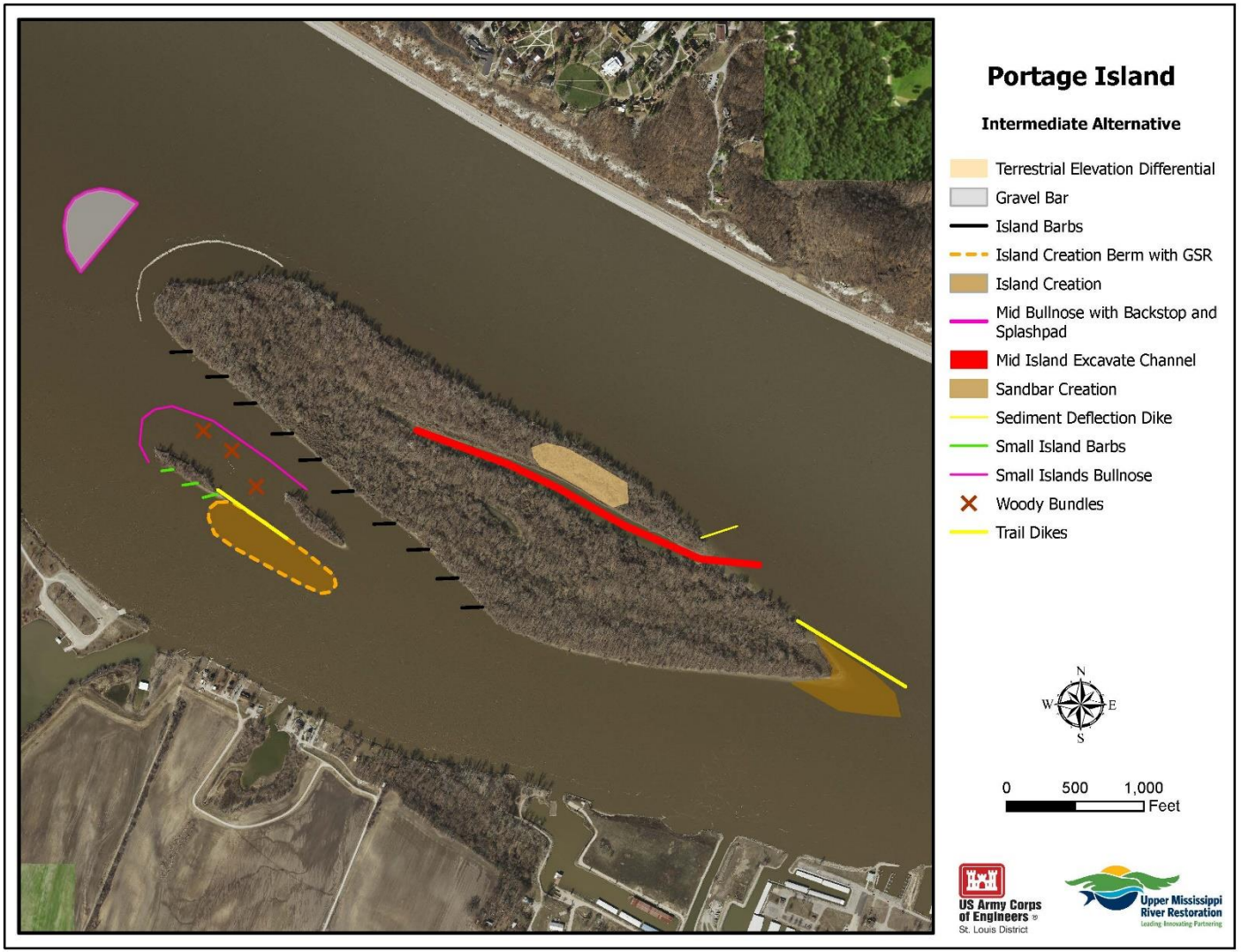


Figure 34: Intermediate Alternative- Portage Island

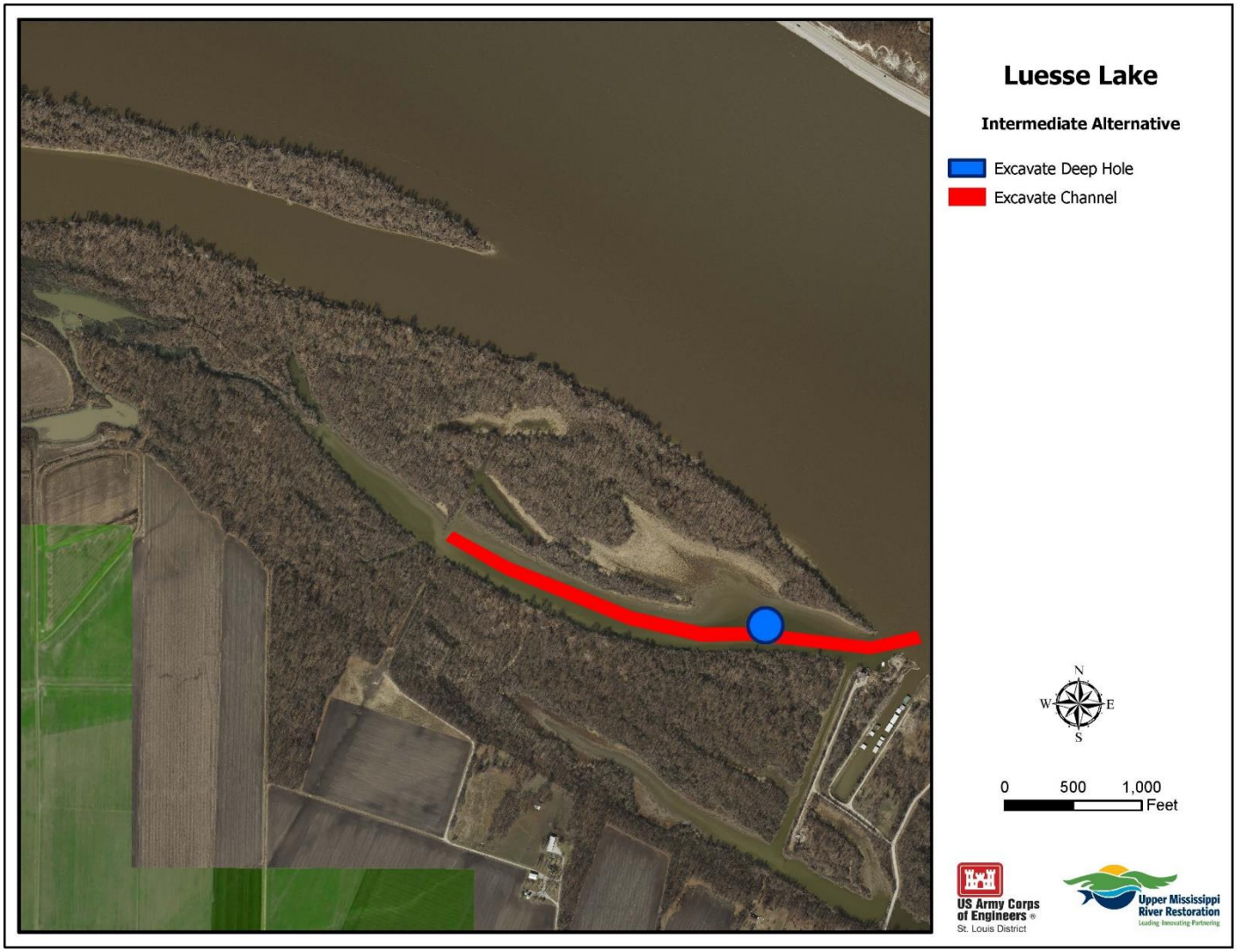


Figure 35: Intermediate Alternative- Luesse Lake

Table 21 presents the proposed schedule to get to Project Implementation.

Table 21: Project Schedule

Event	**Scheduled Date**
Public Review of Draft Report	December 2023
Submit Final FR/EA to MVD	June 2024
Approved Final FR/EA from MVD	Fall 2024
Execute Sponsor Agreements	Fall 2024
Initiate Design	Fall 2024

Further data collection needs, scope changes, design complications, etc., can and will affect the schedule.

Summarized construction quantities are provide in Table 22. Details of quantities and design for the Tentatively Selected Plan can be found in *Appendix G – Engineering. Numbers and quantities will be further refined during PED. Figures below are feasibility level estimates.*

Table 22: Summary of Quantities for the Tentatively Selected Plan

Location/Measure	Acres	Excavation (CY)	Placement (CY)	Stone Placed (TN)	Quantity
Excavated Channels and Deep Water Pockets		491,101			
Island/Sandbar/ Wetland Creation	58.79		380,485		
Stone Placement (Berms, Barbs, Bullnose, Dikes etc)				223,910	
Woody Bundles					3

7.2 Cost Estimates

Table 23 presents the project first cost. Quantities and costs may vary during final design. A full description of the cost estimate, including all related elements, can be found in *Appendix J- Cost*.

Table 23: Project Design and Construction Cost (2023 Price Level)

Account	Measure	Project First Cost
01	Lands and Damages	$0
06	Fish and Wildlife Facilities	$23,184,000
30	Planning, Engineering, and Design	$4,038,000
31	Construction Management (S&A)	$2,072,000
	Project Cost Estimate	$29,294,000

- Figures in table rounded to the nearest thousand and are Class 3 Cost Estimates. Total includes 28.9% contingency.

The annualized costs and AAHUs were used to calculate a total annual cost per average annual habitat unit (Table 24). The total annual cost per habitat unit is $1,289. The costs used for analysis purposes include total project costs, IDC, and annualized O&M, adaptive management, and monitoring costs.

Table 24: Total Annual Cost Per Annual Habitat Unit

Item	Cost
Construction Cost ($)	$29,294,000
IDC,2-year Construction 2.75% ($)	$583,000
Total Project Costs ($)	$29,877,000
Interest and Amortization Factor	2.75%
Average Annual Construction Cost ($)	$1,107,000
Average Annual O&M ($)	$81
Total Average Annual Costs ($)	$1,107,000
Net AAHUs Gain	425
Total Average Annual Cost/AAHU ($)	$2,604

* Figures in table rounded to the nearest thousand. Oct23 Price Level, 2.75% Interest Rate, 50-year Period of Analysis.

7.3 Design Considerations

7.3.1 Overview

The study has been developed to a feasibility level of design. Design details are included in the Engineering Appendix and all proposed measures were modeled to increase the likelihood of project success. As with all feasibility level studies, these details will be refined further in the Plans and Specifications (P&S) stage.

During pre-construction engineering and design (PED), the USACE, FWS, and MDC would complete the detailed engineering and technical analysis needed to begin construction of the project as recommended in this decision document. This includes engineering design documentation and the plans and specifications. Further refinement, and any necessary changes to the Tentatively Selected Plan will occur during this phase.

Design for the three project areas is anticipated to be initiated for the entire project up to approximately the 35% level of design. This will be used to develop and refine the

contract acquisition plan, validate assumptions from feasibility, and otherwise determine the path forward for major design decisions. After the plan is refined, the design refinements will proceed to contract acquisition. If it is decided that construction should be broken into two contract packages, each contract package will follow the same process. Any lessons learned during early construction stages will be applied to subsequent design packages, and/or result in implementation of one or more Adaptive Management strategies.

7.3.2 Surveys

Coordination for collection of any additional survey data will be initiated during the Planning phase and will be conducted as need is determined and water levels allow. The upland features are assumed to be modelled utilizing existing Light Detection and Ranging (LiDAR) data previously collected, supplemented as needed by land survey and/or photogrammetry collected from Unmanned Aerial Survey (UAS) systems. Determination of the survey needs are ongoing. Bathymetry will be modelled using a combination of single-beam and multi-beam sonar, with acquisition, if needed, occurring when adequate water levels are present.

7.3.3 Geotechnical and Environmental Explorations

During PED, there is a potential need for Section 408 coordination with non -federal sponsor associated with the Consolidated North County Levee near West Alton Bay. An analysis may be required for the levee safety review portions of the project in accordance with Section 408 including a geotechnical 2-D Seepage/Slope Model to verify there will be no impacts to the adjacent Consolidated North County Levee. In addition, to ensure no impacts to the levee, the design of the dredge cut through West Alton Bay will be placed a minimum of 400 feet from the riverside levee toe.

HTRW and Clean Water Act compliance are not anticipated to require exploration and testing at this time, but if construction activities are not determined to fall under Nation Wide Permits and/or existing environmental permits/NEPA coordination, additional information may be needed. Design estimates included a conservative estimate of the cost for conducting these activities, if necessary.

7.3.4 Ecological Surveys

Presence/absence surveys for freshwater mussel resources will need to be conducted prior to construction. Timing and scope to be developed in the Planning Phase, with sponsor agency input. Scope will encompass footprint of all measures below OHW.

7.3.5 Hydraulics and Hydrology

The aquatic features implemented in the TSP are previously described in this report and in the engineering appendix. Design of these features will continue to require input from hydraulic engineers. Additional hydraulic modeling may also be utilized to inform design concerns that may come up during PED.

7.3.6 Civil/Hydraulic Design

Planning Level of Design
The Planning process did not include Civil design of any features beyond a conceptual level. Features were quantified using a combination of 2-dimensional lines and shapes, and by manipulation of the existing conditions terrain to mimic channel excavation. Quantities were extrapolated from this minimal information to provide an approximation of 10%-20% level of design. After discussion of risks associated with the current conceptual design of the excavation, it was determined that this task should be completed early in Design, and no further refinements would be needed to complete the report while managing the associated risks. The remaining measures will also be designed and adjusted as needed to reduce impacts, manage construction costs, and maximize potential habitat benefits.

The need for access roads will be minimal and may only be required on the West Alton Bay project area and will be coordinated with the Rivers Project Office team to minimize impacts and adjusted where necessary to avoid tree clearing, or to provide direct access to construction features. All access roads, excepting those marked as temporary haul roads are anticipated to be constructed by grading the alignment, compacting the subgrade, placing a non-woven geotextile, and then placing multiple courses of limestone aggregate, and may remain in place to facilitate Operations, Maintenance, Repair, Rehabilitation, and Replacement (OMRRR) of the project features, as well as Monitoring and Adaptive Management (MAM).

Staging areas vary between alternatives, but the majority if not all of construction will be by floating plant and will not require staging areas on land. Any staging areas will be placed to limit disturbance to existing habitats, provide appropriate access to transfer materials and equipment to and from floating plant, and/or utilize existing operational areas.

Scope of Design Phase
An Existing Conditions Terrain model will be created for use by Civil Design and Hydraulics. This data will be used to model the proposed to develop detailed quantity estimates and for generating construction drawings.

All features from the TSP will be designed based on this terrain, aerial imagery, and site visits to the feature locations to identify potential design conflicts and opportunities. All features will be designed in detail, and adjusted as needed from Planning to reduce impacts, manage construction costs, and maximize potential habitat benefits during Design.

7.3.7 Cultural

This area was included in the 2018 survey conducted by the District, which found extensive deposits of recent alluvium and no cultural resources. For these reasons, the District finds that the project will have no adverse effect on historic properties. No further coordination is necessary during PED.

All correspondence can be found in Appendix A – Coordination.

7.4 Construction Considerations

The District identified several construction considerations in the study area. A summary of critical construction considerations is provided in the following sections.

7.4.1 Protected Species

7.4.1.a Bald Eagles

Consideration (in coordination with the USFWS) would be given during design preparation to sequence construction activities in a manner that minimizes impacts. No forestry measures would be utilized within a buffer of at least 100 feet of a known Bald Eagle nest location. At least a 330 feet buffer would be utilized during the nesting season for Timber Stand Improvement (TSI) in locations where the eagle nest is not visible through a forested buffer. A 660 feet buffer would be utilized under instances of direct line of site during the active nesting season according to the National Bald Eagle Management Guidelines. Staging of equipment would not be allowed within a 660 feet buffer of a known nest. Additional coordination with the USFWS would be conducted during the design phase to account for changes in conditions in the study area relative to proposed project measures prior to or during construction.

7.4.1.b Gray Bat, Indiana Bat, Northern Long-eared Bat, and Tricolored Bat.

Any construction work requiring tree clearing activities must have tree clearing operations scheduled within the bats inactive season from November 1 to March 31. Continued coordination with USFWS will occur through future project phases if tree clearing would be done during the roost season. During clearing, dead trees, split trees, trees that have cavities, and trees with exfoliating bark would be favored for retention where possible. Design of forestry measures would aim to improve foraging habitat and promote development of long-term roost tree sites.

7.4.2 Migratory Wildlife

In accordance with Executive Order 13186, take of migratory birds protected under the Migratory Bird Treaty Act should be avoided or minimized, to the extent practicable, to avoid adverse impact on migratory bird resources. Tree clearing during winter would avoid impacts to nesting migratory wildlife.

7.4.3 Air Quality

Diesel emissions and fugitive dust during project construction may pose environmental and human health risks and should be minimized. Applicable protective measures as outlined in USEPA’s “Construction Emissions Control Checklist” would be followed.

7.4.4 Permits

Laws of the United States and State of Missouri have assigned the USACE and Missouri with specific and different regulatory roles designed to protect the waters within and on the State's boundaries. Protecting Missouri's waters is a cooperative effort between the applicant and regulatory agencies.

7.4.4.a Section 404/401 Compliance

The District is compliant with Section 404 and 401 of the Clean Water Act. See the 404(b)1 evaluation (*Appendix D – Clean Water Act)* Section 404(B)(1) Evaluation) for more details. Based on this evaluation, the project qualifies for a Nationwide 27 permit for Ecosystem Restoration. The Nationwide 27 permit includes general conditions that meet MO DNR Section 401 water quality certification requirements. Therefore, the necessary Section 401 water quality certification would be achieved through the associated Nationwide 27 permit conditions.

Since the project meets the conditions of the Nationwide 27 permit, the necessary Section 401 water quality certification would be achieved through included general conditions.

7.4.4.b National Pollutant Discharge Elimination System (NPDES)

A storm water discharge or NPDES permit for construction activities may be required. Effective March 10, 2003, the NPDES storm water discharge permit is required when a construction activity disturbs more than one acre. The construction contract for the study area may trigger the need for the contractor to apply for this permit. The contractor would be required to prepare an erosion control plan to ensure that unprotected soil is not allowed to leave the study area work limits. The contractor would be required to comply with all local codes and permit requirements.

7.5 Construction Schedule Constraints

Scheduling of construction contracts would depend on availability of funds. The following documents constraints related to construction:

- No clearing of trees shall be allowed between April 1 and October 31, to avoid impacts to bat summer roosting habitat.

- During waterfowl season construction activities may be limited to certain areas.

- Construction staging and access points to project measures would be defined during Plans and Specifications to avoid and minimize potential impacts to wetland resources.

• Coordination with USFWS and MDC personnel is required prior to working during hunting seasons.

• No clearing of trees where roosting or occupied nests exist shall be allowed when bald eagles are present in the area. There is one known active bald eagle nest within the study area. Construction activities and other sources of disturbance would be avoided within a 660-foot buffer area from the nest, when active.

• In accordance with Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds, take of migratory birds protected under the MBTA should be avoided or minimized, to the extent practicable, to avoid adverse impact on migratory bird resources.

7.6 Construction Sequencing

In the cost estimate, it is assumed that the construction effort will be completed in two stages:

Stage 1: Stone placement and land-based work, and

Stage 2: Channel excavation and placement of materials (island building).

A preliminary construction schedule is included in Appendix K: Cost. The construction duration of Stage 1 is anticipated to be 18 months, and the construction duration of Stage 2 is anticipated to be less than 12 months. This sequencing will be refined and updated, as needed, during the Project Engineering Design phase of the potential project.

7.7 Construction Access and Staging

7.7.1 Access

Construction will be mostly river-based using barges to transport equipment and material. In the case that land access is needed, the site can be accessed by multiple public roads. The best access route is from the St. Charles County, Missouri. The site can be accessed by local roads connected to US-67 and MO-94. Existing roads are anticipated to be adequate for construction. Temporary ramps may be needed at boat ramps for loading or unloading of equipment. Access will be further investigated during PED.

7.7.2 Staging

The location of the staging area will be determined during PED. Staging location will be determined based on distance, accessibility, right of way, and environmental

considerations. All temporary staging areas will be restored to prior construction condition. No permanent staging areas are anticipated.

7.8 Real Estate Considerations

All project lands are owned by the federal government and managed by USFWS and MDC who are serving as the sponsors. USACE reserves all land rights that are not specifically granted per the terms of the applicable Cooperative Agreement. All Project measures are located on lands in which the United States of America holds Fee and Easement rights on. These rights are managed by the USACE, USFWS and MDC, as part of the General Plan Lands Agreement.

There is a no-cost Special Use Permit, as stated in the Amended Cooperative Agreement between the Department of the Army, USACE, and the Department of the Interior, U.S. Fish and Wildlife Service. This project does not require the acquisition of additional real estate interest.

This project will be designed to ensure it will not induce flooding.

All placement materials would be excavated from within navigational servitude and project waters and from existing soil within the project area.

A draft Real Estate Plan is included as *Appendix I – Real Estate Plan*.

7.9 USACE Responsibilities

The District is responsible for project management and coordination with the Sponsor, project partners, and other affected agencies. The USACE St. Louis District will submit the Final Feasibility Report; program funds; finalize Plans & Specifications (P&S); complete all NEPA requirements; provide necessary access permits and/or real estate outgrants to the contractor, advertise and award a construction contract; and perform construction contract supervision and administration. Section 906(e) of WRDA 1986 states that first cost funding for enhancement measures will be 100% federal cost because the project measures will be located on federally owned land.

After construction of the project, performance monitoring, which includes monitoring of physical/chemical conditions and some limited biological parameters, will be a USACE responsibility. Performance monitoring is not to exceed ten years. However, the partnering agencies plan to collect various data that will assist the USACE in the performance evaluation for this project (*Appendix E – Monitoring and Adaptive Management*). The states and other federal agencies will provide this information as part of their typical monitoring effort within West Alton Islands HREP.

Minimal operation and maintenance (O&M) will be required for measures of the project as outlined in Project Sponsor Implementation Responsibilities of this report. USACE will provide an O&M Manual at the completion of each functional portion of a project or separable element.

Should rehabilitation exceeding the annual maintenance requirements be required (as a result of a specific storm or flood) a mutual decision between the participating agencies will be made regarding whether to rehabilitate the project. If rehabilitated, the federal share of rehabilitation will be the responsibility of the USACE.

7.10 Sponsor Implementation Responsibilities

O&M of UMRR HREPs is similar to that undertaken by the partner agencies in day-to-day management of parks, boat ramps, wildlife management areas, and other public use areas. The purpose of assigning O&M costs to the project Sponsor is to ensure commitment and accountability. O&M is the responsibility of the Sponsor in accordance with Section 107(b) of WRDA 1992, Public Law 102-580. Upon completion of the construction as determined by the District Engineer, the Sponsor shall operate and maintain the project as defined in this FR/EA; 100 percent of all costs associated with the O&M of the project will be borne by the Sponsor.

This project was designed to reduce overall operation costs and ensure low annual maintenance requirements. In general, operation and maintenance is limited to two site inspections a year to ensure that the measures are performing as designed. Since the measures primarily include excavation work and placement of rock, minimal O&M is expected. The recommended measures are intended to function with passive management. No measures requiring active operation are being recommended. The measures shall be designed with resiliency to withstand periodic flooding. Maintenance requirements will be further detailed in the project's O&M manual published after construction completion and preparation of as-built drawings, and prior to transferring the project to the Sponsor.

MDC and USFWS are the Sponsors and have actively participated in the planning process. MDC and USFWS are in support of implementation of the Tentatively Selected Plan, the Intermediate Alternative. O&M is the responsibility of the Sponsors in accordance with Section 107(b) of WRDA 1992, Public Law 102-580. Annual O&M costs are estimated at $1,200 per year. The project was formulated with consideration given to low operation and maintenance costs. Annual O&M costs include two annual site inspections per year. Projected costs are provided in the Project O&M Manual, which will be provided to the Sponsor after construction completion of a functional portion of the project or separable element, as determined by the District Engineer to MDC & USFWS as discussed in ER 1110-2-401.

Repair, rehabilitation and replacement considerations may extend outside of the typical 50-year period of analysis, as MDC and USFWS are expected to maintain the HREP as outlined in the Memorandum of Agreement (MOA) or other designated agreement. Rehabilitation cannot be accurately measured during design or construction stages. Rehabilitation is the reconstructive work that significantly exceeds the annual O&M requirements and is needed as a result of major storms or flood events. The project could be vulnerable to major storm or flooding events which could potentially bring in excessive flows and sediment loads impacting the ability of the measures to meet the

study objectives. Potential actions could include additional excavation and rock placement.

There are no proposed Public Law 91-646 relocations as there are no acquisitions required. No land acquisition is needed for the project. A Real Estate Plan is included as *Appendix I – Real Estate Plan*.

Table 25 lists the major O&M components, their associated frequencies, and costs.

Table 25: Operations and Maintenance Consideration

O&M Item	Quantity	Unit	Unit Price ($)	Frequency	Cost
Site Inspections	20	hours	50	Annually	$1,000
		Subtotal			$1,000
		With Contingency (20%)			$1,200

7.11 Environmental Effects

The following sections describe the potential environmental effects (both adverse and beneficial) that No Action and the Tentatively Selected Plan may have on the resources addressed in Section II, *Assessment of Existing Resources*. The effects described in the following sections may be temporary or long-term in duration. Minor effects are typically considered negligible, while moderate adverse effects may be either avoided or counteracted by other actions that further enhance or benefit the resource. According to NEPA guidance, the meaning of significant effects varies with the context (where the action occurs) and intensity (how much damage or improvement the action causes). Non-significant effects mean there is no substantial change to the resource, while significant effects may be beneficial or adverse. Resources that are anticipated to experience negligible or no effects from either the No Action Alternative or the Tentatively Selected Plan have been omitted from the summaries below. The effects of the Tentatively Selected Plan may furthermore occur immediately because of the action (direct), occur later in time, or removed in distance in response to the action (indirect), or may be reasonably expected to occur, given similar restoration actions within the UMRR Program (cumulative). Please refer to Table 26 below for a summary and comparison of the environmental effects anticipated by the TSP. No significant negative effects are expected from the TSP.

Table 26: Summary and Comparison of Environmental Effect of the Tentatively Selected Plan

	Insignificant effects	**Insignificant effects as a result of mitigation***	**Resource unaffected by action**	**Positive effects**
Aesthetics	☒	☐	☐	☐
Air quality	☒	☐	☐	☐
Aquatic resources/wetlands	☐	☐	☐	☒
Invasive species	☐	☐	☐	☒
Fish and wildlife habitat	☐	☐	☐	☒
Threatened/Endangered species/critical habitat	☐	☐	☐	☒
Historic properties	☐	☐	☒	☐
Other cultural resources	☐	☐	☒	☐
Floodplains	☐	☐	☐	☒
Hazardous, toxic & radioactive waste	☐	☐	☒	☐
Hydrology	☒	☐	☐	☐
Land use	☐	☐	☒	☐
Navigation	☐	☐	☒	☐
Noise levels	☒	☐	☐	☐
Public infrastructure	☒	☐	☐	☐
Socio-economics	☐	☐	☒	☐
Environmental justice	☒	☐	☐	☐
Soils	☐	☐	☒	☐
Tribal trust resources	☐	☐	☒	☐
Water quality	☐	☐	☐	☒
Climate change	☐	☐	☐	☒

- **Short-Term Construction effects.** Construction of the Tentatively Selected Plan would take place completely on federal lands under the GP land agreement. No measurable change in floodplain storage would occur as a result of the Tentatively Selected Plan, and the project would not directly induce additional development/construction within the floodplain. Additional information is provided in *Appendix G – Engineering*, and *Appendix D – Clean Water Act*.

  Staging areas and access to the site for construction would occur on publicly owned land within the study area. Use of existing roads would be utilized to reduce additional potential environmental impacts. Temporary disruption of traffic may occur related to increased travel for staging and construction but would return to pre-construction conditions following construction completion.

Minor and temporary increases in turbidity, dust, and noise because of construction activities will occur. Additionally, wildlife may be temporarily disturbed during construction. Benthic and aquatic organisms may be lost and/or relocated within the footprint of excavation and dredging operations. Native seed would be used to revegetate disturbed terrestrial areas after construction. Restoration of hydrologic conditions after construction completion will result in the rapid recolonization of benthic organisms. Due to the potential presence of several USFWS and Missouri State threatened and endangered species, seasonal construction restrictions would be implemented to avoid and minimize potential impacts.

- **Aquatic and Wetland Resources.** Construction of the Tentatively Selected Plan will result in temporary, short-term negative impacts to backwaters and emergent wetland resources due to construction activities. These temporary impacts would include localized increases in turbidity, disturbance to aquatic wildlife, and local aesthetics. In the long-term, the Tentatively Selected Plan would benefit 260 acres of backwater and emergent wetland habitat, both directly and indirectly, through an increase in backwater connectivity, overwintering access, and emergent wetland structure and function. Staging of equipment is expected to occur primarily along existing federal parking lots, access roads, or by floating plant.

  Emergent wetland is a plant community type that is dependent on periodic disturbance, annual flooding in the fall, and an annual terrestrial period during the growing season to recruit and support emergent wetland species. The timing of these three factors as well as the rate of flooding and dewatering determines the species composition and habitat quality for migratory waterfowl and other wildlife. Management of water levels also influences the distribution, composition, and quality of habitats at higher elevations nearby. Proposed project measures would reset the emergent wetland areas by excavation to elevations that would benefit from the Pool 26 Environmental Pool Management program. These elevations will vary across the study area as further upstream areas near Luesse Lake are near the hinge point of the pool and will respond differently than West Alton Bay in the lower end of the pool. The exact elevations will be refined in PED, after more precise surveys and data are gathered. These measures will improve the diversity of species and conditions supported in the study area, enhance access to food and cover for wildlife, and extend the life of these backwater and emergent wetland areas. The increased wetland diversity would provide habitat for a range of wetland dependent species, including aquatic invertebrates, fishes, reptiles, amphibians, mammals, and migratory waterfowl.

  Overall, the wetland impacts required for construction would be outweighed by the restoration of emergent wetland habitat that would otherwise continue to degrade, resulting in lower diversity wetlands with low food resources for wildlife.

Through the habitat evaluation and quantification process, the backwater and wetland habitat considered for the Smallmouth Buffalo HSI model generated 171 net AAHU with the Tentatively Selected Plan (for more details refer to *Appendix B – Habitat Evaluation and Quantification*). Therefore, these measures would have a positive effect on aquatic and wetland resources. Additional discussion of aquatic and water quality impacts is contained in *Appendix D – Clean Water Act* Section 404(B)(1) Evaluation.

Riverine fish habitat within the study area includes the side channel habitat in Portage Island area, as well as main channel border sites at Portage Island, West Alton Bay, and the exterior of Luesse Lake. Approximately 281 acres of side channels and 541 acres of main channel habitats provide important resources for lotic-dependent riverine species. The Tentatively Selected Plan includes multiple measures such as hard points, GSR, berm and barb structures, bullnose with gravel substrate placement, and woody bundles to enhance spawning, rearing, foraging, and refugia habitats within the side channel and main channel borders of the study area. Through the habitat evaluation and quantification process, the side channel habitat improvements considered for the White Bass HSI model generated 192 net AAHU with the Tentatively Selected Plan (for more details refer to *Appendix B – Habitat Evaluation and Quantification*). Therefore, these measures would have a positive effect on aquatic resources.

- **Floodplain Forest Habitat.** Floodplain habitat within the study area consists of forest resources on a higher elevation ridge located between West Alton Bay backwater and the main channel, on Portage Island, and on higher elevations within the Luesse Lake Area. In all, approximately 572 acres of forested habitats occur in the study area.

  The Tentatively Selected Plan includes island creation, and terrestrial diversity enhancement measures that would result in an addition of approximately 62 acres of newly constructed islands throughout the study area. The islands will be constructed at elevations conducive to establishment of early successional species such as cottonwood, willow, maple, ash and elm. Over the life of the project, it is anticipated that these islands will mature into closed canopy floodplain forested islands and help replace the lost and degrading habitat found within this reach. Through the habitat evaluation and quantification process, the island creation habitat considered for the Yellow Warbler HSI model generated 42 net AAHU with the Tentatively Selected Plan (for more details refer to *Appendix B – Habitat Evaluation and Quantification*). Therefore, these measures would have a positive effect on forested resources.

- **Geology and Soils.** The current geology and soils within the study area have been altered by natural riverine accretion and erosion through time, with

historical agricultural activities in the vicinity of the study area. Temporary, minor impacts to geology and soils would be expected due to construction activities and Project measures. Excavating and dredging backwaters, island creation, and terrestrial elevation diversity measures would impact existing topography and drainage. However, minor beneficial impacts to soils would be anticipated over the long-term as restored habitats mature or undergo succession.

No impacts to acres that qualify as prime farmland, nor any conversion of farmland to nonagricultural uses are expected within the study by the proposed project. Therefore, negligible impacts overall to geology and soils are anticipated as a result of the project.

- **Wildlife.** Large river floodplains, such as the UMRS, provide a mosaic of forest, grassland, islands, backwaters, side channels, and wetlands. In all, the UMRS supports over 550 vertebrate species, and nearly 50 species of mussels (Guyon L. D., 2012). There are over 300 species of bird that migrate along the Mississippi Flyway. The study area is located near the confluence of the Mississippi, Missouri, and Illinois Rivers and is an important link along this migratory corridor. Without the project, sedimentation is anticipated to result in further conversion of vital backwater habitats into terrestrial habitat which would have long term adverse impacts to the wildlife that rely on these backwaters for spawning, rearing, and foraging. Through the habitat evaluation and quantification process, and the application of the HSI models, the Tentatively Selected Plan is expected to generate 425 net AAHU across the study area, (for more details refer to *Appendix B – Habitat Evaluation and Quantification*). Therefore, the Tentatively Selected Plan will restore and enhance vital habitats for a net positive uplift for the wildlife that live in, use, and migrate through the study area.
- **Bald Eagle.** There is currently one known bald eagle nest near the study area although mature trees fitting this description occur elsewhere in the study area. The no action alternative would have no effect on Bald Eagles. Minor and temporary increases in turbidity, dust, and noise because of construction activities will occur with the Tentatively Selected Plan; however, the project measures are expected to have an overall positive effect on Bald Eagles by improving habitat used by their primary food resources.

  To comply with the BGEPA, the PDT will continue coordination with USFWS as construction limits and timelines develop with enough detail to properly coordinate any potential effects to Bald Eagles within and/or adjacent to the study area.

- **Federally Threatened or Endangered Species.** In accordance with the Endangered Species Act, an updated list of federally threatened and endangered species was obtained from the USFWS on September 25, 2023. This satisfies

the "request for species list requirements" for ESA Section 7 Consultation. The Gray Bat, Indiana Bat, Northern Long-eared Bat, Tri-colored Bat, Spectaclecase mussel, and Decurrent False Aster are listed as federally threatened or endangered; and the Monarch butterfly is a candidate species. USACE prepared a biological assessment (*Appendix C – Biological Assessment*) that will be made available to USFWS for concurrent review during the public comment period. Based on the information obtained, USACE has determined the Project *May Affect, but is Not Likely to Adversely Affect* the Gray Bat, Indiana Bat, Northern Long-eared Bat, Tricolored Bat, Decurrent False Aster, and Monarch butterfly.

- **Invasive Species.** The effect of the Tentatively Selected Plan on invasive species distribution and abundance were considered throughout the planning process. The District has weighed the benefits that this Project will have on invasive species, as well as to the native communities that it is intended to sustain and support.

  The Project would buffer against invasive plant species such as Reed Canary Grass (*Phalaris arundinacea*), Japanese Hops (*Humulus japonicus*), and Coffeeweed (*Sesbania herbacea*). Natural regeneration of the island areas is anticipated with monitoring and adaptive management measures in place to address any potential encroachment by invasives. Please refer to *Appendix E-Monitoring and Adaptive Management Plan*, for a full description of monitoring requirements and adaptive management measures to address invasive species.

- **Water Quality.** Short-term minor increases in turbidity are expected to occur due to construction activities within the study area. Avoidance and minimization were utilized in development and analysis of alternatives and would continue to be utilized through implementation. Best management practices would be required during construction to reduce movement of sediments and nutrients within aquatic areas. As a result, these effects would be less than significant.

  After construction, the proposed Project measures improve water management capabilities and restore emergent wetland, floodplain forest, and floodplain woodland communities, resulting in minor improvements to water quality in the study area. These restored communities will filter nutrients and reduce sediment inputs to the Mississippi River. Overall, the Tentatively Selected Plan will have a positive effect on water quality; additional information is provided in *Appendix D – Clean Water Act Section 404(B)(1) Evaluation*.

- **Greenhouse Gas Emissions and Climate Change.** Carbon dioxide (CO_2) is the primary greenhouse gas emitted from human activities, primarily through the combustion of fossil fuels. Greenhouse gases absorb reflected energy from the sun and warm Earth's atmosphere. Increases in greenhouse gases have resulted in measurable warming of the Earth's surface and ultimately changes to some

ecosystems. Vegetation such as trees, grasses, shrubs, and herbaceous wetland plants are known to reduce the amount of CO_2 in the atmosphere by sequestering the gas during photosynthesis and returning oxygen to the atmosphere as a byproduct.

Under the No Action Alternative, there is no expected change from existing conditions. Across all the alternatives evaluated, it was anticipated that the varying levels of required construction operations per alternative would reflect the varying levels of habitat restoration and benefit. For example, the volumes of excavated material found in the Minimum, Intermediate, and Maximum Alternative are in lock step with acres of restored habitat across those alternatives; therefore, the greenhouse gas emissions (GHG) expected from construction activities would also follow suit with carbon sequestration gained out of each alternative, proportionately.

Under the Tentatively Selected Plan, the Project construction would result in short-term construction related emission release of GHG as construction equipment burns fossil fuels. Construction GHG would be substantially less than the federal reporting threshold. This minor short-term adverse effect would be offset by minor long-term beneficial effects from wetland enhancements and forest restoration realized through environmental pool management, plantings, and natural succession. Approximately 62 acres of forested island habitat would be restored as part of the TSP. Using the March 2022 EPA estimate of 0.84 metric tons of CO_2/acre/year from an average U.S. Forest, this reforestation would result in an additional 52 metric tons of CO_2 sequestered each year, which equates to over 2,600 metric tons of CO_2 sequestered over the 50-year period of analysis (https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator). This carbon sequestration is in addition to other habitat benefits realized through forest stand improvements, wetland restoration, island creation and side channel habitat improvements accomplished across the approximately 1,800-acre study area. Overall, the Tentatively Selected Plan would provide a net benefit rather than an adverse impact to climate change.

- **Socioeconomic Resources.** No short-term or long-term impacts to the growth of the neighboring communities or region are anticipated because of the Project. Some minor, temporary negative impacts to recreational uses may occur as a result of construction activities. However, recreational opportunities would be improved in the study area because of improved habitat diversity which would increase the attractiveness of the area for wildlife observation and hunting. Therefore, moderate, positive impacts on recreational opportunities are anticipated as a result of the proposed project.

  The study area is wholly located on federal lands; therefore, no residential property or land would be displaced. Additionally, no changes in property values

or tax revenues would occur because of the Project. The Project would result in a minor, temporary increase in employment opportunities in the area during construction but would not directly affect employment of the labor force in nearby Illinois or Missouri counties. Overall, the Project would have no adverse impacts to socioeconomic resources.

- **Environmental Justice.** Environmental Justice is a national goal and is defined as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies (see Section 2.20). Project goals and objectives were established to provide environmental restoration and enhance the quality of the environment for all people. Public involvement, via public meetings and distribution of information concerning the proposed project, has and will continue to be an integral part of planning for this project to ensure that concerns of all people will be fully considered in the decision-making process. No differential impacts to underserved communities or populations are expected with any of the considered alternatives. Short-term increases in employment could be realized during construction but would then return to pre-construction conditions. Therefore, the considered action alternatives would have negligible effects on underserved communities and populations.

- **Man-Made Resources.** The Project would not impact flood reduction levees within or adjacent to the study area. The Project would not result in any significant change in floodplain storage. There would be no impacts to navigation training structures on the Mississippi River. Impacts to navigation would not occur as a result of the Tentatively Selected Plan. Overall, the impacts to man-made resources as a result of the Tentatively Selected Plan would be negligible. Additional information is provided in *Appendix G – Engineering.*

- **Short-Term Versus Long-Term Productivity.** Construction activities would temporarily disrupt wildlife and human use of the study area. Long-term productivity for natural resource management would benefit from construction of the Project. Long-term productivity would be enhanced through increased longevity of the enhanced and expanded emergent wetlands, enhanced forest structure and diversity, and by providing more dependable habitat to support migratory and resident wildlife species. The habitat changes and development that would occur as a result of the Project would benefit both game and nongame species. This would result in enhanced recreational opportunities for both consumptive and non-consumptive users. Negative long-term impacts are expected to be negligible for all ecosystems associated with the Project.

- **Irreversible or Irretrievable Resource Commitments.** The purchase of materials and the commitment of man-hours, fuel, and machinery to perform

construction are irretrievable. None of the proposed actions are considered irreversible.

- **Cumulative Effects.** Cumulative effects occur when a relationship exists between a proposed action and other actions which have occurred, are occurring, or are expected to occur in a similar location. The primary area considered in the cumulative effects analysis is limited to Alton Pool of the Illinois River and Pool 26 of the Mississippi River. There would be little to no cumulative effects to operation and maintenance of the nine-foot navigation channel, commercial traffic, and residential development, agricultural practices, and watershed management as a result of this Project or past and future UMRR projects. Overall, it is anticipated that the Project would include minor improvements to floodplain forests, floodplain woodlands, and emergent wetlands.

  Past Actions: The authorization, construction, and maintenance of the nine-foot navigation channel project has resulted in significant impacts to distribution, proportional cover, and acreage of floodplain habitats. Construction of the Locks and Dams on the Illinois River and at Pool 26 raised water levels by approximately 5.5 feet. As a result, there was a conversion in habitat types. Emergent wetlands were converted to permanently inundated lakes and sloughs, many of the permanently inundated lakes have converted to open water habitats, and there was also a conversion of lower elevation forests to aquatic habitats. In addition, the hydrologic fluctuations and sediment transport processes were modified with construction of the lock and dam system. These altered conditions have resulted in reduced topographic diversity, floodplain vegetation diversity, vegetated wetlands, and a modified disturbance regime that only partially supports regeneration of hard-mast and early successional tree species such as Cottonwood.

  Six UMRR HREP projects have been constructed in the Alton Pool of the Illinois River and in Pool 26 of the Mississippi River (Table 27). In all, 9,766 acres of floodplain habitat have been enhanced by these projects. Dresser Island, Calhoun Point, Stump Lake, and Swan Lake aimed to enhance wetland and backwater habitat. Pools 25 and 26 Islands HREP aimed to enhance floodplain forest and backwater habitat. Cuivre Island HREP aimed to enhance wetland and floodplain forest habitat.

Table 27. UMRR HREP Projects in Alton Pool of the Illinois River and Pool 26 of the Mississippi River

Project	Pool	Year Constructed / Expected Construction	Acres Affected
Stump Lake	Alton	1999	2,950

Swan Lake	Alton	2001	2,900
Calhoun Point	Alton	2009	2,150
Dresser Island	26	1991	940
Pools 25/26 Islands	26	2017	2,026
Piasa Island	26	2024	1,380
Cuivre Island	26	1999	1,750

Present and Reasonably Foreseeable Actions: USACE will continue to operate and maintain the nine-foot navigation channel along the Illinois and Mississippi Rivers. This includes continuation of dredging, placement of material, and construction, operation, and maintenance of river regulating structures such as chevrons, closing structures, and wingdams. While maintenance dredging is uncommon in Alton Pool, the study team assumed that it may occur at some point in the future.

One HREP project is under construction currently and would affect an additional 1,380 aquatic habitat acres in the future. Piasa Island HREP aims to enhance side channel and backwater habitat. Three NESP projects on the Illinois River are anticipated to be constructed in the near future. As of this writing, contracts have been awarded, and the construction of Moore's Towhead (RM 76), Wing Island (RM 40), and Fisher Island (RM 38) are anticipated to be complete by end of FY24. All three projects were designed to address erosion issues at the islands and mitigate some of the effects of the locks and dams system. In addition, flood damage repair to the Illinois riverside berm is anticipated around 2025.

Cumulative impacts of the proposed action are not expected to be significant. The Project should have a positive long-term benefit on floodplain forest, emergent wetland, and associated wildlife inhabiting the area. The Project, in concert with previously constructed HREPs in the region, should counter some of the past, current, and foreseeable actions described earlier. In total 62 HREPs have been completed along the UMRS, benefitting nearly 120,000 acres of wetlands, aquatic habitat, and floodplain forest. Additionally, 24 HREP projects are currently in planning, design, and construction that would benefit over 76,000 acres of floodplain habitat.

7.12 Compliance with Environmental Statutes.

Status of compliance activities with environmental protection statutes, regulations, and guidelines is listed in Table 27 below. Remaining compliance activities will be completed as construction limits and timelines develop with enough detail to properly coordinate any potential effects related to the Tentatively Selected Plan within and/or adjacent to

the study area.

Table 27: Relationship to Environmental Protection Statutes and Other Environmental Requirements

Federal Environmental Protection Statutes and Requirements	Applicability/ Compliance[1/2/3]
Archaeological and Historic Preservation Act, 16 U.S.C.	Partial
Clean Air Act, as amended, 42 U.S.C. 1857h-7, et seq.	Full
Clean Water Act, Sections 404 and 401	Full
Endangered Species Act of 1973, as amended, 16 S.C.	Partial
Environmental Justice (EOs 12898, 13985, 13990, 14008)	Full
Executive Order 11988 – Floodplain Management	Full
Executive Order 11990 - Protection of Wetlands	Full
Executive Order 13112 - Invasive Species	Full
Farmland Protection Policy Act. 7 U.S.C. 4201, et seq.	Full
Federal Water Protection Recreation Act, 16 U.S.C. 460-	Full
Fish and Wildlife Coordination Act, 16 U.S.C. 601, et seq.	Partial
Greenhouse Gases, CEQ Memorandum 18, Feb 2010	Full
Land and Water Conservation Fund Act, 16 U.S.C. 460/-	Full
National Environmental Policy Act, 42 U.S.C. 321, et seq.	Partial
National Historic Preservation Act, 16 U.S.C. 470a, et	Full
Rivers and Harbors Act, 33 U.S.C. 403, et seq.	Full
Watershed Protection and Flood Prevention Act, 16	Full
Wild and Scenic Rivers Act, 16 U.S.C. 1271, et seq.	Full

[1] Full Compliance = having met all requirements of the statute for the current stage of planning
[2] Partial Compliance = having met some requirements of the statute for the current stage of planning or anticipate full compliance at completion of planning (additional information below)
[3]Not Applicable = no requirements for the statute or project does not contain resources applicable to the law.

7.13 Post-Construction Evaluation.

Per Section 2039 of WRDA 2007, monitoring for ecosystem restoration studies will be conducted to determine project success. "Monitoring includes the systematic collection and analysis of data that provides information useful for assessment of project performance, determining whether ecological success has been achieved, or whether adaptive management may be needed to attain project benefits." This section summarizes the post-construction evaluation plan, which includes performance monitoring, adaptive management, and long-term performance reporting, described in

Table 28. See *Appendix E-Monitoring and Adaptive Management Plan*, for a full description of post-construction evaluation, including performance monitoring, adaptive management activities, and long-term performance reporting.

Table 28: Post Construction Evaluation Description

	Monitoring Stage	Length of Time	Description	Funding Source
Post-Construction Evaluation	Performance Monitoring	10 years	For entire project, determine the degree to which the project is meeting the success criteria and for informing potential adaptive management decisions	Project Cost
	Adaptive Management	10 years	Provides a process for making decisions in the face of uncertainty and learning from outcomes of management actions; may improve the performance of a designed construction measure that is not meeting performance criteria	Project Cost
	Long-Term Performance Reporting	50 years	For entire project, demonstrates the ability to meet project success criteria through the period of analysis, inform O&M, and provide basic data for planning and UMRR Program purposes	UMRR Program Cost

7.14 Environmental Operating Principles (EOPs)

USACE has reaffirmed its commitment to the environment by formalizing a set of Environmental Operating Principles (EOP) applicable to all its decision-making and programs. The formulation of alternatives considered for implementation met all the EOP principles which include:

- foster sustainability as a way of life throughout the organization;
- proactively consider environmental consequences of all USACE activities and act accordingly;
- create mutually supporting economic and environmentally sustainable solutions;

- continue to meet our corporate responsibility and accountability under the law for activities undertaken by USACE, which may impact human and natural environments;
- consider the environment in employing a risk management and systems approach throughout the life cycles of projects and programs;
- leverage scientific, economic, and social knowledge to understand the environmental context and effects of USACE actions in a collaborative manner; and
- employ an open, transparent process that respects views of individuals and groups interested in USACE activities.

The EOPs were considered during the plan formulation and the Tentatively Selected Plan is consistent with the EOPs. The Tentatively Selected Plan promotes sustainability and economically sound measures by incorporating the most natural and least cost methods for restoring habitat for aquatic plants, migratory bird species, and floodplain forest habitat.

The USACE has developed a Campaign Plan with a mission to "provide vital public engineering services in peace and war to strengthen our Nation's security, energize the economy, and reduce risk from disasters." This study is consistent with the USACE Campaign Plan https://www.usace.army.mil/About/Campaign-Plan/.

7.15 Risk and Uncertainty

Areas of risk and uncertainty have been analyzed and were defined so that decisions could be made regarding the reliability of estimated benefits and the costs of alternative plans. Risk is a measure of the probability and consequence of uncertain future events. Uncertainty refers to the lack of knowledge or natural variability about critical elements or processes that then contributes to the magnitude of the risk.

For feasibility level design (approximately 35 percent) assumptions were made related to the development of quantities in terms of the number, size and placement of measures. While low risk, these assumptions have the potential to impact the selection and placement of measures, and overall cost as more detailed information becomes available during design.

The PDT worked to manage risk in developing measures by expanding on and referencing successful similar work completed by previous HREPs and the Design Handbook. The PDT used that experience and information to identify possible risks and decrease uncertainty in plan formulation. No measures in the Tentatively Selected Plan are believed to be burdened by significant risk or uncertainty regarding the eventual success of the proposed measures. Significant risk would be avoided by proper design, appropriate selection, and correct seasonal timing of applications.

The dynamic and complex nature of riverine environmental processes is a principal source of uncertainty. Post-construction monitoring and adaptive management plans will be used to address uncertain outcomes in all Plan components.

Hydraulic modeling and analysis were conducted to understand the existing and potential project conditions in the study area. Simulations were run at three river conditions: environmental pool, max drawdown, and open river. Potential project measures were added by altering the terrain to include feature geometries and assigning appropriate roughness values. The impacts of potential project measures were evaluated by comparing the differences between the existing and potential project condition simulations. Additionally, simulations were run at the 50% Annual Exceedance Probability (2-year event) and 1% Annual Exceedance Probability (100-year event) to evaluate the TSP's potential impacts to water surface elevation (no-rise analysis). Details of the hydraulic modeling and no-rise analysis can be found in *Appendix G – Engineering*. While low risk, H&H modeling outputs have uncertainties associated with the choice to only run a limited number of scenarios, estimates of geometries and n values. These uncertainties could affect the selection and placement of measures during design as more information becomes available. As design progresses, if negative impacts are observed to navigation or rise in water surface elevations, the measures would be adjusted to avoid negative impacts.

Sea level rise is not expected to impact the Tentatively Selected Plan since the study area is located several hundred feet above mean sea level and located in the midcontinent. There is risk and uncertainty associated with climate change, which may result in increased flood frequency and duration, and changes in sediment deposition and aggradation. Project measures were designed based on FWP hydraulic conditions described in *Appendix H – Climate Assessment*; assumptions included consideration for climate change based on reasonable consensus on an increasing trend in observed temperature, precipitation, and streamflow.

8.0 PUBLIC INVOLVEMENT, COORDINATION, AND CONSULTATION

8.1 Coordination by Correspondence

The TSP is largely in-water work, including dredging, creation of islands, island protection, and habitat creation through the construction of berms, barbs, dikes, etc. Terrestrial work is limited to dredge disposal on the northern side of Portage Island. This area was included in the 2018 survey conducted by the District, which found extensive deposits of recent alluvium and no cultural resources. For these reasons, the District finds that the project will have no adverse effect on historic properties.

A letter stating the District's findings was sent to the Missouri State Historic Preservation Office (SHPO) on July 5, 2023. The Missouri SHPO concurred with the District's findings in a letter dated August 2, 2023.

The United States government has a unique legal relationship with federally recognized American Indian tribes based on recognition of inherent powers of tribal sovereignty and

self-government. Communication with 23 federally recognized tribes that have an interest in this area was initiated with a USACE letter dated June 28, 2023, stating that no historic properties will be affected but requesting if the nations had any information or indigenous knowledge that they would be able to share. The Caddo Nation (July 6, 2023) replied that they had no information to provide but wanted to be notified about projects in the area. The Quapaw Nation (July 10, 2023) requested a cultural reconnaissance survey be conducted. The St. Louis District replied on August 16, 2023, stating that it was the current opinion that no historic properties will be affected but if the Quapaw Nation had additional information, then the District will reevaluate its decision. On August 24, 2023, the Quapaw Nation responded that they sent the wrong letter and they were wanting the 2018 cultural resource survey report. That was provided on August 29, 2023; no further concerns have been expressed by the Quapaw Nation. The Peoria Tribe (July 20, 2023) replied that they accepted the invitation to consult on this project. The St. Louis District reached out to them on August 21, 2023 to clarify if the nation had any objections to the proposed project. On September 25, 2023, the Peoria Tribe responded stating they had no objections to the project.

Copies of all tribal correspondence are provided in *Appendix A - Coordination*.

8.2 Public Views and Comments

In accordance with NEPA, the report with integrated EA and unsigned draft FONSI will be made available to interested members of public during a 30-day public review period, yet to be scheduled. The report will be made available on the USACE St. Louis District's website along with a letter mailed to interested members of the public addressing where to find the report, how to provide comments, and the date of the public meeting/open house (*Appendix A - Coordination*). Comments received during public review will be incorporated into the report where appropriate, and copies of written comments received will be provided in *Appendix A - Coordination*.

A public meeting was held in XX, IL on Day Month Year to elicit feedback from the public on improvements that could enhance habitat within the West Alton Islands HREP area.

8.3 Implementation and Views of the Sponsors

This section discusses the implementation responsibilities for the USFWS and MDC (Sponsors) and USACE. The responsibility for plan implementation and construction falls to USACE as the lead federal agency. The USFWS and MDC would be responsible for OMRR&R for lands they manage as part of the project. Performance evaluation is a USACE responsibility and can be found in *Appendix E- Monitoring and Adaptive Management*.

A *Memorandum of Agreement* (MOA) is the formal agreement that would be entered into by USACE and USFWS before implementation of the project. A *Project Partnership*

Agreement (PPA) will be entered into by USACE and MDC. The MOA and PPA describe obligations for constructing, operation, and maintaining the implemented features of the West Alton Islands HREP. This project is 100% federally funded (per Section 906(e) of WRDA 1986) because it is taking place on federal lands managed by the sponsors. OMRR&R is the responsibility of the sponsors managing the lands per Section 107(b) of WRDA 1992.

US Army Corps of Engineers

The Corps is responsible for study management and coordination with the FWS, MDC and other affected agencies. The Corps will submit the feasibility report; program funds; finalize plans and specifications; complete all NEPA requirements; advertise and award a construction contract; and perform construction contract supervision and administration. Construction of the HREP using the power of navigational servitude is appropriate due to ancillary benefits to navigation. The Corps has agreed to support this HREP's monitoring, and data collection needs as outlined earlier in this report.

US Fish and Wildlife Service and Missouri Department of Conservation

Because a portion of the proposed project will be located on land managed by the Fish and Wildlife Service (Portage Island), the Regional Director of the USFWS, Region 3, will determine whether the proposed project is compatible with NWR goals and objectives and the NWR Comprehensive Conservation Plan. The USFWS Regional Director will also determine if the USFWS approves the TSP for implementation and if the USFWS assumes operation and maintenance responsibilities. The Regional Director will determine, based on the facts and recommendations contain herein, whether the draft integrated Feasibility Report and EA meets the USFWS's obligation under NEPA, the Fish and Wildlife Coordination Act (FWCA) of 1965, the Endangered Species Act (ESA) of 1973, the Migratory Bird Treaty Act of 1918, and the Bald Eagle Protection Act of 1940. The USFWS has been a cooperating agency in the preparation of this EA and has been integral in the decision-making process for the Feasibility Report.

The USFWS and MDC are Sponsors and have actively participated in the planning process. The Sponsors are in support of implementation of the Intermediate Alternative as the Tentatively Selected Plan**.** Operations and Maintenance is the responsibility of the USFWS in accordance with Section 107(b) of WRDA 1992, Public Law 102-580. Annual O&M costs are estimated at $1,200 per year. The USACE will further specify activities in the Project O&M Manual, which will be provided after construction completion of a functional portion of the project or separable element, as determined by the District Engineer to the USFWS as discussed in ER 1110-2-401.

Repair, rehabilitation and replacement considerations may extend outside of the typical 50-year period of analysis, as the USFWS is expected to maintain the HREP as outlined

in the MOA. Rehabilitation cannot be accurately measured during design phase or construction stages. Rehabilitation is the reconstructive work that significantly exceeds the annual O&M requirements and is needed as a result of major storms or flood events.

9.0 RECOMMENDATION

The Tentatively Selected Plan is the Intermediate Alternative, which includes the following measures:

- Excavation without Benching,
- Island Creation,
- Gradual Slope Revetment (GSR) around Islands,
- Containment Berms,
- Bullnose,
- Sandbar/Mudflat Creation,
- Emergent Wetland Enhancement,
- Terrestrial Elevation Diversity,
- Hard Points (Barb & Vane),
- Woody Bundles,
- Trail Dikes,
- Sediment Deflection Dikes,
- Gravel Bar,
- Berm and Barbs, and
- Deep Water Pockets.

The estimated project first cost of the Tentatively Selected Plan is $29,294,000 (October 2023 price level) and the fully funded total project cost is $32,954,000. Upon completion, the USFWS and MDC are responsible for O&M at an estimated cost of $1,200 per year.

The expected outputs of the Tentatively Selected Plan include restoration of 1,000 acres of habitat. The Tentatively Selected Plan will contribute 425 average annual habitat units over the 50-year period of analysis.

The District has weighed the outputs to be obtained from the full implementation of the West Alton Islands HREP against its estimated cost and have considered the various alternatives proposed, impacts identified, and overall scope. The St. Louis District recommends that the West Alton Islands HREP be implemented as generally described in this report.

The recommendations herein reflect the information available at the time and current Department of the Army policies governing the formulation of individual projects. They

do not reflect programming and budgeting priorities inherent in the formulation of national Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are approved for implementing funding. However, prior to approval, the state, federal agencies and other parties will be advised of any modifications and afforded the opportunity to comment.

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DRAFT FINDING OF NO SIGNIFICANT IMPACT

UPPER MISSISSIPPI RIVER RESTORATION
FEASIBILITY REPORT
WITH INTEGRATED ENVIRONMENTAL ASSESSMENT

WEST ALTON ISLANDS HREP
HABITAT REHABILITATION AND ENHANCEMENT PROJECT

POOL 26, UPPER MISSISSIPPI RIVER MILES 203-215.5
ST. CHARLES COUNTY, MISSOURI

The U.S. Army Corps of Engineers, St. Louis District (Corps) has conducted an environmental analysis in accordance with the National Environmental Policy Act of 1969, as amended. The final Integrated Feasibility Report and Environmental Assessment (FR/EA) dated **31 October 2023**, for the Upper Mississippi Restoration Program West Alton Islands Habitat Rehabilitation and Enhancement Project addresses backwater, side channel, and island habitat restoration opportunities and feasibility in St. Charles County, Missouri.

The Final FR/EA, incorporated herein by reference, evaluated various alternatives that would restore ecosystem function and diversity in the study area. The Tentatively Selected Plan is the National Ecosystem Restoration (NER) Plan and includes:

- Excavation without Benching
- Island Creation
- Gradual Slope Revetment (GSR)
- Containment Berm
- Bullnose
- Sandbar/Mudflat Creation
- Emergent Wetland Enhancement
- Terrestrial Elevation Diversity
- Hard Points (Barb & Vane)
- Woody Bundles
- Trail Dike
- Sediment Deflection Dike
- Gravel Bar
- Berm and Barbs
- Deep Water Pockets

In addition to a “no action” plan, three alternatives were evaluated (Refer to sections 5 and 6 for discussion on alternative formulation and selection). The alternatives included:

- No Action
- Minimum Alternative
- Intermediate Alternative
- Maximum Alternative

For all alternatives, the potential effects were evaluated, as appropriate. A summary assessment of the potential effects of the Tentatively Selected Plan are listed in Table 1:

Table 1: Summary of Potential Effects of the Tentatively Selected Plan

	Insignificant effects	**Insignificant effects as a result of mitigation***	**Resource unaffected by action**	**Positive effects**
Aesthetics	☒	☐	☐	☐
Air quality	☒	☐	☐	☐
Aquatic resources/wetlands	☐	☐	☐	☒
Invasive species	☐	☐	☐	☒
Fish and wildlife habitat	☐	☐	☐	☒
Threatened/Endangered species/critical habitat	☐	☐	☐	☒
Historic properties	☐	☐	☒	☐
Other cultural resources	☐	☐	☒	☐
Floodplains	☐	☐	☐	☒
Hazardous, toxic & radioactive waste	☐	☐	☒	☐
Hydrology	☒	☐	☐	☐
Land use	☐	☐	☒	☐
Navigation	☐	☐	☒	☐
Noise levels	☒	☐	☐	☐
Public infrastructure	☒	☐	☐	☐
Socio-economics	☐	☐	☒	☐
Environmental justice	☒	☐	☐	☐
Soils	☐	☐	☒	☐
Tribal trust resources	☐	☐	☒	☐
Water quality	☐	☐	☐	☒
Climate change	☐	☐	☐	☒

All practicable and appropriate means to avoid or minimize adverse environmental effects were analyzed and incorporated into the Tentatively Selected Plan. Best management practices (BMPs) as detailed in the IFR/EA will be implemented, if appropriate, to minimize impacts as discussed in Section 7 of the IFR/EA. [2] No compensatory mitigation is required as part of the Tentatively Selected Plan.

Public review of the draft IFR/EA and FONSI is scheduled to occur ____October 2023. All comments submitted during the public review period will be responded to in the Final IFR/EA and FONSI.

[2] 40 CFR 1505.2(C) all practicable means to avoid and minimize environmental harm are adopted.

Pursuant to section 7 of the Endangered Species Act of 1973, as amended, the U.S. Army Corps of Engineers determined that the Tentatively Selected Plan may affect but is not likely to adversely affect the following federally listed species or their designated critical habitat: Gray Bat, Indiana Bat, Northern Long-eared Bat, Tricolored Bat, Spectaclecase mussel, Decurrent False Aster, and Monarch butterfly. The U.S. Fish and Wildlife Service (FWS) concurred with the Corps' determination on 1 November 2023.

Pursuant to section 106 of the National Historic Preservation Act of 1966 as amended, the U.S. Army Corps of Engineers determined that historic properties would not be affected by the Tentatively Selected Plan. The Missouri SHPO concurred with this determination on August 2, 2023.

Pursuant to the Clean Water Act of 1972, as amended, the discharge of dredged or fill material associated with the Tentatively Selected Plan has been found to be compliant with section 404(b)(1) Guidelines (40 CFR 230). The Clean Water Act Section 404(b)(1) Guidelines evaluation is found in *Appendix D – Clean Water Act* of the FR/EA.

Pending information to be developed during the pre-construction engineering and design phase, a Nationwide 27 permit for *Ecosystem Restoration* will be obtained prior to construction and a letter stating that the Tentatively Selected Plan appears to meet the requirement therein. All conditions of the Nationwide 27 permit for *Ecosystem Restoration* shall be implemented in order to minimize adverse impacts to water quality.

All applicable environmental laws have been considered and coordination with appropriate agencies and officials has been completed.

Technical, environmental, and cost effectiveness criteria used in the formulation of alternative plans were those specified in the Water Resources Council's 1983 Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies. All applicable laws, executive orders, regulations, and local government plans were considered in evaluation of alternatives.[3] Based on this report, the reviews by other Federal, State and local agencies, Tribes, input of the public, and the review by my staff, it is my determination that the Tentatively Selected Plan would not cause significant adverse effects on the quality of the human environment; therefore, preparation of an Environmental Impact Statement is not required.[4]

Date

COL. Andy J. Pannier
U.S. Army Corps of Engineers
District Commander

[3] 40 CFR 1505.2(B) requires identification of relevant factors including any essential to national policy which were balanced in the agency decision.
[4] 40 CFR 1508.13 stated the FONSI shall include an EA or a summary of it and shall note any other environmental documents related to it. If an assessment is included, the FONSI need not repeat any of the discussion in the assessment but may incorporate by reference.



UPPER MISSISSIPPI RIVER RESTORATION
DRAFT FEASIBILITY REPORT
WITH INTEGRATED ENVIRONMENTAL ASSESSMENT

WEST ALTON ISLANDS
HABITAT REHABILITATION
AND ENHANCEMENT PROJECT

Appendix A: Coordination

US Army Corps of Engineers ®
St. Louis District

Mississippi River
Miles 203-215.5
St. Charles County, Missouri
Project Partners: Missouri Department of Conservation & U.S. Fish and Wildlife Service

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1.0 COORDINATING SPONSOR AGENCIES

U.S. Fish and Wildlife Service (FWS)
Missouri Department of Conservation (MDC)

2.0 PLANNING CHARRETTE

A full report is available upon request. The Executive Summary and a full list of the initial objectives, measures and alternatives is provided below.

The West Alton Island Habitat Rehabilitation and Enhancement Project (HREP) is in Pool 26 on the right descending bank of the Mississippi River between river miles 203 and 220.5 and the towns of West Alton, Missouri and Grafton, Illinois. These properties include West Alton Bay, Brickhouse Slough, Mile 215 Tract (Luesse Lake), Mason's Island, and Island No. 526 totaling 1,226 acres and which are collectively managed as part of the Missouri Department of Conservation's (MDC) Upper Mississippi River State Conservation Area. It also includes the 230-acre Portage Island Division of the Two Rivers National Wildlife Refuge managed by the U.S. Fish and Wildlife Service (USFWS). It is comprised of one large (Portage Island) and three smaller islands at river mile 213-214. The role of the U.S. Army Corps of Engineers (USACE) on this study is to document the decision-making process for the proposed Upper Mississippi River Restoration (UMRR) HREP in an integrated feasibility study. The MDC and the USFWS both serve as the project sponsor.

A Scoping Charrette was held virtually over five sessions in January/February 2021 to facilitate the scoping of this study. The virtual sessions drew around 20 attendees per session from USACE, USFWS, INHS, and MDC. A participant from the IL DNR was invited to attend but was not able to.

The charrette participants brainstormed and refined lists of problems, opportunities, objectives, constraints, and considerations for the study. They also provided feedback on a draft conceptual model, provided input on resource significance, and expected existing and future conditions at the site.
Participants brainstormed measures that would address the problems identified and developed alternatives including several measures in four small group discussions. Finally, participants documented uncertainties, risks, and assumptions relating to the study so far. These outputs are documented in this report.

Table 1: Measures and Objectives

Objective - Restore sand bars to increase the habitat for various aquatic and terrestrial species such as interior least terns and softshell turtles as well as small bodied fish in the study area over the period of analysis.	Objective - Restore backwater connectivity, depth diversity, and aquatic vegetation to allow aquatic species to be more resilient to changes in their habitat.	Objective - Restore side channel depth and flow diversity for native riverine fish in the study area over the period of analysis.	Objective - Restore age, structure, and species diversity of the forest in the study area over the period of analysis.	Objective - Restore island and shoreline habitat for birds, bats, and fish species.	Objective - Restore flow and depth diversity in the main channel margins and off channel areas over the period of analysis.	Objective - Restore wetlands to increase habitat for pollinators, waterbirds, reptiles & amphibians, and fish.	Objective - Reduce wind and wave fetch impacts to the channel margin and off channel areas over the period of analysis.
flex pipe dredging	dredging 8' below min pool	island/side channel creation	raise elevations of low areas	dredging followed with willow planting	sced for SC	reduce invasive species	island construction
structures to maintain side channel depth behind new sandbars	dredging 5ft depth	remove or notch closing structures	create ridges	prairie cord grass plantings for bank stabilization	dike notch or removal	increased connectivity	innovative structures
sandbar/island creation	excavation	large boulder cluster	restore ridge/swale habitat	improve forested resource	scour structures rock or wood	increase depth diversity	wave break structure off shoreline
isolated islands/bars and island building	benches of elevation	SCED- side channel enhancement dike	place dredge material on islands to raise island height	woody structures incorporation	remove revetment	improve WLM	convert traditional revetments to gsr
collect sand with rock structure	shallow slopes with deeper center	alternating point bars inside channel	mix dredge material to make suitable	bull-nose dikes or other structures	notch dikes	excavate perched wetland and plant native species	EPM
chevrons	raise the impoundment level of pool 26	riffle structures	plant climate adapted species	build islands	dike mod or enhancement to create div	earthwork on higher elevations areas.	
large bar around elsa/portage	planting native wetland species	woody piles/bundles	plantings	protect or armor existing islands	excavated benches	protection berm	
create slack-water areas with structures	planting native wetland species	remove or replace causeway	plant understory pollinator mix or shrubs	enhance existing islands with dredge disposal	dredge placement and island building	restore natural drainage	
create island with available material, might not be sand	vegetation protection	maintain or create benches or sloping bar habitat	TSI	invasive species control	slope bank lines	improve drainage	
divert flow to encourage deposition	river training structures	dredging	reforestations	slope bank lines to increase littoral zone	Bank-line scalping	ditch plugs	
shallow slow adjust bank slope	drawdown to achieve consolidated sediments	wide and shallow with deeper thalweg	reduce overland flows and sand deposition	adjust slope	gradual slope revetment		
gradual sloped sandbars	transition from forested to shrub to aquatic veg to open water	assisted meandering	create snags	wave/wake protection off island banklines			
w dike, z dike, mrs dike	deflect sediment from backwaters	add gravel or rock for mussels	invasive species treatments	maintain inland waterbodies for fish and bats			
need to be armored on the front	pile structures	increase flow					
various elevations to increase availability	both hinge and dam point greater flexibility	divert some flow from main channel to side channel					
multiple layers of armoring/sand/armoring sand	switch to dam point control	reduce sedimentation					
remove veg from existing sandbars	open upstream end to occasional flood flows						
alternative structures	open upper end of backwater for flows						
incorporate woody debris	bedload collectors						
wood piling	scouring structures, rock, or large wood						

Objective - Restore backwater connectivity, depth diversity, and aquatic vegetation to allow aquatic species to be more resilient to changes in their habitat.	**West Alton**	**Brickhouse Slough**	**Spatterdock Lake**	**Portage Island**	**Luesse Lake**	**Slim Island**	**Mason Island**
dredging 8' below min pool	x	x	x	x	x		x
dredging 5ft depth	x	x	x	x	x		x
excavation	x	x	x	x	x		x
benches of elevation	x		x	x	x		x
shallow slopes with deeper center	x	x	x	x	x		x
raise the impoundment level of pool 26							
planting native wetland species	x		x		x		
planting native wetland species	x		x				
vegetation protection	x		x	x			
river training structures	x	x		x			x
drawdown to achieve consolidated sediments	x		x		x		
transition from forested to shrub to aquatic veg to open water	x		x	x	x		x
deflect sediment from backwaters	x	x			x		x
pile structures		x					
both hinge and dam point greater flexibility	x		x		x		
switch to dam point control	x		x		x		
open upstream end to occasional flood flows	x	x					
open up upper end of backwater for flows							
bedload collectors							
scouring structures, rock, or large wood	x	x		x	x		x

Objective - Restore island and shoreline habitat for birds, bats, and fish species.	**West Alton**	**Brickhouse Slough**	**Spatterdock Lake**	**Portage Island**	**Luesse Lake**	**Slim Island**	**Mason Island**
dredging followed with willow planting						x	
prairie cord grass plantings for bank stabilization							
improve forested resource				x		x	
woody structures incorporation				x		x	
bull-nose dikes or other structures	x			x		x	
build islands	x			x		x	
protect or armor existing islands				x		x	
enhance existing islands with dredge disposal	x			x		x	
invasive species control	x			x		x	x
slope bank lines to increase littoral zone	x			x		x	
adjust slope				x		x	
wave/wake protection off island bank lines				x		x	
maintain inland waterbodies for fish and bats	x			x			x
Objective - Restore wetlands and wet prairie to increase habitat for pollinators, waterbirds, reptiles & amphibians, and fish.	**West Alton**	**Brickhouse Slough**	**Spatterdock Lake**	**Portage Island**	**Luesse Lake**	**Slim Island**	**Mason Island**
reduce invasive species			x		x		
increased connectivity					x		
increase depth diversity					x		
improve WLM			x		x		
excavate perched wetland and plant native species			x				
earthwork on higher elevations areas.							
protection berm			x				

restore natural drainage							
improve drainage							
ditch plugs			x				
restore existing wetlands/wet prairies			x		x		
enhance existing wetlands			x		x		
Objective - Restore age, structure, and species diversity of the forest in the study area over the period of analysis.	**West Alton**	**Brickhouse Slough**	**Spatterdock Lake**	**Portage Island**	**Luesse Lake**	**Slim Island**	**Mason Island**
raise elevations of low areas				x		x	x
create ridges				x		x	x
restore ridge/swale habitat				x		x	x
dredge material on islands for height				x		x	x
mix dredge material to make suitable				x		x	x
plant climate adapted species				x		x	x
plantings			x	x	x	x	x
plant understory pollinator mix or shrubs						x	x
TSI	x		x	x	x	x	x
reforestations						x	x
reduce overland flows and sand deposition							
create snags				x		x	x
invasive species treatments	x		x	x	x	x	x
Objective - Restore flow and depth diversity in the main channel margins and off channel areas over the period of analysis.	**West Alton**	**Brickhouse Slough**	**Spatterdock Lake**	**Portage Island**	**Luesse Lake**	**Slim Island**	**Mason Island**
sced for SC							
dike notch or removal						x	x
scour structures rock or wood						x	x
remove revetment							

notch dikes						x	x
dike mod or enhancement to create div						x	x
excavated benches							
dredge placement and island building	x			x		x	
slope bank lines	x			x		x	x
Bankline scalping				x		x	
gradual slope revetment				x		x	
Objective - Restore side channel depth and flow diversity for native riverine fish in the study area over the period of analysis.	**West Alton**	**Brickhouse Slough**	**Spatterdock Lake**	**Portage Island**	**Luesse Lake**	**Slim Island**	**Mason Island**
island/side channel creation				x		x	x
remove or notch closing structures						x	x
large boulder cluster							
SCED- side channel enhancement dike							
alternating point bars in side channel		x					
riffle structures						x	
woody piles/bundles						x	
remove or replace causeway							
Maintain/ create benches/sloping bar		x		x		x	
dredging		x				x	
wide and shallow with deeper thalweg		x				x	
assisted meandering		x					
add gravel or rock for mussels				x		x	
increase flow		x		x		x	
divert some flow from main channel to side channel		x		x		x	
reduce sedimentation		x		x		x	

Objective - Reduce wind and wave fetch impacts to the channel margin and off channel areas over the period of analysis.	**West Alton**	**Brickhouse Slough**	**Spatterdock Lake**	**Portage Island**	**Luesse Lake**	**Slim Island**	**Mason Island**
island construction	x			x		x	x
innovative structures	x			x		x	x
wave break structure off shoreline				x		x	x
convert traditional revetments to GSR				x			
EPM	x						
Objective - Restore sand bars to increase the habitat for various aquatic and terrestrial species such as interior least terns and softshell turtles as well as small bodied fish in the study area over the period of analysis.	**West Alton**	**Brickhouse Slough**	**Spatterdock Lake**	**Portage Island**	**Luesse Lake**	**Slim Island**	**Mason Island**
flex pipe dredging	x			x		x	x
structures to maintain side channel depth behind new sandbars				x		x	
sandbar/island creation	x			x		x	x
isolated islands/bars and island building	x			x		x	x
collect sand with rock structure	x			x		x	x
chevrons							
large bar around Elsah/Portage				x			
create slack water areas with structures				x		x	x
create island with available material	x			x		x	x
divert flow to encourage deposition	x			x		x	x
shallow slow adjust bank slope	x			x		x	x
gradual sloped sandbars	x			x		x	x
w dike				x		x	
z dike						x	

mrs dike						x	
need to be armored on the front	x			x		x	
various elevations to increase availability	x			x		x	
multiple layers of armoring /sand	x			x		x	
remove veg from existing sandbars							
enhance existing sandbars	x			x		x	
alternative structures	x			x		x	
incorporate woody debris				x		x	
wood piling				x		x	

3.0 SHPO COORDINATION

3.1 Letter to Missouri SHPO

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, ST. LOUIS DISTRICT
1222 SPRUCE STREET
ST. LOUIS, MISSOURI 63103-2833

REPLY TO
ATTENTION OF:

May 24, 2022

Engineering and Construction Division
Curation and Archives Analysis Branch

Subject: West Alton Project, St. Louis County, Missouri

Ms. Amy Rubingh
Review, Compliance, Records Coordinator
Missouri SHPO
1101 Riverside Drive
Jefferson City, Missouri 65101

Dear Ms. Rubingh:

The U.S. Army Corps of Engineers, St. Louis District (District) is presently proposing the West Alton Islands Habitat Rehabilitation and Enhancement Project (HREP) under the Upper Mississippi River Restoration (UMRR) program. The West Alton Islands project is comprised of three action areas: West Alton Bay, Portage Island, and Luesse Lake located between RM203 and RM216 (Figures 1 and 2). The purpose of the project is to create bathymetric, structural, and flow diversity and habitat for aquatic species and to create island, sandbar, mudflat, and emergent wetland habitat for wildlife. The project has reached the Tentatively Selected Plan (TSP) milestone, described below.

Proposed Work-TSP

The TSP is largely in-water work. At West Alton Bay Action Area all work is in water and includes dredging, island creation through the disposal of dredge material; island protection using rock; creation of bullnoses to protect newly created islands from erosion; creating berms and barbs and an overflow weir (Figure 1). No terrestrial work is proposed at West Alton Bay.

At Portage Island Action Area most work is in water and includes dredging; island creation through the disposal of dredge material; placement of barbs/groins of rock west of the island and two smaller islands; placement of rock as gradual slope revetment around the islands to protect and contain dredge material; placing woody bundles behind the bullnose at Portage Island and between the two smaller islands; trail dike placement at the south end of Portage Island; creating a sediment deflection dike; and creating a gravel bar. Terrestrial work is limited to dredge disposal on the northern side of Portage Island (Figure 2).

At Luesse Lake all work is in water. Proposed work includes dredging and island creation using dredge materials (Figure 2). No terrestrial work is proposed at Luesse Lake.

Potential Effect on Cultural Resources

Historic maps indicate the Mississippi River bankline was farther north in the past. West Alton Bay and Luesse Lake action areas were landmasses in the 19th century and inundated in the 20th century, likely fluctuating with river levels (Figures 3 and 4). Portage Island likely was formed in the late 19th century and has changed shape over time, moving southward (Figure 4).

There are no recorded archaeological sites in any of the action areas. West Alton Bay has never been studied for cultural resources. One survey overlaps a small portion of Luesse Lake (Hood 2018). One records study was performed for Portage Island (Rusch 1999). The District performed a pedestrian survey and auger testing at Portage Island in 2018. The survey found the island is covered in recent extensive modern alluvium (Smith 2018). No artifacts or evidence of an archaeological site was found in any of the previous surveys.

Summary and Conclusions

In summary, the proposed TSP is largely in-water work, including dredging, creation of islands, island protection, and habitat creation through the construction of dikes, weirs, etc. Terrestrial work is limited to dredge disposal on the northern side of Portage Island. This area was included in the 2018 survey conducted by the District, which found extensive deposits of recent alluvium and no cultural resources. For these reasons, the District finds that the project will have no adverse effect on historic properties.

Should you have any questions, please contact District Archaeologist Kristen Fuld at (314) 331-8267 or email kristen.a.fuld@usace.army.mil.

Sincerely,

SMITH.MARK.A.1037148934 Digitally signed by SMITH.MARK.A.1037148934 Date: 2023.05.25 07:30:51 -05'00'

For Jennifer L. Riordan
Chief, Curation and Archives
Analysis Branch

References Cited:

Hood, Angela N.
2018 *Spire STL Pipeline Project*; GAI Consultants, Inc., Lisle, IL

Rusch, Lynn
1999 *An Archaeological and Historical Records Study of the Mark Twain National Wildlife Refuge in Illinois, Iowa, and Missouri*; Midwest Archaeological Consulting, Research Report Number 65; Madison, WI

Smith, Mark A.
2018 US Army Corps of Engineers Letter to Ms. Heather Gibb, Office of Historic Preservation, Missouri Department of Natural Resources regarding Forest Management actions, Mason and Portage Islands, St. Charles County, MO.A

3.2 Letter from Missouri SHPO

MISSOURI DEPARTMENT OF NATURAL RESOURCES

Michael L. Parson
Governor

Dru Buntin
Director

August 2, 2023

U.S. Army Corps of Engineers
St. Louis District
Attn: Kristen Fuld
1222 Spruce Street
St. Louis, MO 63103-2833

Re: **SHPO Project Number: 145-SL-23** – West Alton Islands – Habitat Rehabilitation and Enhancement Project, St. Louis County, Missouri (USACE)

Dear Kristen Fuld:

Thank you for submitting information to the State Historic Preservation Office (SHPO) regarding the above-referenced project for review pursuant to Section 106 of the National Historic Preservation Act, P.L. 89-665, as amended (NHPA), and the Advisory Council on Historic Preservation's regulation 36 CFR Part 800, which require identification and evaluation of historic properties.

We have reviewed the information regarding the above-referenced project and have included our comments on the following page(s). Please retain this documentation as evidence of consultation with the Missouri SHPO under Section 106 of the NHPA. SHPO concurrence does not complete the Section 106 process as federal agencies will need to conduct consultation with all interested parties. **Please be advised that, if the current project area or scope of work changes, such as a borrow area being added, or cultural materials are encountered during construction, appropriate information must be provided to this office for further review and comment.**

If you have questions please contact the SHPO at (573) 751-7858 or call/email Amy Rubingh, (573) 751-4589, amy.rubingh@dnr.mo.gov. If additional information is required please submit the information via email to MOSection106@dnr.mo.gov.

Sincerely,

STATE HISTORIC PRESERVATION OFFICE
Toni M. Prawl
Toni M. Prawl, PhD
Director and Deputy
State Historic Preservation Officer

PO Box 176, Jefferson City, MO 65102-0176 • dnr.mo.gov

August 2, 2023
Kristen Fuld
Page 2 of 2

SHPO Project Number: 145-SL-23 – West Alton Islands – Habitat Rehabilitation and Enhancement Project, St. Louis County, Missouri (USACE)

COMMENTS:

Adequate documentation has been provided as outlined in 36 CFR Section 800.11. After review of the initial submission, the project area has no known historic properties present and a low potential for the occurrence of cultural resources. SHPO concurs with your determination of **No Historic Properties Affected**.

SHPO Reviewer: Amy Rubingh, (573) 751-4589, amy.rubingh@dnr.mo.gov

3.3 West Alton Island HREP Figures

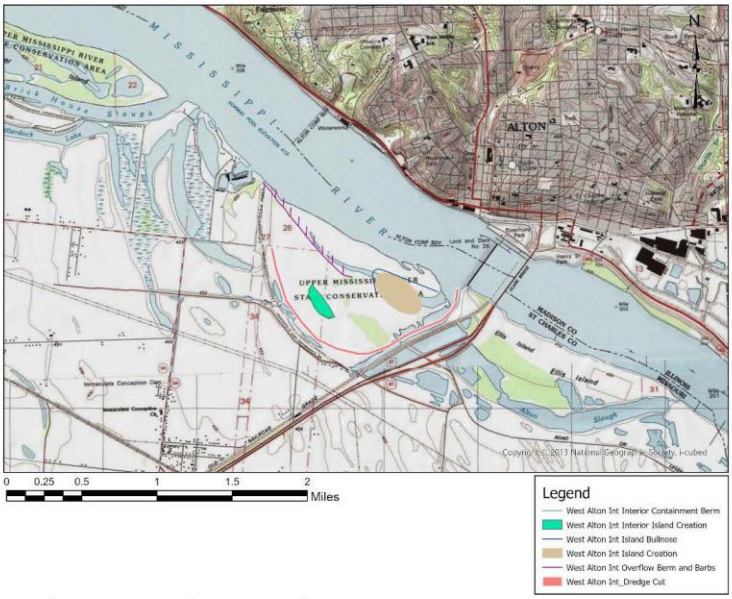


Figure 1. West Alton Bay Action Area

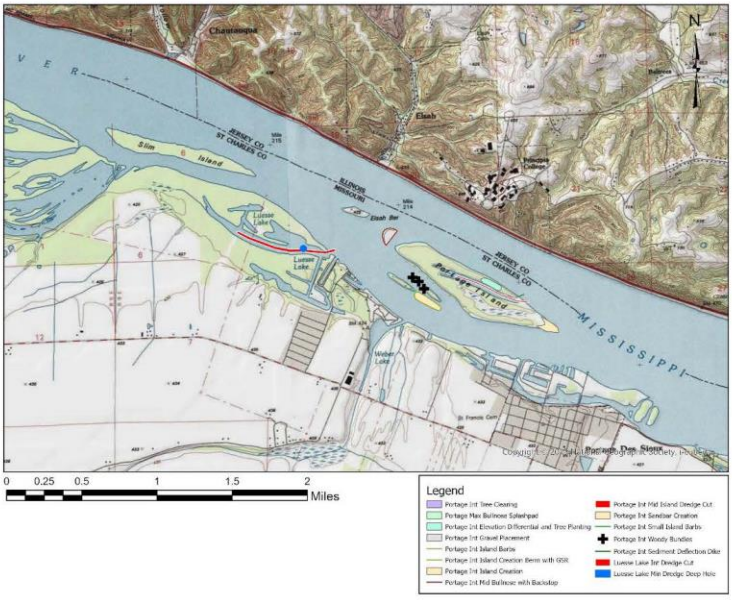


Figure 2. Portage Island and Luesse Lake Action Areas

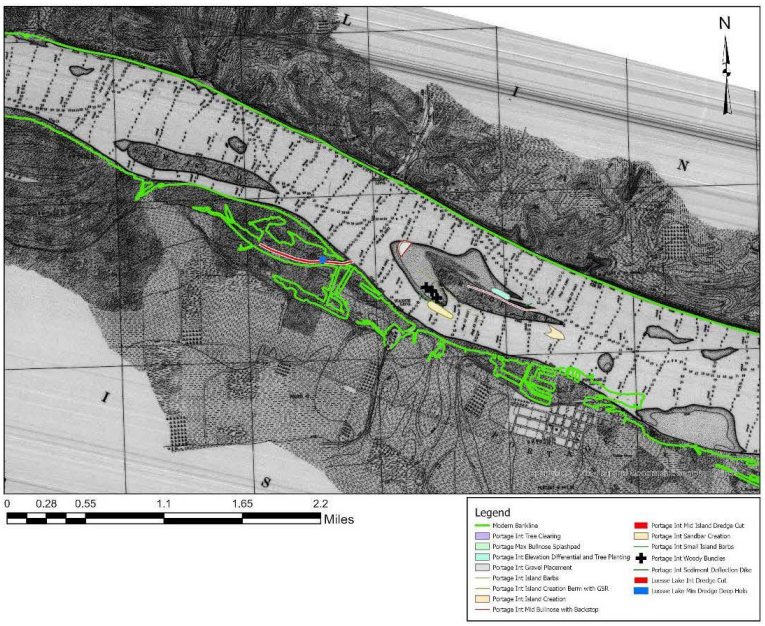


Figure 3. 1880 MRC chart showing the West Alton Action Area

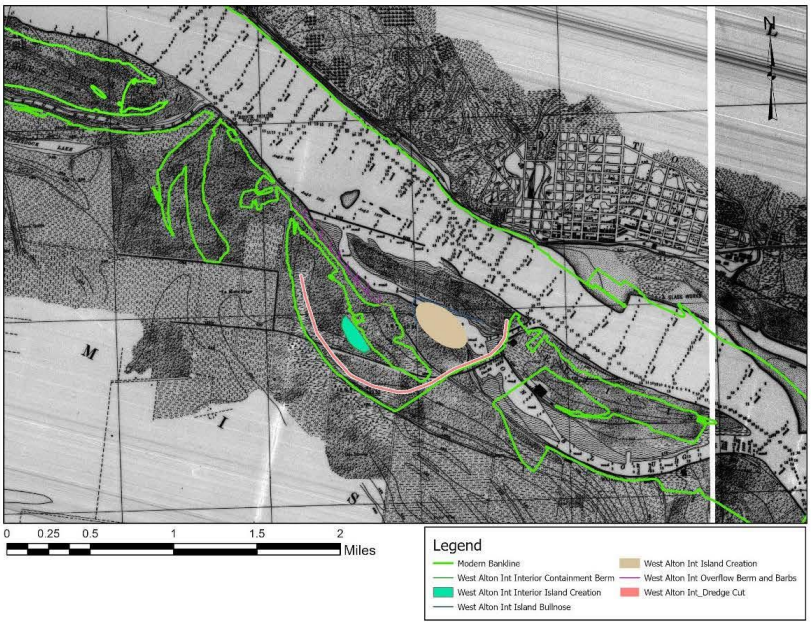


Figure 4. 1880 MRC Chart showing the Portage Island and Luesse Lake Action Areas

4.0 TRIBAL COORDINATION

4.1 Initial Letter to Consulting Tribes

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, ST. LOUIS DISTRICT
1222 SPRUCE STREET
ST. LOUIS, MISSOURI 63103-2833

June 28, 2023

Engineering and Construction Division
Curation and Archives Analysis Branch

Subject: West Alton HREP, St. Charles County, Missouri

Ms. Devon Frazier Smith
Tribal Historic Preservation Officer
Absentee-Shawnee Tribe of Indians of Oklahoma
2025 S. Gordon Cooper Drive
Shawnee, OK 74801

Dear Ms. Frazier Smith:

The U.S. Army Corps of Engineers, St. Louis District (District), is contacting your Tribe to initiate consultation pertaining to a Habitat Rehabilitation and Enhancement Project (HREP) of the West Alton Islands in St. Charles County, Missouri, in accordance with Section 106 of the National Historic Act of 1966, as amended. The West Alton Islands project is composed of three action areas: West Alton Bay, Portage Island, and Luesse Lake located between RM203 and RM216 (Figures 1 and 2). The purpose of the project is to create bathymetric, structural, and flow diversity and habitat for aquatic species and to create island, sandbar, mudflat, and emergent wetland habitat for wildlife. The project has reached the Tentatively Selected Plan (TSP) milestone.

The TSP is largely in-water work. At West Alton Bay, all work is in water and includes dredging, island creation through the disposal of dredge material; island protection using rock; creation of bullnoses to protect newly created islands from erosion; creating berms and barbs and an overflow weir (Figure 1). No terrestrial work is proposed at West Alton Bay.

At Portage Island, most work is in water and includes dredging; island creation through the disposal of dredge material; placement of barbs/groins of rock west of the island and two smaller islands; placement of rock as gradual slope revetment around the islands to protect and contain dredge material; placing woody bundles behind the bullnose at Portage Island and between the two smaller islands; trail dike placement at the south end of Portage Island; creating a sediment deflection dike; and creating a gravel bar. Terrestrial work is limited to dredge disposal on the northern side of Portage Island (Figure 2).

At Luesse Lake all work is in water. Proposed work includes dredging and island creation using dredge materials (Figure 2). No terrestrial work is proposed at Luesse Lake.

Historic maps indicate the Mississippi River bankline was farther north in the past. West Alton Bay and Luesse Lake action areas were landmasses in the 19th century and inundated in the 20th century, likely fluctuating with river levels (Figures 3 and 4). Portage Island likely was formed in the late 19th century and has changed shape over time, moving southward (Figure 4).

There are no recorded archaeological sites in any of the action areas. West Alton Bay has never been studied for cultural resources. Survey SL-1192 for a pipeline overlaps a small portion of Luesse Lake. No cultural resources were identified during this survey. One records study was

performed for Portage Island (Survey JE-127). In 2018, the District performed a pedestrian survey and auger testing at Portage Island and no cultural resources were identified.

The proposed TSP is largely in-water work, including dredging, creation of islands, island protection, and habitat creation through the construction of dikes, weirs, etc. Terrestrial work is limited to dredge disposal on the northern side of Portage Island. This area was included in the 2018 survey conducted by the District, which found extensive deposits of recent alluvium and no cultural resources. For these reasons, the District finds that the project will have no adverse effect on historic properties.

The District is requesting that you review the map and information about the project and notify our office if you have any concerns about sacred sites or other resources in the study area or if your Tribe has indigenous knowledge you are willing to share. If you have any questions or comments, please feel free to contact me at (314) 331-8855 or contact Meredith Hawkins Trautt (Tribal Liaison) at (314) 925-5031 or email Meredith.M.Trautt@usace.army.mil.

Sincerely,

SIGNED

Jennifer L. Riordan
Chief, Curation and Archives
Analysis Branch

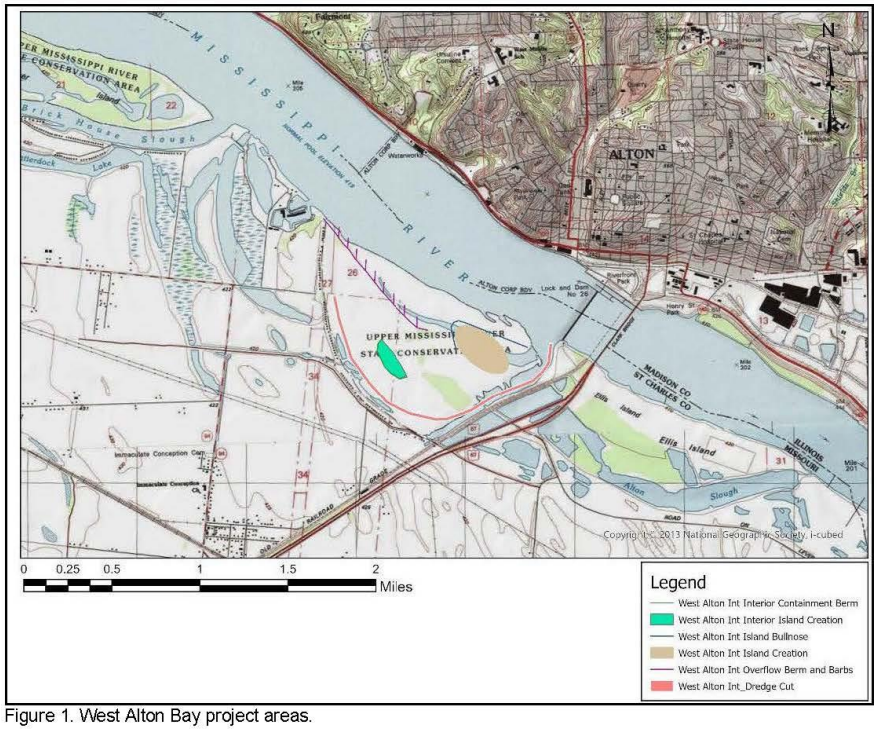


Figure 1. West Alton Bay project areas.

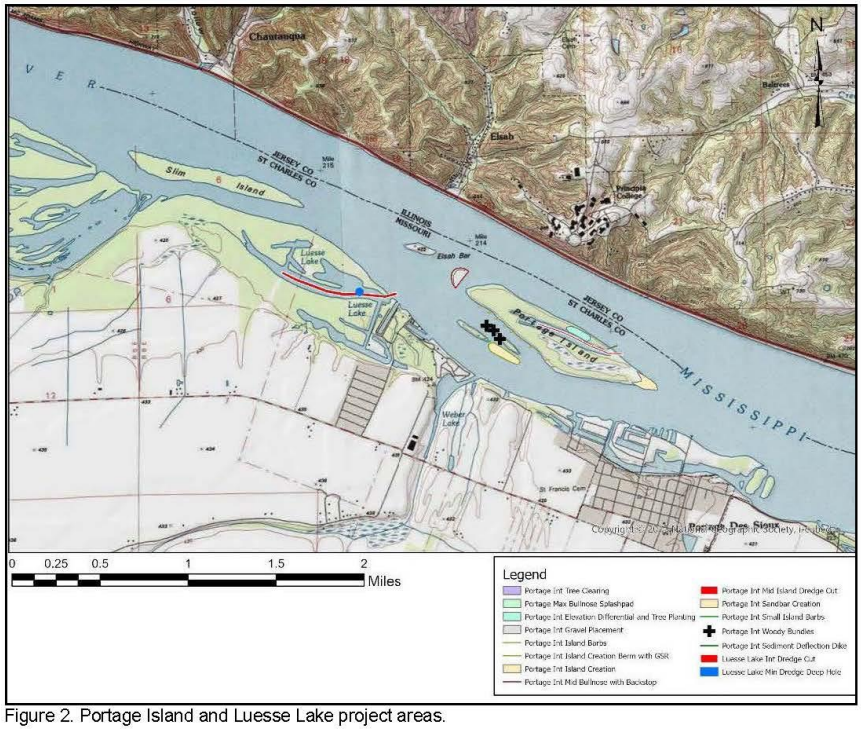


Figure 2. Portage Island and Luesse Lake project areas.

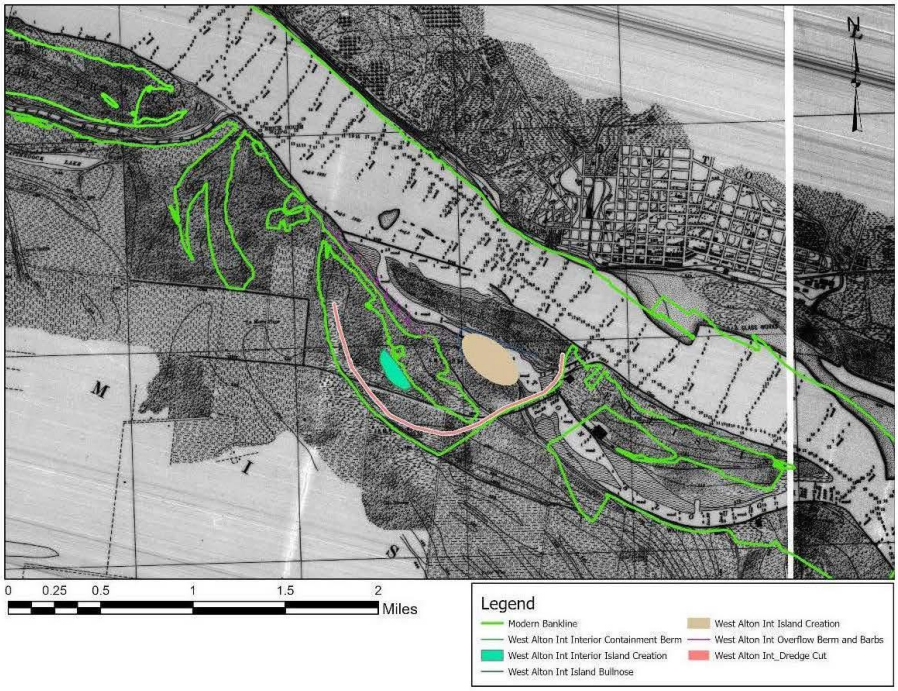


Figure 3. 1880 MRC chart showing the West Alton project area

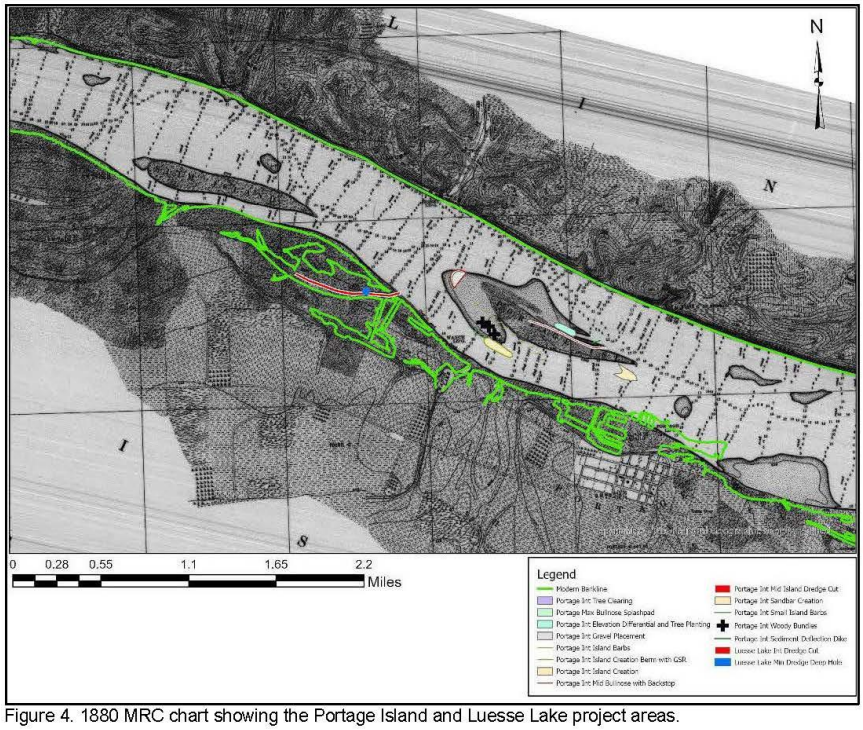


Figure 4. 1880 MRC chart showing the Portage Island and Luesse Lake project areas.

4.1.1 Tribal Distribution List

MVS Leaders

Tribe	Name (First, Middle, Last)	Street Address	City	State	Zip	Furnished Copy
Absentee-Shawnee Tribe of Indians of Oklahoma	Governor John Raymond Johnson c/o Representative Alicia Miller	2025 S. Gordon Cooper Drive	Shawnee	OK	74801	Ms. Carol Butler and Ms. Devon Frazier Smith
Caddo Nation of Oklahoma	Chairman Bobby Gonzalez	P.O. Box 487	Binger	OK	73009	Mr. Jonathan M. Rohrer
Citizen Potawatomi Nation, Oklahoma	Chairman John Barrett	1601 S. Gordon Cooper Drive	Shawnee	OK	74801	Ms. Tracy Wind
Eastern Shawnee Tribe of Oklahoma	Chief Glenna J. Wallace	12755 S. 705 Road	Wyandotte	OK	74370	Mr. Paul Barton
Forest County Potawatomi Community, Wisconsin	Chairman James A. Crawford	P.O. Box 340, 5416 Everybody's Road	Crandon	WI	54520	Mr. Benjamin Rhodd
Hannahville Indian Community, Michigan	Chairman Kenneth Meshigaud	N 14911 Hannahville B-1 Road	Wilson	MI	49896	Mr. Earl Meshigaud
Ho-Chunk Nation of Wisconsin	President Marlon White Eagle	P.O. Box 667	Black River Falls	WI	54615	Mr. William Quackenbush
Iowa Tribe of Kansas and Nebraska	Chairman Tim Rhodd	3345 Thrasher Road, #8	White Cloud	KS	66094	Mr. Lance Foster and Mr. Alan Kelley
Iowa Tribe of Oklahoma	Chairman Edgar B. Kent, Jr.	335588 E. 750 Rd	Perkins	OK	74059	Ms. Candace Pershall
Kickapoo Tribe of Indians of the Kickapoo Reservation in Kansas	Chairman Lester Randall	824 111th Drive	Horton	KS	66439	Ms. Johanna Thomas
Kickapoo Tribe of Oklahoma	Chairman Darwin Kaskaske	105365 S. Hwy 102	McCloud	OK	74851	Ms. Kay Rhoads
Match-E-Be-Nash-She-Wish Band of Pottawatomi Indians	Chairman Bob Peters	2872 Mission Dr.	Shelbyville	MI	49344	Ms. Lakota Hobia
Miami Tribe of Oklahoma	Chief Douglas Lankford	P.O. Box 1326	Miami	OK	74355	Ms. Diane Hunter
Nottawaseppi Huron Band of the Potawatomi, Michigan	Chairman Jamie Stuck	2221—1 & 1/2 Mile Road	Fulton	MI	49052	Mr. Frederick Jacko

Peoria Tribe of Indians of Oklahoma	Chief Craig Harper	P.O. Box 1527	Miami	OK	74355	Ms. Burgundy Fletcher
Prairie Band Potawatomi Nation	Chairperson Joseph Rupnick	Government Center, 16281 Q Road	Mayetta	KS	66509	Ms. Tara Mitchell
Sac & Fox Nation of Missouri in Kansas and Nebraska	Chairperson Tiauna Carnes	305 N. Main Street	Reserve	KS	66434	Mr. Gary Bahr
Sac & Fox Nation, Oklahoma	Principal Chief Justin F. Woods	920963 S Highway 99	Stroud	OK	74079	Mr. Chris Boyd
Sac & Fox Tribe of the Mississippi in Iowa	Chairman Vern Jefferson	349 Meskwaki Road	Tama	IA	52339	Mr. Johnathan Buffalo
Shawnee Tribe	Chief Benjamin Barnes	29 S Hwy 69A	Miami	OK	74354	Ms. Tonya Tipton
Quapaw Nation	Chairman Joseph Byrd	P.O. Box 765	Quapaw	OK	74363	Mr. Everett Bandy
United Keetoowah Band of Cherokee of Oklahoma	Chief Joe Bunch	P.O. Box 746	Tahlequah	OK	74464	Mr. Acee Watt

MVS Reps Hard Copy

Tribe	Title	Name (First, Middle, Last)	Position	Street Address	City	State	Zip
Absentee-Shawnee Tribe of Indians of Oklahoma	Ms.	Carol Butler	Cultural Preservation Director	2025 S. Gordon Cooper Drive	Shawnee	OK	74801
Caddo Nation of Oklahoma	Mr.	Jonathan M. Rohrer	Tribal Historic Preservation Officer	P.O. Box 487	Binger	OK	73009
Hannahville Indian Community, Michigan	Mr.	Earl Meshigaud	Historic Preservation Office	P.O. Box 351, Highway 2 & 41	Harris	MI	49845
Iowa Tribe of Kansas and Nebraska	Mr.	Lance Foster	Tribal Historic Preservation Officer	3345B Thrasher Road	White Cloud	KS	66094
Iowa Tribe of Oklahoma	Ms.	Candace Pershall	Cultural Preservation	335588 E. 750 Rd	Perkins	OK	74875
Kickapoo Tribe of Oklahoma	Ms.	Kay Rhoads	OSG Director/NAGPRA Representatives	P.O. Box 70, 105365 S. Hwy 102	McCloud	OK	74851
Match-E-Be-Nash-She-Wish Band of Pottawatomi Indians	Ms.	Lakota Hobia	Tribal Historic Preservation Officer	2872 Mission Drive	Shelbyville	MI	49344

Prairie Band Potawatomi Nation	Ms.	Tara Mitchell	Deputy Tribal Historic Preservation Officer	Government Center, 16281 Q Road	Mayetta	KS	66509
Sac & Fox Nation, Oklahoma	Mr.	Chris Boyd	NAGPRA/Historic Preservation Office	920963 S Highway 99	Stroud	OK	74079
Sac & Fox Tribe of the Mississippi in Iowa	Mr.	Johnathan Buffalo	Historic Preservation Office	349 Meskwaki Road	Tama	IA	52339
Quapaw Nation	Mr.	Everett Bandy	Tribal Historic Preservation Officer	ATTN: QNHPP, P.O. Box 765	Quapaw	OK	74363

MVS Reps Electronic Copy

Tribe	Name (First, Middle, Last)	Position	Street Address	City	State	Zip	Email
Absentee-Shawnee Tribe of Indians of Oklahoma	Ms. Devon Frazier Smith	Tribal Historic Preservation Officer	2025 S. Gordon Cooper Drive	Shawnee	OK	74801	dfrazier@astribe.com
Citizen Potawatomi Nation, Oklahoma	Ms. Tracy Wind	Assistant Tribal Historic Preservation Officer	Cultural Heritage Center, 1601 S. Gordon Drive	Shawnee	OK	74801	cpnthpo@potawatomi.org
Eastern Shawnee Tribe of Oklahoma	Mr. Paul Barton	Tribal Historic Preservation Officer	70500 E. 128 Road	Wyandotte	OK	74370	THPO@estoo.net
Forest County Potawatomi Community, Wisconsin	Mr. Benjamin Rhodd	Tribal Historic Preservation Officer	8130 Mish ko Swen Dr., P.O. Box 340	Crandon	WI	54520	Benjamin.Rhodd@fcp-nsn.gov
Ho-Chunk Nation of Wisconsin	Mr. William Quackenbush	Tribal Historic Preservation Officer	P.O. Box 667	Black River Falls	WI	54615	bill.quackenbush@ho-chunk.com

Iowa Tribe of Kansas and Nebraska	Mr. Alan Kelley	Deputy Tribal Historic Preservaiton Officer	3345 Thrasher Road	White Cloud	KS	66094	akelley@iowas.org
Kickapoo Tribe of Indians of the Kickapoo Reservation in Kansas	Ms. Johanna Thomas	Vice Chairman	824 111th Drive	Horton	KS	66439	johannathomas83@yahoo.com
Miami Tribe of Oklahoma	Ms. Diane Hunter	Tribal Historic Preservation Officer	202 S. Eight Tribes Trail, P.O. Box 1326	Miami	OK	74355	THPO@MiamiNation.com;
Nottawaseppi Huron Band of the Potawatomi, Michigan	Mr. Frederick Jacko	Tribal Historic Preservation Officer	1485 MNO--Bmadzen Way	Fulton	MI	49052	Frederick.Jacko@nhbp-nsn.ogv
The Osage Nation	Dr. Andrea Hunter	Historic Preservation Office	627 Grandview Avenue	Pawhuska	OK	74056	s106@osagenation-nsn.gov
Peoria Tribe of Indians of Oklahoma	Ms. Burgundy Fletcher	Tribal Historic Preservation Specialist	118 S. Eight Tribes Trail	Miami	OK	74354	bfletcher@peoriatribe.com
Sac & Fox Nation of Missouri in Kansas and Nebraska	Mr. Gary Bahr	Vice Chairperson	305 N. Main Street	Reserve	KS	66434	gary.bahr@sacfoxks.com
Shawnee Tribe	Ms. Tonya Tipton	Historic Preservation Office	P.O. Box 189	Miami	OK	74355	Section106@shawnee-tribe.com

United Keetoowah Band of Cherokee of Oklahoma	Mr. Acee Watt	Tribal Historic Preservation Officer	P.O. Box 746	Tahlequah	OK	74464	ukbthpo@ukb-nsn.gov

4.2 Tribal Response

From: Jonathan Rohrer
To: Trautt, Meredith M CIV USARMY CEMVS (USA)
Subject: [URL Verdict: Unknown][Non-DoD Source] West Alton HREP, St. Charles County, Missouri -
Date: Thursday, July 6, 2023 8:35:28 AM

Meredith Hawkins,

Thank you for your report, received on 07-05-2023. The Caddo Nation of Oklahoma appreciates your willingness to conduct proper consultation, pursuant to Section 106 of the National Historic Preservation Act. At this time the Caddo Nation has no additional information to add. However, in the event that any projects may be proposed in the subject area, we would need to be notified as soon as possible.

Should you have any questions or concerns regarding our response please feel free to contact our office.

Best regards,

Jonathan

Jonathan M. Rohrer
Tribal Historic Preservation Officer

Caddo Nation
P.O. Box 487
Binger, OK 73009
t: (405)656-0970 Ext. 2070
e: jrohrer@mycaddonation.com

www.mycaddonation.com

Via email: Meredith.M.Trautt@usace.army.mil

July 20, 2023

Jennifer L. Riordan
USACE – St. Louis District
1222 Spruce Street
St. Louis, MO 63103-2833

RE: HREP of West Alton Bay in St. Charles, MO

Dear Jennifer Riordan:

The Peoria Tribe accepts the invitation to serve as a consulting party to the proposed project. In my capacity as Historic Preservation Specialist, I am the point of contact for all Section 106 consultations.

Respectfully,

Burgundy Fletcher

Burgundy Fletcher
Historic Preservation Specialist

From: Burgundy Fletcher
To: Trautt, Meredith M CIV USARMY CEMVS (USA)
Subject: [Non-DoD Source] RE: [External] Email West Alton HREP, St. Charles County, Missouri
Date: Monday, September 25, 2023 9:54:38 AM
Attachments: image002.png
image003.png

Hello Meredith,

The Peoria have no objection to the West Alton HREP project.

Thank you.

Burgundy Fletcher
Historic Preservation Specialist
Peoria Tribe of Oklahoma
Office 918.544.9234 | Fax 918.540.2528
bfletcher@peoriatribe.com

-

PEORIA TRIBE
CULTURAL PRESERVATION

From: Trautt, Meredith M CIV USARMY CEMVS (USA) <Meredith.M.Trautt@usace.army.mil>
Sent: Monday, August 21, 2023 4:12 PM
To: Burgundy Fletcher <bfletcher@peoriatribe.com>
Subject: RE: [External] Email West Alton HREP, St. Charles County, Missouri

Good afternoon, Burgundy,
The St. Louis District wanted to follow up with the Peoria Tribe's response to being a consulting party for the proposed undertaking in West Alton, St. Charles County, MO. Specifically, the District is requesting to know if the Peoria Tribe has any objections to the proposed action. As a refresher, the West Alton HREP project is predominately in-water work through dredging, dredge placement for island creation, and the placement of barbs/groins of rock and woody bundles within the water around the islands. Terrestrial work will be limited to the placement of dredge disposal on the northern side of Portage Island. Historic maps indicate that Portage Island was likely created in the 19th century and has been altered by river activity since that time. Additionally, in 2018 Portage Island was surveyed by the District, and no cultural resources were identified. For these reasons, it is the District's opinion that the project will have no adverse effect on historic properties.

If you have any questions or would like to discuss this project further, please call me at (314) 798-2169.

Sincerely,

Meredith Hawkins Trautt, M.S., RPA
Archaeologist and Tribal Liaison
U.S. Army Corps of Engineers, St. Louis District
MCX CMAC, EC Z
1222 Spruce Street
St. Louis, MO 63109
Office: (314) 925-5031
Mobile: (314) 798-2169
Pronouns: she/her

From: Burgundy Fletcher <bfletcher@peoriatribe.com>
Sent: Thursday, July 20, 2023 9:32 AM
To: Trautt, Meredith M CIV USARMY CEMVS (USA) <Meredith.M.Trautt@usace.army.mil>
Subject: [Non-DoD Source] RE: West Alton HREP, St. Charles County, Missouri

Hello Meredith,

Please see the attached 106 response.

Thank you.

Burgundy Fletcher
Historic Preservation Specialist
Peoria Tribe of Indians of Oklahoma
Office 918.540.2535 Ext. 9234 | Fax 918.540.2538
bfletcher@peoriatribe.com

PEORIA TRIBE
CULTURAL PRESERVATION

From: Trautt, Meredith M CIV USARMY CEMVS (USA) <Meredith.M.Trautt@usace.army.mil>
Sent: Wednesday, June 28, 2023 1:52 PM
To: Burgundy Fletcher <bfletcher@peoriatribe.com>
Subject: [External] Email West Alton HREP, St. Charles County, Missouri

Dear Ms. Fletcher,
Please see the attached letter pertaining to a U.S. Army Corps of Engineers, St. Louis District, Habitat Rehabilitation and Enhancement Project in West Alton, St. Charles County, Missouri.

Sincerely,

QUAPAW NATION

P.O. Box 765
Quapaw, OK 74363-0765

(918) 542-1853
FAX (918) 542-4694

July 10, 2023

Jennifer L. Riordan
Department of the Army
U.S. Army Corps of Engineers, St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

Re: West Alton HREP, St. Charles Co, MO

Dear Jennifer L. Riordan,

The Quapaw Nation Historic Preservation Program (QNHPP) has received notification of the proposed project listed as West Alton HREP, St. Charles Co, MO.

In accordance with the National Historic Preservation Act, (NHPA) [16 U.S C. 470 §§ 470-470w-6] 1966, undertakings subject to the review process are referred to in S101 (d) (6) (A), which clarifies that historic properties may have religious and cultural significance to Indian tribes. Additionally, Section 106 of NHPA requires Federal agencies to consider the effects of their actions on historic properties (36 CFR Part 800) as does the National Environmental Policy Act (43 U.S.C. 4321 and 4331-35 and 40 CFR 1501.7(a) of 1969).

The Quapaw Nation has a vital interest in protecting its historic and ancestral cultural resources. The Quapaw Nation requests that a cultural reconnaissance survey be conducted for the project listed as ***project name***.

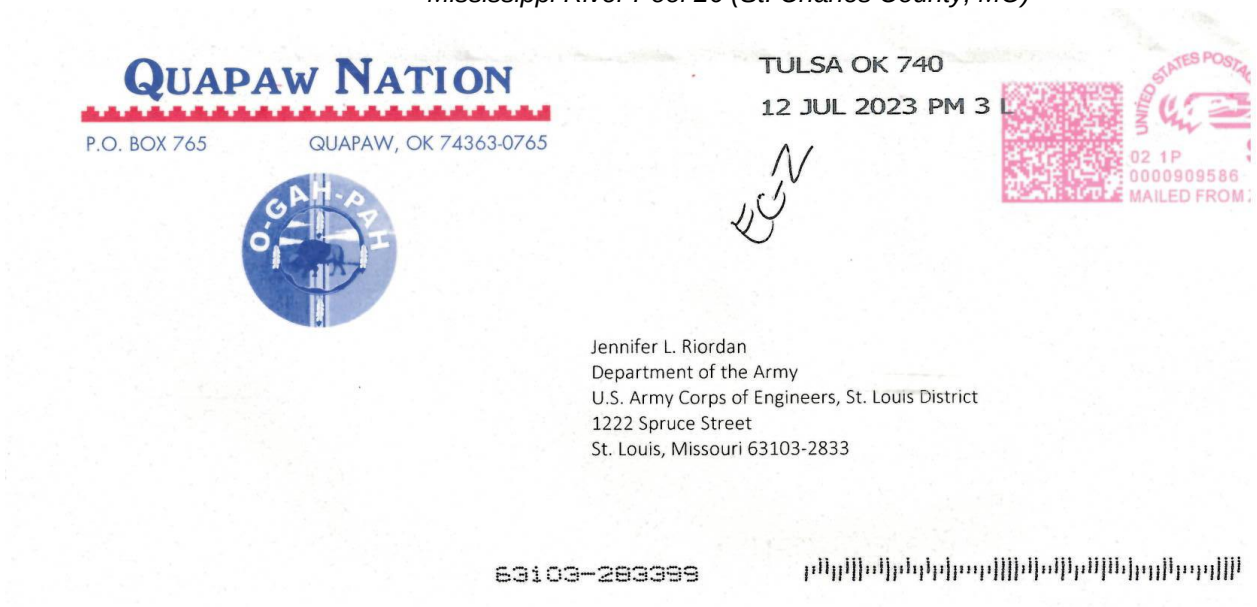
Please contact the Quapaw Nation Historic Preservation Office with your response to this request. This office looks forward to receiving and reviewing the cultural resource survey report for the proposed project listed as ***project name.*** The Quapaw Nation requires that cultural resource survey personnel and reports follow the Secretary of Interior's standards and guidelines.

Should you have any questions or need any additional information, please feel free to contact Cheyenne Greenup at Cheyenne.greenup@quapawnation.com, please copy section106@quapawnation.com to insure additional informational request are reviewed in a timely manner. Thank you for consulting with the Quapaw Nation on this matter.

Sincerely,

Cheyenne Greenup

On behalf of
-Everett Bandy
Preservation Officer/ QHPP Director
Quapaw Nation
P.O. Box 765
Quapaw, OK 74363
(w) 918-238-3100



QUAPAW NATION
P.O. BOX 765 QUAPAW, OK 74363-0765

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MAILED FROM

Jennifer L. Riordan
Department of the Army
U.S. Army Corps of Engineers, St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

63103-283399

From: Trautt, Meredith M CIV USARMY CEMVS (USA)
To: Everett Bandy
Subject: USACE, St. Louis District, West Alton HREP Quapaw Comments
Date: Wednesday, August 16, 2023 3:56:00 PM
Attachments: Quapaw - West Alton HREP.pdf

Good afternoon, Everett,
The St. Louis District recently received the attached letter from the Quapaw Nation pertaining to the West Alton HREP project in St. Charles County, MO. The letter requests that a cultural reconnaissance survey be conducted. The West Alton HREP project is predominately in-water work through dredging, dredge placement for island creation, and the placement of barbs/groins of rock and woody bundles within the water around the islands. Terrestrial work will be limited to the placement of dredge disposal on the northern side of Portage Island. Historic maps indicate that Portage Island was likely created in the 19th century and has been altered by river activity since that time. Additionally, in 2018 Portage Island was surveyed by the District, and no cultural resources were identified. For these reasons, it is the District's opinion that the project will have no adverse effect on historic properties.

If the Quapaw Nation has information not currently available to the District, please let me know and the District will reevaluate its decision. If you would like to discuss this further, you may call me at (314) 78-2169.

Sincerely,

Meredith Hawkins Trautt, M.S., RPA
Archaeologist and Tribal Liaison
U.S. Army Corps of Engineers, St. Louis District
MCX CMAC, EC Z
1222 Spruce Street
St. Louis, MO 63109
Office: (314) 925-5031
Mobile: (314) 798-2169
Pronouns: she/her

From: Trautt, Meredith M CIV USARMY CEMVS (USA)
To: Cheyenne Greenup
Subject: RE: USACE, St. Louis District, West Alton HREP
Date: Monday, August 28, 2023 9:45:00 AM
Attachments: Mason-Portage Islands SHPO - Outgoing - Revised.pdf

Good morning, Cheyenne,
I have attached the 2018 report of the archaeological survey of Mason and Portage Islands. Please let me know if you have any further questions or comments.

Sincerely,

Meredith Hawkins Trautt, M.S., RPA
Archaeologist and Tribal Liaison
U.S. Army Corps of Engineers, St. Louis District
MCX CMAC, EC Z
1222 Spruce Street
St. Louis, MO 63109
Office: (314) 925-5031
Mobile: (314) 798-2169
Pronouns: she/her

From: Cheyenne Greenup <cheyenne.greenup@quapawnation.com>
Sent: Thursday, August 24, 2023 2:37 PM
To: Trautt, Meredith M CIV USARMY CEMVS (USA) <Meredith.M.Trautt@usace.army.mil>
Subject: [Non-DoD Source] USACE, St. Louis District, West Alton HREP

Good afternoon,

Everett had asked me to clear up some confusion form our letter. I had sent the wrong letter I was wanting a copy of the previous surveys for the area since the area itself had not been surveyed. If you have any questions, please let me know.

Thank you,

Cheyenne Greenup
Section 106 Research Coordinator
Quapaw Nation
P.O. Box 765
Quapaw, OK 74363
(W) 918-238-3100 ext.6109

5.0 U.S. FISH AND WILDLIFE SERVICE

Missouri Ecological Services Field Office

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Missouri Ecological Services Field Office
101 Park Deville Drive
Suite A
Columbia, MO 65203-0057
Phone: (573) 234-2132 Fax: (573) 234-2181

In Reply Refer To:
Project Code: 2023-0132801
Project Name: West Alton Islands HREP

September 25, 2023

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

Threatened and Endangered Species

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and may be affected by your proposed project. The species list fulfills the requirement for obtaining a Technical Assistance Letter from the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).
New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. **Note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days.** The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

Consultation Technical Assistance

Refer to the Midwest Region S7 Technical Assistance website for step-by-step instructions for making species determinations and for specific guidance on the following types of projects:

projects in developed areas, HUD, pipelines, buried utilities, telecommunications, and requests for a Conditional Letter of Map Revision (CLOMR) from FEMA.

Federally Listed Bat Species

Indiana bats, gray bats, and northern long-eared bats occur throughout Missouri and the information below may help in determining if your project may affect these species.

Gray bats - Gray bats roost in caves or mines year-round and use water features and forested riparian corridors for foraging and travel. If your project will impact caves, mines, associated riparian areas, or will involve tree removal around these features – particularly within stream corridors, riparian areas, or associated upland woodlots –gray bats could be affected.
Indiana and northern long-eared bats - These species hibernate in caves or mines only during the winter. In Missouri the hibernation season is considered to be November 1 to March 31. During the active season in Missouri (April 1 to October 31) they roost in forest and woodland habitats. Suitable summer habitat for Indiana bats and northern long-eared bats consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags ≥5 inches diameter at breast height (dbh) for Indiana bat, and ≥3 inches dbh for northern long-eared bat, that have exfoliating bark, cracks, crevices, and/or hollows), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Tree species often include, but are not limited to, shellbark or shagbark hickory, white oak, cottonwood, and maple. Individual trees may be considered suitable habitat when they exhibit the characteristics of a potential roost tree and are located within 1,000 feet (305 meters) of other forested/wooded habitat. Northern long-eared bats have also been observed roosting in human-made structures, such as buildings, barns, bridges, and bat houses; therefore, these structures should also be considered potential summer habitat and evaluated for use by bats. If your project will impact caves or mines or will involve clearing forest or woodland habitat containing suitable roosting habitat, Indiana bats or northern long-eared bats could be affected.
Examples of unsuitable habitat include:

- Individual trees that are greater than 1,000 feet from forested or wooded areas;
- Trees found in highly-developed urban areas (e.g., street trees, downtown areas);
- A pure stand of less than 3-inch dbh trees that are not mixed with larger trees; and
- A stand of eastern red cedar shrubby vegetation with no potential roost trees.

Using the IPaC Official Species List to Make No Effect and May Affect Determinations for Listed Species

1. If IPaC returns a result of "There are no listed species found within the vicinity of the project," then project proponents can conclude the proposed activities will have **no effect** on any federally listed species under Service jurisdiction. Concurrence from the Service is not required for **No Effect** determinations. No further consultation or coordination is required. Attach this letter to the dated IPaC species list report for your records. An example "No Effect" document also can be found on the S7 Technical Assistance website.

2. If IPaC returns one or more federally listed, proposed, or candidate species as potentially present in the action area of the proposed project – other than bats (see #3 below) – then project proponents can conclude the proposed activities **may affect** those species. For assistance in determining if suitable habitat for listed, candidate, or proposed species occurs within your project area or if species may be affected by project activities, you can obtain Life History Information for Listed and Candidate Species through the Species website.
3. If IPac returns a result that one or more federally listed bat species (Indiana bat, northern long-eared bat, or gray bat) are potentially present in the action area of the proposed project, project proponents can conclude the proposed activities **may affect** these bat species **IF** one or more of the following activities are proposed:
    a. Clearing or disturbing suitable roosting habitat, as defined above, at any time of year;
    b. Any activity in or near the entrance to a cave or mine;
    c. Mining, deep excavation, or underground work within 0.25 miles of a cave or mine;
    d. Construction of one or more wind turbines; or
    e. Demolition or reconstruction of human-made structures that are known to be used by bats based on observations of roosting bats, bats emerging at dusk, or guano deposits or stains.

If none of the above activities are proposed, project proponents can conclude the proposed activities will have **no effect** on listed bat species. Concurrence from the Service is not required for **No Effect** determinations. No further consultation or coordination is required. Attach this letter to the dated IPaC species list report for your records. An example "No Effect" document also can be found on the S7 Technical Assistance website.
If any of the above activities are proposed in areas where one or more bat species may be present, project proponents can conclude the proposed activities **may affect** one or more bat species. We recommend coordinating with the Service as early as possible during project planning. If your project will involve removal of over 5 acres of suitable forest or woodland habitat, we recommend you complete a Summer Habitat Assessment prior to contacting our office to expedite the consultation process. The Summer Habitat Assessment Form is available in Appendix A of the most recent version of the Range-wide Indiana Bat Summer Survey Guidelines.

Other Trust Resources and Activities

Bald and Golden Eagles - Although the bald eagle has been removed from the endangered species list, this species and the golden eagle are protected by the Bald and Golden Eagle Act and the Migratory Bird Treaty Act. Should bald or golden eagles occur within or near the project area please contact our office for further coordination. For communication and wind energy projects, please refer to additional guidelines below.

Migratory Birds - The Migratory Bird Treaty Act (MBTA) prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Service. The Service has the responsibility under the MBTA

to proactively prevent the mortality of migratory birds whenever possible and we encourage implementation of recommendations that minimize potential impacts to migratory birds. Such measures include clearing forested habitat outside the nesting season (generally March 1 to August 31) or conducting nest surveys prior to clearing to avoid injury to eggs or nestlings.

Communication Towers - Construction of new communications towers (including radio, television, cellular, and microwave) creates a potentially significant impact on migratory birds, especially some 350 species of night-migrating birds. However, the Service has developed voluntary guidelines for minimizing impacts.

Transmission Lines - Migratory birds, especially large species with long wingspans, heavy bodies, and poor maneuverability can also collide with power lines. In addition, mortality can occur when birds, particularly hawks, eagles, kites, falcons, and owls, attempt to perch on uninsulated or unguarded power poles. To minimize these risks, please refer to guidelines developed by the Avian Power Line Interaction Committee and the Service. Implementation of these measures is especially important along sections of lines adjacent to wetlands or other areas that support large numbers of raptors and migratory birds.

Wind Energy - To minimize impacts to migratory birds and bats, wind energy projects should follow the Service's Wind Energy Guidelines. In addition, please refer to the Service's Eagle Conservation Plan Guidance, which provides guidance for conserving bald and golden eagles in the course of siting, constructing, and operating wind energy facilities.

Next Steps

Should you determine that project activities **may affect** any federally listed species or trust resources described herein, please contact our office for further coordination. Letters with requests for consultation or correspondence about your project should include the Consultation Tracking Number in the header. Electronic submission is preferred.

If you have not already done so, please contact the Missouri Department of Conservation (Policy Coordination, P. O. Box 180, Jefferson City, MO 65102) for information concerning Missouri Natural Communities and Species of Conservation Concern.
We appreciate your concern for threatened and endangered species. Please feel free to contact our office with questions or for additional information.

John Weber

Attachment(s):

- Official Species List

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether

any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Missouri Ecological Services Field Office
101 Park Deville Drive
Suite A
Columbia, MO 65203-0057
(573) 234-2132

PROJECT SUMMARY

Project Code: 2023-0132801
Project Name: West Alton Islands HREP
Project Type: Restoration / Enhancement of Waterbody
Project Description: Ecosystem restoration project at Luesse Lake, Portage Island, and West Alton Bay. Project will involve restoration and enhancement of side channel, backwaters, and Mississippi River Island habitats.
Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@38.9139434,-90.2510007859571,14z



Counties: St. Charles County, Missouri

ENDANGERED SPECIES ACT SPECIES

There is a total of 7 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Gray Bat *Myotis grisescens* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6329	Endangered
Indiana Bat *Myotis sodalis* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5949 General project design guidelines: https://ipac.ecosphere.fws.gov/project/VJR6W5XJPVBS5JPVB3KSOQ66HI/documents/generated/6868.pdf	Endangered
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045 General project design guidelines: https://ipac.ecosphere.fws.gov/project/VJR6W5XJPVBS5JPVB3KSOQ66HI/documents/generated/6868.pdf	Endangered
Tricolored Bat *Perimyotis subflavus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

CLAMS

NAME	STATUS
Spectaclecase (mussel) *Cumberlandia monodonta* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/7867	Endangered

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

FLOWERING PLANTS

NAME	STATUS
Decurrent False Aster *Boltonia decurrens* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/7705	Threatened

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

IPAC USER CONTACT INFORMATION

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5.1 U.S. Fish and Wildlife Coordination Act Report

5.3 Missouri Department of Conservation

6.0 PUBLIC COMMENTS

UPPER MISSISSIPPI RIVER RESTORATION

DRAFT FEASIBILITY REPORT

WITH INTEGRATED ENVIRONMENTAL ASSESSMENT

WEST ALTON ISLANDS HABITAT REHABILITATION AND ENHANCEMENT PROJECT

Appendix B: Habitat Evaluation and Quantification

US Army Corps of Engineers ®
St. Louis District

Mississippi River
Miles 203-215.5
St. Charles County, Missouri
Project Partners: Missouri Department of Conservation & U.S. Fish and Wildlife Service

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1. INTRODUCTION

This appendix provides the documentation of the habitat evaluation and quantification process that was conducted to evaluate the benefits of various alternatives for the Upper Mississippi River Restoration Program (UMRR) West Alton Islands Habitat Rehabilitation and Enhancement Project (HREP). The evaluation was conducted by a multi-agency team with active participants that included biologists and foresters from the St. Louis District Corps of Engineers, biologists from the U.S. Fish and Wildlife Service (Two Rivers National Wildlife Refuge and Southern Illinois Ecological Services Office), as well as fisheries biologists and ecologists from the Missouri Department of Conservation; names and disciplines are included in Table B-1 below.

Table B-1. Team that Participated in the Habitat Benefits Analysis for the West Alton Islands HREP

Team Member	Specialty	Affiliation
Justin Garrett	Biologist	USACE
Lane Richter	Wildlife Biologist	USACE
Matt Mangan	Fish and Wildlife Biologist	USFWS
Brian Stoff	Forester	USACE
Insiyaa Ahmed	Natural Resource Specialist	USACE
Charles Deutsch	Refuge Manager	USFWS
Kirsten Schmidt	Wildlife Biologist	USFWS
Molly Sobotka	Ecologist	MDC
Sarah Peper	Fisheries Biologist	MDC

2. HABITAT EVALUATION METHODOLOGY

The purpose of the habitat benefits evaluation is to evaluate and quantify, to the extent possible, environmental benefits of alternative plans for the aquatic and floodplain habitat improvements within the study area. Aquatic and island benefits were quantified through the use of Engineering Circular 1105-2-412, *Assuring Quality of Planning Models,* and habitat suitability index (blue book) models for the white bass (Hamilton & Nelson, 1984), the smallmouth buffalo (Edwards & Twomey, 1982), and the yellow warbler (Schroeder, 1982). All three bluebook models are approved for regional and nationwide use by the USACE Ecosystem Restoration Planning Center of Expertise. Floodplain benefits were quantified through the use of the Upper Mississippi River System Floodplain Forest Habitat Model, which has been certified for regional use by the USACE Ecosystem Restoration Planning Center of Expertise for the Upper Mississippi River System until September 2028. Habitat Suitability Index (HSI) spreadsheet calculators for each of these models was reviewed by the Ecosystem Restoration Planning Center of Expertise and were recommended for regional use (Memorandum for CECW-MVD; 15 September 2016; Enclosure 1). Consistent with guidance from the USACE Ecosystem Restoration Planning Center of Expertise, the Agency Technical Review (ATR) Team for the West Alton Islands HREP will conduct an assessment of the models used for this project. This process will evaluate the technical quality and appropriateness of the models utilized.

2.1 Quantity Component:

Traditionally, the Corps has used the quantity and quality of habitat jointly, in the form of habitat units, to measure benefits provided by ecosystem restoration projects. The quantity proportion is often measured as area (acres of habitat, landform, etc.); in some systems, it is measured as length (feet of stream bank). The evaluation conducted for this study area uses acres, to represent the quantity. The area associated with each proposed measure must have a clear definition for use as guidance in estimating the area component of the ecosystem output model and must be applied consistently to all actions evaluated. Quantities of each feature varied depending on those features in each alternative. Habitat was evaluated in the location in which each feature would be placed. Table B-2 at the end of this report provides the acres proposed for use for each alternative, and the applicable acreage for each model.

Final calculations included determining the acreage of backwater, side channel, floodplain forest, and island habitat, using topographical data, management plans, land coverage data files, and aerial photography.

Acres equate to the action footprint of each feature and was determined for each individual feature. The action footprint is a measurement of the physical footprint of the management measures. For example, the area excavated for the backwater, or the surface area covered by dredged materials for island creation. When evaluation of features was conducted, the footprint equals the total of the features with no double-counting of overlap areas addressed by multiple features.

> **Applicability:** This evaluation method for each individual project feature can quantify with a high degree of certainty specific environmental and biological conditions to accurately evaluate Future With, and Future Without Project conditions.
>
> **Limitations:** This method grossly underestimates the aerial extent of ecological benefits from each specific project feature. For example, the aerial extent of the proposed backwater footprint evaluated does not take into account benefits seen within the immediate area outside of the study area boundary as well as throughout the Upper Mississippi River region. It is well documented that restoring habitat of this type increases the primary productivity and has a positive effect across a much larger spatial area than just where the backwater excavation is to occur.

2.2 Quality Component

The qualitative component of the analysis is rated on a 0.0 to 1.0 scale, with higher values indicating better habitat for that species. The HSI for a particular habitat type is determined by selecting values that reflect present and future study area conditions from a series of abiotic and biotic metrics. Each value corresponds to a suitability index for each species. Future values are determined using management plans, historical conditions, and best professional judgment.

The quantitative component is the number of acres of the habitat being evaluated. From the calculated qualitative and quantitative values, the standard unit of measure, the habitat unit (HU) is calculated using the formula (HSI × Acres = HUs). Habitat units are calculated for specific target years to forecast changes in habitat values over the life of the project with- and without-project conditions. When HSI scores are not available for each year of analysis, a formula that requires only target year HSI and area estimates is used (USFWS 1980). This formula is:

$$\int_0^T HU\ dt = (T_2 - T_1) = \left[\left(\frac{A_1H_1 + A_2H_2}{3}\right) + \left(\frac{A_2H_1 + A_1H_2}{6}\right)\right]$$

Where:

$\int_0^T HU\ dt$ = *Cumulative HUs*

T_1 = first target year of time interval
T_2 = last target year of time interval
A_1 = area of available habitat at beginning of time interval
A_2 = area of available habitat at end of time interval
H_1 = habitat suitability index at the beginning of time interval
H_2 = habitat suitability index at the end of time interval
3 and 6= constants derived from integration of HSI × Area for the interval between any two target years

This formula was developed to precisely calculate cumulative HUs when either HSI, or area, or both change over a time interval, which is common when dealing with the unpredictable fluctuations found in nature. Habitat Unit gains or losses are annualized by summing the cumulative HUs calculated using the above equation across all target years in the period of analysis and dividing the total (cumulative HUs) by the number of years in the life of the project (i.e., 50 years). This calculation results in the Average Annual Habitat Units (AAHUs) (USFWS 1980). The calculation of the HUs and AAHUs were completed in a Microsoft Excel spreadsheet for each model containing the formula above.

The benefits of each proposed project feature (net AAHUs) are then determined by calculating the difference in AAHUs between the with-project benefits and the without-project benefits. The effects of various habitat improvement feature combinations (alternatives) can then be evaluated by comparing the net AAHUs and their associated costs for each alternative considered.

For the purpose of planning, design, and impact analysis, the period of analysis was established as 50 years. To facilitate comparison, target years were established at 0 (existing conditions), 1, 5, 25, and 50 years for both future with and without project features. Target years are used to analyze HUs and characterize habitat changes over the estimated period of analysis. Target years of 1 and 5 capture short-term changes following construction completion. While target years 25 and 50 capture ecological changes that would occur over a longer period of time. The period of analysis was determined to be 50 years based on the prediction that some project features (e.g., development of key ecological processes needed to restore ecosystem structure and function) would need a longer period of time to reach maximum benefits; and the accrual of benefits were predicted to level off after 50 years. HSIs and cumulative HUs for each evaluation species were calculated at each of these target years.

Corps guidance requires that the team evaluate a suite of features that can be combined in various ways to form project alternatives. The approach used to assess the benefits at West Alton Islands study area looked at benefits of project features and their combinations as alternatives and comparatively evaluated each alternative separately. This process is called the iterations process. To determine the habitat units created by each feature, the habitat (aquatic, island, and floodplain forest) affected by the feature would be evaluated using the applicable HSI spreadsheets.

This appendix contains HSI summary tables and other data derived from the spreadsheet files not included in this appendix. These spreadsheets are available upon request. Please contact, Justin Garrett, 314-331-8047, email Justin.M.Garrett@usace.army.mil if you would like an electronic copy of these files.

3. ASSUMPTIONS

In preparation of using the HSI models, the evaluation team conducted a site visit, reviewed aerial photography, topographic maps, and used the results from physical and numerical hydraulic modeling as well as the long-term data set for water quality and fish courtesy of the Upper Mississippi River Restoration Program Long Term Resource Monitoring (UMRR-LTRM) element. During the evaluation, assumptions were developed regarding existing conditions and projected with-project conditions relative to habitat changes over time and management practices.

The following assumptions were made when determining existing and future without project conditions for the primary habitat cover types located within the study area:

3.1 Backwaters:

The Corps approved (EC 1105-2-412) smallmouth buffalo HSI model (Edwards & Twomey, 1982) was used to assess aquatic habitat benefits from the backwater excavation measures. The smallmouth buffalo (*Ictiobus bubalus*), in the family Catostomidae, is an important commercial fish in the Mississippi River drainage basin. This species occurs in deep, flowing water, as well as sloughs, oxbow lakes and other backwaters for resting, spawning, and rearing. They feed on organisms in the substrate of large rivers and backwater lakes. This species was selected because it requires backwaters and off-channel areas to complete important life history stages.

The following assumptions in applying the *Smallmouth Buffalo HSI Model* were made. For more detailed descriptions of the assumptions made for each model parameter for a given alternative, the excel spreadsheet is available upon request.

Baseline Condition: Detailed water quality data were collected by the Upper Mississippi River Restoration Long Term Resource Monitoring element from 1993 to present. These data are randomly stratified and collected throughout the year; therefore, it was assumed that data collected was representative of the entirety of backwater areas for the project. The average depth range of the backwaters is less than 3 feet. These shallow depths lead to relatively poor overall conditions for smallmouth buffalo due to increased summer water temperatures, low dissolved oxygen levels, and decreasing availability/connectivity from sedimentation of the backwaters and their mouths, precluding access depending on pool levels.

Future Without Project Condition:

West Alton Bay: The backwater at West Alton Bay is almost entirely a mudflat when the Mississippi River is at draw down and the water level is considered to be near minimum pool conditions. There are some isolated pockets one to two feet in depth that exist at these conditions, but they are not connected to each other or the main river channel. During Flat or Full Pool conditions, this area would have an average water depth of 3.5 ft. Minimum Pool conditions at this location would have a surface water elevation of 414.0 ft NGVD 29. Flat or Full Pool conditions at this location would be an approximate water surface elevation of 418.6 ft NAVD 88. Without a project, sedimentation would cause this area to continue to become shallower, eventually converting into a terrestrial habitat. Along with shallower depths, this increase in sedimentation is assumed to also result in increased turbidity, increased temperatures, reduced dissolved oxygen as

vegetative cover increases and the shift towards terrestrial habitat gradually takes over.

Portage Island: The backwater in Portage Island is a shallow channel when the Mississippi River is at draw down and the water level is considered to be near minimum pool conditions. The backwater area has one to two feet of depth during minimum pool conditions but becomes disconnected from the main Mississippi River channel. During Flat or Full Pool conditions, this backwater channel would have a water depth between 2 to 3 ft, and the entrance to the backwater would have a depth of 0.5 to 1.5 ft. Minimum Pool conditions at this location would have a surface water elevation of 416.5 ft NGVD 29. Flat or Full Pool conditions at this location would be an approximate water surface elevation of 418.6 ft NAVD 88.

Luesse Lake: The backwater at Luesse Lake is a shallow channel when the Mississippi River is at draw down and the water level is considered to be near minimum pool conditions. The backwater area has two to four feet of depth during minimum pool conditions but is nearly disconnected from the main Mississippi River channel with only a 0 to 0.5 ft of depth at the entrance. During Flat or Full Pool conditions, this backwater channel would have a water depth between 4 and 5 ft, and the entrance to the backwater would have a depth of 1 to 1.5 ft. Minimum Pool conditions at this location would have a surface water elevation of 417.0 ft NGVD 29. Flat or Full Pool conditions at this location would be an approximate water surface elevation of 418.6 ft NAVD 88.

Future With Project Condition:
The proposed measures for backwater habitat improvement include excavation and deep-water pockets to create bathymetric diversity, and deeper seasonal habitat that would lend itself to overwintering refugia for aquatic species; and emergent wetland enhancement that would excavate excessive sediments to elevations more conducive to herbaceous backwater wetlands that work in congruence with Environmental Pool Management. Excavation would result in an overall increase in backwater habitat function such as increased water depths, cooler summer water temperatures, increased capacity for dissolved oxygen, improved water clarity and lower turbidity.

Proposed elevations of the backwater excavations can be found in the Appendix G: H&H; however, the team realizes that these quantities will need further refinement in the Plans and Specs phase of the project.

3.2 Side Channels:
The Corps approved (per EC 1105-2-412), white bass HSI model (Hamilton and Nelson, 1984)**.** The Project measures for side channel habitat were developed to increase flow and bathymetric diversity, to enhance instream structural diversity, and to facilitate effective sediment transport. The white bass (*Morone chrysops*), in the family Moronidae, has been successfully stocked throughout the United States. The white bass inhabits the deeper pools of streams and the open waters of lakes and reservoirs. It tends to avoid waters that are continuously turbid and is most often found over a firm sandy or rocky bottom (MDC, 2023). White bass apparently prefer to spawn over a firm substrate in water 0.5 to 6 m deep, most commonly at depths of 0.6 to 2 m (Hamilton and Nelson, 1984).

The following assumptions were made when applying the *White Bass HSI Model*. For more detailed descriptions, the excel spreadsheet is available upon request.

Baseline Condition: Detailed water quality data were collected by the Upper

Mississippi River Restoration Program Long Term Resource Monitoring (UMRR-LTRM) element from 1993 to present. These data are randomly stratified and collected throughout the year; therefore, it was assumed that data collected was representative of the entire side channel. Additionally, H&H team members modeled existing flow conditions against the projected flows with each alternative to help inform the ecological model.

Future Without Project Condition:
Approximately 675 acres of side channel and main channel border habitat occurs in the study area. Side channel and main channel border habitats within Pool 26 lack desired depth and flow diversity to support a healthy fish community. Resource professionals in the region have identified shallow lotic and overall increased depth and flow diversity within Pool 26 (McCain et al., 2018) as the desired conditions. The side channel at Portage Island has been stable with moderate levels of depth diversity, but flow diversity is not at the desired level. Under the FWOP condition, the study area is anticipated to remain approximately the same.

Future With Project Condition:
Proposed features with the project will accomplish several means of habitat benefits: increased flow diversity throughout the side channel will offer various flow regimes in various and multiple locations for aquatic organisms to spawn, forage, rear offspring, and find flow refugia; other locations will experience higher velocities that would be conducive to sediment and detritus transport and assist with side channel connectivity throughout the new features over the life of the project.

3.3 Floodplain Forest:
Floodplain Forest impacts were quantified through the use of the Upper Mississippi River System Floodplain Forest Habitat Model, which has been certified for regional use by the USACE Ecosystem Restoration Planning Center of Expertise for the Upper Mississippi River System until September 2028. It may appear counter-intuitive to assess impacts in an ecosystem restoration project; however, to fully quantify the proposed project measures' effect on habitat quantity and quality, it was deemed appropriate to also include the required tree clearing for backwater improvements to the small areas on Portage Island that would be subject to clearing for backwater excavation and subsequent placement of that material for topographic elevation diversity. The inclusion of this approach aided in detailing the net benefits gained across the proposed alternatives with a more wholistic view of the anticipated project results.

The floodplain forest model was only applied to Portage Island as it was the only location with proposed measures requiring tree clearing. The spatial extent that the model was applied correlates with the proposed acreage of tree clearing across each alternative, respectively.

Future Without Project Condition:
The areas identified for tree clearing were identified by USACE foresters to be at a location of minimal quality, open canopy and high incidence of invasive Japanese hops. In the future without the project, it is anticipated that the forest health in this area will continue its trajectory of a steady decline as invasive species further outcompete natives and spread spatially across the island. Natural regeneration is not expected to happen on its own due to the hold that hops have in this area already.

Future With Project Condition:
The area identified for tree clearing with the elevation diversity measure (Minimum, Intermediate, and Maximum Alternatives) was identified by USACE foresters to be at a location of minimal quality, open canopy and high incidence of invasive Japanese hops. With the project, invasive species would be outcompeted by the natural regeneration on the placed dredged material, with monitoring and adaptive management measures to keep any invasive resurgence in check. The area identified for tree clearing with the backwater restoration measure (Maximum Alternative) was identified as a remnant side channel that has since sedimented in and closed off from flow through until the island experienced a topping event. With the project, this backwater would be reconnected to the river on the downstream side to provide additional backwater habitat with those benefits captured under the Smallmouth Buffalo model.

In both instances, the general trend anticipated in forest health is that with the project, habitat benefits would experience a decline immediately following the tree clearing event but would rebound over time as natural regeneration takes hold.

3.4 Island Creation:
The Corps approved (EC 1105-2-412) Yellow Warbler HSI model (Schroeder, 1982) was used to assess the early successional forest island habitat benefits resulting from building islands using the dredge disposal material and island stone protection. The yellow warbler (*Dendroica petechia*) is a bird found throughout the United States. Preferred habitats are wet areas with abundant shrubs or small trees. Preferred foraging and nesting habitats are wet areas, partially covered by early successional trees and shrubs, ranging in height from 1.5 to 4 m (5 to 13.3 ft). It is unusual to find yellow warblers in extensive forests with closed canopies (Schroeder 1982). This species was selected because it requires early successional shrub and woody vegetated areas near water for nesting habitat, and they are known to nest on artificial habitat within Pool 26. This model was applied to the island creation measures as well as the excavated material placement area on Portage Island for increased terrestrial elevation diversity. That area is to be left for natural regeneration, so quantifying benefits from early successional forest was deemed appropriate.

The following assumptions were made when applying the Yellow Warbler HSI Model. For more detailed descriptions of the assumptions made for each model parameter for a given alternative, the excel spreadsheet is available upon request.

Baseline Condition: The Project and surrounding areas have numerous different types of riverine island type habitat including sandbars, rock and dike structures, early successional forested islands, and mature forested islands with closed canopies. Within the Project, mature forested islands with edge habitat of early successional forest on their periphery can be found at all three locations. The existing sandbar islands found near the larger, more permanent Portage and West Alton Islands are at low elevations that are currently inundated at normal pool, and are comprised primarily of sand, with some silt and larger fragmentary material.

Future Without Project Condition: From 1890 to 2022, island and sandbar habitat within the study area has declined by 98 and 115 acres, respectively. This equates to a 45% reduction in island area and complete loss of sandbar habitat within the study area, although sandbar habitat has developed at two other locations in lower Pool 26 in recent decades. The majority of island and sandbar habitat loss in the study area was due to the construction of the locks and dam at Alton. Further loss near Portage Island is due

to erosion caused by wind- and vessel-related wave action. Without the proposed project, it is expected that both island and sandbar landcover in the study area would remain nearly stable. Therefore, sandbar dependent species would not be supported in the study area. In addition, forest dependent wildlife species would be limited by lower forest species and structural diversity compared to historical conditions.

Future With Project Condition: With the project, additional acreage of sandbar island habitat would be constructed at elevations that would allow for early successional forests to develop. With the project area spanning approximately 12 river miles; those elevations will be location specific to best fit the varying pool levels with current Pool 26 management practices of Environmental Pool Management. These islands would be constructed to similar elevations as their surrounding island counterparts, and in areas of existing low shear stress based on the hydraulic model outputs. Building of the islands would convert existing open water habitat to sandbar island habitat. The team assumed that these newly restored islands would initially be bare and made of the excavated sediments from the backwater areas in the project. It was recognized that through time vegetation would establish on the islands, providing the anticipated early successional forest habitat. The team assumed that the stone protection on the restored islands would lock the islands in place and allow for the total acres of island habitat to be maintained throughout the period of analysis. Acres of island habitat restored would vary among considered action alternatives based on the amount of dredge disposal material available to build islands. Proposed elevations for island creation can be found in the Appendix G: H&H; however, the team realizes that these quantities will need further refinement in the Plans and Specs phase of the project.

3.5 General Assumptions:

A. It was assumed that target years of 0 (existing condition), 1, 5, 25, and 50 (future without and future with project conditions) are sufficient to analyze HUs and characterize habitat changes over the estimated period of analysis. The period of analysis was determined to be 50 years based on the prediction that some project features (e.g., development of key ecological processes needed to restore ecosystem structure and function) would need a longer period of time to reach maximum benefits; and the accrual of benefits were predicted to level off after 50 years.
B. The team assumed that the main channel habitat (as defined by the UMRR-LTRM stratum) would not be affected by the proposed alternatives; therefore, these acres of main channel habitat within the Project Area were not evaluated for habitat benefits.
C. The team assumed that existing forested island habitat within the Project Area would not be affected by the proposed alternatives outside of the small footprint of proposed tree clearing; therefore these acres of forested island habitat within the Project Area were not evaluated for habitat benefits.

4. RESULTS

Chapter 5 of the main report, *Plan Formulation*, describes each potential Project measure in detail. The Project planning team screened out several features and alternatives before this habitat quantification process began. Chapter 5, Table 10 displays the proposed measures, screening criteria, and which measures were retained for inclusion in the project alternatives. The results of the habitat benefit evaluations respective to habitat model that was used to evaluate each alternative by location is provided below in 4.1, Table 13.

4.1 Total Habitat Benefits

Table B-2 below provides the summary of the calculated AAHUs and acreage applied for each

considered alternative by location and model by habitat type. Table B-3 provides total with habitat types combined.

Table B-2:

Luesse Lake

Alternative	Habitat Type	Acreage per Habitat Type	AAHU per Habitat Type	Net Gain AAHU per Habitat Type
FWOP	Aquatic	52	4	0
	Terrestrial	0	0	0
MIN ALT	Aquatic	52	40	35
	Terrestrial	0	0	0
INT ALT	Aquatic	52	44	40
	Terrestrial	0	0	0
MAX ALT	Aquatic	52	47	43
	Terrestrial	0	0	0

Portage Island

Alternative	Habitat Type	Acreage per Habitat Type	AAHU per Habitat Type	Net Gain AAHU per Habitat Type
FWOP	Aquatic	398	156	0
	Terrestrial	3	3	0
MIN ALT	Aquatic	398	242	86
	Terrestrial	17	30	28
INT ALT	Aquatic	398	270	114
	Terrestrial	17	30	28
MAX ALT	Aquatic	404	288	132
	Terrestrial	27	18	16

West Alton Bay

Alternative	Habitat Type	Acreage per Habitat Type	AAHU per Habitat Type	Net Gain AAHU per Habitat Type
FWOP	Aquatic	488	125	0
	Terrestrial	0	0	0
MIN ALT	Aquatic	488	306	182
	Terrestrial	28	20	20
INT ALT	Aquatic	488	338	213
	Terrestrial	46	33	33
MAX ALT	Aquatic	488	347	223
	Terrestrial	82	60	60

Total Project - All Locations

Alternative	Habitat Type	Acreage per Habitat Type	AAHU per Habitat Type	Net Gain AAHU per Habitat Type
FWOP	Aquatic	938	285	0
	Terrestrial	3	3	0
MIN ALT	Aquatic	938	588	303
	Terrestrial	45	50	47
INT ALT	Aquatic	938	652	367
	Terrestrial	62	63	61
MAX ALT	Aquatic	944	682	397
	Terrestrial	109	78	76

Table B-3: Project totals with habitat types combined:

	FWOP	MIN	INT	MAX
Acreage Totals	941	982	1000	1052
Cumulative Totals	286	633	710	755
Net Gain		348	425	470

5. REFERENCES

Edwards, E., & Twomey, K. (1982). *Habitat Suitability Index Models: Smallmouth Buffalo.* US Department of Interior, Fish and Wildlife Services.

Hamilton, K., & Nelson, P. (1984). *Habitat Suitability Index Models and Instream Flow Suitability Index Curves: White Bass*. US Department of Interior, Fish and Wildlife Services.

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Schroeder, R. (1982). *Habitat Suitability Index Models: Yellow Warbler*. US Department of Interior, Fish and Wildlife Services.

USFWS (US Fish and Wildlife Services). (2016, July 15). *Habitat Evaluation Procedures (HEP) ESM 102.* Retrieved from http://www.fws.gov/polociy/ESM102.pdf: http://www.fws.gov/polociy/ESM102.pdf

ENCLOSURE 1

DEPARTMENT OF THE ARMY
MISSISSIPPI VALLEY DIVISION, CORPS OF ENGINEERS
P.O. BOX 80
VICKSBURG, MISSISSIPPI 39181-0080

REPLY TO
ATTENTION OF:

CEMVD-PD-L 15 September 2016

MEMORANDUM FOR CECW-MVD (Redican)

SUBJECT: Recommendation for Regional Use Approval of 11 Spreadsheet Calculators for Application of Regionally Approved Habitat Suitability Index Models

1. References:
   a. Engineer Circular 1105-2-412: Assuring Quality of Planning Models, dated 31 March 2011.
   b. Final Planning Model Quality Assurance Review Comment Response Record for 11 Habitat Suitability Index Model Calculators, USACE (Encl 1).
   c. Ecosystem Restoration Model Library, Habitat Suitability Index Models

2. The National Ecosystem Restoration Planning Center of Expertise (ECO-PCX) evaluated spreadsheet calculators for the black capped chickadee, bullfrog, creek chub, fox squirrel, gray squirrel, least tern, smallmouth bass, smallmouth buffalo, striped bass, white bass, and wood duck habitat suitability index models following reference 1.a. Based on the review results (Encl 1), the ECO-PCX recommends Regional Use Approval of all spreadsheet calculators for use in the geographic area defined for each model. Please log in this recommendation with the Office of Water Project Review for the Model Certification Team to consider.

3. The black capped chickadee, bullfrog, creek chub, fox squirrel, gray squirrel, least tern, smallmouth bass, smallmouth buffalo, striped bass, white bass, and wood duck habitat suitability index models are approved for regional use per EC 1105-2-412 (Reference 1.c.). However, software was lacking which would allow planners to apply the models in a computational correct fashion for individual projects. Consequently, MVP, MVR, and MVS collaborated to develop a library of Microsoft Excel spreadsheet calculators. Each spreadsheet calculator is an independent spreadsheet built using the same variables, habitat suitability index curves, aggregation equations, and habitat cover types as displayed in the approved model documentation. Furthermore, all spreadsheet calculators employed a similar development scheme to include consistent use of formatting, input requirements, and output display. Each calculator includes user documentation or a link to a user's guide, and employs best spreadsheet practices.

4. The ECO-PCX and biologists from MVP, MVR, and MVS reviewed each spreadsheet calculator independently to assess the degree to which the spreadsheets meet the system quality and usability criteria in accordance with EC 1105-2-412. The spreadsheet development team and the spreadsheet reviewers included individuals with expertise in habitat benefit evaluations, Habitat Evaluation Procedures, plan formulation policies, and software/spreadsheet programming and auditing. Review results are found in the Final Planning Model Quality Assurance Review Comment Response Record for 11 Habitat Suitability Index Model Calculators, USACE (Encl 1).

Review of the spreadsheet calculators resulted in 72 total comments. All comments were related to the system quality and usability of the model, all were of low to medium significance, and all evaluations resulted in concurrence with the comments. The ECO-PCX reviewed the comments, evaluations, and revisions made to the model. All were made to the satisfaction of the ECO-PCX and are in alignment with the requirements of assuring the quality of planning models. The following summarizes the overall review and modifications made to the spreadsheets to improve system quality and usability.

SUBJECT: Recommendation for Regional Use Approval of 11 Spreadsheet Calculators for Application of Regionally Approved Habitat Suitability Index Models

Overall, the calculators were found to function well and included simple and easy-to-use interfaces. Most importantly, the variables, suitability index curves, aggregation equations, and habitat cover types match the technical model documentation. The review resulted in several minor to moderate revisions to improve clarity for the user, reduce potential calculation errors, and improve the quality of the spreadsheets.

- All spreadsheets are locked so only identified input cells are available for modification.
- Requirement to include all inputs prior to population of an overall HSI score.
- Model documentation was made available to the user within the spreadsheet.
- Data validation was included for all input cells.
- HSI curves were added to the user documentation to increase transparency.
- Discrepancies between the variables in the model documentation and those in the calculators were identified and fixed.

5. The spreadsheet calculators have sufficient system quality and usability. The models are all encoded in MS Excel. The spreadsheets are computationally correct and employ best spreadsheet practices including cell locking, highlighting input/calculation/output cells, and data validation. Error messages display appropriately when erroneous inputs are attempted and final scoring is displayed and easy to understand. The models are transparent and would allow for verification of inputs and outputs. User documentation is available and sufficient to implement the technique and use the spreadsheets. The spreadsheets will be maintained by the ECO-PCX on the Ecosystem Restoration Model Library. During application input and output scores should be documented and ATR teams charged with review to ensure the application of the model and its associated parts is appropriate.

6. The ECO-PCX finds the spreadsheet calculators for the black capped chickadee, bullfrog, creek chub, fox squirrel, gray squirrel, least tern, smallmouth bass, smallmouth buffalo, striped bass, white bass, and wood duck habitat suitability index models has sufficient system quality, meets usability criteria, and maintains the already approved technical quality of the models. The ECO-PCX recommends Regional Use Approval of all spreadsheet calculators for use in the geographic area defined for each model. Please notify the ECO-PCX of the Model Certification Panel's findings.

Gregory Miller

Encls (1)

Gregory Miller
Operating Director
National Ecosystem Restoration
Planning Center of Expertise

CF (without enclosures)
CECW-PC (Paynes, Coleman, Matusiak, Trulick, Bee)
CECW-MVD (Brown, Hanneken, Turner)
CEMVD-PD (Chewning, Lachney, Miller, Young)
CEMVP-PD-C (Johnson, Clark, Allen, Jordan, Popkin, McFarlane)
CEMVP-PD-P (Barr, McCain, Herzog, McGuire, Simmons, Ingvalson)
CEMVP-PD-F (Knollenberg, Richards, Opsahl, Savage)

UPPER MISSISSIPPI RIVER RESTORATION

DRAFT FEASIBILITY REPORT

WITH INTEGRATED ENVIRONMENTAL ASSESSMENT

WEST ALTON ISLANDS HABITAT REHABILITATION AND ENHANCEMENT PROJECT

Appendix C: Biological Assessment

US Army Corps of Engineers ®
St. Louis District

Mississippi River
Miles 203-215.5
St. Charles County, Missouri
Project Partners: Missouri Department of Conservation & U.S. Fish and Wildlife Service

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1. INTRODUCTION

1.1 Purpose

The U.S. Army Corps of Engineers, St. Louis District (USACE) is preparing a Feasibility Report with Integrated Environmental Assessment for implementation of the Upper Mississippi River Restoration (UMRR) Program's West Alton Islands Habitat Rehabilitation and Enhancement Project (HREP), referred to as the Study. The primary goal of this ecosystem study is to restore and improve the quality and diversity of side channel, main channel border, riverine island, and backwater ecosystem resources. The purpose of this Draft Feasibility Report with Integrated Environmental Assessment (EA), including the draft unsigned Finding of No Significant Impact (FONSI), is to evaluate the proposal for the UMRR-HREP in the West Alton Islands study area. The Draft Feasibility Report and Integrated EA meet USACE planning guidance and meet NEPA requirements. The draft feasibility report presents a detailed account of the planning, engineering, construction details, and environmental considerations.

The need for this Project is described fully in the draft feasibility report, and only briefly summarized here. Sedimentation in the West Alton Bay, and other off-channel areas, has led to a loss of desirable fisheries habitat, such as fish spawning and rearing areas, as well as overwintering thermal refuges. During the spring when fish, especially centrarchid species such as largemouth bass, bluegill, green sunfish, and crappie, are seeking stable, off-channel spawning areas, the problem is exacerbated due to the tilting of Pool 26 which causes dramatic dewatering of the West Alton Bay and some of the remnant sloughs as extra runoff is released through the Mel Price Dam. The area also has not supported substantial submergent and/or emergent aquatic vegetation since prior to the Flood of 1993. Without action, overall aquatic habitat diversity and quality would continue to decline due to excessive sedimentation. In addition, the continued degradation would lead to conversion of wetland cover to swamp scrub/shrub or early successional forest translating to a quantitative loss of habitat (resting, foraging, breeding, and rearing) for migratory and resident wildlife. There is an opportunity to restore a diverse suite of habitats that have all been identified as a habitat need for the Mississippi River within the Study area. The restoration of ecosystem structure and function within the Study area would contribute to restoring ecological health and resiliency of the Upper Mississippi River System. Refer to the main report for more details.

The purpose of this Biological Assessment (BA) is to review the proposed West Alton Islands HREP in sufficient detail to evaluate whether the proposed actions may affect any federally threatened, endangered, proposed, or candidate species identified by the U.S. Fish and Wildlife Service (USFWS). This BA is prepared in accordance with legal requirements set forth under Section 7 of the Endangered Species Act (15 U.S.C. 1536

(c)) and applicable guidance documents. The BA includes the description of the study area, proposed actions, species accounts and status, effects of the proposed actions, and effects determinations.

1.2 Resource Significance

Public, institutional, and technical resource significance categories, as described in ER 1105-2-100 were identified for the Lower Illinois River Valley (a subset of the Upper Mississippi River Basin) which includes the study area for the study. Resource significance is one component utilized in ecological restoration studies to help determine if an ecosystem is significant enough to warrant federal investment. A summary of resource significance by category is provided in the draft feasibility report, while the more comprehensive list of resource significance can be found below in Table 1.

Table 1. Resource Significance for West Alton Islands study area. The study area is part of the General Plan lands agreement, 100% federally owned.

Resource	Institutional Recognition	Public Recognition	Technical Recognition
Protected Species	Fish and Wildlife Coordination Act, as amended (16 U.S.C.§ 661) Endangered Species Act (ESA) of 1973, as amended Mark Twain National Wildlife and Fish Refuge Comprehensive Conservation Plan (USFWS 2004).	Regularly occurring public events sponsored by local organizations around viewing the protected Bald Eagle. National Audubon Society has designated the Great Rivers Confluence Area an important bird area for wetland birds and migratory landbirds which provides a draw for public recreation opportunities.	*Representativeness:* The USFWS has identified the Gray Bat, Indiana Bat, Northern Long-eared Bat, Tricolored Bat, and Decurrent False Aster as federally endangered or threatened species that have the potential to occur within St. Charles County, MO.
Migratory Birds	Migratory Bird Conservation Act of 1929, and associated treaties Migratory Bird Treaty Act of 1918 EO 13186 – Responsibilities of Federal Agencies to Protect Migratory Birds Bald and Golden Eagle	Migratory birds provide the public with recreational opportunities, such as bird watching and waterfowl hunting. National Audubon Society has designated the Great Rivers Confluence Area an important bird area for wetland birds and	*Representativeness*: Knutson et al. (1996); found relative abundances of all birds and total numbers of neotropical migratory birds were almost twice as high in the UMR floodplain as in the adjacent uplands. Upper Mississippi River Great Lakes Joint Venture (Soulliere, et al., 2018) identified the Mississippi River and Lower Illinois River aquatic habitat as highly important to nonbreeding waterbirds.

Resource	Institutional Recognition	Public Recognition	Technical Recognition
	Protection Act of 1940 North American Waterfowl Management Plan Upper Mississippi Great Lakes JV (Soulliere, et al., 2017) Waterfowl and (2018) Waterbird Habitat Conservation Strategies (Soulliere, et al., 2020) Landbird Conservation Strategy	migratory landbirds. The Upper Mississippi River Waterfowl Conservation Region (Region 19) is a level III Ducks Unlimited conservation priority area, providing a migration corridor waterfowl.	*Limiting Habitat*: National Audubon Society designated the area an Important Bird Area for concentrations of wetland birds and migratory landbirds (Jensen & Forbes, 2006). Both groups are limited by suitable habitat on the landscape. *Status and Trend:* Forest and wetland habitat diversity in the Illinois and Mississippi River confluence have declined over time. These trends are likely to continue, and without intervention, the West Alton Islands project area will provide limited migration, dispersal, breeding, nesting, and cover habitat for a wide range of migratory birds.
Floodplain Forests	Fish and Wildlife Coordination Act, as amended (16 U.S.C.§ 661) ESA of 1973, as amended Mark Twain National Wildlife Refuge Comprehensive Conservation Plan (USFWS 2004). Two Rivers NWR Habitat Management Plan (USFWS 2011) National Wildlife Refuge Systems Biological Integrity, Diversity, and Environmental Health Policy UMRGLJV 2021 Landbird Conservation Strategy	The Upper Mississippi River Conservation Committee (UMRCC) recognized the importance of the floodplain forest to the fish and wildlife of the UMR (Urich et al., 2002). National Audubon Society has identified floodplain forests of the UMR as a focal area due to its importance for breeding and migratory landbirds.	*Scarcity*: Hard-mast forest resources have declined due to hydrologic changes and land use changes along the UMRS and in the study area (Nelson and Sparks, 1997; Cosgriff, Nelson, and Yin, 1999) *Biodiversity:* The study area is likely to continue to experience loss of forest resources and limited species and structural diversity. Neotropical and other migratory landbirds, Indiana bats, and the other floodplain species that rely on the forest resources will be severely impacted. *Representativeness:* Knutson et al. (1996) described the importance of floodplain forest in the conservation and management of neotropical migratory birds. Kirsch and Wellik (2017) describe the importance of oak and other declining species in UMR floodplain forests for neotropical migrant landbirds.
Wetlands	The 2018 *Waterbird Habitat Conservation Strategy Revision* – area of greatest biological importance for breeding and non-breeding	National Audubon Society has designated the Great Rivers Confluence Area an important bird area for wetland birds and	Connectivity: The Illinois and Mississippi River Confluence area contains a high concentration of public and private wetland resources (Soulliere, et al., 2018) for migrating waterfowl. The UMR and

Resource	Institutional Recognition	Public Recognition	Technical Recognition
	waterbird habitats Executive Order No. 11990 of May 1977 (Protection of Wetlands) Water Resources Development Act of 1990, Section 307(a) Mark Twain National Wildlife Refuge Comprehensive Conservation Plan (USFWS 2004).	migratory landbirds. The Upper Mississippi River Waterfowl Conservation Region (Region 19) is a level III Ducks Unlimited conservation priority area, providing a migration corridor waterfowl.	Illinois River Valley provide valuable resources for migratory waterfowl in spring and fall (Stafford et al., 2007) *Scarcity:* Through land use changes, approximately 90% of pre-settlement wetlands were lost by the 1980's in Illinois. *Status and Trend:* Without the West Alton Islands HREP, the emergent wetland habitat extent and ability to provide quality habitat for wetland dependent species is expected to decline.

1.3 Proposed Action

This Biological Assessment evaluates the impacts of the Tentatively Selected Plan for the construction, operation, and maintenance of proposed project features based on the feasibility level of design. For more details on the quantities for the feasibility level of design, see *Appendix I – Civil Engineering*.

1.4 Project Description

USACE is preparing to implement a habitat rehabilitation and enhancement project in the vicinity of West Alton, Missouri. The West Alton Islands HREP consists of approximately 1,823 acres of backwater, wetland, side channel, sandbar, island, and floodplain forest areas. The study area is located in the Mississippi River floodplain on the right descending bank of the Mississippi River between River Miles (RM) 203-215.5 in St. Charles County, MO (Figure 1). The Tentatively Selected Plan, the Intermediate Alternative, consists of three distinct locations and is shown in Figure 2 (Luesse Lake), Figure 3 (Portage Island), and Figure 4 (West Alton Bay).

Figure 1: West Alton Islands HREP study area.

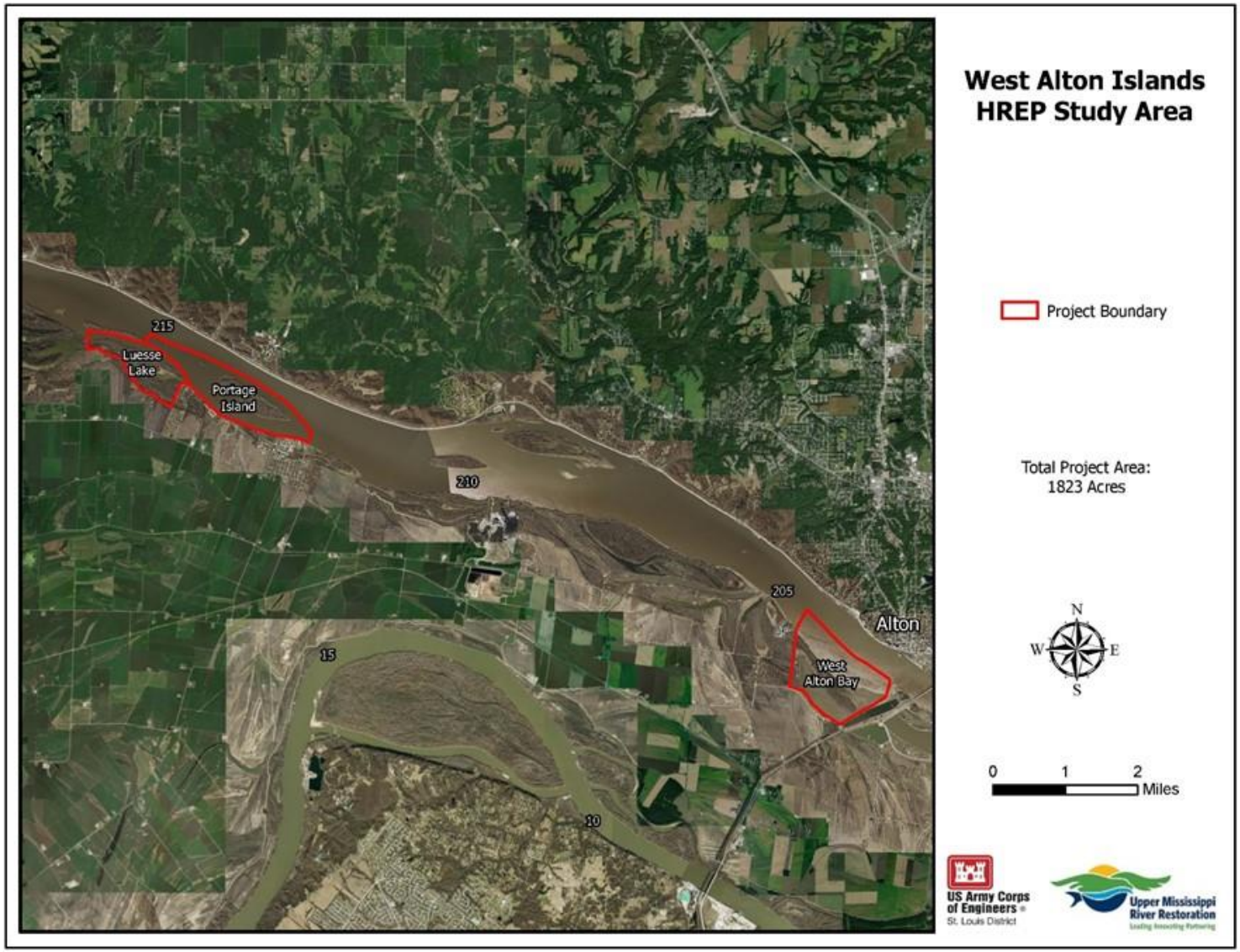


Figure 2: Luesse Lake – Tentatively Selected Plan measures.

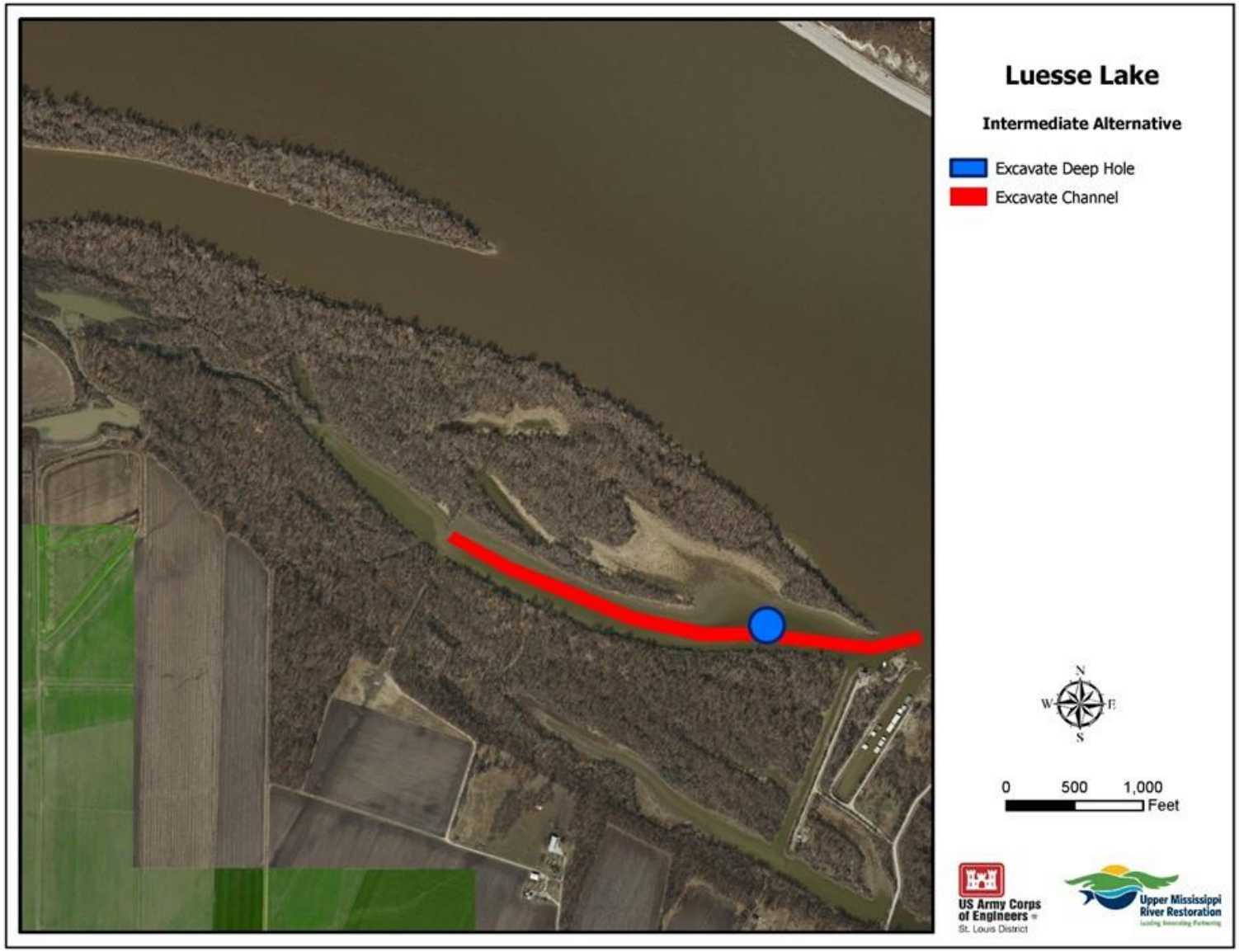


Figure 3: Portage Island – Tentatively Selected Plan measures.

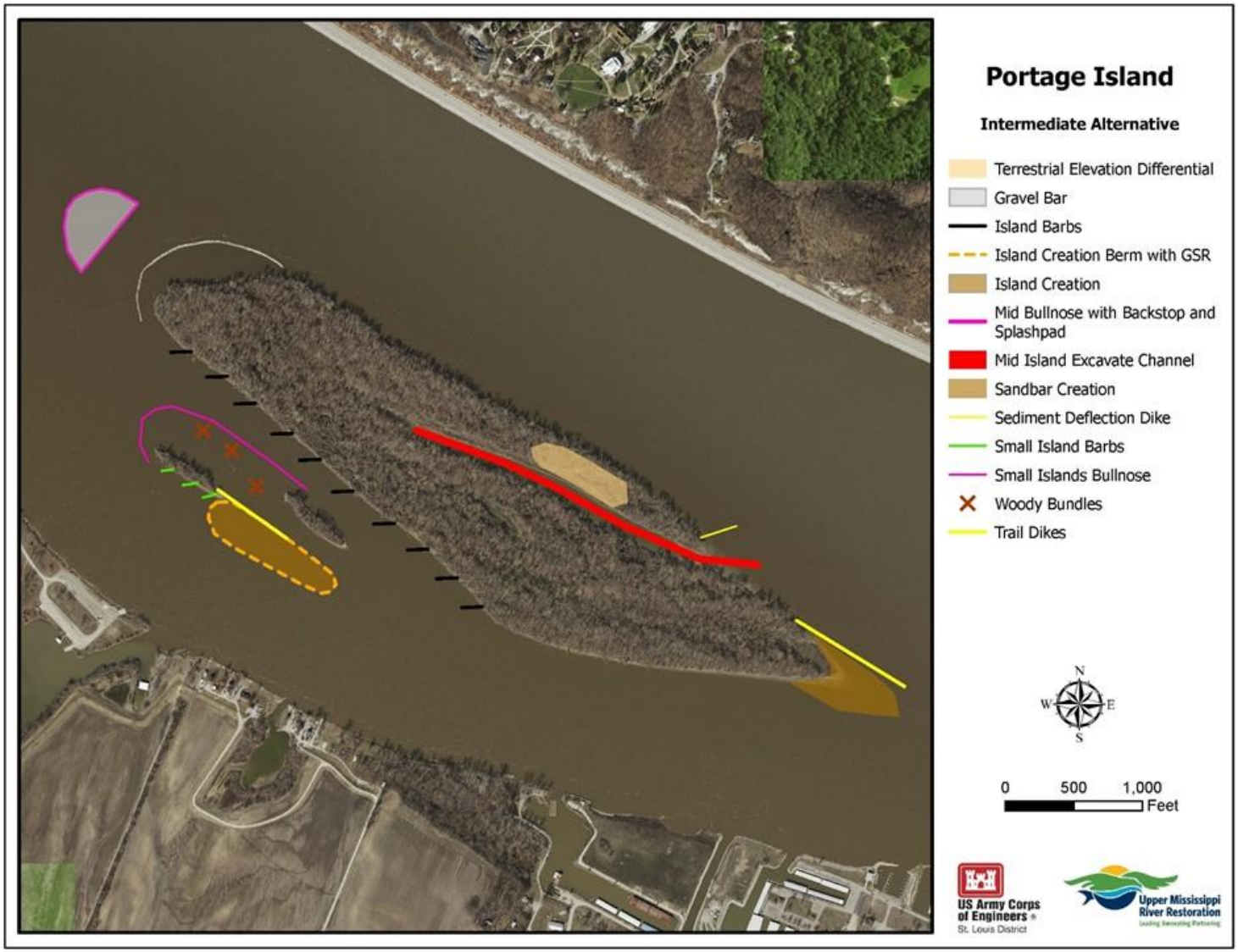
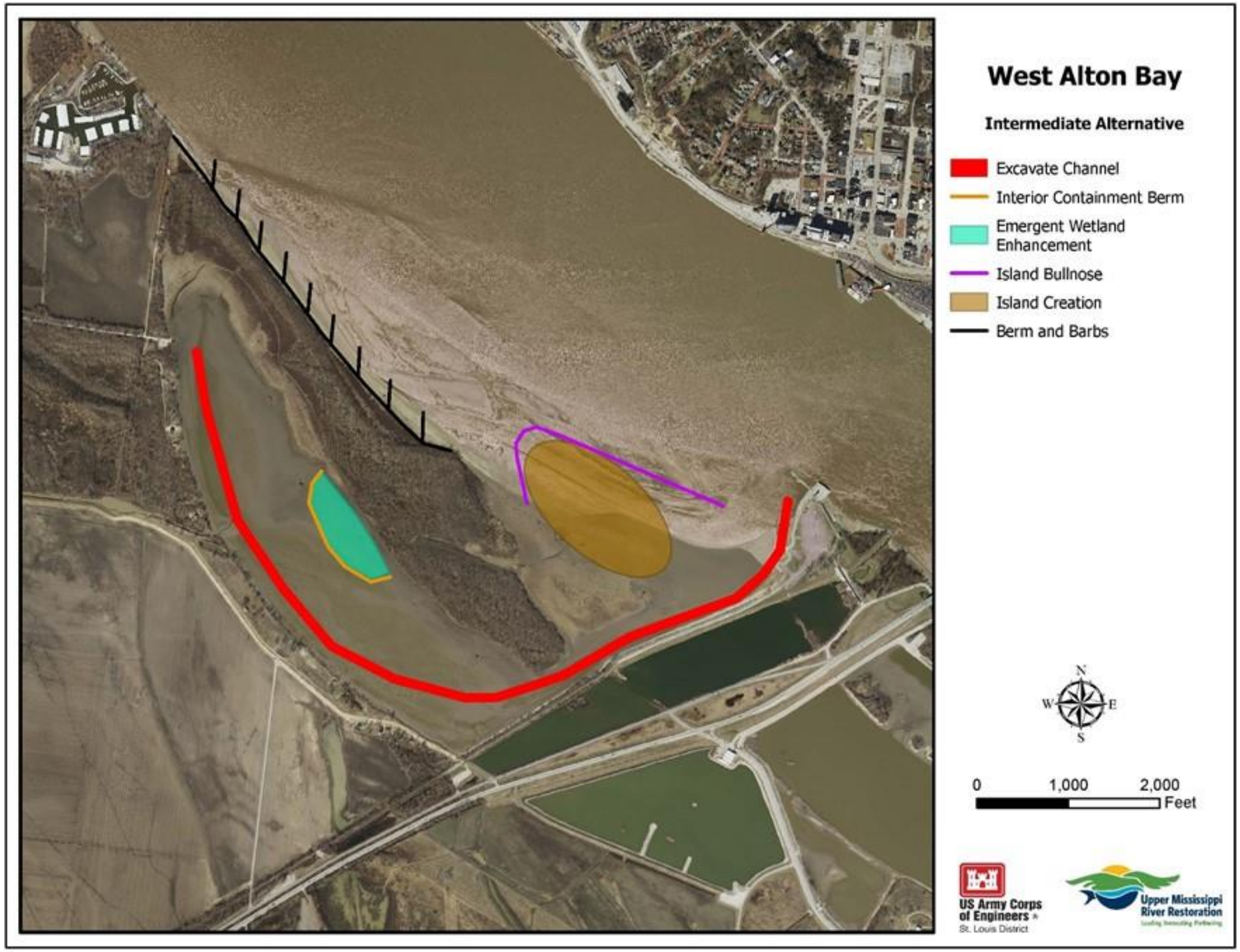


Figure 4: West Alton Bay – Tentatively Selected Plan measures.



1.4.1 West Alton Bay Project Measures

Measures are fully described in Section 5.1 of the main report. This section lists which of those management measures are applied to their corresponding location, and the assumptions and goals behind each for the Tentatively Selected Plan.

1. Excavation (without benching): Excavation to open up backwaters for improved access and connectivity for aquatic organisms to foraging, spawning and rearing habitats in West Alton Bay.

2. Island creation: Excavated material is to be placed at elevations that are advantageous for early successional tree species such as willow, cottonwood, maple, ash, and elm to develop and success naturally overtime. These elevations are to be developed in more detail and accuracy in PED phase, after more gage data and site surveys. An expected 45 acres of island habitat will be created.

3. Bullnose: Bullnose rock protection to keep newly placed material for island creation in place. Intentional gaps so as to not fully encapsulate the island, so fish entrapment is low risk or concern.

4. Emergent wetland enhancement: Material to be excavated and/or graded to elevations that will respond well to Environmental Pool Management. These elevations are to be developed in more detail and accuracy in PED phase, after more gage data and site surveys.

5. Berm and barbs: Berm and barb placement along riverward side of West Alton Bay to capture sediments, continue accretion, and redirect flow during normal and low river conditions to keep excess sediments from entering the West Alton Bay backwaters and prolong the excavation benefits through the life of the project.

1.4.2 Portage Island Project Measures

- Excavation (existing backwater): Excavation to enhance backwater for improved access and connectivity for aquatic organisms to foraging, spawning and rearing habitat in the existing backwater on Portage Island.

6. Island creation: Excavated material is to be placed at elevations that are advantageous to early successional tree species such as willow, cottonwood, maple, ash, and elm to develop and success naturally overtime. These elevations are to be developed in more detail and accuracy in PED phase, after more gage data and site surveys. An expected 13 acres of island habitat will be created.

- Barbs (Hard Points): Rock structures that will provide diversity in substrate, bathymetry, and flow. Sediment capture and island protection that will also result in a more diverse area of aquatic habitat.

- Gradual slope revetment (GSR): Island protection and substrate heterogeneity will help contain placed material for island creation while also providing substrate that is advantageous for mussel colonization. Intentional gaps in the GSR so as to not fully encapsulate the island, so fish entrapment is low risk or concern.

- Woody bundles: Bundles of large woody debris strategically placed and anchored to provide cover and concealment for a number of aquatic organisms. Incorporation of woody material into barb structures throughout the project will also be implemented.

- Sandbar/mudflat creation: Beneficial use of dredged material for the creation of transitional/early successional sandbar habitat. The area is expected to transition over time to forested habitat.

- Trail dike/Sediment deflection dike: Deflect flows and sandbar/island protection to prolong the life of the island placed on the downstream end of Portage Island.

- Bullnose and Gravel bar placement: Bullnose rock protection to keep newly placed gravel bed in place. Gravel bed of 2-4” stone will be placed to provide additional spawning and rearing habitat for fishes but could potentially also be colonized by freshwater mussels.

- Terrestrial elevation diversity: Beneficial use of dredged material for the creation of terrestrial elevation diversity on Portage Island. Natural regeneration of early successional tree species such as willow, cottonwood, maple, ash, and elm are expected to develop. The area is expected to transition over time to forested habitat. The area identified for this measure is currently overrun with Japanese hops and open canopy. This area will be monitored for invasive encroachment and treated as needed under the project Monitoring and Adaptive Management Plan (See *Appendix E*).

1.4.3 Luesse Lake Project Measures

- Excavation (south of pipeline): Excavation to enhance backwater for improved access and connectivity for aquatic organisms to foraging, spawning, and rearing habitat in the existing backwater of Luesse Lake.

- Deep water pocket: Excavation to provide improved access and connectivity for aquatic organisms to overwintering habitat and thermal refugia in the existing backwater of Luesse Lake.

2. SPECIES / HABITAT CONSIDERED IN THE CONSULTATION

In compliance with Section 7(c) of the Endangered Species Act of 1973, as amended, the USFWS provided a list of six federally threatened and endangered species that could potentially be found in the study area (St. Charles County, MO) via a letter dated August 22, 2022 (IPAC report) and updated on September 25, 2023. The six species, federal protection status, and habitat can be found in Table 2. No critical habitat is located within the study area.

Table 2. Federally Listed Threatened and Endangered Species potentially occurring within the study area.

Species	Status	Habitat
Gray Bat (*Myotis grisescens*)	Endangered	Roost in caves or mines year-round. Use water features and forested riparian corridors for travel and foraging.
Indiana Bat (*Myotis sodalis*)	Endangered	Hibernates in caves and mines. Maternity & foraging habitat includes small stream corridors with well-developed riparian woods, upland & bottomland forests.
Northern Long-eared Bat *(Myotis septentrionalis*)	Threatened	Hibernates in caves and mines. Swarming in surrounding wooded areas occurs in autumn. Roosts and forages in understory of a wide range of forested habitats during spring and summer.
Tricolored Bat (*Perimyotis subflavus*)	Proposed Endangered	Hibernates in caves and mines in our region; found in forested habitats in spring, summer, and fall; typically roosts in canopy among leaf clumps/clusters.
Spectaclecase mussel (*Cumberlandia monodonta*)	Endangered	Large rivers where they live in areas sheltered from the main force of the river current. This species often clusters in firm mud and in sheltered areas, like beneath rock slabs, between boulders and even under tree roots.

Decurrent False Aster (*Boltonia decurrens*)	Threatened	Disturbed alluvial soils. Moist, sandy floodplains and prairie wetlands along the Illinois River and a small portion of the Mississippi River primarily above the Missouri-Mississippi River confluence.
Monarch Butterfly (*Danaus plexippus)*	Candidate	Grassland and other herbaceous dominated habitats with Milkweed resources during the breeding life stage and similar habitats with abundant nectar resources during breeding and migration life stages. Overwintering occurs outside our region and must provide specific roosting microclimate conditions.

3. MEASURES TAKEN TO AVOID IMPACT TO LISTED SPECIES

During the planning process for the Wet Alton Islands HREP, the study team considered how project measures could impact listed species. Efforts have been made to reduce direct and indirect impacts to listed species.

3.1 Conservation Measures

Conservation measures are actions to benefit or promote the recovery of a listed species that a federal agency includes as an integral part of the proposed action and that are intended to avoid, minimize, or compensate for potential adverse effects of the action on the listed species. As such, mandatory measures below will be incorporated into every USACE action that falls within this consultation framework.

The following conservation measures are proposed for the proposed action alternative to help minimize effects to currently listed species within the Project.

1. All tree clearing resulting from the USACE action will occur during the inactive season from November 1 to March 31 unless negative presence/probable absence survey results were obtained for the action area through appropriate surveys approved by the U.S. Fish and Wildlife Service (USFWS).
2. During clearing, dead trees, split trees, trees that have cavities, and trees with exfoliating bark would be favored for retention where possible.
3. Tree removal designed to create open foraging corridors in forests and uncluttered understory with plenty of cover and access to foraging corridors.
4. Indiana bat habitat assessments and presence/absence surveys would be conducted as needed per USFWS requests.
5. Best management practices would be utilized according to NWP 27 conditions to reduce impacts to wetlands, sediment movement, and water movement patterns. Additionally, disturbed areas would be restored by applying seed and mulch

utilizing species that are native and would establish cover quickly to stabilize soils.

6. Herbicides used to control invasive species would follow EPA product label instructions.
7. Appropriate buffer distances around potential eagle nests would be coordinated with the USFWS prior to or during construction to account for any changes in conditions from existing resources.

4. IMPACT ASSESSMENT

The following section includes a status description of each species and how it will be affected by proposed Project elements as well as the determination of effects for each species. The effects determination took into account implementation of the conservation measures listed above.

4.1. Gray Bat (*Myotis grisescens*)

4.1.1. Status

The gray bat is a federally listed, endangered mammal species. The gray bat occupies a limited geographic range in limestone karst areas of the southeastern United States, including Missouri. With rare exception, the gray bat roost in caves year-round. In winter, most gray bats hibernate in vertical (pit) caves with cool, stable temperatures below 10 degrees Celsius. Summer caves, especially those used by maternity colonies, are nearly always located within a kilometer (0.6 mile) of rivers or reservoirs over which the bats feed. The summer caves are warm with dome ceilings that trap body heat. Most gray bats migrate seasonally between hibernating and maternity caves, and both types of caves are located in Missouri. Gray bats are active at night, foraging for insects over water or along shorelines, and they need a corridor of forest riparian cover between roosting caves and foraging areas. They can travel as much as 20 kilometers (12 miles) from their roost caves to forage.

Gray bats are endangered largely because of their habitat of living in large numbers in only a few caves, thus making the species vulnerable to human disturbance and habitat loss or modification. Disturbance of gray bats in their caves during their hibernation can cause them to use their energy reserves and could lead to starvation. Disturbances to their caves during their nursing season (June and July) can frighten females causing them to drop non-volant pups to their death in panic to flee from the intruder.

Additionally, many important caves that have been historically used by gray bats have been inundated by reservoirs. The commercialization of caves, and alterations of the air flow, temperature, humidity, and amount of light can make the cave unsuitable habitat for gray bats and drive bats away.

The fatal bat disease, white-nose syndrome (WNS), has not yet been documented to adversely affect the gray bat. However, because gray bats are cave obligates, and

considering how WNS has decimated other cave-dwelling bat species, WNS could be another significant threat to the gray bat.

No known suitable hibernacula or maternity caves have been documented within or adjacent to the study area, but suitable summer foraging habitat is present, and the species may occur in adjacent areas as well as the study area.

4.1.2. Effects Determination

Impact of No Action Alternative - No caves would be impacted under the No Action Alternative. Given the even-aged forest community limited in species and structural diversity, available foraging habitat may be impacted in the future. However, these impacts would be localized, and foraging habitat would exist outside of the study area.

Impacts of Proposed Federal Action – No caves would be impacted under any of the considered alternatives. Impacts to foraging habitat would be similar to that of the other T&E bat species. These impacts of the proposed federal action could have site-specific impacts on gray bat and gray bat habitat but are not anticipated to individually or cumulatively have an adverse impact on the population as a whole. Therefore, we conclude that the Project **may affect but is not likely to adversely affect the Gray Bat.**

4.2. Indiana Bat (*Myotis Sodalis*)

4.2.1. Status

The Indiana bat is a federally listed, endangered mammal species (USFWS, 2007). The range of the Indiana bat includes much of the eastern half of the United States, including Missouri. Indiana bats migrate seasonally between winter hibernacula and summer roosting habitats. Winter hibernacula include caves and abandoned mines. Females emerge from hibernation in late March or early April to migrate to summer roosts. During the summer, the Indiana bat frequents the corridors of small streams with well-developed riparian woods, as well as mature upland forests. It forages for insects along stream corridors, within the canopy of floodplain and upland forest, over clearings with early successional vegetation (old fields), along the borders of croplands, along wooded fencerows, and over farm ponds in pastures. Females form nursery colonies under the loose bark of trees (dead or alive) and/or cavities, where each female gives birth to single young in June or July. A maternity colony may vary widely in size due to time of year, roost switching behavior, and thermal conditions. Maternity roosts with a few to more than 350 individuals have been reported (USFWS, 2007) but typically contain fewer than 100 individuals. A single colony may utilize several roost trees during the summer, typically a primary roost tree and several alternates. Some males remain in the area near the winter hibernacula during summer months, but others disperse throughout the range of the species and roost individually or in small numbers in the same types of trees as females.

Disturbance and vandalism, improper cave gates and structures, natural hazards, such as flooding or freezing, microclimate changes, land use changes in maternity range, and chemical contamination are the leading causes of population decline in the Indiana Bat (USFWS, 2007). To avoid impacting this species, tree clearing activities should not occur during the period of April 1 to October 31.

Suitable summer foraging and roosting habitat exists within the study area. Potential roost trees in already forested areas such as Luesse Lake, Portage Island, and the Missouri side of West Alton Bay are continuously changing as potential roost trees are created and existing roost trees become unsuitable. Tree mortality is anticipated to increase significantly in mature Cottonwood and Green Ash over the near-term.

No known suitable hibernacula or maternity caves have been documented within or adjacent to the study area, but suitable summer foraging habitat is present, and the species may occur in adjacent areas as well as the study area.

4.2.2. Effects Determination

Impact of No Action Alternative - Under the No Action Alternative, the forest community in the study area would persist but Cottonwood, hard-mast (Oaks and Pecan), and mature Green Ash are expected to decrease in abundance as a result of age, hydrological, or insect-related mortality. As a result, suitable roosting habitat is expected to decline in both quality and quantity over time in the study area. Given the proximity to adjacent bottomland and upland forest habitat, Indiana bats that could be present in the study area would likely relocate to suitable habitat nearby.

Impacts of Proposed Federal Action – There are no distinct forestry measures included with the Tentatively Selected Plan; however, natural establishment and succession with the terrestrial elevation diversity measure and the island creation areas through time will result in those trees maturing into suitable summer roosting habitat needed for T&E bats in the study area. In all, an estimated 62 acres of successional forest habitat will be created.

On Portage Island, approximately 3.4 acres of forest would be cleared to place excavated material for the terrestrial elevation diversity measure in an effort to recreate and mimic natural ridge-swale topography typically found in large river floodplains. This area will be allowed to establish, regenerate, and mature as a representative floodplain community. The tree clearing required is located in an area that is currently open canopy and of poor forest health. Due to the proposed tree clearing the proposed Project could have minor, site specific impacts on Indiana Bats and Indiana Bat habitat but are not anticipated to individually or cumulatively have an adverse impact on the population as a whole. Therefore, we conclude that the Project **may affect but is not likely to adversely affect the Indiana Bat**.

4.3. Northern Long-eared Bat (*Myotis septentrionalis*)

4.3.1. Status

The northern long-eared bat is a federally listed, endangered mammal species (Federal Register 29 Nov 2022). The northern long-eared bat is sparsely found across much of the eastern and north central United States and spends winter hibernating in caves and mines. They typically use large caves or mines with large passages and entrances; constant temperatures; and high humidity with no air currents. Within hibernacula, they are found in small crevices or cracks (USFWS, 2022). Northern long-eared bats typically occupy their summer habitat from mid-May through mid-August each year and the species may arrive or leave some time before or after this period. Summer habitat for the northern long-eared bat includes a wide variety of forested/wooded habitats and some adjacent habitats where they roost, forage, and travel for resources. During summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees $\geq$3 inches diameter at breast height. Suitable roost habitat may occur in blocks of forest, linear corridors (i.e., fencerows or riparian forests), and dense or loose clusters of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit characteristics of suitable roost trees and are within 1,000 feet (ft) of other forested/wooded habitat. Males and non-reproductive females may also roost in cooler places, like caves and mines. They have also been found, rarely, roosting in structures like barns and sheds (USFWS, 2022). Foraging occurs in floodplain and upland forests. Forest fragmentation, logging and forest conversion are major threats to the species. One of the primary threats to the northern long-eared bat is the fungal disease, white-nose syndrome, which has spread to over 39 states and 7 provinces in North America, and results in extensive mortality (USFWS, 2002). Cheng et al. (2021) estimated populations declines of 97-100% across over 75% of the northern long-eared bat's range.

No known suitable hibernacula or maternity caves have been documented within or adjacent to the study area, but suitable summer foraging habitat is present, and the species may occur in adjacent areas as well as the study area.

4.3.2. Effects Determination

Impact of No Action Alternative - Under the No Action Alternative, the forest community in the study area would persist but Cottonwood, hard-mast (Oaks and Pecan), and mature Green Ash would decrease in abundance as a result of age, hydrological, or insect-related mortality. As a result, habitat suitable for roosting would be expected to decrease over time in the study area. Given the proximity to adjacent bottomland and upland forest habitat, Northern Long-eared Bats that could be present in the study area would likely relocate to suitable habitat.

Impacts of Proposed Federal Action – There are no distinct forestry measures included with the Tentatively Selected Plan; however, natural establishment and succession with the terrestrial elevation diversity measure and the island creation areas

through time will result in those trees maturing into suitable summer roosting habitat needed for T&E bats in the study area. In all, an estimated 62 acres of successional forest habitat will be created.

On Portage Island, approximately 3.4 acres of forest would be cleared to place excavated material for the terrestrial elevation diversity measure in an effort to recreate and mimic natural ridge-swale topography typically found in large river floodplains. This area will be allowed to establish, regenerate, and mature as a representative floodplain community. The tree clearing required is located in an area that is currently open canopy and of poor forest health. Due to the proposed tree clearing the proposed Project could have minor, site specific impacts on Northern Long-eared Bats and Northern Long-eared Bat habitat but are not anticipated to individually or cumulatively have an adverse impact on the population as a whole. Therefore, we conclude that the Project **may affect but is not likely to adversely affect the Northern Long-eared Bat.**

4.4. Tricolored Bat (*Perimyotis subflavus*)

4.4.1. Status

The Tricolored bat is proposed for federally listing as an endangered mammal species. Tricolored bats were formerly called eastern pipistrelle. Tricolored bats are usually found roosting singly. Maternity colonies averaged approximately 4 (range 1-8) females and pups in Indiana (USFWS, 2021). In winter, tricolored bats hibernate in caves with a preference for caves that are humid and warm. In summer, they generally leave their hibernation caves and roost in trees, clumps of leaves in the canopy, cliffside crevices, and human-made structures. They forage for insects high in the air along forest edge and the boundaries streams or open bodies of water. Tricolored bats mate during spring, fall, and sometimes in the winter. Maternity colonies begin forming in mid-April and females bear 1 to 2 pups by late May to mid-July.

No known suitable hibernacula or maternity caves have been documented within or adjacent to the study area, but suitable summer foraging habitat is present, and the species may occur in adjacent areas as well as the study area.

4.4.2. Effects Determination

Impact of No Action Alternative - Under the No Action Alternative, the forest community in the study area would persist but Cottonwood, hard-mast (Oaks and Pecan), and mature Green Ash would decrease in abundance as a result of age, hydrological, or insect-related mortality. As a result, habitat suitable for roosting would be expected to decrease over time in the study area. Given the proximity to adjacent bottomland and upland forest habitat, tricolored bats that could be present in the study area would likely relocate to suitable habitat.

Impacts of Proposed Federal Action – There are no distinct forestry measures included with the Tentatively Selected Plan; however, natural establishment and

succession with the terrestrial elevation diversity measure and the island creation areas through time will result in those trees maturing into suitable summer roosting habitat needed for T&E bats in the study area. In all, an estimated 62 acres of successional forest habitat will be created.

On Portage Island, approximately 3.4 acres of forest would be cleared to place excavated material for the terrestrial elevation diversity measure in an effort to recreate and mimic natural ridge-swale topography typically found in large river floodplains. This area will be allowed to establish, regenerate, and mature as a representative floodplain community. The tree clearing required is located in an area that is currently open canopy and of poor forest health. Due to the proposed tree clearing the proposed Project could have minor, site specific impacts on Tricolored Bats and Tricolored Bat habitat but are not anticipated to individually or cumulatively have an adverse impact on the population as a whole. Therefore, we conclude that the Project **may affect but is not likely to adversely affect the *tricolored bat.***

4.5. Spectaclecase mussel (*Cumberlandia monodonta*)

4.5.1. Status

Spectaclecase is a federally listed, endangered mussel species (USFWS, 2016b). This mussel lives in large rivers in sheltered areas (e.g., beneath rock slabs). Historically, this large mussel was found in at least 44 streams of the Mississippi, Ohio, and Missouri river basins in 14 states; however, today it is found only in 20 streams, with the populations fragmented and restricted to short stream reaches. This species is considered “rare” in Pool 26 (Ecological Specialist Inc, 2014), and no known observations of Spectaclecase have occurred within or adjacent to the study area, and suitable habitat for federally listed species is not present within the study area (Ecological Specialist Inc, 2014).

4.5.2. Effects Determination

Impact of No Action Alternative – Under the no action alternative, natural river processes will continue within the side channels and the already rare occurrence of Spectaclecase is expected to continue with rarity due to little structure to provide sheltered areas that are attractive to Spectaclecase colonization.

Impacts of Proposed Federal Action – The proposed side channel improvement measures such as hard points (barbs and vanes), GSR, bullnose and gravel bar structure, and trail dikes will provide flow refugia and sheltered areas that are preferred by Spectaclecase. There will be a short term decrease in habitat quality during and immediately following construction, but that is expected to be fully offset by the creation of additional side channel habitat diversity. Mussel surveys will be conducted prior to construction so as to avoid any impacts to mussels that may already be occupying the areas. Location and scale of measures can be adjusted based on the findings of the mussel surveys. Therefore, the Proposed Federal Action ***may affect but is not likely to adversely affect the Spectaclecase mussel.***

4.6. Decurrent False Aster (*Boltonia decurrens*)

4.6.1. Status

Decurrent false aster is a federally listed, threatened floodplain perennial plant species that may be found on moist, sandy floodplains and prairie wetlands along the Illinois River and portions of the Mississippi River. It is dependent on flood pulses or other disturbances that eliminate competing vegetation and provide the high light and moist soil conditions needed for seed germination and establishment (Smith and Keevin, 1998). Without disturbance, other plant species can out-compete decurrent false aster and eliminate it in 3 to 5 years from any given area. Species decline is due to several factors including excessive silting of habitat due to topsoil run-off, conversion of natural habitat to agriculture, drainage/development of wetlands, altered flooding patterns, and herbicide use. No critical habitat rules have been published for the decurrent false aster. This species has been found within the study area.

4.6.2. Effects Determination

Impact of No Action Alternative - Under the No Action Alternative, the emergent and herbaceous, early successional communities in the study area would persist into the near future. Decurrent false aster populations would likely appear periodically after flood disturbance. The quality of habitat would be anticipated to decline over time as sedimentation begins to degrade and convert the emergent wetlands into other land cover types (i.e., shrub or early successional forest). However, some suitable habitat is expected to occur in the study area over the period of analysis.

Impacts of Proposed Federal Action – The emergent wetlands and their forest edge habitats in the backwater areas of the project would improve habitat for the decurrent false aster. The improvements to backwaters and creation of early successional habitat would support a more diverse emergent wetland community and enhance floral resources over the long-term in the study area. The short-term decrease in floral resources due to the disturbance from constructing the proposed project would be offset by the expansion and restoration of emergent wetlands and edge habitats through proposed Project measures. Therefore, the Proposed Federal Action ***may affect but is not likely to adversely affect the decurrent false aster.***

4.7. Monarch Butterfly (*Danaus plexippus)*

4.7.1. Status

The monarch butterfly is a large orange butterfly that is a candidate for listing on the Endangered Species List. Monarch populations of eastern North America have declined 90%. Much of the Monarch butterfly's life is spent migrating between Canada, Mexico, and the U.S. Monarchs do not overwinter in Missouri (USFWS, 2020). The monarch occurs in a variety of habitats where it searches for its host plant, milkweed. Of the over 100 species of milkweed that exist in North America, only about one fourth of them are known to be important host plants for monarch butterflies. The main monarch host plant is Common Milkweed (*Asclepias syriaca*) (Kaul & Wilsey, 2019). Other common hosts

include Swamp Milkweed (*Asclepias incarnata*), Butterfly Milkweed (*Asclepias tuberosa*), Whorled Milkweed (*Asclepias verticillata*), and Poke Milkweed (*Asclepias exaltata*) (USFWS, 2021). Both Common and Swamp Milkweed are likely to occur in the wetland and forested areas within the study area. Three factors appear most important to explain the decline of Monarchs: loss of milkweed habitat, logging at overwintering sites, climate change, and extreme weather. In addition, natural enemies such as diseases, predators, and parasites, as well as chemicals used in agricultural activities may also contribute to the decline.

4.7.2. Effects Determination

Impact of No Action Alternative – Under the No Action Alternative, the emergent and herbaceous, early successional communities in the study area would continue to persist into the future as a result of periodic flooding and natural river processes. The quality of habitat would be anticipated to decline over time as sedimentation begins to degrade and convert the emergent wetlands into other land cover types (i.e., shrub or early successional forest). However, some suitable habitat is expected to occur in the study area over the period of analysis.

Impacts of Proposed Federal Action - The emergent wetlands and their forest edge habitats in the backwater areas of the project would improve habitat for the monarch butterfly. The improvements to backwaters and creation of early successional habitat would support a more diverse emergent wetland community and enhance floral resources over the long-term in the study area. The short-term decrease in floral resources due to the disturbance from constructing the proposed project would be offset by the expansion and restoration of emergent wetlands and edge habitats through proposed Project measures. Therefore, the Proposed Federal Action ***may affect but is not likely to adversely affect the monarch butterfly.***

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UPPER MISSISSIPPI RIVER RESTORATION

DRAFT FEASIBILITY REPORT

WITH INTEGRATED ENVIRONMENTAL ASSESSMENT

WEST ALTON ISLANDS HABITAT REHABILITATION AND ENHANCEMENT PROJECT

Appendix D: Clean Water Act

US Army Corps of Engineers ®
St. Louis District

Mississippi River
Miles 203-215.5
St. Charles County, Missouri
Project Partners: Missouri Department of Conservation & U.S. Fish and Wildlife Service

1 PROJECT DESCRIPTION

1.1 Location

The West Alton Islands study area is approximately 1,823 acres of island, side channel, backwater, and floodplain forest habitats located on the right descending bank of the Mississippi River in St. Charles County, Missouri between River Miles (RM) 203 and 215.5. The study area lies within Pool 26 of the Upper Mississippi River System, a reach beginning below Lock and Dam 25 (RM 241.4) near Cap au Gris, Missouri, and ending at Melvin Price Lock and Dam (L&D) (RM 200.8) at Alton, IL. The study area encompasses West Alton Bay, Portage Island and side channel, and Luesse Lake. **Error! Reference source not found.**1 provides a vicinity map and Pool 26 location map for the West Alton Islands HREP.

1.2 General Description

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

- The project would restore backwater habitats and improve the quality of existing side channel habitat, thus enhancing depth diversity and connectivity. It would also increase floodplain forest, early successional forested island, and emergent wetland habitat.

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

Objective 1. Restore diversity of bathymetry, flow, and connectivity of aquatic areas throughout study area (side channel, main channel, off channel, backwaters, etc.)

Objective 2. Restore diverse island mosaics throughout study area (sand bars, islands; reduce wind fetch and wave impacts)

Objective 3. Restore native vegetation diversity and structural complexity throughout study area (wetlands, forests, etc.)

1.3 Authority and Purpose

The Corps proposes to rehabilitate West Alton Islands through construction of measures which would restore bathymetric flow and connectivity diversity of aquatic areas, diverse island mosaics, and native vegetation diversity and structural complexity to improve the overall structure and function of West Alton Islands habitat. The purpose of this draft Feasibility Report with Integrated Environmental Assessment (EA) is to evaluate the proposal for the UMRR-HREP at West Alton Islands. The Feasibility Report with Integrated EA meets Corps of Engineers planning guidance and National Environmental Protection Act (NEPA) requirements. This report presents a detailed account of the planning, engineering, construction, and environmental considerations which resulted in the Tentatively Selected Plan (TSP) and is being developed by the Corps of Engineers with the U.S. Fish and Wildlife Service (USFWS) serving as the

Federal project partner, and the Missouri Department of Conservation (MDC) serving as the non-federal sponsor.

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

1.4 General Description of Excavated and Placed Materials

1.4.1 General Characteristics of Materials

a. Fill material:

Fill materials will include quarry run limestone consisting of graded “A” stone and earthen materials including silt, sand, and clays.

b. Excavated material:

Excavated material is defined as material that is either hydraulically dredged or mechanically excavated from waters of the United States. Earthen material excavated in West Alton Bay and Luesse Lake backwaters will consist of alluvial sands, silts, and clays, and will be beneficially reused within the study area for construction of the islands.

1.4.2 Quantity of Materials

a. Backwater:

- *Dredged Backwater material:* The total dredged material from the backwaters would be approximately 491,101 CY.

Side Channels:

- *Stone material:* The total placed stone material for berm and barb structure, bullnose, dikes, hard points, etc. would be approximately 223,910 CY.

Island and Sandbar Creation:

- *Beneficial use of dredged material:* The material that will be placed within containment berms to create sandbar, island, and mudflat habitat for vegetative establishment and would be constructed of 380,485 CY of material dredged from the backwater.

1.5 Description of the proposed Placement Sites

1.5.1. Location.

The proposed placement sites of dredged material are located along the main channel border of West Alton Bay (Figure 3), and between the side channel and right descending bank at Portage Island (Figure 2) and will be used to construct the islands;

shown in the project maps below (Figures 1-3). The excavated material from West Alton Bay (Figure 3) and Luesse Lake (Figure 1) backwaters would be placed at elevations that are advantageous to early successional tree species such as willow, cottonwood, maple, ash, and elm to develop and success naturally overtime. These elevations are to be developed in more detail and accuracy in PED phase, after more gage data and site surveys.

1.5.2. Size and Types of Habitat.

Final placement of project features will result in loss or conversion of minor amounts of natural habitat. Temporary, short-term impacts to wetlands may result from construction activities. For the dredging of West Alton Bay and Luesse Lake backwaters, the intent of which is to restore depths, access, and connectivity of the back water to the Mississippi River by removing the sediment at the entrance of the backwater, may result in conversion of wetland to open water habitat along the periphery of the existing backwater. No conversion or removal of existing forested wetland habitat is anticipated. The placement of the dredge disposal material would be beneficially reused to construct the island features. Placement of material to construct the island features would result in approximately 62 acres of open water habitat being permanently converted to successional forest habitat. Overall, implementation and construction of the project features would enhance the ecosystem functionality within the study area.

1.5.3. Type of Site.

a. Permanent Deposits of Excavated or Fill Material.

The construction of proposed islands, chevron, hard points, trailing dike structures, and the containment berms of the islands would result in permanent placement of dredge disposal material and stone. Material dredged from West Alton Bay and Luesse Lake backwaters would be used to construct the island features.

b. Temporary Deposits of Excavated or Fill Material.

Temporary placement of fill material will be done in such a manner as to avoid and minimize impacts to wetlands and other natural features. Temporary stockpiles of material may also be necessary during construction of the various project features. Construction staging areas would be created in a logical manner in order to avoid impacts to wetlands.

1.5.4 Timing and Duration of Placement.

The construction of the island containment berms, hard points, and chevron would require work to be performed within higher (but non-flood) stages. Depending on local weather and river flooding conditions, the construction period may occur over several years.

1.6 Description of the Placement Method

Material removed from West Alton Bay and Luesse Lake backwaters would be hydraulically or mechanically dredged, or both, depending on contractor's equipment utilized for the Project. Hydraulic dredging equipment could consist of a cutterhead dredge, pontoons, and/or pipelines to transport the excavated dredge material in the form of a slurry. Mechanical dredging equipment could consist of a crane with clamshell bucket or a barge mounted excavator along with deck barges to transport the excavated dredge material in a more solid or cohesive condition. Either construction method selected would use the removed material from West Alton Bay and Luesse Lake backwaters for beneficially constructing the island features. The excavated dredge material would be transported on site to the planned island locations by either pipeline system (hydraulic dredging) or by barge (mechanical dredging). The preferred method for removing material from the backwaters would be the hydraulic dredging method as previously described. During the plans and specifications phase, the project delivery team would identify locations for pipe crossings that would avoid and minimize the amount of temporary impact to habitat within the study area. After material has been placed to the desired height for the islands (to be refined in plans and specifications phase, at elevations advantageous to early successional cottonwood and willow establishment), the material may be re-graded using earth-moving equipment.

Stone used to construct the chevron, hard point, trailing dike structure, and the containment berm of the islands would be transported by barge to the project site. Heavy equipment (e.g., cranes and/or excavators) operating from a barge would be used to place stone to construct these features.

2 FACTUAL DETERMINATIONS

2.1 Physical Determinations

Elevation and Slope.

Construction specifications are provided in the full report.

Sediment Type.

The primary soil type in the West Alton portion of study area has been characterized by the Natural Resource Conservation Service, Missouri as Chequest silt loam, a hydric, frequently flooded mollisol of alluvium parent material. This soil is typically found in wet floodplain prairies, with poorly drained permeability.

The primary soil type in the Luesse Lake portion of study area has been characterized by the Natural Resource Conservation Service, Missouri as Carlow silty clay loam, a hydric, occasionally flooded mollisol of clayey alluvium parent material. This soil type is typically found in wet floodplain prairies, with poorly drained permeability.

Actions Taken to Minimize Impacts.

All excavated and filled areas would be allowed to reestablish by natural regeneration of early successional woody vegetation or herbaceous emergent vegetation, respective of final grade elevation in order to protect against erosive forces.

Additionally, Best Management Practices for construction would be enforced. Feature designs incorporated methods to reduce tree clearing where practicable. Beneficial reuse of all material was incorporated so soil balances for constructed features were met by excavated features. Therefore, no in-stream disposal of dredged or excavated materials is necessary.

2.2 Water Circulation, Fluctuation, and Salinity Determinations

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

Table 1 Potential Impacts on Physical and Chemical Characteristics

Water.

a. Salinity – Not applicable.
b. Water Chemistry - Mechanical excavation or hydraulic dredging is expected to have a short-term temporary effect on water chemistry. Increased turbidity in areas where dredging occurs is expected; however, turbidity levels are not expected to significantly affect any aquatic organisms or downstream habitat. The removal of material in the backwater areas would improve depth and connectivity to the river, thus improving water chemistry. The backwater would have gradual side slopes of 1 ft. vertical on 3 ft. horizontal and be dredged to a depth approximately 5 feet deeper than the existing ground elevation which would allow it to be self-maintaining into the future, limiting erosion, sedimentation, and woody debris deposition.
c. Clarity – Elevated suspended sediment levels are expected to occur in a localized nature within the backwater during dredging. Decreased water clarity is expected to be short-term.
d. Color – No change is expected.
e. Odor – The project is not expected to have an impact on water odors.
f. Taste – The project is not expected to impact water taste.
g. Dissolved Gas Levels – Construction activities associated with the

project are not expected to have a significant adverse impact on dissolved gas levels.

h. Nutrients – Nutrients would be released to the water column during dredging; however, this would represent a temporary increase and is not considered significant.
i. Eutrophication – The project is not expected to contribute toward eutrophication of the water column.
j. Water Temperature – Temperatures are expected to improve with increased depth and flow, thus allowing for the backwater to support a larger diversity of aquatic life.

Current Patterns and Circulation.

The main purpose of this project is to increase depth, connectivity, and access to the backwater and beneficially reuse the material to construct riverine islands. The island locations berm and barb structure on West Alton Island would shift paths of flow and alter sediment deposition patterns in the immediate vicinity of the islands high water events.

Overall, the project would slightly alter circulation and flow patterns; however, these alterations are not expected to significantly change river hydraulics.

a. Velocity – There should be no detectible changes in current velocity in the Mississippi River.
b. Stratification – Stratification does not occur within the project area because of shallow depths. Stratification is not likely to occur after construction completion even with increased depths throughout the backwater. The target depths of backwater excavation is not anticipated to be deep enough to allow for temperature stratification.
c. Hydrologic Regime – The project would not alter the hydrologic regime or the flood profile of the Mississippi River.

Normal Water Level Fluctuations.

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

Actions That Will Be Taken to Minimize Impacts.

Best Management Practices for construction would be enforced. Refer to Section 7, in the main report for more details on Construction Considerations and Environmental Effects, as well as Appendix C – *Biological Assessment* for Conservation Measures.

2.3 Suspended Particulate/Turbidity Determinations

Expected Changes in Suspended Particles and Turbidity Levels in Vicinity of Placement Site.

Increases in suspended particulates and turbidity due to construction activities are expected to be greatest within the vicinity of the backwater dredging and placement locations. This would cease after construction completion. Refer to Sections 7.3 and 7.4 for Design and Construction in the main report for more details. The improved backwater depth as well as the improved soil composition throughout the West Alton Islands Project Area would increase benefits to fish and wildlife resources over the 50 year evaluation period. Stabilization of the backwaters would be realized upon construction completion. Refer to Appendix B - *Habitat Evaluation and Quantification* for more details.

Effects on Chemical and Physical Properties of the Water Column.

a. **Light Penetration. There would be a temporary reduction until sediments suspended as part of the project activities settle out of the water column.**
b. Dissolved Oxygen. No adverse effects expected. Improved dissolved oxygen is expected post-construction due to increased depths in the backwaters.
c. Toxic Metals and Organics. No adverse effects are expected. Hazardous material surveys would be completed during Plans & Specs.
d. Aesthetics. Aesthetics of work sites are likely to be adversely affected during construction but are expected to be temporary and improve after construction. Increased aesthetics would likely be realized soon after construction when cleared areas have been revegetated.
e. Effects on Biota. The project would likely result in some short-term displacement of biota in the immediate vicinity of construction activities due to temporary decreases in water quality and disturbance by construction equipment. Long-term beneficial effects should occur as aquatic species, especially riverine fishes, benefit from the improved habitat within the West Alton Islands study area. Floodplain forests would also benefit in the long term with the improved soil composition, thus allowing the successful establishment of early successional forest.. Refer to Section 7.11, Environmental Effects and Appendix B - *Habitat Evaluation and Quantification* for more details.

2.4 Contaminant Determinations

The Phase I Hazardous, Toxic, and Radioactive Waste survey conducted for this study did not identify contaminant sources or migration pathways from surrounding properties that would adversely impact surrounding environments (human and

ecological receptors). It does not appear that there is a risk of HTRW contamination within the project area. Please refer to Appendix F – *Hazardous Toxic Radioactive Waste* for more details.

2.5 Aquatic Ecosystem and Organism Determinations

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

Table 2 Potential Impacts on Biological Characteristics. More information provided in Appendix C, Biological Assessment for species-specific determinations.

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

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

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

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

Effects on Special Aquatic Sites.

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

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

Table 3 Potential impacts on special aquatic sites.

a. Sediment Deflection Berm and Barb – The berm and barb structure on the riverside of West Alton Bay would include placing material along the existing high ground of the peninsula at West Alton Island. This activity would include temporary increases in turbidity during construction but be offset over the life of the project as it will serve to protect the backwaters of West Alton Bay from increased sedimentation, turbidity, and conversion to terrestrial habitat. Therefore, this feature would have minor short-term effects on wetlands.
b. Forest Clearing – Approximately 3.4 acres forested area would be cleared for the placement of dredged material on Portage Island. The forest community type in this area is currently overrun with invasive Japanese hops (*Humulus japonicus*), with some regeneration of early successional, small diameter forest consisting of cottonwood (*Populus deltoides*), silver maple (*Acer saccarhinum*), and willow (*Salix nigra*). Reforestation will occur as beneficial use of dredged material and be allowed to reforest under natural regeneration. Due to the poor quality currently onsite, the clearing will be self-mitigating by the reforestation (62 acres project total). Therefore, this feature would have a minor short-term effect on wetlands. Reactionary invasive species management is also included for this reforestation site, please refer to Appendix E – *Monitoring and Adaptive Management* for more details.
c. Backwater Habitat – Approximately 260 acres of backwater habitat would be restored by hydraulic dredging. This area was historically a

flow-through side channel that became disconnected on the upper end, continued to fill as sedimentation occurred, and as the entranced filled completely, disconnected from the main channel. Therefore, the dredging of the backwater is considered restoration of an aquatic site and would have a minor short-term effect on wetlands.

Threatened and Endangered Species.

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

2.6 Proposed Placement Site Determinations

Mixing Zone Determinations.

Suspended particulates and turbidity would increase during construction activities. These increases would be most evident at the point of excavation or dredging and would quickly fall within baseline conditions in the mixing zone. Excavated or dredged material will be placed within containment berms in order to construct the islands. No significant adverse impacts to the chemical and physical properties of the water column are expected.

Determination of Compliance with Applicable Water Quality Standards.

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

Potential Effects on Human Use Characteristics.

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

2.6 Determinations of Cumulative Effects on the Aquatic Ecosystem

Although minor short-term construction-related impacts to local fish and wildlife populations are likely to occur, no negative cumulative impacts to fish and wildlife are identified. From a systemic approach, the tentatively selected plan would result in positive long-term benefits to backwaters, side channels and floodplain forest habitats

located in and around the West Alton Islands Project Area and throughout the UMR. Refer to Section 7.11, Environmental Effects in the Feasibility Report for more details.

2.7 Determinations of Secondary Effects on the Aquatic Ecosystem

No adverse secondary effects should result from the proposed action. Long-term benefits to aquatic habitat and wildlife are expected. Refer to Section 7.11, Environmental Effects and *Appendix C - Biological Assessment* of the Feasibility Report for more details.

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

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

Alternatives that were considered for the proposed action included fewer features than the tentatively selected plan. All feasible combinations of features, 4 final alternatives including the no action alternative were analyzed for environmental benefits and costs (Refer to Section 6, Evaluation and Comparison of Final Array of Alternatives in the main report for more details on alternatives analysis). The tentatively selected plan provided a large number of environmental benefits and best met project objectives and the four plan formulation criteria of completeness, effectiveness, efficiency, and acceptability.

1 Certification under Section 401 of the Clean Water Act would be obtained from the Missouri Department of Natural Resources where applicable.

2 Prior to construction, full compliance with the Endangered Species Act would be documented.

3 The project is situated along an inland freshwater river system. No marine sanctuaries are involved or would be affected by the proposed action.

4 No municipal or private water supplies would be affected by the proposed action, and no degradation of waters of the United States is anticipated to result from the proposed action. The proposed construction activity would not have a significant adverse effect on human health and welfare, recreation and commercial fisheries, plankton, fish, shellfish, wildlife, or special aquatic sites. No significant adverse effects on life stages of aquatic life and other wildlife dependent on aquatic ecosystems are expected to result. The proposed construction activity would have no significant adverse effects on aquatic ecosystem diversity, productivity, and stability. No significant adverse effects on recreational, aesthetic, and economic values would occur.

5 The materials used for construction would be chemically and physically stable and non-contaminating.

6 No other practical alternatives have been identified. The proposed action will be

in compliance with Section 404(b)(1) of the Clean Water Act, as amended prior to construction. The proposed action would not significantly impact water quality.

_____ Date

_____
COL. Andy J. Pannier
U.S. Army Corps of Engineers
District Commander

4 Figures

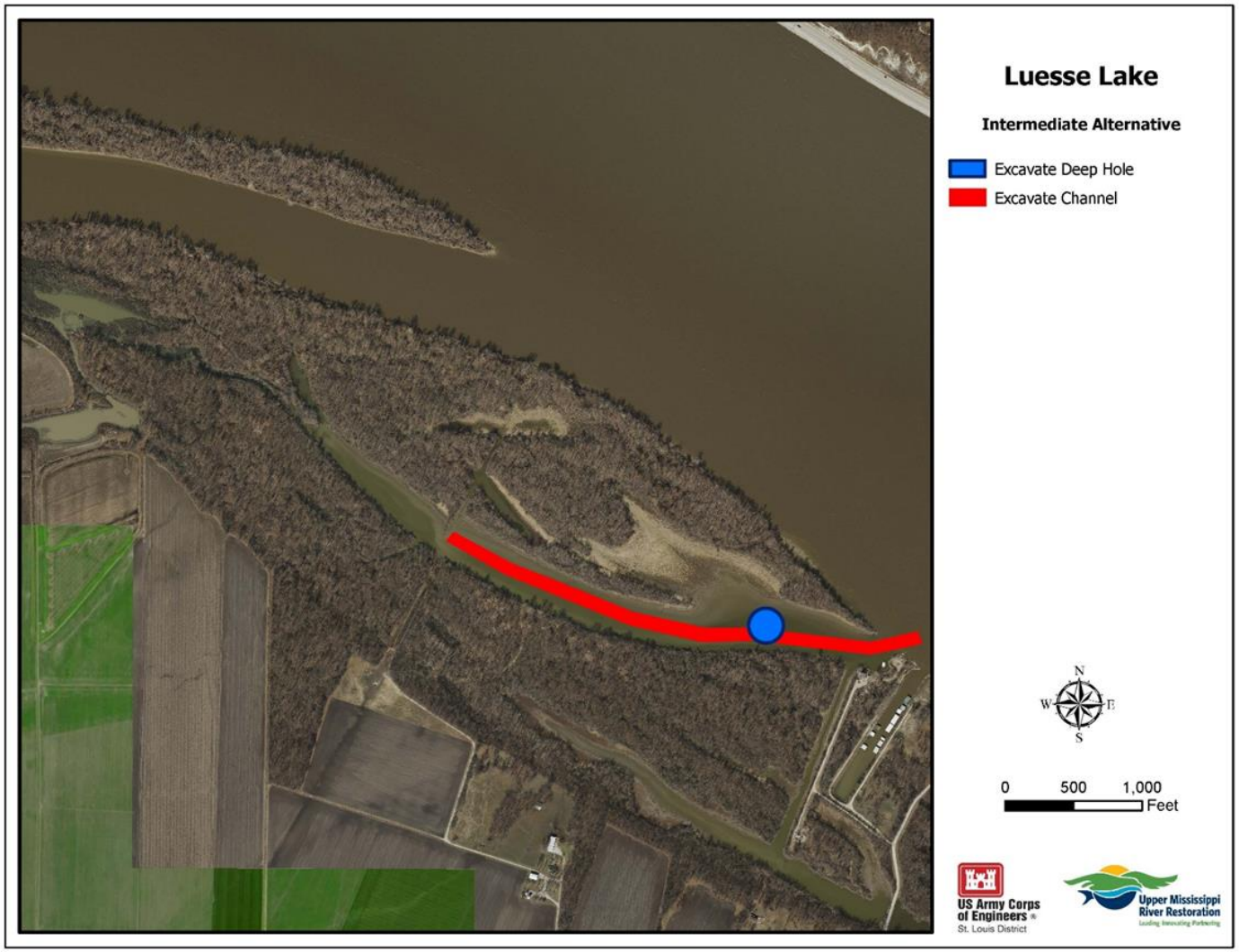

Figure 1: Luesse Lake Project Measures

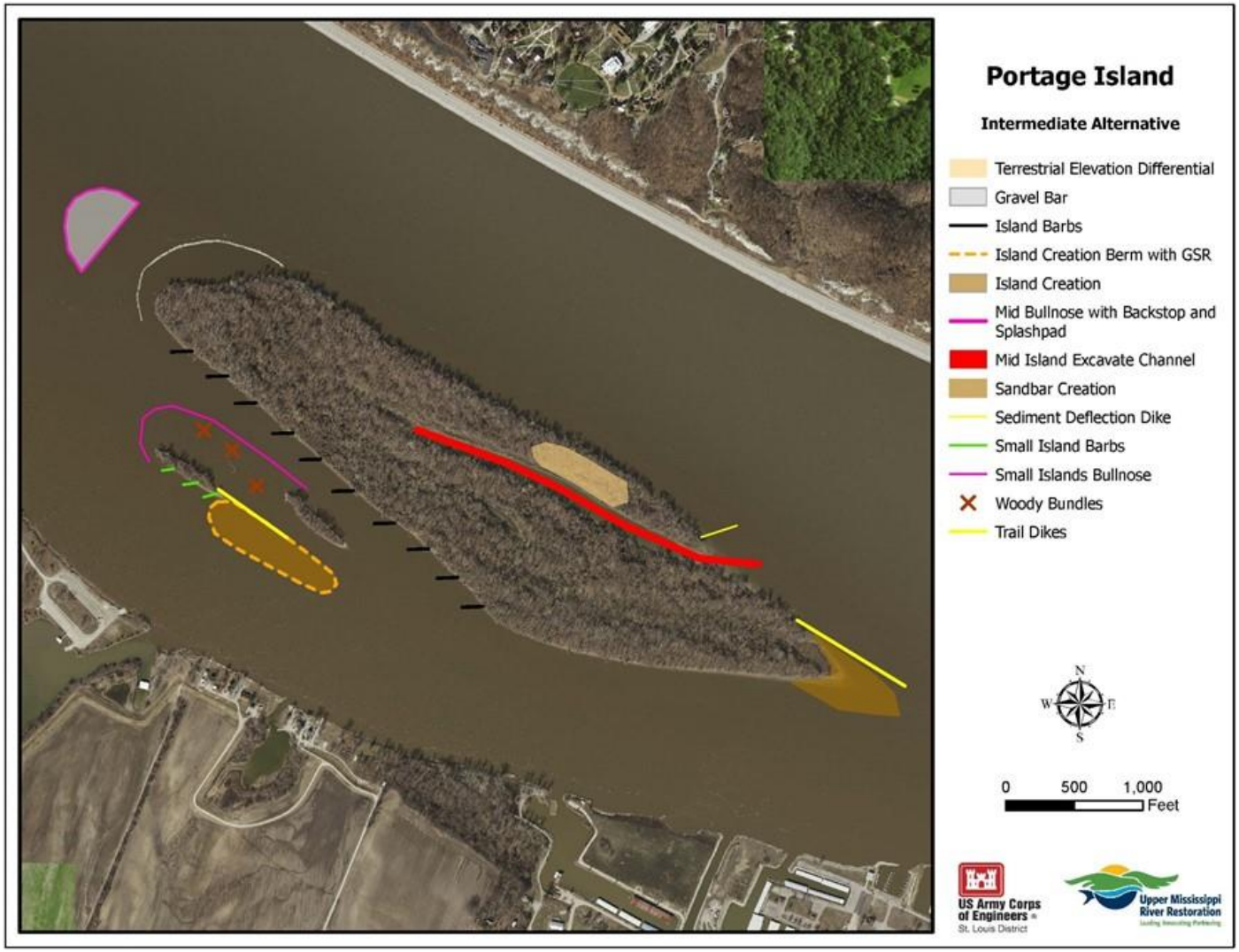

Figure 2: Portage Island Project Measures

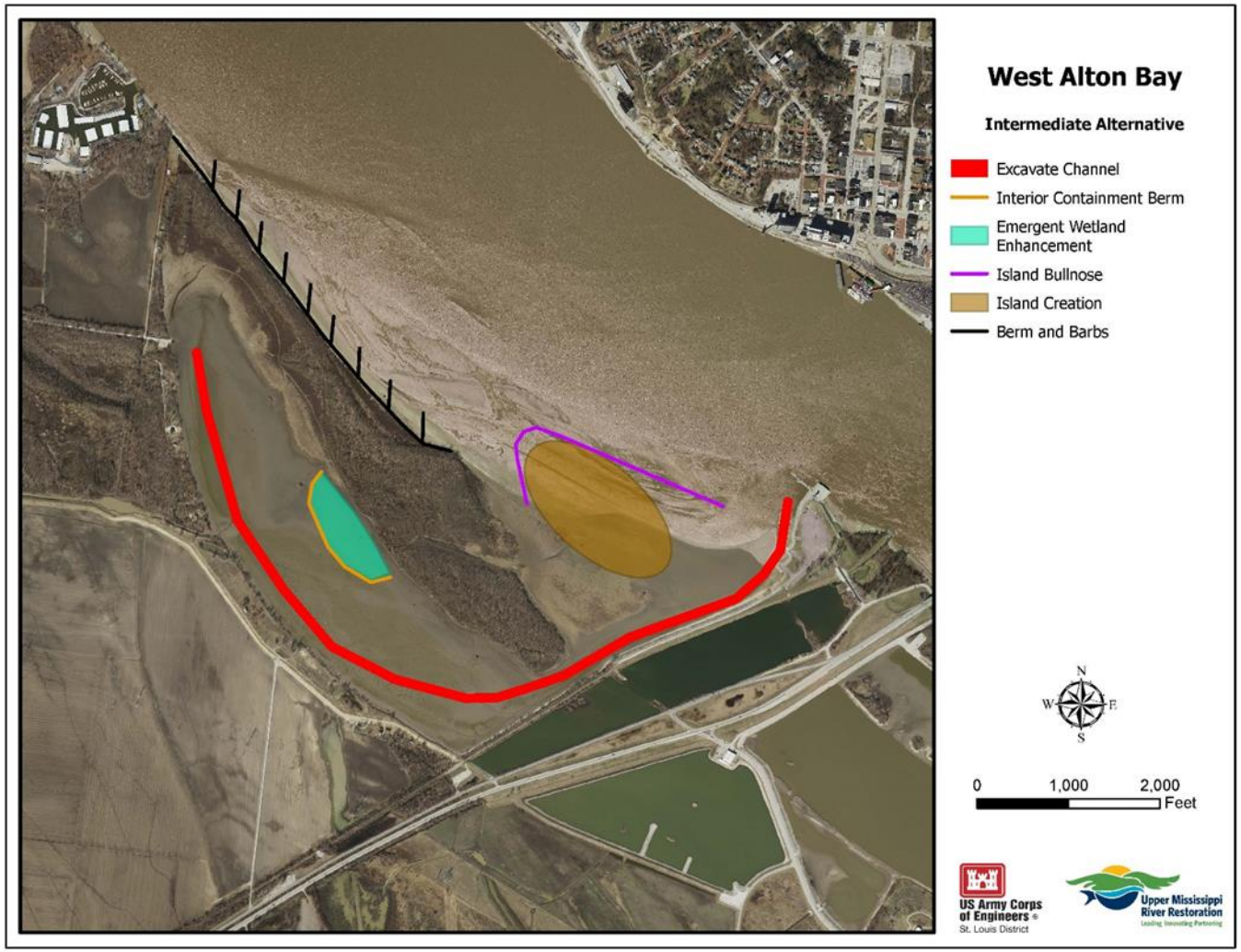

Figure 3: West Alton Bay Project Measures

5 **Nationwide Permit 27 Terms and Conditions, and MO state 401 WQC regional conditions.** The proposed project must comply with all terms and conditions for NWP 27.

2022 Nationwide Permit Summary

U.S Army Corps
Of Engineers

Issued: February 25, 2022 **Expires: March 14, 2026**

No. 27. Aquatic Habitat Restoration, Enhancement, and Establishment Activities
(NWP Final Notice, 86 FR, 73576)

Activities in waters of the United States associated with the restoration, enhancement, and establishment of tidal and non-tidal wetlands and riparian areas, the restoration and enhancement of non-tidal streams and other non-tidal open waters, and the rehabilitation or enhancement of tidal streams, tidal wetlands, and tidal open waters, provided those activities result in net increases in aquatic resource functions and services.

To be authorized by this NWP, the aquatic habitat restoration, enhancement, or establishment activity must be planned, designed, and implemented so that it results in aquatic habitat that resembles an ecological reference. An ecological reference may be based on the characteristics of one or more intact aquatic habitats or riparian areas of the same type that exist in the region. An ecological reference may be based on a conceptual model developed from regional ecological knowledge of the target aquatic habitat type or riparian area.

To the extent that a Corps permit is required, activities authorized by this NWP include, but are not limited to the removal of accumulated sediments; releases of sediment from reservoirs to maintain sediment transport continuity to restore downstream habitats; the installation, removal, and maintenance of small water control structures, dikes, and berms, as well as discharges of dredged or fill material to restore appropriate stream channel configurations after small water control structures, dikes, and berms are removed; the installation of current deflectors; the enhancement, rehabilitation, or re-establishment of riffle and pool stream structure; the placement of in-stream habitat structures; modifications of the stream bed and/or banks to enhance, rehabilitate, or re-establish stream meanders; the removal of stream barriers, such as undersized culverts, fords, and grade control structures; the backfilling of artificial channels; the removal of existing drainage structures, such as drain tiles, and the filling, blocking, or reshaping of drainage ditches to restore wetland hydrology; the installation of structures or fills necessary to restore or enhance wetland or stream hydrology; the construction of small nesting islands; the construction of open water areas; the construction of oyster habitat over unvegetated bottom in tidal waters; coral restoration or relocation activities; shellfish seeding; activities needed to reestablish vegetation, including plowing or discing for seed bed preparation and the planting of appropriate wetland species; re-establishment of submerged aquatic vegetation in areas where those plant communities previously existed; re-establishment of tidal wetlands in tidal waters where those wetlands previously existed; mechanized land clearing to remove non-native invasive, exotic, or nuisance vegetation; and other related activities. Only native plant species should be planted at the site.

This NWP authorizes the relocation of non-tidal waters, including non-tidal wetlands and streams, on the project site provided there are net increases in aquatic resource functions and services.

Except for the relocation of non-tidal waters on the project site, this NWP does not authorize the conversion of a stream or natural wetlands to another aquatic habitat type (e.g., the conversion of a stream to wetland or vice versa) or uplands. Changes in wetland plant communities that occur when wetland hydrology is more fully restored during wetland rehabilitation activities are not considered a conversion to another aquatic habitat type. This NWP does not authorize stream channelization. This NWP does not authorize the relocation of tidal waters or the conversion of tidal waters, including tidal wetlands, to other aquatic uses, such as the conversion of tidal wetlands into open water impoundments.

Compensatory mitigation is not required for activities authorized by this NWP since these activities must result in net increases in aquatic resource functions and services.

Reversion. For enhancement, restoration, and establishment activities conducted: (1) In accordance with the

terms and conditions of a binding stream or wetland enhancement or restoration agreement, or a wetland establishment agreement, between the landowner and the U.S. Fish and Wildlife Service (FWS), the Natural Resources Conservation Service (NRCS), the Farm Service Agency (FSA), the National Marine Fisheries Service (NMFS), the National Ocean Service (NOS), U.S. Forest Service (USFS), or their designated state cooperating agencies; (2) as voluntary wetland restoration, enhancement, and establishment actions documented by the NRCS or USDA Technical Service Provider pursuant to NRCS Field Office Technical Guide standards; or (3) on reclaimed surface coal mine lands, in accordance with a Surface Mining Control and Reclamation Act permit issued by the Office of Surface Mining Reclamation and Enforcement (OSMRE) or the applicable state agency, this NWP also authorizes any future discharge of dredged or fill material associated with the reversion of the area to its documented prior condition and use (i.e., prior to the restoration, enhancement, or establishment activities). The reversion must occur within five years after expiration of a limited term wetland restoration or establishment agreement or permit, and is authorized in these circumstances even if the discharge of dredged or fill material occurs after this NWP expires. The five-year reversion limit does not apply to agreements without time limits reached between the landowner and the FWS, NRCS, FSA, NMFS, NOS, USFS, or an appropriate state cooperating agency. This NWP also authorizes discharges of dredged or fill material in waters of the United States for the reversion of wetlands that were restored, enhanced, or established on prior-converted cropland or on uplands, in accordance with a binding agreement between the landowner and NRCS, FSA, FWS, or their designated state cooperating agencies (even though the restoration, enhancement, or establishment activity did not require a section 404 permit). The prior condition will be documented in the original agreement or permit, and the determination of return to prior conditions will be made by the Federal agency or appropriate state agency executing the agreement or permit. Before conducting any reversion activity, the permittee or the appropriate Federal or state agency must notify the district engineer and include the documentation of the prior condition. Once an area has reverted to its prior physical condition, it will be subject to whatever the Corps Regulatory requirements are applicable to that type of land at the time. The requirement that the activity results in a net increase in aquatic resource functions and services does not apply to reversion activities meeting the above conditions. Except for the activities described above, this NWP does not authorize any future discharge of dredged or fill material associated with the reversion of the area to its prior condition. In such cases a separate permit would be required for any reversion.

Reporting. For those activities that do not require pre-construction notification, the permittee must submit to the district engineer a copy of: (1) The binding stream enhancement or restoration agreement or wetland enhancement, restoration, or establishment agreement, or a project description, including project plans and location map; (2) the NRCS or USDA Technical Service Provider documentation for the voluntary stream enhancement or restoration action or wetland restoration, enhancement, or establishment action; or (3) the SMCRA permit issued by OSMRE or the applicable state agency. The report must also include information on baseline ecological conditions on the project site, such as a delineation of wetlands, streams, and/or other aquatic habitats. These documents must be submitted to the district engineer at least 30 days prior to commencing activities in waters of the United States authorized by this NWP.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing any activity (see general condition 32), except for the following activities:

(1) Activities conducted on non-Federal public lands and private lands, in accordance with the terms and conditions of a binding stream enhancement or restoration agreement or wetland enhancement, restoration, or establishment agreement between the landowner and the FWS, NRCS, FSA, NMFS, NOS, USFS or their designated state cooperating agencies;

(2) Activities conducted in accordance with the terms and conditions of a binding coral restoration or relocation agreement between the project proponent and the NMFS or any of its designated state cooperating agencies;

(3) Voluntary stream or wetland restoration or enhancement action, or wetland establishment action, documented by the NRCS or USDA Technical Service Provider pursuant to Start Printed Page 73578 NRCS Field Office Technical Guide standards; or

(4) The reclamation of surface coal mine lands, in accordance with an SMCRA permit issued by the OSMRE or the applicable state agency.

However, the permittee must submit a copy of the appropriate documentation to the district engineer to fulfill the reporting requirement. (Authorities: Sections 10 and 404).

Note: This NWP can be used to authorize compensatory mitigation projects, including mitigation banks and in-lieu fee projects. However, this NWP does not authorize the reversion of an area used for a compensatory mitigation project to its prior condition, since compensatory mitigation is generally intended to be permanent.

C. Nationwide Permit General Conditions

(NWP Final Notice, 86 FR 2867-2874)

Note: To qualify for NWP authorization, the prospective permittee must comply with the following general conditions, as applicable, in addition to any regional or case-specific conditions imposed by the division engineer or district engineer. Prospective permittees should contact the appropriate Corps district office to determine if regional conditions have been imposed on an NWP. Prospective permittees should also contact the appropriate Corps district office to determine the status of Clean Water Act Section 401 water quality certification and/or Coastal Zone Management Act consistency for an NWP. Every person who may wish to obtain permit authorization under one or more NWPs, or who is currently relying on an existing or prior permit authorization under one or more NWPs, has been and is on notice that all of the provisions of 33 CFR 330.1 through 330.6 apply to every NWP authorization. Note especially 33 CFR 330.5 relating to the modification, suspension, or revocation of any NWP authorization.

1. Navigation. (a) No activity may cause more than a minimal adverse effect on navigation.

(b) Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the United States.

(c) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his or her authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

2. Aquatic Life Movements. No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. All permanent and temporary crossings of waterbodies shall be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species. If a bottomless culvert cannot be used, then the crossing should be designed and constructed to minimize adverse effects to aquatic life movements.

3. Spawning Areas. Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.

4. Migratory Bird Breeding Areas. Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.

5. Shellfish Beds. No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWPs 4 and 48, or is a shellfish seeding or habitat restoration activity authorized by NWP 27.

6. Suitable Material. No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see section 307 of the Clean Water Act).

7. Water Supply Intakes. No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

8. Adverse Effects From Impoundments. If the activity creates an impoundment of water, adverse

effects to the aquatic system due to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.

9. Management of Water Flows. To the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization, storm water management activities, and temporary and permanent road crossings, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

10. Fills Within 100-Year Floodplains. The activity must comply with applicable FEMA-approved state or local floodplain management requirements.

11. Equipment. Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.

12. Soil Erosion and Sediment Controls. Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow, or during low tides.

13. Removal of Temporary Structures and Fills. Temporary structures must be removed, to the maximum extent practicable, after their use has been discontinued. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

14. Proper Maintenance. Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety and compliance with applicable NWP general conditions, as well as any activity-specific conditions added by the district engineer to an NWP authorization.

15. Single and Complete Project. The activity must be a single and complete project. The same NWP cannot be used more than once for the same single and complete project.

16. Wild and Scenic Rivers. (a) No NWP activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status.

(b) If a proposed NWP activity will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, the permittee must submit a pre-construction notification (see general condition 32). The district engineer will coordinate the PCN with the Federal agency with direct management responsibility for that river. Permittees shall not begin the NWP activity until notified by the district engineer that the Federal agency with direct management responsibility for that river has determined in writing that the proposed NWP activity will not adversely affect the Wild and Scenic River designation or study status.

(c) Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency responsible for the designated Wild and Scenic River or study river (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service). Information on these rivers is also available at: http://www.rivers.gov/.

17. Tribal Rights. No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

18. Endangered Species. (a) No activity is authorized under any NWP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify designated critical habitat or critical habitat proposed for such designation. No activity is authorized under any NWP which "may affect" a listed species or critical habitat, unless ESA section 7

consultation addressing the consequences of the proposed activity on listed species or critical habitat has been completed. See 50 CFR 402.02 for the definition of "effects of the action" for the purposes of ESA section 7 consultation, as well as 50 CFR 402.17, which provides further explanation under ESA section 7 regarding "activities that are reasonably certain to occur" and "consequences caused by the proposed action."

(b) Federal agencies should follow their own procedures for complying with the requirements of the ESA (see 33 CFR 330.4(f)(1)). If pre-construction notification is required for the proposed activity, the Federal permittee must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will verify that the appropriate documentation has been submitted. If the appropriate documentation has not been submitted, additional ESA section 7 consultation may be necessary for the activity and the respective federal agency would be responsible for fulfilling its obligation under section 7 of the ESA.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if any listed species (or species proposed for listing) or designated critical habitat (or critical habitat proposed such designation) might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat or critical habitat proposed for such designation, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species (or species proposed for listing) or designated critical habitat (or critical habitat proposed for such designation), the pre-construction notification must include the name(s) of the endangered or threatened species (or species proposed for listing) that might be affected by the proposed activity or that utilize the designated critical habitat (or critical habitat proposed for such designation) that might be affected by the proposed activity. The district engineer will determine whether the proposed activity "may affect" or will have "no effect" to listed species and designated critical habitat and will notify the non-Federal applicant of the Corps' determination within 45 days of receipt of a complete pre-construction notification. For activities where the non-Federal applicant has identified listed species (or species proposed for listing) or designated critical habitat (or critical habitat proposed for such designation) that might be affected or is in the vicinity of the activity, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification that the proposed activity will have "no effect" on listed species (or species proposed for listing or designated critical habitat (or critical habitat proposed for such designation), or until ESA section 7 consultation or conference has been completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(d) As a result of formal or informal consultation or conference with the FWS or NMFS the district engineer may add species-specific permit conditions to the NWPs.

(e) Authorization of an activity by an NWP does not authorize the "take" of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the FWS or the NMFS, the Endangered Species Act prohibits any person subject to the jurisdiction of the United States to take a listed species, where "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The word "harm" in the definition of "take" means an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

(f) If the non-federal permittee has a valid ESA section 10(a)(1)(B) incidental take permit with an approved Habitat Conservation Plan for a project or a group of projects that includes the proposed NWP activity, the non-federal applicant should provide a copy of that ESA section 10(a)(1)(B) permit with the PCN required by paragraph (c) of this general condition. The district engineer will coordinate with the agency that issued the ESA section 10(a)(1)(B) permit to determine whether the proposed NWP activity and the associated incidental take were considered in the internal ESA section 7 consultation conducted for the ESA section 10(a)(1)(B) permit. If that coordination results in concurrence

from the agency that the proposed NWP activity and the associated incidental take were considered in the internal ESA section 7 consultation for the ESA section 10(a)(1)(B) permit, the district engineer does not need to conduct a separate ESA section 7 consultation for the proposed NWP activity. The district engineer will notify the non-federal applicant within 45 days of receipt of a complete pre-construction notification whether the ESA section 10(a)(1)(B) permit covers the proposed NWP activity or whether additional ESA section 7 consultation is required.

(g) Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the FWS and NMFS or their world wide web pages at http://www.fws.gov/ or http://www.fws.gov/ipac and http://www.nmfs.noaa.gov/pr/species/esa/ respectively.

19. Migratory Birds and Bald and Golden Eagles. The permittee is responsible for ensuring that an action authorized by an NWP complies with the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. The permittee is responsible for contacting the appropriate local office of the U.S. Fish and Wildlife Service to determine what measures, if any, are necessary or appropriate to reduce adverse effects to migratory birds or eagles, including whether "incidental take" permits are necessary and available under the Migratory Bird Treaty Act or Bald and Golden Eagle Protection Act for a particular activity.

20. Historic Properties. (a) No activity is authorized under any NWP which may have the potential to cause effects to properties listed, or eligible for listing, in the National Register of Historic Places until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied.

(b) Federal permittees should follow their own procedures for complying with the requirements of section 106 of the National Historic Preservation Act (see 33 CFR 330.4(g)(1)). If pre-construction notification is required for the proposed NWP activity, the Federal permittee must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will verify that the appropriate documentation has been submitted. If the appropriate documentation is not submitted, then additional consultation under section 106 may be necessary. The respective federal agency is responsible for fulfilling its obligation to comply with section 106.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if the NWP activity might have the potential to cause effects to any historic properties listed on, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties. For such activities, the pre-construction notification must state which historic properties might have the potential to be affected by the proposed NWP activity or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of, or potential for, the presence of historic properties can be sought from the State Historic Preservation Officer, Tribal Historic Preservation Officer, or designated tribal representative, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)). When reviewing pre-construction notifications, district engineers will comply with the current procedures for addressing the requirements of section 106 of the National Historic Preservation Act. The district engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts commensurate with potential impacts, which may include background research, consultation, oral history interviews, sample field investigation, and/or field survey. Based on the information submitted in the PCN and these identification efforts, the district engineer shall determine whether the proposed NWP activity has the potential to cause effects on the historic properties. Section 106 consultation is not required when the district engineer determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR 800.3(a)). Section 106 consultation is required when the district engineer determines that the activity has the potential to cause effects on historic properties. The district engineer will conduct consultation with consulting parties identified under 36 CFR 800.2(c) when he or she makes any of the following effect determinations for the purposes of section 106 of the NHPA: No historic properties affected, no adverse effect, or adverse effect.

(d) Where the non-Federal applicant has identified historic properties on which the proposed NWP activity might have the potential to cause effects and has so notified the Corps, the non-Federal applicant shall not begin the activity until notified by the district engineer

either that the activity has no potential to cause effects to historic properties or that NHPA section 106 consultation has been completed. For non-federal permittees, the district engineer will notify the prospective permittee within 45 days of receipt of a complete pre-construction notification whether NHPA section 106 consultation is required. If NHPA section 106 consultation is required, the district engineer will notify the non-Federal applicant that he or she cannot begin the activity until section 106 consultation is completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(e) Prospective permittees should be aware that section 110k of the NHPA (54 U.S.C. 306113) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

21. Discovery of Previously Unknown Remains and Artifacts. Permittees that discover any previously unknown historic, cultural or archeological remains and artifacts while accomplishing the activity authorized by an NWP, they must immediately notify the district engineer of what they have found, and to the maximum extent practicable, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The district engineer will initiate the Federal, Tribal, and state coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

22. Designated Critical Resource Waters. Critical resource waters include, NOAA-managed marine sanctuaries and marine monuments, and National Estuarine Research Reserves. The district engineer may designate, after notice and opportunity for public comment, additional waters officially designated by a state as having particular environmental or ecological significance, such as outstanding national resource waters or state natural heritage sites. The district engineer may also designate additional critical resource waters after notice and opportunity for public comment.

(a) Discharges of dredged or fill material into waters of the United States are not authorized by NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, 50, 51, 52, 57 and 58 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters.

(b) For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, 38, and 54, notification is required in accordance with general condition 32, for any activity proposed by permittees in the designated critical resource waters including wetlands adjacent to those waters. The district engineer may authorize activities under these NWPs only after she or he determines that the impacts to the critical resource waters will be no more than minimal.

23. Mitigation. The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that the individual and cumulative adverse environmental effects are no more than minimal:

(a) The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (i.e., on site).

(b) Mitigation in all its forms (avoiding, minimizing, rectifying, reducing, or compensating for resource losses) will be required to the extent necessary to ensure that the individual and cumulative adverse environmental effects are no more than minimal.

(c) Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1/10-acre and require pre-

construction notification, unless the district engineer determines in writing that either some other form of mitigation would be more environmentally appropriate or the adverse environmental effects of the proposed activity are no more than minimal, and provides an activity-specific waiver of this requirement. For wetland losses of 1/10-acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in only minimal adverse environmental effects.

(d) Compensatory mitigation at a minimum one-for-one ratio will be required for all losses of stream bed that exceed 3/100-acre and require pre-construction notification, unless the district engineer determines in writing that either some other form of mitigation would be more environmentally appropriate or the adverse environmental effects of the proposed activity are no more than minimal, and provides an activity-specific waiver of this requirement. This compensatory mitigation requirement may be satisfied through the restoration or enhancement of riparian areas next to streams in accordance with paragraph (e) of this general condition. For losses of stream bed of 3/100-acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in only minimal adverse environmental effects. Compensatory mitigation for losses of streams should be provided, if practicable, through stream rehabilitation, enhancement, or preservation, since streams are difficult-to-replace resources (see 33 CFR 332.3(e)(3)).

(e) Compensatory mitigation plans for NWP activities in or near streams or other open waters will normally include a requirement for the restoration or enhancement, maintenance, and legal protection (e.g., conservation easements) of riparian areas next to open waters. In some cases, the restoration or maintenance/protection of riparian areas may be the only compensatory mitigation required. If restoring riparian areas involves planting vegetation, only native species should be planted. The width of the required riparian area will address documented water quality or aquatic habitat loss concerns. Normally, the riparian area will be 25 to 50 feet wide on each side of the stream, but the district engineer may require slightly wider riparian areas to address documented water quality or habitat loss concerns. If it is not possible to restore or maintain/protect a riparian area on both sides of a stream, or if the waterbody is a lake or coastal waters, then restoring or maintaining/protecting a riparian area along a single bank or shoreline may be sufficient. Where both wetlands and open waters exist on the project site, the district engineer will determine the appropriate compensatory mitigation (e.g., riparian areas and/or wetlands compensation) based on what is best for the aquatic environment on a watershed basis. In cases where riparian areas are determined to be the most appropriate form of minimization or compensatory mitigation, the district engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses.

(f) Compensatory mitigation projects provided to offset losses of aquatic resources must comply with the applicable provisions of 33 CFR part 332.

(1) The prospective permittee is responsible for proposing an appropriate compensatory mitigation option if compensatory mitigation is necessary to ensure that the activity results in no more than minimal adverse environmental effects. For the NWPs, the preferred mechanism for providing compensatory mitigation is mitigation bank credits or in-lieu fee program credits (see 33 CFR 332.3(b)(2) and (3)). However, if an appropriate number and type of mitigation bank or in-lieu credits are not available at the time the PCN is submitted to the district engineer, the district engineer may approve the use of permittee-responsible mitigation.

(2) The amount of compensatory mitigation required by the district engineer must be sufficient to ensure that the authorized activity results in no more than minimal individual and cumulative adverse environmental effects (see 33 CFR 330.1(e)(3)). (See also 33 CFR 332.3(f).)

(3) Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, aquatic resource restoration should be the first compensatory mitigation option considered for permittee-responsible mitigation.

(4) If permittee-responsible mitigation is the proposed option, the prospective permittee is responsible for submitting a mitigation plan. A conceptual or detailed mitigation plan may be used by the district engineer to make the decision on the NWP verification

request, but a final mitigation plan that addresses the applicable requirements of 33 CFR 332.4(c)(2) through (14) must be approved by the district engineer before the permittee begins work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation (see 33 CFR 332.3(k)(3)). If permittee-responsible mitigation is the proposed option, and the proposed compensatory mitigation site is located on land in which another federal agency holds an easement, the district engineer will coordinate with that federal agency to determine if proposed compensatory mitigation project is compatible with the terms of the easement.

(5) If mitigation bank or in-lieu fee program credits are the proposed option, the mitigation plan needs to address only the baseline conditions at the impact site and the number of credits to be provided (see 33 CFR 332.4(c)(1)(ii)).

(6) Compensatory mitigation requirements (e.g., resource type and amount to be provided as compensatory mitigation, site protection, ecological performance standards, monitoring requirements) may be addressed through conditions added to the NWP authorization, instead of components of a compensatory mitigation plan (see 33 CFR 332.4(c)(1)(ii)).

(g) Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the NWPs. For example, if an NWP has an acreage limit of 1/2-acre, it cannot be used to authorize any NWP activity resulting in the loss of greater than 1/2-acre of waters of the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that an NWP activity already meeting the established acreage limits also satisfies the no more than minimal impact requirement for the NWPs.

(h) Permittees may propose the use of mitigation banks, in-lieu fee programs, or permittee-responsible mitigation. When developing a compensatory mitigation proposal, the permittee must consider appropriate and practicable options consistent with the framework at 33 CFR 332.3(b). For activities resulting in the loss of marine or estuarine resources, permittee-responsible mitigation may be environmentally preferable if there are no mitigation banks or in-lieu fee programs in the area that have marine or estuarine credits available for sale or transfer to the permittee. For permittee-responsible mitigation, the special conditions of the NWP verification must clearly indicate the party or parties responsible for the implementation and performance of the compensatory mitigation project, and, if required, its long-term management.

(i) Where certain functions and services of waters of the United States are permanently adversely affected by a regulated activity, such as discharges of dredged or fill material into waters of the United States that will convert a forested or scrub-shrub wetland to a herbaceous wetland in a permanently maintained utility line right-of-way, mitigation may be required to reduce the adverse environmental effects of the activity to the no more than minimal level.

24. Safety of Impoundment Structures. To ensure that all impoundment structures are safely designed, the district engineer may require non-Federal applicants to demonstrate that the structures comply with established state or federal, dam safety criteria or have been designed by qualified persons. The district engineer may also require documentation that the design has been independently reviewed by similarly qualified persons, and appropriate modifications made to ensure safety.

25. Water Quality. (a) Where the certifying authority (state, authorized tribe, or EPA, as appropriate) has not previously certified compliance of an NWP with CWA section 401, a CWA section 401 water quality certification for the proposed discharge must be obtained or waived (see 33 CFR 330.4(c)). If the permittee cannot comply with all of the conditions of a water quality certification previously issued by certifying authority for the issuance of the NWP, then the permittee must obtain a water quality certification or waiver for the proposed discharge in order for the activity to be authorized by an NWP.

(b) If the NWP activity requires pre-construction notification and the certifying authority has not previously certified compliance of an NWP with CWA section 401, the proposed discharge is not authorized by an NWP until water quality certification is obtained or waived. If the certifying authority issues a water quality certification for the proposed discharge, the permittee must submit a copy of the certification to the district engineer. The discharge is not authorized by an NWP

until the district engineer has notified the permittee that the water quality certification requirement has been satisfied by the issuance of a water quality certification or a waiver.

(c) The district engineer or certifying authority may require additional water quality management measures to ensure that the authorized activity does not result in more than minimal degradation of water quality.

26. Coastal Zone Management. In coastal states where an NWP has not previously received a state coastal zone management consistency concurrence, an individual state coastal zone management consistency concurrence must be obtained, or a presumption of concurrence must occur (see 33 CFR 330.4(d)). If the permittee cannot comply with all of the conditions of a coastal zone management consistency concurrence previously issued by the state, then the permittee must obtain an individual coastal zone management consistency concurrence or presumption of concurrence in order for the activity to be authorized by an NWP. The district engineer or a state may require additional measures to ensure that the authorized activity is consistent with state coastal zone management requirements.

27. Regional and Case-By-Case Conditions. The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its CWA section 401 Water Quality Certification, or by the state in its Coastal Zone Management Act consistency determination.

28. Use of Multiple Nationwide Permits. The use of more than one NWP for a single and complete project is authorized, subject to the following restrictions:

(a) If only one of the NWPs used to authorize the single and complete project has a specified acreage limit, the acreage loss of waters of the United States cannot exceed the acreage limit of the NWP with the highest specified acreage limit. For example, if a road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3-acre.

(b) If one or more of the NWPs used to authorize the single and complete project has specified acreage limits, the acreage loss of waters of the United States authorized by those NWPs cannot exceed their respective specified acreage limits. For example, if a commercial development is constructed under NWP 39, and the single and complete project includes the filling of an upland ditch authorized by NWP 46, the maximum acreage loss of waters of the United States for the commercial development under NWP 39 cannot exceed 1/2-acre, and the total acreage loss of waters of United States due to the NWP 39 and 46 activities cannot exceed 1 acre.

29. Transfer of Nationwide Permit Verifications. If the permittee sells the property associated with a nationwide permit verification, the permittee may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate Corps district office to validate the transfer. A copy of the nationwide permit verification must be attached to the letter, and the letter must contain the following statement and signature:

"When the structures or work authorized by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this nationwide permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this nationwide permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below."

(Transferee)

(Date)

30. Compliance Certification. Each permittee who receives an NWP verification letter from the Corps must provide a signed certification documenting completion of the authorized activity and implementation of any required compensatory mitigation. The success of any required permittee-responsible mitigation, including the achievement of ecological performance standards, will be addressed separately by the district engineer. The Corps will provide the permittee the certification document with the NWP verification letter. The certification document will include:

(a) A statement that the authorized activity was done in accordance with the NWP authorization, including any general, regional, or activity-specific conditions;

(b) A statement that the implementation of any required compensatory mitigation was completed in accordance with the permit conditions. If credits from a

mitigation bank or in-lieu fee program are used to satisfy the compensatory mitigation requirements, the certification must include the documentation required by 33 CFR 332.3(l)(3) to confirm that the permittee secured the appropriate number and resource type of credits; and

(c) The signature of the permittee certifying the completion of the activity and mitigation.

The completed certification document must be submitted to the district engineer within 30 days of completion of the authorized activity or the implementation of any required compensatory mitigation, whichever occurs later.

31. Activities Affecting Structures or Works Built by the United States. If an NWP activity also requires review by, or permission from, the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers (USACE) federally authorized Civil Works project (a "USACE project"), the prospective permittee must submit a pre-construction notification. See paragraph (b)(10) of general condition 32. An activity that requires section 408 permission and/or review is not authorized by an NWP until the appropriate Corps office issues the section 408 permission or completes its review to alter, occupy, or use the USACE project, and the district engineer issues a written NWP verification.

32. Pre-Construction Notification. (a) Timing. Where required by the terms of the NWP, the prospective permittee must notify the district engineer by submitting a pre-construction notification (PCN) as early as possible. The district engineer must determine if the PCN is complete within 30 calendar days of the date of receipt and, if the PCN is determined to be incomplete, notify the prospective permittee within that 30 day period to request the additional information necessary to make the PCN complete. The request must specify the information needed to make the PCN complete. As a general rule, district engineers will request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the district engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the district engineer. The prospective permittee shall not begin the activity until either:

(1) He or she is notified in writing by the district engineer that the activity may proceed under the NWP with any special conditions imposed by the district or division engineer; or

(2) 45 calendar days have passed from the district engineer's receipt of the complete PCN and the prospective permittee has not received written notice from the district or division engineer. However, if the permittee was required to notify the Corps pursuant to general condition 18 that listed species or critical habitat might be affected or are in the vicinity of the activity, or to notify the Corps pursuant to general condition 20 that the activity might have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that there is "no effect" on listed species or "no potential to cause effects" on historic properties, or that any consultation required under Section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or section 106 of the National Historic Preservation Act (see 33 CFR 330.4(g)) has been completed. If the proposed activity requires a written waiver to exceed specified limits of an NWP, the permittee may not begin the activity until the district engineer issues the waiver. If the district or division engineer notifies the permittee in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the permittee cannot begin the activity until an individual permit has been obtained. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

(b) Contents of Pre-Construction Notification: The PCN must be in writing and include the following information:

(1) Name, address and telephone numbers of the prospective permittee;

(2) Location of the proposed activity;

(3) Identify the specific NWP or NWP(s) the prospective permittee wants to use to authorize the proposed activity;

(4) (i) A description of the proposed activity; the activity's purpose; direct and indirect adverse environmental effects the activity would cause, including the anticipated amount of loss of wetlands, other special aquatic sites, and other waters expected to result from the NWP activity, in acres, linear feet, or other appropriate unit of measure; a description of any proposed mitigation measures intended to reduce

the adverse environmental effects caused by the proposed activity; and any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity, including other separate and distant crossings for linear projects that require Department of the Army authorization but do not require pre-construction notification. The description of the proposed activity and any proposed mitigation measures should be sufficiently detailed to allow the district engineer to determine that the adverse environmental effects of the activity will be no more than minimal and to determine the need for compensatory mitigation or other mitigation measures.

(ii) For linear projects where one or more single and complete crossings require pre-construction notification, the PCN must include the quantity of anticipated losses of wetlands, other special aquatic sites, and other waters for each single and complete crossing of those wetlands, other special aquatic sites, and other waters (including those single and complete crossings authorized by an NWP but do not require PCNs). This information will be used by the district engineer to evaluate the cumulative adverse environmental effects of the proposed linear project, and does not change those non-PCN NWP activities into NWP PCNs.

(iii) Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the activity and when provided results in a quicker decision. Sketches should contain sufficient detail to provide an illustrative description of the proposed activity (e.g., a conceptual plan), but do not need to be detailed engineering plans);

(5) The PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial and intermittent streams, on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters on the project site, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many wetlands, other special aquatic sites, and other waters. Furthermore, the 45-day period will not start until the delineation has been submitted to or completed by the Corps, as appropriate;

(6) If the proposed activity will result in the loss of greater than 1/10-acre of wetlands or 3/100-acre of stream bed and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied, or explaining why the adverse environmental effects are no more than minimal and why compensatory mitigation should not be required. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.

(7) For non-federal permittees, if any listed species (or species proposed for listing) or designated critical habitat (or critical habitat proposed for such designation) might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat (or critical habitat proposed for such designation), the PCN must include the name(s) of those endangered or threatened species (or species proposed for listing) that might be affected by the proposed activity or utilize the designated critical habitat (or critical habitat proposed for such designation) that might be affected by the proposed activity. For NWP activities that require pre-construction notification, Federal permittees must provide documentation demonstrating compliance with the Endangered Species Act;

(8) For non-federal permittees, if the NWP activity might have the potential to cause effects to a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, the PCN must state which historic property might have the potential to be affected by the proposed activity or include a vicinity map indicating the location of the historic property. For NWP activities that require pre-construction notification, Federal permittees must provide documentation demonstrating compliance with section 106 of the National Historic Preservation Act;

(9) For an activity that will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, the PCN must identify the Wild and Scenic River or the "study river" (see general condition 16); and

(10) For an NWP activity that requires permission from, or review by, the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers federally authorized civil works project, the pre-construction

notification must include a statement confirming that the project proponent has submitted a written request for section 408 permission from, or review by, the Corps office having jurisdiction over that USACE project.

(c) Form of Pre-Construction Notification: The nationwide permit pre-construction notification form (Form ENG 6082) should be used for NWP PCNs. A letter containing the required information may also be used. Applicants may provide electronic files of PCNs and supporting materials if the district engineer has established tools and procedures for electronic submittals.

(d) Agency Coordination: (1) The district engineer will consider any comments from Federal and state agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the activity's adverse environmental effects so that they are no more than minimal.

(2) Agency coordination is required for: (i) All NWP activities that require pre-construction notification and result in the loss of greater than 1/2-acre of waters of the United States; (ii) NWP 13 activities in excess of 500 linear feet, fills greater than one cubic yard per running foot, or involve discharges of dredged or fill material into special aquatic sites; and (iii) NWP 54 activities in excess of 500 linear feet, or that extend into the waterbody more than 30 feet from the mean low water line in tidal waters or the ordinary high water mark in the Great Lakes.

(3) When agency coordination is required, the district engineer will immediately provide (e.g., via email, facsimile transmission, overnight mail, or other expeditious manner) a copy of the complete PCN to the appropriate Federal or state offices (FWS, state natural resource or water quality agency, EPA, and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will have 10 calendar days from the date the material is transmitted to notify the district engineer via telephone, facsimile transmission, or email that they intend to provide substantive, site-specific comments. The comments must explain why the agency believes the adverse environmental effects will be more than minimal. If so contacted by an agency, the district engineer will wait an additional 15 calendar days before making a decision on the pre-construction notification. The district engineer will fully consider agency comments received within the specified time frame concerning the proposed activity's compliance with the terms and conditions of the NWPs, including the need for mitigation to ensure that the net adverse environmental effects of the proposed activity are no more than minimal. The district engineer will provide no response to the resource agency, except as provided below. The district engineer will indicate in the administrative record associated with each pre-construction notification that the resource agencies' concerns were considered. For NWP 37, the emergency watershed protection and rehabilitation activity may proceed immediately in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur. The district engineer will consider any comments received to decide whether the NWP 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5.

(4) In cases of where the prospective permittee is not a Federal agency, the district engineer will provide a response to NMFS within 30 calendar days of receipt of any Essential Fish Habitat conservation recommendations, as required by section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act.

(5) Applicants are encouraged to provide the Corps with either electronic files or multiple copies of pre-construction notifications to expedite agency coordination.

D. District Engineer's Decision

1. In reviewing the PCN for the proposed activity, the district engineer will determine whether the activity authorized by the NWP will result in more than minimal individual or cumulative adverse environmental effects or may be contrary to the public interest. If a project proponent requests authorization by a specific NWP, the district engineer should issue the NWP verification for that activity if it meets the terms and conditions of that NWP, unless he or she determines, after considering mitigation, that the proposed activity will result in more than minimal individual and cumulative adverse effects on the aquatic environment and other aspects of the public interest and exercises discretionary authority to require an individual permit for the proposed activity. For a linear project, this determination will include an evaluation of the single and complete crossings of waters of the United States that require PCNs to determine whether they

individually satisfy the terms and conditions of the NWP(s), as well as the cumulative effects caused by all of the crossings of waters of the United States authorized by an NWP. If an applicant requests a waiver of an applicable limit, as provided for in NWPs 13, 36, or 54, the district engineer will only grant the waiver upon a written determination that the NWP activity will result in only minimal individual and cumulative adverse environmental effects.

2. When making minimal adverse environmental effects determinations the district engineer will consider the direct and indirect effects caused by the NWP activity. He or she will also consider the cumulative adverse environmental effects caused by activities authorized by an NWP and whether those cumulative adverse environmental effects are no more than minimal. The district engineer will also consider site specific factors, such as the environmental setting in the vicinity of the NWP activity, the type of resource that will be affected by the NWP activity, the functions provided by the aquatic resources that will be affected by the NWP activity, the degree or magnitude to which the aquatic resources perform those functions, the extent that aquatic resource functions will be lost as a result of the NWP activity (e.g., partial or complete loss), the duration of the adverse effects (temporary or permanent), the importance of the aquatic resource functions to the region (e.g., watershed or ecoregion), and mitigation required by the district engineer. If an appropriate functional or condition assessment method is available and practicable to use, that assessment method may be used by the district engineer to assist in the minimal adverse environmental effects determination. The district engineer may add case-specific special conditions to the NWP authorization to address site-specific environmental concerns.

3. If the proposed activity requires a PCN and will result in a loss of greater than 1/10-acre of wetlands or 3/100-acre of stream bed, the prospective permittee should submit a mitigation proposal with the PCN. Applicants may also propose compensatory mitigation for NWP activities with smaller impacts, or for impacts to other types of waters. The district engineer will consider any proposed compensatory mitigation or other mitigation measures the applicant has included in the proposal in determining whether the net adverse environmental effects of the proposed activity are no more than minimal. The compensatory mitigation proposal may be either conceptual or detailed. If the district engineer determines that the activity complies with the terms and conditions of the NWP and that the adverse environmental effects are no more than minimal, after considering mitigation, the district engineer will notify the permittee and include any activity-specific conditions in the NWP verification the district engineer deems necessary. Conditions for compensatory mitigation requirements must comply with the appropriate provisions at 33 CFR 332.3(k). The district engineer must approve the final mitigation plan before the permittee commences work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation. If the prospective permittee elects to submit a compensatory mitigation plan with the PCN, the district engineer will expeditiously review the proposed compensatory mitigation plan. The district engineer must review the proposed compensatory mitigation plan within 45 calendar days of receiving a complete PCN and determine whether the proposed mitigation would ensure that the NWP activity results in no more than minimal adverse environmental effects. If the net adverse environmental effects of the NWP activity (after consideration of the mitigation proposal) are determined by the district engineer to be no more than minimal, the district engineer will provide a timely written response to the applicant. The response will state that the NWP activity can proceed under the terms and conditions of the NWP, including any activity-specific conditions added to the NWP authorization by the district engineer.

4. If the district engineer determines that the adverse environmental effects of the proposed activity are more than minimal, then the district engineer will notify the applicant either: (a) That the activity does not qualify for authorization under the NWP and instruct the applicant on the procedures to seek authorization under an individual permit; (b) that the activity is authorized under the NWP subject to the applicant's submission of a mitigation plan that would reduce the adverse environmental effects so that they are no more than minimal; or (c) that the activity is authorized under the NWP with specific modifications or conditions. Where the district engineer determines that mitigation is required to ensure no more than minimal

adverse environmental effects, the activity will be authorized within the 45-day PCN period (unless additional time is required to comply with general conditions 18, 20, and/or 31), with activity-specific conditions that state the mitigation requirements. The authorization will include the necessary conceptual or detailed mitigation plan or a requirement that the applicant submit a mitigation plan that would reduce the adverse environmental effects so that they are no more than minimal. When compensatory mitigation is required, no work in waters of the United States may occur until the district engineer has approved a specific mitigation plan or has determined that prior approval of a final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation.

E. Further Information

1. District engineers have authority to determine if an activity complies with the terms and conditions of an NWP.

2. NWPs do not obviate the need to obtain other federal, state, or local permits, approvals, or authorizations required by law.

3. NWPs do not grant any property rights or exclusive privileges.

4. NWPs do not authorize any injury to the property or rights of others.

5. NWPs do not authorize interference with any existing or proposed Federal project (see general condition 31).

F. Definitions

Best management practices (BMPs): Policies, practices, procedures, or structures implemented to mitigate the adverse environmental effects on surface water quality resulting from development. BMPs are categorized as structural or non-structural.

Compensatory mitigation: The restoration (re-establishment or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances preservation of aquatic resources for the purposes of offsetting unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved.

Currently serviceable: Useable as is or with some maintenance, but not so degraded as to essentially require reconstruction.

Direct effects: Effects that are caused by the activity and occur at the same time and place.

Discharge: The term "discharge" means any discharge of dredged or fill material into waters of the United States.

Ecological reference: A model used to plan and design an aquatic habitat and riparian area restoration, enhancement, or establishment activity under NWP 27. An ecological reference may be based on the structure, functions, and dynamics of an aquatic habitat type or a riparian area type that currently exists in the region where the proposed NWP 27 activity is located. Alternatively, an ecological reference may be based on a conceptual model for the aquatic habitat type or riparian area type to be restored, enhanced, or established as a result of the proposed NWP 27 activity. An ecological reference takes into account the range of variation of the aquatic habitat type or riparian area type in the region.

Enhancement: The manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s), but may also lead to a decline in other aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area.

Establishment (creation): The manipulation of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. Establishment results in a gain in aquatic resource area.

High Tide Line: The line of intersection of the land with the water's surface at the maximum height reached by a rising tide. The high tide line may be determined, in the absence of actual data, by a line of oil or scum along shore objects, a more or less continuous deposit of fine shell or debris on the foreshore or berm, other physical markings or characteristics, vegetation lines, tidal gages, or other suitable means that delineate the general height reached by a rising tide. The line encompasses spring high tides and other high tides that occur with periodic frequency but does not include storm surges in which there is a departure from the normal or predicted reach of the tide due to the piling up of water against a coast by strong winds such as those accompanying a hurricane or other intense storm.

Historic Property: Any prehistoric or historic district, site (including archaeological site), building, structure,

or other object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria (36 CFR part 60).

Independent utility: A test to determine what constitutes a single and complete non-linear project in the Corps Regulatory Program. A project is considered to have independent utility if it would be constructed absent the construction of other projects in the project area. Portions of a multi-phase project that depend upon other phases of the project do not have independent utility. Phases of a project that would be constructed even if the other phases were not built can be considered as separate single and complete projects with independent utility.

Indirect effects: Effects that are caused by the activity and are later in time or farther removed in distance, but are still reasonably foreseeable.

Loss of waters of the United States: Waters of the United States that are permanently adversely affected by filling, flooding, excavation, or drainage because of the regulated activity. The loss of stream bed includes the acres of stream bed that are permanently adversely affected by filling or excavation because of the regulated activity. Permanent adverse effects include permanent discharges of dredged or fill material that change an aquatic area to dry land, increase the bottom elevation of a waterbody, or change the use of a waterbody. The acreage of loss of waters of the United States is a threshold measurement of the impact to jurisdictional waters or wetlands for determining whether a project may qualify for an NWP; it is not a net threshold that is calculated after considering compensatory mitigation that may be used to offset losses of aquatic functions and services. Waters of the United States temporarily filled, flooded, excavated, or drained, but restored to pre-construction contours and elevations after construction, are not included in the measurement of loss of waters of the United States. Impacts resulting from activities that do not require Department of the Army authorization, such as activities eligible for exemptions under section 404(f) of the Clean Water Act, are not considered when calculating the loss of waters of the United States.

Navigable waters: Waters subject to section 10 of the Rivers and Harbors Act of 1899. These waters are defined at 33 CFR part 329.

Non-tidal wetland: A non-tidal wetland is a wetland that is not subject to the ebb and flow of tidal waters. Non-tidal wetlands contiguous to tidal waters are located landward of the high tide line (i.e., spring high tide line).

Open water: For purposes of the NWPs, an open water is any area that in a year with normal patterns of precipitation has water flowing or standing above ground to the extent that an ordinary high water mark can be determined. Aquatic vegetation within the area of flowing or standing water is either non-emergent, sparse, or absent. Vegetated shallows are considered to be open waters. Examples of "open waters" include rivers, streams, lakes, and ponds.

Ordinary High Water Mark: The term ordinary high water mark means that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

Perennial stream: A perennial stream has surface water flowing continuously year-round during a typical year.

Practicable: Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

Pre-construction notification: A request submitted by the project proponent to the Corps for confirmation that a particular activity is authorized by nationwide permit. The request may be a permit application, letter, or similar document that includes information about the proposed work and its anticipated environmental effects. Pre-construction notification may be required by the terms and conditions of a nationwide permit, or by regional conditions. A pre-construction notification may be voluntarily submitted in cases where pre-construction notification is not required and the project proponent wants confirmation that the activity is authorized by nationwide permit.

Preservation: The removal of a threat to, or preventing the decline of, aquatic resources by an action in or near those

aquatic resources. This term includes activities commonly associated with the protection and maintenance of aquatic resources through the implementation of appropriate legal and physical mechanisms. Preservation does not result in a gain of aquatic resource area or functions.

Re-establishment: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former aquatic resource. Re-establishment results in rebuilding a former aquatic resource and results in a gain in aquatic resource area and functions.

Rehabilitation: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions to a degraded aquatic resource. Rehabilitation results in a gain in aquatic resource function, but does not result in a gain in aquatic resource area.

Restoration: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former or degraded aquatic resource. For the purpose of tracking net gains in aquatic resource area, restoration is divided into two categories: Re-establishment and rehabilitation.

Riffle and pool complex: Riffle and pool complexes are special aquatic sites under the 404(b)(1) Guidelines. Riffle and pool complexes sometimes characterize steep gradient sections of streams. Such stream sections are recognizable by their hydraulic characteristics. The rapid movement of water over a course substrate in riffles results in a rough flow, a turbulent surface, and high dissolved oxygen levels in the water. Pools are deeper areas associated with riffles. A slower stream velocity, a streaming flow, a smooth surface, and a finer substrate characterize pools.

Riparian areas: Riparian areas are lands next to streams, lakes, and estuarine-marine shorelines. Riparian areas are transitional between terrestrial and aquatic ecosystems, through which surface and subsurface hydrology connects riverine, lacustrine, estuarine, and marine waters with their adjacent wetlands, non-wetland waters, or uplands. Riparian areas provide a variety of ecological functions and services and help improve or maintain local water quality. (See general condition 23.)

Shellfish seeding: The placement of shellfish seed and/or suitable substrate to increase shellfish production. Shellfish seed consists of immature individual shellfish or individual shellfish attached to shells or shell fragments (i.e., spat on shell). Suitable substrate may consist of shellfish shells, shell fragments, or other appropriate materials placed into waters for shellfish habitat.

Single and complete linear project: A linear project is a project constructed for the purpose of getting people, goods, or services from a point of origin to a terminal point, which often involves multiple crossings of one or more waterbodies at separate and distant locations. The term "single and complete project" is defined as that portion of the total linear project proposed or accomplished by one owner/developer or partnership or other association of owners/developers that includes all crossings of a single water of the United States (i.e., a single waterbody) at a specific location. For linear projects crossing a single or multiple waterbodies several times at separate and distant locations, each crossing is considered a single and complete project for purposes of NWP authorization. However, individual channels in a braided stream or river, or individual arms of a large, irregularly shaped wetland or lake, etc., are not separate waterbodies, and crossings of such features cannot be considered separately.

Single and complete non-linear project: For non-linear projects, the term "single and complete project" is defined at 33 CFR 330.2(i) as the total project proposed or accomplished by one owner/developer or partnership or other association of owners/developers. A single and complete non-linear project must have independent utility (see definition of "independent utility"). Single and complete non-linear projects may not be "piecemealed" to avoid the limits in an NWP authorization.

Stormwater management: Stormwater management is the mechanism for controlling stormwater runoff for the purposes of reducing downstream erosion, water quality degradation, and flooding and mitigating the adverse effects of changes in land use on the aquatic environment.

Stormwater management facilities: Stormwater management facilities are those facilities, including but not limited to, stormwater retention and detention ponds and best management practices, which retain water for a period of time to control runoff and/or improve the quality (i.e., by reducing the concentration of nutrients, sediments, hazardous substances and other pollutants) of stormwater runoff.

Stream bed: The substrate of the stream channel between the ordinary high water marks. The substrate may be bedrock or inorganic particles that range in size from clay to boulders. Wetlands contiguous to the stream bed, but outside of the ordinary high water marks, are not considered part of the stream bed.

Stream channelization: The manipulation of a stream's course, condition, capacity, or location that causes more than minimal interruption of normal stream processes. A channelized jurisdictional stream remains a water of the United States.

Structure: An object that is arranged in a definite pattern of organization. Examples of structures include, without limitation, any pier, boat dock, boat ramp, wharf, dolphin, weir, boom, breakwater, bulkhead, revetment, riprap, jetty, artificial island, artificial reef, permanent mooring structure, power transmission line, permanently moored floating vessel, piling, aid to navigation, or any other manmade obstacle or obstruction.

Tidal wetland: A tidal wetland is a jurisdictional wetland that is inundated by tidal waters. Tidal waters rise and fall in a predictable and measurable rhythm or cycle due to the gravitational pulls of the moon and sun. Tidal waters end where the rise and fall of the water surface can no longer be practically measured in a predictable rhythm due to masking by other waters, wind, or other effects. Tidal wetlands are located channelward of the high tide line.

Tribal lands: Any lands title to which is either: (1) Held in trust by the United States for the benefit of any Indian tribe or individual; or (2) held by any Indian tribe or individual subject to restrictions by the United States against alienation.

Tribal rights: Those rights legally accruing to a tribe or tribes by virtue of inherent sovereign authority, unextinguished aboriginal title, treaty, statute, judicial decisions, executive order or agreement, and that give rise to legally enforceable remedies.

Vegetated shallows: Vegetated shallows are special aquatic sites under the 404(b)(1) Guidelines. They are areas that are permanently inundated and under normal circumstances have rooted aquatic vegetation, such as seagrasses in marine and estuarine systems and a variety of vascular rooted plants in freshwater systems.

Waterbody: For purposes of the NWPs, a waterbody is a "water of the United States." If a wetland is adjacent to a waterbody determined to be a water of the United States, that waterbody and any adjacent wetlands are considered together as a single aquatic unit (see 33 CFR 328.4(c)(2)).

US Army Corps
of Engineers
Kansas City District

STATE OF MISSOURI
2021 NATIONWIDE PERMIT REGIONAL CONDITIONS

For All Nationwide Permits

1. Stream Crossings. In addition to requirements of General Condition 2 and General Condition 9 of the Nationwide Permits, the following guidelines for stream crossings apply for regulated activities in waters of the United States (WOTUS). The guidelines are available at:
https://www.nwk.usace.army.mil/Portals/29/docs/regulatory/NWP/2021/MO/MORC1Streams.pdf

- Corps Districts may waive RC 1 when project site geomorphology (i.e. bedrock, gradient) or existing alterations (i.e. adjacent impoundment, as part of a dry detention basin) creates conflict with the guidelines. The applicant must provide Pre-construction Notification (PCN) to the District Engineer for any waiver request.

2. Seasonal Restrictions for Activities Proposed in Spawning Areas. In addition to the requirements of General Condition 3 of the Nationwide Permits, the following specific seasonal restrictions apply for regulated activities in WOTUS. Between the closed dates listed in the Missouri Combined Stream Spawning List, the permittee must not excavate from or discharge into the listed waters. The list of waters with seasonal restrictions is available on request from the Corps or at:
https://www.nwk.usace.army.mil/Portals/29/docs/regulatory/NWP/2021/MO/MORC2SpawningArea.pdf

- Corps Districts may waive RC 2 when the applicant demonstrates imminent threats to public safety and health, or to property. The Corps will consult with the U.S. Fish and Wildlife Service and Missouri Department of Conservation before granting the waiver and may add additional special conditions to protect aquatic life during the operation. The applicant must PCN to the District Engineer for any waiver request.

3. Suitable Material. In addition to the specific examples in General Condition 6 of the Nationwide Permits, the following materials are not suitable for fill activities in WOTUS: garbage, tires, treated lumber products that do not comply with the Registration Documents issued by the U.S. Environmental Protection Agency (USEPA) under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) and that are not in accordance with standards issued by American Wood Protection Association of the International Code Council, liquid concrete not poured into forms, grouted riprap, bagged cement and sewage or organic waste.

- Broken concrete used as bank stabilization must be reasonably well graded, consisting of pieces varying in size from 20 pounds up to and including at least 150-pound pieces to withstand expected high flows. Applicants must break all large slabs to conform to the well graded requirement. Generally, the maximum weight of any piece should not be more than 500 pounds. Gravel and dirt should not exceed 15% of the total fill volume when using broken concrete as fill. All protruding reinforcement rods, trash, asphalt, and other extraneous materials must be removed from the broken concrete prior to placement in WOTUS.

4. Priority Watersheds. The applicant must provide PCN to the District Engineer for any regulated activity in a priority watershed. The list of priority watersheds requiring notification is available on request from the Corps or at:
https://www.nwk.usace.army.mil/Portals/29/docs/regulatory/NWP/2021/MO/MORC4PriorityWaters.pdf

5. Sensitive Aquatic Species. The applicant must provide PCN to the District Engineer for any regulated activity in waters listed at: https://www.nwk.usace.army.mil/Portals/29/docs/regulatory/NWP/2021/MO/MORC5AquaSpecies.pdf. The submitted PCN will be coordinated in accordance with General Condition 32(d) with the U.S. Fish and Wildlife Service as determined appropriate by the Corps.

For Specific Nationwide Permits:

6. Lake of the Ozarks. The applicant must provide a PCN to the District Engineer for any regulated activity associated with Nationwide Permit 12, 57, and 58 within Lake of the Ozarks. A copy of this notification must also concurrently be sent to Ameren Missouri. Nationwide Permits 29 and 44 are revoked in the Lake of the Ozarks. The Corps and Ameren Missouri, regardless of the request to use any Nationwide Permit, may verify the activity under the provisions of Regional General Permit 38M, which can be found at https://www.nwk.usace.army.mil/Missions/Regulatory-Branch/General-Permits/. Additional information on Ameren Missouri and Lake of the Ozarks permit requirements can be found at the following webpage: https://www.ameren.com/missouri/residential/lake-of-the-ozarks/permitting-process-forms.

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Note: PCN to the District Engineer must be in accordance with General Condition 32 of the Nationwide Permits.

Missouri Department of Natural Resources

CLEAN WATER ACT SECTION 401 WATER QUALITY CERTIFICATION
2021 GENERAL AND SPECIFIC CONDITIONS

Water Protection Program 10/2021

Division of Environmental Quality PUB2947

Consistent with Section 401 of the Clean Water Act (CWA), 33 U.S.C. § 1341, the Missouri Department of Natural Resources (Department) has designed these precertified conditions to ensure activities carried out in Missouri pursuant to Nationwide Permits (NWPs) authorized by the U.S. Army Corps of Engineers (USACE) will comply with Missouri water quality requirements. Unless otherwise stated, these conditions are in addition to, not a replacement for, any federal requirements or conditions.

The conditions outlined in this programmatic WQC apply to those authorized projects where the project proponent has chosen to accept these conditions instead of pursuing an individual CWA Section 401 Water Quality Certification (WQC) for the following NWPs:

- Only General Conditions apply to projects authorized by NWPs 5, 6, 7, 13, 15, 16, 18, 19, 22, 23, 25, 27, 29, 30, 31, 36, 39, 40, 42, 43, 45, 46, 54, and 59.
- Both General and Specific Conditions apply to projects authorized by NWPs 3, 4, 12, 14, 20, 33, 41, 53, 57, and 58.

Alternatively, a project proponent may apply to the Department for individual WQC if it does not wish to accept the conditions outlined in this document.

NWPs 1, 2, 8, 9, 10, 11, 28, and 35 authorize projects pursuant to Section 10 of the Rivers and Harbors Act of 1899 only. These NWPs do not require CWA Section 401 WQC because they authorize activities which, in the opinion of the USACE, could not reasonably be expected to result in a discharge into waters of the United States. An activity needing only a Section 10 permit may require a WQC if that activity can reasonably be expected to result in any discharge either during construction or operation of the facility. Thus, if the USACE determines the activity is likely to result in a discharge during construction or operation, the Department has discretion to require a WQC for the Section 10 activity. The USACE may advise a Section 10 permit project proponent that it might need a WQC if there is a reasonable expectation that a discharge will occur either during the construction or operation of the project.

Pursuant to Section 644.037, RSMo, the Department shall certify without conditions NWPs as they apply to impacts on wetlands in Missouri. Because NWPs are minimal impact, Missouri does not have water quality standards specific to wetlands, and only the general criteria apply, discharges to wetlands from projects authorized by NWPs will comply with water quality requirements.

Pursuant to Section 644.038, RSMo, the Department shall certify without conditions all NWPs for impacts in all waters of the state for the construction of highways and bridges approved by the Missouri Highway and Transportation Commission. A Memorandum of Understanding between the Missouri Departments of Natural Resources and Transportation contains the requirements by which the Missouri Department of Transportation will design and construct such projects in order to protect the water quality of waters of the state. Therefore, as a result of this side agreement, the Department grants programmatic WQC for all NWPs without conditions for the construction of highways and bridges approved by the Missouri Highway and Transportation Commission, because any discharges from these projects will comply with water quality requirements.

GENERAL CONDITIONS

1. A stream's pattern, profile, and dimension, including but not limited to sinuosity, slope, and channel width, shall be maintained as much as practicable. Streambed gradient shall not be adversely impacted during project construction. No project shall accelerate bed or bank erosion. This will ensure compliance with the Missouri Water Quality Standards general criterion requiring waters to be free from physical, chemical, or hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)].

2. Channelization of streams is not allowed under this precertification. Channelization includes but is not limited to reducing the length of the channel, widening the channel for increased water storage or flow, and/or construction of hard structures which concentrate flow. Unless necessary for a stream crossing associated with infrastructure projects and contained within an associated right-of-way, construction easement, or permanent easement, bank stabilization activities only along one bank of a stream are permitted, including but not limited to bank sloping and riprapping. The redirection of flow by excavation of the opposite bank or a streambed is considered a channel modification and is not authorized by this WQC. This will ensure compliance with the Missouri Water Quality Standards general criterion requiring waters to be free from physical, chemical, or hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)].

3. No new or expanded wet stormwater retention basins or similar impoundment structures may be constructed unless they are located off-channel. In-channel dry stormwater detention basins are allowable if the stream channel is either temporarily or not adversely affected by the basin. This will ensure compliance with the Missouri Water Quality Standards general criterion requiring waters to be free from physical, chemical, or hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)].

4. Only clean, nonpolluting fill shall be used. The following materials are not suitable where contact with water is expected and shall not be used due to their potential to cause violations of the general criteria of Missouri's Water Quality Standards [10 CSR 20-7.031(4)]:
   a. Earthen fill, gravel and broken concrete where the material does not meet the Suitable Material specifications stated in the "Missouri Nationwide Permit Regional Conditions" (https://usace.contentdm.oclc.org/digital/collection/p16021coll11/id/2662/) in locations where erosive flows are expected to occur on a regular basis, such as streambanks and/or lake shorelines.
   b. Asphalt.
   c. Concrete with exposed rebar.
   d. Tires, vehicles or vehicle bodies, and construction or demolition debris are solid waste and are excluded from placement in the waters of the state. Properly sized, broken concrete without exposed rebar is allowed.
   e. Liquid concrete, including grouted riprap, if not placed in forms as part of an engineered structure.
   f. Any material containing chemicals that would result in violation of Missouri Water Quality Standards general criteria [10 CSR 20-7.031(4)] or specific criteria [10 CSR 20-7.031(5)].

5. Waste concrete or concrete rinsate shall be disposed of in a manner that does not result in discharge to any jurisdictional water ways. This will ensure compliance with the Missouri Water Quality Standards general criteria requiring waters be free from unsightly bottom deposits [10 CSR 20-7.031(4)(A)]; substances resulting in toxicity to human, animal, or aquatic life [10 CSR 20-7.031(4)(D)]; and physical, chemical, or hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)].

6. Missouri Water Quality Standards antidegradation requirements dictate all appropriate and reasonable Best Management Practices related to erosion and sediment control, project stabilization and prevention of water quality degradation are applied and maintained; for example, preserving vegetation, streambank stability and basic drainage [10 CSR 20-7.031(3)(D)]. Best Management Practices shall be properly installed prior to conducting authorized activities and maintained, repaired and/or replaced as needed during all phases of the project to limit the amount of discharge of water contaminants to waters of the state. The project shall not involve more than normal stormwater or incidental loading of sediment caused by project activities so as to comply with Missouri's general water quality criteria [10 CSR 20-7.031(4)]; https://www.sos.mo.gov/cmsimages/adrules/csr/current/10csr/10c20-7a.pdf

7. Clearing of vegetation and trees shall be the minimum necessary to accomplish the activity except for the removal of invasive or noxious species and placement of ecologically beneficial practices. This will ensure compliance with the Missouri Water Quality Standards antidegradation requirement for Best Management Practices [10 CSR 20-7.031(3)(B)].

8. Care shall be taken to keep machinery out of the water way as much as possible. If work in the water way is unavoidable, it shall be performed in a way that minimizes the duration and amount of any disturbance to banks, substrate and vegetation to prevent increases in turbidity. Fuel, oil and other petroleum products, equipment, construction materials and any solid waste shall not be stored below the ordinary high water mark at any time or in the adjacent flood-prone areas beyond normal working hours. All precautions shall be taken to avoid the release of wastes or fuel to streams and other adjacent waters as a result of this operation. This will ensure compliance with the Missouri Water Quality Standards antidegradation requirement for Best Management Practices [10 CSR 20-7.031(3)(B]) and Missouri Water Quality Standards general criteria requiring waters be free from substances preventing beneficial uses [10 CSR 20-7.031(3)(A)]; substances causing unsightly color or turbidity [10 CSR 20-7.031(4)(C)]; and physical, chemical, or hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)].

9. Petroleum products spilled into any water or on the banks where the material may enter waters of the state shall be immediately cleaned up and disposed of properly. Any such spills of petroleum shall be reported as soon as possible, but no later than 24 hours after discovery to the Department of Natural Resources' Environmental Emergency Response number at 573-634-2436 or website at http://dnr.mo.gov/env/esp/esp-eer.htm. This will ensure compliance with Missouri Environmental Improvement Authority to provide for the conservation of state water resources by the prevention of pollution and proper methods of disposal [Section 260.015, RSMo] and Missouri Water Quality Standards general criteria requiring waters be free from substances that prevent maintenance of beneficial uses; cause unsightly bottom deposits, color, turbidity or toxicity; and/or impair the natural biological community [10 CSR 20-7.031(4)(A), -(B), and -(H)].

10. All efforts shall be made to minimize exposure of unprotected soils. To the best of the project proponent's ability, project activity shall be conducted at times of little or no rainfall to limit the amount of overland flow and sediment disturbance caused by heavy equipment. This will ensure compliance with Missouri antidegradation requirements for Best Management Practices [10 CSR 20-7.031(3)(B)].

11. Programmatic WQC is denied for any NWP issued on a water that is listed for a sediment-related impairment, aquatic habitat alteration, channelization, or unknown impairment as listed in the most current Water Quality Report (Section 305(b) Report) at https://dnr.mo.gov/water/what-were-doing/water-planning/quality-standards-impaired-waters-total-maximum-daily-loads/impaired-waters. Although intended to result in minimal impacts, NWP authorizations in these waters may contribute to impairments and result in noncompliance with Missouri's general water quality criteria requiring waters be free from physical, chemical, and hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)] or exceedance of Missouri Water Quality Standards specific criteria [10 CSR 20-7.031(5)]. Since WQC General or Specific Conditions cannot be established to address all concerns from the variety of impairments and activities authorized by NWPs, individual review for WQC will be required. Requirements for individual WQC will be determined on a case-by-case basis based on the specific impairments, and additional testing, design, disposal, or BMP considerations may be required.

    To determine the location of the waters noted above, the Department's geospatial data is available upon request, and all published data is available on the Missouri Spatial Data Information Services website at msdis.missouri.edu/. Additional information to identify the project location, including stream reaches with listed impairments or special water designations, may be obtained from the Department's Water Protection Program at 573-522-4502.

12. Programmatic WQC is denied for projects authorized by NWPs 17, 21, 32, 34, 37, 38, 44, 48, 49, 50, 51, 52, 55, and 56. Although intended to result in minimal impacts, these NWPs authorize activities that may contribute to impairments and result in noncompliance with Missouri's general water quality criteria [10 CSR 20-7.031(4)], including the requirement that all waters of the state shall be free from physical, chemical, and hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)], or noncompliance with Missouri's specific water quality criteria [10 CSR 20-7.031(5)]. Because programmatic WQC General or Specific Conditions cannot be established to address all concerns from the variety of impairments and activities authorized by these NWPs, the Department requires individual review for WQC for these NWPs. Requirements for individual WQC will be determined on a case-by-case basis based on the specific projects, and additional testing, design, disposal, or BMP considerations may be required.

13. Mitigation for loss of stream resources should be in conformance with the compensatory mitigation guidance currently approved for use in Missouri, including guidance provided by the Missouri Stream Mitigation Method. Stream impacts shall require compensatory mitigation with only instream or riparian corridor credits. Compensatory mitigation shall be within the state of Missouri. This will ensure compliance with the Missouri Water Quality Standards antidegradation requirement for maintenance and protection of designated uses [10 CSR 20-7.031(3)] Mitigation guidance documents can be located online at www.nwk.usace.army.mil/Missions/RegulatoryBranch/StateofMissouri.

SPECIFIC CONDITIONS

14. Nationwide Permit 3 *Maintenance*
    a. Silt, sediment, and debris removal shall be limited to a maximum of 200 LF upstream and 200 LF downstream of structures. This will ensure compliance with the Missouri Water Quality Standards antidegradation requirement for maintenance and protection of designated uses [10 CSR 20-7.031(3)].

15. Nationwide Permit 4 *Fish and Wildlife Harvesting, Enhancement, and Attraction Devices and Activities*
    Any inorganic or extraneous debris, such as may be found on Christmas trees shall be removed to qualify as clean, nonpolluting fill. This will ensure compliance with the Missouri's Water Quality Standards general criteria that waters shall be free from unsightly bottom deposits [10 CSR 20-7.031(4)(A)] and solid waste [10 CSR 20-7.031(4)(I)].

16. Nationwide Permit 12 *Oil and Natural Gas Pipeline Activities*,
    Nationwide Permit 57 *Electric Utility Line and Telecommunications Activities,* and
    Nationwide Permit 58 *Utility Line Activities for Water and Other Substances*
    a. For project crossings that must disturb a water body, work shall be conducted in such a manner as to seal off the work area from flow and minimize sediment transport. Material resulting from the activity shall not be sidecast into waters of the state for more than one month. This will ensure compliance with the Missouri Water Quality Standards antidegradation requirement for Best Management Practices [10 CSR 20-7.031(3)(B) and general criteria requiring waters be free from substances that prevent maintenance of beneficial uses; cause unsightly color, turbidity, or toxicity; and/or impair the natural biological community [10 CSR 20-7.031(4)(B), -(C), and -(H)].
    b. If Horizontal Directional Drilling is used, drilling mud and/or other materials shall not be discharged into waters of the state. Best Management Practices shall be implemented to prevent possible discharges from reaching waters of the state. In the event materials are inadvertently discharged to waters of the state, notification to the Department of Natural Resources is required within 24 hours by calling 573-634-2436. This will ensure compliance with Missouri Water Quality Standards antidegradation requirement for Best Management Practices [10 CSR 20-7.031(3)(B)] and Missouri Environmental Improvement Authority [Section 260.015, RSMo] to provide for the conservation of state air, land and water resources by the prevention of pollution and proper methods of disposal.
    c. Project crossings shall be placed as close to perpendicular as possible and shall be limited to a maximum crossing length of no more than one and one-half times the width of the stream. This will ensure compliance with the Missouri antidegradation requirement for maintenance and protection of designated uses [10 CSR 20-7.031(3)] and Best Management Practices [10 CSR 20-7.031(3)(B)].

17. Nationwide Permit 14 *Linear Transportation Projects*
    a. The permittee shall propose and employ measures to mitigate the removal of impounded sediment (e.g., sand, gravel) in the unstable area upstream of a proposed project to prevent it from being transported downstream and/or construct a notched weir to slow the release of impounded sediment from upstream of the proposed project. This will ensure compliance with the Missouri Water Quality Standards general criteria requiring waters be free from substances causing unsightly color or turbidity [10 CSR 20-7.031(4)(C)] and physical chemical, or hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)]. Accumulated gravel may be allowed to naturally deposit into downstream plunge pool voids. Consultation with a hydrologist or other scientist is recommended if the amount of accumulated unconsolidated gravel exceeds the volume of plunge pool voids.
    b. Where this NWP is used to authorize bridge and culvert structures, stream channel work shall be limited to a maximum of 200 feet upstream and a maximum of 200 feet downstream of the bridge or culvert. For purposes of this condition, a channel modification is any activity that alters the width, depth, length and/or sinuosity of a water way. This will ensure compliance with the Missouri antidegradation requirement for maintenance and protection of designated uses [10 CSR 20-7.031(3)] and the Missouri Water Quality Standards general criterion requiring waters be free from physical, chemical, or hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)].

18. Nationwide Permit 20 *Response Operations for Oil and Hazardous Substances*
    Oil and hazardous substance releases shall be reported to the Department of Natural Resources' Environmental Emergency Response number at 573-634-2436. Continue to report updates with regard to the containment and cleanup of releases. This will ensure compliance with Missouri Environmental Improvement Authority [Section 260.015, RSMo] to provide for the conservation of state water resources by the prevention of pollution and proper methods of disposal.

19. Nationwide Permit 33 *Temporary Construction, Access and Dewatering*
    a. The use of this NWP shall be limited to impacts of six months or less in duration. This will ensure compliance with the Missouri Water Quality Standards antidegradation requirements for maintenance and protection of designated uses [10 CSR 20-7.031(3)]
    b. Any removal of accumulated sediment (e.g., sand, gravel) upstream of a proposed project shall be limited to the quantity necessary to relieve any obstruction or to protect downstream habitat. The permittee must propose and employ measures to mitigate the removal of impounded sediment in the unstable area upstream of a proposed project to prevent it from being transported downstream and/or construct a notched weir to slow the release of impounded sediment from upstream of the proposed project. This will ensure compliance with the Missouri Water Quality Standards general criteria requiring waters be free from substances causing unsightly color or turbidity [10 CSR 20-7.031(4)(C)] and physical, chemical, or hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)].

20. Nationwide Permit 41 *Reshaping Existing Drainage Ditches*
    In-channel disposal of excavated material not used for reshaping activities is prohibited. This will ensure compliance with the Missouri Water Quality Standards antidegradation requirement for Best Management Practices [10 CSR 20-7.031(3)(B) and general criteria requiring waters be free from substances that prevent maintenance of beneficial uses; cause unsightly color, turbidity or toxicity; and/or impair the natural biological community [10 CSR 20-7.031(4)(B), -(C), and -(H)].

21. Nationwide Permit 53 *Removal of Low-Head Dams*
    a. The permittee must propose and employ measures to mitigate the removal of impounded sediment (e.g., sand, gravel) in the unstable area upstream of a proposed project to prevent it from being transported downstream and/or construct a notched weir to slow the release of impounded sediment from upstream of the proposed project. This will ensure compliance with the Missouri Water Quality Standards general criteria requiring waters be free from substances causing unsightly color or turbidity [10 CSR 20-7.031(4)(C)] and physical chemical, or hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)]. Accumulated gravel may be allowed to naturally deposit into downstream plunge pool voids. Consultation with a hydrologist or other scientist is recommended if the amount of accumulated unconsolidated gravel exceeds the volume of plunge pool voids.
    b. Stream channel work shall be limited to a maximum of 100 feet upstream and a maximum of 100 feet downstream of the dam. This will ensure compliance with the Missouri Water Quality Standards antidegradation requirement for maintenance and protection of designated uses [10 CSR 20-7.031(3)] and the Missouri Water Quality Standards general criterion requiring waters to be free from physical, chemical, or hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)].
    c. Restoration of the stream channel to its former, natural state is authorized. Individual WQC is required for non-natural channel modifications. This will ensure compliance with the Missouri Water Quality Standards general criteria requiring waters be free from physical chemical, or hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)]. For purposes of this condition, a channel modification is any activity that alters the width, depth, length and/or sinuosity of a water way.

Unless the Department agrees to an alternative, requests for WQC should be sent electronically to wpsc401cert@dnr.mo.gov [Section 644.026.1(26), RSMo and 10 CSR 20-6.060(5)]. A request for WQC shall include all required information for a complete request for certification in compliance with 40 CFR Part 121. The Department may request additional information prior to providing a WQC decision to ensure Missouri water quality requirements are met, such as a response to comments from the Department, other resource agencies, and/or the public; planned compensatory mitigation; and/or an analysis of practicable alternatives.

An issued WQC, whether programmatically or individually issued, becomes part of and expires with the Section 404 and/or Section 10 permit unless explicitly stated in the WQC.

Acquisition of NWPs and the attendant WQCs shall not be construed or interpreted to imply the requirements for other permits are replaced or superseded, including Clean Water Act Section 402 National Pollutant Discharge Elimination System Permits required under Missouri Clean Water Law [Sections 644.026.1 and 644.051, RSMo] for land disturbance or return water from material deposition. Permits or any other requirements shall remain in effect. Project proponents with questions are encouraged to contact the Department of Natural Resources' regional office in the project area. A regional office map with contact information is located at https://dnr.mo.gov/about-us/division-environmental-quality/regional-office.

Some localities are covered pursuant to Municipal Separate Storm Sewer System Permits with measures to control and possibly treat stormwater. If the project is located within one of these localities, project proponents must comply with all stormwater requirements of the locality's Stormwater Management Plan and any related ordinances. This ensures compliance with CWA Section 402 National Pollutant Discharge Elimination System Permit requirements and the Missouri Clean Water Law [Chapter 644, RSMo].

The Department encourages, but does not require, permittees to consider environmentally-friendly design techniques to include stormwater management strategies that maintain or restore the original site hydrology through infiltration, evaporation, or reuse of stormwater. Designs might include using porous pavement or creating vegetated swales and/or rain gardens. More information can be found at these websites: www.epa.gov/owow/NPS/lid/ and www.lid-stormwater.net/lid_techniques.htm.

The Department encourages the use of native vegetation to protect impacted areas from future water quality concerns. Native vegetation has evolved with Missouri's geology, climate, and wildlife to occur within a region as a result of natural processes rather than human intervention. For areas where direct impacts to streams are to be avoided, the Department recommends a minimum riparian buffer strip width of 50 feet as measured from top of bank.

The Department encourages the use of Horizontal Directional Drilling for stream and wetland crossings when practicable. If properly utilized, Horizontal Directional Drilling is an alternative to more traditional, open-trench methods and can result in significant minimization and/or complete avoidance of aquatic resource impacts.

The following publication provides guidance on how to protect water quality through Best Management Practices on project sites. For more information, please read: "Protecting Water Quality: A field guide to erosion, sediment and stormwater best management practices for development sites in Missouri and Kansas" dated January 2011 and located online at https://dnr.mo.gov/document-search/protecting-water-quality-field-guide.

To help determine if a proposed activity could encounter species or sites of conservation concern within or near a project, including those that have not been recorded, the project proponent is encouraged to visit:

- Missouri Department of Conservation's "Natural Heritage Review" website at https://naturalheritagereview.mdc.mo.gov/.
- U.S. Fish and Wildlife Service's "Information, Planning and Conservation" website at http://ecos.fws.gov/ipac/.

If the proposed project encounters and will potentially affect a species of concern, please promptly report it to the Missouri Department of Conservation and the U.S. Fish and Wildlife Service.

For more information
Missouri Department of Natural Resources
Water Protection Program
P.O. Box 176
Jefferson City, MO 65102-0176
wpsc401cert@dnr.mo.gov
800-361-4827 or 573-522-4502
https://dnr.mo.gov/water

UPPER MISSISSIPPI RIVER RESTORATION
DRAFT FEASIBILITY REPORT
WITH INTEGRATED ENVIRONMENTAL ASSESSMENT

WEST ALTON ISLANDS
HABITAT REHABILITATION
AND ENHANCEMENT PROJECT

Appendix E: Monitoring and Adaptive Management

US Army Corps of Engineers ®
St. Louis District

Mississippi River
Miles 203-215.5
St. Charles County, Missouri
Project Partners: Missouri Department of Conservation & U.S. Fish and Wildlife Service

1. Introduction

The 1985 Supplemental Appropriations Act (Public Law 99-88) and Section 1103 of the Water Resources Development Act of 1986 (Public Law 99-662) authorized implementation of ecosystem restoration projects to ensure the coordinated development and improvement of the Upper Mississippi River System. Section 2039 of WRDA 2007 requires that when conducting a feasibility study for ecosystem restoration, the proposed project includes a plan for monitoring the success of the ecosystem restoration. Additionally, paragraph (3)(d) of Section 2039 states that "an adaptive management plan will be developed for ecosystem restoration projects…appropriately scoped to the scale of the project." The implementation guidance for Section 2039, in the form of a CECW-PB Memo dated 31 August 2009, also requires that an adaptive management plan be developed for all ecosystem restoration projects.

Adaptive management "prescribes a process wherein management actions can be changed in response to monitored system response, so as to maximize restoration efficacy or achieve a desired ecological state" (Fischenich et al. 2012).
At the programmatic level, knowledge gained from monitoring one project can be applied to other projects. Opportunities for this type of adaptive management are common within the UMRR. Using an adaptive management approach during project planning enabled better selection of appropriate design and operating scenarios to meet the West Alton Islands HREP project objectives. Lessons learned in designing, constructing, and operating similar restoration projects within the UMRS have been incorporated into the planning and design of this HREP to ensure that the proposed plan represents the most effective design and operation to achieve project goal and objectives.
The adaptive management for the West Alton Islands HREP describes and justifies whether adaptive management is needed in relation to the proposed project management alternatives identified in the project feasibility study. This appendix outlines how the results of the project-specific monitoring plan would be used to adaptively manage the project, including monitoring targets which demonstrate project success in meeting project objectives. The District's intent was to develop monitoring and adaptive management actions appropriate for the project's goal and objectives.

2. Goal and Objectives

The primary goal of the West Alton Islands HREP is to restore and improve the quality and diversity of aquatic and island ecosystem resources within the Project Area. Full realization of the potential habitat value in the West Alton Islands project area has been hindered by loss of side-channel flow and depth diversity within side channel habitat, excessive sedimentation that has resulted in poor water quality, shallow depths, and loss of connectivity among project backwater areas with the main channel of the Mississippi River, loss of sandbars and islands due to inundation caused by impoundment, and the subsequent degradation of aquatic resources. Additionally, the loss of topographic and hydrologic diversity reduces vegetative community composition and wildlife resources on the remaining islands. Establishing connectivity between the backwater and main channel would contribute to spawning, rearing, and overwintering fish habitat as well as feeding areas for migratory wildlife; providing bathymetric diversity and flow within Portage Island

side channel would increase habitat complexity and broaden the range of flow velocities to further bolster important side channel habitat within Pool 26; and restoring historic islands would allow the Project Area to realize the highest benefit to fish and wildlife. The objectives identified to meet the project goal are to:

a. Restore diversity of bathymetry, flow, and connectivity of aquatic areas throughout study area (side channel, main channel, off channel, backwaters, etc.)
b. Restore diverse island mosaics throughout study area (sand bars, islands; reduce wind fetch and wave impacts)
c. Restore native vegetation diversity and structural complexity throughout study area (wetlands, forests, etc.)

The following restoration measures, also described in detail in Section 5.1.1 of the main report, were considered to achieve the Project goal and objectives:

- Excavation (with and without benching)
- Hard points (barbs/vanes)
- Island creation
- Gradual slope revetment (GSR)
- Overflow weir
- Deep water pockets
- Berm and Barbs
- Containment berm
- Bullnose
- Woody bundles
- Sandbar/mudflat creation
- Dike (sediment deflection and trail dike)
- Terrestrial elevation diversity
- Emergent Wetland Enhancement
- Gravel Bar
- Water Level Management

3. Sources of Uncertainty

Adaptive management provides a process for making decisions in the face of uncertainty. The primary incentive for implementing an adaptive management plan is to increase the likelihood of achieving desired project outcomes given the identified uncertainties, which can include incomplete description and understanding of relevant ecosystem structure and function; imprecise relationships among project management actions and corresponding outcomes; engineering challenges in implementing project alternatives; and ambiguous management and decision-making processes. Below is a list of uncertainties associated with the aquatic and island habitat in the West Alton Islands HREP.

3.1 Side Channel Habitat

- River training structures and other project features will be utilized in the Portage Island Side Channel. There is a risk that these project features may result in unintended and potentially unwanted changes to side channel habitat. A modification to project features in the side channel may be required if this risk is realized, which could impact project costs and schedule.

  The District evaluated the level of uncertainty and risk in the use of improperly sized material for in stream structures. River training structures constructed of large quarry stone will be utilized in the Portage Island Side Channel. Due to the dynamic nature of the flows in the Mississippi River, there is a risk that the stone may erode over time, potentially to an extent that the structure is no longer performing as intended. A modification to stone river training structures in the side channel may be required if this risk is realized, which could impact project costs and schedule.

3.2 Backwater Habitat

- It is expected that overwintering and summer habitat in the dredged backwater will not be limited by dissolved oxygen, flow, or depth. However, uncertainty still remains in the accuracy of predicted sedimentation rates. If monitoring demonstrates that conditions of the interior backwater are not performing as anticipated, then an adaptive management measure of re-excavation would be implemented. This would have an impact on project costs and schedule.

3.3 Island Habitat

- It is expected the implementation of the island building will become permanent features in the Project Area; however, there is some uncertainty as to whether the islands will naturally establish with early successional forest species, or become established with invasive vegetation, such as Japanese hops. If monitoring demonstrates that invasive vegetation is becoming problematic for island habitat, the invasive vegetation would be removed and then planted with trees. This could have an impact on project costs and schedule.

4. Monitoring of Objectives to Determine Project Success and Adaptive Management Measures

The power of a monitoring program developed to support determinations of project success and inform adaptive management lies in the establishment of feedback between continued project monitoring and corresponding project management. This monitoring and adaptive management plan was developed with input from state and federal resource agencies. Performance indicators to the above objectives were developed with the best available knowledge. They were developed to be specific, measurable, attainable, realistic, and timely. Performance indicators, monitoring targets, and Adaptive Management measures are summarized in Table 1. The conceptual monitoring schedule and estimated costs are provided in Table 2.

4.1 Side Channel and Backwater Habitat

- **Bathymetric Diversity:** Hydrographic surveys will be conducted upon

completion of the Project 3-year post construction to determine base depth conditions and construction compliance. A comparison survey (ISOPACH) survey will be conducted at year 7 to map and quantify the amount of the side channel greater than 5 feet in depth.

Success Criteria:

Monitoring Target	Years 1-5	Year 25	Year 50
% of side channel ≥ 5 feet deep	>75%	>65%	>50%

Adaptive Management Measure: Not applicable, the bathymetric data will inform future projects from a lessons learned standpoint on efficiency and efficacy of river structures.

- **Connectivity:** Connectivity of backwater areas to the main channel will be surveyed by site inspection surveys and gage data. At normal pool conditions, adequate access to backwaters by aquatic species will be quantified by the length of backwater connection that is greater than 5 feet in depth. Increase over pre-construction condition will aid determining Project success. Visual observations and gage readings will be used to conduct this comparison.

Success Criteria:

Monitoring Target	Years 1-5	Year 25	Year 50
Backwater mouth to main channel measured by width of connection greater than 5 feet in depth.	Increase over pre-construction		

Adaptive Management Measure. If monitoring result indicate an inability for aquatic species to access the backwaters due to limited opening size criteria by excessive sedimentation by year 6 post-construction, then re-excavation of backwater mouth would be re-visited by the Corps and sponsor.

- **Dissolved Oxygen:** Water quality data collected from the site annually under UMRR-LTRM will be used to determine dissolved oxygen concentrations throughout the year.

Success Criteria:

Monitoring Target	Years 1-5	Year 25	Year 50
Minimum dissolved oxygen (mg/L)	> 5.0mg/L		

Adaptive Management Measure: Not applicable, the dissolved oxygen data will inform future projects from a lessons learned standpoint on efficiency and efficacy of measures.

- **Native Fish Assemblage:** Comparison of fish habitat use during the year will be compared with pre-project habitat use to aid in determining Project success. The UMRR-LTRM (i.e., daytime electrofishing) will complete the fish surveys used to conduct this comparison.

Success Criteria:

Monitoring Target	Years 1-5	Year 25	Year 50
Catch-per-unit-effort of native fish preferring flowing habitat (i.e., fluvial specialists and dependents)	Increase over pre-construction		

Adaptive Management Measure: *Not applicable, the native fish assemblage data will inform future projects from a lessons learned standpoint on efficiency and efficacy of measures.*

4.3 Island / Terrestrial Habitat

- **Island Acreage:** Aerial imagery along with hydrographic survey and site inspection surveys will be conducted upon completion of the Project to determine base acres constructed and construction compliance. Comparison of hydrographic, aerial, and site inspection surveys will be conducted at various project intervals (see Table 2 below for respective survey intervals) to map and quantify the acres of island habitat created. The results of this will study will inform Project success, inform adaptive management triggers and measures, and inform future HREPs.

Success Criteria:

Monitoring Target	Years 1-5	Year 25	Year 50
Acres of island habitat created.	>58	>50	>40

Adaptive Management Measure: *Not applicable, the island acreage data will inform future projects from a lessons learned standpoint on efficiency and efficacy of measures.*

- **Species Composition:** Vegetative monitoring would be conducted by visual observations during site inspection surveys by the sponsor and the Corps. During planning, the desire was to restore terrestrial habitat with a diversity threshold of 30:70 annuals to perennials, a species richness threshold of eight species per project area, and a quality threshold of 3.5 of greater importance value score. Adaptive management actions would be applied if any of the monitoring targets fall outside the desired thresholds by year 6 post construction.

Success Criteria:

Monitoring Target	Years 1-5	Year 25	Year 50
Diversity threshold: 30:70 annual to perennial	Pass/Fail		
Species richness threshold: 8 species per project area	Pass/Fail		
Quality threshold: importance value score of > 3.5	Pass/Fail		

Adaptive Management Measure. Evaluate hydrology of site and management actions including disturbance and timing of drawdown via EPM, and re-visit management actions by Corps and sponsor.

- **Natural Regeneration:** Site inspection surveys immediately following construction activities to ensure project compliance. Follow up site inspections surveys in years 4, 7, and 9 to evaluate natural regeneration of desired species and invasive encroachment. Success by year 6 post construction, would equate to >150 and <300 trees per acre of desirable species with at least 3 feet of height, and overall <20% invasive species across the site. Adaptive management actions would be applied if any of the monitoring targets fall outside the desired thresholds by year 6 post construction.

Success Criteria:

Monitoring Target	Years 1-5	Year 25	Year 50
Desirable trees per acre taller than 3 feet	>150 and <300 TPA of desirable species with >20% invasive species		

Adaptive Management Measure. Invasive species removal and supplemental tree planting.

- **Invasive Species:** Site inspection surveys immediately following construction activities to ensure project compliance. Follow up site inspections surveys in years 4, 7, and 9 to evaluate invasive encroachment. Success by year 6 post construction, would equate to <10% invasive species composition of the herbaceous layer across the project. Adaptive management actions would be applied if any of the monitoring targets fall outside the desired thresholds by year 6 post construction.

Success Criteria:

Monitoring Target	Years 1-5	Year 25	Year 50
<10% invasive species composition of herbaceous layer	>10%	>10%	>10%

Adaptive Management Measure. Invasive species removal and supplemental tree planting.

5. Documentation, Implementation Costs, Responsibilities, and Project Close-Out

- **Documentation, Reporting, and Coordination.** The Project Delivery Team will document each of the performed assessments and communicate the results to the HREP program manager and partners designated for the Project. Periodic reports will be produced to measure progress towards the Project goal and objectives as characterized by the selected performance measures.

- **Cost.** The costs associated with implementing monitoring and adaptive management measures were estimated based on currently available data and information developed during plan formulation as part of the feasibility study. Because uncertainties remain as to the exact Project measures, monitoring elements, and adaptive management opportunities, the estimated costs in Table 2

will need refinement in PED during the development of the Detailed Monitoring and Adaptive Management Plans.

- **Responsibilities.** The Corps will be responsible for collecting hydrographic surveys, aerial imagery analysis, gage data analysis, and vegetation surveys. The UMRR-LTRM will be responsible for fish and water quality data collection. The Corps will be responsible for analyzing and evaluating theUMRR-LTRM fish and water quality data. The sponsor and the Corps will be responsible for site inspections and visual observations to assist in overall project success evaluation.

- **Project Close-Out.** Close-out of the Project would occur when it is determined that the Project has successfully met the Project success criteria described above. Success would be considered to have been achieved when the Project objectives have been met, or when it is clear that they will be met based upon the trends for the site conditions and processes. Project success would be based on the following:

    - Success criteria met;
    - Continued site inspections to determine continued Project status;
    - and Continued OMRR&R into the future

Table 1. West Alton Islands HREP performance indicators, monitoring targets, and Adaptive Management measures.

Objective	Performance Indicator	Monitoring Target (Desired Outcome)	Responsible Party	Action Criteria (AM triggers)	AM Measure
Restore diversity of bathymetry, flow, and connectivity of aquatic areas throughout study area (side channel, main channel, off channel, backwaters, etc.) during the 50-year period of analysis.	Bathymetric Diversity	Increase bathymetric diversity as acres deeper than 5 feet in backwater habitats.	Corps	Not applicable. See discussion in text.	Not applicable. See discussion in text.
	Connectivity	Increase connectivity of backwaters to lotic habitats as measured by width of connection greater than 5 feet in depth.		If sedimentation is deemed restrict access for aquatic organisms by Year 6 post-construction.	Re-excavate mouth of backwaters
	Minimum dissolved oxygen (mg/L)	> 5.0 mg/L	UMRR-LTRM	Not applicable. See discussion in text.	Not applicable. See discussion in text.
	Native fish assemblage	Increase in abundance (Catch-per-unit-effort) over existing conditions of fish species preferring flowing habitat (i.e. fluvial specialists or dependents)			
Restore native vegetation diversity and structural complexity throughout study area during the 50-year period of analysis.	Species composition & quality of annual and perennial herbaceous vegetation (relative cover and frequency)	Diversity threshold = 30:70 ratio of annuals and perennials Species richness threshold = > 8 species per project area Quality threshold = importance value score of > 3.5 % Invasive species = maintain below 5% relative cover and frequency per project area	Corps	If any of the monitoring targets fall outside the desired thresholds by Year 6 post-construction	Evaluate hydrology of site and management actions including disturbance and timing of drawdown via EPM.
Restore diverse island mosaics throughout study area (sand bars and islands) and reduce wind fetch and wave impacts during the 50-year period of analysis.	Island acreage	Increase acres of island/sandbar habitat as measured by area, percent vegetation, and vegetation type.	Corps	By Year 6 post-construction: >150 and <300 TPA of desirable species with >20% invasive species	Invasive species removal and supplemental tree planting
	Natural regeneration of floodplain forest communities	Desirable trees per acre taller than 3 feet			
	Reduction of invasive species	<10% invasive species composition of herbaceous layer			

Table 2. West Alton Islands HREP conceptual monitoring schedule and estimated monitoring costs. Construction completion is set at year 0.

			Post-Construction Years										
	Work Category	Activity	1	2	3	4	5	6	7	8	9	10	SUBTOTAL
Side Channel improvements, Bullnose structures, woody bundles, barb structures, Gradual Slope Revetment	Monitoring, Analysis, & Reporting	Hydrographic Survey			20,000				20,000				40,000
		UMRR LTRM Fisheries	X	X	X	X	X	X	X	X	X	X	0
		UMRR LTRM Water Quality	X	X	X	X	X	X	X	X	X	X	0
		Aerial Imagery Analysis			5,000			5,000			5,000		15,000
		Site Inspections	X			X			X				
	AM Feature: Structure modifications (construct/notching)					70,000							70,000
Backwaters and Wetland Enhancement	Monitoring, Analysis, & Reporting	UMRR LTRM Fisheries	X	X	X	X	X	X	X	X	X	X	0
		UMRR LTRM Water Quality	X	X	X	X	X	X	X	X	X	X	0
		Gage Data Analysis	1,000		1,000		1,000		1,000		1,000		5,000
		Vegetation Surveys	2,000					2,000		2,000		2,000	8,000
		Site Inspections	X			X			X		X		
	AM Feature: Install rock/ re-excavate backwater entrance (if needed)						120,000						120,000
Island Creation & Terrestrial Dredge Placement	Monitoring, Analysis, & Reporting	Site Inspections	X			X			X		X		
	AM Feature: Invasive species removal and supplemental tree plantings. [1]				27,100					27,100			54,200
Overall Project	Monitoring, Analysis, & Reporting	Site Inspections	2,000			2,000			2,000		2,000		8,000
		Performance Evaluation Reporting					10000					10000	20,000

Table 2. West Alton Islands HREP conceptual monitoring schedule and estimated monitoring costs. Construction completion is set at year 0.

Subtotal	$340,200
Contingencies (30%)	$102,060
TOTAL	$442,260

* The Project falls within a Corps UMRR-LTRM study reach; therefore no additional funds would be needed to collect data. Assessment of the data is included in the cost of preparing of the Performance Evaluation Report

6. References

Fischenich, C., C. Vogt, and others. 2012. The application of adaptive management to ecosystem restoration projects. ERDC TN-EMRRP-EBA-10 April 2012, Vicksburg, MS: U.S. Army Corps of Engineers Ecological Management and Restoration Research Program.

US Army Corps of Engineers
St. Louis District®

Environmental Quality Section
1222 Spruce Street
St Louis Missouri, 63103

ENVIRONMENTAL SITE ASSESSMENT REPORT

West Alton HREP Phase I

PREPARED FOR:

United States Army Corps of Engineers
Saint Louis District
1222 Spruce Street
Saint Louis, MO 63103

June 13, 2023

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1.0 ABBREVIATIONS

ABV	Description
AST	Above Ground Storage Tank
ATSM	American Society for Testing and Materials
CERCLIS	Comprehensive Environmental Response, Compensation and Liability Information System
DOD	Department of Defense
EDR	Environmental Data Resources
EMF	Electromotive force
ES	Enforcement Standard
EPA	Environmental Protection Agency
ERNS	Emergency Response Notification System
ESA	Environmental Site Assessment
FEMA	Federal Emergency Management Agency
FRDS	Federal Reporting Data System
HREP	Habitat Restoration and Enhancement Project
HTRW	Hazardous Toxic Radioactive Waste
IEMA	Illinois Emergency Management Agency
LLC	Limited Liability Company
MDL	Method Detection Limit
NPDES	National Pollutant Discharge Elimination System
NPL	National Priority List
NWI	National Wetlands Inventory
PAL	Preventative Action Limit
PCB	Polychlorinated Biphenyl
PQL	Practical Quantitation Limit
RCL	Residual Contaminant Levels
REC	Recognized Environmental Condition
SEMS	Superfund Enterprise Management System
SSURGO	Soil Survey Geographic Database
UIC	Underground Injection Control
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USGS	United States Geological Survey
UST	Underground Storage Tank

2.0 ACKNOWLEDGEMENTS AND QUALIFICATIONS

Project Name: West Alton Islands Habitat Rehabilitation and Enhancement Project

Site Information: West Alton Lake
West Alton, MO 63386

Portage Island
Portage Des Sioux, MO 63373

Luesse Lake
Portage Des Sioux, MO 63373

County: St. Charles County

Site Assessor: _____
Ashley Edwards
Environmental Specialist

Environmental Professional Qualification:

I declare that, to the best of my professional knowledge and belief, I meet the definition of Environmental Professional as defined in 40 CFR 312.10.

I have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject property. I have developed and performed the all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

_____
Travis J Schepker
Senior Reviewer
Senior Environmental Specialist

3.0 EXECUTIVE SUMMARY

The U.S. Army Corps of Engineers (USACE) regulations (ER-1165-2-132, ER 200-2-3) and Division policy requires procedures be established to facilitate early identification and appropriate consideration of potential hazardous, toxic, and radioactive waste (HTRW) in reconnaissance, feasibility, preconstruction engineering and design, land acquisition, construction, operations and maintenance, repairs, replacement, and rehabilitation phases of water resources studies or projects by conducting a Phase I Environmental Site Assessment (ESA). USACE specifies that these assessments follow the process/standard practices for conducting Phase I ESA's published by the American Society for Testing and Materials (ASTM).

The purpose of a Phase I ESA is to identify, to the extent feasible in the absence of sampling and analysis, the range of contaminants (i.e. Recognized Environmental Conditions, RECs) within the scope of the U.S. Environmental Protection Agency's (EPA) Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and petroleum products. Current policy is to avoid known HTRW to the extent practicable or until hazard risks and potential liability are mitigated.

A Phase I ESA has been conducted for the West Alton Habitat Restoration and Enhancement Project (HREP) project area using methods outlined by ASTM E2247. This included a records review, physical site visit, and communications with persons knowledgeable of the project area and adjoining properties. Generally, the project area contains no major sites of interest which would impact the project's cost, design, or schedule. The environmental impact for the migration of off-site contaminants onto the project property is negligible. Therefore, no special considerations are being recommended for the project to proceed to construction. It is however recommended that a Site Health and Safety Plan, and a Quality Control Plan are submitted by the awarded contractor, discussed internally by USACE personnel, and implemented to prevent environmental hazards from being developed during construction. U.S. Army Corps of Engineers, Environmental Quality and HTRW Section, Environmental and Munitions Branch (CEMVS EC-EQ) should be contacted immediately if future development of the property discovers hazardous or toxic materials.

4.0 INTRODUCTION

4.1 Background

The purpose of this ESA was to evaluate the current and historical conditions of the subject property to identify Recognized Environmental Conditions (RECs) in connection with the subject property and surrounding operations. Recognized Environmental Conditions are defined as the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment. *De minimis* conditions are not RECs.

4.2 Scope of Work

A Phase I ESA was conducted at the subject property in accordance with ASTM Standards Practice 2247, and further defined below:

- USACE has gathered and reviewed available Federal, State, and tribal environmental records. Standard environmental records reviewed included Federal NPL; Federal and State CERCLIS; Federal and State institutional controls/engineering controls registries; Federal ERNS list; State and tribal landfill and/or disposal site lists; State and tribal leaking storage tank lists; State and tribal registered storage tank lists; State and tribal voluntary cleanup sites; and State Brownfield sites. Details from the standard environmental records review are available in Supplementary Materials A.

- USACE has physically inspected the subject property via walking survey, looking for signs of recognized environmental conditions such as stressed vegetation, soil staining, dumping, and evidence of aboveground and underground storage tanks. Photo documentation for the site visit are available in Supplementary Materials B

- USACE has engaged with individuals having institutional knowledge of the subject properties to discuss environmental conditions. Documented conversations and questionnaires are available in Supplementary Materials C.

- USACE has physically observed adjoining properties, paying particular attention to evidence of aboveground and underground storage tanks, questionable housekeeping practices, or unusual business practices.

4.3 Limitations

The observations, measurements, and research reported herein are considered sufficient in detail and scope to form a reasonable basis for a limited Phase I ESA of the subject property (ASTM 2247). The assessment, conclusions, and recommendations presented herein are based upon the subjective evaluation of limited data. The data may not represent all conditions at the subject site, as they reflect the information gathered from specific locations. The limitations of this assessment should be recognized as the client formulates conclusions on the environmental risks associated with these properties.

5.0 GENERAL PROJECT AND SITE INFORMATION

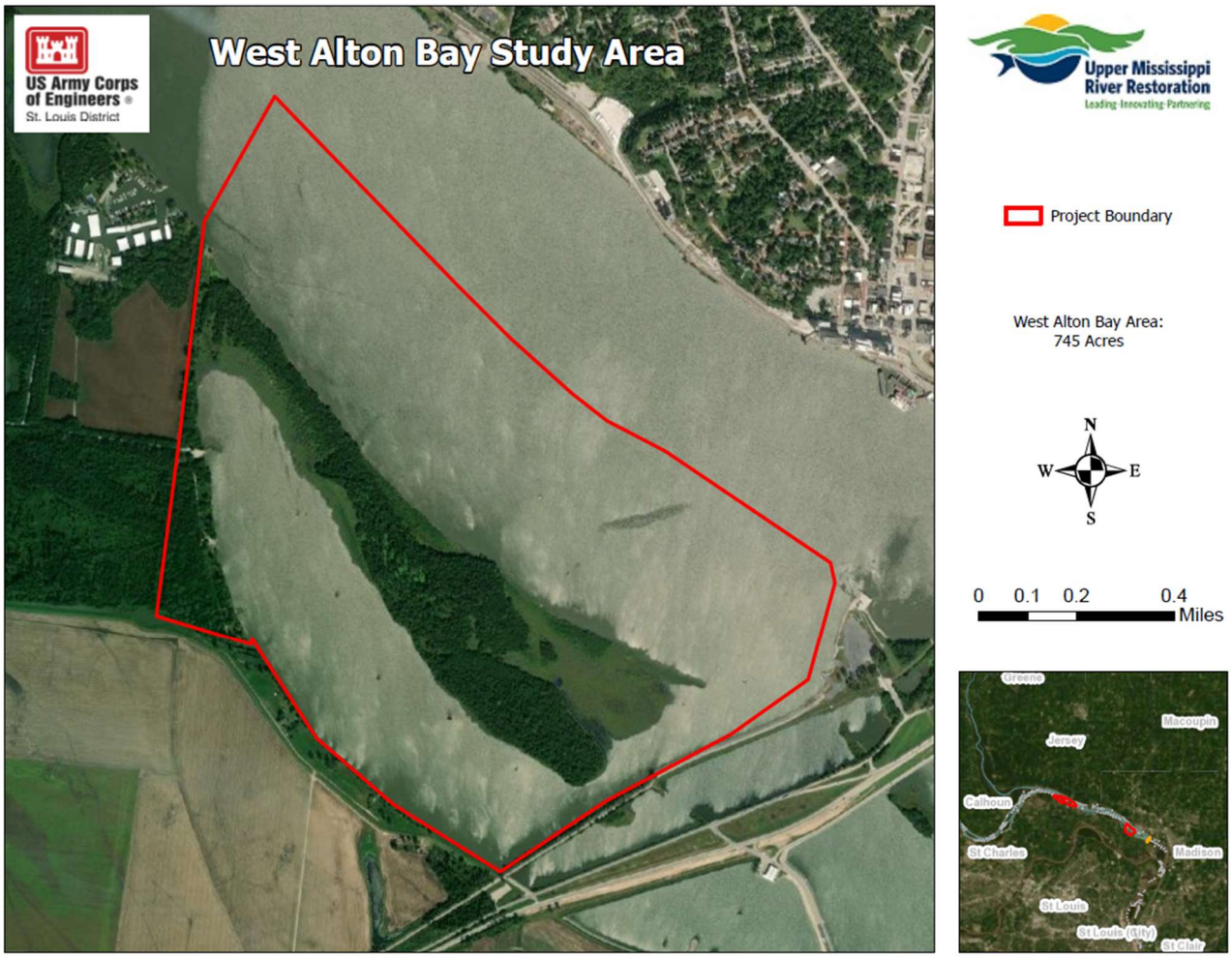

Figure 1: West Alton Bay Study Area.

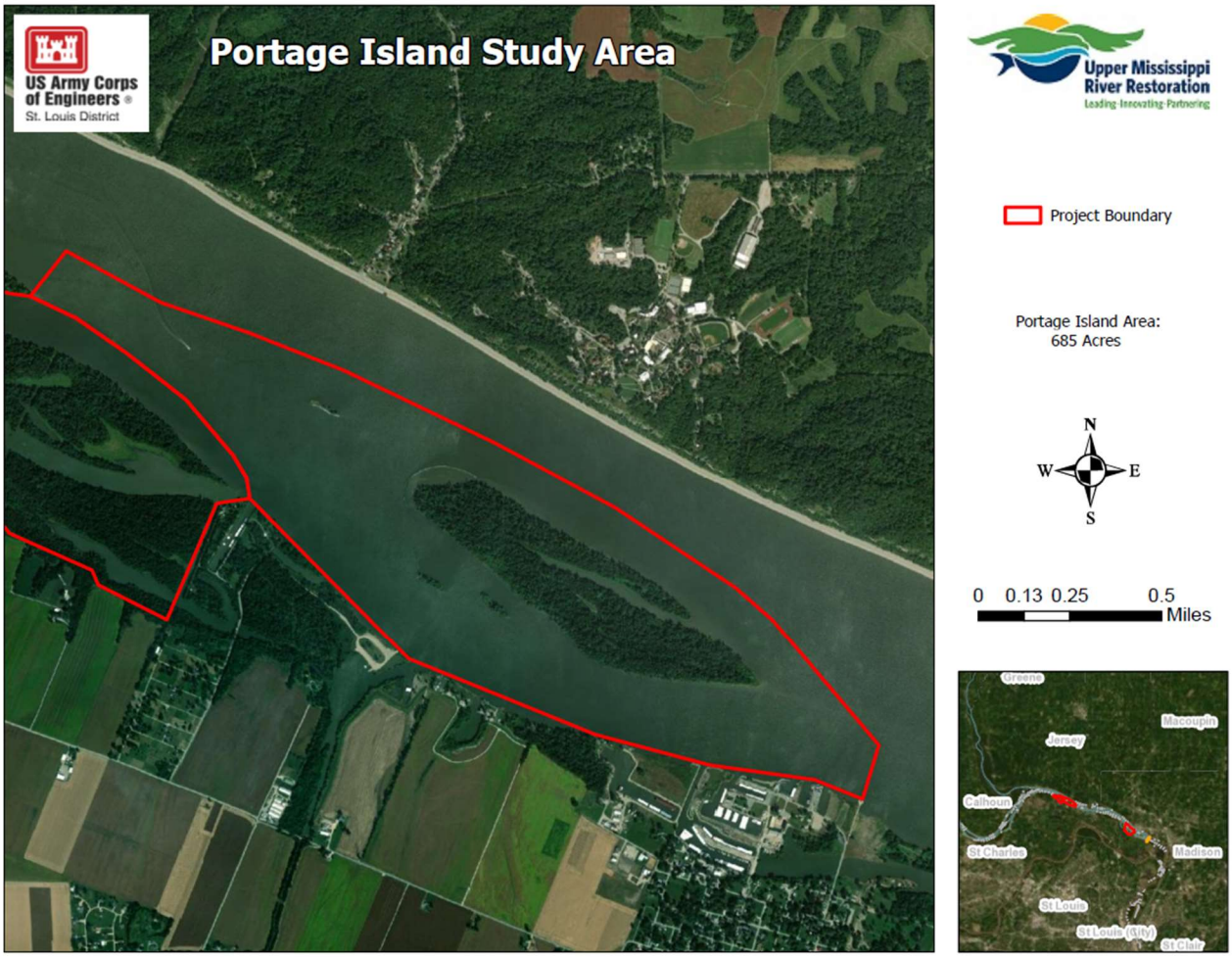

Figure 2: Portage Island Study Area.

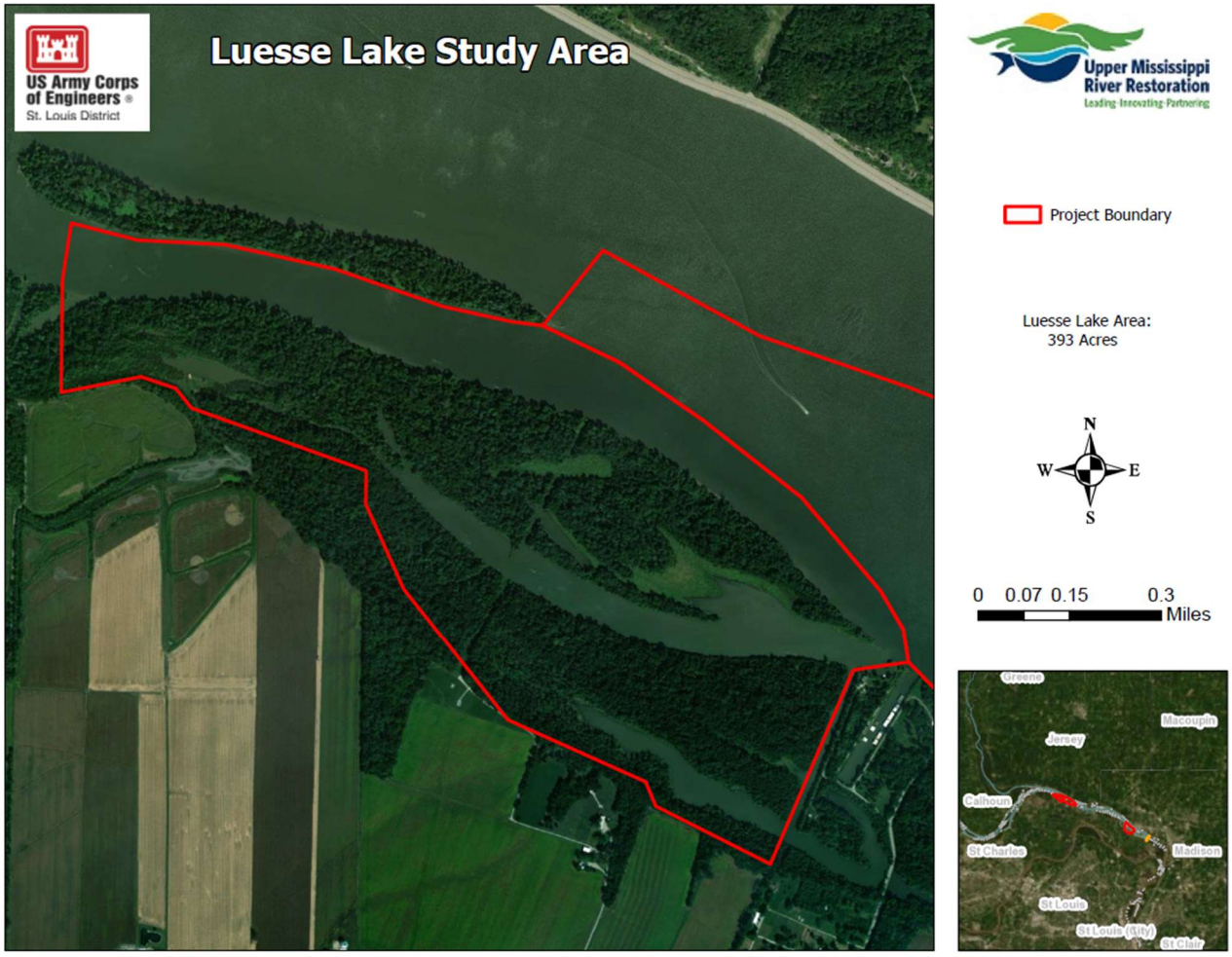

Figure 3: Luesse Lake Study Area.

5.1 Project Description

The West Alton Islands project area is approximately 1,823 acres of island, side channel, backwater, and floodplain forest habitats located on the right descending bank of the Mississippi River in St. Charles County, Missouri between River Miles (RM) 203 and 215.5. The study area lies within Pool 26 of the Upper Mississippi River System, a reach beginning below Lock and Dam 25 (RM 241.4) near Winfield, Missouri, and ending at Melvin Price Lock and Dam (L&D) (RM 200.8) at Alton, IL. The study area encompasses West Alton Bay, Portage Island and side channel, and Luesse Lake (see figures 1-3).

A Tentatively Selected Plan (TSP) has been developed whose objective it is to remove sedimentation and potentially reconstruct islands via dredging and fill. The TSP would include the removal of sediment via dredging and the creation of channels connected to the Mississippi River to encourage water flow through the lakes. Low areas will be built up using dredged material as fill.

5.2 Historical and Current Land Use

The terrestrial habitats in the West Alton Bay and Luesse Lake areas are owned by USACE and cooperatively managed with the Missouri Department of Conservation. Portage Island is owned and managed by the U.S Fish and Wildlife Service for migratory and resident wildlife. West Alton Bay and Luesse Lake areas are popular recreation areas for waterfowl hunters, as well as other forms of recreation such as fishing, kayaking, and nature viewing.

5.3 Adjoining Property Use

Portage Island is surrounded entirely by the Mississippi River. Barge traffic, commercial fishing, and recreation are common activities for the surrounding area.

The northern adjoining property for West Alton Lake is Harbor Point Yacht Club, an active marina with boat storage and petroleum-based fuels. Two private residences and empty grassy lots are the western adjoining properties to West Alton Lake.

The southern adjoining properties for Luesse Lake consist of two rural residences, woody wetlands, and agricultural properties.

6.0 PHASE I ENVIRONMENTAL SITE ASSESSMENT DUE DILIGENCE

6.1 Records Review

For the purpose of this ESA, the following standard record sources were obtained and reviewed to assist in the identification of potential RECs in connection with this project:

- Federal National Priorities List (NPL)
- Federal and State Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS)
- Federal Emergency Response Notification System (ERNS)
- Federal and State institutional controls/engineering controls registries
- State and tribal landfill and/or disposal site lists
- State and tribal leaking storage tank lists
- State and tribal registered storage tanks lists
- State and tribal voluntary cleanup sites
- State Brownfield sites
- State 303D list
- Historical aerial photographs
- USACE historical information
- Historical topographic maps
- Historical City Directory
- Physical Setting Report
- National Pipeline Mapping System

These records assist in meeting the requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), and the ASTM Standard Practice for Environmental Site Assessments (E 2247). For properties that contained inadequate address information for mapping purposes, reasonable efforts were made to identify the approximate location of the sites in relation to the target property as part of the review process. In addition, the physical setting was assessed for the target property by reviewing topographic maps to identify conditions in which hazardous substances or petroleum products could migrate. Additional details can be reviewed in Supplemental Materials A.

6.2 Site Reconnaissance

A physical site visit was performed on 21 and 24 April 2023 by Environmental Specialists Travis J. Schepker and Ashley Edwards of CEMVS-EC-EQ. The site visit inspected the project area footprint and adjoining properties by boat and on foot. Photo documentation for the site visit can be reviewed in Supplementary Materials B.

A second physical site visit was performed on 22 June 2023 by Environmental Specialist Travis J. Schepker for Alton Lake. The site visit was performed by canoe and focused on a 950 gallon tank that was not accessible during the April site visit.

6.3 Owner/Operator/Occupant Interviews

An environmental questionnaire for West Alton Lake and Luesse Lake were submitted to the owner representative, Brian Stoff of USACE on 27 April 2023 to determine if any historical or

current RECs occur on the subject property. On 11 May 2023 Mr. Stoff replied that no historical or current RECs occurred on the subject properties.

An environmental questionnaire for Portage Island was submitted to the owner representative, Charles Deutsch of the United States Fish and Wildlife Service on 27 April 2023 to determine if any historical or current RECs occur on the subject property. On 23 May 2023 Mr. Deutsch replied that no historical or current RECs occurred on the subject property.

Questionnaires received from Mr. Stoff and Mr. Deutsch can be reviewed in Supplementary Materials C.

6.4 Local Government Officials Interviews

An effort was made to reach out to the local fire departments, Rivers Pointe Fire District and Orchard Farm Fire Protection District on 24 April 2023. No response was received as of the finalization of this report.

7 SUMMARY OF FINDINGS

7.1 Recognized Environmental Conditions

A Records review, site reconnaissance, and interviews with knowledgeable persons identified two RECs near or within The West Alton Islands HREP project footprint. The findings of this effort are summarized below:

1. On 29 April 1996 a caller reported that a storm downed three transformers in a flooded area 100 feet west of West Alton Lake. The responsible party responded, removed, and replaced the transformers.

   It is unknown if the transformers contained PCBs. Further, it is unknown if the transformers leaked any fluid. The industry standard would have been to clean up any spilled fluid. This is a low-risk REC that warrants no additional investigation.

2. The Lewis & Clark Sawmill site is southwest of West Alton, Missouri along Highway 67 in St. Charles County. Lewis & Clark Sawmill, no longer in operation, manufactured both treated and untreated lumber (mostly oak). Prior to 1988, pentachlorophenol (PCP) was used as a wood preservative; after 1988 the treated lumber was preserved using copper naphthenate. There have been two fires at this site, one in 1999 and another in 2001.

   The abandoned site was classified as a Superfund site by the USEPA in 2018. The primary contaminants of concern are dioxin total equivalents (TEQ) and pentachlorophenol, as well as a number of hazardous substances. A draft action memo for a time-critical removal action was submitted in July 2018. The primary objectives of this action include the removal and proper disposal of drums and tanks containing hazardous substances, and removal of soil contaminated with dioxin toxic equivalent quantity (TEQs) or pentachlorophenol.

   A drainage area delineation was performed using USEPA Waters Geo Viewer 2.0. The delineation indicated that the site does not drain into West Alton Lake. Further the records review indicated that site remediation was completed on February 13th, 2020, and there are no institutional controls documented on the USEPA website for the site. This is a low-risk REC that warrants no additional investigation.

7.2 Non-Scope Considerations

Non-Scope considerations include findings that are not classified as RECs but are relevant to the environment. Relevant findings classified as Non-Scope Considerations include:

1. On 16 November 2004 an unmarked abandoned drum was washed to shore at Hideaway Harbor. Some liquid remained in the drum, although some surface rust was observed, there was no leaking. Joe Salmons, from St. Charles County parks and recreation contacted Mike Duvall, the director of St. Charles County environmental services program. They both coordinated to hire a contractor to characterize and remove the drum.

The report indicated that the drum was not leaking and therefore there was not a release to the environment. This is not a REC.

2. The National Pipeline Mapping System indicated that a pipeline carrying hazardous liquid and a second pipe carrying gas cut across Luesse Lake where construction will occur. There have been no spills reported for either pipeline. There was nothing discovered indicating the pipelines are in poor condition. Therefore, this finding is not classified as a REC. The presence of the pipelines should be addressed during design.

3. A metal storage tank with an estimated capacity of 900-1,000 gallons was identified in West Alton Lake. The approximate location of the tank was 38.880788°, -90.207757°. USACE Environmental Quality personnel were able to access the tank on June 22, 2023, via canoe. The tank is rusted through in several locations. There were no indications of remnant substances being released from the tank (odors or sheens). Photo documentation can be reviewed Supplementary Materials B.

7.3 Significant Data Gaps

Paragraph 11 of ASTM 2247 requires Interviews with State and/or Local Government Officials be performed to obtain information on RECs. This requirement was not fulfilled for the West Alton Island HREP Phase I.

The environmental professional who performed the Phase I made a reasonable effort to contact the Rivers Pointe Fire District and Orchard Farm Fire Protection District. The reasonable effort included multiple phone calls and emails to both fire districts.

8 ENVIRONMENTAL PROFESSIONALS' OPINION

Based on the data and resources available for this assessment, it is the Environmental Professional's opinion that the Project Area contains no major sites of interest that would impact the project's cost, design, or schedule. The environmental impact for the migration of off-site contaminants onto the Project Area is negligible. Therefore, a Phase II ESA is not recommended at this time.

9 LIMITATIONS AND EXCEPTIONS

U.S. Army Corps of Engineers, Environmental Quality and HTRW Section, Environmental and Munitions Branch (CEMVS-EC-EQ) should be contacted with any known or suspected variations from the conditions described herein. If future development of the property indicates the presence of hazardous or toxic materials, USACE should be notified to perform a re-evaluation of the environmental conditions.

The scope of this assessment did not include any additional environmental investigation, not outlined herein, or analyses for the presence or absence of hazardous or toxic materials in the soil, ground water, surface water, or air, in, on, under, or above the subject tract.

This site assessment was performed in accordance with generally accepted practices of consultants undertaking similar studies at the same time and in the same geographical area, and USACE observed that degree of care and skill generally exercised by consultants under similar circumstances and conditions. The findings and conclusions stated herein must be considered not as scientific certainties, but rather as professional opinions concerning the significance of the limited data gathered during the course of the environmental site assessment. No other warranty, expressed or implied, is made.

Specifically, USACE does not and cannot represent that the site contains no hazardous waste or material, oil (including petroleum products), or other latent condition beyond that observed by USACE during its site assessment.

The observations described in this report were made under the conditions stated herein. The conclusions presented in the report were based solely upon the services described therein, and not on scientific tasks or procedure beyond the scope of described services or the time and budgetary constraints imposed by the client. Furthermore, such conclusions are based solely on site conditions and rules and regulations, which were in effect at the time of the study.

In preparing this report, USACE relied on certain information provided by State and local officials and other parties referenced herein, and on information contained in the files of State and/or local agencies available to USACE at the time of the site assessment. Although there may have been some degree of overlap in the information provided by these various sources, an attempt to independently verify the accuracy or completeness of all information reviewed or received during the course of this site assessment was not made.

Observations were made of the site and of structures on the site as indicated within the report. Where access to portions of the site or to structures on the site was unavailable or limited, USACE renders no opinion as to the presence of indirect evidence relating to hazardous waste, material, oil, or other petroleum products in that portion of the site or structure. In addition, USACE renders no opinion as to the presence of hazardous waste or material, oil, or other petroleum products or to the presence of indirect evidence relating to hazardous material, oil, or petroleum products where direct observation of the interior walls, floor, roof, or ceiling of a structure on a site was obstructed by objects or coverings on or over these surfaces.

Unless otherwise specified in the report, USACE did not perform testing or analyses to determine the presence or concentration of asbestos, radon, formaldehyde, lead-based paint, lead in drinking water, electromagnetic fields (EMFs), or polychlorinated biphenyls (PCBs) at the site or in the environment at the site.

The purpose of this report is to assess the physical characteristics of the subject site with respect to the presence of hazardous waste, material, oil, or petroleum products in the environment. Except as otherwise described in this report, no specific attempt was made to check on the compliance of present or past owners or operators of the site with Federal, State, or local laws and regulations, environmental or otherwise.

Personnel from CEMVS-EC-EQ have specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject property and declare that, to the best of their professional knowledge and belief, meet the definitions of Environmental Professionals as defined under 40 CFR 312.

15 REFERENCES

E2247-16, A. (2016). Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process for Forestland or Rural Property.

USACE, 1992. ER 1165-2-132 Hazardous Toxic and Radioactive Waste Guidance for Civil Works Projects, Washington DC: Department of the Army.

USACE, 2010. ER 200-2-3 *Environmental Compliance Policies,* Washington D. C.: Department of the Army.

USACE. (2023). *West Alton Island HREP Feasability Study (Draft Version).* Saint Louis: United States Army Corps of Engineers.

USEPA, 2005. 40 CFR 312: Innocent Landowners, Standards for Conducting All Appropriate Inquiries. *Code of Federal Regulations.*

SUPPLEMENTARY MATERIALS A: RECORDS REVIEW

DATABASE REPORT

Project Property:	*West Alton Lake Phase I* *15957 Deer Dr* *West Alton MO*
Project No:	
Report Type:	*Database Report*
Order No:	*23042100138*
Requested by:	*US Army Corps of Engineers*
Date Completed:	*April 25, 2023*

Environmental Risk Information Services
A division of Glacier Media Inc.
1.866.517.5204 | info@erisinfo.com | erisinfo.com

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Executive Summary

Property Information:

Project Property:		*West Alton Lake Phase I* *15957 Deer Dr West Alton MO*
Project No:		
Coordinates:		
	Latitude:	*38.87175202*
	Longitude:	*-90.17834224*
	UTM Northing:	*4,307,314.33*
	UTM Easting:	*742,192.22*
	UTM Zone:	*UTM Zone 15S*
Elevation:		*416 FT*

Order Information:

Order No:	*23042100138*
Date Requested:	*April 21, 2023*
Requested by:	*US Army Corps of Engineers*
Report Type:	*Database Report*

Historicals/Products:

Aerial Photographs	*Historical Aerials (with Project Boundaries)*
City Directory Search	*CD - 2 Street Search*
ERIS Xplorer	*ERIS Xplorer*
Excel Add-On	*Excel Add-On*
Fire Insurance Maps	*US Fire Insurance Maps*
Physical Setting Report (PSR)	*Physical Setting Report (PSR)*
Topographic Map	*Topographic Maps*

Executive Summary: Report Summary

Database	Searched	Search Radius	Project Property	Within 0.12mi	0.125mi to 0.25mi	0.25mi to 0.50mi	0.50mi to 1.00mi	Total
Standard Environmental Records								
Federal								
NPL	Y	1	0	0	0	0	0	0
PROPOSED NPL	Y	1	0	0	0	0	0	0
DELETED NPL	Y	0.5	0	0	0	0	-	0
SEMS	Y	0.5	0	0	0	**1**	-	**1**
SEMS ARCHIVE	Y	0.5	0	0	0	0	-	0
ODI	Y	0.5	0	0	0	0	-	0
CERCLIS	Y	0.5	0	0	0	0	-	0
IODI	Y	0.5	0	0	0	0	-	0
CERCLIS NFRAP	Y	0.5	0	0	0	0	-	0
CERCLIS LIENS	Y	PO	0	-	-	-	-	0
RCRA CORRACTS	Y	1	0	0	0	0	0	0
RCRA TSD	Y	0.5	0	0	0	0	-	0
RCRA LQG	Y	0.25	0	0	0	-	-	0
RCRA SQG	Y	0.25	0	0	0	-	-	0
RCRA VSQG	Y	0.25	0	0	0	-	-	0
RCRA NON GEN	Y	0.25	0	0	0	-	-	0
RCRA CONTROLS	Y	0.5	0	0	0	0	-	0
FED ENG	Y	0.5	0	0	0	0	-	0
FED INST	Y	0.5	0	0	0	0	-	0
LUCIS	Y	0.5	0	0	0	0	-	0
NPL IC	Y	0.5	0	0	0	0	-	0
ERNS 1982 TO 1986	Y	PO	0	-	-	-	-	0
ERNS 1987 TO 1989	Y	PO	0	-	-	-	-	0
ERNS	Y	PO	0	**1**	-	-	-	**1**
FED BROWNFIELDS	Y	0.5	0	0	0	0	-	0
FEMA UST	Y	0.25	0	0	0	-	-	0
FRP	Y	0.25	0	0	0	-	-	0

Database	Searched	Search Radius	Project Property	Within 0.12mi	0.125mi to 0.25mi	0.25mi to 0.50mi	0.50mi to 1.00mi	Total
DELISTED FRP	Y	0.25	0	0	0	-	-	0
HIST GAS STATIONS	Y	0.25	0	0	0	-	-	0
REFN	Y	0.25	0	0	0	-	-	0
BULK TERMINAL	Y	0.25	0	0	0	-	-	0
SEMS LIEN	Y	PO	0	-	-	-	-	0
SUPERFUND ROD	Y	1	0	0	0	0	0	0
DOE FUSRAP	Y	1	0	0	0	0	0	0
State								
SHWS	Y	1	0	0	0	0	0	0
SMAR	Y	0.5	0	0	0	**1**	-	**1**
DELISTED SHWS	Y	1	0	0	0	0	0	0
REMOVED SHWS	Y	0.5	0	0	0	0	-	0
DELISTED HWC	Y	1	0	0	0	0	0	0
DEL SHWS	Y	1	0	0	0	0	0	0
HWCP	Y	1	0	0	0	**1**	0	**1**
SWF/LF	Y	0.5	0	0	0	0	-	0
LST	Y	0.5	0	0	0	0	-	0
DELISTED LST	Y	0.5	0	0	0	0	-	0
TANK AUL	Y	0.5	0	0	0	0	-	0
UST	Y	0.25	0	0	0	-	-	0
AST	Y	0.25	0	0	0	-	-	0
DEL TANK	Y	0.25	0	0	0	-	-	0
AUL	Y	0.5	0	0	0	0	-	0
VCP	Y	0.5	0	0	0	0	-	0
BROWNFIELDS	Y	0.5	0	0	0	0	-	0
Tribal								
INDIAN LUST	Y	0.5	0	0	0	0	-	0
INDIAN UST	Y	0.25	0	0	0	-	-	0
DELISTED INDIAN LST	Y	0.5	0	0	0	0	-	0
DELISTED INDIAN UST	Y	0.25	0	0	0	-	-	0

County ***No County standard environmental record sources available for this State.***

Additional Environmental Records

Federal

Database	Searched	Search Radius	Project Property	Within 0.12mi	0.125mi to 0.25mi	0.25mi to 0.50mi	0.50mi to 1.00mi	Total
FINDS/FRS	Y	PO	0	-	-	-	-	0
TRIS	Y	PO	0	-	-	-	-	0
PFAS NPL	Y	0.5	0	0	0	0	-	0
PFAS FED SITES	Y	0.5	0	0	0	0	-	0
PFAS SSEHRI	Y	0.5	0	0	0	0	-	0
ERNS PFAS	Y	0.5	0	0	0	0	-	0
PFAS NPDES	Y	0.5	0	0	0	0	-	0
PFAS TRI	Y	0.5	0	0	0	0	-	0
PFAS WATER	Y	0.5	0	0	0	0	-	0
PFAS TSCA	Y	0.5	0	0	0	0	-	0
PFAS E-MANIFEST	Y	0.5	0	0	0	0	-	0
HMIRS	Y	0.125	0	0	-	-	-	0
NCDL	Y	0.125	0	0	-	-	-	0
TSCA	Y	0.125	0	0	-	-	-	0
HIST TSCA	Y	0.125	0	0	-	-	-	0
FTTS ADMIN	Y	PO	0	-	-	-	-	0
FTTS INSP	Y	PO	0	-	-	-	-	0
PRP	Y	PO	0	-	-	-	-	0
SCRD DRYCLEANER	Y	0.5	0	0	0	0	-	0
ICIS	Y	PO	0	-	-	-	-	0
FED DRYCLEANERS	Y	0.25	0	0	0	-	-	0
DELISTED FED DRY	Y	0.25	0	0	0	-	-	0
FUDS	Y	1	0	0	0	0	0	0
FORMER NIKE	Y	1	0	0	0	0	0	0
PIPELINE INCIDENT	Y	PO	0	-	-	-	-	0
MLTS	Y	PO	0	-	-	-	-	0
HIST MLTS	Y	PO	0	-	-	-	-	0
MINES	Y	0.25	0	0	0	-	-	0
SMCRA	Y	1	0	0	0	0	0	0
MRDS	Y	1	0	0	0	0	0	0
LM SITES	Y	1	0	0	0	0	0	0
ALT FUELS	Y	0.25	0	0	0	-	-	0
CONSENT DECREES	Y	0.25	0	0	0	-	-	0
AFS	Y	PO	0	-	-	-	-	0
SSTS	Y	0.25	0	0	0	-	-	0

Database	Searched	Search Radius	Project Property	Within 0.12mi	0.125mi to 0.25mi	0.25mi to 0.50mi	0.50mi to 1.00mi	Total
PCBT	Y	0.5	0	0	0	0	-	0
PCB	Y	0.5	0	0	0	0	-	0
State								
PFAS	Y	0.5	0	0	0	0	-	0
DRYCLEANERS	Y	0.25	0	0	0	-	-	0
DELISTED DRYCLEANERS	Y	0.25	0	0	0	-	-	0
SPILLS	Y	0.125	0	**2**	-	-	-	**2**
TIER 2	Y	0.125	0	0	-	-	-	0
Tribal	***No Tribal additional environmental record sources available for this State.***							
County	***No County additional environmental record sources available for this State.***							
	Total:		0	**3**	0	**3**	0	**6**

**** PO – Property Only***
**** 'Property and adjoining properties' database search radii are set at 0.25 miles.***

Executive Summary: Site Report Summary - Project Property

Map Key	DB	Company/Site Name	Address	Direction	Distance (mi/ft)	Elev Diff (ft)	Page Number

No records found in the selected databases for the project property.

Executive Summary: Site Report Summary - Surrounding Properties

Map Key	DB	Company/Site Name	Address	Direction	Distance (mi/ft)	Elev Diff (ft)	Page Number
1	ERNS		37 SOUTH LAKE SHORE DR WEST ALTON MO ***NRC Report No:*** 338852	WNW	0.02 / 102.55	3	17
1	SPILLS	Union Electric	37 South Lakeshore Drive West Alton MO ***Spill No:*** 9604291455BJA	WNW	0.02 / 102.55	3	19
2	SPILLS	Unknown	Mississippi River (River Mark 204) West Alton MO ***Spill No:*** 9904011320DLM	NW	0.06 / 321.13	3	19
3	SMAR	Lewis & Clark Sawmill	14400 Hwy 67 West Alton MO 63386	S	0.44 / 2,307.39	21	21
3	HWCP	Lewis & Clark Sawmill: Lewis & Clark Sawmills	14400 Hwy 67 West Alton MO 63386	S	0.44 / 2,307.39	21	21
3	SEMS	LEWIS & CLARK SAWMILL	14400 Highway 67 WEST ALTON MO 63386 ***EPA ID:*** MOR000505545	S	0.44 / 2,307.39	21	22

Executive Summary: Summary by Data Source

Standard

Federal

SEMS - SEMS List 8R Active Site Inventory

A search of the SEMS database, dated Jan 25, 2023 has found that there are 1 SEMS site(s) within approximately 0.50 miles of the project property.

Equal/Higher Elevation	Address	Direction	Distance (mi/ft)	Map Key
LEWIS & CLARK SAWMILL	14400 Highway 67 WEST ALTON MO 63386 ***EPA ID**: MOR000505545*	S	0.44 / 2,307.39	3

ERNS - Emergency Response Notification System

A search of the ERNS database, dated Jan 16, 2023 has found that there are 1 ERNS site(s) within approximately 0.02 miles of the project property.

Equal/Higher Elevation	Address	Direction	Distance (mi/ft)	Map Key
	37 SOUTH LAKE SHORE DR WEST ALTON MO ***NRC Report No**: 338852*	WNW	0.02 / 102.55	1

State

SMAR - Site Management and Reporting System

A search of the SMAR database, dated Mar 9, 2023 has found that there are 1 SMAR site(s) within approximately 0.50 miles of the project property.

Equal/Higher Elevation	Address	Direction	Distance (mi/ft)	Map Key
Lewis & Clark Sawmill	14400 Hwy 67 West Alton MO 63386	S	0.44 / 2,307.39	3

HWCP - Hazardous Waste Cleanup Program Sites

A search of the HWCP database, dated Mar 6, 2023 has found that there are 1 HWCP site(s) within approximately 1.00 miles of the project property.

Equal/Higher Elevation	Address	Direction	Distance (mi/ft)	Map Key
Lewis & Clark Sawmill: Lewis & Clark Sawmills	14400 Hwy 67 West Alton MO 63386	S	0.44 / 2,307.39	3

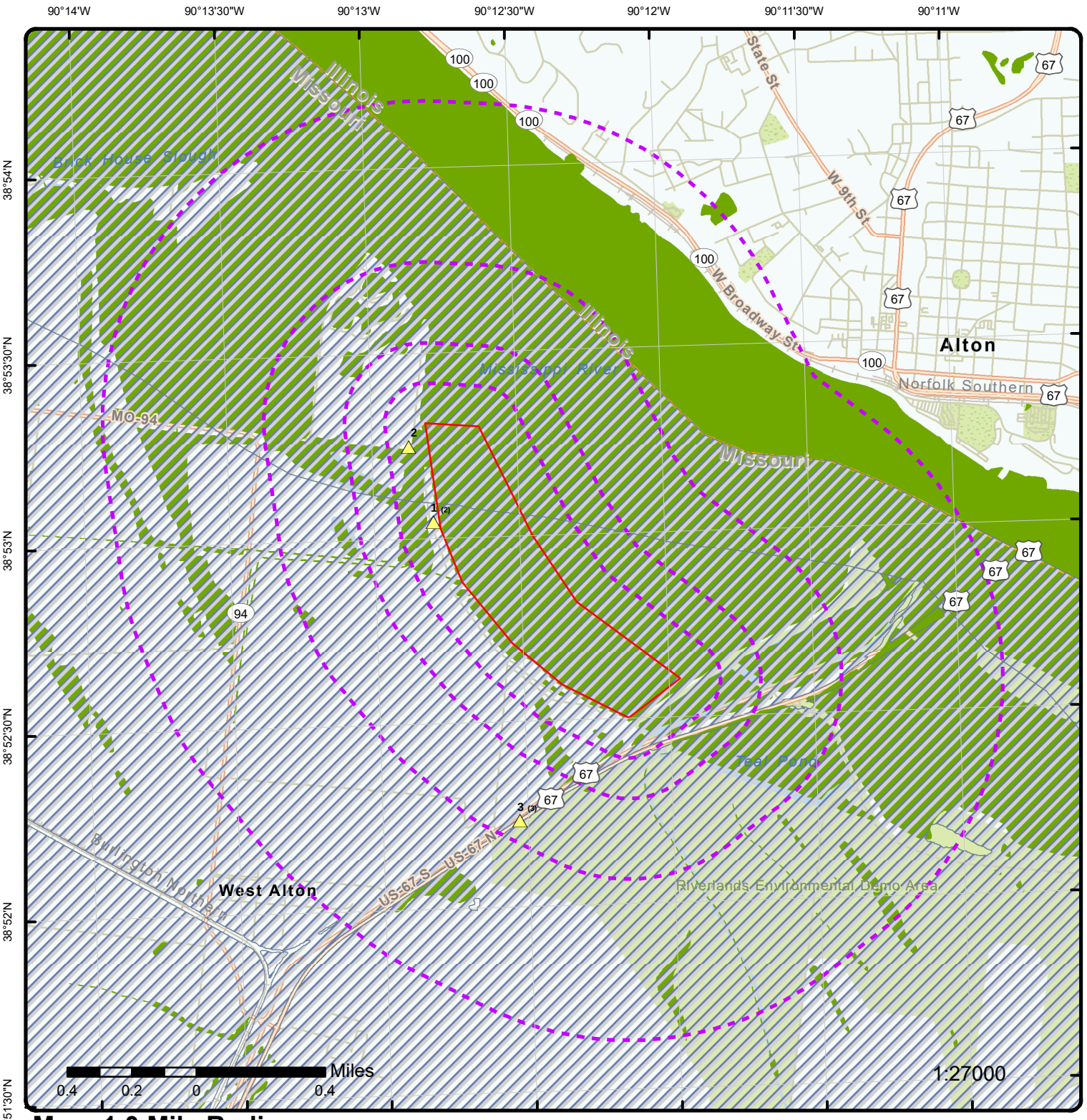
Non Standard

State

SPILLS - Environmental Incident Summary Database

A search of the SPILLS database, dated Sep 22, 2021 has found that there are 2 SPILLS site(s) within approximately 0.12 miles of the project property.

Equal/Higher Elevation	Address	Direction	Distance (mi/ft)	Map Key
Union Electric	37 South Lakeshore Drive West Alton MO ***Spill No**: 9604291455BJA*	WNW	0.02 / 102.55	1
Unknown	Mississippi River (River Mark 204) West Alton MO ***Spill No**: 9904011320DLM*	NW	0.06 / 321.13	2



Map: 1.0 Mile Radius

Order Number: 23042100138

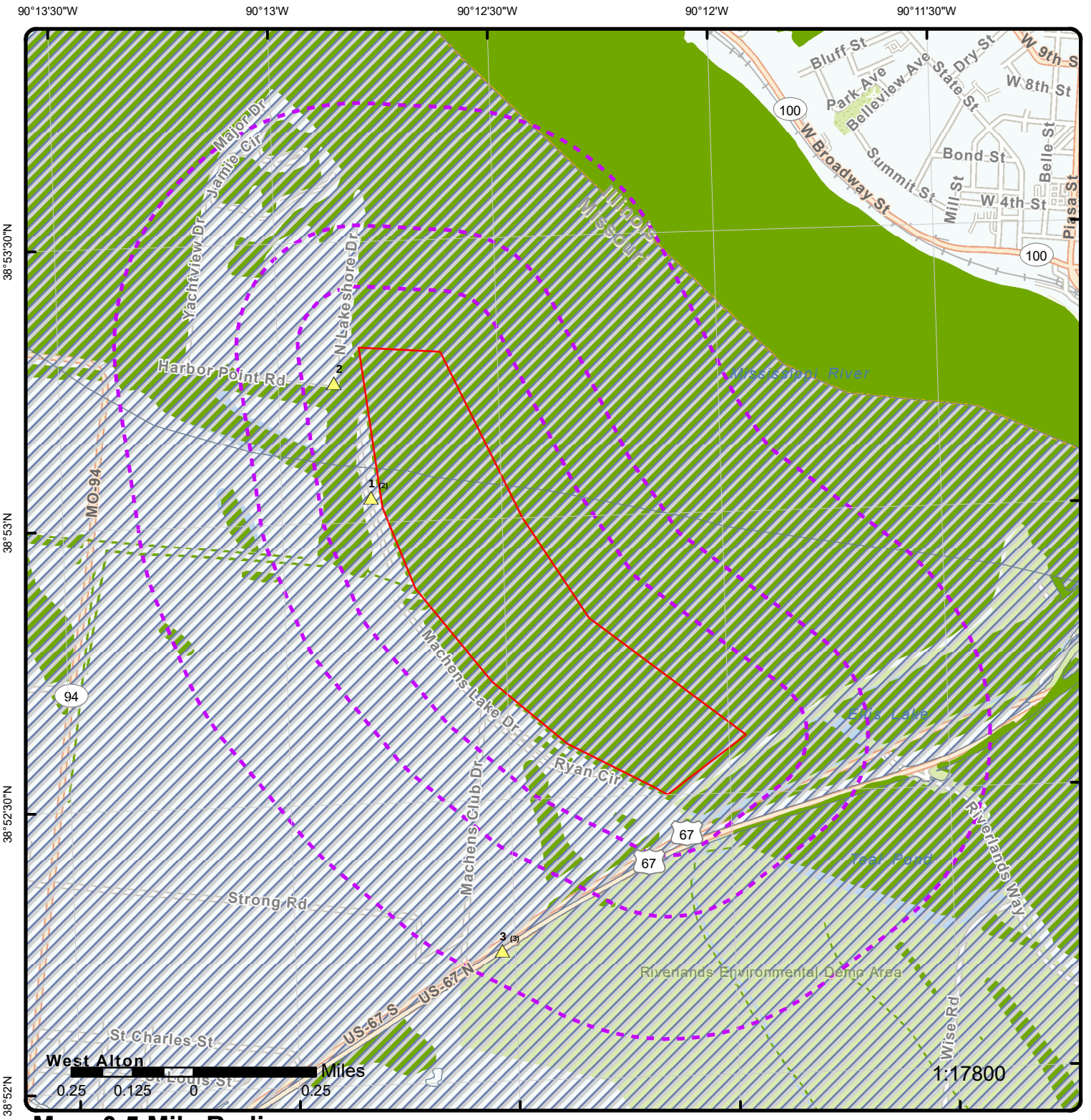
Address: 15957 Deer Dr, West Alton, MO

ERIS

- Project Property
- Buffer Outline
- Sites with Higher Elevation
- Sites with Same Elevation
- Sites with Lower Elevation
- Sites with Unknown Elevation
- Areas with Higher Elevation
- Areas with Same Elevation
- Areas with Lower Elevation
- Areas with Unknown Elevation
- Freeways; Highways
- Traffic Circle; Ramp
- Major & Minor Arterial
- Traffic Circle; Ramp
- Local Road
- Rail
- State
- Country
- National Wetland
- Indian Reserve Land
- Plume
- 100 Year Flood Zone
- 500 Year Flood Zone
- FWS Special Designation Areas
- National Priorities List (Active, Delisted, Proposed, Institutional Control)

Source: © 2021 ESRI StreetMap Premium

© ERIS Information Inc.



Map: 0.5 Mile Radius

Order Number: 23042100138

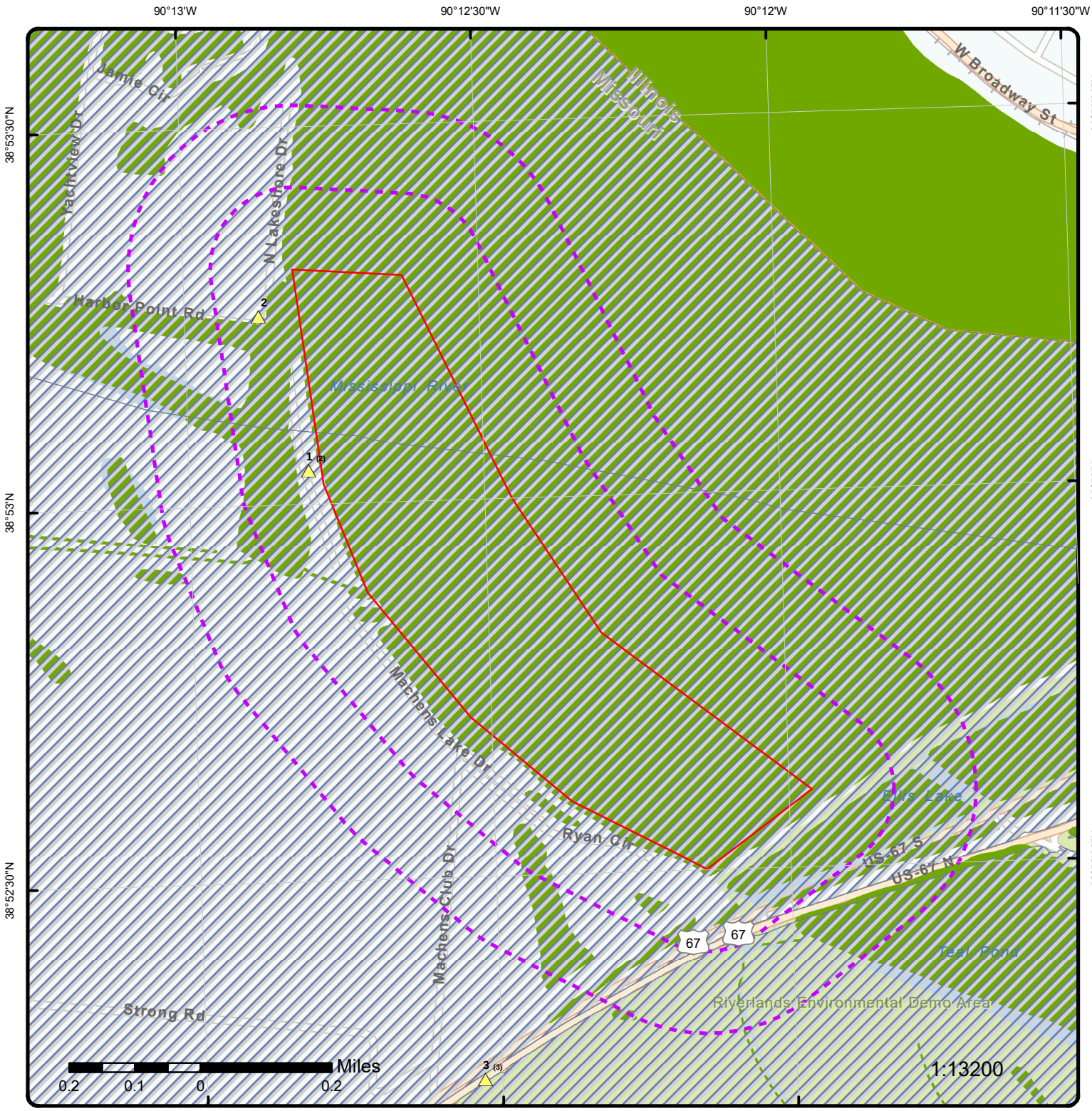
Address: 15957 Deer Dr, West Alton, MO

ERIS

- Project Property
- Buffer Outline
- Sites with Higher Elevation
- Sites with Same Elevation
- Sites with Lower Elevation
- Sites with Unknown Elevation
- Areas with Higher Elevation
- Areas with Same Elevation
- Areas with Lower Elevation
- Areas with Unknown Elevation
- Freeways; Highways
- Traffic Circle; Ramp
- Major & Minor Arterial
- Traffic Circle; Ramp
- Local Road
- Rail
- State
- Country
- National Wetland
- Indian Reserve Land
- Plume
- 100 Year Flood Zone
- 500 Year Flood Zone
- FWS Special Designation Areas
- National Priorities List (Active, Delisted, Proposed, Institutional Control)

Source: © 2021 ESRI StreetMap Premium

© ERIS Information Inc.



Map: 0.25 Mile Radius

Order Number: 23042100138

Address: 15957 Deer Dr, West Alton, MO

ERIS

- Project Property
- Buffer Outline
- Sites with Higher Elevation
- Sites with Same Elevation
- Sites with Lower Elevation
- Sites with Unknown Elevation
- Areas with Higher Elevation
- Areas with Same Elevation
- Areas with Lower Elevation
- Areas with Unknown Elevation
- Freeways; Highways
- Traffic Circle; Ramp
- Major & Minor Arterial
- Traffic Circle; Ramp
- Local Road
- Rail
- State
- Country
- National Wetland
- Indian Reserve Land
- Plume
- 100 Year Flood Zone
- 500 Year Flood Zone
- FWS Special Designation Areas
- National Priorities List (Active, Delisted, Proposed, Institutional Control)

Source: © 2021 ESRI StreetMap Premium

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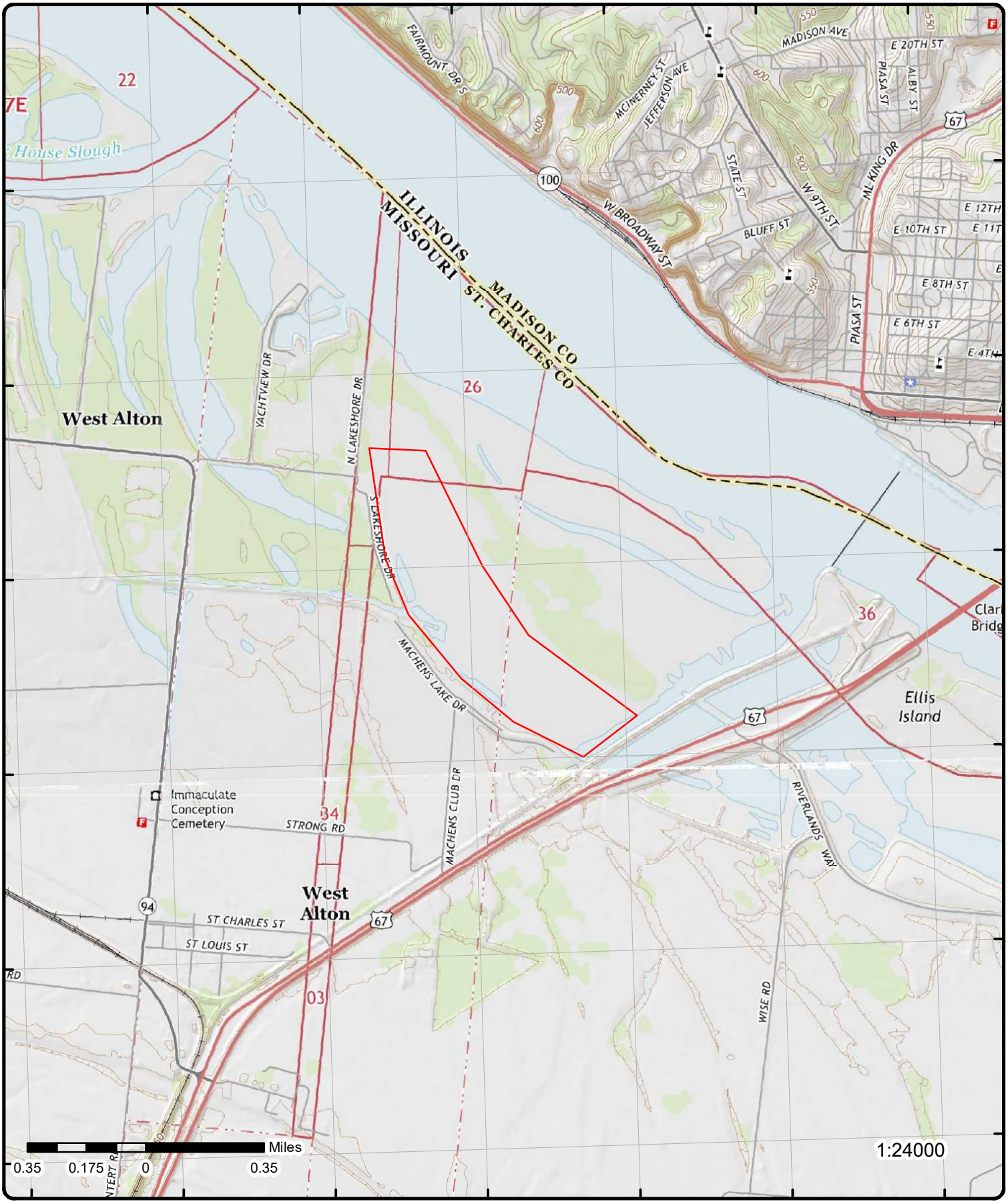
Aerial **Year: 2022**

Order Number: 23042100138

Address: 15957 Deer Dr, West Alton, MO

Source: ESRI World Imagery

© ERIS Information Inc.



Topographic Map

Year: 2015

Order Number: 23042100138

Address: 15957 Deer Dr, MO

Quadrangle(s): Elsah, IL; Alton, IL; Columbia Bottom, MO

Source: USGS Topographic Map

© ERIS Information Inc.

Detail Report

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
1	1 of 2	WNW	0.02 / 102.55	419.06 / 3	37 SOUTH LAKE SHORE DR WEST ALTON MO	ERNS

NRC Report No:	338852	**Latitude Degrees:**	
Type of Incident:	FIXED	**Latitude Minutes:**	
Incident Cause:	NATURAL PHENOMENON	**Latitude Seconds:**	
Incident Date:	4/29/1996 2:30:00 PM	**Longitude Degrees:**	
Incident Location:		**Longitude Minutes:**	
Incident Dtg:	DISCOVERED	**Longitude Seconds:**	
Distance from City:		**Lat Quad:**	
Distance Units:		**Long Quad:**	
Direction from City:		**Location Section:**	
Location County:	ST. CHARLES	**Location Township:**	
Potential Flag:		**Location Range:**	
Year:	Year 1996 Reports		

Description of Incident: 3 POLE MOUNTED TRANSFORMERS DOWNED BY STORM / UNKNOWN IF ANY OILRELEASE / CAPACITY OF EACH 15GAL

Material Spill Information

Chris Code:	OTF	**Unit of Measure:**	UNKNOWN AMOUNT
CAS No:		**If Reached Water:**	YES
UN No:		**Amount in Water:**	0
Name of Material:	OIL, MISC: TRANSFORMER - PCB CONTENT UNKNOWN	**Unit Reach Water:**	UNKNOWN AMOUNT
Amount of Material:	0		

Calls Information

Date Time Received:	4/29/1996 3:45:14 PM	**Responsible City:**	ST. LOUIS
Date Time Complete:	4/29/1996 3:51:17 PM	**Responsible State:**	MO
Call Type:	INC	**Responsible Zip:**	63166
Resp Company:	UNION ELECTRIC	**Source:**	UNAVAILABLE
Resp Org Type:	PUBLIC UTILITY		

Incident Information

Tank ID:		**Building ID:**	
Tank Regulated:	U	**Location Area ID:**	
Tank Regulated By:		**Location Block ID:**	
Capacity of Tank:		**OCSG No:**	
Capacity Tank Units:		**OCSP No:**	
Description of Tank:		**State Lease No:**	
Actual Amount:		**Pier Dock No:**	
Actual Amount Units:		**Berth Slip No:**	
Tank Above Ground:	ABOVE	**Brake Failure:**	N
NPDES:		**Airbag Deployed:**	
NPDES Compliance:	U	**Transport Contain:**	U
Init Contin Rel No:		**Location Subdiv:**	
Contin Rel Permit:		**Platform Rig Name:**	
Contin Release Type:		**Platform Letter:**	
Aircraft ID:		**Allision:**	N
Aircraft Runway No:		**Type of Structure:**	
Aircraft Spot No:		**Structure Name:**	
Aircraft Type:	UNKNOWN	**Structure Oper:**	Y

Aircraft Model:		***Transit Bus Flag:***	
Aircraft Fuel Cap:		***Date Time Norm Serv:***	
Aircraft Fuel Cap U:		***Serv Disrupt Time:***	
Aircraft Fuel on Brd:		***Serv Disrupt Units:***	
Aircraft Fuel OB U:		***CR Begin Date:***	
Aircraft Hanger:		***CR End Date:***	
Road Mile Marker:		***CR Change Date:***	
Power Gen Facility:	U	***FBI Contact:***	
Generating Capacity:		***FBI Contact Dt Tm:***	
Type of Fixed Obj:	UNKNOWN	***Passenger Handling:***	
Type of Fuel:		***Passenger Route:***	XXX
DOT Crossing No:		***Passenger Delay:***	XXX
DOT Regulated:	U	***Sub Part C Test Req:***	XXX
Pipeline Type:	UNKNOWN	***Conductor Test:***	
Pipeline Abv Ground:	ABOVE	***Engineer Test:***	
Pipeline Covered:	U	***Trainman Test:***	
Exposed Underwater:	U	***Yard Foreman Test:***	
Railroad Hotline:	No	***RCL Operator Test:***	
Railroad Milepost:	UNKNOWN	***Brakeman Test:***	
Grade Crossing:	N	***Train Dispat Test:***	
Crossing Device Ty:		***Signalman Test:***	
Ty Vehicle Involved:	UNKNOWN	***Oth Employee Test:***	
Device Operational:	Y	***Unknown Test:***	

Incident Details Information

Release Secured:	U	***State Agen Report No:***	
Release Rate:		***State Agen on Scene:***	
Release Rate Unit:		***State Agen Notified:***	
Release Rate Rate:		***Fed Agency Notified:***	
Est Duration of Rel:		***Oth Agency Notified:***	
Desc Remedial Act:	CREWS EN ROUTE TO INVESTIGATE DAMAGE & ROMOVE TRANSFORMERS OR LEAKAGE	***Body of Water:***	
Fire Involved:	N	***Tributary of:***	
Fire Extinguished:	U	***Near River Mile Make:***	
Any Evacuations:	N	***Near River Mile Mark:***	
No Evacuated:		***Offshore:***	N
Who Evacuated:		***Weather Conditions:***	
Radius of Evacu:		***Air Temperature:***	
Any Injuries:	U	***Wind Direction:***	
No. Injured:		***Wind Speed:***	
No. Hospitalized:		***Wind Speed Unit:***	
No. Fatalities:		***Water Supp Contam:***	U
Any Fatalities:	U	***Water Temperature:***	
Any Damages:	N	***Wave Condition:***	
Damage Amount:		***Current Speed:***	
Air Corridor Closed:	N	***Current Direction:***	
Air Corridor Desc:		***Current Speed Unit:***	
Air Closure Time:		***EMPL Fatality:***	
Waterway Closed:	N	***Pass Fatality:***	
Waterway Desc:		***Community Impact:***	N
Waterway Close Time:		***Passengers Transfer:***	UNK
Road Closed:	N	***Passenger Injuries:***	
Road Desc:		***Employee Injuries:***	
Road Closure Time:		***Occupant Fatality:***	
Road Closure Units:		***Sheen Size:***	
Closure Direction:		***Sheen Size Units:***	
Major Artery:	No	***Sheen Size Length:***	
Track Closed:	N	***Sheen Size Length U:***	
Track Desc:		***Sheen Size Width:***	
Track Closure Time:		***Sheen Size Width U:***	
Track Closure Units:		***Sheen Color:***	
Track Close Dir:		***Dir of Sheen Travel:***	
Media Interest:		***Sheen Odor Desc:***	
Medium Desc:	WATER	***Duration Unit:***	
Addl Medium Info:	LOW FLOOD PLAINS TO MISSISSIPPI RIVER	***Additional Info:***	WILL NOTIFY: DNR, EPA VII

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
1	2 of 2	WNW	0.02 / 102.55	419.06 / 3	Union Electric 37 South Lakeshore Drive West Alton MO	SPILLS

Spill No:	9604291455BJA	**Property Use Code:**	25
Entity ID:	205	**Property Use Desc:**	Transformer/Substation
ID:	4164	**Prop Subcat ID:**	
Discovery Date:	29-Apr-1996 00:00:00	**Prop Subcat Name:**	
Discovery Time:		**RP Contact:**	240
Cause Subcat ID:		**Regional Office:**	SLRO
Cause Description:	Weather Related	**Agency:**	Private - Responsible Party
Cause Subcat Name:		**Contact Name:**	Warren Mueller
Incident Cause:	22	**Contacts Phone:**	3145543063
Incident City:	West Alton	**Organization Name:**	Union Electric
Incident State:	46	**Org Phone:**	3145543063
Incident Dt Search:	29-Apr-1996 00:00:00	**Address 1:**	1901 Chouteau Avenue
Incident Date:	29-Apr-1996 00:00:00	**Address 2:**	PO Box 66149
Incident Time:		**City:**	St. Louis
Issuer:		**State:**	46
Issue Date:		**State Ref Desc:**	MO
Issue Time:		**Zip:**	63103
Issuer Ref Desc:		**Call Date:**	29-Apr-1996 00:00:00
Collection Box:		**Call Time:**	29-Apr-1996 14:55:00
E-Mail:	FALSE	**Latitude:**	
Contaminant Rel:	FALSE	**Longitude:**	
Chemical Pickup:	FALSE	**GPS Method Code:**	
Household Haz Waste:	FALSE	**UTM Northing:**	
Historic Release:	FALSE	**UTM Easting:**	
PSTIF:	FALSE	**UTM Zone:**	
Haz Sub Issued:	FALSE	**UTM EPE:**	
County Code:	183.0	**Report Origin:**	68
County:	St. Charles	**Job Code:**	
Incident Location:	37 South Lakeshore Drive		
Description:			
X:			
Y:			
Source:	Missouri Environmental Emergency Response Tracking System (MEERTS) - Incidents		
Additional Info:			

Spill Summary:

CALLER REPORTS THAT A STORM HAS DOWNED THREE TRANSFORMERS INTO A FLOODED AREA. THE PCB CONTENT OF THE TRANSFORMERS OR EVEN, IF THEY ARE LEAKING, IS UNKNOWN.

Response Summary:

THE RP RESPONDED, REMOVED, AND REPLACED THE TRANSFORMERS. THE RP ALSO SOAKED UP ANY OIL WHICH MAY HAVE LEAKED AND PROPERLY DISPOSED OF IT.

Responding Agencies

ID:	3937	**Agency:**	Private - Responsible Party
Agent Code:	68	**Immediate/Delayed:**	I

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
2	1 of 1	NW	0.06 / 321.13	418.92 / 3	Unknown Mississippi River (River Mark 204) West Alton MO	SPILLS

Spill No:	9904011320DLM	**Property Use Code:**	28
Entity ID:	7132	**Property Use Desc:**	Water/Waterway/Marina
ID:	9560	**Prop Subcat ID:**	11
Discovery Date:	01-Apr-1999 00:00:00	**Prop Subcat Name:**	Unknown/Other
Discovery Time:	01-Apr-1999 13:30:00	**RP Contact:**	9548
Cause Subcat ID:		**Regional Office:**	SLRO
Cause Description:	Improper Disposal	**Agency:**	Private - Citizen

Cause Subcat Name:	Unknown/Other	***Contact Name:***	Unknown
Incident Cause:	8	***Contacts Phone:***	
Incident City:	West Alton	***Organization Name:***	Unknown
Incident State:	46	***Org Phone:***	
Incident Dt Search:	01-Apr-1999 00:00:00	***Address 1:***	
Incident Date:	01-Apr-1999 00:00:00	***Address 2:***	
Incident Time:	01-Apr-1999 13:00:00	***City:***	
Issuer:		***State:***	
Issue Date:		***State Ref Desc:***	
Issue Time:		***Zip:***	
Issuer Ref Desc:		***Call Date:***	01-Apr-1999 00:00:00
Collection Box:		***Call Time:***	01-Apr-1999 13:20:00
E-Mail:	FALSE	***Latitude:***	38.8874969482422
Contaminant Rel:	FALSE	***Longitude:***	-90.2146606445313
Chemical Pickup:	FALSE	***GPS Method Code:***	UN
Household Haz Waste:	FALSE	***UTM Northing:***	4307980.28484997
Historic Release:	FALSE	***UTM Easting:***	741589.253753378
PSTIF:	FALSE	***UTM Zone:***	15.0
Haz Sub Issued:	FALSE	***UTM EPE:***	
County Code:	183.0	***Report Origin:***	67
County:	St. Charles	***Job Code:***	

Incident Location: Mississippi River (River Mark 204)
Description: Other - Unknown
X: -90.2146668596384
Y: 38.8875041371647
Source: Missouri Environmental Emergency Response Tracking System (MEERTS) - Incidents; Missouri Spatial Data Information Service Open Data Site (Dec 1, 2020)
Additional Info:

Spill Summary:

CALLER REPORTS A BARGE OPERATOR IS DUMPING 55 GALLON METAL DRUMS, STEEL CABLE, DREDGE SPOIL, AND SEWAGE INTO THE MISSISSIPPI RIVER.

Response Summary:

THE US COAST GUARD WAS NOTIFIED AND WILL RESPOND TO THE SITE TO INVESTIGATE.

Additional Information:

THE BARGE OPERATOR CONDUCTED THE DREDGING AND RECEIVED THE SEWAGE WASTE FROM PORT ARROWHEAD HARBOR POINT MARINA.

4/5/99 - 1130 - DAVE MICHAELSON, EER, SPOKE WITH DAN SCHROEDER, PHONE NUMBER (314) 539-3091 EXT. 218, USCG-POLLUTION INVESTIGATION, TO INQUIRE WHETHER ANY RESPONSE HAD BEEN MADE. THE COAST GUARD HAD SENT TWO INDIVIDUALS TO THE SITE ON THE EVENING OF 4/1/99, BUT DID NOT OBSERVE ANY DUMPING. THE BARGE IN QUESTION WAS FREE OF ANY DEBRIS. THE COAST GUARD REFERRED THE INCIDENT TO THE US ARMY CORPS OF ENGINEERS FOR AN INVESTIGATION OF ILLEGAL DREDGE AND FILL OPERATIONS.

Responding Agencies

ID:	9102	***Agency:***	US Coast Guard
Agent Code:	52	***Immediate/Delayed:***	I

Details (GIS Open Data)

Call Date: 1999/04/01 00:00:00+00
Cause: Improper Disposal
Material: Sewage
Prprty Use: Water/Waterway/Marina
EPE:
H Coll Code Desc: Unknown
H Coll Code: UN
UTM Easting: 741589.2538
UTM Northin: 4307980.285

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB

Details (GIS Open Data)

Call Date:	1999/04/01 00:00:00+00
Cause:	Improper Disposal
Material:	Solid Waste
Prprty Use:	Water/Waterway/Marina
EPE:	
H Coll Code Desc:	Unknown
H Coll Code:	UN
UTM Easting:	741589.2538
UTM Northin:	4307980.285

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
3	1 of 3	S	0.44 / 2,307.39	437.75 / 21	Lewis & Clark Sawmill 14400 Hwy 67 West Alton MO 63386	SMAR

SM No:	11250	***Site Code:***	
Tank Status:		***Other Site Code:***	
Type S:	Yes	***CERCLIS:***	
Type V:	No	***NPL Date:***	
Type F:	No	***Tank R:***	
Type R:	No	***Registry:***	No
Ownership:	Superfund	***Site County:***	St. Charles

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
3	2 of 3	S	0.44 / 2,307.39	437.75 / 21	Lewis & Clark Sawmill: Lewis & Clark Sawmills 14400 Hwy 67 West Alton MO 63386	HWCP

AUL ID:		***Federal ID (WSP):***	
OU ID:	1233	***SMARS ID (AUL):***	
SMARS ID (WSP):	11250	***Federal ID (AUL):***	
Site Status:	Active	***SMARS ID (WSA):***	
Sensitive:	FALSE	***Federal ID (WSA):***	

Contaminants of Concern:	
Activity Use Limitations:	
Site Status Description:	Sites where no investigation or remedial action has been performed, or where remedial actions are in progress but are not complete.
DNR Web Page Link:	
DNR Program:	DNR/Hazardous Waste Program/Superfund Section
Site Owner (AUL):	
Site Ownrshp (WSA):	
Site Alias:	
Site Facility Name:	Lewis & Clark Sawmill: Lewis & Clark Sawmills
Address:	14400 Hwy 67
City:	West Alton
ZIP:	63386
County:	St. Charles
Data Source:	DNR Hazardous Waste Site Point Data (WSP); DNR Hazardous Waste Cleanup Sites (Web)
Site Cleanup Summary:	

EPA conducted removal assessment sampling in May 2018. The primary contaminants of concern are dioxin total equivalents (TEQ) and pentachlorophenol, as well as a number of hazardous substances. A draft action memo for a time-critical removal action was submitted in July 2018. The primary objectives of this action will include the removal and proper disposal of drums and tanks containing hazardous substances, and removal of soil contaminated with dioxin toxic equivalent quantity (TEQs) or pentachlorophenol. The proposed removal action may take place in August or September 2018.

Site Background History:

The Lewis & Clark Sawmill site is north of West Alton, Missouri along Highway 67 in St. Charles County. Lewis & Clark Sawmill, no longer in operation, manufactured both treated and untreated lumber (mostly oak). Prior to 1988, pentachlorophenol (PCP) was used as a wood preservative; after 1988 the treated lumber was preserved using copper naphthenate. There have been two fires at this site, one in 1999 and another in 2001.

The Environmental Protection Agency (EPA) initiated the Compliance Incentive Program (CIP) for facilities with significant noncompliance issues in an attempt to increase compliance with the Resource Conservation and Recovery Act (RCRA) and expedite remedial actions where applicable. Lewis & Clark Sawmills joined the CIP; the RCRA compliance evaluation and sampling inspection was performed at this facility on October 15, 2008. Four violations were noted during the inspection: Storing Without a Permit; Failure to Make a Hazardous Waste Determination / Used Oil Spill; Closing and

Labeling Used Oil Containers; and Illegal Disposal and Surface Impoundment Storage.

EPA conducted follow-up activities in 2017 and 2018 to determine if the site needed a time-critical removal action. A site visit was conducted on October 17, 2017. The site has been abandoned and there are wastes left in place.

Site Details (WSP)

UTM Easting:	741928.73
UTM Northng:	4305601.63
H Datum Nm:	NAD83
H Accuracy:	12.2
H Accur UOM:	Meters
H Coll Code:	I2
P DOP:	0.0
Sources Dal:	24000

Site Details (Web)

Easting:	741928.73
Northing:	4305601.63
Horizontal Reference Datum:	NAD83
Horizontal Collection Method:	I2
Horizontal Accuracy Estimate:	12.2
Horizontal Accuracy Units of:	Meters
Point Dilution of Precision:	
Source Map Scale No:	24000

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3 | ***3 of 3*** | ***S*** | ***0.44 / 2,307.39*** | ***437.75 / 21*** | ***LEWIS & CLARK SAWMILL***
14400 Highway 67
WEST ALTON MO 63386 | ***SEMS***

EPA ID:	MOR000505545	***Pgm Sys ID:***	MOR000505545
Primary Name(MAP):	LEWIS & CLARK SAWMILL	***Loc Address(MAP):***	14400 HWY 67
City Name:	WEST ALTON	***Postal Code:***	63386-1802
Site Name:	LEWIS & CLARK SAWMILL	***County Name:***	ST CHARLES
Street Address:	14400 Highway 67	***Latitude83:***	38.866192999999996
Street Address 2:		***Longitude83:***	-90.21194299999999
City:	WEST ALTON	***PGM SYS ID(CalOES):***	MOR000505545
State:	MO	***Name(CalOES):***	LEWIS & CLARK SAWMILL
Zip:	63386	***Loc Addr(CalOES):***	14400 HWY 67
County:	ST. CHARLES	***City(CalOES):***	WEST ALTON
Latitude:	+38.866193	***Postal(CalOES):***	63386-1802
Longitude:	-90.211943	***County(CalOES):***	ST CHARLES
Latitude83(CalOES):	38.866193	***Longitude83(CalOES):***	-90.211943

Data Source: EPA Superfund Data and Reports Active Site Inventory (List 8R Active);EPA FRS Interests Map - SEMS;CalOES EPA RCRA TSDF Map - SEMS

Site Level Information

Site ID:	0704623	***Superfund Alt Agmt:***	No
NPL:	Not on the NPL	***FIPS Code:***	29183
Federal Facility:	No	***Cong District:***	
FF Docket:	No	***Region:***	07
Non NPL Status:	Removal Only Site (No Site Assessment Work Needed)		

Action Information

Operable Units:	00	***Start Actual:***	05/14/2018
Action Code:	RS	***Finish Actual:***	06/14/2018
Action Name:	RV ASSESS	***Qual:***	
SEQ:	1	***Curr Action Lead:***	EPA Perf
Operable Units:	00	***Start Actual:***	03/25/2019

Action Code:	RV	**Finish Actual:**	02/13/2020
Action Name:	RMVL	**Qual:**	C
SEQ:	1	**Curr Action Lead:**	EPA Perf

REST Information

Registry ID:	110070559555	**Pgm Sys Acrnm:**	SEMS
Active Status:	NOT ON THE NPL	**Accuracy Value:**	
Key Field:	SEMSMOR000505545	**HUC8 Code:**	07110009
Interest Type:	SUPERFUND (NON-NPL)	**HUC 12:**	
Fed Agency Name:		**Federal Land Ind:**	
Fed Facility Code:		**Public Ind:**	Y
EPA Region Code:	07	**Pgm Report:**	no data yet
Collect Mth Desc:			
Ref Point Desc:			
Fac Url:	https://ofmpub.epa.gov/frs_public2/fii_query_detail.disp_program_facility?p_registry_id=110070559555		
Program Url:			
Pgm Report Url:	no data yet		
Fips Code:	29183		

CalOES EPA RCRA TSDF - SEMS

Registry ID:	110070559555	**HUC 12:**	
Interest Ttpe:	SUPERFUND (NON-NPL)	**Collect Method:**	
Active Status:	NOT ON THE NPL	**Accuracy Value:**	
Pgm Sys Acrnm:	SEMS	**Ref Point Desc:**	
Federal Ag:		**EPA Region:**	07
Federal La:		**Key Field:**	SEMSMOR000505545
Fed Facility Cd:		**Create Dt:**	2021/10/26 00:00:00+00
Public Ind:	Y	**Update Dt:**	2021/11/24 13:48:58+00
FIPS Code:	29183	**Last Reported Dt:**	
HUC8 Code:	07110009		
Pgm Report:	no data yet		
Program Url:			
Fac Url:	https://ofmpub.epa.gov/frs_public2/fii_query_detail.disp_program_facility?p_registry_id=110070559555		

Unplottable Summary

Total: 0 Unplottable sites

DB	Company Name/Site Name	Address	City	Zip	ERIS ID

No unplottable records were found that may be relevant for the search criteria.

Unplottable Report

No unplottable records were found that may be relevant for the search criteria.

Appendix: Database Descriptions

Environmental Risk Information Services (ERIS) can search the following databases. The extent of historical information varies with each database and current information is determined by what is publicly available to ERIS at the time of update. ERIS updates databases as set out in ASTM Standard E1527-13 and E1527-21, Section 8.1.8 Sources of Standard Source Information:

"Government information from nongovernmental sources may be considered current if the source updates the information at least every 90 days, or, for information that is updated less frequently than quarterly by the government agency, within 90 days of the date the government agency makes the information available to the public."

Standard Environmental Record Sources

Federal

National Priority List: NPL

Sites on the United States Environmental Protection Agency (EPA)'s National Priorities List of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action under the Superfund program. The NPL, which EPA is required to update at least once a year, is based primarily on the score a site receives from EPA's Hazard Ranking System. A site must be on the NPL to receive money from the Superfund Trust Fund for remedial action. Sites are represented by boundaries where available in the EPA Superfund Site Boundaries maintained by the Shared Enterprise Geodata and Services (SEGS). Site boundaries represent the footprint of a whole site, the sum of all of the Operable Units and the current understanding of the full extent of contamination; for Federal Facility sites, the total site polygon may be the Facility boundary. Where there is no polygon boundary data available for a given site, the site is represented as a point.

Government Publication Date: Jan 25, 2023

National Priority List - Proposed: PROPOSED NPL

Sites proposed by the United States Environmental Protection Agency (EPA), the state agency, or concerned citizens for addition to the National Priorities List (NPL) due to contamination by hazardous waste and identified by the EPA as a candidate for cleanup because it poses a risk to human health and/or the environment. Sites are represented by boundaries where available in the EPA Superfund Site Boundaries maintained by the Shared Enterprise Geodata and Services (SEGS). Site boundaries represent the footprint of a whole site, the sum of all of the Operable Units and the current understanding of the full extent of contamination; for Federal Facility sites, the total site polygon may be the Facility boundary. Where there is no polygon boundary data available for a given site, the site is represented as a point.

Government Publication Date: Jan 25, 2023

Deleted NPL: DELETED NPL

Sites deleted from the United States Environmental Protection Agency (EPA)'s National Priorities List. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate. Sites are represented by boundaries where available in the EPA Superfund Site Boundaries maintained by the Shared Enterprise Geodata and Services (SEGS). Site boundaries represent the footprint of a whole site, the sum of all of the Operable Units and the current understanding of the full extent of contamination; for Federal Facility sites, the total site polygon may be the Facility boundary. Where there is no polygon boundary data available for a given site, the site is represented as a point.

Government Publication Date: Jan 25, 2023

SEMS List 8R Active Site Inventory: SEMS

The U.S. Environmental Protection Agency's (EPA) Superfund Program has deployed the Superfund Enterprise Management System (SEMS), which integrates multiple legacy systems into a comprehensive tracking and reporting tool. This inventory contains active sites evaluated by the Superfund program that are either proposed to be or are on the National Priorities List (NPL) as well as sites that are in the screening and assessment phase for possible inclusion on the NPL. The Active Site Inventory Report displays site and location information at active SEMS sites. An active site is one at which site assessment, removal, remedial, enforcement, cost recovery, or oversight activities are being planned or conducted. This data includes SEMS sites from the List 8R Active file as well as applicable sites from the SEMS GIS/REST file layer obtained from EPA's Facility Registry Service.

Government Publication Date: Jan 25, 2023

SEMS List 8R Archive Sites: SEMS ARCHIVE

The U.S. Environmental Protection Agency's (EPA) Superfund Enterprise Management System (SEMS) Archived Site Inventory displays site and location information at sites archived from SEMS. An archived site is one at which EPA has determined that assessment has been completed and no further remedial action is planned under the Superfund program at this time. This data includes sites from the List 8R Archived site file.

Government Publication Date: Jan 25, 2023

Inventory of Open Dumps, June 1985: ODI

The Resource Conservation and Recovery Act (RCRA) provides for publication of an inventory of open dumps. The Act defines "open dumps" as facilities which do not comply with EPA's "Criteria for Classification of Solid Waste Disposal Facilities and Practices" (40 CFR 257).

Government Publication Date: Jun 1985

Comprehensive Environmental Response, Compensation and Liability Information System - CERCLIS: CERCLIS

Superfund is a program administered by the United States Environmental Protection Agency (EPA) to locate, investigate, and clean up the worst hazardous waste sites throughout the United States. CERCLIS is a database of potential and confirmed hazardous waste sites at which the EPA Superfund program has some involvement. It contains sites that are either proposed to be or are on the National Priorities List (NPL) as well as sites that are in the screening and assessment phase for possible inclusion on the NPL. The EPA administers the Superfund program in cooperation with individual states and tribal governments; this database is made available by the EPA.

Government Publication Date: Oct 25, 2013

EPA Report on the Status of Open Dumps on Indian Lands: IODI

Public Law 103-399, The Indian Lands Open Dump Cleanup Act of 1994, enacted October 22, 1994, identified congressional concerns that solid waste open dump sites located on American Indian or Alaska Native (AI/AN) lands threaten the health and safety of residents of those lands and contiguous areas. The purpose of the Act is to identify the location of open dumps on Indian lands, assess the relative health and environment hazards posed by those sites, and provide financial and technical assistance to Indian tribal governments to close such dumps in compliance with Federal standards and regulations or standards promulgated by Indian Tribal governments or Alaska Native entities.

Government Publication Date: Dec 31, 1998

CERCLIS - No Further Remedial Action Planned: CERCLIS NFRAP

An archived site is one at which EPA has determined that assessment has been completed and no further remedial action is planned under the Superfund program at this time. The Archive designation means that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL). This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

Government Publication Date: Oct 25, 2013

CERCLIS Liens: CERCLIS LIENS

A Federal Superfund lien exists at any property where EPA has incurred Superfund costs to address contamination ("Superfund site") and has provided notice of liability to the property owner. A Federal CERCLA ("Superfund") lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. This database is made available by the United States Environmental Protection Agency (EPA). This database was provided by the United States Environmental Protection Agency (EPA). Refer to SEMS LIEN as the current data source for Superfund Liens.

Government Publication Date: Jan 30, 2014

RCRA CORRACTS-Corrective Action: RCRA CORRACTS

RCRA Info is the U.S. Environmental Protection Agency's (EPA) comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. At these sites, the Corrective Action Program ensures that cleanups occur. EPA and state regulators work with facilities and communities to design remedies based on the contamination, geology, and anticipated use unique to each site.

Government Publication Date: Jan 23, 2023

RCRA non-CORRACTS TSD Facilities: RCRA TSD

RCRA Info is the U.S. Environmental Protection Agency's (EPA) comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. This database includes Non-Corrective Action sites listed as treatment, storage and/or disposal facilities of hazardous waste as defined by RCRA.

Government Publication Date: Jan 23, 2023

RCRA Generator List: RCRA LQG

RCRA Info is the U.S. Environmental Protection Agency's (EPA) comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. RCRA Info replaces the data recording and reporting abilities of the Resource Conservation and Recovery Information System (RCRIS) and the Biennial Reporting System (BRS). A hazardous waste generator is any person or site whose processes and actions create hazardous waste (see 40 CFR 260.10). Large Quantity Generators (LQGs) generate 1,000 kilograms per month or more of hazardous waste or more than one kilogram per month of acutely hazardous waste.

Government Publication Date: Jan 23, 2023

RCRA Small Quantity Generators List: RCRA SQG

RCRA Info is the U.S. Environmental Protection Agency's (EPA) comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. RCRA Info replaces the data recording and reporting abilities of the Resource Conservation and Recovery Information System (RCRIS) and the Biennial Reporting System (BRS). A hazardous waste generator is any person or site whose processes and actions create hazardous waste (see 40 CFR 260.10). Small Quantity Generators (SQGs) generate more than 100 kilograms, but less than 1,000 kilograms, of hazardous waste per month.

Government Publication Date: Jan 23, 2023

RCRA Very Small Quantity Generators List: RCRA VSQG

RCRA Info is the U.S. Environmental Protection Agency's (EPA) comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. A hazardous waste generator is any person or site whose processes and actions create hazardous waste (see 40 CFR 260.10). Very Small Quantity Generators (VSQG) generate 100 kilograms or less per month of hazardous waste, or one kilogram or less per month of acutely hazardous waste. Additionally, VSQG may not accumulate more than 1,000 kilograms of hazardous waste at any time.

Government Publication Date: Jan 23, 2023

RCRA Non-Generators: RCRA NON GEN

RCRA Info is the U.S. Environmental Protection Agency's (EPA) comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. RCRA Info replaces the data recording and reporting abilities of the Resource Conservation and Recovery Information System (RCRIS) and the Biennial Reporting System (BRS). A hazardous waste generator is any person or site whose processes and actions create hazardous waste (see 40 CFR 260.10). Non-Generators do not presently generate hazardous waste.

Government Publication Date: Jan 23, 2023

RCRA Sites with Controls: RCRA CONTROLS

List of Resource Conservation and Recovery Act (RCRA) facilities with institutional controls in place. RCRA gives the U.S. Environmental Protection Agency (EPA) the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous solid wastes. The 1986 amendments to RCRA enabled EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances.

Government Publication Date: Jan 23, 2023

Federal Engineering Controls-ECs: FED ENG

This list of Engineering controls (ECs) is provided by the United States Environmental Protection Agency (EPA). ECs encompass a variety of engineered and constructed physical barriers (e.g., soil capping, sub-surface venting systems, mitigation barriers, fences) to contain and/or prevent exposure to contamination on a property. The EC listing includes remedy component data from Superfund decision documents issued in fiscal years 1982-2020 for applicable sites on the final or deleted on the National Priorities List (NPL); and sites with a Superfund Alternative Approach (SAA) Agreement in place. The only sites included that are not on the NPL; proposed for NPL; or removed from proposed NPL, are those with an SAA Agreement in place.

Government Publication Date: Feb 23, 2023

Federal Institutional Controls- ICs: FED INST

This list of Institutional controls (ICs) is provided by the United States Environmental Protection Agency (EPA). ICs are non-engineered instruments, such as administrative and legal controls, that help minimize the potential for human exposure to contamination and/or protect the integrity of the remedy. Although it is EPA's expectation that treatment or engineering controls will be used to address principal threat wastes and that groundwater will be returned to its beneficial use whenever practicable, ICs play an important role in site remedies because they reduce exposure to contamination by limiting land or resource use and guide human behavior at a site. The IC listing includes remedy component data from Superfund decision documents issued in fiscal years 1982-2020 for applicable sites on the final or deleted on the National Priorities List (NPL); and sites with a Superfund Alternative Approach (SAA) Agreement in place. The only sites included that are not on the NPL; proposed for NPL; or removed from proposed NPL, are those with an SAA Agreement in place.

Government Publication Date: Feb 23, 2023

Land Use Control Information System: LUCIS

The LUCIS database is maintained by the U.S. Department of the Navy and contains information for former Base Realignment and Closure (BRAC) properties across the United States.

Government Publication Date: Sep 1, 2006

Institutional Control Boundaries at NPL sites: NPL IC

Boundaries of Institutional Control areas at sites on the United States Environmental Protection Agency (EPA)'s National Priorities List, or Proposed or Deleted, made available by the EPA's Shared Enterprise Geodata and Services (SEGS). United States Environmental Protection Agency (EPA)'s National Priorities List of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action under the Superfund program. Institutional controls are non-engineered instruments such as administrative and legal controls that help minimize the potential for human exposure to contamination and/or protect the integrity of the remedy.

Government Publication Date: Jan 25, 2023

Emergency Response Notification System: ERNS 1982 TO 1986

Database of oil and hazardous substances spill reports controlled by the National Response Center. The primary function of the National Response Center is to serve as the sole national point of contact for reporting oil, chemical, radiological, biological, and etiological discharges into the environment anywhere in the United States and its territories.

Government Publication Date: 1982-1986

Emergency Response Notification System: ERNS 1987 TO 1989

Database of oil and hazardous substances spill reports controlled by the National Response Center. The primary function of the National Response Center is to serve as the sole national point of contact for reporting oil, chemical, radiological, biological, and etiological discharges into the environment anywhere in the United States and its territories.

Government Publication Date: 1987-1989

Emergency Response Notification System: ERNS

Database of oil and hazardous substances spill reports made available by the United States Coast Guard National Response Center (NRC). The NRC fields initial reports for pollution and railroad incidents and forwards that information to appropriate federal/state agencies for response. These data contain initial incident data that has not been validated or investigated by a federal/state response agency.

Government Publication Date: Jan 16, 2023

The Assessment, Cleanup and Redevelopment Exchange System (ACRES) Brownfield Database: FED BROWNFIELDS

Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties protects the environment, reduces blight, and takes development pressures off greenspaces and working lands. This data is provided by the United States Environmental Protection Agency (EPA) and includes Brownfield sites from the Cleanups in My Community (CIMC) web application.

Government Publication Date: Sep 13, 2022

FEMA Underground Storage Tank Listing: FEMA UST

The Federal Emergency Management Agency (FEMA) of the Department of Homeland Security maintains a list of FEMA owned underground storage tanks.

Government Publication Date: Dec 31, 2017

Facility Response Plan: FRP

List of facilities that have submitted Facility Response Plans (FRP) to EPA. Facilities that could reasonably be expected to cause "substantial harm" to the environment by discharging oil into or on navigable waters are required to prepare and submit Facility Response Plans (FRPs). Harm is determined based on total oil storage capacity, secondary containment and age of tanks, oil transfer activities, history of discharges, proximity to a public drinking water intake or sensitive environments.

Government Publication Date: Dec 31, 2021

Delisted Facility Response Plans: DELISTED FRP

Facilities that once appeared in - and have since been removed from - the list of facilities that have submitted Facility Response Plans (FRP) to EPA. Facilities that could reasonably be expected to cause "substantial harm" to the environment by discharging oil into or on navigable waters are required to prepare and submit Facility Response Plans (FRPs). Harm is determined based on total oil storage capacity, secondary containment and age of tanks, oil transfer activities, history of discharges, proximity to a public drinking water intake or sensitive environments.

Government Publication Date: Dec 31, 2021

Historical Gas Stations: HIST GAS STATIONS

This historic directory of service stations is provided by the Cities Service Company. The directory includes Cities Service filling stations that were located throughout the United States in 1930.

Government Publication Date: Jul 1, 1930

Petroleum Refineries: REFN

List of petroleum refineries from the U.S. Energy Information Administration (EIA) Refinery Capacity Report. Includes operating and idle petroleum refineries (including new refineries under construction) and refineries shut down during the previous year located in the 50 States, the District of Columbia, Puerto Rico, the Virgin Islands, Guam, and other U.S. possessions. Survey locations adjusted using public data.

Government Publication Date: Aug 30, 2022

Petroleum Product and Crude Oil Rail Terminals: BULK TERMINAL

List of petroleum product and crude oil rail terminals made available by the U.S. Energy Information Administration (EIA). Includes operable bulk petroleum product terminals located in the 50 States and the District of Columbia with a total bulk shell storage capacity of 50,000 barrels or more, and/or the ability to receive volumes from tanker, barge, or pipeline; also rail terminals handling the loading and unloading of crude oil that were active between 2017 and 2018. Petroleum product terminals comes from the EIA-815 Bulk Terminal and Blender Report, which includes working, shell in operation, and shell idle for several major product groupings. Survey locations adjusted using public data.

Government Publication Date: Jun 29, 2022

LIEN on Property: SEMS LIEN

The U.S. Environmental Protection Agency's (EPA) Superfund Enterprise Management System (SEMS) provides Lien details on applicable properties, such as the Superfund lien on property activity, the lien property information, and the parties associated with the lien.

Government Publication Date: Jan 25, 2023

Superfund Decision Documents: SUPERFUND ROD

This database contains a list of decision documents for Superfund sites. Decision documents serve to provide the reasoning for the choice of (or) changes to a Superfund Site cleanup plan. The decision documents include completed Records of Decision (ROD), ROD Amendments, Explanations of Significant Differences (ESD) for active and archived sites stored in the Superfund Enterprise Management System (SEMS), along with other associated memos and files. This information is maintained and made available by the U.S. Environmental Protection Agency.

Government Publication Date: Dec 22, 2022

Formerly Utilized Sites Remedial Action Program: DOE FUSRAP

The U.S. Department of Energy (DOE) established the Formerly Utilized Sites Remedial Action Program (FUSRAP) in 1974 to remediate sites where radioactive contamination remained from the Manhattan Project and early U.S. Atomic Energy Commission (AEC) operations. The DOE Office of Legacy Management (LM) established long-term surveillance and maintenance (LTS&M) requirements for remediated FUSRAP sites. DOE evaluates the final site conditions of a remediated site on the basis of risk for different future uses. DOE then confirms that LTS&M requirements will maintain protectiveness.

Government Publication Date: Mar 4, 2017

State

Registry of Confirmed Abandoned or Uncontrolled Hazardous Waste Disposal Sites: SHWS

Sites listed on and proposed for the Registry of Confirmed Abandoned or Uncontrolled Hazardous Waste Disposal Sites in Missouri maintained by the Missouri Department of Natural Resources. Sites listed on the Registry appear on a publicly available list, and a notice filed with the Recorder of Deeds documents hazardous waste contamination at the site. Notice regarding contamination must be provided by the seller to potential buyers. The use of a property listed on the Registry may not change substantially without the written approval of the department. List of sites is updated quarterly, details from the Registry Annual Report are released and updated annually. This database is state equivalent CERCLIS.

Government Publication Date: Jun 30, 2022

Site Management and Reporting System: SMAR

Missouri's Department of Natural Resources (MDNR) maintains a Site Management and Reporting System (SMARS) managed by the Hazardous Waste Program. SMARS currently houses information for Superfund, Federal Facility, Brownfields Voluntary Cleanup Program (BVCP) and Missouri's other state response programs.

Government Publication Date: Mar 9, 2023

Delisted Registry of Confirmed Abandoned or Uncontrolled Hazardous Waste Disposal Sites: DELISTED SHWS

The Missouri Department of Natural Resources would remove a record from the Registry of Confirmed Abandoned or Uncontrolled Hazardous Waste Disposal Sites, if the record is not a Registry Site. This list contains all such non-registry sites that are not included in the Registry Removed sites.

Government Publication Date: Jun 30, 2022

Registry Sites Removed or Action Suspended: REMOVED SHWS

This is a list of registry sites that are removed or have action suspended from the Missouri Registry Annual Report Registry of Confirmed Abandoned or Uncontrolled Hazardous Waste Disposal Sites in Missouri. The Registry is made available by Missouri Department of Natural Resources.

Government Publication Date: Jun 30, 2022

Delisted Hazardous Waste Cleanup Sites: DELISTED HWC

List of sites which once appeared on the Missouri Department of Natural Resources (MDNR)'s Hazardous Waste Program Cleanup Sites list, but have since been removed.

Government Publication Date: Mar 6, 2023

Registry Sites Withdrawn or Deleted: DEL SHWS

This database contains a list of sites that were removed from the Registry of Confirmed Abandoned or Uncontrolled Hazardous Waste Disposal Sites, or Registry action was suspended due to cleanup. This database is state equivalent CERCLIS.

Government Publication Date: Oct 31, 2022

Hazardous Waste Cleanup Program Sites: HWCP

Missouri's Department of Natural Resources (MDNR) manages a Hazardous Waste Program Cleanup Sites list that includes sites that were remediated or investigated under the oversight of the Hazardous Waste Program. These include Superfund, Federal Facilities, Resource Conservation and Recovery Act (RCRA) Corrective Action, and Brownfields/Voluntary Cleanup Program sites that fall under the following four categories: Active Sites, Long Term Sterwardship Sites, Environmental Notice Sites and Completed Sites.

Government Publication Date: Mar 6, 2023

Solid Waste Facility List: SWF/LF

List of landfill locations made available by the Missouri Department of Natural Resources (DNR). Includes Sanitary Landfills, Utility Waste Landfills, Industrial Waste Landfills, and Demolition Landfills. The Missouri Department of Natural Resources provides no warranty, expressed or implied, as to the accuracy of the data, and no responsibility is assumed by the DNR in the use of these data.

Government Publication Date: Mar 15, 2021

Leaking Storage Tank: LST

List of remediation facilities in the Missouri Department of Natural Resources (DNR)'s Underground Storage Tank and Aboveground Storage Tank Summary database.

Government Publication Date: Jan 16, 2023

Delisted Leaking Storage Tank: DELISTED LST

This database contains a list of closed leaking storage tank sites that were removed from the Missouri Department of Natural Resources (DNR)'s Underground Storage Tank and Aboveground Storage Tank Summary database.

Government Publication Date: Jan 16, 2023

Regulated Tanks with Activity and Use Limitations: TANK AUL

List of Regulated Petroleum and Hazardous Substance Storage Tanks with Activity and Use Limitations, made available by the Missouri Department of Natural Resources (DNR) via the Environmental Site Tracking and Research Tool (E-START).

Government Publication Date: Jan 16, 2023

Petroleum Storage Tanks: UST

List of Underground Storage Tank (UST) facilities included in the Missouri Department of Natural Resources (DNR)'s Underground Storage Tank summary database and the Environmental Site Tracking and Research Tool (E-START) .

Government Publication Date: Jan 16, 2023

Aboveground Storage Tanks: AST

List of Aboveground Storage Tanks (ASTs) inspected by the Missouri Department of Agriculture's Petroleum/Propane/Anhydrous Ammonia Inspection Program.

Government Publication Date: Jan 13, 2023

Delisted Storage Tanks: DEL TANK

This database contains a list of closed storage tank sites that were removed from the Missouri Department of Natural Resources (DNR)'s Underground Storage Tank summary database.

Government Publication Date: Jan 16, 2023

Activity and Use Limitations: AUL

Missouri's Department of Natural Resources (MDNR) manages a Hazardous Waste Program Cleanup Sites list that includes sites that have Activity and Use Limitations in place. These mechanisms or controls ensure that exposure pathways to Contaminants of Concern (COCs) through current or reasonable future uses, are not completed for as long as the COCs pose an unacceptable risk to human health, public welfare or the environment.

Government Publication Date: Mar 6, 2023

Brownfields/Voluntary Cleanup Program: VCP

The Missouri Department of Natural Resources Voluntary Cleanup Program is administered by the Hazardous Waste Program's Brownfields/Voluntary Cleanup Section to provide state oversight for voluntary cleanups of properties contaminated with hazardous substances. Many of the sites entering the BVCP are not heavily contaminated, and are contaminated by sources not addressed by any of Department of Natural Resources' regulatory programs such as Emergency Response, Superfund, Resource Conservation and Recovery Act or Petroleum Storage Tanks.

Government Publication Date: Jan 4, 2023

Brownfields Assessment Sites List: BROWNFIELDS

The Missouri Department of Natural Resources Brownfields/Voluntary Cleanup Program (BVCP) under a cooperative agreement with the U.S. Environmental Protection Agency (EPA) conducts brownfields site-specific assessments of properties for public entities such as cities, counties and quasi-governmental entities, as well as for not-for-profit organizations.The site-specific assessment program provides funding and technical assistance to help communities assess properties. An assessment provides valuable information that can aid in making decisions regarding the future of the property.

Government Publication Date: Mar 9, 2023

Tribal

Leaking Underground Storage Tanks (LUSTs) on Indian Lands: INDIAN LUST

This list of leaking underground storage tanks (LUSTs) on Tribal/Indian Lands in Region 7, which includes Missouri, is made available by the United States Environmental Protection Agency (EPA).

Government Publication Date: Oct 12, 2017

Underground Storage Tanks (USTs) on Indian Lands: INDIAN UST

This list of underground storage tanks (USTs) on Tribal/Indian Lands in Region 7, which includes Missouri, is made available by the United States Environmental Protection Agency (EPA).

Government Publication Date: Oct 12, 2017

Delisted Tribal Leaking Storage Tanks: DELISTED INDIAN LST

Leaking Underground Storage Tank (LUST) facilities which once appeared on - and have since been removed from - the Regional Tribal/Indian LUST lists made available by the United States Environmental Protection Agency (EPA).

Government Publication Date: Nov 23, 2022

Delisted Tribal Underground Storage Tanks: DELISTED INDIAN UST

Underground Storage Tank (UST) facilities which once appeared on - and have since been removed from - the Regional Tribal/Indian UST lists made available by the United States Environmental Protection Agency (EPA).

Government Publication Date: Nov 23, 2022

County

No County standard environmental record sources available for this State.

Additional Environmental Record Sources

Federal

Facility Registry Service/Facility Index: FINDS/FRS

The Facility Registry Service (FRS) is a centrally managed database that identifies facilities, sites, or places subject to environmental regulations or of environmental interest. FRS creates high-quality, accurate, and authoritative facility identification records through rigorous verification and management procedures that incorporate information from program national systems, state master facility records, and data collected from EPA's Central Data Exchange registrations and data management personnel. This list is made available by the Environmental Protection Agency (US EPA).

Government Publication Date: Aug 18, 2022

Toxics Release Inventory (TRI) Program: TRIS

The EPA's Toxics Release Inventory (TRI) is a database containing data on disposal or other releases of over 650 toxic chemicals from thousands of U. S. facilities and information about how facilities manage those chemicals through recycling, energy recovery, and treatment. One of TRI's primary purposes is to inform communities about toxic chemical releases to the environment.

Government Publication Date: Aug 24, 2021

PFOA/PFOS Contaminated Sites: PFAS NPL

List of National Priorities List (NPL) and related Superfund Alternative Agreement (SAA) sites where PFOA or PFOS contaminants have been found in water and/or soil. The site listing is provided by the Federal Environmental Protection Agency (EPA).

Government Publication Date: Dec 28, 2022

Federal Agency Locations with Known or Suspected PFAS Detections: PFAS FED SITES

List of Federal agency locations with known or suspected detections of Per- and Polyfluoroalkyl Substances (PFAS), made available by the U.S. Environmental Protection Agency (EPA) in their PFAS Analytic Tools data. EPA outlines that these data are gathered from several federal entities, such as the Federal Superfund program, Department of Defense (DOD), National Aeronautics and Space Administration, Department of Transportation, and Department of Energy. Sites on this list do not necessarily reflect the source/s of contamination and detections do not indicate level of risk or human exposure at the site. Agricultural notifications in this data are limited to DOD sites only. At this time, the EPA is aware that this list is not comprehensive of all Federal agencies.

Government Publication Date: Jun 30, 2022

SSEHRI PFAS Contamination Sites: PFAS SSEHRI

This PFAS Contamination Site Tracker database is compiled by the Social Science Environmental Health Research Institute (SSEHRI) at Northeastern University. According to the SSEHRI, the database records qualitative and quantitative data from each known site of PFAS contamination, including timeline of discovery, sources, levels, health impacts, community response, and government response. The goal of this database is to compile information and support public understanding of the rapidly unfolding issue of PFAS contamination. All data presented was extracted from government websites, news articles, or publicly available documents, and this is cited in the tracker. Disclaimer: The source conveys this database undergoes regular updates as new information becomes available, some sites may be missing and/or contain information that is incorrect or outdated, as well as their information represents all contamination sites SSEHRI is aware of, not all possible contamination sites. This data is not intended to be used for legal purposes. Limited location details are available with this data. Access the following for the most current informations https://pfasproject.com/pfas-contamination-site-tr acker/

Government Publication Date: Dec 12, 2019

National Response Center PFAS Spills: ERNS PFAS

National Response Center (NRC) calls from 1990 to the most recent complete calendar year where there is indication of Aqueous Film Forming Foam (AFFF) usage. NRC calls may reference AFFF usage in the "Material Involved" or "Incident Description" fields. Data made available by the US Environmental Protection Agency (EPA). Disclaimer: dataset may include initial or misidentified incident data not yet validated or investigated by a federal/state response agency.

Government Publication Date: Feb 23, 2022

PFAS NPDES Discharge Monitoring: PFAS NPDES

This list of National Pollutant Discharge Elimination System (NPDES) permitted facilities with required monitoring for Per- and Polyfluoroalkyl (PFAS) Substances is made available via the U.S. Environmental Protection Agency (EPA)'s PFAS Analytic Tools. Any point-source wastewater discharger to waters of the United States must have a NPDES permit, which defines a set of parameters for pollutants and monitoring to ensure that the discharge does not degrade water quality or impair human health. This list includes NPDES permitted facilities associated with permits that monitor for Per- and Polyfluoroalkyl Substances (PFAS), limited to the years 2007 - present. EPA further advises the following regarding these data: currently, fewer than half of states have required PFAS monitoring for at least one of their permittees, and fewer states have established PFAS effluent limits for permittees. For states that may have required monitoring, some reporting and data transfer issues may exist on a state-by-state basis.

Government Publication Date: Feb 19, 2023

Perfluorinated Alkyl Substances (PFAS) from Toxic Release Inventory: PFAS TRI

List of Toxics Release Inventory (TRI) facilities at which the reported chemical is a Per- or polyfluorinated alkyl substance (PFAS) included in the Environmental Protection Agency (EPA)'s consolidated PFAS Master List of PFAS Substances. The EPA's Toxics Release Inventory (TRI) is a database containing data on disposal or other releases of over 650 toxic chemicals from thousands of U.S. facilities and information about how facilities manage those chemicals through recycling, energy recovery, and treatment.

Government Publication Date: Aug 24, 2021

Perfluorinated Alkyl Substances (PFAS) Water Quality: PFAS WATER

The Water Quality Portal (WQP) is a cooperative service sponsored by the United States Geological Survey (USGS), the Environmental Protection Agency (EPA), and the National Water Quality Monitoring Council (NWQMC). This listing includes records from the Water Quality Portal where the characteristic (environmental measurement) is in the Environmental Protection Agency (EPA)'s consolidated Master List of PFAS Substances.

Government Publication Date: Jul 20, 2020

PFAS TSCA Manufacture and Import Facilities: PFAS TSCA

The US Environmental Protection Agency (EPA) issued the Chemical Data Reporting (CDR) Rule under the Toxic Substances Control Act (TSCA) requiring facilities that manufacture or import chemical substances to report to EPA. This list is specific to TSCA Manufacture and Import Facilities with reported per- and poly-fluoroalkyl substances (PFAS). Data file made available by the EPA and includes CDR/Inventory Update Reporting data from 1998 up to 2020. EPA makes notes the following about these data: this data file includes production and importation data for chemicals identified in EPA's CompTox Chemicals Dashboard list of PFAS without explicit structures and list of PFAS structures in DSSTox. Note that some regulations have specific chemical structure requirements that define PFAS differently than the lists in EPA's CompTox Chemicals Dashboard. Reporting information on manufactured or imported chemical substance amounts should not be compared between facilities, as some companies claim Chemical Data Reporting Rule data fields for PFAS information as Confidential Business Information.

Government Publication Date: Jun 20, 2022

PFAS Waste Transfers from RCRA e-Manifest : PFAS E-MANIFEST

This Per- and Poly-Fluoroalkyl Substances (PFAS) Waste Transfers dataset is made available via the U.S. Environmental Protection Agency's (EPA) PFAS Analytic Tools. Every shipment of hazardous waste in the U.S. must be accompanied by a shipment manifest, which is a critical component of the cradle-to-grave tracking of wastes mandated by the Resource Conservation and Recovery Act (RCRA). According to the EPA, currently no Federal Waste Code exists for any PFAS compounds. To work around the lack of PFAS waste codes in the RCRA database, EPA developed the PFAS Transfers dataset by mining e-Manifest records containing at least one of these common PFAS keywords: • PFAS • PFOA • PFOS • PERFL • AFFF • GENX • GEN-X (plus the Vermont state-specific waste codes). Limitations: Amount or concentration of PFAS being transferred cannot be determined from the manifest information. Keyword searches may misidentify some manifest records that do not contain PFAS. This dataset should also not be considered to be exhaustive of all PFAS waste transfers.

Government Publication Date: Apr 9, 2023

Hazardous Materials Information Reporting System: HMIRS

US DOT - Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) Incidents Reports Database taken from Hazmat Intelligence Portal, U.S. Department of Transportation.

Government Publication Date: Sep 1, 2020

National Clandestine Drug Labs: NCDL

The U.S. Department of Justice ("the Department"), Drug Enforcement Administration (DEA), provides this data as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy.

Government Publication Date: Aug 30, 2022

Toxic Substances Control Act: TSCA

The Environmental Protection Agency (EPA) is amending the Toxic Substances Control Act (TSCA) section 8(a) Inventory Update Reporting (IUR) rule and changing its name to the Chemical Data Reporting (CDR) rule.

The CDR enables EPA to collect and publish information on the manufacturing, processing, and use of commercial chemical substances and mixtures (referred to hereafter as chemical substances) on the TSCA Chemical Substance Inventory (TSCA Inventory). This includes current information on chemical substance production volumes, manufacturing sites, and how the chemical substances are used. This information helps the Agency determine whether people or the environment are potentially exposed to reported chemical substances. EPA publishes submitted CDR data that is not Confidential Business Information (CBI).

Government Publication Date: Apr 11, 2019

Hist TSCA: HIST TSCA

The Environmental Protection Agency (EPA) is amending the Toxic Substances Control Act (TSCA) section 8(a) Inventory Update Reporting (IUR) rule and changing its name to the Chemical Data Reporting (CDR) rule.

The 2006 IUR data summary report includes information about chemicals manufactured or imported in quantities of 25,000 pounds or more at a single site during calendar year 2005. In addition to the basic manufacturing information collected in previous reporting cycles, the 2006 cycle is the first time EPA collected information to characterize exposure during manufacturing, processing and use of organic chemicals. The 2006 cycle also is the first time manufacturers of inorganic chemicals were required to report basic manufacturing information.

Government Publication Date: Dec 31, 2006

FTTS Administrative Case Listing: FTTS ADMIN

An administrative case listing from the Federal Insecticide, Fungicide, & Rodenticide Act (FIFRA) and Toxic Substances Control Act (TSCA), together known as FTTS. This database was obtained from the Environmental Protection Agency's (EPA) National Compliance Database (NCDB). The FTTS and NCDB was shut down in 2006.

Government Publication Date: Jan 19, 2007

FTTS Inspection Case Listing: FTTS INSP

An inspection case listing from the Federal Insecticide, Fungicide, & Rodenticide Act (FIFRA) and Toxic Substances Control Act (TSCA), together known as FTTS. This database was obtained from the Environmental Protection Agency's (EPA) National Compliance Database (NCDB). The FTTS and NCDB was shut down in 2006.

Government Publication Date: Jan 19, 2007

Potentially Responsible Parties List: PRP

Early in the site cleanup process, the U.S. Environmental Protection Agency (EPA) conducts a search to find the Potentially Responsible Parties (PRPs). The EPA looks for evidence to determine liability by matching wastes found at the site with parties that may have contributed wastes to the site. This listing contains PRPs, Noticed Parties, at sites in the EPA's Superfund Enterprise Management System (SEMS).

Government Publication Date: Jan 25, 2023

State Coalition for Remediation of Drycleaners Listing: SCRD DRYCLEANER

The State Coalition for Remediation of Drycleaners (SCRD) was established in 1998, with support from the U.S. Environmental Protection Agency (EPA) Office of Superfund Remediation and Technology Innovation. Coalition members are states with mandated programs and funding for drycleaner site remediation. Current members are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin. Since 2017, the SCRD no longer maintains this data, refer to applicable state source data where available.

Government Publication Date: Nov 08, 2017

Integrated Compliance Information System (ICIS): ICIS

The U.S. Environmental Protection Agency's Enforcement and Compliance History Online system incorporates data from the Integrated Compliance Information System - National Pollutant Discharge Elimination System (ICIS-NPDES). ICIS-NPDES is an information management system maintained by the Office of Compliance to track permit compliance and enforcement status of facilities regulated by the NPDES under the Clean Water Act. This data includes permit, inspection, violation and enforcement action information for applicable ICIS records.

Government Publication Date: Oct 15, 2022

Drycleaner Facilities: FED DRYCLEANERS

A list of drycleaner facilities from Enforcement and Compliance History Online (ECHO) data as made available by the U.S. Environmental Protection Agency (EPA), sourced from the ECHO Exporter file. The EPA tracks facilities that possess NAIC and SIC codes that classify businesses as drycleaner establishments.

Government Publication Date: Dec 11, 2022

Delisted Drycleaner Facilities: DELISTED FED DRY

List of sites removed from the list of Drycleaner Facilities (sites in the EPA's Integrated Compliance Information System (ICIS) with NAIC or SIC codes identifying the business as a drycleaner establishment).

Government Publication Date: Dec 11, 2022

Formerly Used Defense Sites: FUDS

Formerly Used Defense Sites (FUDS) are properties that were formerly owned by, leased to, or otherwise possessed by and under the jurisdiction of the Secretary of Defense prior to October 1986, where the Department of Defense (DOD) is responsible for an environmental restoration. The FUDS Annual Report to Congress (ARC) is published by the U.S. Army Corps of Engineers (USACE). This data is compiled from the USACE's Geospatial FUDS data layers and Homeland Infrastructure Foundation-Level Data (HIFLD) FUDS dataset.

Government Publication Date: Jul 12, 2022

Former Military Nike Missile Sites: FORMER NIKE

This information was taken from report DRXTH-AS-IA-83A016 (Historical Overview of the Nike Missile System, 12/1984) which was performed by Environmental Science and Engineering, Inc. for the U.S. Army Toxic and Hazardous Materials Agency Assessment Division. The Nike system was deployed between 1954 and the mid-1970's. Among the substances used or stored on Nike sites were liquid missile fuel (JP-4); starter fluids (UDKH, aniline, and furfuryl alcohol); oxidizer (IRFNA); hydrocarbons (motor oil, hydraulic fluid, diesel fuel, gasoline, heating oil); solvents (carbon tetrachloride, trichloroethylene, trichloroethane, stoddard solvent); and battery electrolyte. The quantities of material a disposed of and procedures for disposal are not documented in published reports. Virtually all information concerning the potential for contamination at Nike sites is confined to personnel who were assigned to Nike sites. During deactivation most hardware was shipped to depot-level supply points. There were reportedly instances where excess materials were disposed of on or near the site itself at closure. There was reportedly no routine site decontamination.

Government Publication Date: Dec 2, 1984

PHMSA Pipeline Safety Flagged Incidents: PIPELINE INCIDENT

A list of flagged pipeline incidents made available by the U.S. Department of Transportation (US DOT) Pipeline and Hazardous Materials Safety Administration (PHMSA). PHMSA regulations require incident and accident reports for five different pipeline system types.

Government Publication Date: Mar 31, 2021

Material Licensing Tracking System (MLTS): MLTS

A list of sites that store radioactive material subject to the Nuclear Regulatory Commission (NRC) licensing requirements. This list is maintained by the NRC. As of September 2016, the NRC no longer releases location information for sites. Site locations were last received in July 2016.

Government Publication Date: May 11, 2021

Historic Material Licensing Tracking System (MLTS) sites: HIST MLTS

A historic list of sites that have inactive licenses and/or removed from the Material Licensing Tracking System (MLTS). In some cases, a site is removed from the MLTS when the state becomes an "Agreement State". An Agreement State is a State that has signed an agreement with the Nuclear Regulatory Commission (NRC) authorizing the State to regulate certain uses of radioactive materials within the State.

Government Publication Date: Jan 31, 2010

Mines Master Index File: MINES

The Master Index File (MIF) is provided by the United State Department of Labor, Mine Safety and Health Administration (MSHA). This file, which was originally created in the 1970's, contained many Mine-IDs that were invalid. MSHA removes invalid IDs from the MIF upon discovery. MSHA applicable data includes the following: all Coal and Metal/Non-Metal mines under MSHA's jurisdiction since 1/1/1970; mine addresses for all mines in the database except for Abandoned mines prior to 1998 from MSHA's legacy system (addresses may or may not correspond with the physical location of the mine itself); violations that have been assessed penalties as a result of MSHA inspections beginning on 1/1/2000; and violations issued as a result of MSHA inspections conducted beginning on 1/1/2000.

Government Publication Date: Nov 7, 2022

Surface Mining Control and Reclamation Act Sites: SMCRA

An inventory of land and water impacted by past mining (primarily coal mining) is maintained by the Office of Surface Mining Reclamation and Enforcement (OSMRE) to provide information needed to implement the Surface Mining Control and Reclamation Act of 1977 (SMCRA). The inventory contains information on the location, type, and extent of Abandoned Mine Land (AML) impacts, as well as information on the cost associated with the reclamation of those problems. The inventory is based upon field surveys by State, Tribal, and OSMRE program officials. It is dynamic to the extent that it is modified as new problems are identified and existing problems are reclaimed.

Government Publication Date: Aug 18, 2022

Mineral Resource Data System: MRDS

The Mineral Resource Data System (MRDS) is a collection of reports describing metallic and nonmetallic mineral resources throughout the world. Included are deposit name, location, commodity, deposit description, geologic characteristics, production, reserves, resources, and references. This database contains the records previously provided in the Mineral Resource Data System (MRDS) of USGS and the Mineral Availability System/Mineral Industry Locator System (MAS/MILS) originated in the U.S. Bureau of Mines, which is now part of USGS. The USGS has ceased systematic updates of the MRDS database with their focus more recently on deposits of critical minerals while providing a well-documented baseline of historical mine locations from USGS topographic maps.

Government Publication Date: Mar 15, 2016

DOE Legacy Management Sites: LM SITES

The U.S. Department of Energy (DOE) Office of Legacy Management (LM) currently manages radioactive and chemical waste, environmental contamination, and hazardous material at over 100 sites across the U.S. The LM manages sites with diverse regulatory drivers (statutes or programs that direct cleanup and management requirements at DOE sites) or as part of internal DOE or congressionally-recognized programs, such as but not limited to: Formerly Utilized Sites Remedial Action Program (FUSRAP), Uranium Mill Tailings Radiation Control Act (UMTRCA Title I, Tile II), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Resource Conservation and Recovery Act (RCRA), Decontamination and Decommissioning (D&D), Nuclear Waste Policy Act (NWPA). This site listing includes data exported from the DOE Office of LM's Geospatial Environmental Mapping System (GEMS). GEMS Data disclaimer: The DOE Office of LM makes no representation or warranty, expressed or implied, regarding the use, accuracy, availability, or completeness of the data presented herein.

Government Publication Date: Dec 1, 2022

Alternative Fueling Stations: ALT FUELS

This list of alternative fueling stations is sourced from the Alternative Fuels Data Center (AFDC). The U.S. Department of Energy's Office of Energy Efficiency & Renewable Energy launched the AFDC in 1991 as a repository for alternative fuel vehicle performance data, which provides a wealth of information and data on alternative and renewable fuels, advanced vehicles, fuel-saving strategies, and emerging transportation technologies. The data includes Biodiesel (B20 and above), Compressed Natural Gas (CNG), Electric, Ethanol (E85), Hydrogen, Liquefied Natural Gas (LNG), Propane (LPG) fuel type locations.

Government Publication Date: Jan 3, 2023

Superfunds Consent Decrees: CONSENT DECREES

This list of Superfund consent decrees is provided by the Department of Justice, Environment & Natural Resources Division (ENRD) through a Freedom of Information Act (FOIA) applicable file. This listing includes Consent Decrees for CERCLA or Superfund Sites filed and/or as proposed within the ENRD's Case Management System (CMS) since 2010. CMS may not reflect the latest developments in a case nor can the agency guarantee the accuracy of the data. ENRD Disclaimer: Congress excluded three discrete categories of law enforcement and national security records from the requirements of the FOIA; response is limited to those records that are subject to the requirements of the FOIA; however, this should not be taken as an indication that excluded records do, or do not, exist.

Government Publication Date: Jan 11, 2023

Air Facility System: AFS

This EPA retired Air Facility System (AFS) dataset contains emissions, compliance, and enforcement data on stationary sources of air pollution. Regulated sources cover a wide spectrum; from large industrial facilities to relatively small operations such as dry cleaners. AFS does not contain data on facilities that are solely asbestos demolition and/or renovation contractors, or landfills. ECHO Clean Air Act data from AFS are frozen and reflect data as of October 17, 2014; the EPA retired this system for Clean Air Act stationary sources and transitioned to ICIS-Air.

Government Publication Date: Oct 17, 2014

Registered Pesticide Establishments: SSTS

List of active EPA-registered foreign and domestic pesticide-producing and device-producing establishments based on data from the Section Seven Tracking System (SSTS). The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Section 7 requires that facilities producing pesticides, active ingredients, or devices be registered. The list of establishments is made available by the EPA.

Government Publication Date: Mar 30, 2022

Polychlorinated Biphenyl (PCB) Transformers: PCBT

Locations of Transformers Containing Polychlorinated Biphenyls (PCBs) registered with the United States Environmental Protection Agency. PCB transformer owners must register their transformer(s) with EPA. Although not required, PCB transformer owners who have removed and properly disposed of a registered PCB transformer may notify EPA to have their PCB transformer de-registered. Data made available by EPA.

Government Publication Date: Oct 15, 2019

Polychlorinated Biphenyl (PCB) Notifiers: PCB

Facilities included in the national list of facilities that have notified the United States Environmental Protection Agency (EPA) of Polychlorinated Biphenyl (PCB) activities. Any company or person storing, transporting or disposing of PCBs or conducting PCB research and development must notify the EPA and receive an identification number.

Government Publication Date: Nov 3, 2022

State

Per- and Polyfluoroalkyl Substances (PFAS): PFAS

A list of sites where PFAS/PFOS or a PFOS or PFAS-containing material is currently or ever has been: manufactured, used, stored, disposed of, or released. This list is made available by the Missouri Department of Natural Resources.

Government Publication Date: Nov 8, 2019

Dry Cleaner List: DRYCLEANERS

List of sites included in the Dry Cleaner List made available by the Missouri Department of Natural Resources. Includes sites that are known or thought to have been a dry cleaning facility at one time.

Government Publication Date: Nov 30, 2017

Delisted Dry Cleaner: DELISTED DRYCLEANERS

List of sites which once appeared on - and have since been removed from - the list of dry cleaners made available by the Missouri Department of Natural Resources.

Government Publication Date: Nov 30, 2017

Environmental Incident Summary Database: SPILLS

List of hazardous substance release incidents reported to and entered in the Missouri Department of Natural Resources (DNR)'s Environmental Emergency Response Tracking System; also includes locations of responses to environmental incidents by the DNR Emergency Response Section available on the Missouri Spatial Data Information Service Open Data.

Government Publication Date: Sep 22, 2021

Tier 2 Report: TIER 2

A list of Tier 2 facilities in Missouri. This list is made available by the State Emergency Management Agency (SEMA), a division of the Department of Public Safety. SEMA is the state of Missouri's coordinating agency for disaster planning, response, and recovery.

Government Publication Date: Sep 23, 2019

Tribal

No Tribal additional environmental record sources available for this State.

County

No County additional environmental record sources available for this State.

Definitions

Database Descriptions: This section provides a detailed explanation for each database including: source, information available, time coverage, and acronyms used. They are listed in alphabetic order.

Detail Report: This is the section of the report which provides the most detail for each individual record. Records are summarized by location, starting with the project property followed by records in closest proximity.

Distance: The distance value is the distance between plotted points, not necessarily the distance between the sites' boundaries. All values are an approximation.

Direction: The direction value is the compass direction of the site in respect to the project property and/or center point of the report.

Elevation: The elevation value is taken from the location at which the records for the site address have been plotted. All values are an approximation. Source: Google Elevation API.

Executive Summary: This portion of the report is divided into 3 sections:

'Report Summary'- Displays a chart indicating how many records fall on the project property and, within the report search radii.

'Site Report Summary'-Project Property'- This section lists all the records which fall on the project property. For more details, see the 'Detail Report' section.

'Site Report Summary-Surrounding Properties'- This section summarizes all records on adjacent properties, listing them in order of proximity from the project property. For more details, see the 'Detail Report' section.

Map Key: The map key number is assigned according to closest proximity from the project property. Map Key numbers always start at #1. The project property will always have a map key of '1' if records are available. If there is a number in brackets beside the main number, this will indicate the number of records on that specific property. If there is no number in brackets, there is only one record for that property.

The symbol and colour used indicates 'elevation': the red inverted triangle will dictate 'ERIS Sites with Lower Elevation', the yellow triangle will dictate 'ERIS Sites with Higher Elevation' and the orange square will dictate 'ERIS Sites with Same Elevation.'

Unplottables: These are records that could not be mapped due to various reasons, including limited geographic information. These records may or may not be in your study area, and are included as reference.

PSR
PHYSICAL SETTING REPORT

Property Information

Order Number:		23042100138p
Date Completed:		April 22, 2023
Project Number:		
Project Property:		West Alton Lake Phase I 15957 Deer Dr West Alton MO
Coordinates:		
	Latitude:	38.87175202
	Longitude:	-90.17834224
	UTM Northing:	4307314.32893 Meters
	UTM Easting:	742192.218248 Meters
	UTM Zone:	UTM Zone 15S
	Elevation:	416.34 ft
	Slope Direction:	N/A

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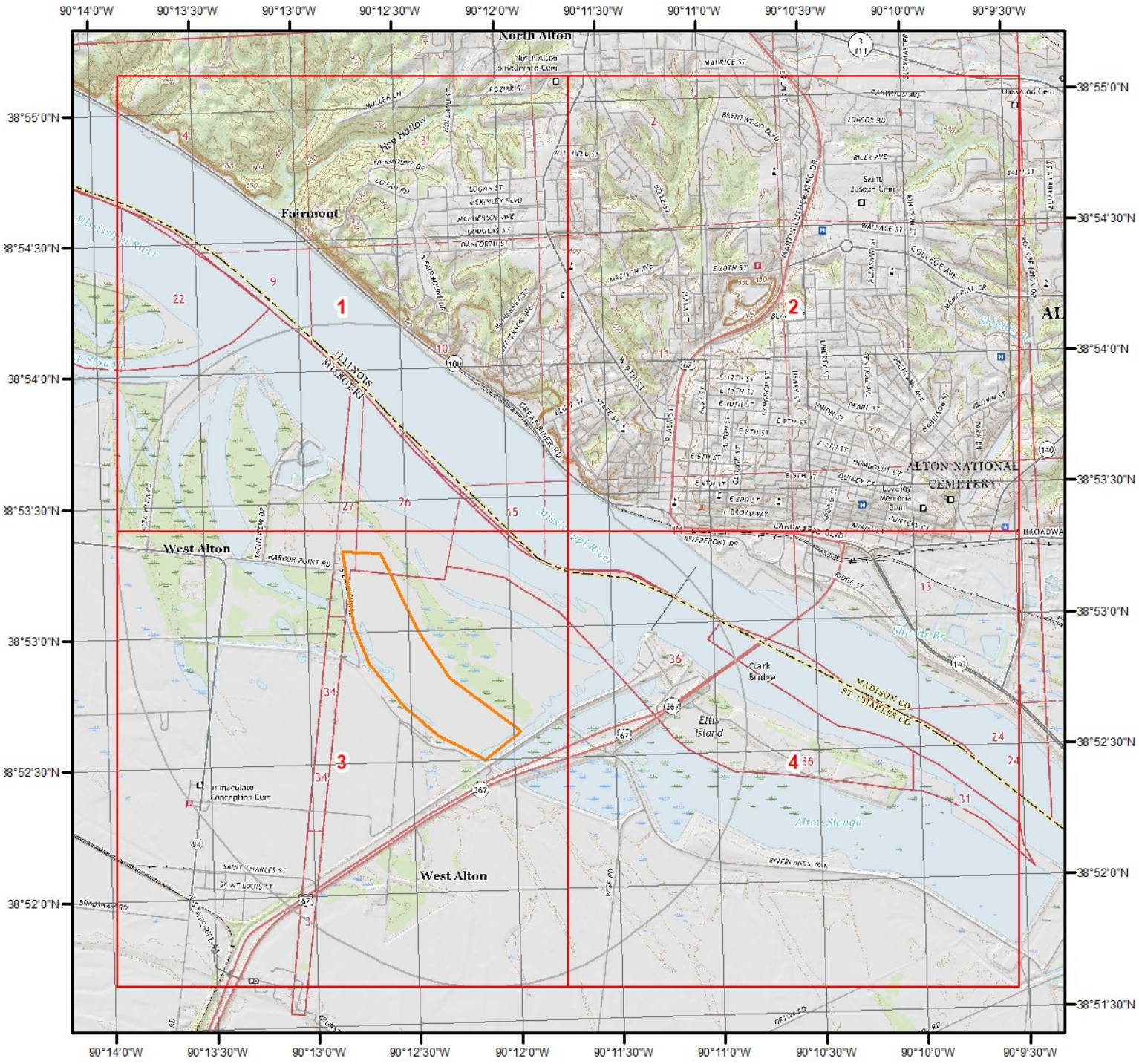
The ERIS ***Physical Setting Report - PSR*** provides comprehensive information about the physical setting around a site and includes a complete overview of topography and surface topology, in addition to hydrologic, geologic and soil characteristics. The location and detailed attributes of oil and gas wells, water wells, public water systems and radon are also included for review.

The compilation of both physical characteristics of a site and additional attribute data is useful in assessing the impact of migration of contaminants and subsequent impact on soils and groundwater.

Disclaimer

This Report does not provide a full environmental evaluation for the site or adjacent properties. Please see the terms and disclaimer at the end of the Report for greater detail.

Topographic Information



Current USGS Topo (2021)

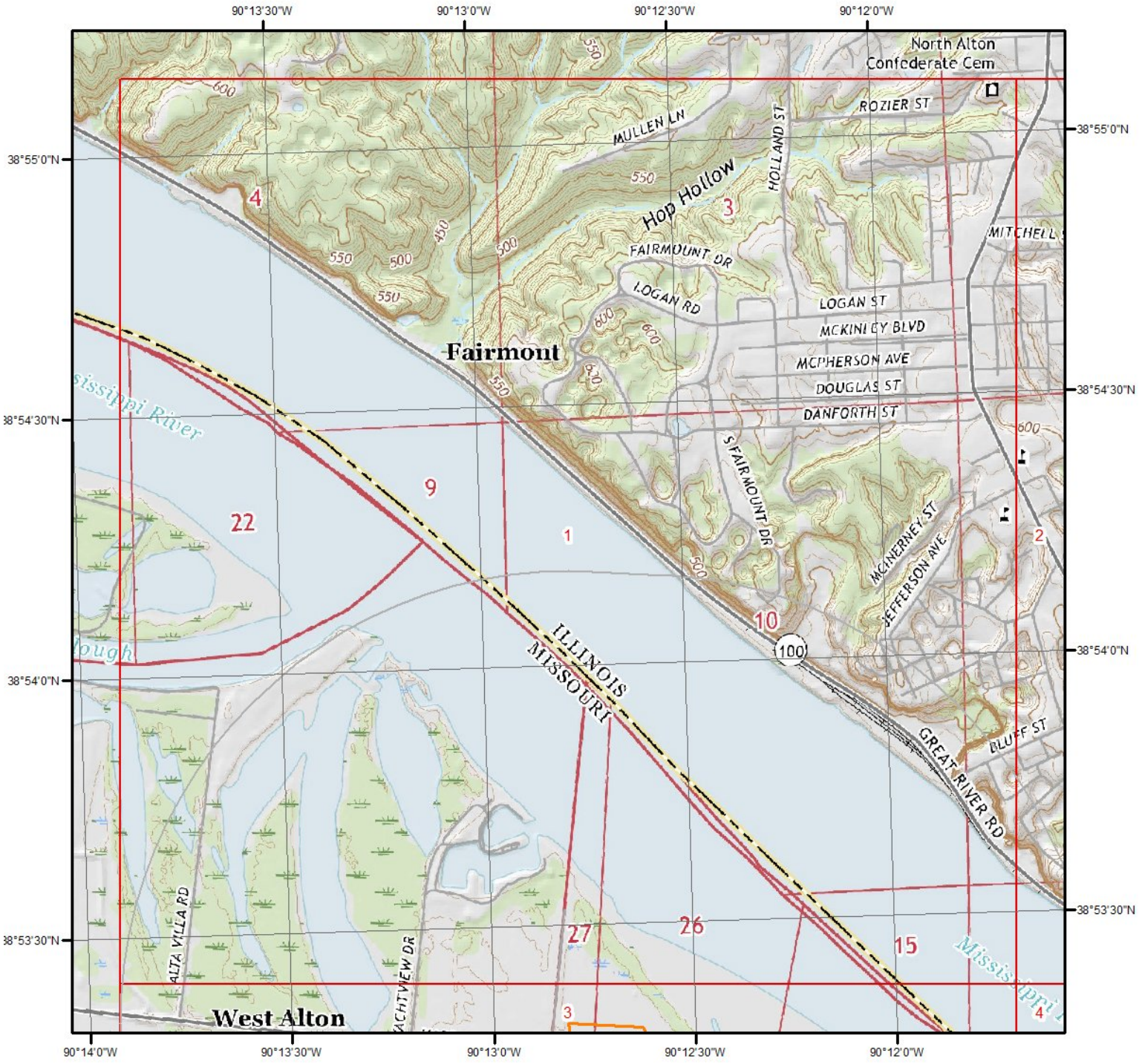
0 0.2 0.4 0.8 1.2 1.6 Miles

N

Quadrangle(s): Florissant,MO; Alton,IL; Bethalto,IL; Columbia Bottom,MO; Wood River,IL; Elsah,IL

Source: USGS 7.5 Minute Topographic Map

Topographic Information



Current USGS Topo - Page 1

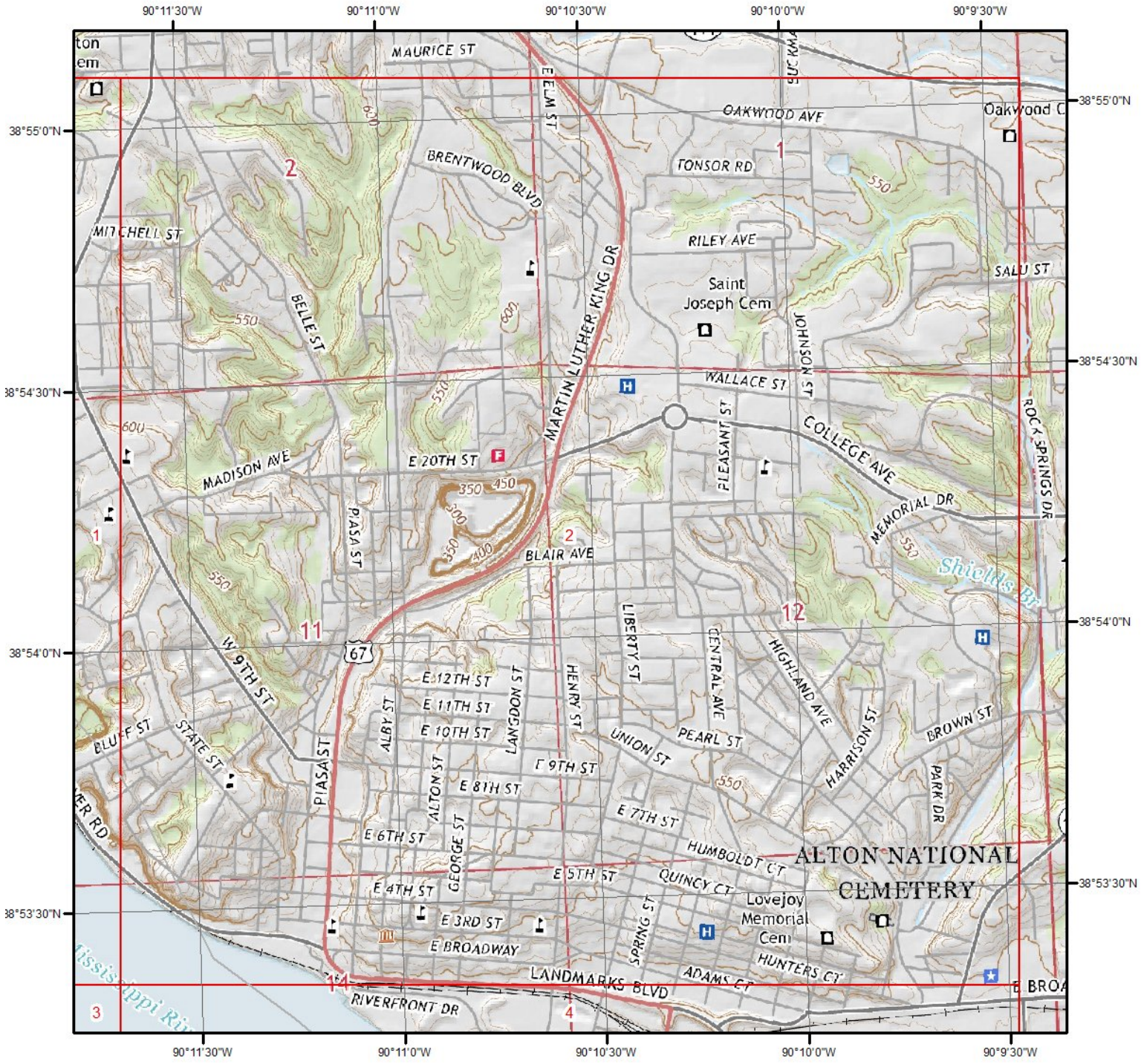
0 0.2 0.4 0.8 Miles

N

Quadrangle(s): Alton,IL

Source: USGS 7.5 Minute Topographic Map

Topographic Information



Current USGS Topo - Page 2

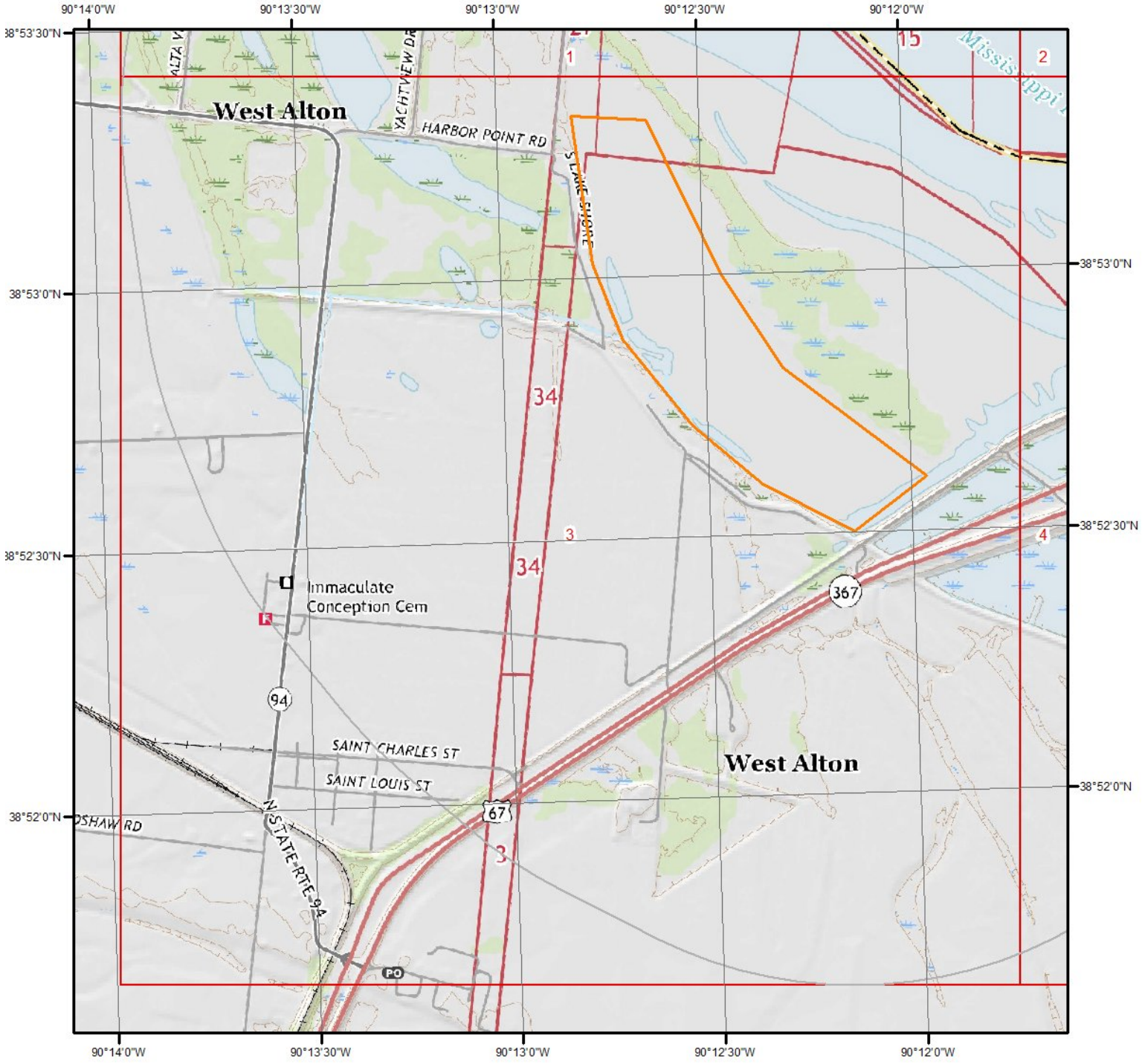
0 0.2 0.4 0.8 Miles

N

Quadrangle(s): Alton,IL

Source: USGS 7.5 Minute Topographic Map

Topographic Information



Current USGS Topo - Page 3

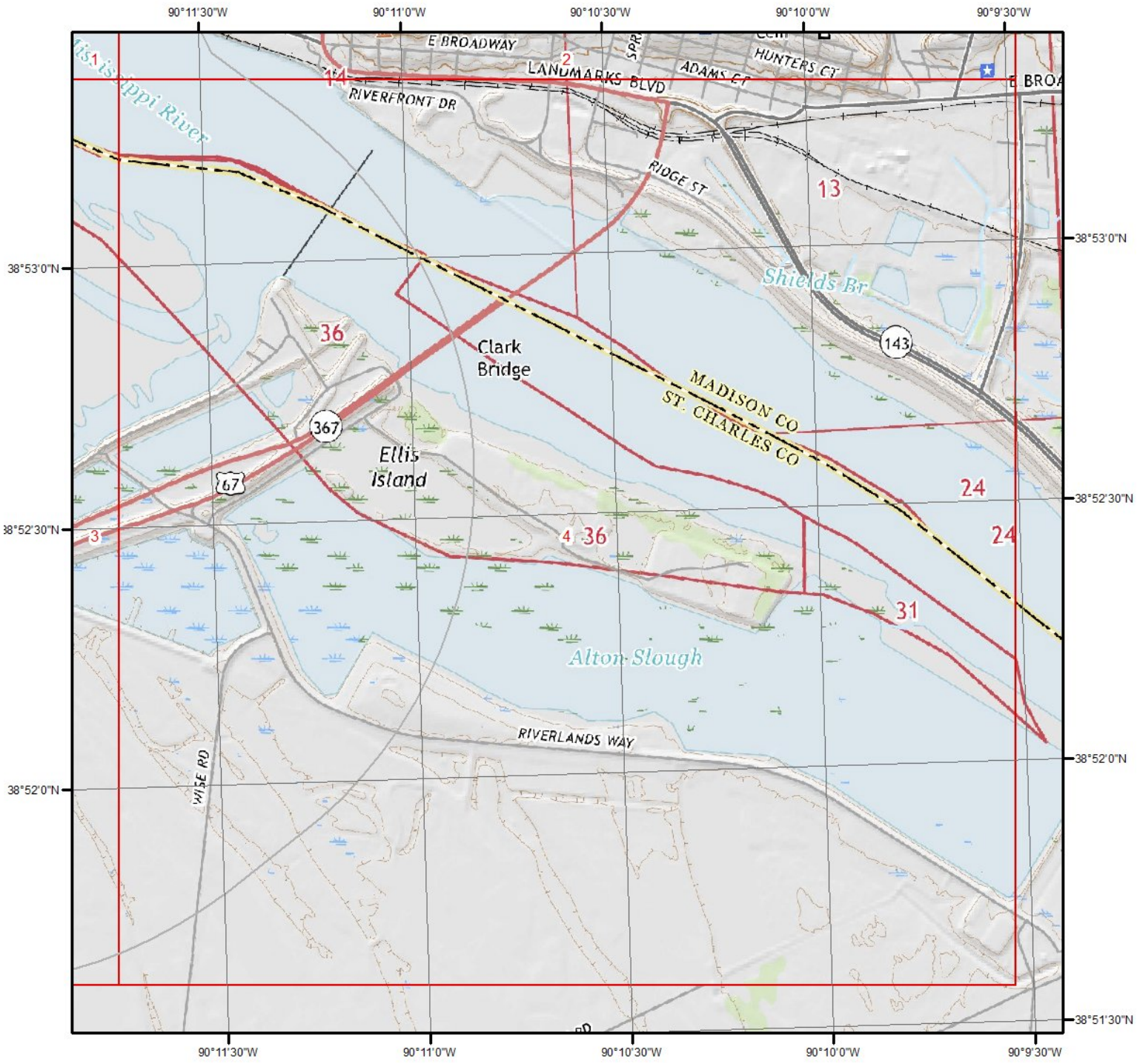
0 0.2 0.4 0.8 Miles

N

Quadrangle(s): Alton,IL; Columbia Bottom,MO

Source: USGS 7.5 Minute Topographic Map

Topographic Information



Current USGS Topo - Page 4

0 0.2 0.4 0.8 Miles

N

Quadrangle(s): Alton,IL; Columbia Bottom,MO

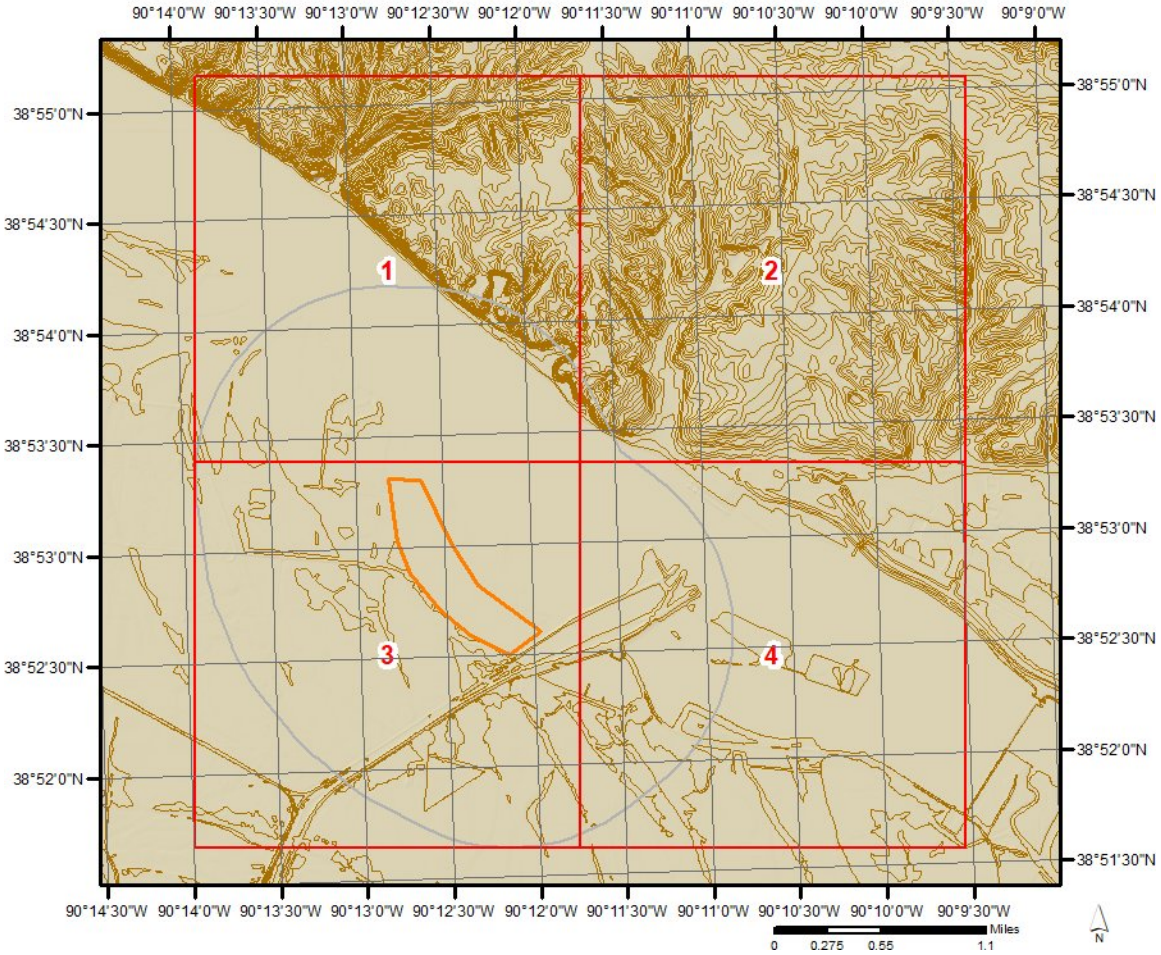
Source: USGS 7.5 Minute Topographic Map

Topographic Information

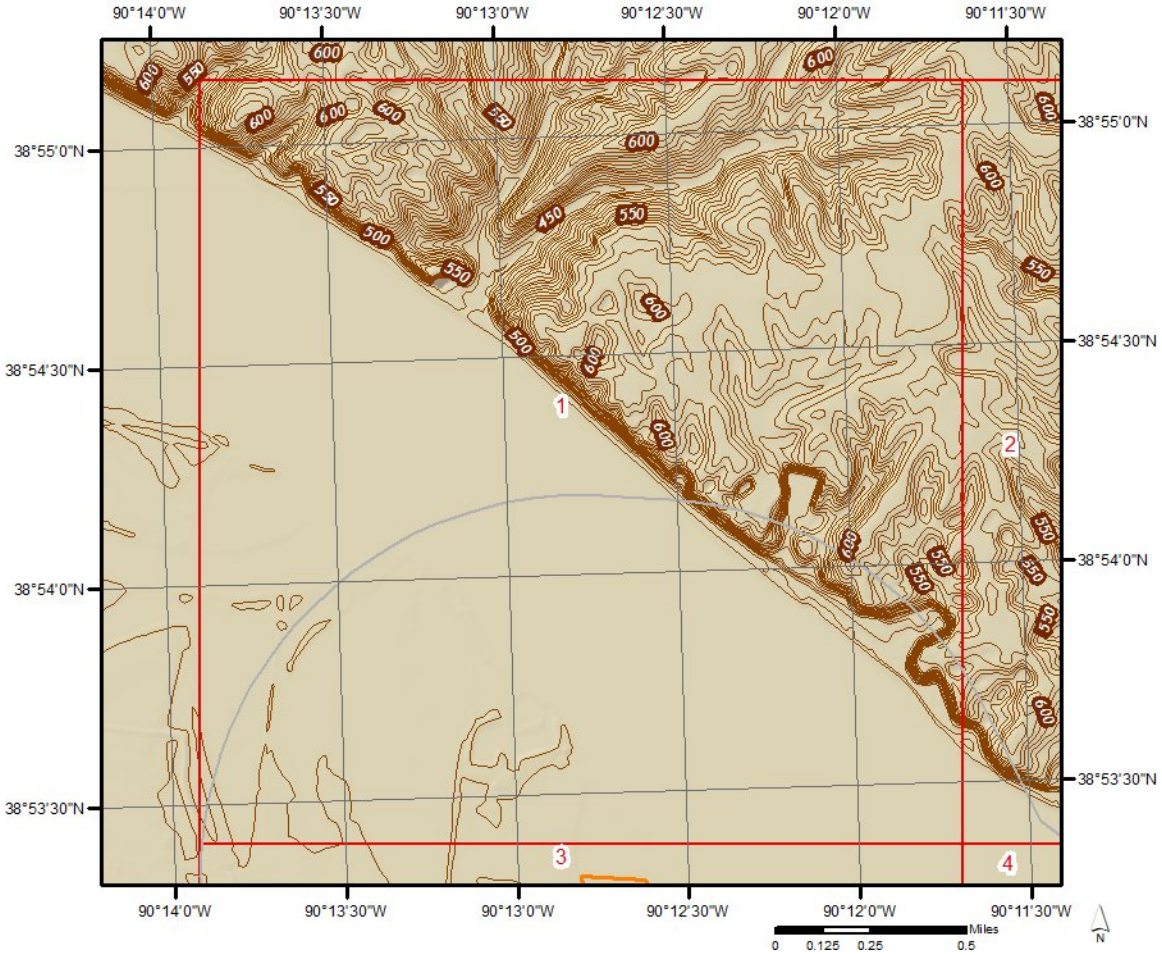
The previous topographic map(s) are created by seamlessly merging and cutting current USGS topographic data. Below are shaded relief map(s), derived from USGS elevation data to show surrounding topography in further detail.

Topographic information at project property:

Elevation:	416.34 ft
Slope Direction:	N/A



Topographic Information



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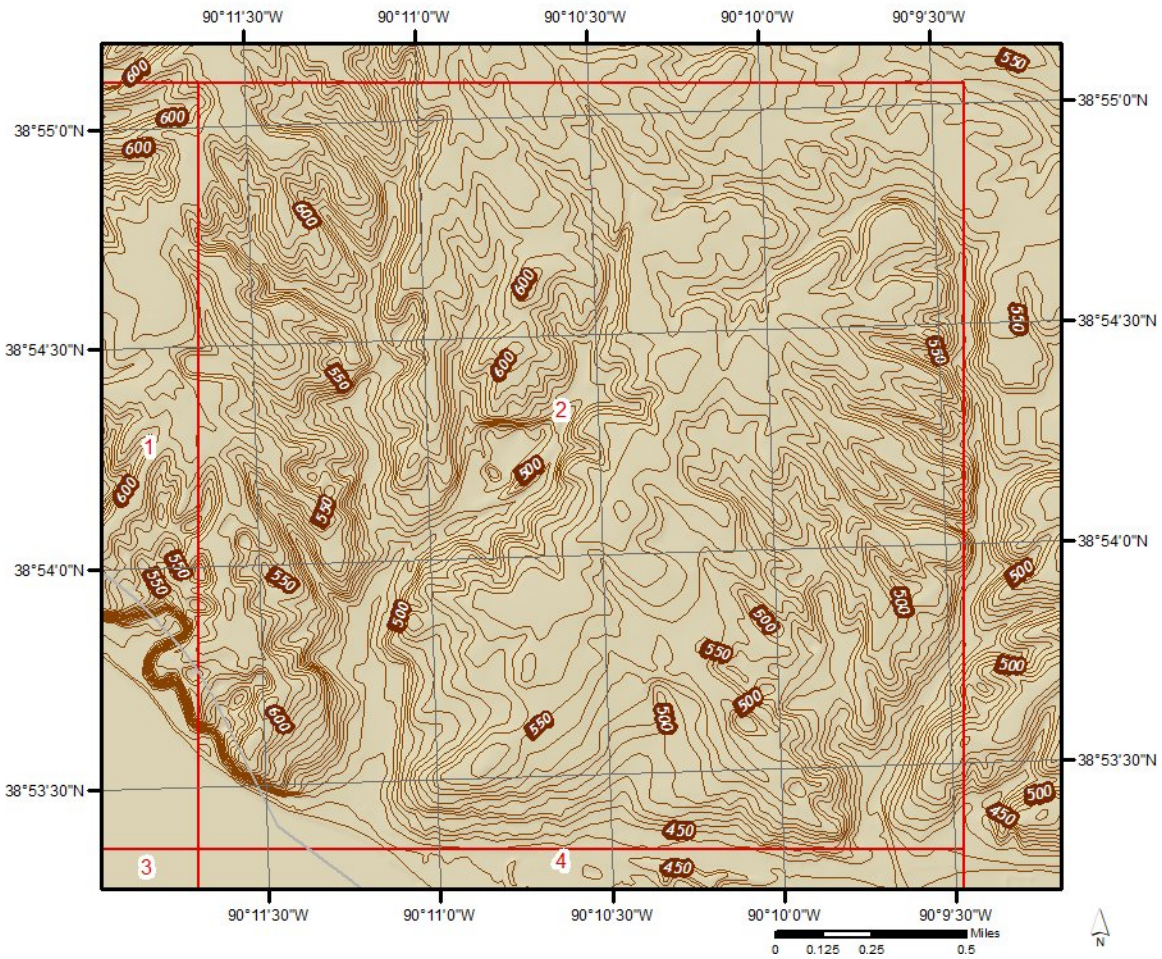
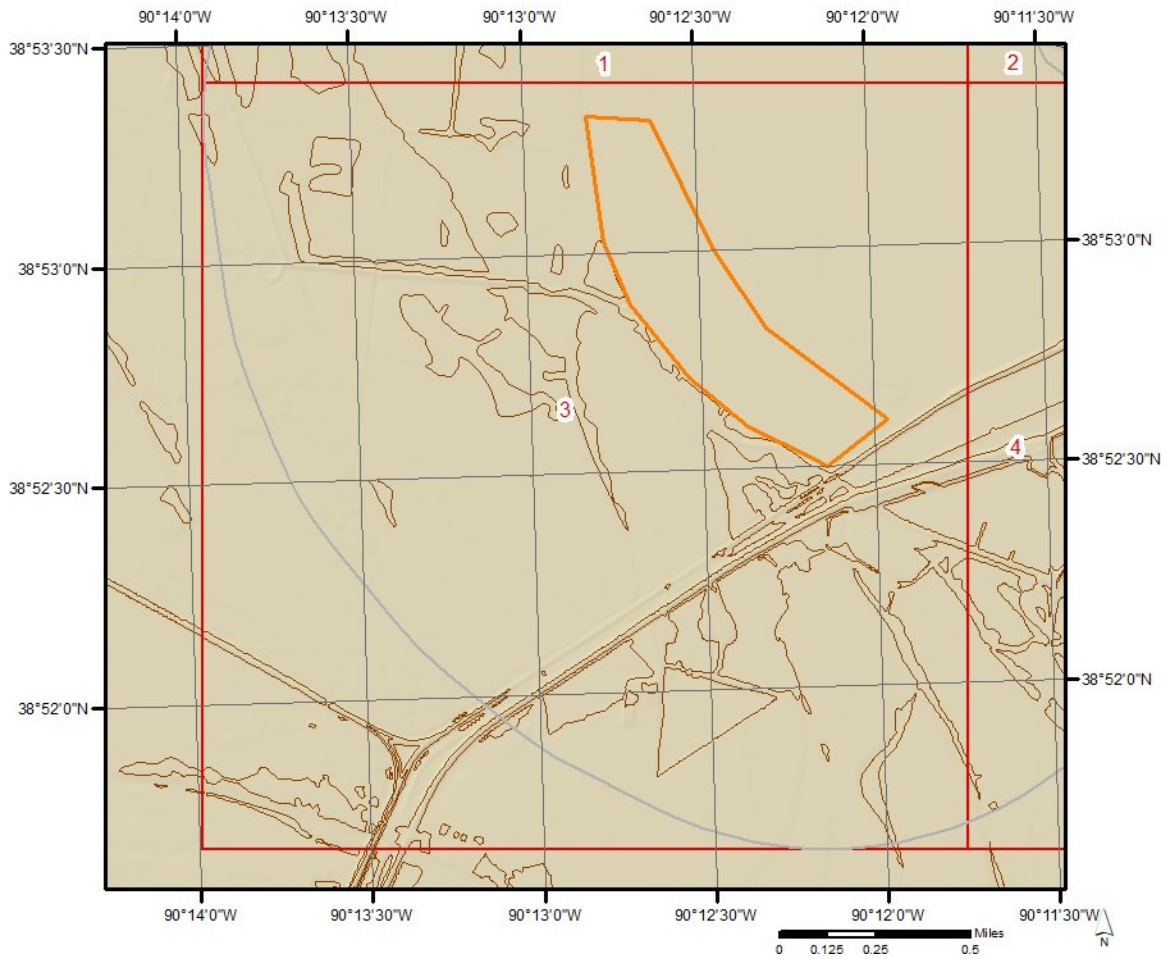
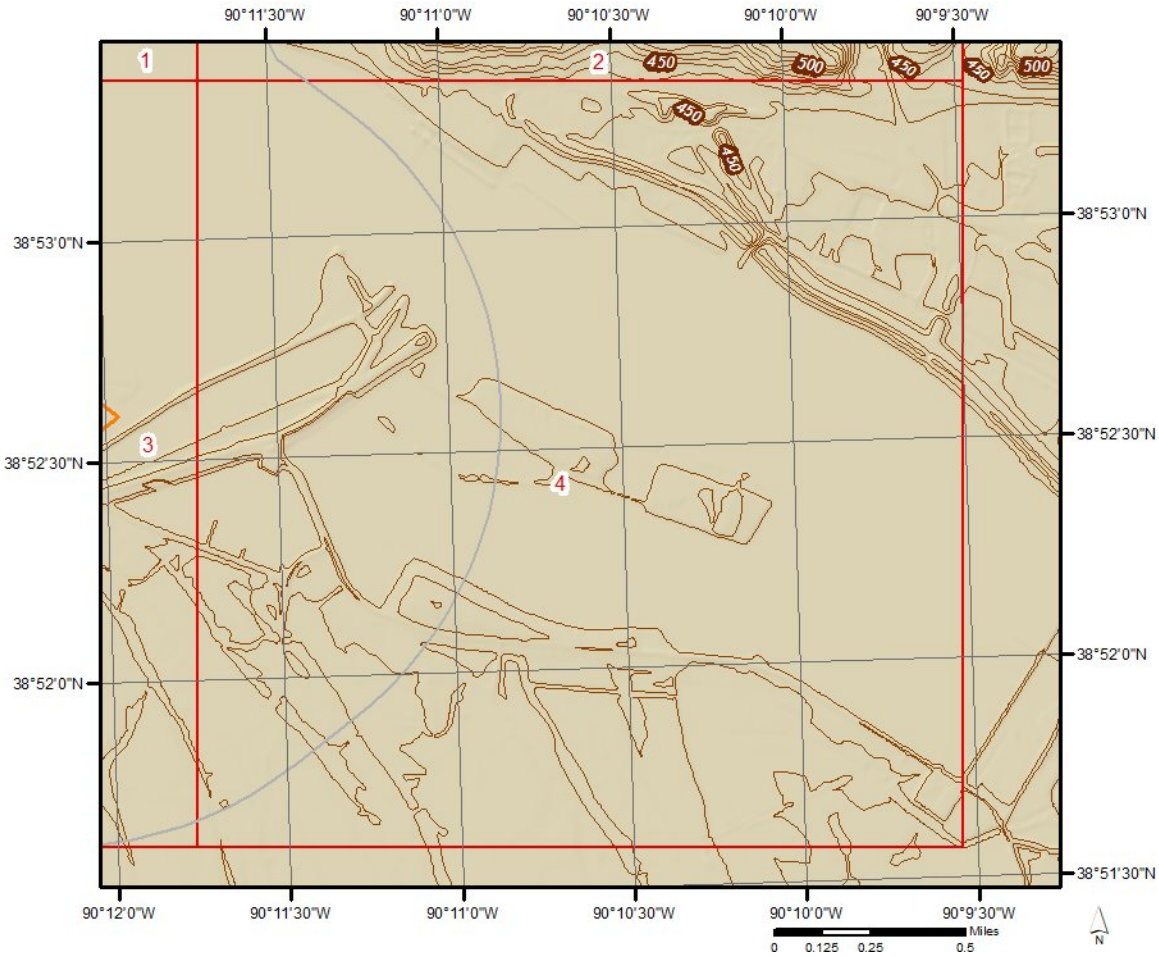


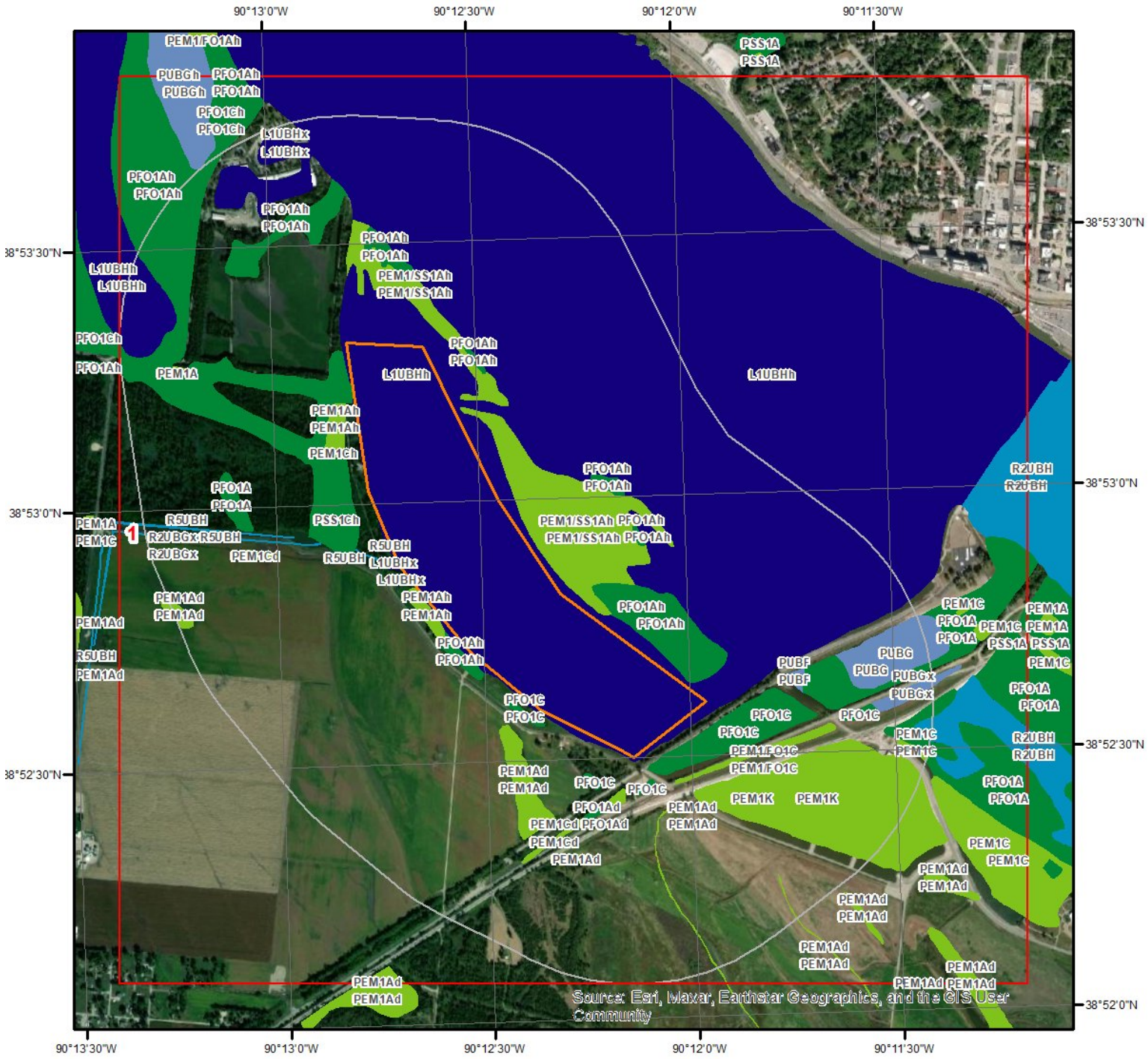
Topographic Information



Topographic Information



Hydrologic Information



Wetland

Miles
0 0.125 0.25 0.5

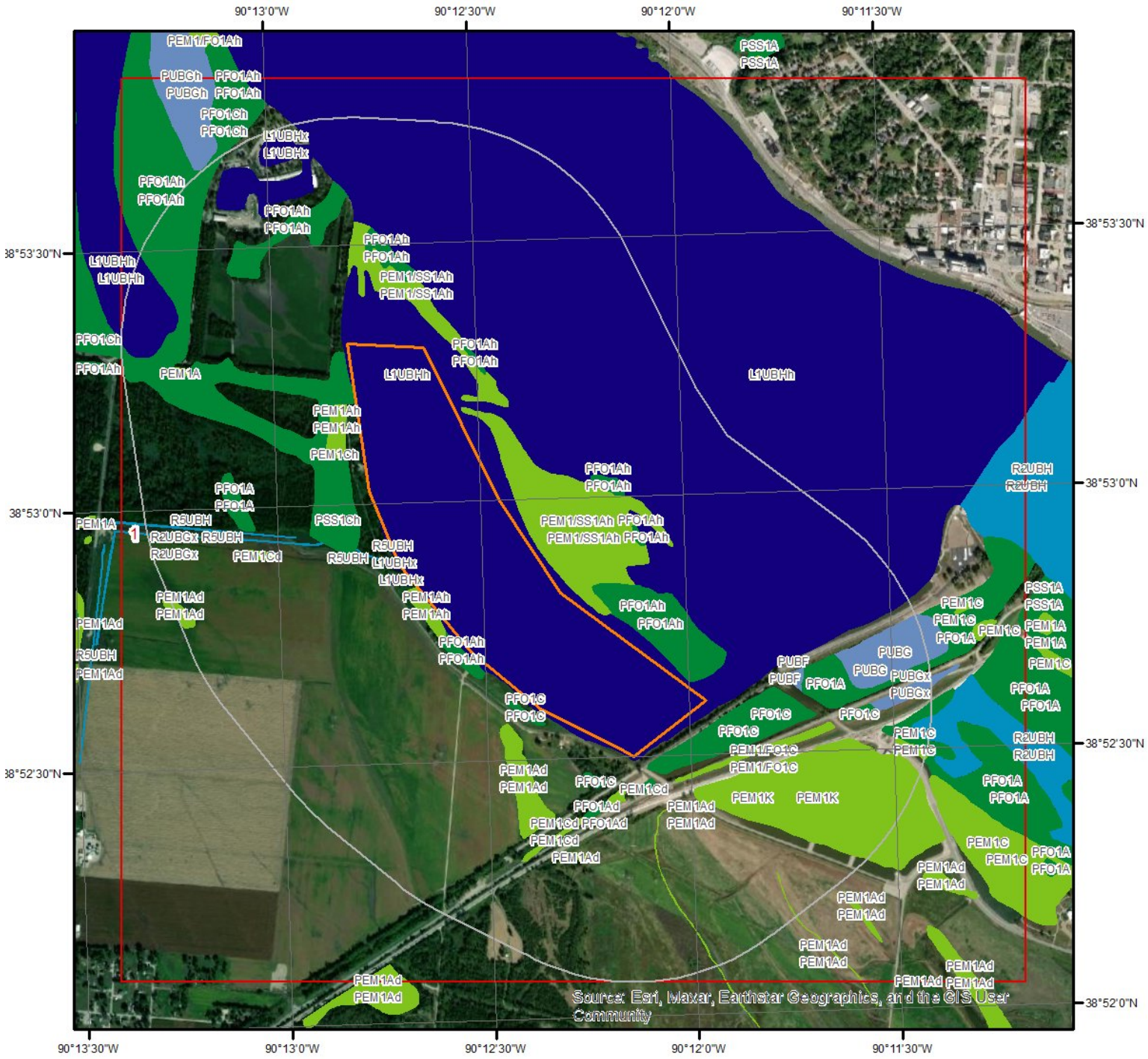
N

This map shows wetland existence using data from US Fish & Wildlife.
Data coverage is shown to the right. Gray indicates no data available in the area.

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

ERIS

Hydrologic Information



Wetland Type - Page 1

0 0.125 0.25 0.5 Miles

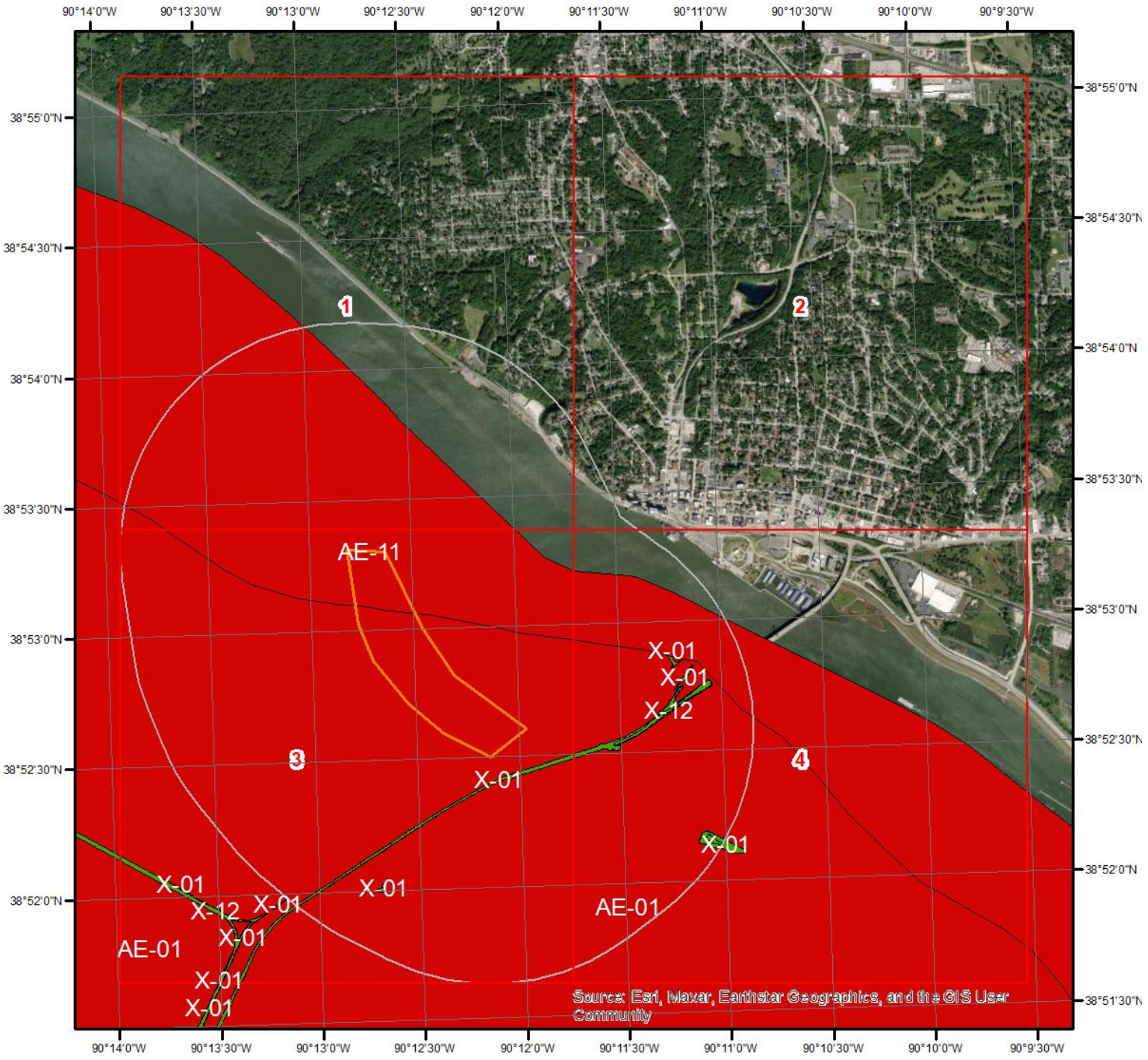
N

This map shows wetland existence using data from US Fish & Wildlife.
Data coverage is shown to the right. Gray indicates no data available in the area.

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

ERIS

Hydrologic Information

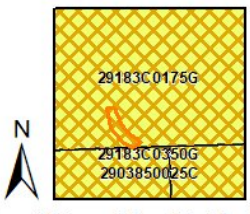


Flood Hazard Zones

0 0.2 0.4 0.8 Miles

This map shows FEMA flood hazard zones. FIRM panels are shown to the right, and blank indicates no data is available.

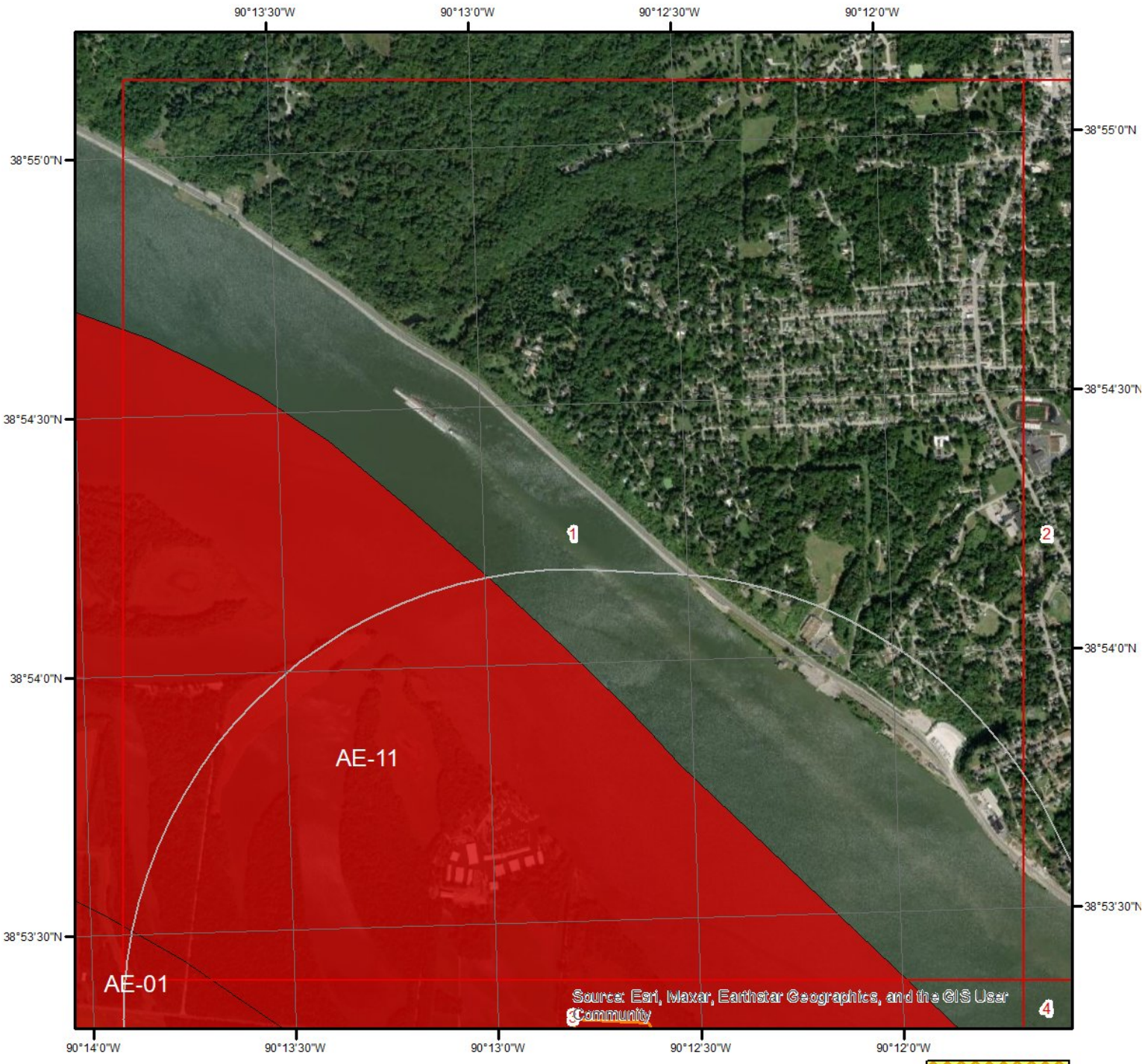
A	AO	X
A99	V	OPEN WATER
AE	VE	NOT POPULATED
AH	D	AREA NOT INCLUDED



Quadrangle(s): Florissant,MO; Alton,IL; Bethalto,IL; Columbia Bottom,MO; Wood River,IL; Elsah,IL

ERIS

Hydrologic Information



Flood Hazard Zones - Page 1

This map shows FEMA flood hazard zones. FIRM panels are shown to the right, and blank indicates no data is available.

Miles
0 0.2 0.4

29183C0175G

N

A	AO	X
A99	V	OPEN WATER
AE	VE	NOT POPULATED
AH	D	AREA NOT INCLUDED

Quadrangle(s): Alton,IL

ERIS

Hydrologic Information



Flood Hazard Zones - Page 2

This map shows FEMA flood hazard zones. FIRM panels are shown to the right, and blank indicates no data is available.

Miles
0 0.2 0.4

N

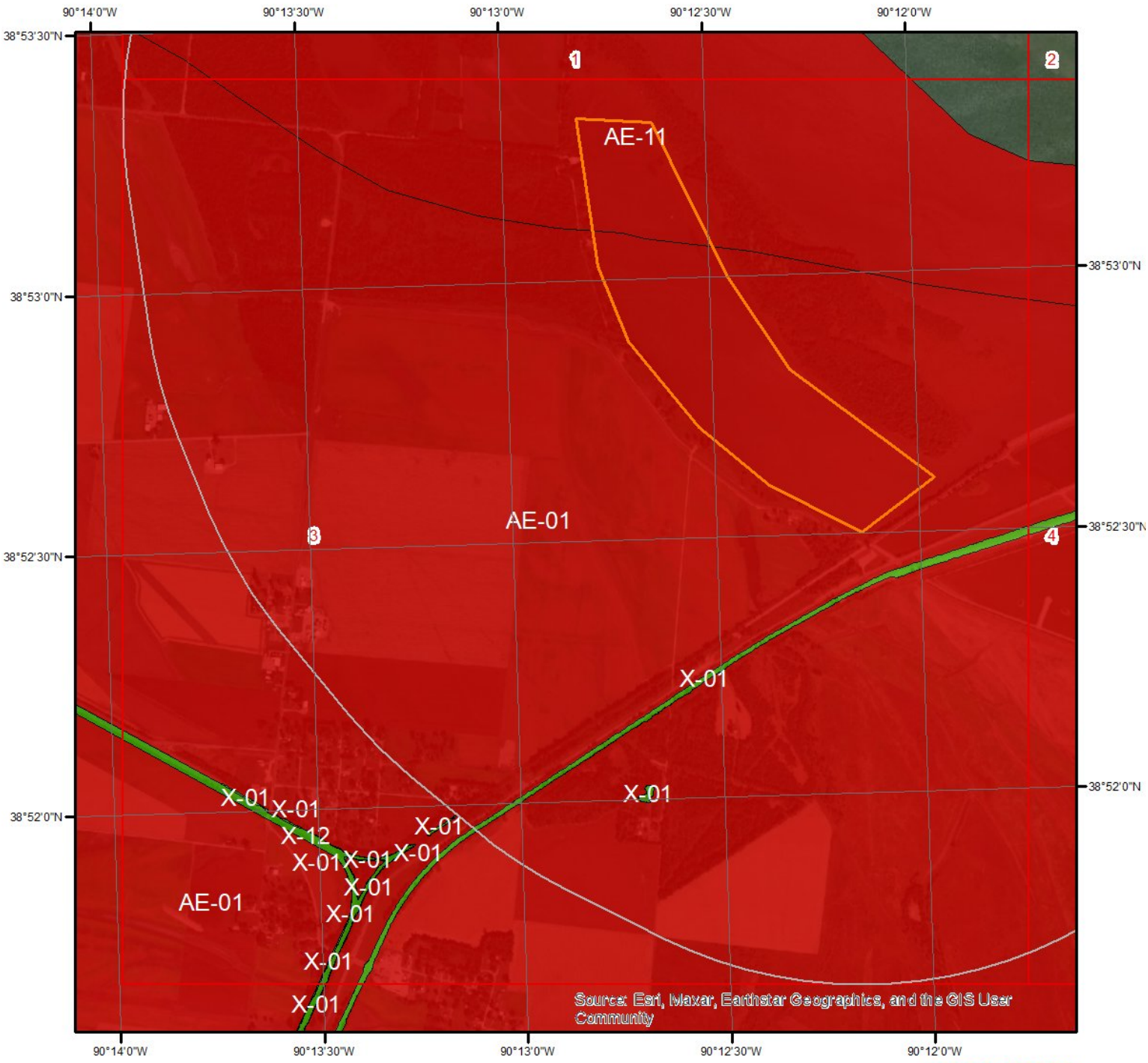
29183C0175G

A	AO	X
A99	V	OPEN WATER
AE	VE	NOT POPULATED
AH	D	AREA NOT INCLUDED

Quadrangle(s): Alton,IL

ERIS

Hydrologic Information



Flood Hazard Zones - Page 3

This map shows FEMA flood hazard zones. FIRM panels are shown to the right, and blank indicates no data is available.

Miles
0 0.2 0.4

N

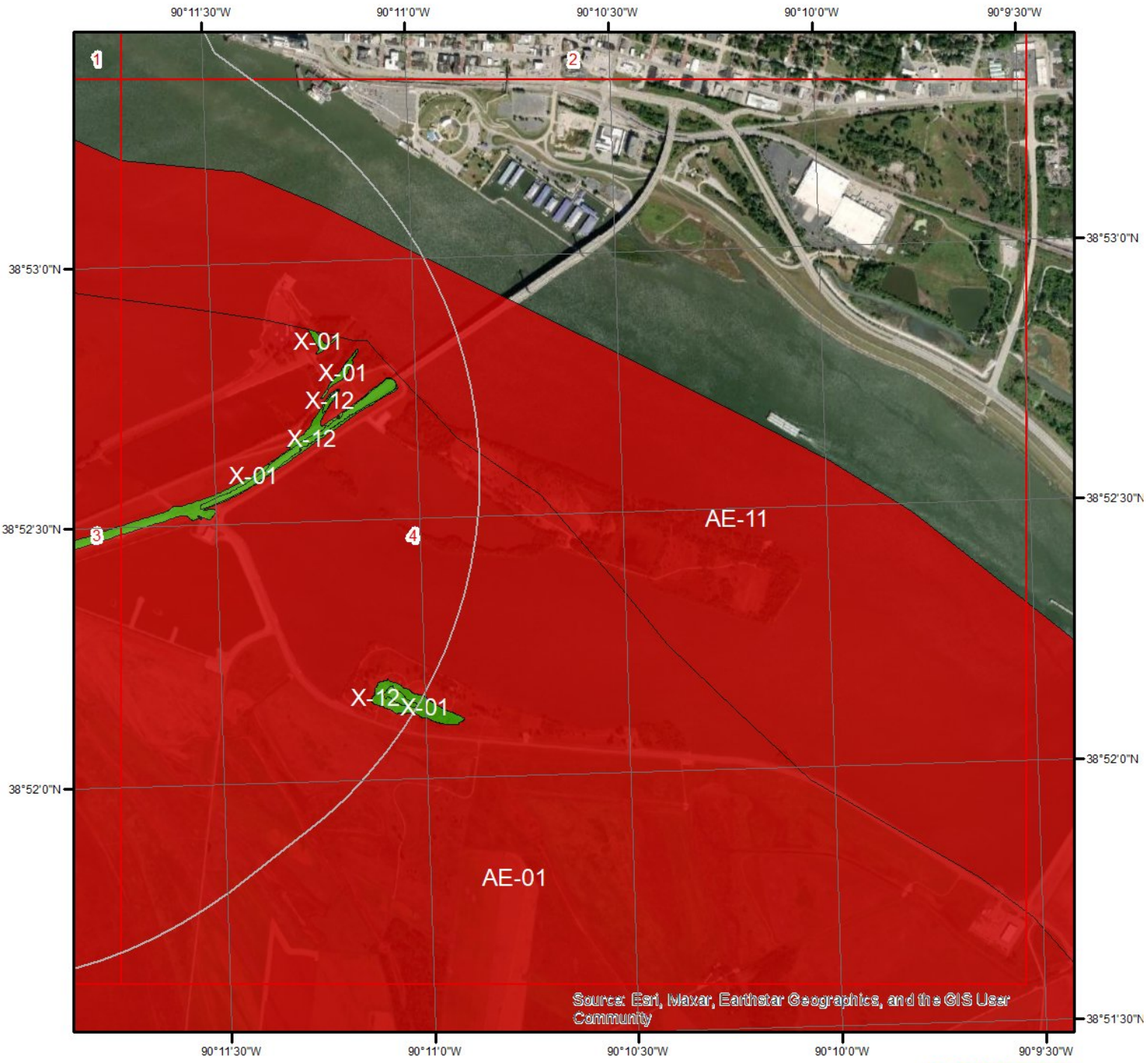
29183C0175G
29183C0350G
2903850025C
29189C0080K

A	AO	X
A99	V	OPEN WATER
AE	VE	NOT POPULATED
AH	D	AREA NOT INCLUDED

Quadrangle(s): Alton,IL; Columbia Bottom,MO

ERIS

Hydrologic Information



Flood Hazard Zones - Page 4

This map shows FEMA flood hazard zones. FIRM panels are shown to the right, and blank indicates no data is available.

Miles
0 0.2 0.4

N

29183C0175G
29189C0085K
29038500025C
29183C0350G

A	AO	X
A99	V	OPEN WATER
AE	VE	NOT POPULATED
AH	D	AREA NOT INCLUDED

Quadrangle(s): Alton,IL; Columbia Bottom,MO

ERIS

Hydrologic Information

The Wetland Type map shows wetland existence overlaid on an aerial imagery. The Flood Hazard Zones map shows FEMA flood hazard zones overlaid on an aerial imagery. Relevant FIRM panels and detailed zone information is provided below.
For detailed Zone descriptions please click the link: https://floodadvocate.com/fema-zone-definitions

Available FIRM Panels in area:	2903850025C(effective:2011-05-24) 29183C0350G(effective:2016-01-20) 29183C0175G(effective:2016-01-20) 29189C0080K(effective:2015-02-04) 29189C0085K(effective:2015-02-04)

Flood Zone AE-01

Zone:	AE
Zone subtype:	

Flood Zone AE-11

Zone:	AE
Zone subtype:	FLOODWAY

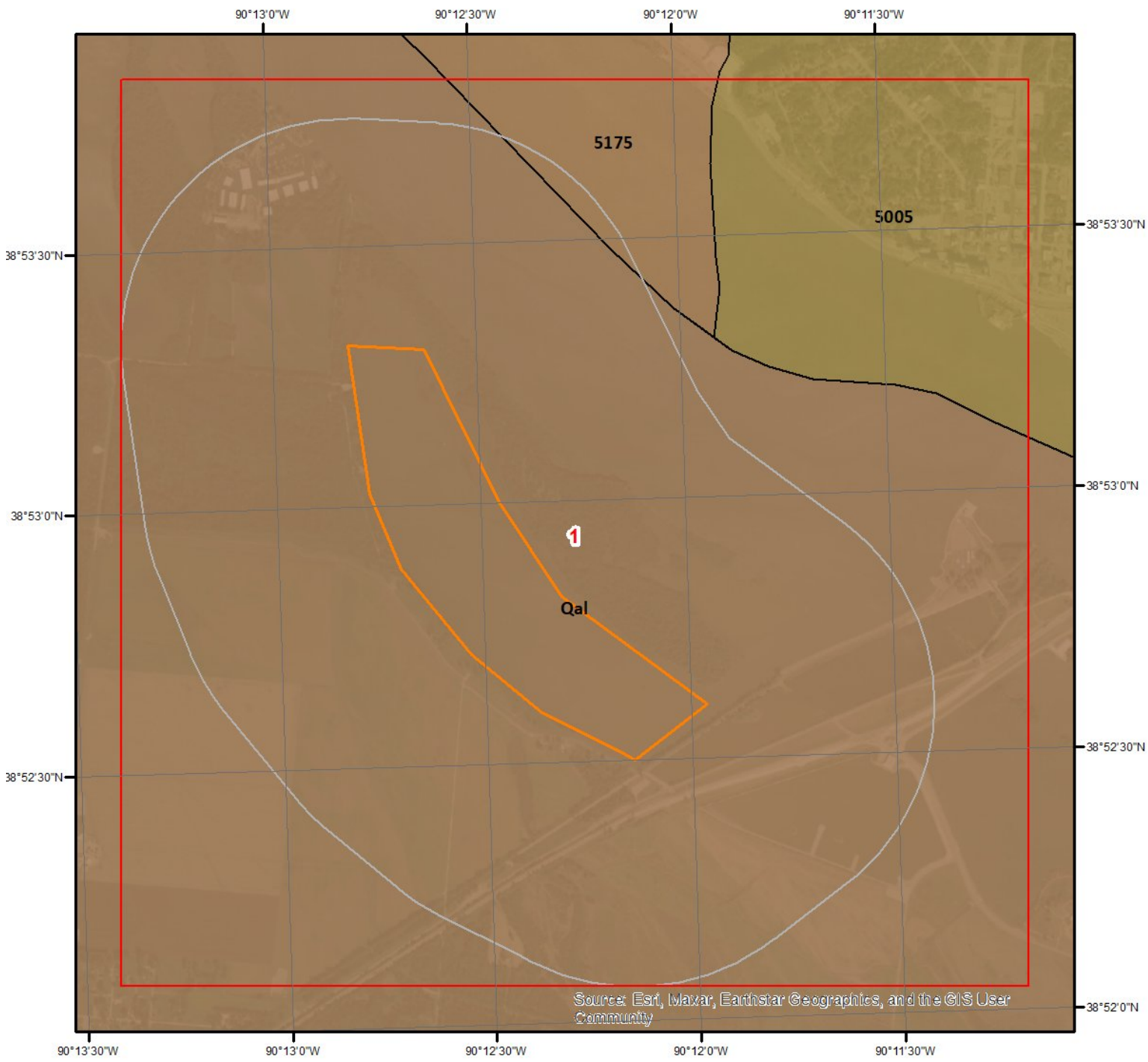
Flood Zone X-01

Zone:	X
Zone subtype:	0.2 PCT ANNUAL CHANCE FLOOD HAZARD

Flood Zone X-12

Zone:	X
Zone subtype:	AREA OF MINIMAL FLOOD HAZARD

Geologic Information



0 0.425 0.85 Miles

N

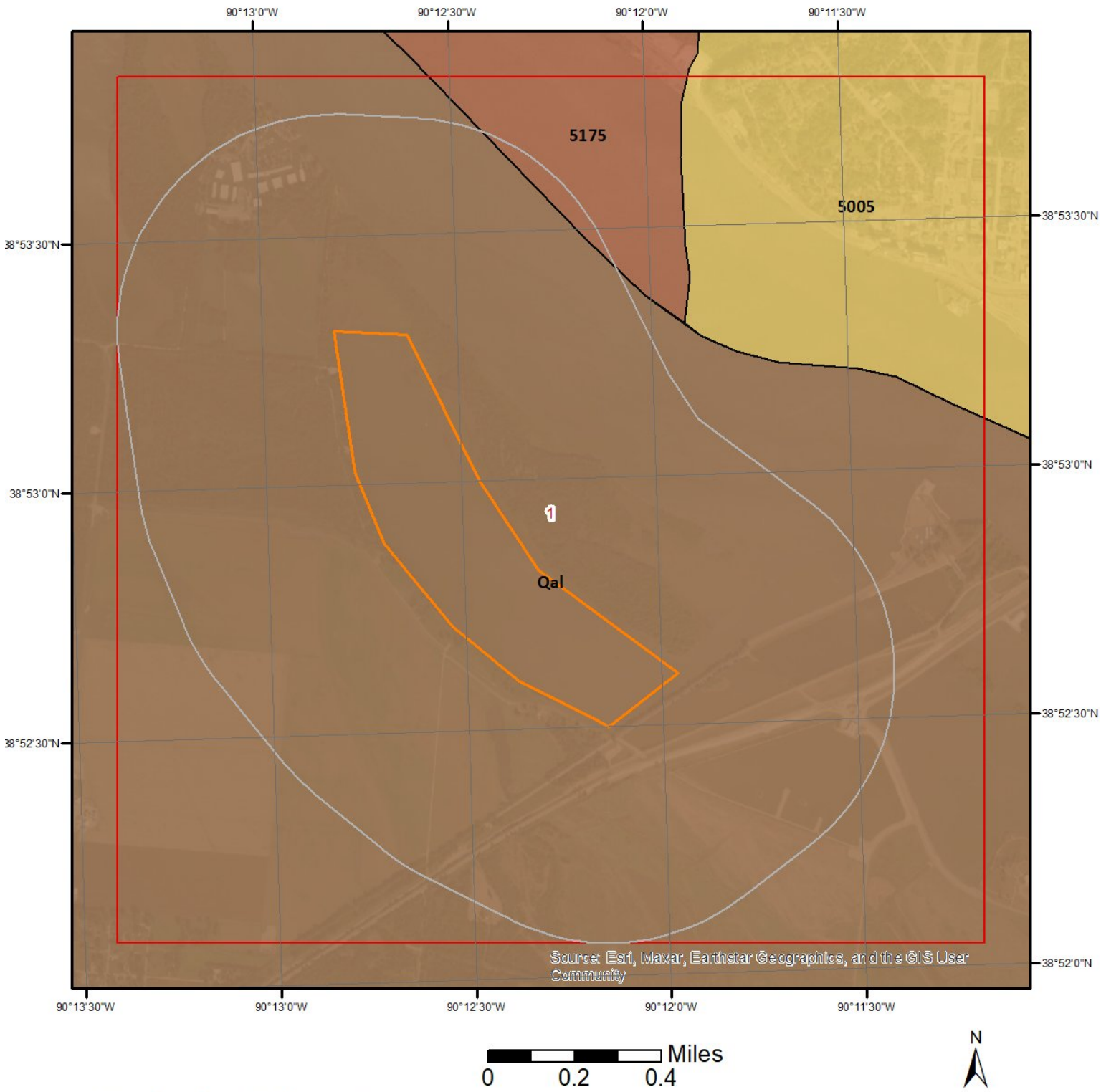
Geologic Units

This maps shows geologic units in the area. Please refer to the report for detailed descriptions.

ERIS

0 0.4 0.8 Miles

Geologic Information



Geologic Units - Page 1

This maps shows geologic units in the area. Please refer to the report for detailed descriptions.

Geologic Information

The previous page shows USGS geology information. Detailed information about each unit is provided below.

Geologic Unit 5175

Unit Name:	Middle Valmeyeran (Salem, Warsaw, Borden, Springville; includes thin Mvl and Mk in south and east) Series
Unit Age:	Mississippian
Primary Rock Type:	limestone
Secondary Rock Type:	siltstone
Unit Description:	Middle Valmeyeran (Salem, Warsaw, Borden, Springville; includes thin Mvl and Mk in south and east) Series

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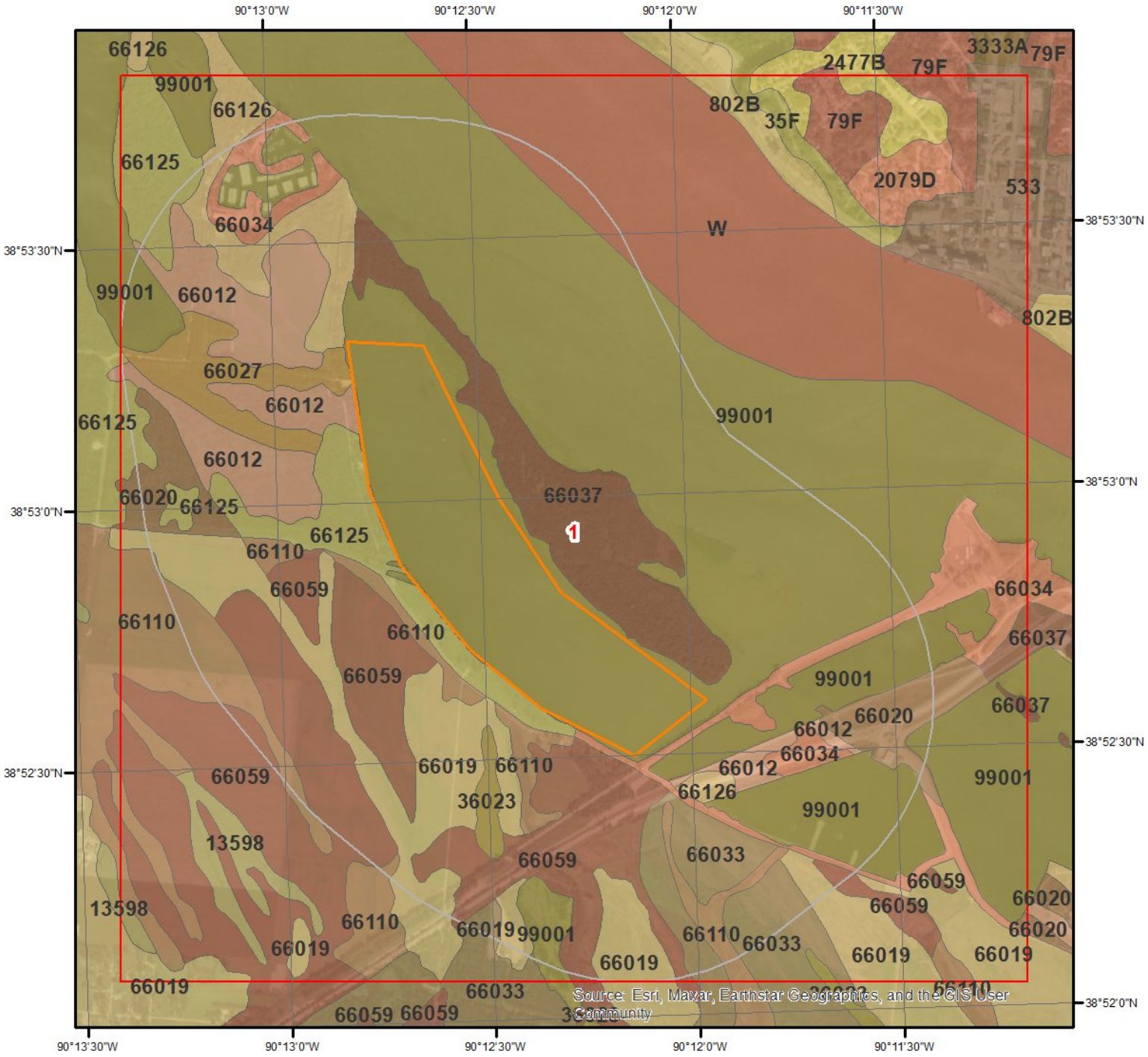
Geologic Unit Qal

Unit Name:	HOLOCENE SERIES
Unit Age:	Phanerozoic | Cenozoic | Quaternary | Holocene
Primary Rock Type:	clay or mud
Secondary Rock Type:	silt
Unit Description:	HOLOCENE SERIES - Alluvium - clay, silt, sand, and gravel

Soil Information



SSURGO Soils

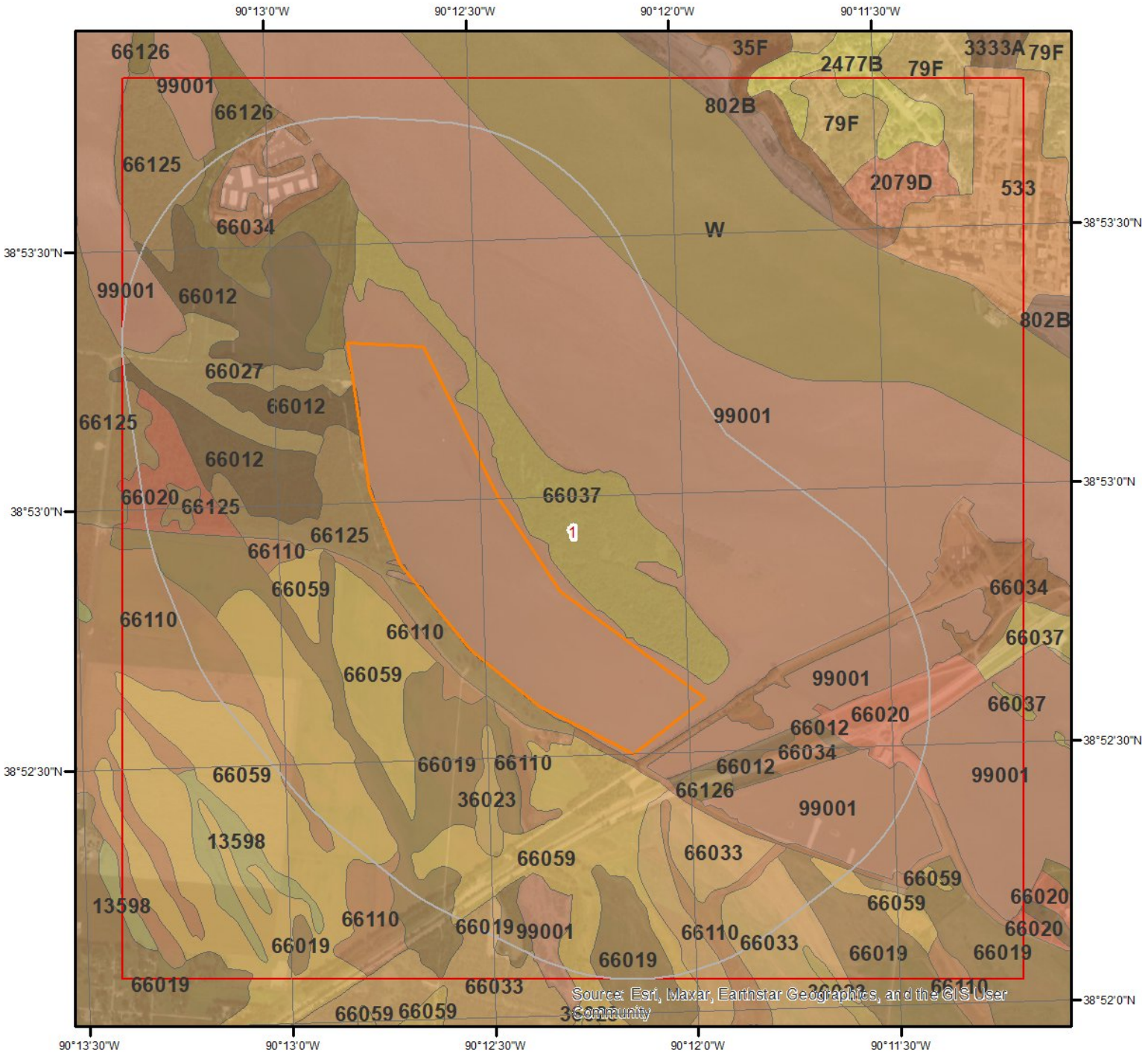
Miles
0 0.2 0.4

N

This maps shows SSURGO soil units around the target property. Please refer to the report for detailed soil descriptions.

ERIS

Soil Information



SSURGO Soils - Page 1

0 0.2 0.4 Miles

N

This maps shows SSURGO soil units around the target property. Please refer to the report for detailed soil descriptions.

ERIS

Soil Information

The previous page shows a soil map using SSURGO data from USDA Natural Resources Conservation Service. Detailed information about each unit is provided below.

Map Unit 36023 (0.03%)

Map Unit Name:	Landes fine sandy loam, 0 to 2 percent slopes, occasionally flooded
Bedrock Depth - Min:	null
Watertable Depth - Annual Min:	153cm
Drainage Class - Dominant:	Moderately well drained
Hydrologic Group - Dominant:	B - Soils in this group have moderately low runoff potential when thoroughly wet. Water transmission through the soil is unimpeded.

Major components are printed below

Landes(90%)

horizon Ap(0cm to 18cm)	Fine sandy loam
horizon Bw(18cm to 97cm)	Fine sandy loam
horizon C(97cm to 152cm)	Stratified silt loam

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 36023 - Landes fine sandy loam, 0 to 2 percent slopes, occasionally flooded

Component: Landes (90%)
The Landes component makes up 90 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood-plain steps, river valleys. The parent material consists of alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 60 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 2 percent. This component is in the F115BY015MO Sandy/loamy Floodplain Forest ecological site. Nonirrigated land capability classification is 2w. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 2 percent. There are no saline horizons within 30 inches of the soil surface.

Component: Sarpy (5%)
Generated brief soil descriptions are created for major soil components. The Sarpy soil is a minor component.

Map Unit 66012 (0.38%)

Map Unit Name:	Blake silt loam, 0 to 2 percent slopes, frequently flooded
Bedrock Depth - Min:	null
Watertable Depth - Annual Min:	36cm
Drainage Class - Dominant:	Somewhat poorly drained
Hydrologic Group - Dominant:	C/D - These soils have moderately high runoff potential when drained and high runoff potential when undrained.

Major components are printed below

Blake(85%)

horizon Ap(0cm to 18cm)	Silt loam
horizon C(18cm to 152cm)	Stratified very fine sandy loam to silt loam to silty clay loam

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 66012 - Blake silt loam, 0 to 2 percent slopes, frequently flooded

Component: Blake (85%)

Soil Information

The Blake component makes up 85 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood plains, river valleys. The parent material consists of alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is very high. Shrink-swell potential is moderate. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 14 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 3 percent. This component is in the F115BY015MO Sandy/loamy Floodplain Forest ecological site. Nonirrigated land capability classification is 5w. Irrigated land capability classification is 1 This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 18 percent.

Component: Sarpy (5%)
Generated brief soil descriptions are created for major soil components. The Sarpy soil is a minor component.

Component: Haynie (5%)
Generated brief soil descriptions are created for major soil components. The Haynie soil is a minor component.

Component: SansDessein (5%)
Generated brief soil descriptions are created for major soil components. The SansDessein soil is a minor component.

Map Unit 66019 (1.06%)

Map Unit Name:	Lowmo silt loam, 0 to 2 percent slopes, occasionally flooded
Bedrock Depth - Min:	null
Watertable Depth - Annual Min:	122cm
Drainage Class - Dominant:	Well drained
Hydrologic Group - Dominant:	B - Soils in this group have moderately low runoff potential when thoroughly wet. Water transmission through the soil is unimpeded.

Major components are printed below

Lowmo(85%)

horizon Ap(0cm to 25cm)	Silt loam
horizon A(25cm to 38cm)	Silt loam
horizon Bw(38cm to 102cm)	Silt loam
horizon C1(102cm to 208cm)	Stratified silt loam to very fine sandy loam
horizon 2C2(208cm to 234cm)	Fine sand

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 66019 - Lowmo silt loam, 0 to 2 percent slopes, occasionally flooded

Component: Lowmo (85%)
The Lowmo, occasionally flooded component makes up 85 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood-plain steps on river valleys. The parent material consists of alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is very high. Shrink-swell potential is low. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 48 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 2 percent. This component is in the F115BY015MO Sandy/loamy Floodplain Forest ecological site. Nonirrigated land capability classification is 2w. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent.

Component: Peers (5%)
Generated brief soil descriptions are created for major soil components. The Peers, occasionally flooded soil is a minor component.

Component: Treloar (5%)
Generated brief soil descriptions are created for major soil components. The Treloar, occasionally flooded soil is a minor component.

Component: SansDessein (5%)
Generated brief soil descriptions are created for major soil components. The SansDessein, occasionally flooded soil is a minor component.

Map Unit 66020 (0.18%)

Map Unit Name:	Haynie silt loam, 0 to 2 percent slopes, frequently flooded
Bedrock Depth - Min:	null
Watertable Depth - Annual Min:	null
Drainage Class - Dominant:	Well drained
Hydrologic Group - Dominant:	B - Soils in this group have moderately low runoff potential when thoroughly wet. Water transmission through the soil is unimpeded.

Major components are printed below

Haynie(85%)

horizon Ap(0cm to 18cm)	Silt loam
horizon C(18cm to 200cm)	Stratified very fine sandy loam to silt loam

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 66020 - Haynie silt loam, 0 to 2 percent slopes, frequently flooded

Component: Haynie (85%)
The Haynie component makes up 85 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood plains, river valleys. The parent material consists of alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is very high. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. This component is in the F115BY015MO Sandy/loamy Floodplain Forest ecological site. Nonirrigated land capability classification is 5w. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 5 percent. There are no saline horizons within 30 inches of the soil surface.

Component: Parkville (10%)
Generated brief soil descriptions are created for major soil components. The Parkville soil is a minor component.

Component: Sarpy (5%)
Generated brief soil descriptions are created for major soil components. The Sarpy soil is a minor component.

Map Unit 66027 (0.13%)

Map Unit Name:	Carlow silty clay loam, 0 to 2 percent slopes, frequently flooded
Bedrock Depth - Min:	null
Watertable Depth - Annual Min:	15cm
Drainage Class - Dominant:	Poorly drained
Hydrologic Group - Dominant:	D - Soils in this group have high runoff potential when thoroughly wet. Water movement through the soil is restricted or very restricted.

Major components are printed below

Carlow(90%)

horizon A1(0cm to 18cm)	Silty clay loam
horizon A2(18cm to 61cm)	Silty clay loam
horizon Bg(61cm to 150cm)	Silty clay
horizon Cg(150cm to 165cm)	Stratified silt loam to silty clay

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 66027 - Carlow silty clay loam, 0 to 2 percent slopes, frequently flooded

Component: Carlow (90%)
The Carlow component makes up 90 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood-plain steps, river

valleys. The parent material consists of alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is very high. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 6 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 3 percent. This component is in the R115CY001MO Wet Floodplain Prairie ecological site. Nonirrigated land capability classification is 5w. This soil meets hydric criteria.

Map Unit 66033 (1.6%)

Map Unit Name:	Lowmo-Peers complex, 0 to 2 percent slopes, occasionally flooded
Bedrock Depth - Min:	null
Watertable Depth - Annual Min:	56cm
Drainage Class - Dominant:	Well drained
Hydrologic Group - Dominant:	B - Soils in this group have moderately low runoff potential when thoroughly wet. Water transmission through the soil is unimpeded.

Major components are printed below

Lowmo(50%)	
horizon Ap(0cm to 25cm)	Silt loam
horizon A(25cm to 38cm)	Silt loam
horizon Bw(38cm to 102cm)	Silt loam
horizon C1(102cm to 208cm)	Stratified silt loam to very fine sandy loam
horizon 2C2(208cm to 234cm)	Stratified fine sand
Peers(40%)	
horizon Ap(0cm to 38cm)	Silty clay loam
horizon A(38cm to 56cm)	Silty clay loam
horizon Bw(56cm to 127cm)	Silt loam
horizon Cg(127cm to 203cm)	Silt loam

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 66033 - Lowmo-Peers complex, 0 to 2 percent slopes, occasionally flooded

Component: Lowmo (50%)
The Lowmo component makes up 50 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood-plain steps, river valleys. The parent material consists of alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is very high. Shrink-swell potential is low. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 48 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 2 percent. This component is in the F115BY015MO Sandy/loamy Floodplain Forest ecological site. Nonirrigated land capability classification is 2w. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent.

Component: Peers (40%)
The Peers component makes up 40 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood-plain steps, river valleys. The parent material consists of alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is very high. Shrink-swell potential is low. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 22 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 2 percent. This component is in the F115BY015MO Sandy/loamy Floodplain Forest ecological site. Nonirrigated land capability classification is 2w. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent.

Component: SansDessein (5%)
Generated brief soil descriptions are created for major soil components. The SansDessein soil is a minor component.

Map Unit 66034 (0.33%)

Soil Information

Map Unit Name:	Sarpy-Treloar complex, 0 to 2 percent slopes, frequently flooded
Bedrock Depth - Min:	null
Watertable Depth - Annual Min:	71cm
Drainage Class - Dominant:	Excessively drained
Hydrologic Group - Dominant:	A - Soils in this group have low runoff potential when thoroughly wet. Water is transmitted freely through the soil.

Major components are printed below

Sarpy(45%)	
horizon A(0cm to 8cm)	Fine sand
horizon C(8cm to 157cm)	Fine sand
Treloar(40%)	
horizon A(0cm to 18cm)	Fine sandy loam
horizon C(18cm to 71cm)	Fine sand
horizon 2Bw(71cm to 114cm)	Loam
horizon 2C(114cm to 203cm)	Stratified silt loam to very fine sandy loam

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 66034 - Sarpy-Treloar complex, 0 to 2 percent slopes, frequently flooded

Component: Sarpy (45%)
The Sarpy component makes up 45 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood-plain steps, river valleys. The parent material consists of alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 0 percent. This component is in the F115BY015MO Sandy/loamy Floodplain Forest ecological site. Nonirrigated land capability classification is 5w. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 2 percent.

Component: Treloar (40%)
The Treloar component makes up 40 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood-plain steps, river valleys. The parent material consists of sandy alluvium over loamy alluvium. Depth to a root restrictive layer, strongly contrasting textural stratification, is 16 to 39 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 28 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 1 percent. This component is in the F115BY015MO Sandy/loamy Floodplain Forest ecological site. Nonirrigated land capability classification is 5w. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

Component: Haynie (10%)
Generated brief soil descriptions are created for major soil components. The Haynie soil is a minor component.

Map Unit 66037 (0.36%)

Map Unit Name:	Chequest silt loam, 0 to 2 percent slopes, frequently flooded
Bedrock Depth - Min:	null
Watertable Depth - Annual Min:	20cm
Drainage Class - Dominant:	Poorly drained
Hydrologic Group - Dominant:	C/D - These soils have moderately high runoff potential when drained and high runoff potential when undrained.

Major components are printed below

Chequest(100%)	
horizon A(0cm to 51cm)	Silt loam
horizon Bg(51cm to 152cm)	Silty clay loam

Component Description:

Soil Information

Minor map unit components are excluded from this report.

Map Unit: 66037 - Chequest silt loam, 0 to 2 percent slopes, frequently flooded

Component: Chequest (100%)
The Chequest component makes up 100 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood-plain steps, river valleys. The parent material consists of alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is high. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 8 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 4 percent. This component is in the R115CY001MO Wet Floodplain Prairie ecological site. Nonirrigated land capability classification is 5w. This soil meets hydric criteria.

Map Unit 66059 (2.25%)

Map Unit Name:	Peers silty clay loam, 0 to 2 percent slopes, occasionally flooded
Bedrock Depth - Min:	null
Watertable Depth - Annual Min:	56cm
Drainage Class - Dominant:	Somewhat poorly drained
Hydrologic Group - Dominant:	C/D - These soils have moderately high runoff potential when drained and high runoff potential when undrained.

Major components are printed below

Peers(85%)

horizon Ap(0cm to 38cm)	Silty clay loam
horizon A(38cm to 56cm)	Silty clay loam
horizon Bw(56cm to 127cm)	Silt loam
horizon Cg(127cm to 203cm)	Silt loam

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 66059 - Peers silty clay loam, 0 to 2 percent slopes, occasionally flooded

Component: Peers (85%)
The Peers component makes up 85 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood-plain steps, river valleys. The parent material consists of alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is very high. Shrink-swell potential is low. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 22 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 2 percent. This component is in the F115BY015MO Sandy/loamy Floodplain Forest ecological site. Nonirrigated land capability classification is 2w. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent.

Component: SansDessein (10%)
Generated brief soil descriptions are created for major soil components. The SansDessein soil is a minor component.

Component: Lowmo (5%)
Generated brief soil descriptions are created for major soil components. The Lowmo soil is a minor component.

Map Unit 66110 (0.75%)

Map Unit Name:	SansDessein silty clay, 0 to 2 percent slopes, occasionally flooded
Bedrock Depth - Min:	null
Watertable Depth - Annual Min:	20cm
Drainage Class - Dominant:	Poorly drained
Hydrologic Group - Dominant:	C/D - These soils have moderately high runoff potential when drained and high runoff potential when undrained.

Soil Information

Major components are printed below

SansDessein(90%)

horizon Ap(0cm to 20cm)	Silty clay
horizon A(20cm to 43cm)	Silty clay
horizon Bg(43cm to 142cm)	Silty clay
horizon 2Cg(142cm to 173cm)	Stratified silt loam to silt
horizon 3Cg(173cm to 203cm)	Fine sand

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 66110 - SansDessein silty clay, 0 to 2 percent slopes, occasionally flooded

Component: SansDessein (90%)
The SansDessein component makes up 90 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood-plain steps, river valleys. The parent material consists of alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is very high. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 8 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 2 percent. This component is in the F115BY041MO Clayey Floodplain Forest ecological site. Nonirrigated land capability classification is 3w. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 2 percent.

Component: Blencoe (5%)
Generated brief soil descriptions are created for major soil components. The Blencoe soil is a minor component.

Component: Peers (5%)
Generated brief soil descriptions are created for major soil components. The Peers soil is a minor component.

Map Unit 66125 (1.18%)

Map Unit Name:	SansDessein silty clay, 0 to 2 percent slopes, frequently flooded
Bedrock Depth - Min:	null
Watertable Depth - Annual Min:	20cm
Drainage Class - Dominant:	Poorly drained
Hydrologic Group - Dominant:	C/D - These soils have moderately high runoff potential when drained and high runoff potential when undrained.

Major components are printed below

SansDessein(90%)

horizon Ap(0cm to 20cm)	Silty clay
horizon A(20cm to 43cm)	Silty clay
horizon Bg(43cm to 142cm)	Silty clay
horizon 2Cg(142cm to 173cm)	Stratified silt loam to silt
horizon 3Cg(173cm to 203cm)	Fine sand

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 66125 - SansDessein silty clay, 0 to 2 percent slopes, frequently flooded

Component: SansDessein (90%)
The SansDessein component makes up 90 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood-plain steps, river valleys. The parent material consists of alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is very high. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 8 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 2 percent. This component is in the F115BY041MO Clayey Floodplain Forest ecological site. Nonirrigated land capability classification is 5w. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does

not exceed 2 percent.

Component: Blencoe (5%)
Generated brief soil descriptions are created for major soil components. The Blencoe soil is a minor component.

Map Unit 66126 (0.22%)

Map Unit Name:	Haynie-Treloar-Blake complex, 0 to 2 percent slopes, frequently flooded
Bedrock Depth - Min:	null
Watertable Depth - Annual Min:	36cm
Drainage Class - Dominant:	Well drained
Hydrologic Group - Dominant:	B - Soils in this group have moderately low runoff potential when thoroughly wet. Water transmission through the soil is unimpeded.

Major components are printed below

Haynie(45%)	
horizon Ap(0cm to 18cm)	Silt loam
horizon C(18cm to 152cm)	Stratified very fine sandy loam to silt loam
Treloar(25%)	
horizon A(0cm to 18cm)	Fine sandy loam
horizon C(18cm to 71cm)	Fine sand
horizon 2Bw(71cm to 114cm)	Loam
horizon 2C(114cm to 203cm)	Stratified silt loam to very fine sandy loam
Blake(20%)	
horizon A(0cm to 8cm)	Silty clay loam
horizon C1(8cm to 58cm)	Silt loam
horizon C2(58cm to 152cm)	Silt loam

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 66126 - Haynie-Treloar-Blake complex, 0 to 2 percent slopes, frequently flooded

Component: Haynie (45%)
The Haynie component makes up 45 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood plains, river valleys. The parent material consists of alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is very high. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. This component is in the F115BY015MO Sandy/loamy Floodplain Forest ecological site. Nonirrigated land capability classification is 5w. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 5 percent.

Component: Treloar (25%)
The Treloar component makes up 25 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood-plain steps, river valleys. The parent material consists of sandy alluvium over loamy alluvium. Depth to a root restrictive layer, strongly contrasting textural stratification, is 16 to 39 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 28 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 1 percent. This component is in the F115BY015MO Sandy/loamy Floodplain Forest ecological site. Nonirrigated land capability classification is 5w. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

Component: Blake (20%)
The Blake component makes up 20 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood plains, river valleys. The parent material consists of alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is very high. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 14 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 3 percent. This component is in the F115BY031MO Loamy Floodplain Forest ecological site. Nonirrigated land capability classification is 5w. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does

not exceed 5 percent.

Component: SansDessein (5%)
Generated brief soil descriptions are created for major soil components. The SansDessein soil is a minor component.

Component: Sarpy (5%)
Generated brief soil descriptions are created for major soil components. The Sarpy soil is a minor component.

Map Unit 99001 (68.57%)

Map Unit Name: Water

No more attributes available for this map unit

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 99001 - Water

Component: Water (100%)
Generated brief soil descriptions are created for major soil components. The Water is a miscellaneous area.

Map Unit W (22.96%)

Map Unit Name: Water

No more attributes available for this map unit

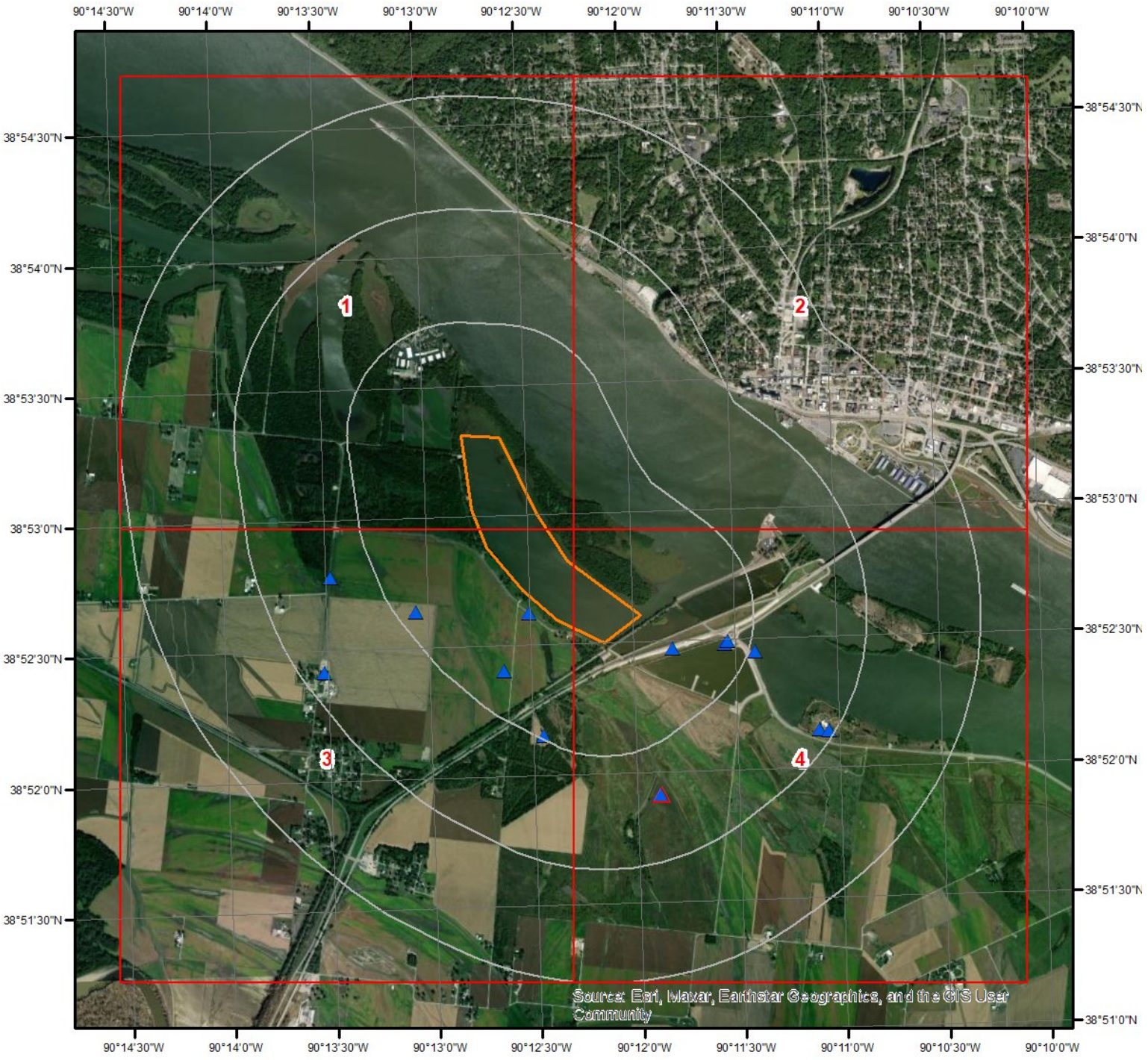
Component Description:

Minor map unit components are excluded from this report.

Map Unit: W - Water

Component: Water (100%)
Generated brief soil descriptions are created for major soil components. The Water is a miscellaneous area.

Wells and Additional Sources



Wells & Additional Sources

N

0 0.3 0.6 1.2 Miles

- Sites with Higher Elevation
- Sites with Same Elevation
- Sites with Lower Elevation
- Sites with Unknown Elevation
- OGW Sites with Higher Elevation
- OGW Sites with Same Elevation
- OGW Sites with Lower Elevation
- OGW Sites with Unknown Elevation

ERIS

Wells and Additional Sources



Wells & Additional Sources - Page 1

N

0 0.15 0.3 0.6 Miles

- Sites with Higher Elevation
- Sites with Same Elevation
- Sites with Lower Elevation
- Sites with Unknown Elevation
- OGW Sites with Higher Elevation
- OGW Sites with Same Elevation
- OGW Sites with Lower Elevation
- OGW Sites with Unknown Elevation

ERIS

Wells and Additional Sources



Wells & Additional Sources - Page 2

N

0 0.15 0.3 0.6 Miles

- Sites with Higher Elevation
- Sites with Same Elevation
- Sites with Lower Elevation
- Sites with Unknown Elevation
- OGW Sites with Higher Elevation
- OGW Sites with Same Elevation
- OGW Sites with Lower Elevation
- OGW Sites with Unknown Elevation

ERIS

Wells and Additional Sources



Wells & Additional Sources - Page 3

N

0 0.15 0.3 0.6 Miles

- Sites with Higher Elevation
- Sites with Same Elevation
- Sites with Lower Elevation
- Sites with Unknown Elevation
- OGW Sites with Higher Elevation
- OGW Sites with Same Elevation
- OGW Sites with Lower Elevation
- OGW Sites with Unknown Elevation

ERIS

Wells and Additional Sources



Wells & Additional Sources - Page 4

N

0 0.15 0.3 0.6 Miles

- Sites with Higher Elevation
- Sites with Same Elevation
- Sites with Lower Elevation
- Sites with Unknown Elevation
- OGW Sites with Higher Elevation
- OGW Sites with Same Elevation
- OGW Sites with Lower Elevation
- OGW Sites with Unknown Elevation

ERIS

Wells and Additional Sources Summary

Federal Sources

Public Water Systems Violations and Enforcement Data

Map Key	ID	Distance (ft)	Direction
	No records found		

Safe Drinking Water Information System (SDWIS)

Map Key	ID	Distance (ft)	Direction
	No records found		

USGS National Water Information System

Map Key	Site Number	Distance (ft)	Direction
2	USGS-385224090123801	1712.62	SSW
5	USGS-385209090122701	2553.73	S
10	USGS-385227090112401	2813.26	ESE

Wells from NWIS

Map Key	ID	Distance (ft)	Direction
	No records found		

State Sources

Oil and Gas Wells

Map Key	API No	Distance (ft)	Direction
11	183-20018	3783.49	SSE

Public Drinking Water Wells

Map Key	Unique ID	Distance (ft)	Direction
7	106858	2091.28	ESE
9	106856	4764.09	WSW
13	106988	5162.87	ESE

Springs

Map Key	ID	Distance (ft)	Direction
	No records found		

Water Wells

Map Key	Ref No	Distance (ft)	Direction

Wells and Additional Sources Summary

1	00038784	293.63	S
3	00096988	2224.25	WSW
4	00339072	1080.34	SE
6	00285824	3622.48	W
6	00298080	3622.48	W
8	00502960	2120.19	ESE
12	00149585	4966.39	ESE

Wells and Additional Sources Detail Report

USGS National Water Information System

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
2	SSW	0.32	1,712.62	423.18	FED USGS

Reporting Agency:	USGS Missouri Water Science Center
Site Number:	USGS-385224090123801
Station Name:	MS.9.REGIONAL MISSISSIPPI R POST FLOOD SOIL SAMPLE
Site Type:	Land: Soil hole
Latitude:	38.87338190000000
Longitude:	-90.2106661000000
Date Drilled:	
Well Depth:	
Well Depth Unit:	
Well Hole Depth:	
W Hole Depth Unit:	
Formation Type:	

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
5	S	0.48	2,553.73	425.87	FED USGS

Reporting Agency:	USGS Missouri Water Science Center
Site Number:	USGS-385209090122701
Station Name:	T48N R07E 34DAA
Site Type:	Well
Latitude:	38.86921528000000
Longitude:	-90.2076104000000
Date Drilled:	
Well Depth:	24.0
Well Depth Unit:	ft
Well Hole Depth:	24.0
W Hole Depth Unit:	ft
Formation Type:	Holocene Alluvium

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
10	ESE	0.53	2,813.26	416.37	FED USGS

Reporting Agency:	USGS Missouri Water Science Center
Site Number:	USGS-385227090112401
Station Name:	T48N R07E 35ABD1
Site Type:	Well
Latitude:	38.87421510000000
Longitude:	-90.1901099000000
Date Drilled:	19680101

Well Depth:	52.0
Well Depth Unit:	ft
Well Hole Depth:	52.0
W Hole Depth Unit:	ft
Formation Type:	Holocene Alluvium

Oil and Gas Wells

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
11	SSE	0.72	3,783.49	423.81	OGW

API No:	183-20018	Township:	48
Operator:	Spire Missouri Inc.	Township Dir:	North
County:	St. Charles	Range:	7
Well Latitude Dec:	38.86519	Range Direction:	East
Well Longitude Dec:	-90.19816	Section:	
Data Source:	MDNR Oil & Gas Well Permits, as of 28 July 2022; MSDIS Open Data Oil & Gas Well Permits, as of 21 December 2018		

Public Drinking Water Wells

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
7	ESE	0.40	2,091.28	433.04	PWSW

Well No:	1	From CD:	Alluvium
Well ID:	19006	From TD:	Alluvium
Unique ID:	106858	Head:	0
Log ID:		Nitrate:	
WWIMS ID:		Out Case Dep:	0
PWSS ID:	6293185	Out Case Size:	0
PWSS ID Ext:	6293185101	Pump Capacity:	0
IPWS:	MO6293185	Pump Depth:	0
IPWS Ext:	MO6293185101	Pump Manuf:	
Local Name:	Well #1	Pump Test Da:	-9999
Status:	Active	Pump Type:	
Facility Type:	C-Store/Svc. Station	Scrn Length:	-9999
Fed Type:	NC	Scrn Size:	-9999
MDNR No:	6	Stand by Power:	
MDNR Reg:	St. Louis	Stappr:	
Drill Date:	-9999	Static Lev:	0
Aban:	0	Surf Drain:	
Plug:	0	Top Case Elv:	420
Material:	Unconsolidated	Top Seal:	Cement Grout
GWUDISW:		Tot Depth:	-9999
Bottom Seal:	Cement Grout	VOC:	
Case Depth:	-9999	Yield:	0
Case Height:	0	County:	St. Charles
Case Size:	6	Verloc:	No

Case Type:	Steel	Grnd Elev:	420
Meter:		DD Latitude:	38.874700347
Chlor:		DD Longitude:	-90.19258
Draw Down:	0	Method:	GPS
Entry:		Accuracy:	33
Filter:		Location Status:	Not Verified
FIPS:	29183	Last Update:	2018/03/29

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
9	WSW	0.90	4,764.09	422.68	PWSW

Well No:	1	From CD:	Alluvium
Well ID:	19007	From TD:	Alluvium
Unique ID:	106856	Head:	0
Log ID:		Nitrate:	
WWIMS ID:		Out Case Dep:	0
PWSS ID:	6213186	Out Case Size:	0
PWSS ID Ext:	6213186101	Pump Capacity:	0
IPWS:	MO6213186	Pump Depth:	0
IPWS Ext:	MO6213186101	Pump Manuf:	
Local Name:	Well #1	Pump Test Da:	-9999
Status:	Active	Pump Type:	
Facility Type:	Restaurant	Scrn Length:	-9999
Fed Type:	NC	Scrn Size:	-9999
MDNR No:	6	Stand by Power:	
MDNR Reg:	St. Louis	Stappr:	
Drill Date:	-9999	Static Lev:	0
Aban:	0	Surf Drain:	
Plug:	0	Top Case Elv:	425
Material:	Unconsolidated	Top Seal:	Cement Grout
GWUDISW:		Tot Depth:	-9999
Bottom Seal:	Cement Grout	VOC:	
Case Depth:	-9999	Yield:	0
Case Height:	0	County:	St. Charles
Case Size:	6	Verloc:	No
Case Type:	Steel	Grnd Elev:	425
Meter:		DD Latitude:	38.8736458
Chlor:		DD Longitude:	-90.2253418
Draw Down:	0	Method:	GPS
Entry:		Accuracy:	33
Filter:		Location Status:	Not Verified
FIPS:	29183	Last Update:	2016/01/07

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
13	ESE	0.98	5,162.87	439.21	PWSW

Wells and Additional Sources Detail Report

Well No:	1	From CD:	Alluvium
Well ID:	17919	From TD:	Alluvium
Unique ID:	106988	Head:	48
Log ID:		Nitrate:	
WWIMS ID:	00149585	Out Case Dep:	0
PWSS ID:	6112781	Out Case Size:	0
PWSS ID Ext:	6112781101	Pump Capacity:	120
IPWS:	MO6112781	Pump Depth:	68
IPWS Ext:	MO6112781101	Pump Manuf:	
Local Name:	Well #1	Pump Test Da:	-9999
Status:	Active	Pump Type:	
Facility Type:	Recreational Facility	Scrn Length:	-9999
Fed Type:	NC	Scrn Size:	-9999
MDNR No:	6	Stand by Power:	
MDNR Reg:	St. Louis	Stappr:	
Drill Date:	1996	Static Lev:	20
Aban:	0	Surf Drain:	
Plug:	0	Top Case Elv:	415
Material:	Unconsolidated	Top Seal:	Cement Grout
GWUDISW:		Tot Depth:	125
Bottom Seal:		VOC:	
Case Depth:	77	Yield:	300
Case Height:	0	County:	St. Charles
Case Size:	10	Verloc:	No
Case Type:	Steel	Grnd Elev:	415
Meter:		DD Latitude:	38.869
Chlor:		DD Longitude:	-90.18425
Draw Down:	0	Method:	GPS
Entry:		Accuracy:	33
Filter:		Location Status:	Not Verified
FIPS:	29183	Last Update:	2018/05/03

Water Wells

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
1	S	0.06	293.63	429.34	WATER WELLS

Well No:		Drill Area:	AREA 5
FID:	149986	Elev:	0
Ref No:	00038784	Total Dpth:	88
Cert No:	A014058	Casing Len:	80
Well Type:	Water Well	Casing Mat:	Steel
Well Use:	Unknown	SWL:	18
Well Yield:	400	Liner Len:	0
Date Compl:	1990/06/21 00:00:00+00	Liner Mat:	
From 1:	0	Liner Use:	
To 1:	20	Subdiv 1:	

From 2:	20	Subdiv 2:	
To 2:	72	Subdiv 3:	
From 3:	72	Twn No:	0
To 3:	88	Twn Dir:	
From 4:	0	Rng No:	0
To 4:	0	Rng Dir:	
From 5:	0	Sctn No:	1730
To 5:	0	Cnty Fips:	183
From 6:	0	X:	38.8770823812244
To 6:	0	Y:	-90.2085023073145
Form 1:	CLY/SND		
Form 2:	SND		
Form 3:	GRVL 400+ GPM		
Form 4:			
Form 5:			
Form 6:			

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
3	WSW	0.42	2,224.25	419.54	WATER WELLS

Well No:		Drill Area:	AREA 5
FID:	175850	Elev:	0
Ref No:	00096988	Total Dpth:	124
Cert No:	A034326	Casing Len:	124
Well Type:	Water Well	Casing Mat:	Steel
Well Use:	Domestic	SWL:	12
Well Yield:	200	Liner Len:	0
Date Compl:	1993/11/04 00:00:00+00	Liner Mat:	
From 1:	0	Liner Use:	
To 1:	25	Subdiv 1:	
From 2:	25	Subdiv 2:	
To 2:	110	Subdiv 3:	
From 3:	110	Twn No:	0
To 3:	124	Twn Dir:	
From 4:	0	Rng No:	0
To 4:	0	Rng Dir:	
From 5:	0	Sctn No:	1703
To 5:	0	Cnty Fips:	183
From 6:	0	X:	38.877326521188
To 6:	0	Y:	-90.2177186180387
Form 1:	CLY		
Form 2:	SND,SND CLY		
Form 3:	GRVL		
Form 4:			
Form 5:			
Form 6:			

Wells and Additional Sources Detail Report

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
4	SE	0.20	1,080.34	435.25	WATER WELLS

Well No:	MW1	Drill Area:	AREA 5
FID:	35366	Elev:	0
Ref No:	00339072	Total Dpth:	24
Cert No:	B0019039	Casing Len:	5
Well Type:	Abandoned	Casing Mat:	Plastic
Well Use:	Monitoring	SWL:	18
Well Yield:	0	Liner Len:	0
Date Compl:	2005/12/21 00:00:00+00	Liner Mat:	
From 1:	0	Liner Use:	
To 1:	0	Subdiv 1:	
From 2:	0	Subdiv 2:	
To 2:	0	Subdiv 3:	
From 3:	0	Twn No:	0
To 3:	0	Twn Dir:	
From 4:	0	Rng No:	0
To 4:	0	Rng Dir:	
From 5:	0	Sctn No:	1765
To 5:	0	Cnty Fips:	183
From 6:	0	X:	38.8745189053531
To 6:	0	Y:	-90.196905623982
Form 1:			
Form 2:			
Form 3:			
Form 4:			
Form 5:			
Form 6:			

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
6	W	0.69	3,622.48	416.63	WATER WELLS

Well No:		Drill Area:	AREA 5
FID:	255559	Elev:	0
Ref No:	00285824	Total Dpth:	20
Cert No:		Casing Len:	0
Well Type:	Monitoring Well	Casing Mat:	
Well Use:	Water level	SWL:	11
Well Yield:	0	Liner Len:	0
Date Compl:	2002/07/26 00:00:00+00	Liner Mat:	
From 1:	0	Liner Use:	
To 1:	5	Subdiv 1:	
From 2:	5	Subdiv 2:	
To 2:	20	Subdiv 3:	

From 3:	0	Twn No:	0
To 3:	0	Twn Dir:	
From 4:	0	Rng No:	0
To 4:	0	Rng Dir:	
From 5:	0	Sctn No:	1838
To 5:	0	Cnty Fips:	183
From 6:	0	X:	38.8797068923119
To 6:	0	Y:	-90.2246155930599
Form 1:	GRY BRN SILT SND		
Form 2:	GRY SILTY SND		
Form 3:			
Form 4:			
Form 5:			
Form 6:			

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
6	W	0.69	3,622.48	416.63	WATER WELLS

Well No:		Drill Area:	AREA 5
FID:	4216	Elev:	0
Ref No:	00298080	Total Dpth:	32
Cert No:	B011769	Casing Len:	0
Well Type:	Abandoned	Casing Mat:	
Well Use:	Soil boring	SWL:	0
Well Yield:	0	Liner Len:	0
Date Compl:	2002/07/25 00:00:00+00	Liner Mat:	
From 1:	0	Liner Use:	
To 1:	0	Subdiv 1:	
From 2:	0	Subdiv 2:	
To 2:	0	Subdiv 3:	
From 3:	0	Twn No:	0
To 3:	0	Twn Dir:	
From 4:	0	Rng No:	0
To 4:	0	Rng Dir:	
From 5:	0	Sctn No:	1838
To 5:	0	Cnty Fips:	183
From 6:	0	X:	38.8797068923119
To 6:	0	Y:	-90.2246155930599
Form 1:			
Form 2:			
Form 3:			
Form 4:			
Form 5:			
Form 6:			

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
8	ESE	0.40	2,120.19	435.76	WATER WELLS

Well No:	SB1-7	Drill Area:	AREA 5
FID:	66851	Elev:	0
Ref No:	00502960	Total Dpth:	15
Cert No:	B0030892	Casing Len:	0
Well Type:	Abandoned	Casing Mat:	
Well Use:	Soil boring	SWL:	0
Well Yield:	0	Liner Len:	0
Date Compl:	2010/03/18 00:00:00+00	Liner Mat:	
From 1:	0	Liner Use:	
To 1:	0	Subdiv 1:	
From 2:	0	Subdiv 2:	
To 2:	0	Subdiv 3:	
From 3:	0	Twn No:	0
To 3:	0	Twn Dir:	
From 4:	0	Rng No:	0
To 4:	0	Rng Dir:	
From 5:	0	Sctn No:	1765
To 5:	0	Cnty Fips:	183
From 6:	0	X:	38.8748851161541
To 6:	0	Y:	-90.1923890211715
Form 1:			
Form 2:			
Form 3:			
Form 4:			
Form 5:			
Form 6:			

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
12	ESE	0.94	4,966.39	437.21	WATER WELLS

Well No:		Drill Area:	AREA 5
FID:	194459	Elev:	415
Ref No:	00149585	Total Dpth:	125
Cert No:	A058309	Casing Len:	77
Well Type:	Water Well	Casing Mat:	
Well Use:	Unknown	SWL:	20
Well Yield:	300	Liner Len:	0
Date Compl:	1996/08/08 00:00:00+00	Liner Mat:	
From 1:	0	Liner Use:	
To 1:	25	Subdiv 1:	
From 2:	25	Subdiv 2:	
To 2:	34	Subdiv 3:	
From 3:	34	Twn No:	0
To 3:	76	Twn Dir:	

Wells and Additional Sources Detail Report

From 4:	76	Rng No:	0
To 4:	97	Rng Dir:	
From 5:	97	Sctn No:	1765
To 5:	125	Cnty Fips:	183
From 6:	0	X:	38.8690867758893
To 6:	0	Y:	-90.1850037643758
Form 1:	CLY FILL		
Form 2:	SILTY CLY		
Form 3:	SND		
Form 4:	SND\GRVL		
Form 5:	SILTY SND		
Form 6:			

Radon Information

This section lists any relevant radon information found for the target property.

No Radon Zone Level records found for the project property or surrounding properties.

Zone 1: Counties with predicted average indoor radon screening levels greater than 4 pCi/L
Zone 2: Counties with predicted average indoor radon screening levels from 2 to 4 pCi/L
Zone 3: Counties with predicted average indoor radon screening levels less than 2 pCi/L

No Indoor Radon Data records found for the project property or surrounding properties.

Appendix

Federal Sources

FEMA National Flood Hazard Layer — **FEMA FLOOD**

The National Flood Hazard Layer (NFHL) data incorporates Flood Insurance Rate Map (FIRM) databases published by the Federal Emergency Management Agency (FEMA), and any Letters Of Map Revision (LOMRs) that have been issued against those databases since their publication date. The FIRM Database is the digital, geospatial version of the flood hazard information shown on the published paper FIRMs. The FIRM Database depicts flood risk information and supporting data used to develop the risk data. The FIRM Database is derived from Flood Insurance Studies (FISs), previously published FIRMs, flood hazard analyses performed in support of the FISs and FIRMs, and new mapping data, where available.

Indoor Radon Data — **INDOOR RADON**

Indoor radon measurements tracked by the Environmental Protection Agency(EPA) and the State Residential Radon Survey.

Public Water Systems Violations and Enforcement Data — **PWSV**

List of drinking water violations and enforcement actions from the Safe Drinking Water Information System (SDWIS) made available by the Drinking Water Protection Division of the US EPA's Office of Groundwater and Drinking Water. Enforcement sensitive actions are not included in the data released by the EPA. Address information provided in SWDIS may correspond either with the physical location of the water system, or with a contact address.

Radon Zone Level — **RADON ZONE**

Areas showing the level of Radon Zones (level 1, 2 or 3) by county. This data is maintained by the Environmental Protection Agency (EPA).

Safe Drinking Water Information System (SDWIS) — **SDWIS**

The Safe Drinking Water Information System (SDWIS) contains information about public water systems as reported to US Environmental Protection Agency (EPA) by the states. Addresses may correspond with the location of the water system, or with a contact address.

Soil Survey Geographic database — **SSURGO**

The Soil Survey Geographic database (SSURGO) contains information about soil as collected by the National Cooperative Soil Survey at the Natural Resources Conservation Service (NRCS). Soil maps outline areas called map units. The map units are linked to soil properties in a database. Each map unit may contain one to three major components and some minor components.

U.S. Fish & Wildlife Service Wetland Data — **US WETLAND**

The U.S. Fish & Wildlife Service Wetland layer represents the approximate location and type of wetlands and deepwater habitats in the United States.

USGS Current Topo — **US TOPO**

US Topo topographic maps are produced by the National Geospatial Program of the U.S. Geological Survey (USGS). The project was launched in late 2009, and the term "US Topo" refers specifically to quadrangle topographic maps published in 2009 and later.

USGS Geology — **US GEOLOGY**

Seamless maps depicting geological information provided by the United States Geological Survey (USGS).

USGS National Water Information System — **FED USGS**

The U.S. Geological Survey (USGS)'s National Water Information System (NWIS) is the nation's principal repository of water resources data. This database includes comprehensive information of well-construction details, time-series data for gage height, streamflow, groundwater level, and precipitation and water use data.

Wells from NWIS — **FED USGS**

The U.S. Geological Survey's National Water Information System (NWIS) is the nation's principal repository of water resources data. The NWIS includes comprehensive information of well-construction details, time-series data for gage height, streamflow, groundwater level, and precipitation and water use data. This NWIW dataset contains select Site Types from the overall NWIS Sites data, limited to the following Group Site Types only: Groundwater Group Site Types: Well, Collector or Ranney type well, Hyporheic-zone well,

Appendix

Interconnected Wells, Multiple wells; Spring Group Site Type: Spring; and Other Group Site Types: Aggregate groundwater use, Cistern.

State Sources

Oil and Gas Wells **OGW**

Oil and Gas Wells Data Collected by Missouri Department of Natural Resources.

Public Drinking Water Wells **PWSW**

The Public Drinking Water Wells data consists of community water supply wells in Missouri. This data was made available by the Missouri Department of Natural Resources to facilitate safe public drinking water systems and awareness.

Springs **SPRING**

Locations of known and probable spring locations as determined by review of U.S. Geological Survey topographic maps and field verification, made available by the Missouri Geological Survey.

Water Wells **WATER WELLS**

This data set provides information about certified water wells and is maintained by the Missouri Department of Natural Resources (DNR), Missouri Geological Survey (MGS), Geological Survey Program (GSP), Wellhead Protection Section (WHP).

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CITY DIRECTORY

Project Property:	*West Alton Lake Phase I* *15957 Deer Dr* *West Alton,MO*
Project No:	
Requested By:	*US Army Corps of Engineers*
Order No:	*23042100138*
Date Completed:	*April 25, 2023*

Environmental Risk Information Services
A division of Glacier Media Inc.
1.866.517.5204 | info@erisinfo.com | erisinfo.com

April 25, 2023
RE: CITY DIRECTORY RESEARCH
15957 Deer Dr
West Alton,MO

Thank you for contacting ERIS for an City Directory Search for the site described above. Our staff has conducted a reverse listing City Directory search to determine prior occupants of the subject site and adjacent properties. We have provided the nearest addresses(s) when adjacent addresses are not listed. If we have searched a range of addresses, all addresses in that range found in the Directory are included.

Note: Reverse Listing Directories generally are focused on more highly developed areas. Newly developed areas may be covered in the more recent years, but the older directories will tend to cover only the "central" parts of the city. To complete the search, we have either utilized the ACPL, Library of Congress, State Archives, and/or a regional library or history center as well as multiple digitized directories. These do not claim to be a complete collection of all reverse listing city directories produced.

ERIS has made every effort to provide accurate and complete information but shall not be held liable for missing, incomplete or inaccurate information. To complete this search we used the general range(s) below to search for relevant findings. If you believe there are additional addresses or streets that require searching please contact us at 866-517-5204.

Search Criteria:
BEG-1000 of Riverlands Way
All of Wise RD
Search Notes:

Search Results Summary

Date	Source	Comment
2022	DIGITAL BUSINESS DIRECTORY	
2020	DIGITAL BUSINESS DIRECTORY	
2016	DIGITAL BUSINESS DIRECTORY	
2012	DIGITAL BUSINESS DIRECTORY	
2008	DIGITAL BUSINESS DIRECTORY	
2003	DIGITAL BUSINESS DIRECTORY	
2000	DIGITAL BUSINESS DIRECTORY	
1997	HAINES	
1991	HAINES	
1987	HAINES	

2022 RIVERLANDS WAY

SOURCE: DIGITAL BUSINESS DIRECTORY

301 **AUDUBON CENTER AT RIVERLANDS**...*NONCLASSIFIED ESTABLISHMENTS*

301 **AUDUBON CENTER AT RIVERLANDS**...*ENVIRONMENTAL CONSERVATION/ECOLOGCL ORG*

301 **US ARMY CORPS OF ENGINEERS**...*GOVERNMENT OFFICES-US*

1000 **EDWARD 'TED'-PAT JONES**...*GENERAL GOVERNMENT*

2022 WISE RD

SOURCE: DIGITAL BUSINESS DIRECTORY

NO LISTING FOUND

2020 RIVERLANDS WAY

SOURCE: DIGITAL BUSINESS DIRECTORY

301 **AUDUBON CENTER AT RIVERLANDS**...*NONCLASSIFIED ESTABLISHMENTS*

301 **AUDUBON CENTER AT RIVERLANDS**...*ENVIRONMENTAL CONSERVATION/ECOLOGCL ORG*

301 **US ARMY CORPS OF ENGINEERS**...*GOVERNMENT OFFICES-US*

1000 **EDWARD 'TED'-PAT JONES**...*GENERAL GOVERNMENT*

2020 WISE RD

SOURCE: DIGITAL BUSINESS DIRECTORY

NO LISTING FOUND

2016 RIVERLANDS WAY

SOURCE: DIGITAL BUSINESS DIRECTORY

301 **AUDUBON CENTER AT RIVERLANDS**...*NONCLASSIFIED ESTABLISHMENTS*

2016 WISE RD

SOURCE: DIGITAL BUSINESS DIRECTORY

NO LISTING FOUND

2012 RIVERLANDS WAY

SOURCE: DIGITAL BUSINESS DIRECTORY

1000 **JONES CONFLUENCE POINT STATE**...*PARKS*

2012 WISE RD

SOURCE: DIGITAL BUSINESS DIRECTORY

NO LISTING FOUND

2008 RIVERLANDS WAY

SOURCE: DIGITAL BUSINESS DIRECTORY

1000 **JONES CONFLUENCE PT STATE PK**...*UNCLASSIFIED*

2008 WISE RD

SOURCE: DIGITAL BUSINESS DIRECTORY

NO LISTING FOUND

2003 RIVERLANDS WAY

SOURCE: DIGITAL BUSINESS DIRECTORY

NO LISTING FOUND

2003 WISE RD

SOURCE: DIGITAL BUSINESS DIRECTORY

NO LISTING FOUND

2000 RIVERLANDS WAY

SOURCE: DIGITAL BUSINESS DIRECTORY

0 **META PLANT FOOD INC**

2000 WISE RD

SOURCE: DIGITAL BUSINESS DIRECTORY

NO LISTING FOUND

1997 RIVERLANDS WAY

SOURCE: HAINES

STREET NOT LISTED

1997 WISE RD

SOURCE: HAINES



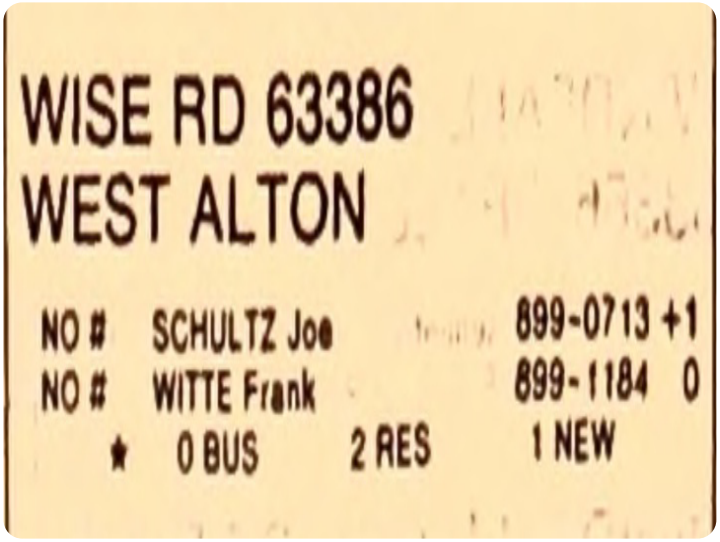
1991 RIVERLANDS WAY

SOURCE: HAINES

STREET NOT LISTED

1991 WISE RD

SOURCE: HAINES



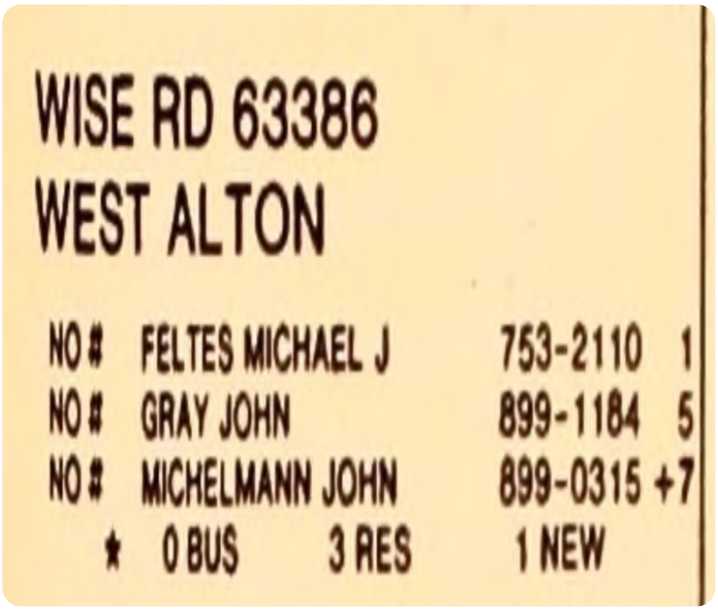
1987 RIVERLANDS WAY

SOURCE: HAINES

STREET NOT LISTED

1987 WISE RD

SOURCE: HAINES



HISTORICAL AERIALS

Project Property: West Alton Lake Phase I
15957 Deer Dr
West Alton MO

Project No:

Requested By: US Army Corps of Engineers

Order No: 23042100138

Date Completed: April 24,2023

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Date	Source	Scale	Comments
2022	MAXAR TECHNOLOGIES	1" = 700'	
2020	United States Department of Agriculture	1" = 700'	
2018	United States Department of Agriculture	1" = 700'	
2016	United States Department of Agriculture	1" = 700'	
2014	United States Department of Agriculture	1" = 700'	
2012	United States Department of Agriculture	1" = 700'	
2009	United States Department of Agriculture	1" = 700'	
2006	United States Department of Agriculture	1" = 700'	
1998	United States Geological Survey	1" = 700'	
1988	United States Geological Survey	1" = 700'	
1985	United States Geological Survey	1" = 700'	
1979	United States Geological Survey	1" = 700'	
1974	United States Geological Survey	1" = 700'	
1968	United States Geological Survey	1" = 700'	
1955	Agricultural Stabilization & Conserv. Service	1" = 700'	
1945	United States Geological Survey	1" = 700'	



Year: 2022
Source: MAXAR
Scale: 1" = 700'
Comment:

Address: 15957 Deer Dr, West Alton, MO
Approx Center: -90.20795141,38.88133685

Order No: 23042100138

ERIS



Year: 2020
Source: USDA
Scale: 1" = 700'
Comment:

Address: 15957 Deer Dr, West Alton, MO
Approx Center: -90.20795141,38.88133685

Order No: 23042100138

ERIS



Year: 2018
Source: USDA
Scale: 1" = 700'
Comment:

Address: 15957 Deer Dr, West Alton, MO
Approx Center: -90.20795141,38.88133685

Order No: 23042100138

ERIS



Year: 2016
Source: USDA
Scale: 1" = 700'
Comment:

Address: 15957 Deer Dr, West Alton, MO
Approx Center: -90.20795141,38.88133685

Order No: 23042100138

ERIS



Year: 2014
Source: USDA
Scale: 1" = 700'
Comment:

Address: 15957 Deer Dr, West Alton, MO
Approx Center: -90.20795141,38.88133685

Order No: 23042100138

ERIS



Year: 2012
Source: USDA
Scale: 1" = 700'
Comment:

Address: 15957 Deer Dr, West Alton, MO
Approx Center: -90.20795141,38.88133685

Order No: 23042100138

ERIS



Year: 2009
Source: USDA
Scale: 1" = 700'
Comment:

Address: 15957 Deer Dr, West Alton, MO
Approx Center: -90.20795141,38.88133685

Order No: 23042100138

ERIS



Year: 2006
Source: USDA
Scale: 1" = 700'
Comment:

Address: 15957 Deer Dr, West Alton, MO
Approx Center: -90.20795141,38.88133685

Order No: 23042100138

ERIS



Year: 1998
Source: USGS
Scale: 1" = 700'
Comment:

Address: 15957 Deer Dr, West Alton, MO
Approx Center: -90.20795141,38.88133685

Order No: 23042100138

ERIS



Year: 1988
Source: USGS
Scale: 1" = 700'
Comment:

Address: 15957 Deer Dr, West Alton, MO
Approx Center: -90.20795141,38.88133685

Order No: 23042100138

ERIS



Year: 1985
Source: USGS
Scale: 1" = 700'
Comment:

Address: 15957 Deer Dr, West Alton, MO
Approx Center: -90.20795141,38.88133685

Order No: 23042100138

ERIS



Year: 1979
Source: USGS
Scale: 1" = 700'
Comment:

Address: 15957 Deer Dr, West Alton, MO
Approx Center: -90.20795141,38.88133685

Order No: 23042100138

ERIS



Year: 1974
Source: USGS
Scale: 1" = 700'
Comment:

Address: 15957 Deer Dr, West Alton, MO
Approx Center: -90.20795141,38.88133685

Order No: 23042100138

ERIS



Year: 1968
Source: USGS
Scale: 1" = 700'
Comment:

Address: 15957 Deer Dr, West Alton, MO
Approx Center: -90.20795141,38.88133685

Order No: 23042100138

ERIS



Year: 1955
Source: ASCS
Scale: 1" = 700'
Comment:

Address: 15957 Deer Dr, West Alton, MO
Approx Center: -90.20795141,38.88133685

Order No: 23042100138

ERIS



Year: 1945
Source: USGS
Scale: 1" = 700'
Comment:

Address: 15957 Deer Dr, West Alton, MO
Approx Center: -90.20795141,38.88133685

Order No: 23042100138

ERIS

TOPOGRAPHIC MAPS

Project Property:	West Alton Lake Phase I 15957 Deer Dr West Alton MO None
Project No:	None
Requested By:	US Army Corps of Engineers
Order No:	23042100138
Date Completed:	April 22, 2023

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We have searched USGS collections of current topographic maps and historical topographic maps for the project property. Below is a list of maps found for the project property and adjacent area. Maps are from 7.5 and 15 minute topographic map series, if available.

Year	Map Series
2021	7.5
2015	7.5
1998	7.5
1994	7.5
1979	7.5
1974	7.5
1968	7.5
1954	7.5
1951	7.5
1950	7.5
1948	7.5
1935	7.5
1955	15
1934	15
1927	15

Topographic Map Symbology for the maps may be available in the following documents:

Pre-1947

Page 223 of 1918 Topographic Instructions

Page 130 of 1928 Topographic Instructions

1947-2009

Topographic Map Symbols

2009-present

US Topo Map Symbols

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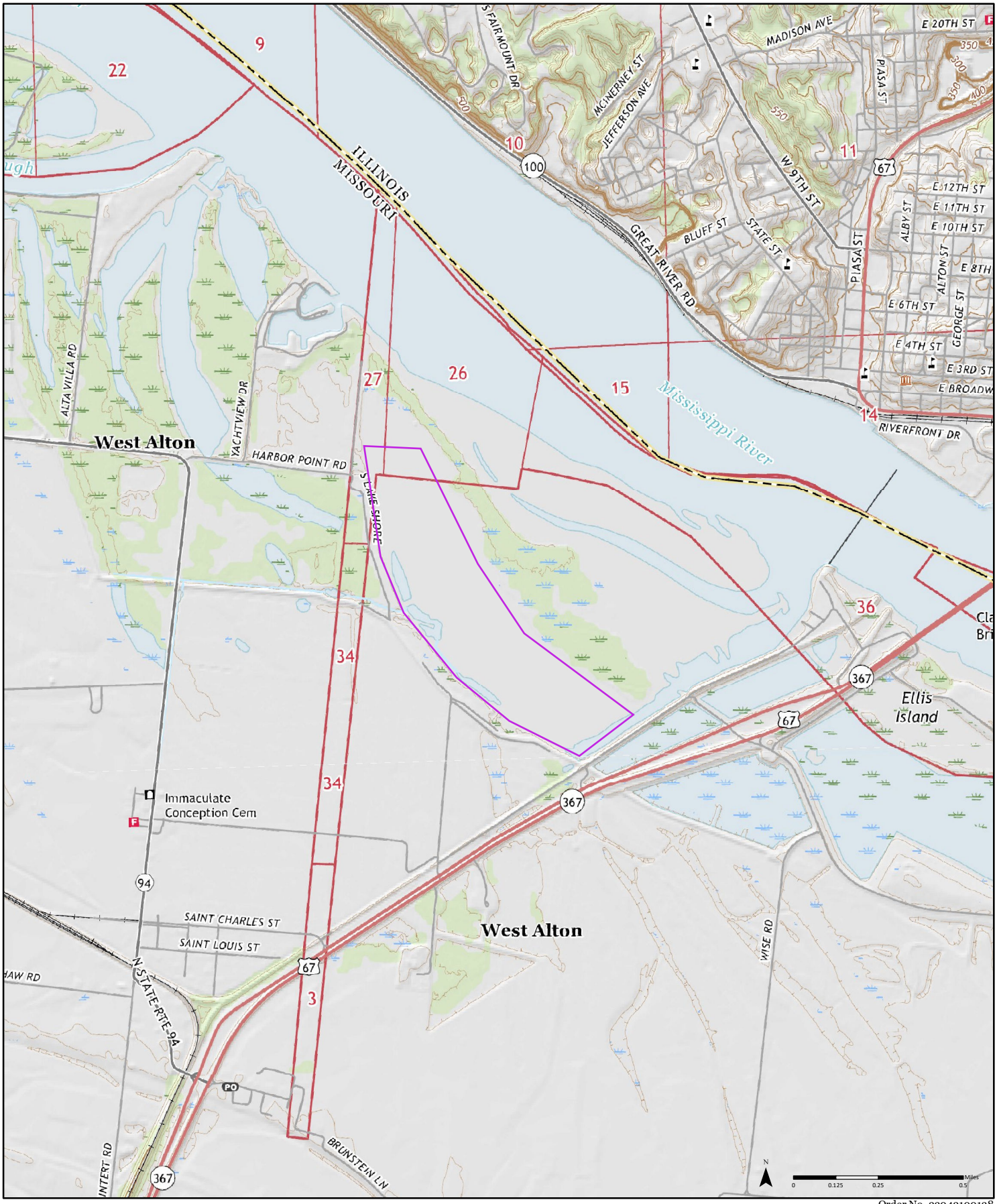
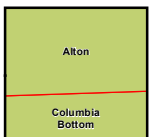


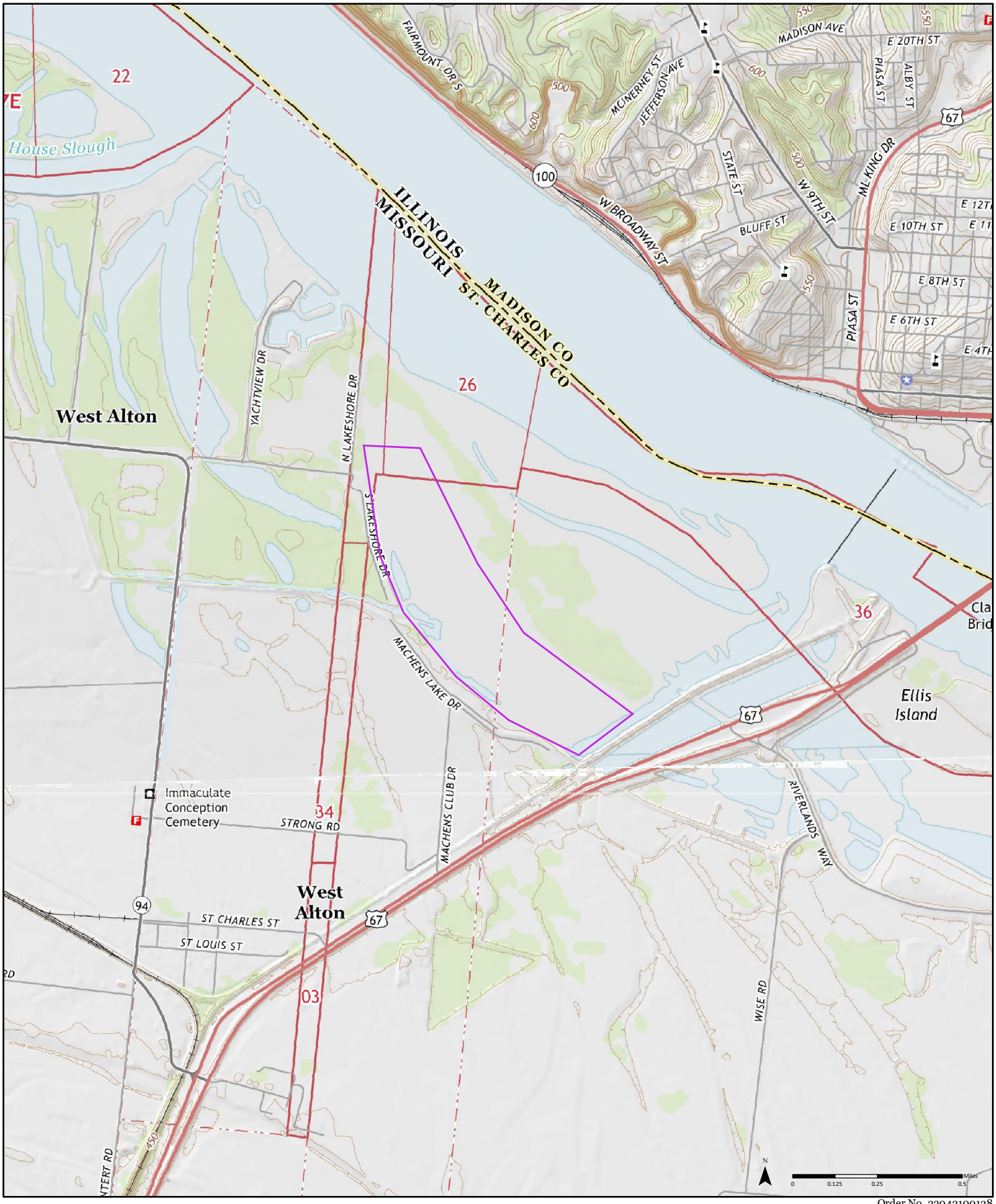
Order No. 23042100138

2021



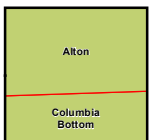
Available Quadrangle(s): Columbia Bottom, MO
Alton, IL

Source: USGS 7.5 Minute Topographic Map



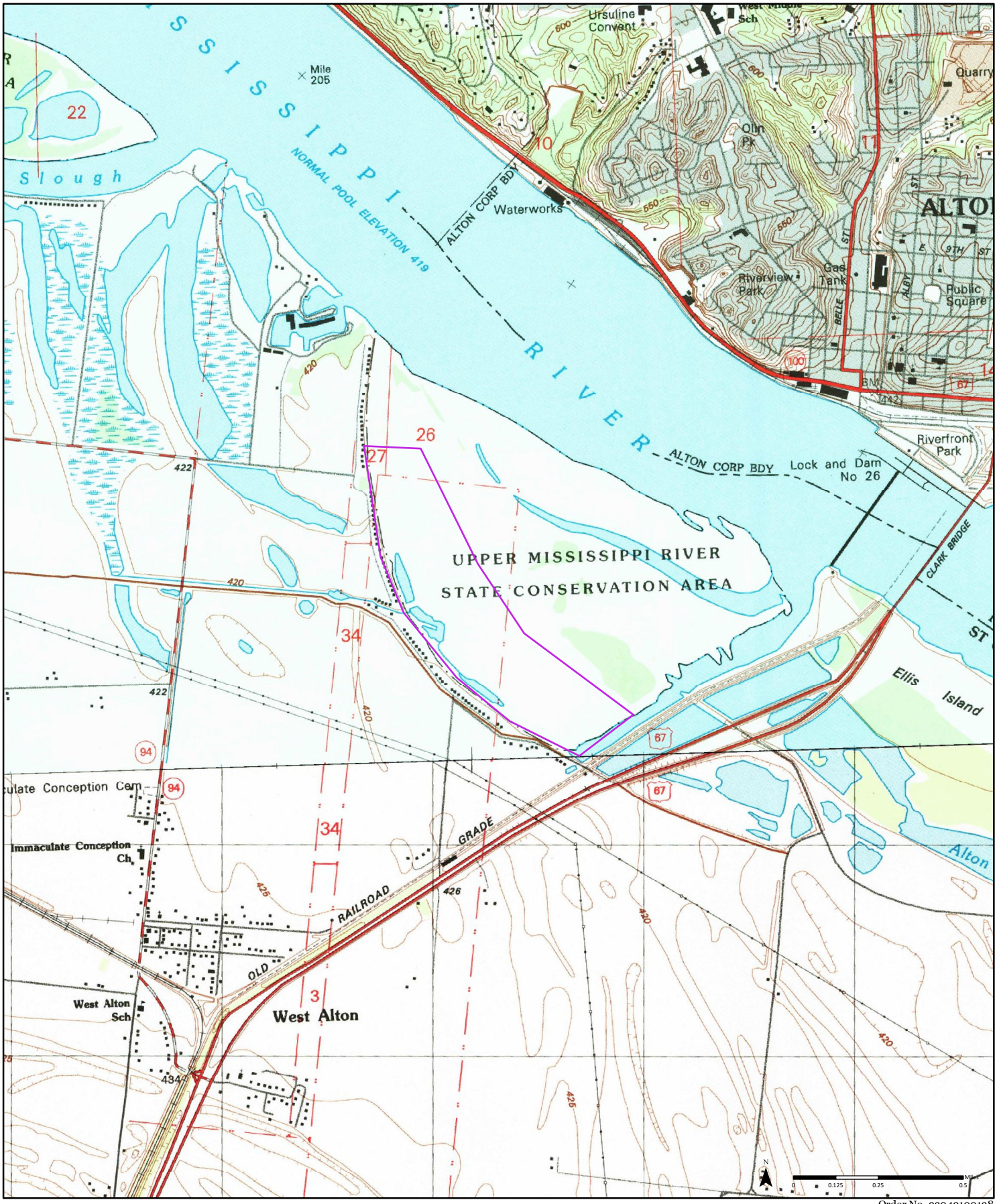
Order No. 23042100138

2015



Available Quadrangle(s): Alton, IL
Columbia Bottom, MO

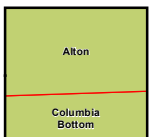
Source: USGS 7.5 Minute Topographic Map



1998 (1-1998) *Aerial Photo Year: 1998* (2-1994) *Aerial Photo Year: 1988*

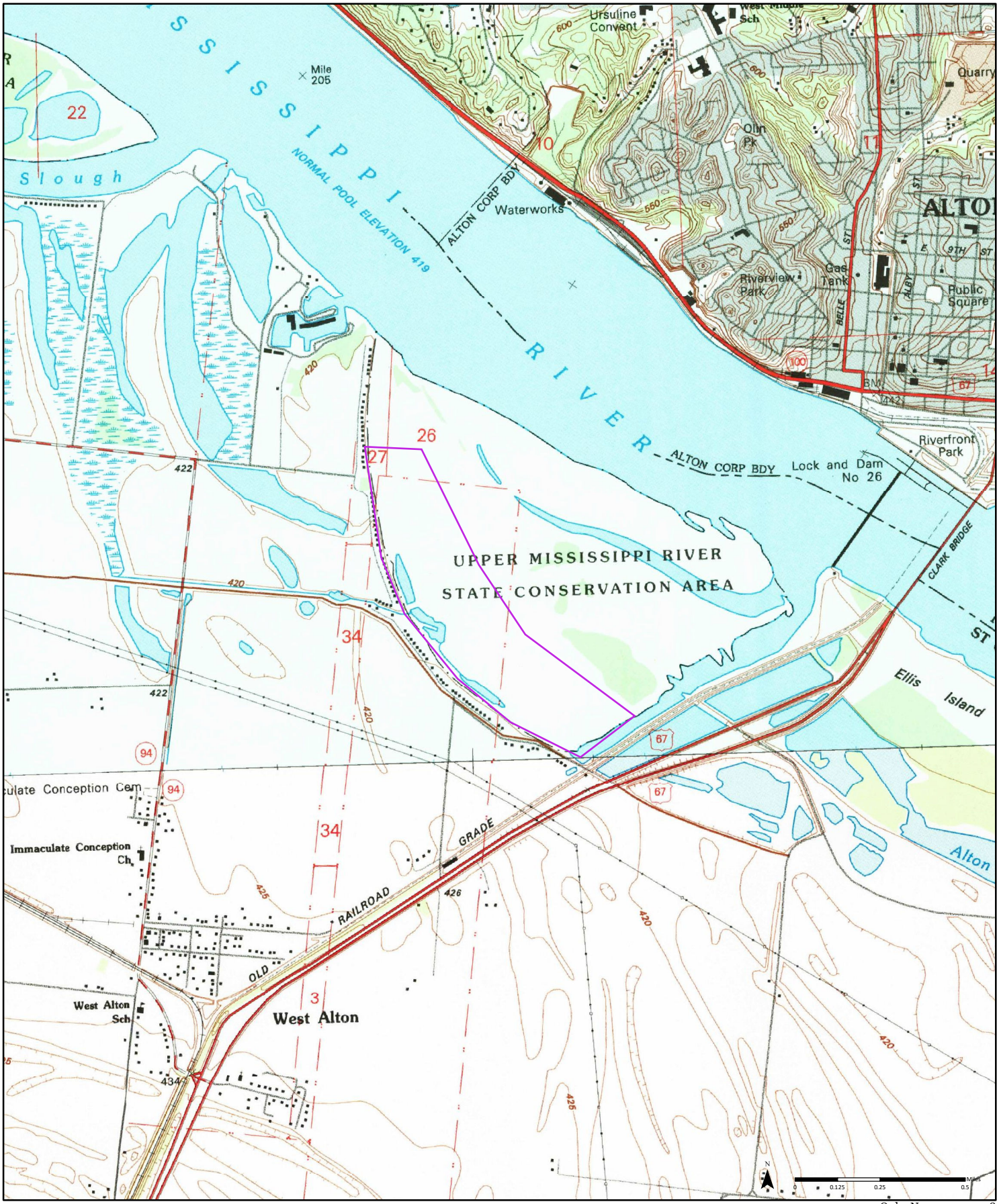
Order No. 23042100138

Available Quadrangle(s): Columbia Bottom, MO(1-1998)
Alton, IL(2-1994)



Source: USGS 7.5 Minute Topographic Map

ERIS

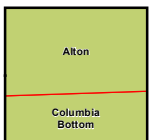


1994

(1-1994) *Aerial Photo Year: 1988*

(2-1994) *Aerial Photo Year: 1988*

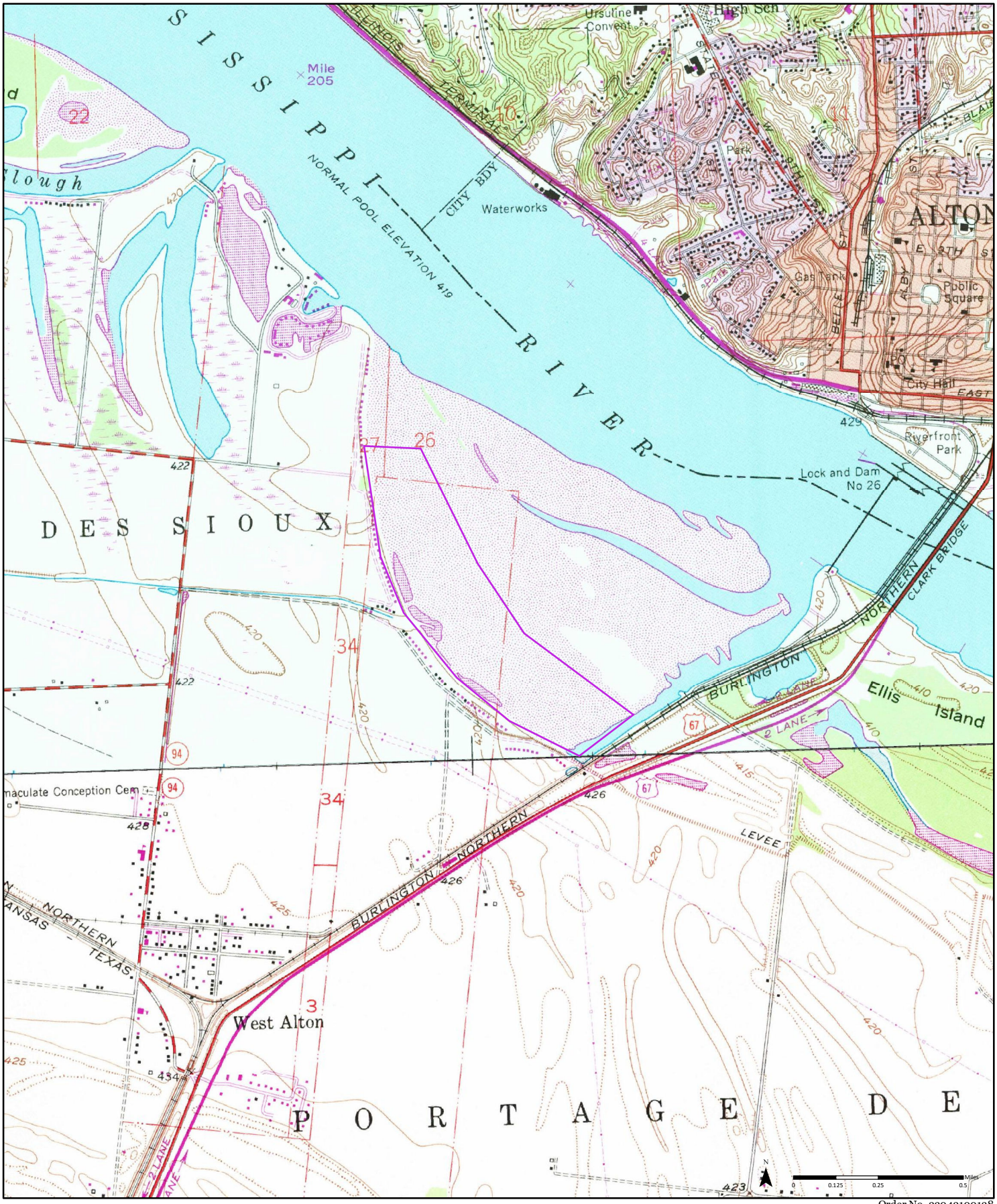
Order No. 23042100138



Available Quadrangle(s): Columbia Bottom, MO(1-1994)
Alton, IL(2-1994)

Source: USGS 7.5 Minute Topographic Map

ERIS

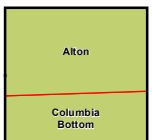


1979

(1-1974) *Aerial Photo Year: 1974*
Photo Revision Year: 1974

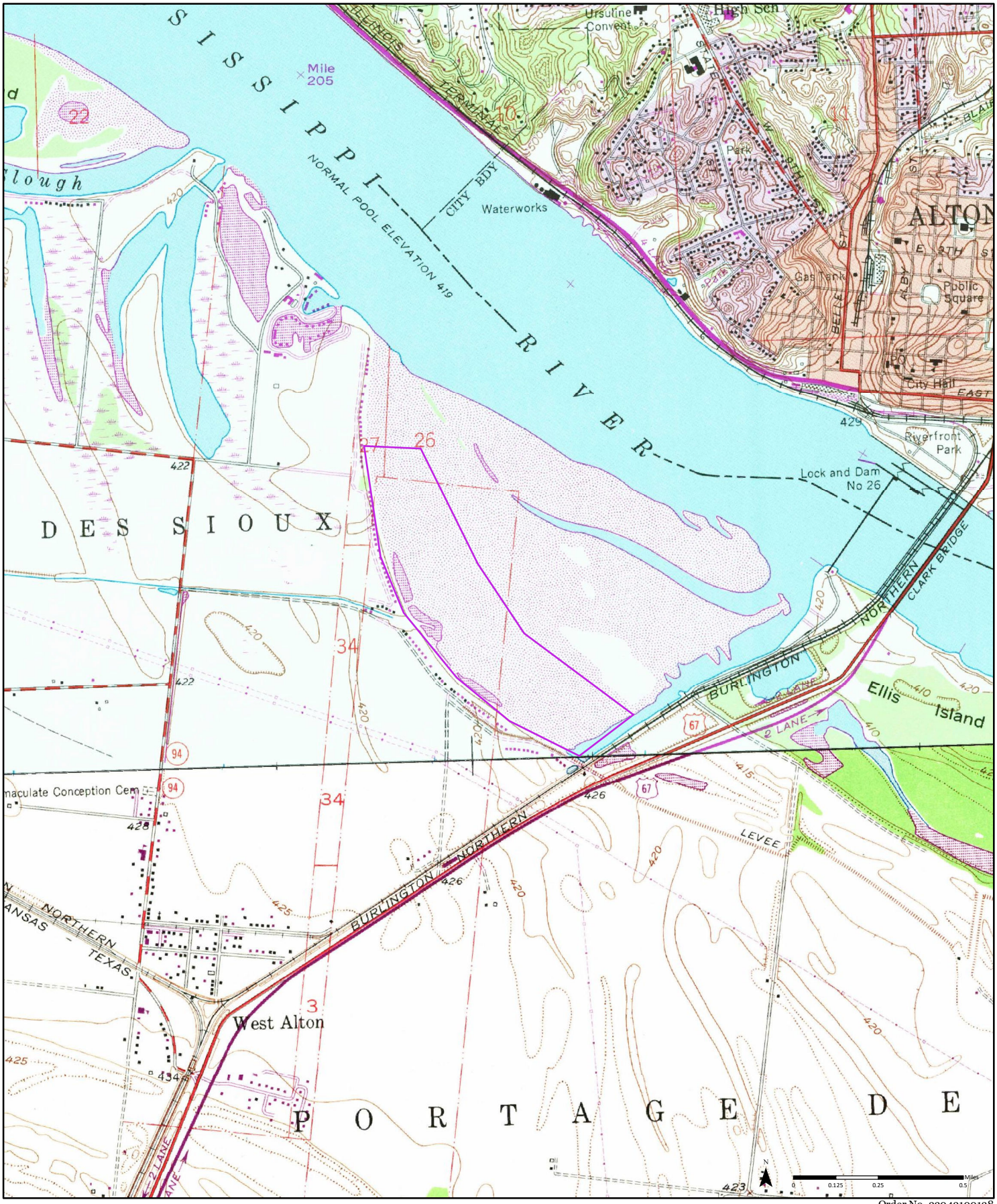
(2-1979) *Aerial Photo Year: 1979*
Photo Revision Year: 1974

Order No. 23042100138



Available Quadrangle(s): Alton, IL(1-1974)
Columbia Bottom, MO(2-1979)

Source: USGS 7.5 Minute Topographic Map

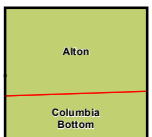


1974

(1-1974) *Aerial Photo Year: 1974*
Photo Revision Year: 1974

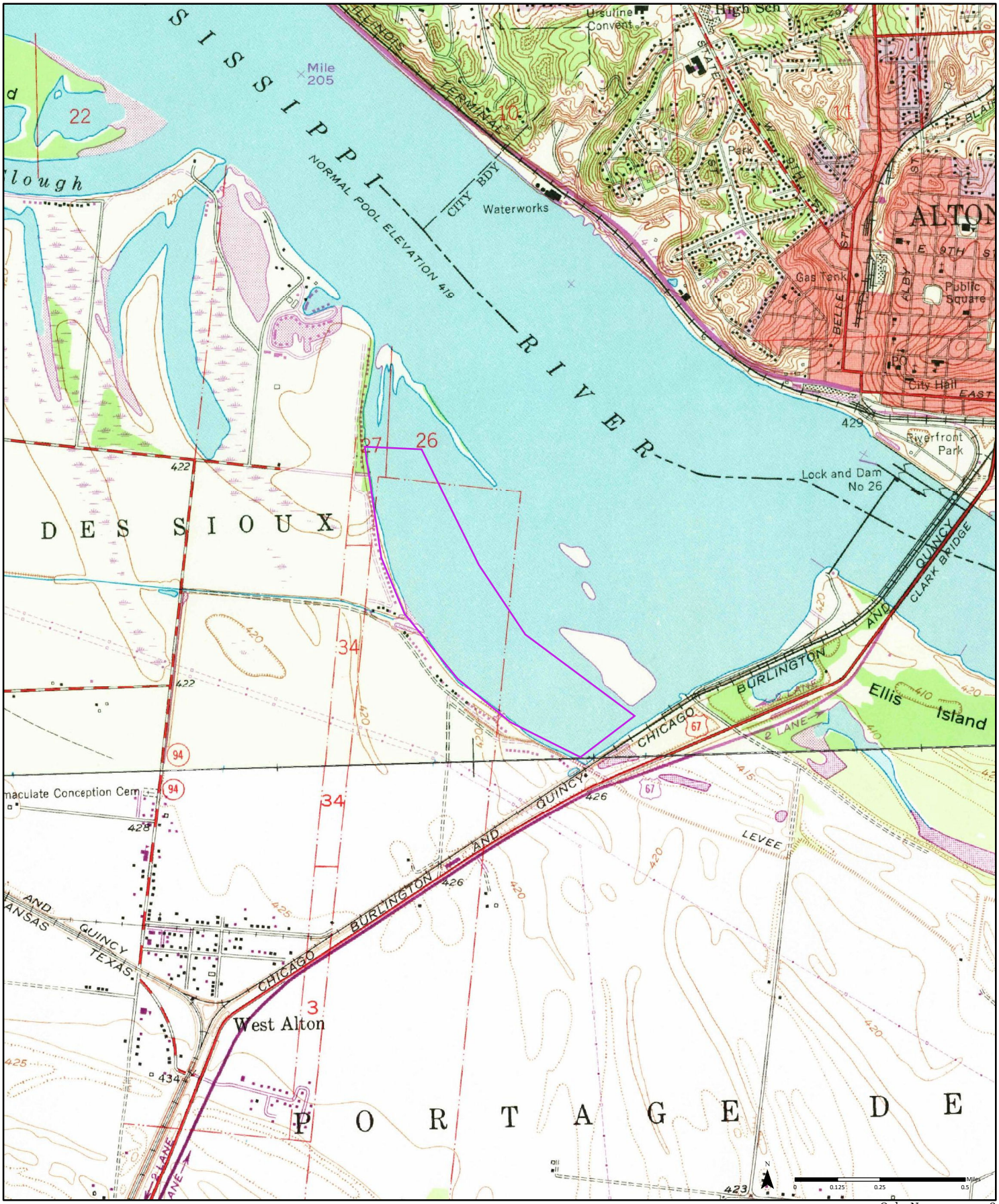
(2-1974) *Aerial Photo Year: 1974*
Photo Revision Year: 1974

Order No. 23042100138



Available Quadrangle(s): Alton, IL(1-1974)
Columbia Bottom, MO(2-1974)

Source: USGS 7.5 Minute Topographic Map

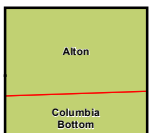


1968

(1-1968) *Aerial Photo Year: 1968*
Photo Revision Year: 1968

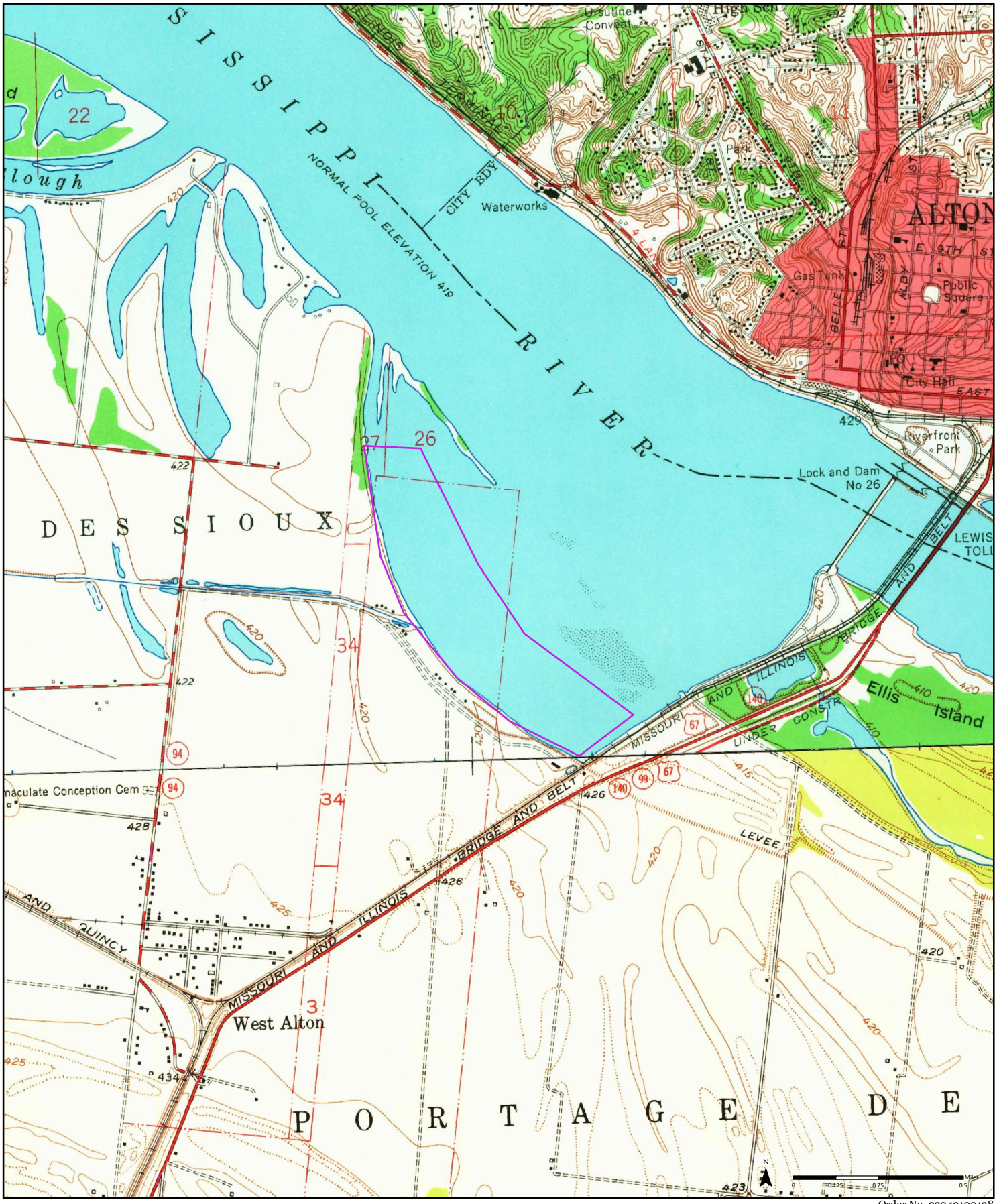
(2-1968) *Aerial Photo Year: 1968*
Photo Revision Year: 1968

Order No. 23042100138



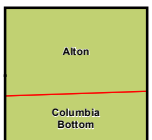
Available Quadrangle(s): Alton, IL(1-1968)
Columbia Bottom, MO(2-1968)

Source: USGS 7.5 Minute Topographic Map



1954 (1-1951) *Aerial Photo Year: 1941* (2-1954) *Aerial Photo Year: 1952*

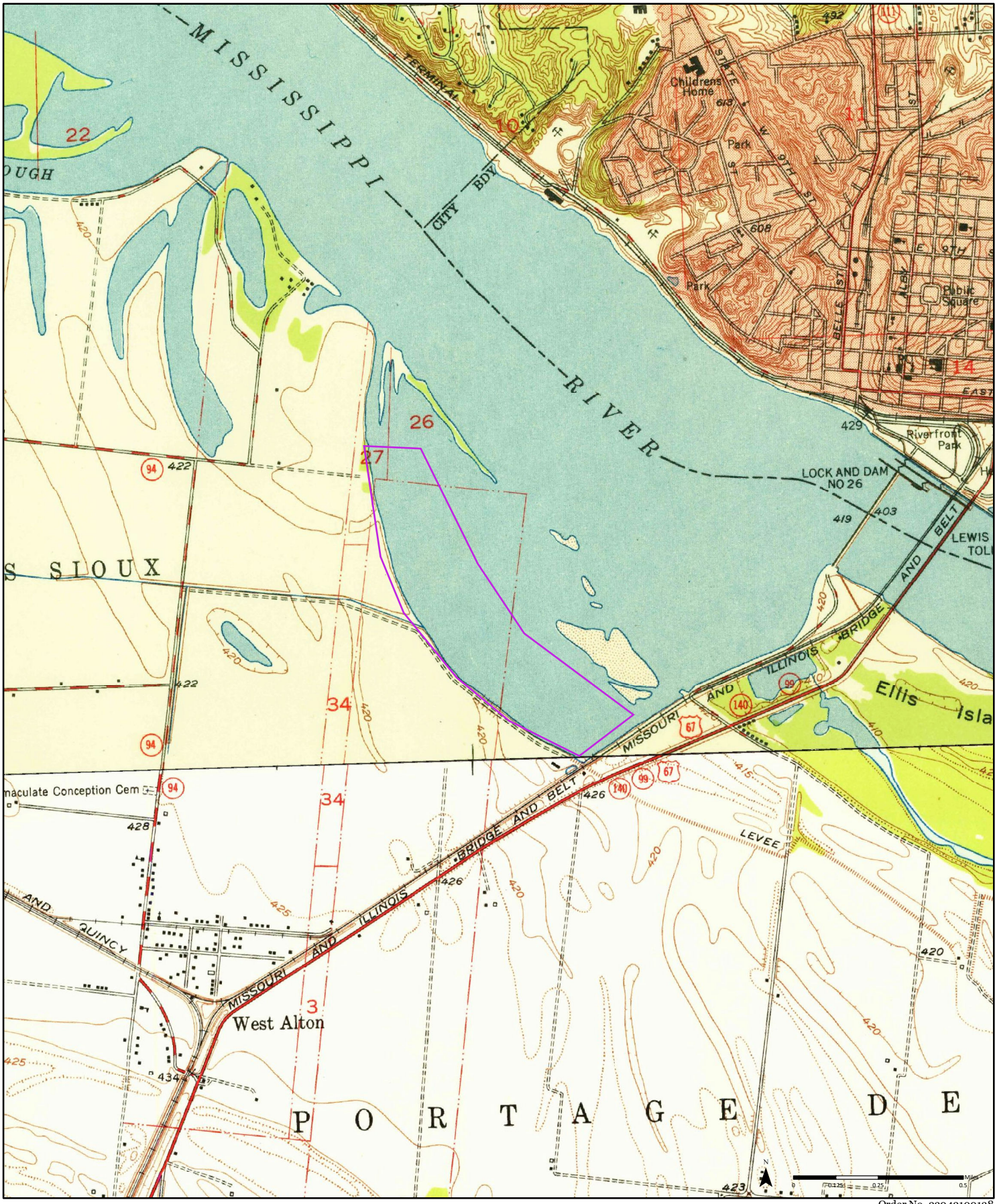
Order No. 23042100138



Available Quadrangle(s): Columbia Bottom, MO(1-1951)
Alton, IL(2-1954)

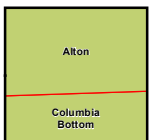
Source: USGS 7.5 Minute Topographic Map

ERIS



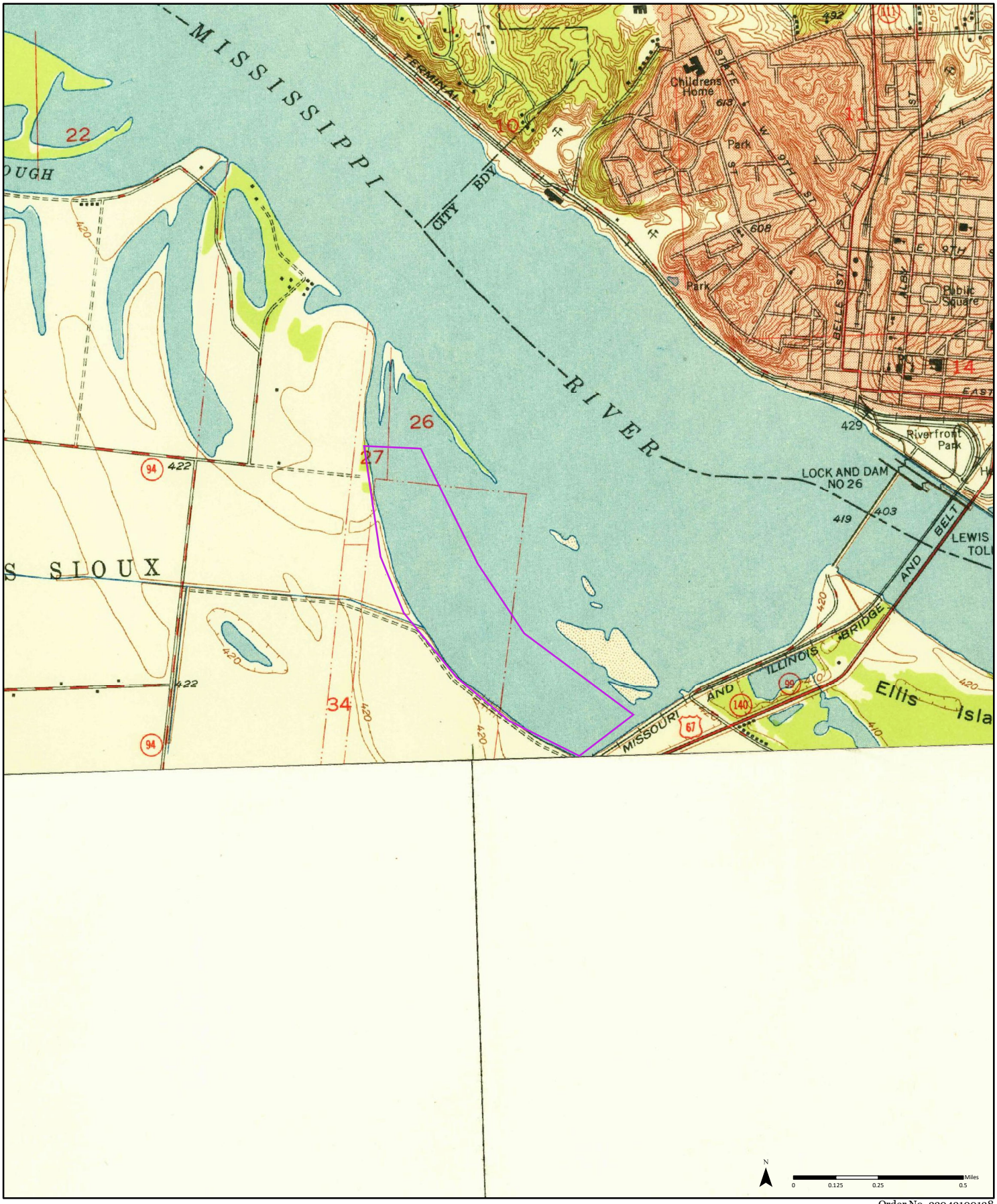
1951 (1-1951) *Aerial Photo Year: 1941* (2-1950) *Aerial Photo Year: 1945*

Order No. 23042100138



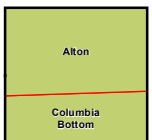
Available Quadrangle(s): Columbia Bottom, MO(1-1951)
Alton, IL(2-1950)

Source: USGS 7.5 Minute Topographic Map



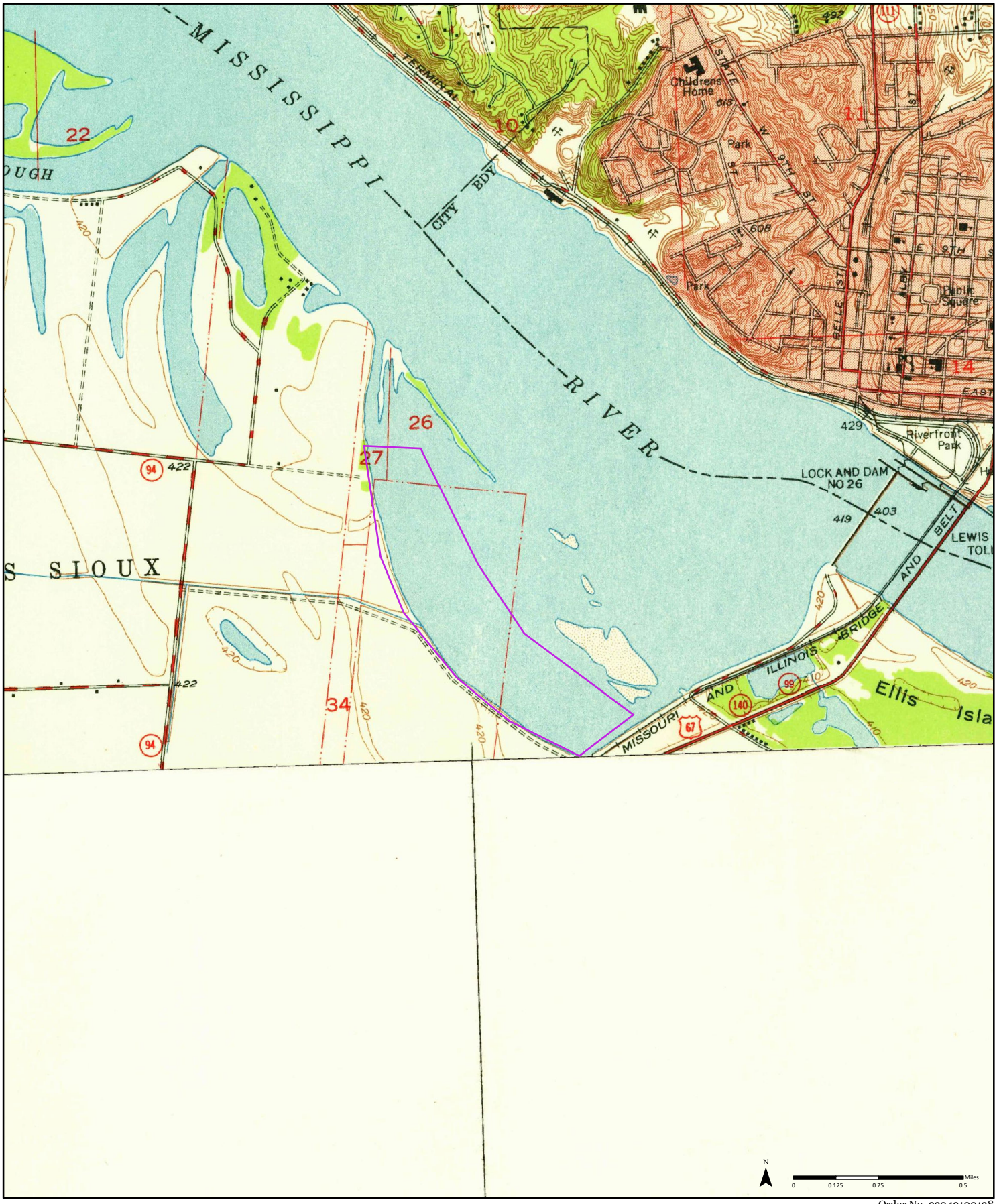
Order No. 23042100138

1950



Available Quadrangle(s): Alton, IL(1-1950)
Columbia Bottom, MO

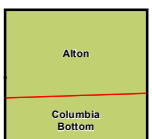
Source: USGS 7.5 Minute Topographic Map



Order No. 23042100138

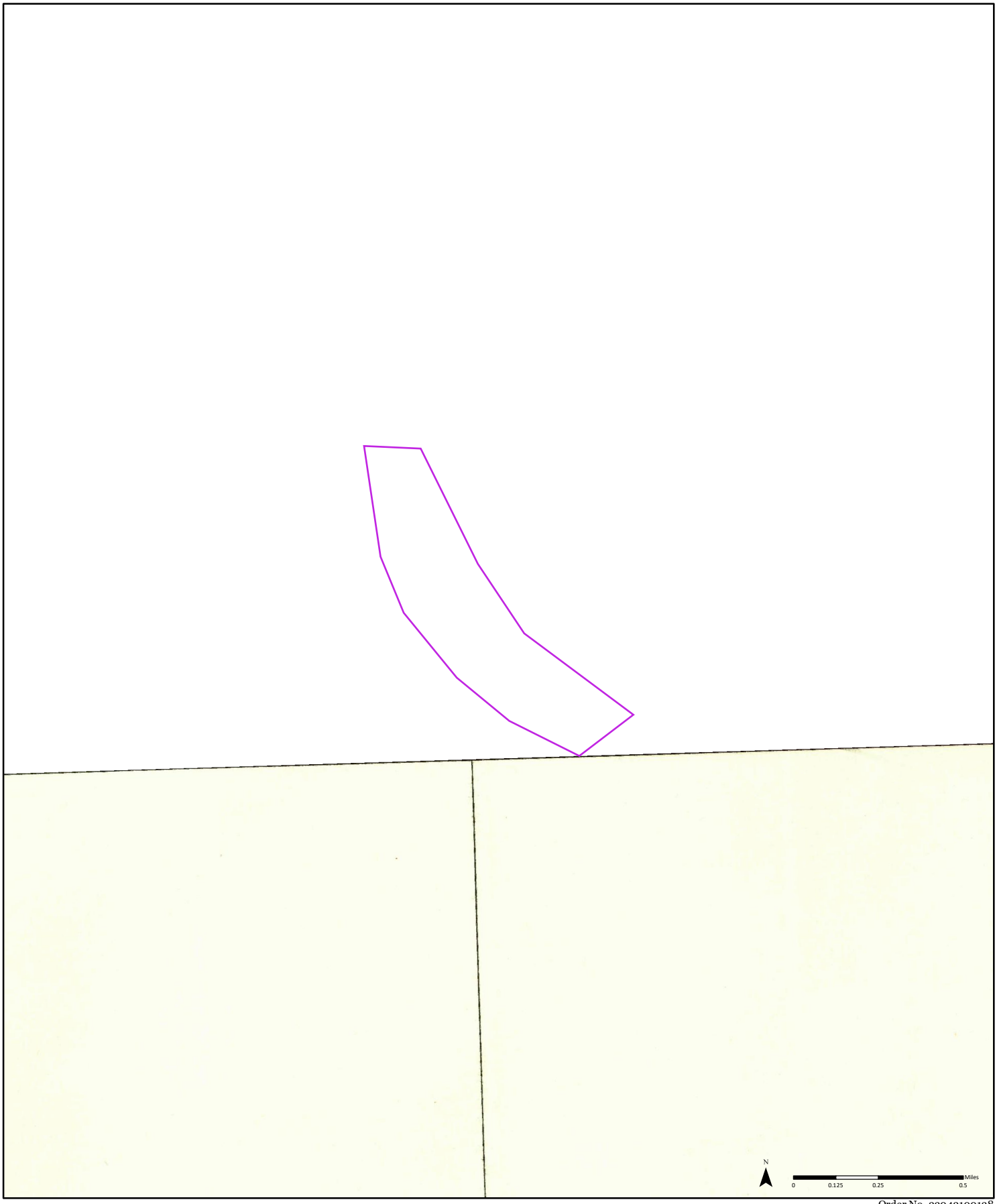
1948

Available Quadrangle(s): Alton, IL(1-1948)
Columbia Bottom, MO



Source: USGS 7.5 Minute Topographic Map

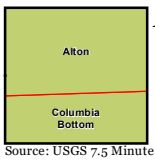
ERIS



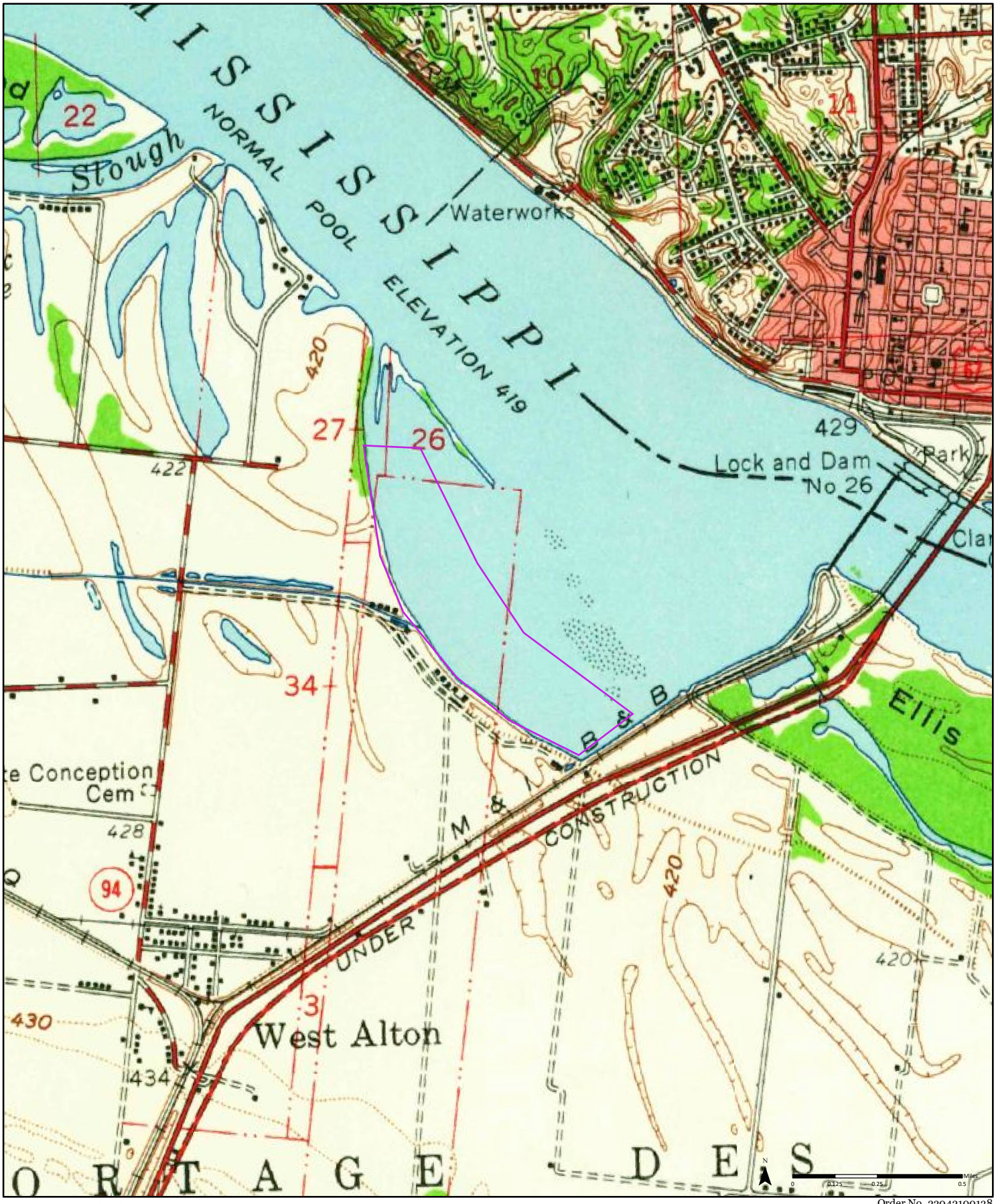
Order No. 23042100138

1935

Available Quadrangle(s): Columbia Bottom, MO



Source: USGS 7.5 Minute Topographic Map

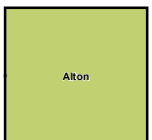


1955 *(1-1955)*

Aerial Photo Year: 1955

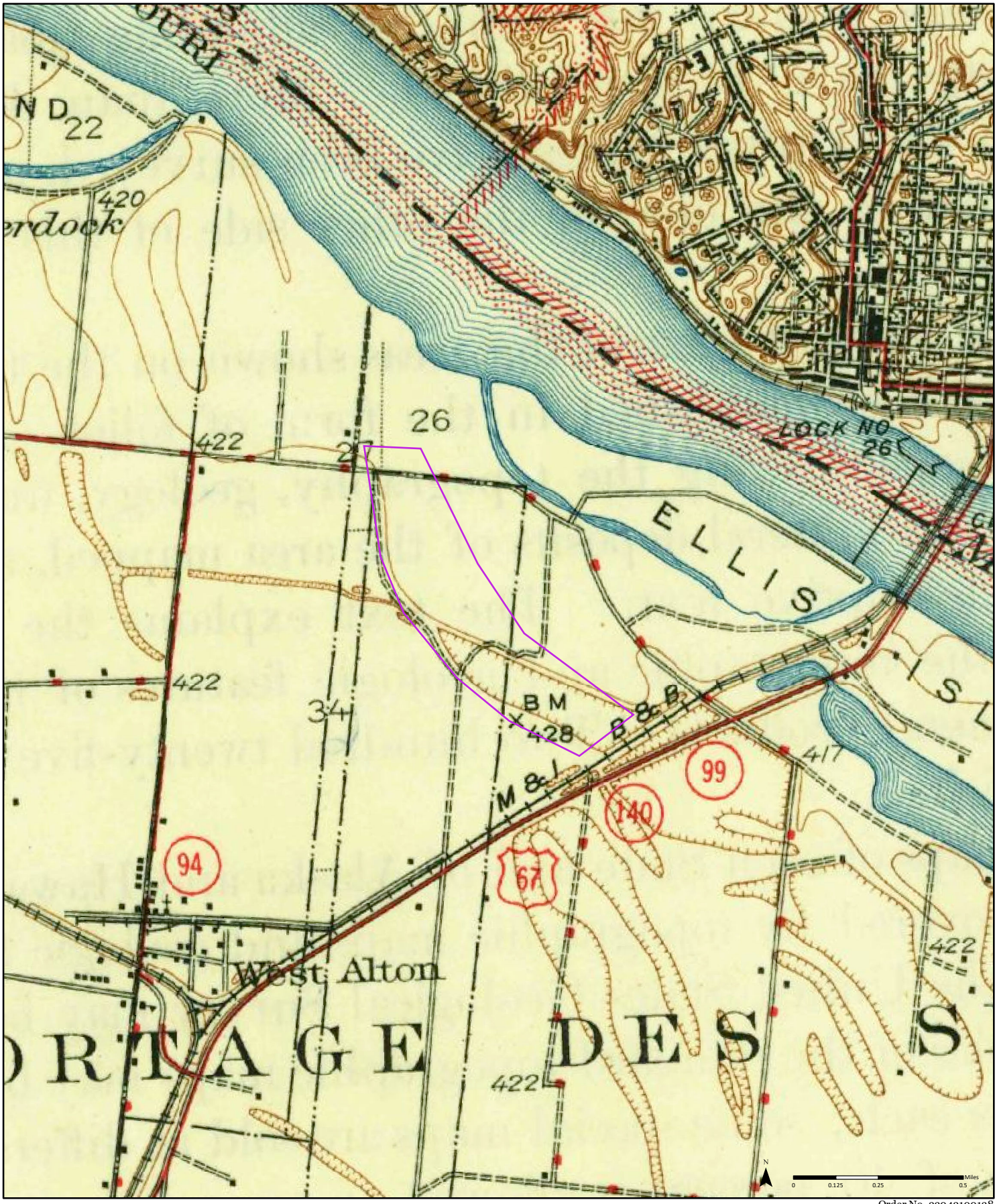
Order No. 23042100138

Available Quadrangle(s): Alton, IL(1-1955)



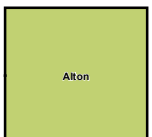
Source: USGS 15 Minute Topographic Map

ERIS



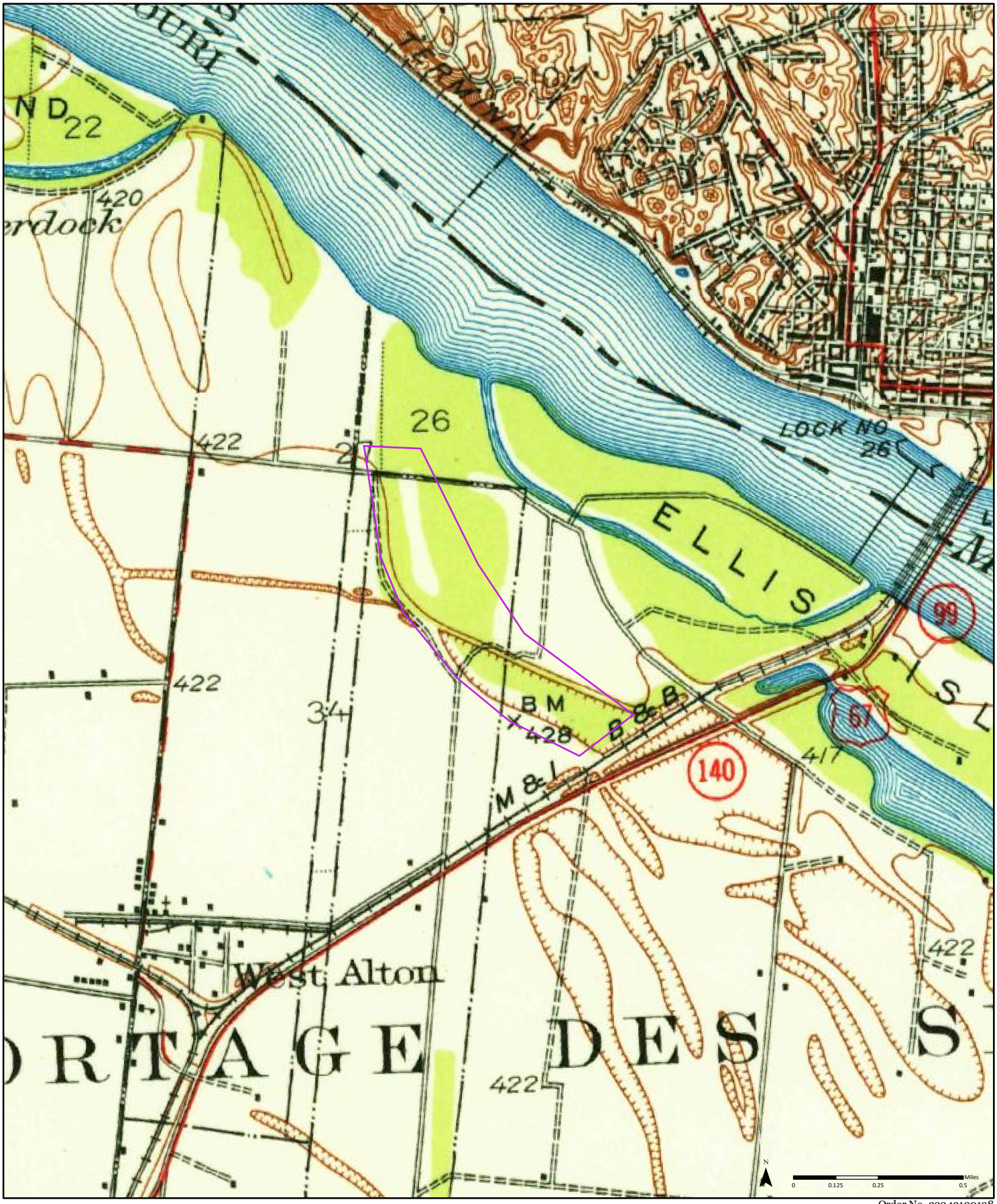
Order No. 23042100138

1934



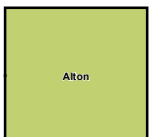
Available Quadrangle(s): Alton, IL

Source: USGS 15 Minute Topographic Map



Order No. 23042100138

1927



Available Quadrangle(s): Alton, IL

Source: USGS 15 Minute Topographic Map

DATABASE REPORT

Project Property:	*West Alton Phase I* *n/a* *Portage Des Sioux MO*
Project No:	
Report Type:	*Database Report*
Order No:	*23042100139*
Requested by:	*US Army Corps of Engineers*
Date Completed:	*April 25, 2023*

Environmental Risk Information Services
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Executive Summary

Property Information:

Project Property:		*West Alton Phase I* *n/a Portage Des Sioux MO*
Project No:		
Coordinates:		
	Latitude:	*38.94267315*
	Longitude:	*-90.36496062*
	UTM Northing:	*4,313,717.05*
	UTM Easting:	*728,373.77*
	UTM Zone:	*UTM Zone 15S*
Elevation:		*418 FT*

Order Information:

Order No:	*23042100139*
Date Requested:	*April 21, 2023*
Requested by:	*US Army Corps of Engineers*
Report Type:	*Database Report*

Historicals/Products:

Aerial Photographs	*Historical Aerials (with Project Boundaries)*
City Directory Search	*CD - 2 Street Search*
ERIS Xplorer	*ERIS Xplorer*
Excel Add-On	*Excel Add-On*
Fire Insurance Maps	*US Fire Insurance Maps*
Physical Setting Report (PSR)	*Physical Setting Report (PSR)*
Topographic Map	*Topographic Maps*

Executive Summary: Report Summary

Database	Searched	Search Radius	Project Property	Within 0.12mi	0.125mi to 0.25mi	0.25mi to 0.50mi	0.50mi to 1.00mi	Total
Standard Environmental Records								
Federal								
NPL	Y	1	0	0	0	0	0	0
PROPOSED NPL	Y	1	0	0	0	0	0	0
DELETED NPL	Y	0.5	0	0	0	0	-	0
SEMS	Y	0.5	0	0	0	0	-	0
ODI	Y	0.5	0	0	0	0	-	0
SEMS ARCHIVE	Y	0.5	0	0	0	0	-	0
CERCLIS	Y	0.5	0	0	0	0	-	0
IODI	Y	0.5	0	0	0	0	-	0
CERCLIS NFRAP	Y	0.5	0	0	0	0	-	0
CERCLIS LIENS	Y	PO	0	-	-	-	-	0
RCRA CORRACTS	Y	1	0	0	0	0	0	0
RCRA TSD	Y	0.5	0	0	0	0	-	0
RCRA LQG	Y	0.25	0	0	0	-	-	0
RCRA SQG	Y	0.25	0	0	0	-	-	0
RCRA VSQG	Y	0.25	0	0	0	-	-	0
RCRA NON GEN	Y	0.25	0	0	0	-	-	0
RCRA CONTROLS	Y	0.5	0	0	0	0	-	0
FED ENG	Y	0.5	0	0	0	0	-	0
FED INST	Y	0.5	0	0	0	0	-	0
LUCIS	Y	0.5	0	0	0	0	-	0
NPL IC	Y	0.5	0	0	0	0	-	0
ERNS 1982 TO 1986	Y	PO	0	-	-	-	-	0
ERNS 1987 TO 1989	Y	PO	0	-	-	-	-	0
ERNS	Y	PO	0	-	-	-	-	0
FED BROWNFIELDS	Y	0.5	0	0	0	0	-	0
FEMA UST	Y	0.25	0	0	0	-	-	0
FRP	Y	0.25	0	0	0	-	-	0

Database	Searched	Search Radius	Project Property	Within 0.12mi	0.125mi to 0.25mi	0.25mi to 0.50mi	0.50mi to 1.00mi	Total
DELISTED FRP	Y	0.25	0	0	0	-	-	0
HIST GAS STATIONS	Y	0.25	0	0	0	-	-	0
REFN	Y	0.25	0	0	0	-	-	0
BULK TERMINAL	Y	0.25	0	0	0	-	-	0
SEMS LIEN	Y	PO	0	-	-	-	-	0
SUPERFUND ROD	Y	1	0	0	0	0	0	0
DOE FUSRAP	Y	1	0	0	0	0	0	0
State								
SHWS	Y	1	0	0	0	0	0	0
SMAR	Y	0.5	0	0	0	0	-	0
DELISTED SHWS	Y	1	0	0	0	0	0	0
REMOVED SHWS	Y	0.5	0	0	0	0	-	0
DELISTED HWC	Y	1	0	0	0	0	0	0
DEL SHWS	Y	1	0	0	0	0	0	0
HWCP	Y	1	0	0	0	0	0	0
SWF/LF	Y	0.5	0	0	0	0	-	0
LST	Y	0.5	0	0	**1**	0	-	**1**
DELISTED LST	Y	0.5	0	0	0	0	-	0
TANK AUL	Y	0.5	0	0	0	0	-	0
UST	Y	0.25	0	0	**1**	-	-	**1**
AST	Y	0.25	0	0	0	-	-	0
DEL TANK	Y	0.25	0	0	**2**	-	-	**2**
AUL	Y	0.5	0	0	0	0	-	0
VCP	Y	0.5	0	0	0	0	-	0
BROWNFIELDS	Y	0.5	0	0	0	0	-	0
Tribal								
INDIAN LUST	Y	0.5	0	0	0	0	-	0
INDIAN UST	Y	0.25	0	0	0	-	-	0
DELISTED INDIAN LST	Y	0.5	0	0	0	0	-	0
DELISTED INDIAN UST	Y	0.25	0	0	0	-	-	0

County ***No County databases were selected to be included in the search.***

Additional Environmental Records

Federal

Database	Searched	Search Radius	Project Property	Within 0.12mi	0.125mi to 0.25mi	0.25mi to 0.50mi	0.50mi to 1.00mi	Total
FINDS/FRS	Y	PO	0	-	-	-	-	0
TRIS	Y	PO	0	-	-	-	-	0
PFAS NPL	Y	0.5	0	0	0	0	-	0
PFAS FED SITES	Y	0.5	0	0	0	0	-	0
PFAS SSEHRI	Y	0.5	0	0	0	0	-	0
ERNS PFAS	Y	0.5	0	0	0	0	-	0
PFAS NPDES	Y	0.5	0	0	0	0	-	0
PFAS TRI	Y	0.5	0	0	0	0	-	0
PFAS WATER	Y	0.5	0	0	0	0	-	0
PFAS TSCA	Y	0.5	0	0	0	0	-	0
PFAS E-MANIFEST	Y	0.5	0	0	0	0	-	0
HMIRS	Y	0.125	0	0	-	-	-	0
NCDL	Y	0.125	0	0	-	-	-	0
TSCA	Y	0.125	0	0	-	-	-	0
HIST TSCA	Y	0.125	0	0	-	-	-	0
FTTS ADMIN	Y	PO	0	-	-	-	-	0
FTTS INSP	Y	PO	0	-	-	-	-	0
PRP	Y	PO	0	-	-	-	-	0
SCRD DRYCLEANER	Y	0.5	0	0	0	0	-	0
ICIS	Y	PO	0	-	-	-	-	0
FED DRYCLEANERS	Y	0.25	0	0	0	-	-	0
DELISTED FED DRY	Y	0.25	0	0	0	-	-	0
FUDS	Y	1	0	0	0	0	0	0
FORMER NIKE	Y	1	0	0	0	0	0	0
PIPELINE INCIDENT	Y	PO	0	-	-	-	-	0
MLTS	Y	PO	0	-	-	-	-	0
HIST MLTS	Y	PO	0	-	-	-	-	0
MINES	Y	0.25	0	0	0	-	-	0
SMCRA	Y	1	0	0	0	0	0	0
MRDS	Y	1	0	0	0	**1**	0	**1**
LM SITES	Y	1	0	0	0	0	0	0
ALT FUELS	Y	0.25	0	0	0	-	-	0
CONSENT DECREES	Y	0.25	0	0	0	-	-	0
AFS	Y	PO	0	-	-	-	-	0
SSTS	Y	0.25	0	0	0	-	-	0

Database	Searched	Search Radius	Project Property	Within 0.12mi	0.125mi to 0.25mi	0.25mi to 0.50mi	0.50mi to 1.00mi	Total
PCBT	Y	0.5	0	0	0	0	-	0
PCB	Y	0.5	0	0	0	0	-	0
State								
PFAS	Y	0.5	0	0	0	0	-	0
DRYCLEANERS	Y	0.25	0	0	0	-	-	0
DELISTED DRYCLEANERS	Y	0.25	0	0	0	-	-	0
SPILLS	Y	0.125	**1**	**1**	-	-	-	**2**
TIER 2	Y	0.125	0	0	-	-	-	0
Tribal	***No Tribal additional environmental record sources available for this State.***							
County	***No County additional environmental record sources available for this State.***							
Total:			**1**	**1**	**4**	**1**	0	**7**

**** PO – Property Only***
**** 'Property and adjoining properties' database search radii are set at 0.25 miles.***

Executive Summary: Site Report Summary - Project Property

Map Key	DB	Company/Site Name	Address	Direction	Distance (mi/ft)	Elev Diff (ft)	Page Number
1	SPILLS	Portage Des Sioux Power Plant	Highway 94 Portage Des Sioux MO ***Spill No:*** *0511042140LJT*	ESE	0.00 / 0.00	0	17

Executive Summary: Site Report Summary - Surrounding Properties

Map Key	DB	Company/Site Name	Address	Direction	Distance (mi/ft)	Elev Diff (ft)	Page Number
2	SPILLS	National Response Center	HIDEAWAY HARBOR Park (Near PORTAGE DES SIOUX) St. Charles MO ***Spill No:*** 0411161109HRM	WSW	0.03 / 142.66	4	17
3	DEL TANK	Venetian Harbor	1 Venetian Drive Portage Des Souix MO 63373	SE	0.19 / 985.47	5	19
3	DEL TANK	Liberty Harbor	#1 Venetian Road Portage Des Sioux MO 63373	SE	0.19 / 985.47	5	19
4	UST	LIBERTY HARBOR	#1 LIBERTY HARBOR DRIVE PORTAGE DES SIOUX MO 63373 ***Facility ID | Active:*** ST0020771 | No ***Tank ID | Tank Type Desc | Date Closed:*** 1 | Below Ground | 9/13/2012, 2 | Below Ground | 9/13/2012	SE	0.24 / 1,254.47	8	20
4	LST	LIBERTY HARBOR	#1 LIBERTY HARBOR DRIVE PORTAGE DES SIOUX MO 63373 ***Facility ID | Active:*** ST0020771 | No	SE	0.24 / 1,254.47	8	24
5	MRDS	WESTERN WHITING COMPANY QUARRY	JERSEY COUNTY ELSAH IL 62028 ***Dep ID:*** 10256549	NNE	0.47 / 2,466.99	9	26

Executive Summary: Summary by Data Source

Standard

State

LST - Leaking Storage Tank

A search of the LST database, dated Jan 16, 2023 has found that there are 1 LST site(s) within approximately 0.50 miles of the project property.

Equal/Higher Elevation	Address	Direction	Distance (mi/ft)	Map Key
LIBERTY HARBOR	#1 LIBERTY HARBOR DRIVE PORTAGE DES SIOUX MO 63373	SE	0.24 / 1,254.47	4
	Facility ID **|** ***Active***: *ST0020771 | No*			

UST - Petroleum Storage Tanks

A search of the UST database, dated Jan 16, 2023 has found that there are 1 UST site(s) within approximately 0.25 miles of the project property.

Equal/Higher Elevation	Address	Direction	Distance (mi/ft)	Map Key
LIBERTY HARBOR	#1 LIBERTY HARBOR DRIVE PORTAGE DES SIOUX MO 63373	SE	0.24 / 1,254.47	4
	Facility ID **|** ***Active***: *ST0020771 | No* ***Tank ID*** **|** ***Tank Type Desc*** **|** ***Date Closed***: *1 | Below Ground | 9/13/2012, 2 | Below Ground | 9/13/2012*			

DEL TANK - Delisted Storage Tanks

A search of the DEL TANK database, dated Jan 16, 2023 has found that there are 2 DEL TANK site(s) within approximately 0.25 miles of the project property.

Equal/Higher Elevation	Address	Direction	Distance (mi/ft)	Map Key
Liberty Harbor	#1 Venetian Road Portage Des Sioux MO 63373	SE	0.19 / 985.47	3
Venetian Harbor	1 Venetian Drive Portage Des Souix MO 63373	SE	0.19 / 985.47	3

Non Standard

Federal

MRDS - Mineral Resource Data System

A search of the MRDS database, dated Mar 15, 2016 has found that there are 1 MRDS site(s) within approximately 1.00 miles of the project property.

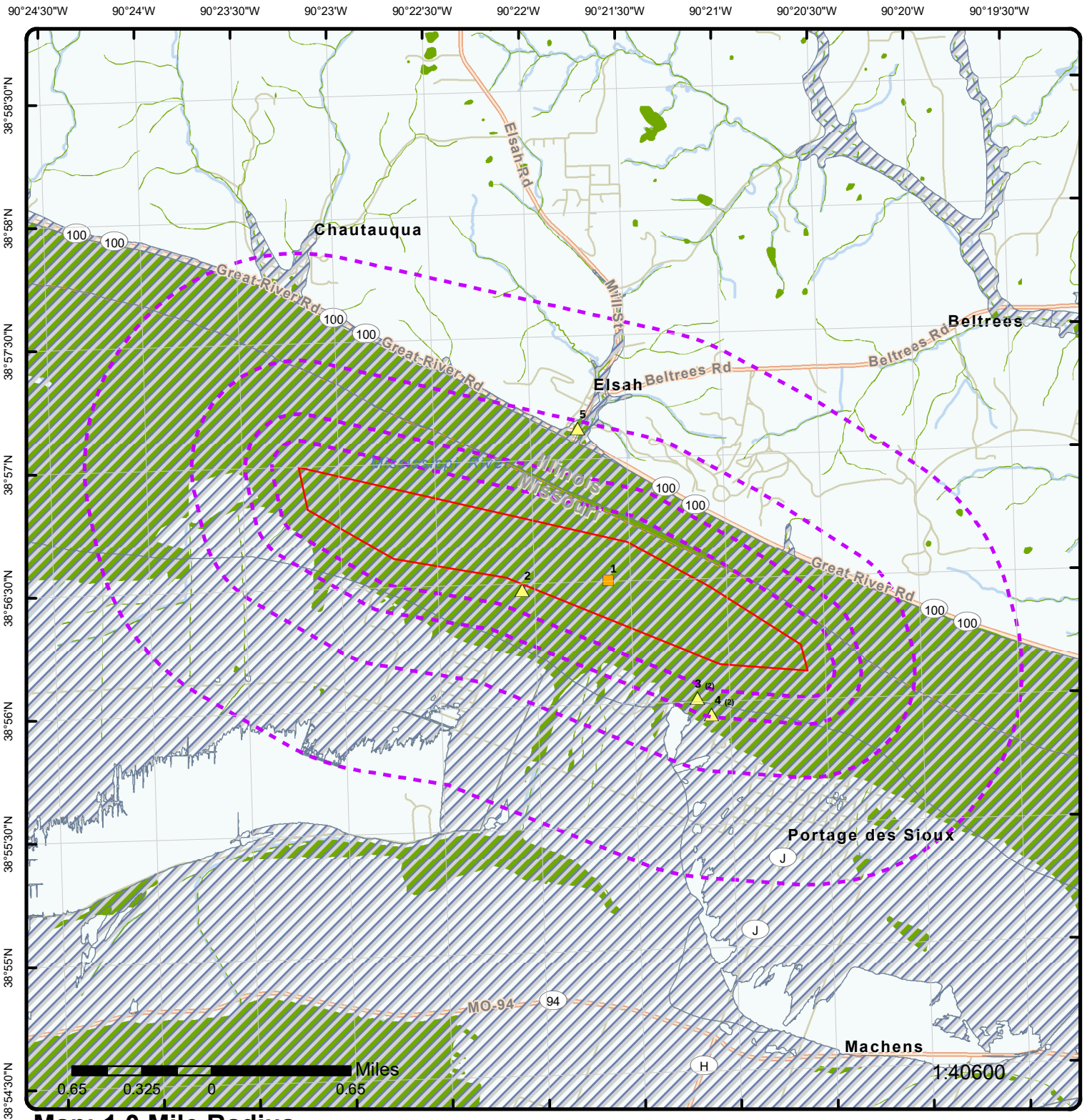
Equal/Higher Elevation	Address	Direction	Distance (mi/ft)	Map Key
WESTERN WHITING COMPANY QUARRY	JERSEY COUNTY ELSAH IL 62028 ***Dep ID**: 10256549*	NNE	0.47 / 2,466.99	5

State

SPILLS - Environmental Incident Summary Database

A search of the SPILLS database, dated Sep 22, 2021 has found that there are 2 SPILLS site(s) within approximately 0.12 miles of the project property.

Equal/Higher Elevation	Address	Direction	Distance (mi/ft)	Map Key
Portage Des Sioux Power Plant	Highway 94 Portage Des Sioux MO ***Spill No**: 0511042140LJT*	ESE	0.00 / 0.00	1
National Response Center	HIDEAWAY HARBOR Park (Near PORTAGE DES SIOUX) St. Charles MO ***Spill No**: 0411161109HRM*	WSW	0.03 / 142.66	2



Map: 1.0 Mile Radius

Order Number: 23042100139

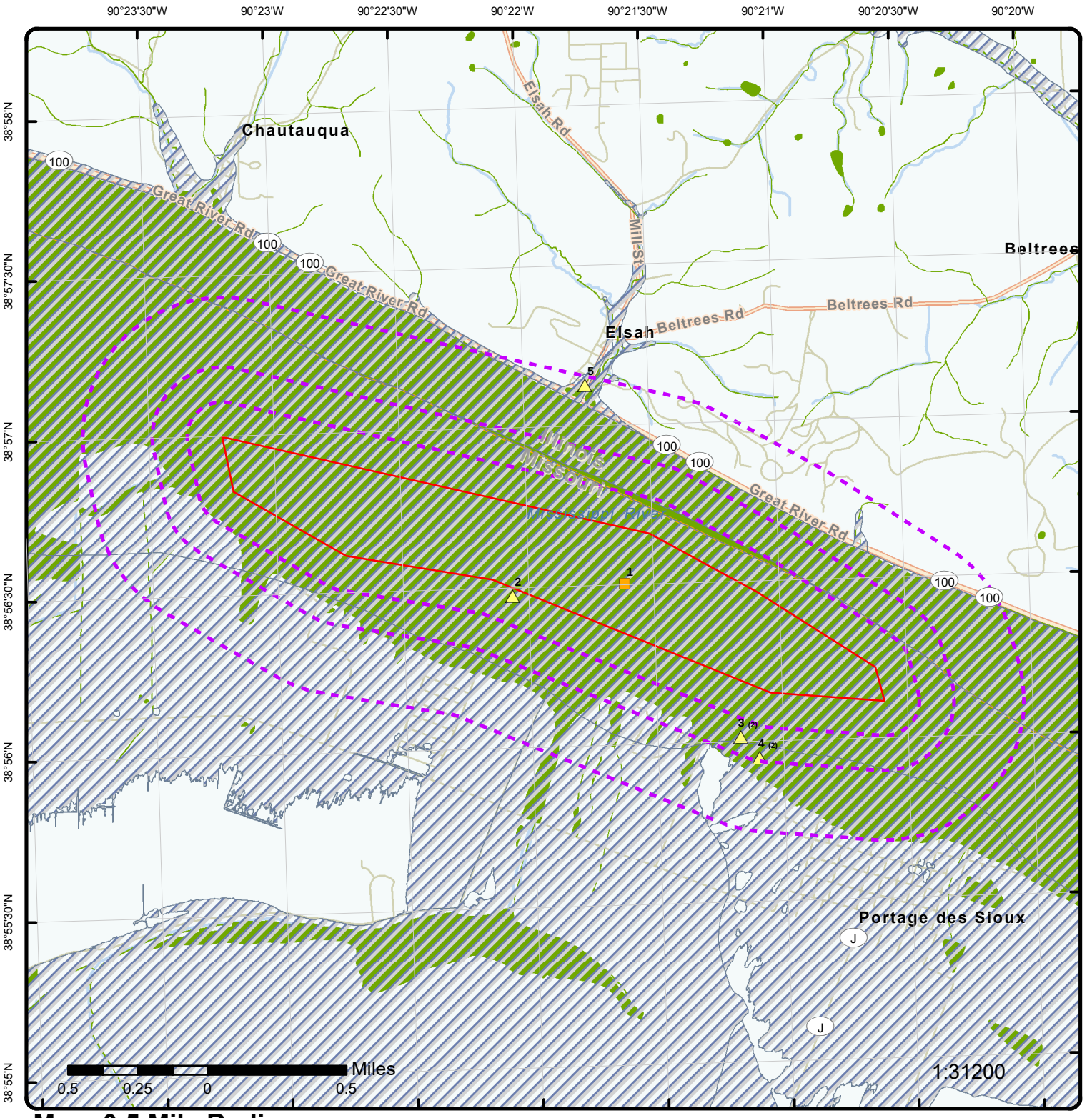
Address: n/a, Portage Des Sioux, MO

ERIS

- Project Property
- Buffer Outline
- Sites with Higher Elevation
- Sites with Same Elevation
- Sites with Lower Elevation
- Sites with Unknown Elevation
- Areas with Higher Elevation
- Areas with Same Elevation
- Areas with Lower Elevation
- Areas with Unknown Elevation
- Freeways; Highways
- Traffic Circle; Ramp
- Major & Minor Arterial
- Traffic Circle; Ramp
- Local Road
- Rail
- State
- Country
- National Wetland
- Indian Reserve Land
- Plume
- 100 Year Flood Zone
- 500 Year Flood Zone
- FWS Special Designation Areas
- National Priorities List (Active, Delisted, Proposed, Institutional Control)

Source: © 2021 ESRI StreetMap Premium

© ERIS Information Inc.



Map: 0.5 Mile Radius

Order Number: 23042100139

Address: n/a, Portage Des Sioux, MO

ERIS

- Project Property
- Buffer Outline
- Sites with Higher Elevation
- Sites with Same Elevation
- Sites with Lower Elevation
- Sites with Unknown Elevation
- Areas with Higher Elevation
- Areas with Same Elevation
- Areas with Lower Elevation
- Areas with Unknown Elevation
- Freeways; Highways
- Traffic Circle; Ramp
- Major & Minor Arterial
- Traffic Circle; Ramp
- Local Road
- Rail
- State
- Country
- National Wetland
- Indian Reserve Land
- Plume
- 100 Year Flood Zone
- 500 Year Flood Zone
- FWS Special Designation Areas
- National Priorities List (Active, Delisted, Proposed, Institutional Control)

Source: © 2021 ESRI StreetMap Premium

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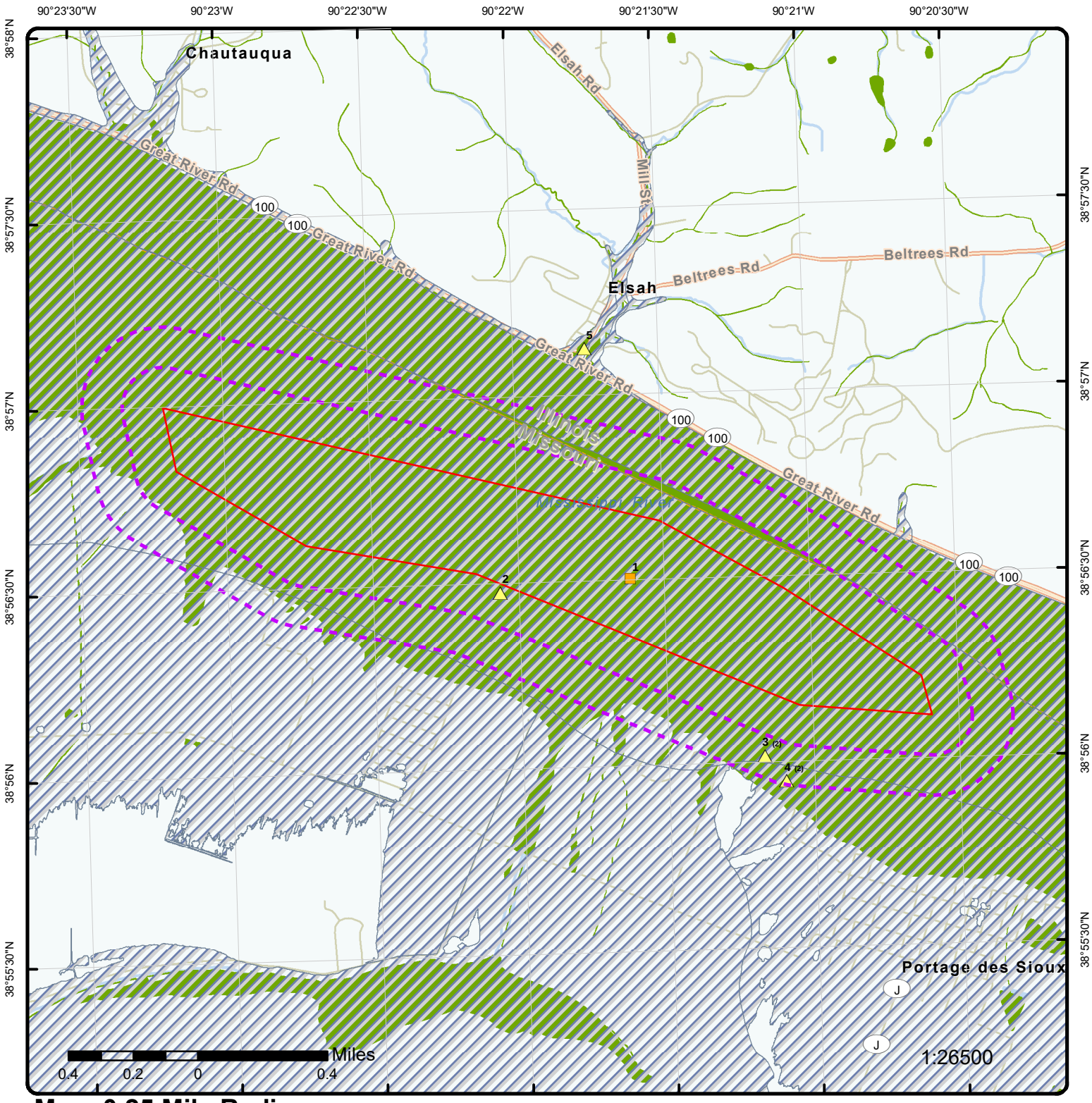

Map: 0.25 Mile Radius

Order Number: 23042100139

Address: n/a, Portage Des Sioux, MO

ERIS

- Project Property
- Buffer Outline
- Sites with Higher Elevation
- Sites with Same Elevation
- Sites with Lower Elevation
- Sites with Unknown Elevation
- Areas with Higher Elevation
- Areas with Same Elevation
- Areas with Lower Elevation
- Areas with Unknown Elevation
- Freeways; Highways
- Traffic Circle; Ramp
- Major & Minor Arterial
- Traffic Circle; Ramp
- Local Road
- Rail
- State
- Country
- National Wetland
- Indian Reserve Land
- Plume
- 100 Year Flood Zone
- 500 Year Flood Zone
- FWS Special Designation Areas
- National Priorities List (Active, Delisted, Proposed, Institutional Control)

Source: © 2021 ESRI StreetMap Premium

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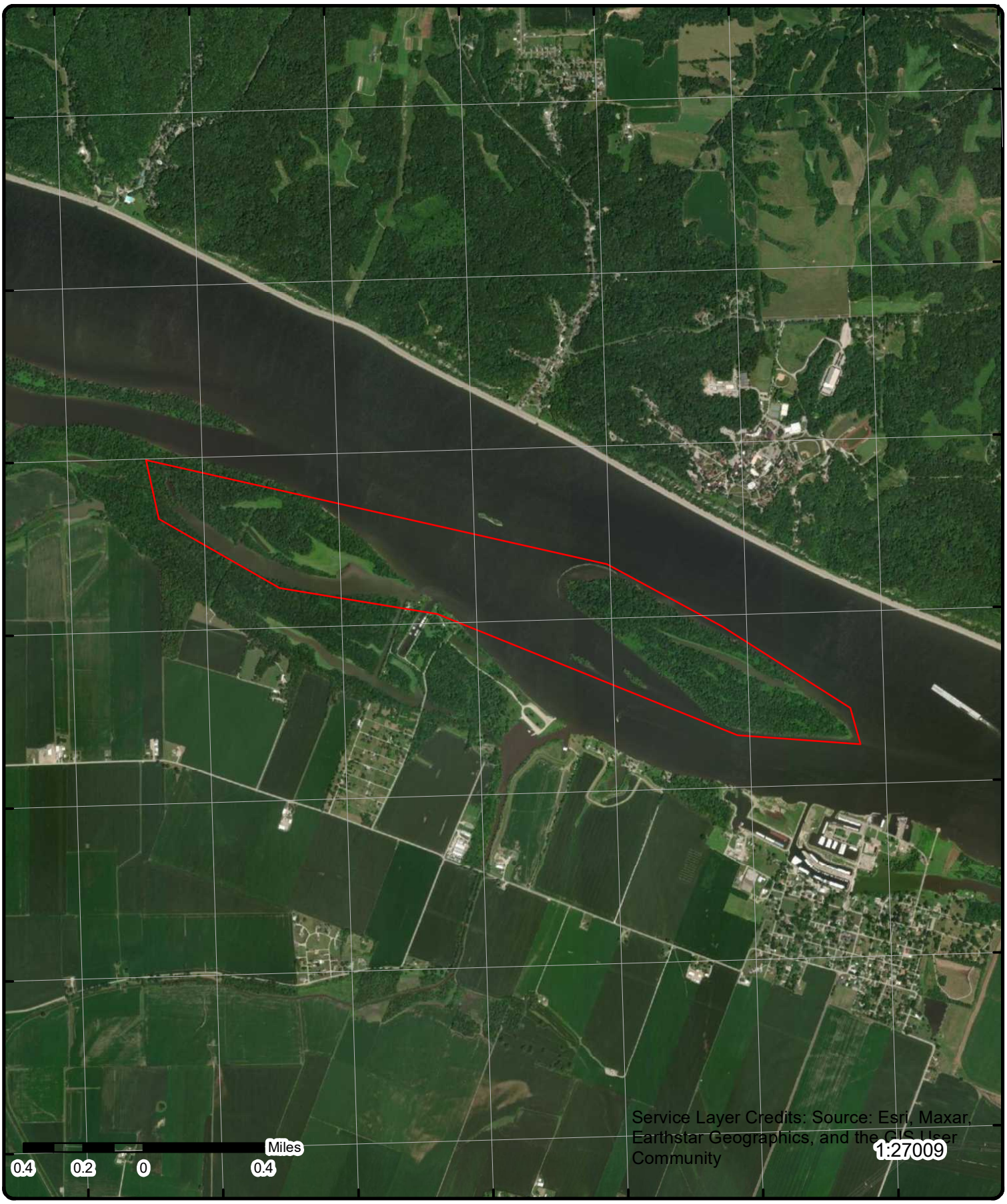

Aerial **Year: 2022**

Order Number: 23042100139

Address: n/a, Portage Des Sioux, MO

Source: ESRI World Imagery

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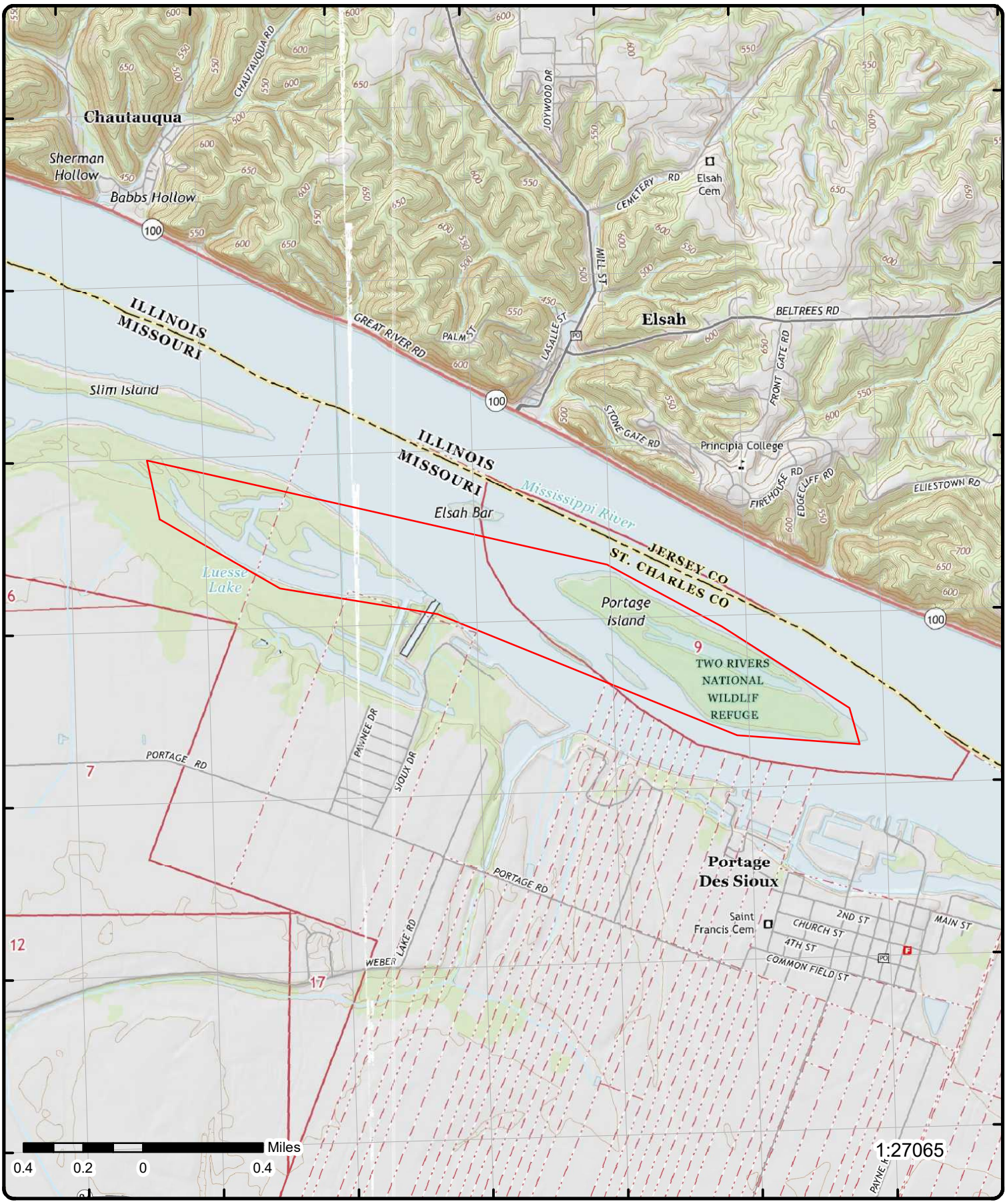

Topographic Map

Year: 2015

Order Number: 23042100139

Address: n/a, MO

Quadrangle(s): Grafton, IL; Elsah, IL

Source: USGS Topographic Map

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Detail Report

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
1	1 of 1	ESE	0.00 / 0.00	417.95 / 0	Portage Des Sioux Power Plant Highway 94 Portage Des Sioux MO	SPILLS

Spill No:	0511042140LJT	**Property Use Code:**	16
Entity ID:	21031	**Property Use Desc:**	Power Plant
ID:	31349	**Prop Subcat ID:**	
Discovery Date:	04-Nov-2005 00:00:00	**Prop Subcat Name:**	
Discovery Time:	04-Nov-2005 02:00:00	**RP Contact:**	30520
Cause Subcat ID:		**Regional Office:**	SLRO
Cause Description:	Unknown/Undetermined	**Agency:**	Private - Citizen
Cause Subcat Name:		**Contact Name:**	Unknown
Incident Cause:	19	**Contacts Phone:**	0000000000
Incident City:	Portage Des Sioux	**Organization Name:**	Portage Des Sioux Power Plant
Incident State:	46	**Org Phone:**	0000000000
Incident Dt Search:	04-Nov-2005 00:00:00	**Address 1:**	
Incident Date:	04-Nov-2005 00:00:00	**Address 2:**	
Incident Time:	04-Nov-2005 02:00:00	**City:**	Portage Des Sioux
Issuer:		**State:**	46
Issue Date:		**State Ref Desc:**	MO
Issue Time:		**Zip:**	
Issuer Ref Desc:		**Call Date:**	04-Nov-2005 00:00:00
Collection Box:		**Call Time:**	04-Nov-2005 21:40:00
E-Mail:	FALSE	**Latitude:**	38.9417190551758
Contaminant Rel:	FALSE	**Longitude:**	-90.3603515625
Chemical Pickup:	FALSE	**GPS Method Code:**	AO
Househld Haz Waste:	FALSE	**UTM Northing:**	4313622.72652552
Historic Release:	FALSE	**UTM Easting:**	728776.346105576
PSTIF:	FALSE	**UTM Zone:**	15.0
Haz Sub Issued:	FALSE	**UTM EPE:**	
County Code:	183.0	**Report Origin:**	67
County:	St. Charles	**Job Code:**	

Incident Location: Highway 94
Description: Address Matching - Other Address Matching
X: -90.3603578237487
Y: 38.9417262490705
Source: Missouri Environmental Emergency Response Tracking System (MEERTS) - Incidents; Missouri Spatial Data Information Service Open Data Site (Dec 1, 2020)

Additional Info:

The caller reported loud noises coming from the power plant around 0200-0400. The caller reported that he could hear the noises clear across the Mississippi River on the Illinois side.

Details (GIS Open Data)

Call Date:	2005/11/04 00:00:00+00
Cause:	Unknown/Undetermined
Material:	Unknown
Prprty Use:	Power Plant
EPE:	
H Coll Code Desc:	Address Match Other
H Coll Code:	AO
UTM Easting:	728776.3461
UTM Northin:	4313622.727

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
2	1 of 1	WSW	0.03 /	422.23 /	National Response Center	SPILLS

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
			142.66	4	HIDEAWAY HARBOR Park (Near PORTAGE DES SIOUX) St. Charles MO	

Spill No:	0411161109HRM	**Property Use Code:**	18
Entity ID:	2	**Property Use Desc:**	Public Property
ID:	27995	**Prop Subcat ID:**	
Discovery Date:	16-Nov-2004 00:00:00	**Prop Subcat Name:**	
Discovery Time:	16-Nov-2004 11:50:00	**RP Contact:**	2
Cause Subcat ID:		**Regional Office:**	SLRO
Cause Description:	Improper Disposal	**Agency:**	Other
Cause Subcat Name:		**Contact Name:**	Unknown
Incident Cause:	8	**Contacts Phone:**	0000000000
Incident City:	St. Charles	**Organization Name:**	National Response Center
Incident State:	46	**Org Phone:**	8004248802
Incident Dt Search:	16-Nov-2004 00:00:00	**Address 1:**	2100 Second Street Southwest
Incident Date:		**Address 2:**	C/O United States Coast Guard
Incident Time:		**City:**	Washington
Issuer:		**State:**	19
Issue Date:		**State Ref Desc:**	DC
Issue Time:		**Zip:**	20593-0001
Issuer Ref Desc:		**Call Date:**	16-Nov-2004 00:00:00
Collection Box:		**Call Time:**	16-Nov-2004 11:09:00
E-Mail:	FALSE	**Latitude:**	38.9412307739258
Contaminant Rel:	FALSE	**Longitude:**	-90.3678283691406
Chemical Pickup:	TRUE	**GPS Method Code:**	G1
Household Haz Waste:	FALSE	**UTM Northing:**	4313549.77609076
Historic Release:	FALSE	**UTM Easting:**	728129.806192009
PSTIF:	FALSE	**UTM Zone:**	15.0
Haz Sub Issued:	FALSE	**UTM EPE:**	
County Code:	183.0	**Report Origin:**	66
County:	St. Charles	**Job Code:**	

Incident Location: HIDEAWAY HARBOR Park (Near PORTAGE DES SIOUX)
Description: GPS - Static Mode
X: -90.3678346324794
Y: 38.9412379622448
Source: Missouri Environmental Emergency Response Tracking System (MEERTS) - Incidents; Missouri Spatial Data Information Service Open Data Site (Dec 1, 2020)
Additional Info:

Spill Summary:

THE CALLER REPORTS THE DISCOVERY OF AN ABANDONED CONTAINER(S).

Response Summary:

THE ROUTE 66 EER RESPONDED TO THE INCIDENT.

Additional Information:

SKIP RICKETTS, EER/SLRO, WAS CONTACTED BY ST. CHARLES COUNTY PARKS AND RECREATION REGARDING AN ABANDONED DRUM THAT WASHED UP AT HIDEAWAY HARBOR. SOME LIQUID REMAINS IN THE DRUM, BUT IT IS NOT LEAKING. SOME SURFACE RUST WAS OBSERVED AND THE DRUM WAS UNMARKED. JOE SALMONS, FROM ST. CHARLES COUNTY PARKS AND RECREATION CONTACTED MIKE DUVALL, THE DIRECTOR OF ST. CHARLES COUNTY ENVIRONMENTAL SERVICES PROGRAM. THEY BOTH WILL COORDINATE TO HIRE A CONTRACTOR TO CHARACTERIZE AND REMOVE THE DRUM. THEY WILL CONTACT SKIP RICKETTS WITH MORE INFORMATION ON THE CLEANUP ONCE IT IS KNOWN.

Responding Agencies

ID:	19930	**Agency:**	DNR - Route 66 - EER
Agent Code:	27	**Immediate/Delayed:**	D

Details (GIS Open Data)

Call Date: 2004/11/16 00:00:00+00
Cause: Improper Disposal

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB

Material:	Abandoned Drum
Prprty Use:	Public Property
EPE:	
H Coll Code Desc:	GPS, Carrier Phase, Static Mode (SA Off)
H Coll Code:	G1
UTM Easting:	728129.8062
UTM Northin:	4313549.776

3	1 of 2	SE	0.19 / 985.47	423.40 / 5	Venetian Harbor 1 Venetian Drive Portage Des Souix MO 63373	DEL TANK

Delisted Aboveground Storage Tanks

Facility ID:	7420	**Fac Tel. 2 Type:**	
Loc Latitude:		**DOR Tax No:**	10750321
Loc Longitude:		**DNRUST Fac ID:**	
Fac Tel. 1:		**USTs Count:**	2
AST Count:	0	**Blocked K 1Bit:**	FALSE
Products Count:	6	**AST FR Req Status:**	No
Cabinets Count:	3	**FR Type Code:**	
Meters Count:	0	**PIP Season Status:**	No
Fac Additional Nm:		**Fac Originated Dt:**	
Fac Status:	I	**Last FQ Inspect Dt:**	
PIP Reg Status Cd:	Yes	**Fac Inactive Date:**	
Last PIP Insp Dt:	8/21/2000 12:00:00 AM	**Open Viocalc:**	0
PIP Area Assign No:	183	**Sys Created Dt:**	7/19/2011 8:10:00 AM
FQ Area Assign No:		**Sys Created by:**	system
Station Brand Name:		**Sys Modified Dt:**	
Fac Tel. 1 Ext Cd:		**Area Desc:**	St. Charles
Fac Tel. 1 Type:	Business	**Inspector Name:**	Derick Vining
Fac Tel. 2:		**Dev Territory 1:**	
Fac Tel. 2 Ext Cd:		**Bus Territory 1:**	
Prod Concat:			
Fac Concat:	MAR;		
Loc Address 2:			
Loc Zip Cd Plus 4:			
Loc County FIPS Cd:	183		
Fac Email Addr:			
Fac Comments:			
Business ID:			
Business Name:			
Store ID:			
Business Type:			
Address 1:			
Address 2:			
City:			
Zip:			
County:			
Data Source:	Inactive		
Original Source:	AST		
Record Date:	24-JAN-2018		

3	2 of 2	SE	0.19 / 985.47	423.40 / 5	Liberty Harbor #1 Venetian Road Portage Des Sioux MO 63373	DEL TANK

Delisted Aboveground Storage Tanks

Facility ID:	8102	**Fac Tel. 2 Type:**	
Loc Latitude:		**DOR Tax No:**	
Loc Longitude:		**DNRUST Fac ID:**	20771
Fac Tel. 1:	6368990101	**USTs Count:**	2

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB

AST Count:	0	**Blocked K 1Bit:**	FALSE
Products Count:	0	**AST FR Req Status:**	No
Cabinets Count:	0	**FR Type Code:**	
Meters Count:	0	**PIP Season Status:**	No
Fac Additional Nm:		**Fac Originated Dt:**	
Fac Status:	I	**Last FQ Inspect Dt:**	
PIP Reg Status Cd:	Yes	**Fac Inactive Date:**	
Last PIP Insp Dt:	7/8/2005 12:00:00 AM	**Open Viocalc:**	0
PIP Area Assign No:	183	**Sys Created Dt:**	7/19/2011 8:10:00 AM
FQ Area Assign No:		**Sys Created by:**	system
Station Brand Name:		**Sys Modified Dt:**	
Fac Tel. 1 Ext Cd:		**Area Desc:**	St. Charles
Fac Tel. 1 Type:	Business	**Inspector Name:**	Derick Vining
Fac Tel. 2:		**Dev Territory 1:**	
Fac Tel. 2 Ext Cd:		**Bus Territory 1:**	
Prod Concat:			
Fac Concat:	MAR;		
Loc Address 2:			
Loc Zip Cd Plus 4:			
Loc County FIPS Cd:	183		
Fac Email Addr:			
Fac Comments:			
Business ID:			
Business Name:			
Store ID:			
Business Type:			
Address 1:			
Address 2:			
City:			
Zip:			
County:			
Data Source:	Inactive		
Original Source:	AST		
Record Date:	24-JAN-2018		

4	**1 of 2**	**SE**	**0.24 / 1,254.47**	**426.28 / 8**	**LIBERTY HARBOR #1 LIBERTY HARBOR DRIVE PORTAGE DES SIOUX MO 63373**	**UST**

Facility ID:	ST0020771	**Zip Extension:**	
Active:	No	**Signer:**	
Facility Type Code:	U	**Signer Title:**	
Facility Type:	Under Ground	**RP Area Code:**	314
Facility Status Cd:	R	**RP Phone Prefix:**	521
Facility Status:	Registered	**RP Phone Suffix:**	4997
Source Code:	D6	**RP Undeliverable:**	No
Source:	SLRO	**County Code:**	183
No Tanks Upgraded:	0.0	**County Name:**	ST CHARLES
No Observe Wells:	0	**Geo Owner:**	5
Regist Start Date:	10/1/2011	**Geo Owner Desc:**	Hazardous Waste Program
Regist End Date:	9/30/2016	**Geo Collected By:**	CON_Fortin,Joel
Date Received:	7/24/2000	**Date Collected:**	4/29/2014
Archive Date:		**Horiz Col Typ Desc:**	Interpolation
Date Certif Printd:		**Horiz Accuracy Est:**	12.20
Certificate Printd:	No	**PDOP:**	
New Facility:	No	**Score:**	
Due Contract Insp:	No	**Source Map Scale:**	24000
Create Invoice:	No	**Horiz Acc U of Mea:**	Meters
Receipt:	No	**Geo Type:**	POINT
Archive:	No	**Datum:**	NAD83
House Bill:	No	**Region:**	SL
Label Printed:	No	**Easting:**	729694.185789
Moratorium:	No	**Northing:**	4312674.12036
Deliv Mail to Own:	Yes	**UTM Zone:**	15
Non Deliverable:	No	**Verified:**	Yes
Contact:	JERRY ROHE	**Source Y:**	38.9329400000606
Area Code:		**Source X:**	-90.3500899985839
Phone Prefix:		**UTM Estng(ESTART):**	729694.185789

Phone Suffix:		**UTM Nrthg(ESTART):**	4312674.12036
Name:	LIBERTY HARBOR	**Address:**	#1 LIBERTY HARBOR DRIVE
Address 2:		**City:**	PORTAGE DES SIOUX
Zip:	63373	**Fac Name(E-START):**	LIBERTY HARBOR
Address(E-START):	#1 LIBERTY HARBOR DRIVE	**City(E-START):**	PORTAGE DES SIOUX
County(E-START):	ST CHARLES	**Zip(E-START):**	63373
RP Name:	BERT SCHONLAU	**RP Contact:**	OWNER
RP Address:	601 NORTH SHORE DR	**RP City:**	ST CHARLES
RP State:	MO	**RP Zip:**	63301
Email Address:		**Property Owner:**	JERRY & NORBERT ROHE
Hriz Coll Mth Desc:	Interpolation from photography	**Ref Pt Code:**	TU
Horiz Coll Meth Cd:	I2		

Title: OWNER
Ref Pt: Tank, Underground or Partially Underground
Original Source: Missouri Department of Natural Resources - UST Summary Database; E-START Tank Sites/Former Underground Storage Tank Facilities; E-START Tank Sites/Facilities

Tanks Information

Tank PK:	37919	**Admin 585:**	
Tank ID:	1	**Installer:**	
IFR No:		**Installer Address:**	
Owner ID:	OW20830	**Installer City:**	
Tank Type:	B	**Installer State:**	
Tank Type Desc:	Below Ground	**Installer Zip:**	
Status:	R	**Installer Contact:**	
Tank Status Desc:	Removed	**Installer Phone:**	
Tank Install Date:	8/16/1996	**Installer Fax:**	
Tank Material:	3	**Closure Proj Mngr:**	RB
Tank Material Desc:	Fiberglass	**Date of Last Use:**	6/27/2011
Tank Mat Other:		**Date Closed:**	9/13/2012
Tk Int Prot:		**Expected in Use Dt:**	
Tk Int Prot Desc:		**No Further Act Dt:**	
Tk Int Prot Other:		**Date Closed Null:**	No
Tk Int Protect Dt:		**Date Admin Closed:**	
Tk Ext Prot:		**Approval Letter:**	9/6/2012
Tk Ext Prot Desc:		**Report Received:**	3/13/2014
Tk Ext Prot Other:		**Date Received:**	9/5/2012
Tk Ext Protect Dt:		**Reg End Date:**	9/30/2016
Tank Double Wall:	No	**UST 1 Flag:**	Yes
Tank Material Man:		**UST 1 Flag Date:**	9/30/2003
Tanks Use:	No	**UST 2 Flag:**	Yes
Tank Fees Waived:	No	**UST 2 Flag Date:**	3/31/2014
Expidite:	No	**UST 3 Flag:**	No
Lockout Flag:	0	**UST 3 Flag Date:**	
Tank Mat Man Name:			

Firm Name: Landmark Environmental Associates, Inc.
Installer Name:
Installer Email:
Installer Comments:
Comments:

4/24/13 MAD- Open Closure Notice

5/28/13 MAD- Receieved call from Chris with Landmark Environmental. Closure has been completed and the report has been written, however, it is being held due to payment dispute with the owner.

3/26/2014 RMB. Draft letter sent to Mike Martin Enforcement Section, AGO sent the letter out 3/28/2014:
Because the groundwater sample in the closure report was above the Department's default target levels, further investigation of the extent of the contamination is required. Please submit a workplan to delineate the extent of contamination in soil and groundwater to Mr. Michael Davis, of the Tanks Section, within 60 days.--No other closure issues.

Compartments Information

Tank Compart PK:	37916	**Pipe Double Wall:**	No
Compartment No:	1	**Mixture:**	No

CAS No:		**Substance:**	U
Compartment Status:	R	**Tk Substance Desc:**	Gasoline, Including Blends
Tank Status Desc:	Removed	**Tanks Use:**	No
Capacity:	5000.0	**Comp Lockout Flag:**	No
Pipe Installer:		**Spill Protection:**	Yes
Pipe Install Date:	8/16/1996	**Spill Protect Wall:**	SW
Pipe System:	1	**Tank Top:**	
Tank Pipe Sys Desc:	Pressure	**Sub Dispensor:**	
Pipe Material:	8	**Disp Conn Fit Prot:**	
Pipe Material Desc:	Flex Pipe	**Tk Top Con Fit Pro:**	
Pipe Protection:		**Throughput:**	
Pipe Protect Desc:		**Date of Last Use:**	6/27/2011
Pipe Protect Date:			
Pipe Mat Other:			
Substance Other:			
Hazard Substance:			

Tanks Information

Tank PK:	37920	**Admin 585:**	
Tank ID:	2	**Installer:**	
IFR No:		**Installer Address:**	
Owner ID:	OW20830	**Installer City:**	
Tank Type:	B	**Installer State:**	
Tank Type Desc:	Below Ground	**Installer Zip:**	
Status:	R	**Installer Contact:**	
Tank Status Desc:	Removed	**Installer Phone:**	
Tank Install Date:	9/10/1996	**Installer Fax:**	
Tank Material:	3	**Closure Proj Mngr:**	RB
Tank Material Desc:	Fiberglass	**Date of Last Use:**	6/27/2011
Tank Mat Other:		**Date Closed:**	9/13/2012
Tk Int Prot:		**Expected in Use Dt:**	
Tk Int Prot Desc:		**No Further Act Dt:**	
Tk Int Prot Other:		**Date Closed Null:**	No
Tk Int Protect Dt:		**Date Admin Closed:**	
Tk Ext Prot:		**Approval Letter:**	9/6/2012
Tk Ext Prot Desc:		**Report Received:**	3/13/2014
Tk Ext Prot Other:		**Date Received:**	9/5/2012
Tk Ext Protect Dt:		**Reg End Date:**	9/30/2016
Tank Double Wall:	No	**UST 1 Flag:**	Yes
Tank Material Man:		**UST 1 Flag Date:**	9/30/2003
Tanks Use:	No	**UST 2 Flag:**	Yes
Tank Fees Waived:	No	**UST 2 Flag Date:**	3/31/2014
Expidite:	No	**UST 3 Flag:**	No
Lockout Flag:	0	**UST 3 Flag Date:**	
Tank Mat Man Name:			
Firm Name:	Landmark Environmental Associates, Inc.		
Installer Name:			
Installer Email:			
Installer Comments:			
Comments:			

4/24/13 MAD- Open Closure Notice

3/26/2014 RMB. Draft letter sent to Mike Martin Enforcement Section:
Because the groundwater sample in the closure report was above the Department's default target levels, further investigation of the extent of the contamination is required. Please submit a workplan to delineate the extent of contamination in soil and groundwater to Mr. Michael Davis, of the Tanks Section, within 60 days.--No other closure issues.

Compartments Information

Tank Compart PK:	37917	**Pipe Double Wall:**	No
Compartment No:	1	**Mixture:**	No
CAS No:		**Substance:**	D
Compartment Status:	R	**Tk Substance Desc:**	Diesel
Tank Status Desc:	Removed	**Tanks Use:**	No

Capacity:	3000.0	**Comp Lockout Flag:**	No
Pipe Installer:		**Spill Protection:**	Yes
Pipe Install Date:	9/10/1996	**Spill Protect Wall:**	SW
Pipe System:	1	**Tank Top:**	
Tank Pipe Sys Desc:	Pressure	**Sub Dispensor:**	
Pipe Material:	8	**Disp Conn Fit Prot:**	
Pipe Material Desc:	Flex Pipe	**Tk Top Con Fit Pro:**	
Pipe Protection:		**Throughput:**	
Pipe Protect Desc:		**Date of Last Use:**	6/27/2011
Pipe Protect Date:			
Pipe Mat Other:			
Substance Other:			
Hazard Substance:			

Owners Information

Owner ID:	OW20830	**Area Code:**	636
Active:	No	**Phone Prefix:**	899
Non Deliverable:	No	**Phone Suffix:**	0101
Date Received:	5/2/2005	**Phone Ext:**	
State:	MO	**User Name:**	PURVIS, K
Zip:	63373	**Date Added:**	5/12/2005
Zip Extension:	0130	**Date Edited:**	1/22/2007
County:			
Name:	WATERWAY INVESTMENTS, LLC dba LIBERTY HARBOR		
Address:	#1 VENETIAN DR		
City:	PORTAGE DES SIOUX		
Owner Email:			

Missouri Environmental Site Tracking and Research Tool (E-START)

AUL ID:		**Northing:**	4312674.12
Remediation ID:	R008913 Active	**Hrizntl Ref Datum:**	NAD83
Cntmnnts of Cncern:	Methyl tertiary butyl ether, Benzene, Naphthalene	**Hrizntl Acc Estmte:**	12.2
URL:		**Hrizntl Acc M Unts:**	Meters
Sensitive:	FALSE	**Score:**	
Easting:	729694.1858	**Src Map Scale No:**	24000
Closure Guidance Used for Clos:	2004 MRBCA		
Horizontal Collection Method C:	I2		
Point Dilution of Precision:			
Facility Status:	Investigation/Corrective Action is Ongoing or Incomplete		
Facility Type:	Former Underground Storage Tank Facilities		
Summary:	A petroleum or hazardous substance release is currently being addressed under the Missouri Risk-Based Corrective Action Guidance for Petroleum Storage Tanks. Please review the Department of Natural Resources site file for more information.		
Activity Use Limitations:			
Site Ownership:	DNR/Hazardous Waste Program/Tanks Section		
Data Source:	E-START Tank Sites/Facilities(Unmapped)		

Missouri Environmental Site Tracking and Research Tool(E-START) Tank Sites

Fac Name:	LIBERTY HARBOR	**Federal ID:**	
Address:	#1 LIBERTY HARBOR DRIVE	**H Accuracy:**	12.2
City:	PORTAGE DES SIOUX	**H Accur UoM:**	Meters
Closguid:	2004 MRBCA	**H Coll Code:**	I2
Contamins:	Methyl tertiary butyl ether, Benzene, Naphthalene	**H Datum Nm:**	NAD83
County:	ST CHARLES	**P DoP:**	0.0
Latitude:	38.9329400009705	**Remed ID:**	R008913 Active
Longitude:	-90.3500900009978	**Score:**	0
Sources Cal:	24000	**UTM Easting:**	729694.185789
Use Limits:		**UTM Northng:**	4312674.12036
Original Source:	E-START Tank Sites/Former Underground Storage Tank Facilities		

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB

Fac Stat: Investigation/Corrective Action is Ongoing or Incomplete
Fac Type: Former Underground Storage Tank Facilities
Site Owner: DNR/Hazardous Waste Program/Tanks Section
Summary: A petroleum or hazardous substance release is currently being addressed under the Missouri Risk-Based Corrective Action Guidance for Petroleum Storage Tanks. Please review the Department of Natural Resources site file for more information.

4	2 of 2	SE	0.24 / 1,254.47	426.28 / 8	LIBERTY HARBOR #1 LIBERTY HARBOR DRIVE PORTAGE DES SIOUX MO 63373	LST

Facility ID:	ST0020771	**RP Address:**	601 NORTH SHORE DR
Active:	No	**RP City:**	ST CHARLES
Facility Type Code:	U	**RP State:**	MO
Facility Type:	Under Ground	**RP Zip:**	63301
Facility Status Code:	R	**RP Area Code:**	314
Facility Status:	Registered	**RP Phone Prefix:**	521
Source Code:	D6	**UTM Estng(ESTART):**	729694.185789
Source:	SLRO	**UTM Nrthg(ESTART):**	4312674.12036
No Tanks Upgraded:	0.0	**Fac Name(E-START):**	LIBERTY HARBOR
No Observe Wells:	0	**Address(E-START):**	#1 LIBERTY HARBOR DRIVE
Regist Start Dt:	10/1/2011	**City(E-START):**	PORTAGE DES SIOUX
Regist End Dt:	9/30/2016	**County(E-START):**	ST CHARLES
Date Received:	7/24/2000	**Zip(E-START):**	63373
Archive Date:		**RP Phone Suffix:**	4997
Dt Certif Printed:		**RP Undeliverable:**	No
Certificate Printed:	No	**County Code:**	183
New Facility:	No	**County Name:**	ST CHARLES
Due Contract Insp:	No	**Geo Owner:**	5
Create Invoice:	No	**Geo Owner Desc:**	Hazardous Waste Program
Archive:	No	**Geo Collected By:**	CON_Fortin,Joel
Receipt:	No	**Date Collected:**	4/29/2014
House Bill:	No	**Horiz Coll Meth Code:**	I2
Label Printed:	No	**Horiz Coll Meth Desc:**	Interpolation from photography
Moratorium:	No	**Horiz Coll Meth Type:**	Interpolation
Deliv Mail to Own:	Yes	**Horiz Accuracy Est:**	12.20
Non Deliverable:	No	**PDOP:**	
Contact:	JERRY ROHE	**Score:**	
Area Code:		**Source Map Scale:**	24000
Phone Prefix:		**Horiz Acc U of Meas:**	Meters
Phone Suffix:		**Geo Type:**	POINT
Zip Extension:		**Datum:**	NAD83
Signer:		**Region:**	SL
Signer Title:		**Easting:**	729694.185789
Ref Pt Code:	TU	**Northing:**	4312674.12036
Ref Pt:	Tank, Underground or Partially Underground	**UTM Zone:**	15
Property Owner:	JERRY & NORBERT ROHE	**Verified:**	Yes
RP Name:	BERT SCHONLAU	**Source Y:**	38.9329400000606
RP Contact:	OWNER	**Source X:**	-90.3500899985839
Title:	OWNER		
Email Address:			

Original Source: Internet.accdb(LST_MO); Missouri Department of Natural Resources - UST Summary Database; E-START Tank Sites/Former Underground Storage Tank Facilities;E-START Tank Sites/Facilities

Remediation Detail(s)

REM ID:	R008913
LTS ID:	
Spill No:	121210-1505-DLK
Active:	Yes
Rank:	36
Release Type:	U
Release Desc:	Below Ground
Release Date:	
Cleanup Start Date:	3/26/2014
Cleanup Finish Date:	
Emerg Resp Date:	

Emerg Cleanup Date:	
No Further Action:	
Next Update:	9/21/2023
Date Closed:	
Expedited Date:	
Archive Date:	
Reopened Date:	
Expidite:	No
RBCANOFA:	
Archive:	
ARRA:	No
Refer DGLSO Resp:	
DGLSO Resp Desc:	
Contractor:	254
Project Manager:	MA
LUST 1 Flag:	Yes
LUST 1 Flag Dt:	3/31/2014
LUST 2A Flag:	Yes
LUST 2A Flag Dt:	3/31/2014
LUST 2B Flag:	No
LUST 2B Flag Dt:	
LUST 3A Flag:	No
LUST 3A Flag Dt:	
LUST 3B Flag:	No
LUST 3B Flag Dt:	
LUST 4 Flag:	No
LUST 4 Flag Dt:	
Moratorium:	
No Monitoring Wells:	0
No Physical R:	No
Guidance Used:	85
Comments:	

3/26/2014 RMB. Draft letter sent to Mike Martin Enforcement Section:
Because the groundwater sample in the closure report was above the Department's default target levels, further investigation of the extent of the contamination is required. Please submit a workplan to delineate the extent of contamination in soil and groundwater to Mr. Michael Davis, of the Tanks Section, within 60 days.

6/2/2014 RMB. Email from Landmark that they are developing a workplan and can expect it in a week or two.

6/9/2014 RMB. Workplan received.

6/11/14 MAD- Reviewed WP. Approved 1 MW to determine if gw contamination exists and state that if it does 2 additional wells and monitoring will be necessary. Copy Angela and AGO

7/9/2014 RMB. Email from Chris @ Landmark: I recently called my client Burt S who reported to me the the former UST site (on the dike) is currently under water. Thus we will have to wait until the water goes down (in the Mississippi) to be able to install the monitoring well that is included in the June 3, 2014 workplan provided by Landmark.

9/8/14 MAD- Email with Enforcement. AGO is going to be sending letter requesting work be completed now that river has gone down. Sent copy of email to file.

9/15/14 MAD- Received copy of AGO's letter. Sent to file.

11/10/14 MAD- Received response letter from RP. Does not believe MW necessary and feels that it will be destroyed as the river floods yearly. Spoke with Enforcement, they are going to talk with AGO and get back with us regarding response, as the intial well is still necessary to determine if GW contamiantion exists.

12/16/14 MAD- AGOs office sent letter rejecting argument demanding they install well within 15 days.

3/18/15 AGO sent RP a letter stating that they still need to install a well. AGO gave him until April 22, 2015.

6/22/15 TB Review of Enforcement tab. Laura Asbury has been reassigned case as of 6/15/15. Will recheck status in one month.

11/29/15 TB Sent Mike Martin an email requesting status.
11/30/15 TB Email update from Mike. They are currently working on a penalty in order to file contempt.

2/29/16 TB Reviewed enforcement tab. Appears case has been placed back into active status. Hearing set for March 4, 2016. Reset tracking.

3/16/16 TB Drafted simplified WP status request letter to RP for Ms. Laura Asbury, AGO. Request status of approved WP (June 2014) activities within

60 days. Explained one gwm well needed to be installed. Based on results, if below DTLs, can issue NFA. If above DTLs, two add'l gwm wells to be installed and periodic monitoring. Forwarded to Laura. 60 day response.

3/22/16 TB Above letter mailed. Forwarded finalized copy to Laura Elsbury, AGO.

6/6/16 TB Emailed MM for update on case. Mike responded indicating a hearing was scheduled in March at which time the judge granted defendants 60 days to hire legal counsel. He has not been informed of any additional hearings. Will reset tracking for 2 months.

9/2/16 TB Emailed MM for update. Mike responded indicating nothing further is known at this time. Reset tracking for 2 months.

1/19/17 TB Emailed MM for update. No response received.

5/30/17 TB Emailed MM for update.

6/5/17 TB Rec'd copy of consent judgment (CJ), finalized on Dec 16, 2016. CJ stated within 180 days, defendant agrees to implement and execute WP for GWI which includes installation of gwm well, conduct gw sampling and submit reports to DNR. If not completed w/in 180 days (June 16, 2017), civil penalty of $9,000 will have to be paid.

7/5/17 TB Email from Mike Martin to Tim Duggan requesting enforcement case be reopened and pursue compliance/contempt.

8/24/17 TB Informed by CV case has been reassigned to Shawna Bligh.

10/24/17 TB Emailed MM for update. Email response indicates no new developments.

1/9/18 TB Spoke with MM. They are getting ready to file for a trial date.

5/3/18 TB Emailed MM for update. Mike's response states Shawna has not provided Mike with an update since the last entry above.

8/13/18 TB Email to MM for update.

10/2/18 TB No response to above request. Sent MM another status email. MM has heard nothing add'l from Shawna.

12/27/18 TB Email from Mike. Shawna, AGO plans to file Application for Show Cause as Mr. Schonlau has not submitted the requested GWI work plan nor paid civil penalty.

1/31/19 TB Email update from MM. A Show Cause hearing is scheduled for tomorrow morning. He will provide update following the hearing.

3/12/19 TB Emailed Mike for update. Mike responded that hearing is still set but hopefully owner will submit something to us prior to hearing. I responded asking Mike when the date of the hearing was.

6/18/19 TB Emailed MM for update. Mike responded - AGO has not provided him a date of the hearing yet.

10/23/19 TB Emailed MM for update. Mike responded that he sent AGO email requesting whether hearing occurred and what the outcome was.

07/16/2020 Talked to MM. Still no movement by AGO. - LL

07/20/2020 Talked to AGO. Mr. Schonlau passed away in January 2019. Need abandoned site memo written up.

9/30/22 HLM Called assessor, can't find current owner with address listed in database. Site is abandoned. Adjust tracking.

Other Detail(s)

REM Source Desc:	Unknown	***Source Other Desc:***	
REM Cause Desc:	Unknown	***Cause Other Desc:***	Historical Release
REM Tech Desc:	Tank Closure	***Media Affected:***	Ground Water; Soil

5	***1 of 1***	***NNE***	***0.47 / 2,466.99***	***427.08 / 9***	***WESTERN WHITING COMPANY QUARRY JERSEY COUNTY ELSAH IL 62028***	***MRDS***

Dep ID:	10256549	***I1:***	18
Dev Status:	PAST PRODUCER	***Latitude:***	38.952087
Code List:	STN_C	***Longitude:***	-90.36261
Url:	http://mrdata.usgs.gov/mrds/show-mrds.php?dep_id=10256549		

Commodity

I1:	36	***Line:***	1
Code:	STN_C	***Inserted By:***	MAS migration
Commodity:	Stone, Crushed/Broken	***Insert Date:***	29-OCT-2002 09:00:24
Commodity Type:	Non-metallic	***Updated By:***	USGS
Commodity Group:	Stone, Crushed	***Update Date:***	29-OCT-2002 09:02:17
Importance:	Primary		

Names

I1:	15	***Inserted By:***	MAS migration
Status:	Current	***Insert Date:***	29-OCT-02
Site Name:	Western Whiting Company Quarry	***Updated By:***	USGS
Line:	1	***Update Date:***	29-OCT-02

Unplottable Summary

Total: 0 Unplottable sites

DB	Company Name/Site Name	Address	City	Zip	ERIS ID

No unplottable records were found that may be relevant for the search criteria.

Unplottable Report

No unplottable records were found that may be relevant for the search criteria.

Appendix: Database Descriptions

Environmental Risk Information Services (ERIS) can search the following databases. The extent of historical information varies with each database and current information is determined by what is publicly available to ERIS at the time of update. ERIS updates databases as set out in ASTM Standard E1527-13 and E1527-21, Section 8.1.8 Sources of Standard Source Information:

"Government information from nongovernmental sources may be considered current if the source updates the information at least every 90 days, or, for information that is updated less frequently than quarterly by the government agency, within 90 days of the date the government agency makes the information available to the public."

Standard Environmental Record Sources

Federal

National Priority List: NPL

Sites on the United States Environmental Protection Agency (EPA)'s National Priorities List of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action under the Superfund program. The NPL, which EPA is required to update at least once a year, is based primarily on the score a site receives from EPA's Hazard Ranking System. A site must be on the NPL to receive money from the Superfund Trust Fund for remedial action. Sites are represented by boundaries where available in the EPA Superfund Site Boundaries maintained by the Shared Enterprise Geodata and Services (SEGS). Site boundaries represent the footprint of a whole site, the sum of all of the Operable Units and the current understanding of the full extent of contamination; for Federal Facility sites, the total site polygon may be the Facility boundary. Where there is no polygon boundary data available for a given site, the site is represented as a point.

Government Publication Date: Jan 25, 2023

National Priority List - Proposed: PROPOSED NPL

Sites proposed by the United States Environmental Protection Agency (EPA), the state agency, or concerned citizens for addition to the National Priorities List (NPL) due to contamination by hazardous waste and identified by the EPA as a candidate for cleanup because it poses a risk to human health and/or the environment. Sites are represented by boundaries where available in the EPA Superfund Site Boundaries maintained by the Shared Enterprise Geodata and Services (SEGS). Site boundaries represent the footprint of a whole site, the sum of all of the Operable Units and the current understanding of the full extent of contamination; for Federal Facility sites, the total site polygon may be the Facility boundary. Where there is no polygon boundary data available for a given site, the site is represented as a point.

Government Publication Date: Jan 25, 2023

Deleted NPL: DELETED NPL

Sites deleted from the United States Environmental Protection Agency (EPA)'s National Priorities List. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate. Sites are represented by boundaries where available in the EPA Superfund Site Boundaries maintained by the Shared Enterprise Geodata and Services (SEGS). Site boundaries represent the footprint of a whole site, the sum of all of the Operable Units and the current understanding of the full extent of contamination; for Federal Facility sites, the total site polygon may be the Facility boundary. Where there is no polygon boundary data available for a given site, the site is represented as a point.

Government Publication Date: Jan 25, 2023

SEMS List 8R Active Site Inventory: SEMS

The U.S. Environmental Protection Agency's (EPA) Superfund Program has deployed the Superfund Enterprise Management System (SEMS), which integrates multiple legacy systems into a comprehensive tracking and reporting tool. This inventory contains active sites evaluated by the Superfund program that are either proposed to be or are on the National Priorities List (NPL) as well as sites that are in the screening and assessment phase for possible inclusion on the NPL. The Active Site Inventory Report displays site and location information at active SEMS sites. An active site is one at which site assessment, removal, remedial, enforcement, cost recovery, or oversight activities are being planned or conducted. This data includes SEMS sites from the List 8R Active file as well as applicable sites from the SEMS GIS/REST file layer obtained from EPA's Facility Registry Service.

Government Publication Date: Jan 25, 2023

Inventory of Open Dumps, June 1985: ODI

The Resource Conservation and Recovery Act (RCRA) provides for publication of an inventory of open dumps. The Act defines "open dumps" as facilities which do not comply with EPA's "Criteria for Classification of Solid Waste Disposal Facilities and Practices" (40 CFR 257).

Government Publication Date: Jun 1985

SEMS List 8R Archive Sites: SEMS ARCHIVE

The U.S. Environmental Protection Agency's (EPA) Superfund Enterprise Management System (SEMS) Archived Site Inventory displays site and location information at sites archived from SEMS. An archived site is one at which EPA has determined that assessment has been completed and no further remedial action is planned under the Superfund program at this time. This data includes sites from the List 8R Archived site file.

Government Publication Date: Jan 25, 2023

Comprehensive Environmental Response, Compensation and Liability Information System - CERCLIS: CERCLIS

Superfund is a program administered by the United States Environmental Protection Agency (EPA) to locate, investigate, and clean up the worst hazardous waste sites throughout the United States. CERCLIS is a database of potential and confirmed hazardous waste sites at which the EPA Superfund program has some involvement. It contains sites that are either proposed to be or are on the National Priorities List (NPL) as well as sites that are in the screening and assessment phase for possible inclusion on the NPL. The EPA administers the Superfund program in cooperation with individual states and tribal governments; this database is made available by the EPA.

Government Publication Date: Oct 25, 2013

EPA Report on the Status of Open Dumps on Indian Lands: IODI

Public Law 103-399, The Indian Lands Open Dump Cleanup Act of 1994, enacted October 22, 1994, identified congressional concerns that solid waste open dump sites located on American Indian or Alaska Native (AI/AN) lands threaten the health and safety of residents of those lands and contiguous areas. The purpose of the Act is to identify the location of open dumps on Indian lands, assess the relative health and environment hazards posed by those sites, and provide financial and technical assistance to Indian tribal governments to close such dumps in compliance with Federal standards and regulations or standards promulgated by Indian Tribal governments or Alaska Native entities.

Government Publication Date: Dec 31, 1998

CERCLIS - No Further Remedial Action Planned: CERCLIS NFRAP

An archived site is one at which EPA has determined that assessment has been completed and no further remedial action is planned under the Superfund program at this time. The Archive designation means that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL). This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

Government Publication Date: Oct 25, 2013

CERCLIS Liens: CERCLIS LIENS

A Federal Superfund lien exists at any property where EPA has incurred Superfund costs to address contamination ("Superfund site") and has provided notice of liability to the property owner. A Federal CERCLA ("Superfund") lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. This database is made available by the United States Environmental Protection Agency (EPA). This database was provided by the United States Environmental Protection Agency (EPA). Refer to SEMS LIEN as the current data source for Superfund Liens.

Government Publication Date: Jan 30, 2014

RCRA CORRACTS-Corrective Action: RCRA CORRACTS

RCRA Info is the U.S. Environmental Protection Agency's (EPA) comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. At these sites, the Corrective Action Program ensures that cleanups occur. EPA and state regulators work with facilities and communities to design remedies based on the contamination, geology, and anticipated use unique to each site.

Government Publication Date: Jan 23, 2023

RCRA non-CORRACTS TSD Facilities: RCRA TSD

RCRA Info is the U.S. Environmental Protection Agency's (EPA) comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. This database includes Non-Corrective Action sites listed as treatment, storage and/or disposal facilities of hazardous waste as defined by RCRA.

Government Publication Date: Jan 23, 2023

RCRA Generator List: RCRA LQG

RCRA Info is the U.S. Environmental Protection Agency's (EPA) comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. RCRA Info replaces the data recording and reporting abilities of the Resource Conservation and Recovery Information System (RCRIS) and the Biennial Reporting System (BRS). A hazardous waste generator is any person or site whose processes and actions create hazardous waste (see 40 CFR 260.10). Large Quantity Generators (LQGs) generate 1,000 kilograms per month or more of hazardous waste or more than one kilogram per month of acutely hazardous waste.

Government Publication Date: Jan 23, 2023

RCRA Small Quantity Generators List: RCRA SQG

RCRA Info is the U.S. Environmental Protection Agency's (EPA) comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. RCRA Info replaces the data recording and reporting abilities of the Resource Conservation and Recovery Information System (RCRIS) and the Biennial Reporting System (BRS). A hazardous waste generator is any person or site whose processes and actions create hazardous waste (see 40 CFR 260.10). Small Quantity Generators (SQGs) generate more than 100 kilograms, but less than 1,000 kilograms, of hazardous waste per month.

Government Publication Date: Jan 23, 2023

RCRA Very Small Quantity Generators List: RCRA VSQG

RCRA Info is the U.S. Environmental Protection Agency's (EPA) comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. A hazardous waste generator is any person or site whose processes and actions create hazardous waste (see 40 CFR 260.10). Very Small Quantity Generators (VSQG) generate 100 kilograms or less per month of hazardous waste, or one kilogram or less per month of acutely hazardous waste. Additionally, VSQG may not accumulate more than 1,000 kilograms of hazardous waste at any time.

Government Publication Date: Jan 23, 2023

RCRA Non-Generators: RCRA NON GEN

RCRA Info is the U.S. Environmental Protection Agency's (EPA) comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. RCRA Info replaces the data recording and reporting abilities of the Resource Conservation and Recovery Information System (RCRIS) and the Biennial Reporting System (BRS). A hazardous waste generator is any person or site whose processes and actions create hazardous waste (see 40 CFR 260.10). Non-Generators do not presently generate hazardous waste.

Government Publication Date: Jan 23, 2023

RCRA Sites with Controls: RCRA CONTROLS

List of Resource Conservation and Recovery Act (RCRA) facilities with institutional controls in place. RCRA gives the U.S. Environmental Protection Agency (EPA) the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous solid wastes. The 1986 amendments to RCRA enabled EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances.

Government Publication Date: Jan 23, 2023

Federal Engineering Controls-ECs: FED ENG

This list of Engineering controls (ECs) is provided by the United States Environmental Protection Agency (EPA). ECs encompass a variety of engineered and constructed physical barriers (e.g., soil capping, sub-surface venting systems, mitigation barriers, fences) to contain and/or prevent exposure to contamination on a property. The EC listing includes remedy component data from Superfund decision documents issued in fiscal years 1982-2020 for applicable sites on the final or deleted on the National Priorities List (NPL); and sites with a Superfund Alternative Approach (SAA) Agreement in place. The only sites included that are not on the NPL; proposed for NPL; or removed from proposed NPL, are those with an SAA Agreement in place.

Government Publication Date: Feb 23, 2023

Federal Institutional Controls- ICs: FED INST

This list of Institutional controls (ICs) is provided by the United States Environmental Protection Agency (EPA). ICs are non-engineered instruments, such as administrative and legal controls, that help minimize the potential for human exposure to contamination and/or protect the integrity of the remedy. Although it is EPA's expectation that treatment or engineering controls will be used to address principal threat wastes and that groundwater will be returned to its beneficial use whenever practicable, ICs play an important role in site remedies because they reduce exposure to contamination by limiting land or resource use and guide human behavior at a site. The IC listing includes remedy component data from Superfund decision documents issued in fiscal years 1982-2020 for applicable sites on the final or deleted on the National Priorities List (NPL); and sites with a Superfund Alternative Approach (SAA) Agreement in place. The only sites included that are not on the NPL; proposed for NPL; or removed from proposed NPL, are those with an SAA Agreement in place.

Government Publication Date: Feb 23, 2023

Land Use Control Information System: LUCIS

The LUCIS database is maintained by the U.S. Department of the Navy and contains information for former Base Realignment and Closure (BRAC) properties across the United States.

Government Publication Date: Sep 1, 2006

Institutional Control Boundaries at NPL sites: NPL IC

Boundaries of Institutional Control areas at sites on the United States Environmental Protection Agency (EPA)'s National Priorities List, or Proposed or Deleted, made available by the EPA's Shared Enterprise Geodata and Services (SEGS). United States Environmental Protection Agency (EPA)'s National Priorities List of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action under the Superfund program. Institutional controls are non-engineered instruments such as administrative and legal controls that help minimize the potential for human exposure to contamination and/or protect the integrity of the remedy.

Government Publication Date: Jan 25, 2023

Emergency Response Notification System: ERNS 1982 TO 1986

Database of oil and hazardous substances spill reports controlled by the National Response Center. The primary function of the National Response Center is to serve as the sole national point of contact for reporting oil, chemical, radiological, biological, and etiological discharges into the environment anywhere in the United States and its territories.

Government Publication Date: 1982-1986

Emergency Response Notification System: ERNS 1987 TO 1989

Database of oil and hazardous substances spill reports controlled by the National Response Center. The primary function of the National Response Center is to serve as the sole national point of contact for reporting oil, chemical, radiological, biological, and etiological discharges into the environment anywhere in the United States and its territories.

Government Publication Date: 1987-1989

Emergency Response Notification System: ERNS

Database of oil and hazardous substances spill reports made available by the United States Coast Guard National Response Center (NRC). The NRC fields initial reports for pollution and railroad incidents and forwards that information to appropriate federal/state agencies for response. These data contain initial incident data that has not been validated or investigated by a federal/state response agency.

Government Publication Date: Jan 16, 2023

The Assessment, Cleanup and Redevelopment Exchange System (ACRES) Brownfield Database: FED BROWNFIELDS

Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties protects the environment, reduces blight, and takes development pressures off greenspaces and working lands. This data is provided by the United States Environmental Protection Agency (EPA) and includes Brownfield sites from the Cleanups in My Community (CIMC) web application.

Government Publication Date: Sep 13, 2022

FEMA Underground Storage Tank Listing: FEMA UST

The Federal Emergency Management Agency (FEMA) of the Department of Homeland Security maintains a list of FEMA owned underground storage tanks.

Government Publication Date: Dec 31, 2017

Facility Response Plan: FRP

List of facilities that have submitted Facility Response Plans (FRP) to EPA. Facilities that could reasonably be expected to cause "substantial harm" to the environment by discharging oil into or on navigable waters are required to prepare and submit Facility Response Plans (FRPs). Harm is determined based on total oil storage capacity, secondary containment and age of tanks, oil transfer activities, history of discharges, proximity to a public drinking water intake or sensitive environments.

Government Publication Date: Dec 31, 2021

Delisted Facility Response Plans: DELISTED FRP

Facilities that once appeared in - and have since been removed from - the list of facilities that have submitted Facility Response Plans (FRP) to EPA. Facilities that could reasonably be expected to cause "substantial harm" to the environment by discharging oil into or on navigable waters are required to prepare and submit Facility Response Plans (FRPs). Harm is determined based on total oil storage capacity, secondary containment and age of tanks, oil transfer activities, history of discharges, proximity to a public drinking water intake or sensitive environments.

Government Publication Date: Dec 31, 2021

Historical Gas Stations: HIST GAS STATIONS

This historic directory of service stations is provided by the Cities Service Company. The directory includes Cities Service filling stations that were located throughout the United States in 1930.

Government Publication Date: Jul 1, 1930

Petroleum Refineries: REFN

List of petroleum refineries from the U.S. Energy Information Administration (EIA) Refinery Capacity Report. Includes operating and idle petroleum refineries (including new refineries under construction) and refineries shut down during the previous year located in the 50 States, the District of Columbia, Puerto Rico, the Virgin Islands, Guam, and other U.S. possessions. Survey locations adjusted using public data.

Government Publication Date: Aug 30, 2022

Petroleum Product and Crude Oil Rail Terminals: BULK TERMINAL

List of petroleum product and crude oil rail terminals made available by the U.S. Energy Information Administration (EIA). Includes operable bulk petroleum product terminals located in the 50 States and the District of Columbia with a total bulk shell storage capacity of 50,000 barrels or more, and/or the ability to receive volumes from tanker, barge, or pipeline; also rail terminals handling the loading and unloading of crude oil that were active between 2017 and 2018. Petroleum product terminals comes from the EIA-815 Bulk Terminal and Blender Report, which includes working, shell in operation, and shell idle for several major product groupings. Survey locations adjusted using public data.

Government Publication Date: Jun 29, 2022

LIEN on Property: SEMS LIEN

The U.S. Environmental Protection Agency's (EPA) Superfund Enterprise Management System (SEMS) provides Lien details on applicable properties, such as the Superfund lien on property activity, the lien property information, and the parties associated with the lien.

Government Publication Date: Jan 25, 2023

Superfund Decision Documents: SUPERFUND ROD

This database contains a list of decision documents for Superfund sites. Decision documents serve to provide the reasoning for the choice of (or) changes to a Superfund Site cleanup plan. The decision documents include completed Records of Decision (ROD), ROD Amendments, Explanations of Significant Differences (ESD) for active and archived sites stored in the Superfund Enterprise Management System (SEMS), along with other associated memos and files. This information is maintained and made available by the U.S. Environmental Protection Agency.

Government Publication Date: Dec 22, 2022

Formerly Utilized Sites Remedial Action Program: DOE FUSRAP

The U.S. Department of Energy (DOE) established the Formerly Utilized Sites Remedial Action Program (FUSRAP) in 1974 to remediate sites where radioactive contamination remained from the Manhattan Project and early U.S. Atomic Energy Commission (AEC) operations. The DOE Office of Legacy Management (LM) established long-term surveillance and maintenance (LTS&M) requirements for remediated FUSRAP sites. DOE evaluates the final site conditions of a remediated site on the basis of risk for different future uses. DOE then confirms that LTS&M requirements will maintain protectiveness.

Government Publication Date: Mar 4, 2017

State

Registry of Confirmed Abandoned or Uncontrolled Hazardous Waste Disposal Sites: SHWS

Sites listed on and proposed for the Registry of Confirmed Abandoned or Uncontrolled Hazardous Waste Disposal Sites in Missouri maintained by the Missouri Department of Natural Resources. Sites listed on the Registry appear on a publicly available list, and a notice filed with the Recorder of Deeds documents hazardous waste contamination at the site. Notice regarding contamination must be provided by the seller to potential buyers. The use of a property listed on the Registry may not change substantially without the written approval of the department. List of sites is updated quarterly, details from the Registry Annual Report are released and updated annually. This database is state equivalent CERCLIS.

Government Publication Date: Jun 30, 2022

Site Management and Reporting System: SMAR

Missouri's Department of Natural Resources (MDNR) maintains a Site Management and Reporting System (SMARS) managed by the Hazardous Waste Program. SMARS currently houses information for Superfund, Federal Facility, Brownfields Voluntary Cleanup Program (BVCP) and Missouri's other state response programs.

Government Publication Date: Mar 9, 2023

Delisted Registry of Confirmed Abandoned or Uncontrolled Hazardous Waste Disposal Sites: DELISTED SHWS

The Missouri Department of Natural Resources would remove a record from the Registry of Confirmed Abandoned or Uncontrolled Hazardous Waste Disposal Sites, if the record is not a Registry Site. This list contains all such non-registry sites that are not included in the Registry Removed sites.

Government Publication Date: Jun 30, 2022

Registry Sites Removed or Action Suspended: REMOVED SHWS

This is a list of registry sites that are removed or have action suspended from the Missouri Registry Annual Report Registry of Confirmed Abandoned or Uncontrolled Hazardous Waste Disposal Sites in Missouri. The Registry is made available by Missouri Department of Natural Resources.

Government Publication Date: Jun 30, 2022

Delisted Hazardous Waste Cleanup Sites: DELISTED HWC

List of sites which once appeared on the Missouri Department of Natural Resources (MDNR)'s Hazardous Waste Program Cleanup Sites list, but have since been removed.

Government Publication Date: Mar 6, 2023

Registry Sites Withdrawn or Deleted: DEL SHWS

This database contains a list of sites that were removed from the Registry of Confirmed Abandoned or Uncontrolled Hazardous Waste Disposal Sites, or Registry action was suspended due to cleanup. This database is state equivalent CERCLIS.

Government Publication Date: Oct 31, 2022

Hazardous Waste Cleanup Program Sites: HWCP

Missouri's Department of Natural Resources (MDNR) manages a Hazardous Waste Program Cleanup Sites list that includes sites that were remediated or investigated under the oversight of the Hazardous Waste Program. These include Superfund, Federal Facilities, Resource Conservation and Recovery Act (RCRA) Corrective Action, and Brownfields/Voluntary Cleanup Program sites that fall under the following four categories: Active Sites, Long Term Sterwardship Sites, Environmental Notice Sites and Completed Sites.

Government Publication Date: Mar 6, 2023

Solid Waste Facility List: SWF/LF

List of landfill locations made available by the Missouri Department of Natural Resources (DNR). Includes Sanitary Landfills, Utility Waste Landfills, Industrial Waste Landfills, and Demolition Landfills. The Missouri Department of Natural Resources provides no warranty, expressed or implied, as to the accuracy of the data, and no responsibility is assumed by the DNR in the use of these data.

Government Publication Date: Mar 15, 2021

Leaking Storage Tank: LST

List of remediation facilities in the Missouri Department of Natural Resources (DNR)'s Underground Storage Tank and Aboveground Storage Tank Summary database.

Government Publication Date: Jan 16, 2023

Delisted Leaking Storage Tank: DELISTED LST

This database contains a list of closed leaking storage tank sites that were removed from the Missouri Department of Natural Resources (DNR)'s Underground Storage Tank and Aboveground Storage Tank Summary database.

Government Publication Date: Jan 16, 2023

Regulated Tanks with Activity and Use Limitations: TANK AUL

List of Regulated Petroleum and Hazardous Substance Storage Tanks with Activity and Use Limitations, made available by the Missouri Department of Natural Resources (DNR) via the Environmental Site Tracking and Research Tool (E-START).

Government Publication Date: Jan 16, 2023

Petroleum Storage Tanks: UST

List of Underground Storage Tank (UST) facilities included in the Missouri Department of Natural Resources (DNR)'s Underground Storage Tank summary database and the Environmental Site Tracking and Research Tool (E-START) .

Government Publication Date: Jan 16, 2023

Aboveground Storage Tanks: AST

List of Aboveground Storage Tanks (ASTs) inspected by the Missouri Department of Agriculture's Petroleum/Propane/Anhydrous Ammonia Inspection Program.

Government Publication Date: Jan 13, 2023

Delisted Storage Tanks: DEL TANK

This database contains a list of closed storage tank sites that were removed from the Missouri Department of Natural Resources (DNR)'s Underground Storage Tank summary database.

Government Publication Date: Jan 16, 2023

Activity and Use Limitations: AUL

Missouri's Department of Natural Resources (MDNR) manages a Hazardous Waste Program Cleanup Sites list that includes sites that have Activity and Use Limitations in place. These mechanisms or controls ensure that exposure pathways to Contaminants of Concern (COCs) through current or reasonable future uses, are not completed for as long as the COCs pose an unacceptable risk to human health, public welfare or the environment.

Government Publication Date: Mar 6, 2023

Brownfields/Voluntary Cleanup Program: VCP

The Missouri Department of Natural Resources Voluntary Cleanup Program is administered by the Hazardous Waste Program's Brownfields/Voluntary Cleanup Section to provide state oversight for voluntary cleanups of properties contaminated with hazardous substances. Many of the sites entering the BVCP are not heavily contaminated, and are contaminated by sources not addressed by any of Department of Natural Resources' regulatory programs such as Emergency Response, Superfund, Resource Conservation and Recovery Act or Petroleum Storage Tanks.

Government Publication Date: Jan 4, 2023

Brownfields Assessment Sites List: BROWNFIELDS

The Missouri Department of Natural Resources Brownfields/Voluntary Cleanup Program (BVCP) under a cooperative agreement with the U.S. Environmental Protection Agency (EPA) conducts brownfields site-specific assessments of properties for public entities such as cities, counties and quasi-governmental entities, as well as for not-for-profit organizations.The site-specific assessment program provides funding and technical assistance to help communities assess properties. An assessment provides valuable information that can aid in making decisions regarding the future of the property.

Government Publication Date: Mar 9, 2023

Tribal

Leaking Underground Storage Tanks (LUSTs) on Indian Lands: INDIAN LUST

This list of leaking underground storage tanks (LUSTs) on Tribal/Indian Lands in Region 7, which includes Missouri, is made available by the United States Environmental Protection Agency (EPA).

Government Publication Date: Oct 12, 2017

Underground Storage Tanks (USTs) on Indian Lands: INDIAN UST

This list of underground storage tanks (USTs) on Tribal/Indian Lands in Region 7, which includes Missouri, is made available by the United States Environmental Protection Agency (EPA).

Government Publication Date: Oct 12, 2017

Delisted Tribal Leaking Storage Tanks: DELISTED INDIAN LST

Leaking Underground Storage Tank (LUST) facilities which once appeared on - and have since been removed from - the Regional Tribal/Indian LUST lists made available by the United States Environmental Protection Agency (EPA).

Government Publication Date: Nov 23, 2022

Delisted Tribal Underground Storage Tanks: DELISTED INDIAN UST

Underground Storage Tank (UST) facilities which once appeared on - and have since been removed from - the Regional Tribal/Indian UST lists made available by the United States Environmental Protection Agency (EPA).

Government Publication Date: Nov 23, 2022

County

No County databases were selected to be included in the search.

Additional Environmental Record Sources

Federal

Facility Registry Service/Facility Index: FINDS/FRS

The Facility Registry Service (FRS) is a centrally managed database that identifies facilities, sites, or places subject to environmental regulations or of environmental interest. FRS creates high-quality, accurate, and authoritative facility identification records through rigorous verification and management procedures that incorporate information from program national systems, state master facility records, and data collected from EPA's Central Data Exchange registrations and data management personnel. This list is made available by the Environmental Protection Agency (US EPA).

Government Publication Date: Aug 18, 2022

Toxics Release Inventory (TRI) Program: TRIS

The EPA's Toxics Release Inventory (TRI) is a database containing data on disposal or other releases of over 650 toxic chemicals from thousands of U. S. facilities and information about how facilities manage those chemicals through recycling, energy recovery, and treatment. One of TRI's primary purposes is to inform communities about toxic chemical releases to the environment.

Government Publication Date: Aug 24, 2021

PFOA/PFOS Contaminated Sites: PFAS NPL

List of National Priorities List (NPL) and related Superfund Alternative Agreement (SAA) sites where PFOA or PFOS contaminants have been found in water and/or soil. The site listing is provided by the Federal Environmental Protection Agency (EPA).

Government Publication Date: Dec 28, 2022

Federal Agency Locations with Known or Suspected PFAS Detections: PFAS FED SITES

List of Federal agency locations with known or suspected detections of Per- and Polyfluoroalkyl Substances (PFAS), made available by the U.S. Environmental Protection Agency (EPA) in their PFAS Analytic Tools data. EPA outlines that these data are gathered from several federal entities, such as the Federal Superfund program, Department of Defense (DOD), National Aeronautics and Space Administration, Department of Transportation, and Department of Energy. Sites on this list do not necessarily reflect the source/s of contamination and detections do not indicate level of risk or human exposure at the site. Agricultural notifications in this data are limited to DOD sites only. At this time, the EPA is aware that this list is not comprehensive of all Federal agencies.

Government Publication Date: Jun 30, 2022

SSEHRI PFAS Contamination Sites: PFAS SSEHRI

This PFAS Contamination Site Tracker database is compiled by the Social Science Environmental Health Research Institute (SSEHRI) at Northeastern University. According to the SSEHRI, the database records qualitative and quantitative data from each known site of PFAS contamination, including timeline of discovery, sources, levels, health impacts, community response, and government response. The goal of this database is to compile information and support public understanding of the rapidly unfolding issue of PFAS contamination. All data presented was extracted from government websites, news articles, or publicly available documents, and this is cited in the tracker. Disclaimer: The source conveys this database undergoes regular updates as new information becomes available, some sites may be missing and/or contain information that is incorrect or outdated, as well as their information represents all contamination sites SSEHRI is aware of, not all possible contamination sites. This data is not intended to be used for legal purposes. Limited location details are available with this data. Access the following for the most current informations https://pfasproject.com/pfas-contamination-site-tr acker/

Government Publication Date: Dec 12, 2019

National Response Center PFAS Spills: ERNS PFAS

National Response Center (NRC) calls from 1990 to the most recent complete calendar year where there is indication of Aqueous Film Forming Foam (AFFF) usage. NRC calls may reference AFFF usage in the "Material Involved" or "Incident Description" fields. Data made available by the US Environmental Protection Agency (EPA). Disclaimer: dataset may include initial or misidentified incident data not yet validated or investigated by a federal/state response agency.

Government Publication Date: Feb 23, 2022

PFAS NPDES Discharge Monitoring: PFAS NPDES

This list of National Pollutant Discharge Elimination System (NPDES) permitted facilities with required monitoring for Per- and Polyfluoroalkyl (PFAS) Substances is made available via the U.S. Environmental Protection Agency (EPA)'s PFAS Analytic Tools. Any point-source wastewater discharger to waters of the United States must have a NPDES permit, which defines a set of parameters for pollutants and monitoring to ensure that the discharge does not degrade water quality or impair human health. This list includes NPDES permitted facilities associated with permits that monitor for Per- and Polyfluoroalkyl Substances (PFAS), limited to the years 2007 - present. EPA further advises the following regarding these data: currently, fewer than half of states have required PFAS monitoring for at least one of their permittees, and fewer states have established PFAS effluent limits for permittees. For states that may have required monitoring, some reporting and data transfer issues may exist on a state-by-state basis.

Government Publication Date: Feb 19, 2023

Perfluorinated Alkyl Substances (PFAS) from Toxic Release Inventory: PFAS TRI

List of Toxics Release Inventory (TRI) facilities at which the reported chemical is a Per- or polyfluorinated alkyl substance (PFAS) included in the Environmental Protection Agency (EPA)'s consolidated PFAS Master List of PFAS Substances. The EPA's Toxics Release Inventory (TRI) is a database containing data on disposal or other releases of over 650 toxic chemicals from thousands of U.S. facilities and information about how facilities manage those chemicals through recycling, energy recovery, and treatment.

Government Publication Date: Aug 24, 2021

Perfluorinated Alkyl Substances (PFAS) Water Quality: PFAS WATER

The Water Quality Portal (WQP) is a cooperative service sponsored by the United States Geological Survey (USGS), the Environmental Protection Agency (EPA), and the National Water Quality Monitoring Council (NWQMC). This listing includes records from the Water Quality Portal where the characteristic (environmental measurement) is in the Environmental Protection Agency (EPA)'s consolidated Master List of PFAS Substances.

Government Publication Date: Jul 20, 2020

PFAS TSCA Manufacture and Import Facilities: PFAS TSCA

The US Environmental Protection Agency (EPA) issued the Chemical Data Reporting (CDR) Rule under the Toxic Substances Control Act (TSCA) requiring facilities that manufacture or import chemical substances to report to EPA. This list is specific to TSCA Manufacture and Import Facilities with reported per- and poly-fluoroalkyl substances (PFAS). Data file made available by the EPA and includes CDR/Inventory Update Reporting data from 1998 up to 2020. EPA makes notes the following about these data: this data file includes production and importation data for chemicals identified in EPA's CompTox Chemicals Dashboard list of PFAS without explicit structures and list of PFAS structures in DSSTox. Note that some regulations have specific chemical structure requirements that define PFAS differently than the lists in EPA's CompTox Chemicals Dashboard. Reporting information on manufactured or imported chemical substance amounts should not be compared between facilities, as some companies claim Chemical Data Reporting Rule data fields for PFAS information as Confidential Business Information.

Government Publication Date: Jun 20, 2022

PFAS Waste Transfers from RCRA e-Manifest : PFAS E-MANIFEST

This Per- and Poly-Fluoroalkyl Substances (PFAS) Waste Transfers dataset is made available via the U.S. Environmental Protection Agency's (EPA) PFAS Analytic Tools. Every shipment of hazardous waste in the U.S. must be accompanied by a shipment manifest, which is a critical component of the cradle-to-grave tracking of wastes mandated by the Resource Conservation and Recovery Act (RCRA). According to the EPA, currently no Federal Waste Code exists for any PFAS compounds. To work around the lack of PFAS waste codes in the RCRA database, EPA developed the PFAS Transfers dataset by mining e-Manifest records containing at least one of these common PFAS keywords: • PFAS • PFOA • PFOS • PERFL • AFFF • GENX • GEN-X (plus the Vermont state-specific waste codes). Limitations: Amount or concentration of PFAS being transferred cannot be determined from the manifest information. Keyword searches may misidentify some manifest records that do not contain PFAS. This dataset should also not be considered to be exhaustive of all PFAS waste transfers.

Government Publication Date: Apr 9, 2023

Hazardous Materials Information Reporting System: HMIRS

US DOT - Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) Incidents Reports Database taken from Hazmat Intelligence Portal, U.S. Department of Transportation.

Government Publication Date: Sep 1, 2020

National Clandestine Drug Labs: NCDL

The U.S. Department of Justice ("the Department"), Drug Enforcement Administration (DEA), provides this data as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy.

Government Publication Date: Aug 30, 2022

Toxic Substances Control Act: TSCA

The Environmental Protection Agency (EPA) is amending the Toxic Substances Control Act (TSCA) section 8(a) Inventory Update Reporting (IUR) rule and changing its name to the Chemical Data Reporting (CDR) rule.

The CDR enables EPA to collect and publish information on the manufacturing, processing, and use of commercial chemical substances and mixtures (referred to hereafter as chemical substances) on the TSCA Chemical Substance Inventory (TSCA Inventory). This includes current information on chemical substance production volumes, manufacturing sites, and how the chemical substances are used. This information helps the Agency determine whether people or the environment are potentially exposed to reported chemical substances. EPA publishes submitted CDR data that is not Confidential Business Information (CBI).

Government Publication Date: Apr 11, 2019

Hist TSCA: HIST TSCA

The Environmental Protection Agency (EPA) is amending the Toxic Substances Control Act (TSCA) section 8(a) Inventory Update Reporting (IUR) rule and changing its name to the Chemical Data Reporting (CDR) rule.

The 2006 IUR data summary report includes information about chemicals manufactured or imported in quantities of 25,000 pounds or more at a single site during calendar year 2005. In addition to the basic manufacturing information collected in previous reporting cycles, the 2006 cycle is the first time EPA collected information to characterize exposure during manufacturing, processing and use of organic chemicals. The 2006 cycle also is the first time manufacturers of inorganic chemicals were required to report basic manufacturing information.

Government Publication Date: Dec 31, 2006

FTTS Administrative Case Listing: FTTS ADMIN

An administrative case listing from the Federal Insecticide, Fungicide, & Rodenticide Act (FIFRA) and Toxic Substances Control Act (TSCA), together known as FTTS. This database was obtained from the Environmental Protection Agency's (EPA) National Compliance Database (NCDB). The FTTS and NCDB was shut down in 2006.

Government Publication Date: Jan 19, 2007

FTTS Inspection Case Listing: FTTS INSP

An inspection case listing from the Federal Insecticide, Fungicide, & Rodenticide Act (FIFRA) and Toxic Substances Control Act (TSCA), together known as FTTS. This database was obtained from the Environmental Protection Agency's (EPA) National Compliance Database (NCDB). The FTTS and NCDB was shut down in 2006.

Government Publication Date: Jan 19, 2007

Potentially Responsible Parties List: PRP

Early in the site cleanup process, the U.S. Environmental Protection Agency (EPA) conducts a search to find the Potentially Responsible Parties (PRPs). The EPA looks for evidence to determine liability by matching wastes found at the site with parties that may have contributed wastes to the site. This listing contains PRPs, Noticed Parties, at sites in the EPA's Superfund Enterprise Management System (SEMS).

Government Publication Date: Jan 25, 2023

State Coalition for Remediation of Drycleaners Listing: SCRD DRYCLEANER

The State Coalition for Remediation of Drycleaners (SCRD) was established in 1998, with support from the U.S. Environmental Protection Agency (EPA) Office of Superfund Remediation and Technology Innovation. Coalition members are states with mandated programs and funding for drycleaner site remediation. Current members are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin. Since 2017, the SCRD no longer maintains this data, refer to applicable state source data where available.

Government Publication Date: Nov 08, 2017

Integrated Compliance Information System (ICIS): ICIS

The U.S. Environmental Protection Agency's Enforcement and Compliance History Online system incorporates data from the Integrated Compliance Information System - National Pollutant Discharge Elimination System (ICIS-NPDES). ICIS-NPDES is an information management system maintained by the Office of Compliance to track permit compliance and enforcement status of facilities regulated by the NPDES under the Clean Water Act. This data includes permit, inspection, violation and enforcement action information for applicable ICIS records.

Government Publication Date: Oct 15, 2022

Drycleaner Facilities: FED DRYCLEANERS

A list of drycleaner facilities from Enforcement and Compliance History Online (ECHO) data as made available by the U.S. Environmental Protection Agency (EPA), sourced from the ECHO Exporter file. The EPA tracks facilities that possess NAIC and SIC codes that classify businesses as drycleaner establishments.

Government Publication Date: Dec 11, 2022

Delisted Drycleaner Facilities: DELISTED FED DRY

List of sites removed from the list of Drycleaner Facilities (sites in the EPA's Integrated Compliance Information System (ICIS) with NAIC or SIC codes identifying the business as a drycleaner establishment).

Government Publication Date: Dec 11, 2022

Formerly Used Defense Sites: FUDS

Formerly Used Defense Sites (FUDS) are properties that were formerly owned by, leased to, or otherwise possessed by and under the jurisdiction of the Secretary of Defense prior to October 1986, where the Department of Defense (DOD) is responsible for an environmental restoration. The FUDS Annual Report to Congress (ARC) is published by the U.S. Army Corps of Engineers (USACE). This data is compiled from the USACE's Geospatial FUDS data layers and Homeland Infrastructure Foundation-Level Data (HIFLD) FUDS dataset.

Government Publication Date: Jul 12, 2022

Former Military Nike Missile Sites: FORMER NIKE

This information was taken from report DRXTH-AS-IA-83A016 (Historical Overview of the Nike Missile System, 12/1984) which was performed by Environmental Science and Engineering, Inc. for the U.S. Army Toxic and Hazardous Materials Agency Assessment Division. The Nike system was deployed between 1954 and the mid-1970's. Among the substances used or stored on Nike sites were liquid missile fuel (JP-4); starter fluids (UDKH, aniline, and furfuryl alcohol); oxidizer (IRFNA); hydrocarbons (motor oil, hydraulic fluid, diesel fuel, gasoline, heating oil); solvents (carbon tetrachloride, trichloroethylene, trichloroethane, stoddard solvent); and battery electrolyte. The quantities of material a disposed of and procedures for disposal are not documented in published reports. Virtually all information concerning the potential for contamination at Nike sites is confined to personnel who were assigned to Nike sites. During deactivation most hardware was shipped to depot-level supply points. There were reportedly instances where excess materials were disposed of on or near the site itself at closure. There was reportedly no routine site decontamination.

Government Publication Date: Dec 2, 1984

PHMSA Pipeline Safety Flagged Incidents: PIPELINE INCIDENT

A list of flagged pipeline incidents made available by the U.S. Department of Transportation (US DOT) Pipeline and Hazardous Materials Safety Administration (PHMSA). PHMSA regulations require incident and accident reports for five different pipeline system types.

Government Publication Date: Mar 31, 2021

Material Licensing Tracking System (MLTS): MLTS

A list of sites that store radioactive material subject to the Nuclear Regulatory Commission (NRC) licensing requirements. This list is maintained by the NRC. As of September 2016, the NRC no longer releases location information for sites. Site locations were last received in July 2016.

Government Publication Date: May 11, 2021

Historic Material Licensing Tracking System (MLTS) sites: HIST MLTS

A historic list of sites that have inactive licenses and/or removed from the Material Licensing Tracking System (MLTS). In some cases, a site is removed from the MLTS when the state becomes an "Agreement State". An Agreement State is a State that has signed an agreement with the Nuclear Regulatory Commission (NRC) authorizing the State to regulate certain uses of radioactive materials within the State.

Government Publication Date: Jan 31, 2010

Mines Master Index File: MINES

The Master Index File (MIF) is provided by the United State Department of Labor, Mine Safety and Health Administration (MSHA). This file, which was originally created in the 1970's, contained many Mine-IDs that were invalid. MSHA removes invalid IDs from the MIF upon discovery. MSHA applicable data includes the following: all Coal and Metal/Non-Metal mines under MSHA's jurisdiction since 1/1/1970; mine addresses for all mines in the database except for Abandoned mines prior to 1998 from MSHA's legacy system (addresses may or may not correspond with the physical location of the mine itself); violations that have been assessed penalties as a result of MSHA inspections beginning on 1/1/2000; and violations issued as a result of MSHA inspections conducted beginning on 1/1/2000.

Government Publication Date: Nov 7, 2022

Surface Mining Control and Reclamation Act Sites: SMCRA

An inventory of land and water impacted by past mining (primarily coal mining) is maintained by the Office of Surface Mining Reclamation and Enforcement (OSMRE) to provide information needed to implement the Surface Mining Control and Reclamation Act of 1977 (SMCRA). The inventory contains information on the location, type, and extent of Abandoned Mine Land (AML) impacts, as well as information on the cost associated with the reclamation of those problems. The inventory is based upon field surveys by State, Tribal, and OSMRE program officials. It is dynamic to the extent that it is modified as new problems are identified and existing problems are reclaimed.

Government Publication Date: Aug 18, 2022

Mineral Resource Data System: MRDS

The Mineral Resource Data System (MRDS) is a collection of reports describing metallic and nonmetallic mineral resources throughout the world. Included are deposit name, location, commodity, deposit description, geologic characteristics, production, reserves, resources, and references. This database contains the records previously provided in the Mineral Resource Data System (MRDS) of USGS and the Mineral Availability System/Mineral Industry Locator System (MAS/MILS) originated in the U.S. Bureau of Mines, which is now part of USGS. The USGS has ceased systematic updates of the MRDS database with their focus more recently on deposits of critical minerals while providing a well-documented baseline of historical mine locations from USGS topographic maps.

Government Publication Date: Mar 15, 2016

DOE Legacy Management Sites: LM SITES

The U.S. Department of Energy (DOE) Office of Legacy Management (LM) currently manages radioactive and chemical waste, environmental contamination, and hazardous material at over 100 sites across the U.S. The LM manages sites with diverse regulatory drivers (statutes or programs that direct cleanup and management requirements at DOE sites) or as part of internal DOE or congressionally-recognized programs, such as but not limited to: Formerly Utilized Sites Remedial Action Program (FUSRAP), Uranium Mill Tailings Radiation Control Act (UMTRCA Title I, Tile II), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Resource Conservation and Recovery Act (RCRA), Decontamination and Decommissioning (D&D), Nuclear Waste Policy Act (NWPA). This site listing includes data exported from the DOE Office of LM's Geospatial Environmental Mapping System (GEMS). GEMS Data disclaimer: The DOE Office of LM makes no representation or warranty, expressed or implied, regarding the use, accuracy, availability, or completeness of the data presented herein.

Government Publication Date: Dec 1, 2022

Alternative Fueling Stations: ALT FUELS

This list of alternative fueling stations is sourced from the Alternative Fuels Data Center (AFDC). The U.S. Department of Energy's Office of Energy Efficiency & Renewable Energy launched the AFDC in 1991 as a repository for alternative fuel vehicle performance data, which provides a wealth of information and data on alternative and renewable fuels, advanced vehicles, fuel-saving strategies, and emerging transportation technologies. The data includes Biodiesel (B20 and above), Compressed Natural Gas (CNG), Electric, Ethanol (E85), Hydrogen, Liquefied Natural Gas (LNG), Propane (LPG) fuel type locations.

Government Publication Date: Jan 3, 2023

Superfunds Consent Decrees: CONSENT DECREES

This list of Superfund consent decrees is provided by the Department of Justice, Environment & Natural Resources Division (ENRD) through a Freedom of Information Act (FOIA) applicable file. This listing includes Consent Decrees for CERCLA or Superfund Sites filed and/or as proposed within the ENRD's Case Management System (CMS) since 2010. CMS may not reflect the latest developments in a case nor can the agency guarantee the accuracy of the data. ENRD Disclaimer: Congress excluded three discrete categories of law enforcement and national security records from the requirements of the FOIA; response is limited to those records that are subject to the requirements of the FOIA; however, this should not be taken as an indication that excluded records do, or do not, exist.

Government Publication Date: Jan 11, 2023

Air Facility System: AFS

This EPA retired Air Facility System (AFS) dataset contains emissions, compliance, and enforcement data on stationary sources of air pollution. Regulated sources cover a wide spectrum; from large industrial facilities to relatively small operations such as dry cleaners. AFS does not contain data on facilities that are solely asbestos demolition and/or renovation contractors, or landfills. ECHO Clean Air Act data from AFS are frozen and reflect data as of October 17, 2014; the EPA retired this system for Clean Air Act stationary sources and transitioned to ICIS-Air.

Government Publication Date: Oct 17, 2014

Registered Pesticide Establishments: SSTS

List of active EPA-registered foreign and domestic pesticide-producing and device-producing establishments based on data from the Section Seven Tracking System (SSTS). The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Section 7 requires that facilities producing pesticides, active ingredients, or devices be registered. The list of establishments is made available by the EPA.

Government Publication Date: Mar 30, 2022

Polychlorinated Biphenyl (PCB) Transformers: PCBT

Locations of Transformers Containing Polychlorinated Biphenyls (PCBs) registered with the United States Environmental Protection Agency. PCB transformer owners must register their transformer(s) with EPA. Although not required, PCB transformer owners who have removed and properly disposed of a registered PCB transformer may notify EPA to have their PCB transformer de-registered. Data made available by EPA.

Government Publication Date: Oct 15, 2019

Polychlorinated Biphenyl (PCB) Notifiers: PCB

Facilities included in the national list of facilities that have notified the United States Environmental Protection Agency (EPA) of Polychlorinated Biphenyl (PCB) activities. Any company or person storing, transporting or disposing of PCBs or conducting PCB research and development must notify the EPA and receive an identification number.

Government Publication Date: Nov 3, 2022

State

Per- and Polyfluoroalkyl Substances (PFAS): PFAS

A list of sites where PFAS/PFOS or a PFOS or PFAS-containing material is currently or ever has been: manufactured, used, stored, disposed of, or released. This list is made available by the Missouri Department of Natural Resources.

Government Publication Date: Nov 8, 2019

Dry Cleaner List: DRYCLEANERS

List of sites included in the Dry Cleaner List made available by the Missouri Department of Natural Resources. Includes sites that are known or thought to have been a dry cleaning facility at one time.

Government Publication Date: Nov 30, 2017

Delisted Dry Cleaner: DELISTED DRYCLEANERS

List of sites which once appeared on - and have since been removed from - the list of dry cleaners made available by the Missouri Department of Natural Resources.

Government Publication Date: Nov 30, 2017

Environmental Incident Summary Database: SPILLS

List of hazardous substance release incidents reported to and entered in the Missouri Department of Natural Resources (DNR)'s Environmental Emergency Response Tracking System; also includes locations of responses to environmental incidents by the DNR Emergency Response Section available on the Missouri Spatial Data Information Service Open Data.

Government Publication Date: Sep 22, 2021

Tier 2 Report: TIER 2

A list of Tier 2 facilities in Missouri. This list is made available by the State Emergency Management Agency (SEMA), a division of the Department of Public Safety. SEMA is the state of Missouri's coordinating agency for disaster planning, response, and recovery.

Government Publication Date: Sep 23, 2019

Tribal

No Tribal additional environmental record sources available for this State.

County

No County additional environmental record sources available for this State.

Definitions

Database Descriptions: This section provides a detailed explanation for each database including: source, information available, time coverage, and acronyms used. They are listed in alphabetic order.

Detail Report: This is the section of the report which provides the most detail for each individual record. Records are summarized by location, starting with the project property followed by records in closest proximity.

Distance: The distance value is the distance between plotted points, not necessarily the distance between the sites' boundaries. All values are an approximation.

Direction: The direction value is the compass direction of the site in respect to the project property and/or center point of the report.

Elevation: The elevation value is taken from the location at which the records for the site address have been plotted. All values are an approximation. Source: Google Elevation API.

Executive Summary: This portion of the report is divided into 3 sections:

'Report Summary'- Displays a chart indicating how many records fall on the project property and, within the report search radii.

'Site Report Summary'-Project Property'- This section lists all the records which fall on the project property. For more details, see the 'Detail Report' section.

'Site Report Summary-Surrounding Properties'- This section summarizes all records on adjacent properties, listing them in order of proximity from the project property. For more details, see the 'Detail Report' section.

Map Key: The map key number is assigned according to closest proximity from the project property. Map Key numbers always start at #1. The project property will always have a map key of '1' if records are available. If there is a number in brackets beside the main number, this will indicate the number of records on that specific property. If there is no number in brackets, there is only one record for that property.

The symbol and colour used indicates 'elevation': the red inverted triangle will dictate 'ERIS Sites with Lower Elevation', the yellow triangle will dictate 'ERIS Sites with Higher Elevation' and the orange square will dictate 'ERIS Sites with Same Elevation.'

Unplottables: These are records that could not be mapped due to various reasons, including limited geographic information. These records may or may not be in your study area, and are included as reference.

PSR
PHYSICAL SETTING REPORT

Property Information

Order Number:		23042100139p
Date Completed:		April 24, 2023
Project Number:		
Project Property:		West Alton Phase I n/a Portage Des Sioux MO
Coordinates:		
	Latitude:	38.94267315
	Longitude:	-90.36496062
	UTM Northing:	4313717.05329 Meters
	UTM Easting:	728373.774111 Meters
	UTM Zone:	UTM Zone 15S
	Elevation:	417.95 ft
	Slope Direction:	N/A

Topographic Information....2
Hydrologic Information....14
Geologic Information....24
Soil Information....28
Wells and Additional Sources....38
Summary....45
Detail Report....47
Radon Information....54
Appendix....55
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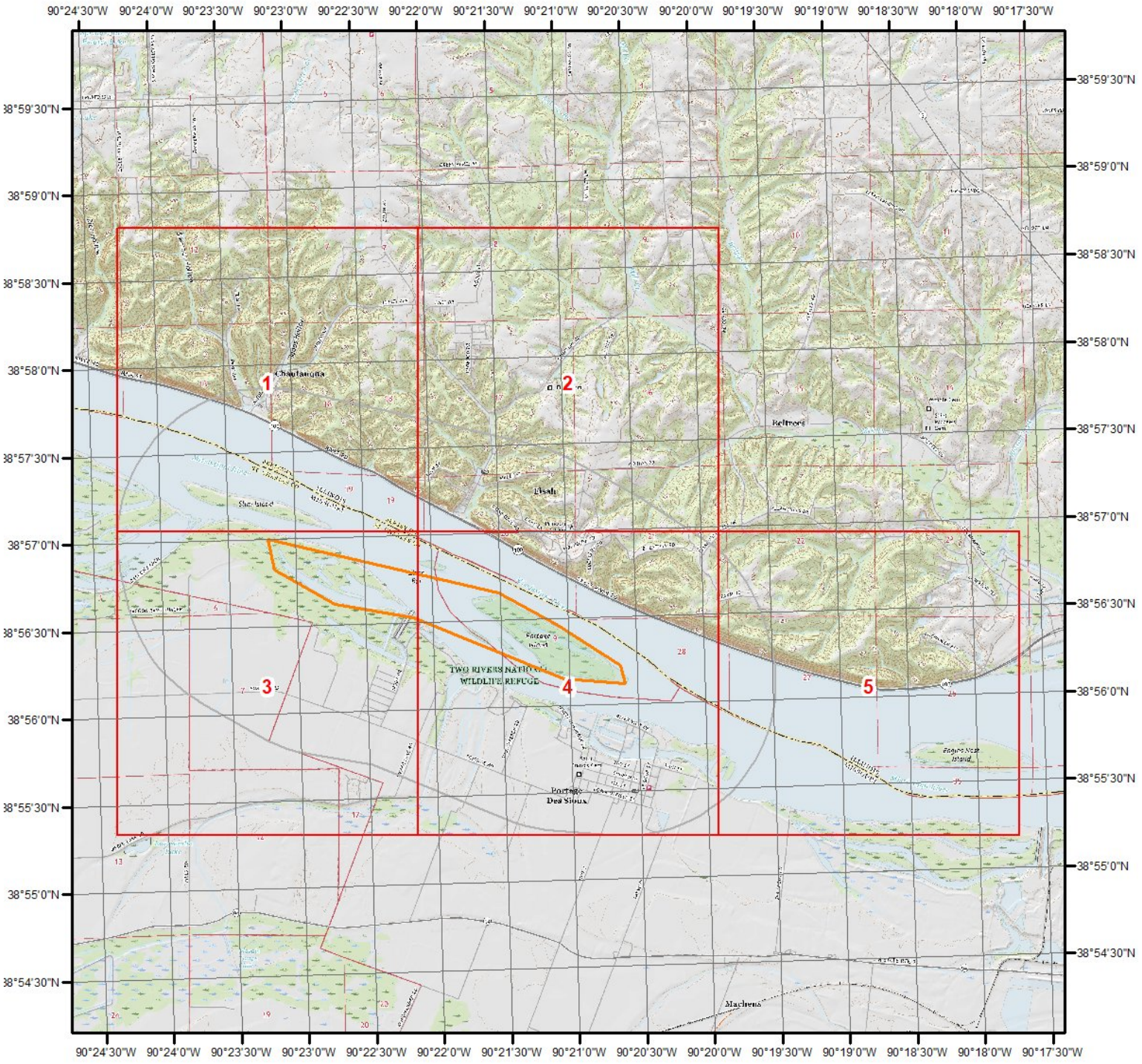
The ERIS ***Physical Setting Report - PSR*** provides comprehensive information about the physical setting around a site and includes a complete overview of topography and surface topology, in addition to hydrologic, geologic and soil characteristics. The location and detailed attributes of oil and gas wells, water wells, public water systems and radon are also included for review.

The compilation of both physical characteristics of a site and additional attribute data is useful in assessing the impact of migration of contaminants and subsequent impact on soils and groundwater.

Disclaimer

This Report does not provide a full environmental evaluation for the site or adjacent properties. Please see the terms and disclaimer at the end of the Report for greater detail.

Topographic Information



Current USGS Topo (2021)

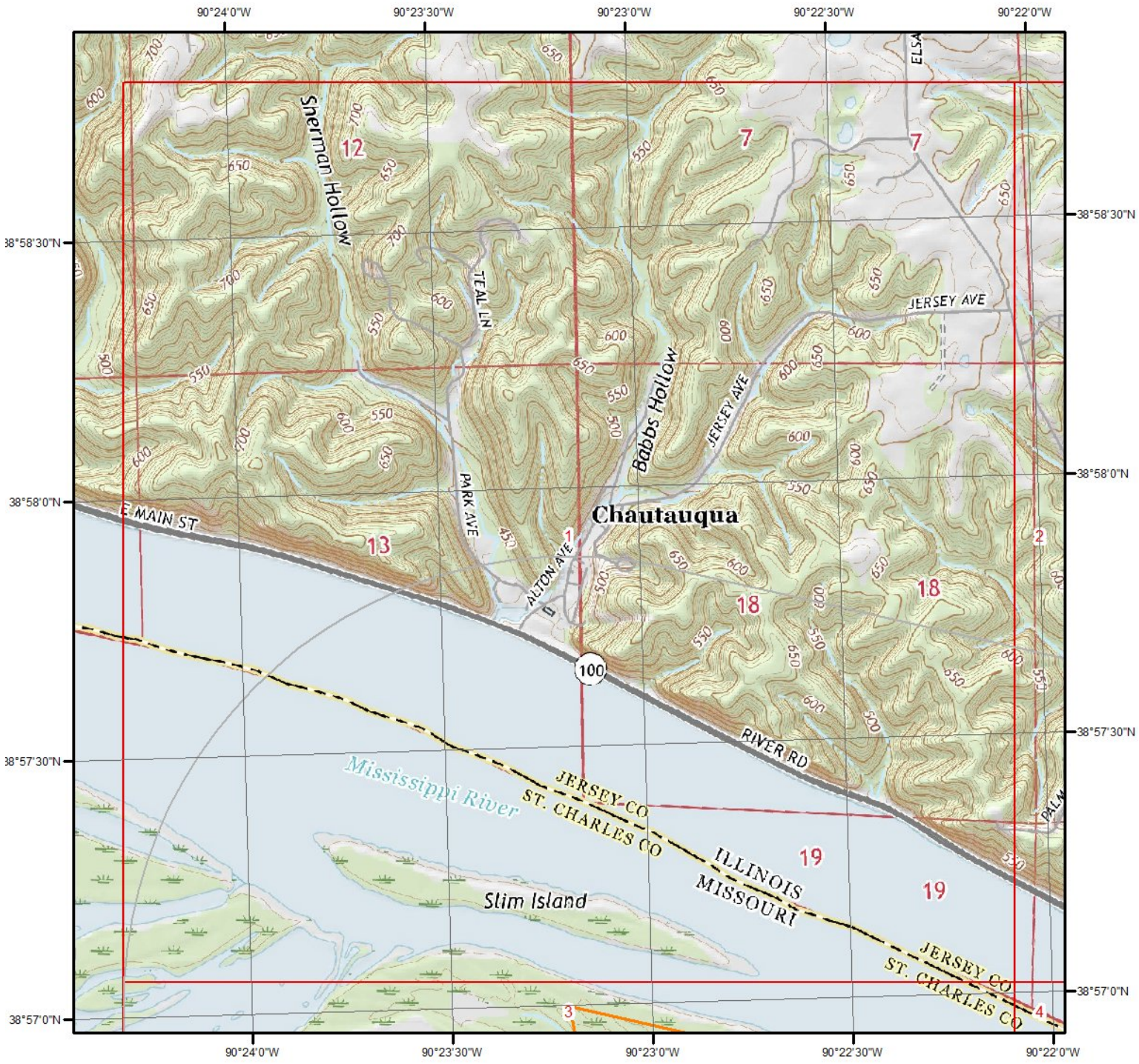
0 0.2 0.4 0.8 1.2 1.6 2 2.4 Miles

N

Quadrangle(s): Florissant,MO; Jerseyville South,IL; Brighton,IL; Alton,IL; Otterville,IL; Grafton,IL; Saint Charles,MO; Elsah,IL

Source: USGS 7.5 Minute Topographic Map

Topographic Information



Current USGS Topo - Page 1

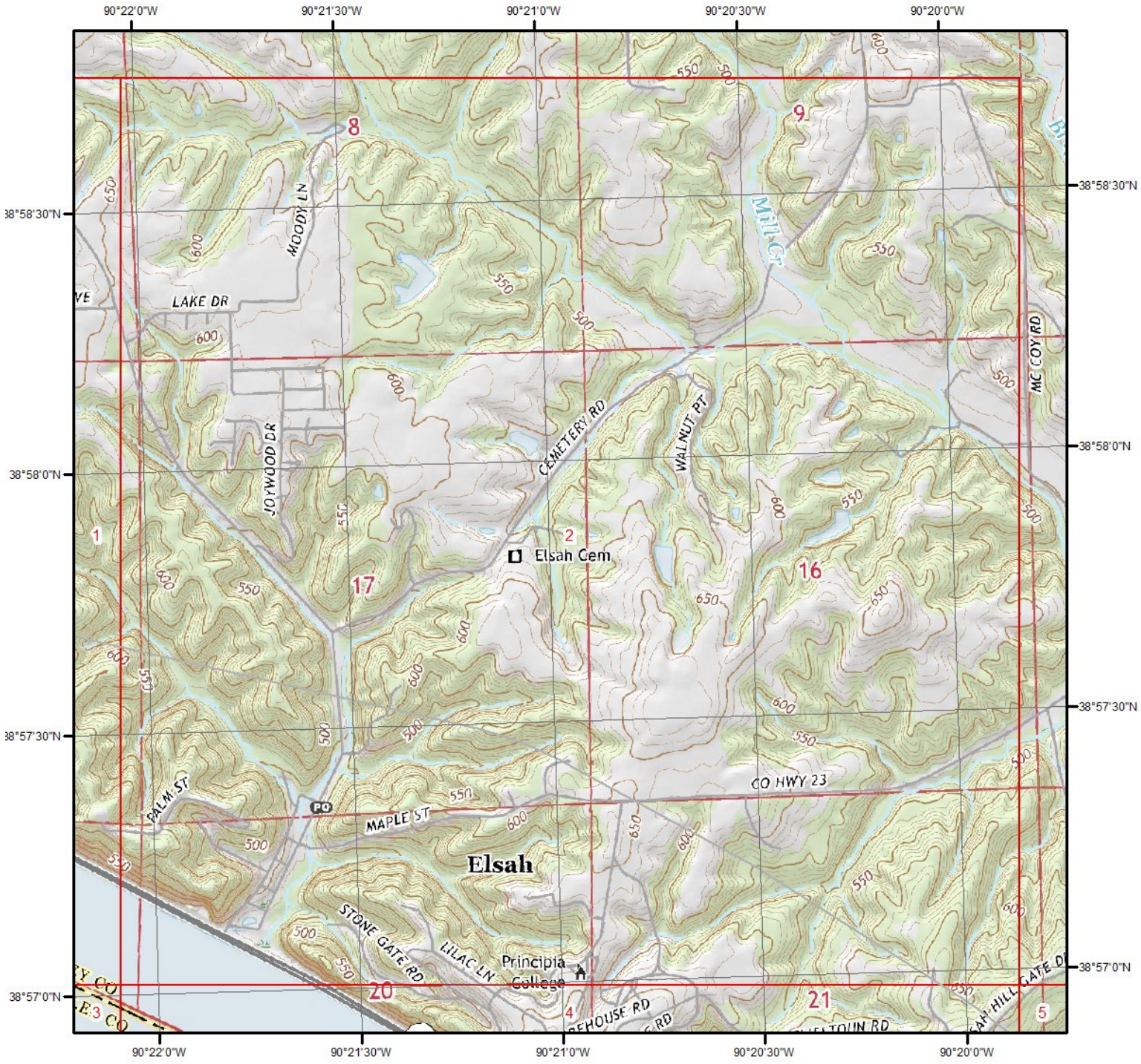
0 0.2 0.4 0.8 Miles

N

Quadrangle(s): Grafton,IL; Elsah,IL

Source: USGS 7.5 Minute Topographic Map

Topographic Information



Current USGS Topo - Page 2

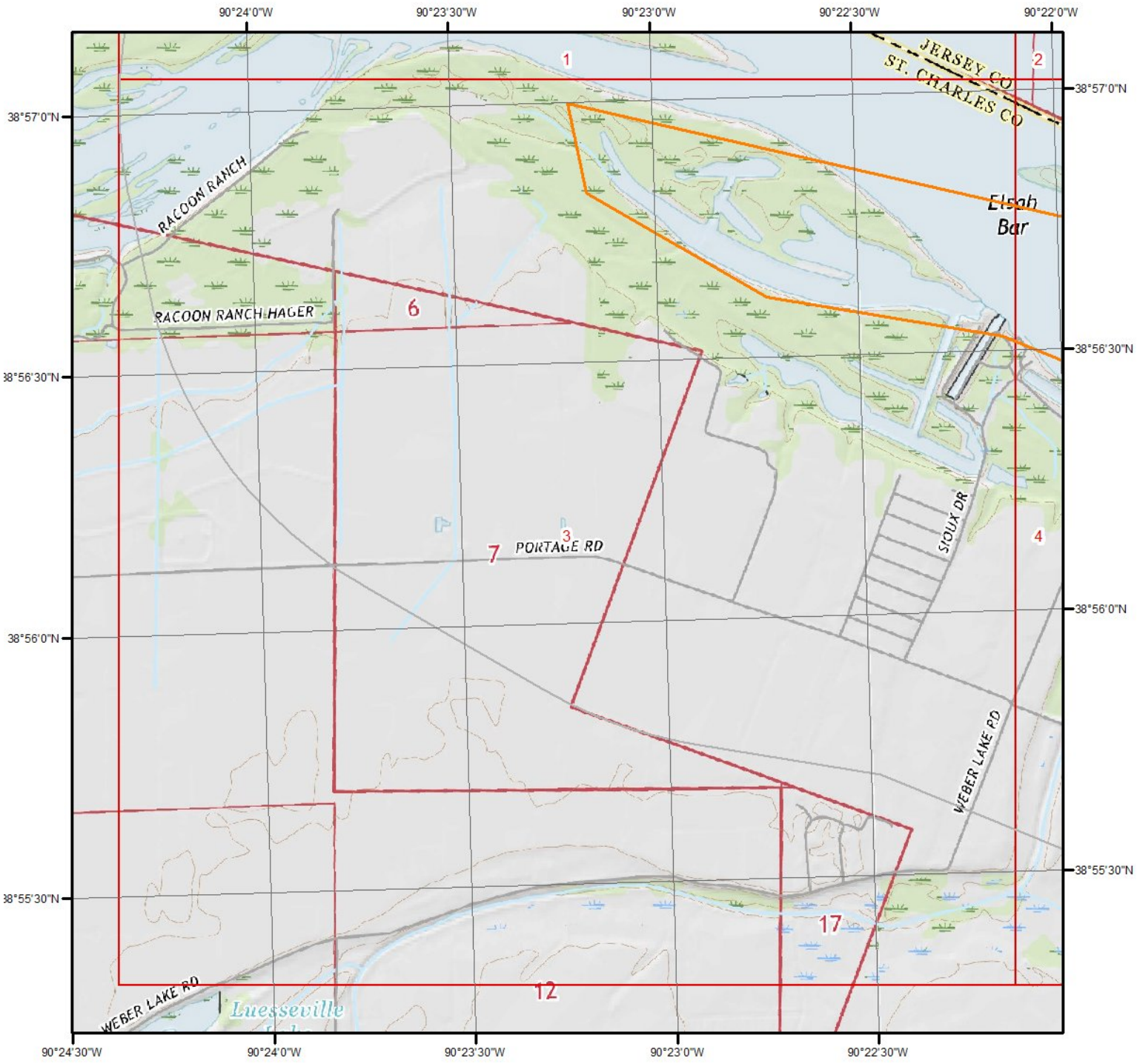
0 0.2 0.4 0.8 Miles

N

Quadrangle(s): Elsah,IL

Source: USGS 7.5 Minute Topographic Map

Topographic Information



Current USGS Topo - Page 3

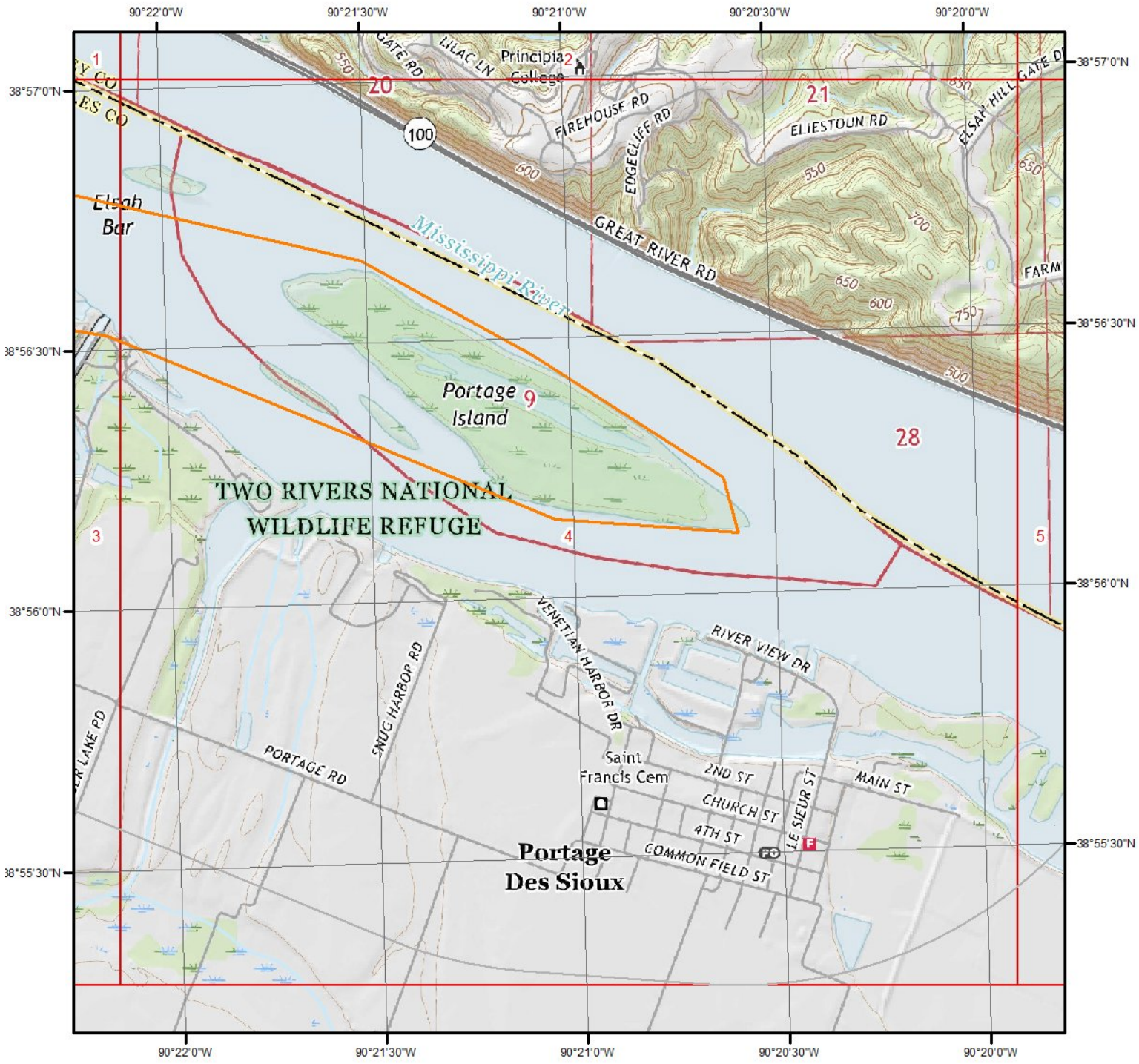
0 0.2 0.4 0.8 Miles

N

Quadrangle(s): Grafton,IL; Elsah,IL

Source: USGS 7.5 Minute Topographic Map

Topographic Information



Current USGS Topo - Page 4

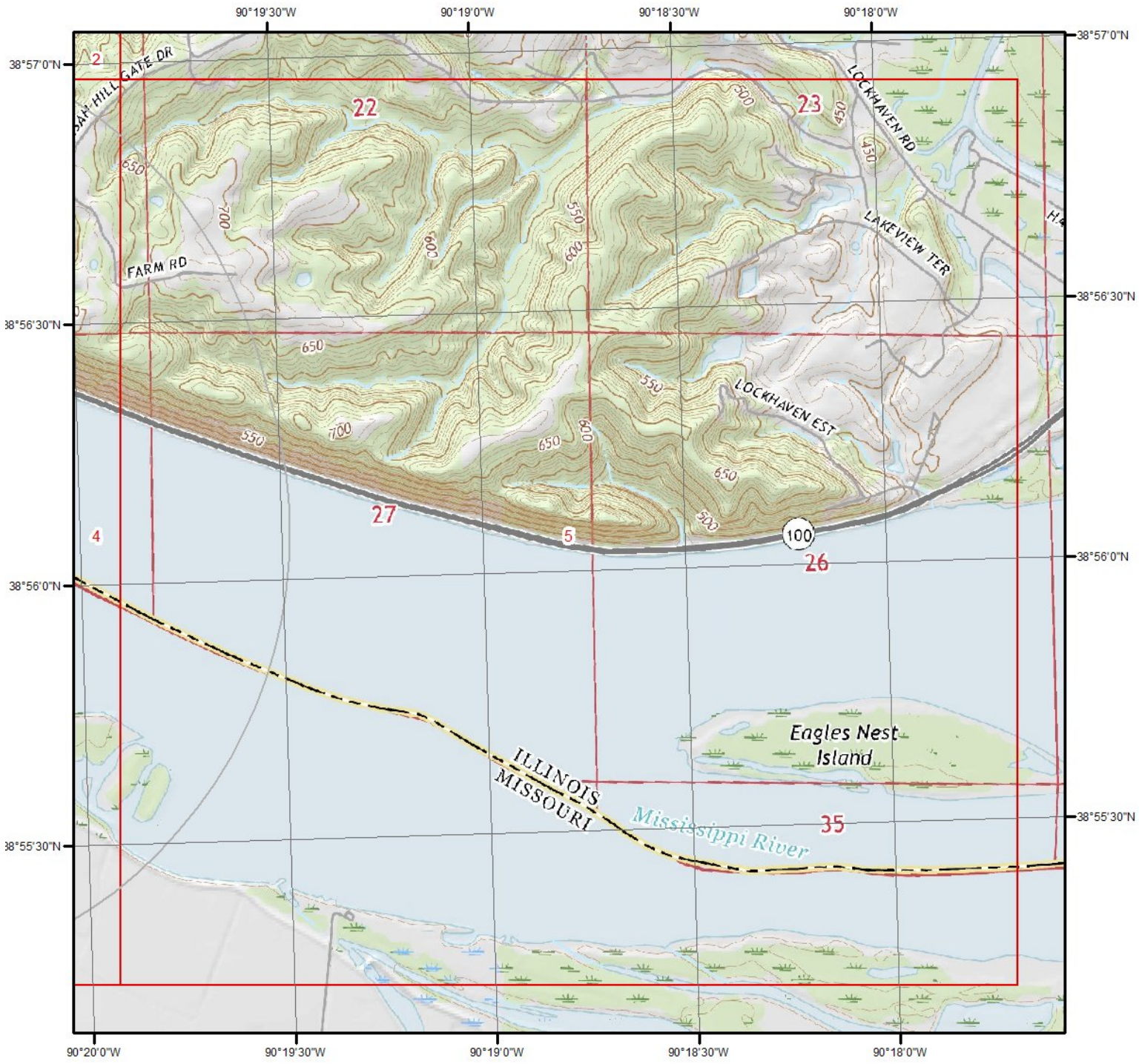
0 0.2 0.4 0.8 Miles

N

Quadrangle(s): Elsah,IL

Source: USGS 7.5 Minute Topographic Map

Topographic Information



Current USGS Topo - Page 5

0 0.2 0.4 0.8 Miles

N

Quadrangle(s): Elsah,IL

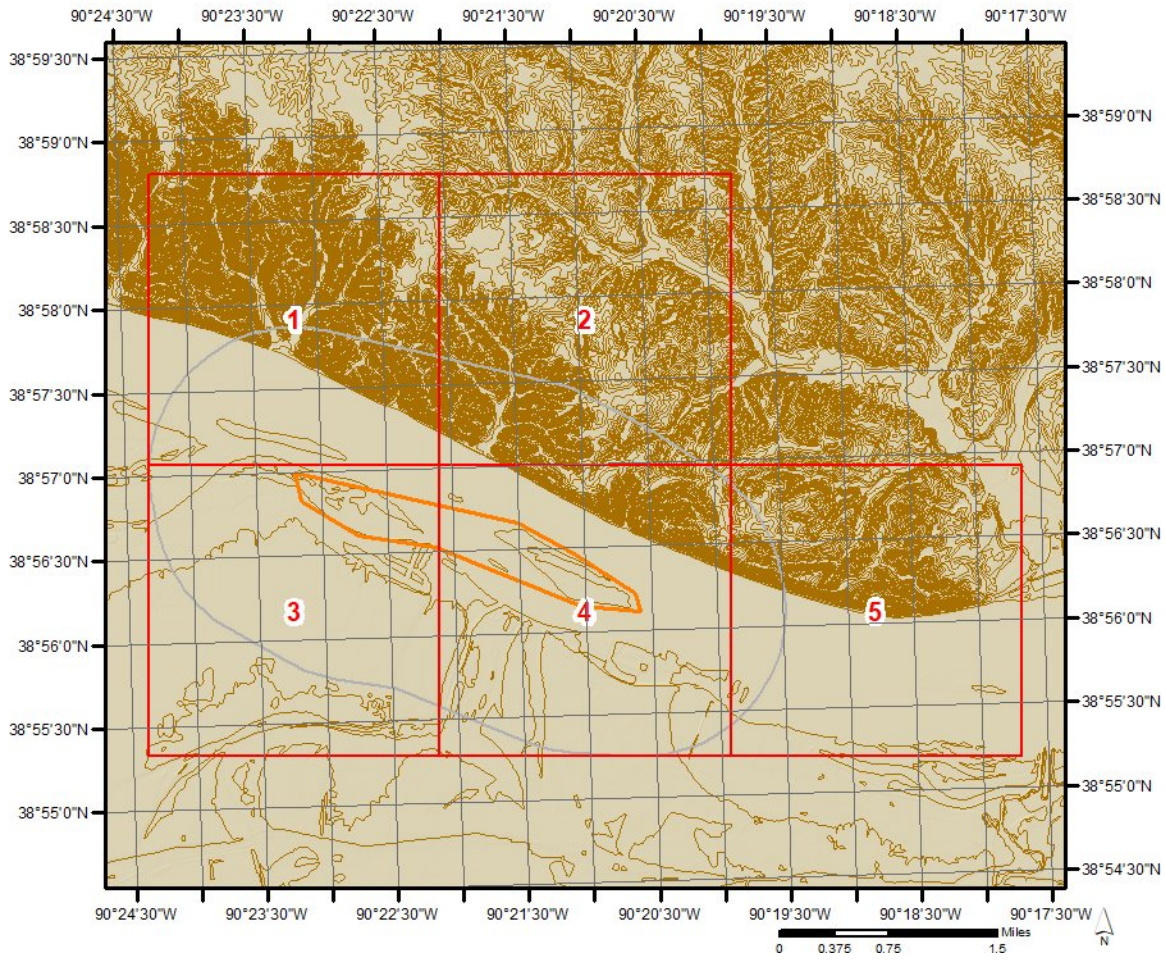
Source: USGS 7.5 Minute Topographic Map

Topographic Information

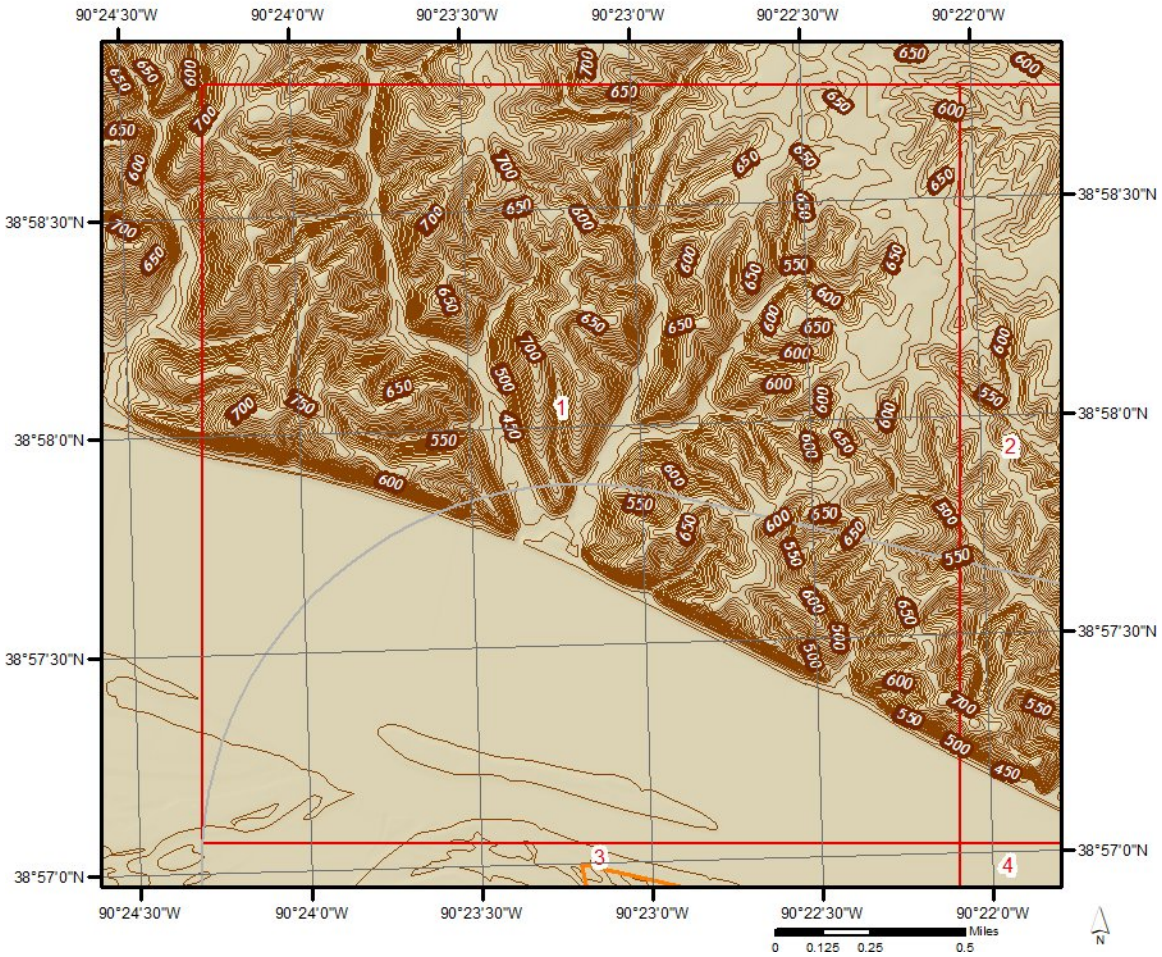
The previous topographic map(s) are created by seamlessly merging and cutting current USGS topographic data. Below are shaded relief map(s), derived from USGS elevation data to show surrounding topography in further detail.

Topographic information at project property:

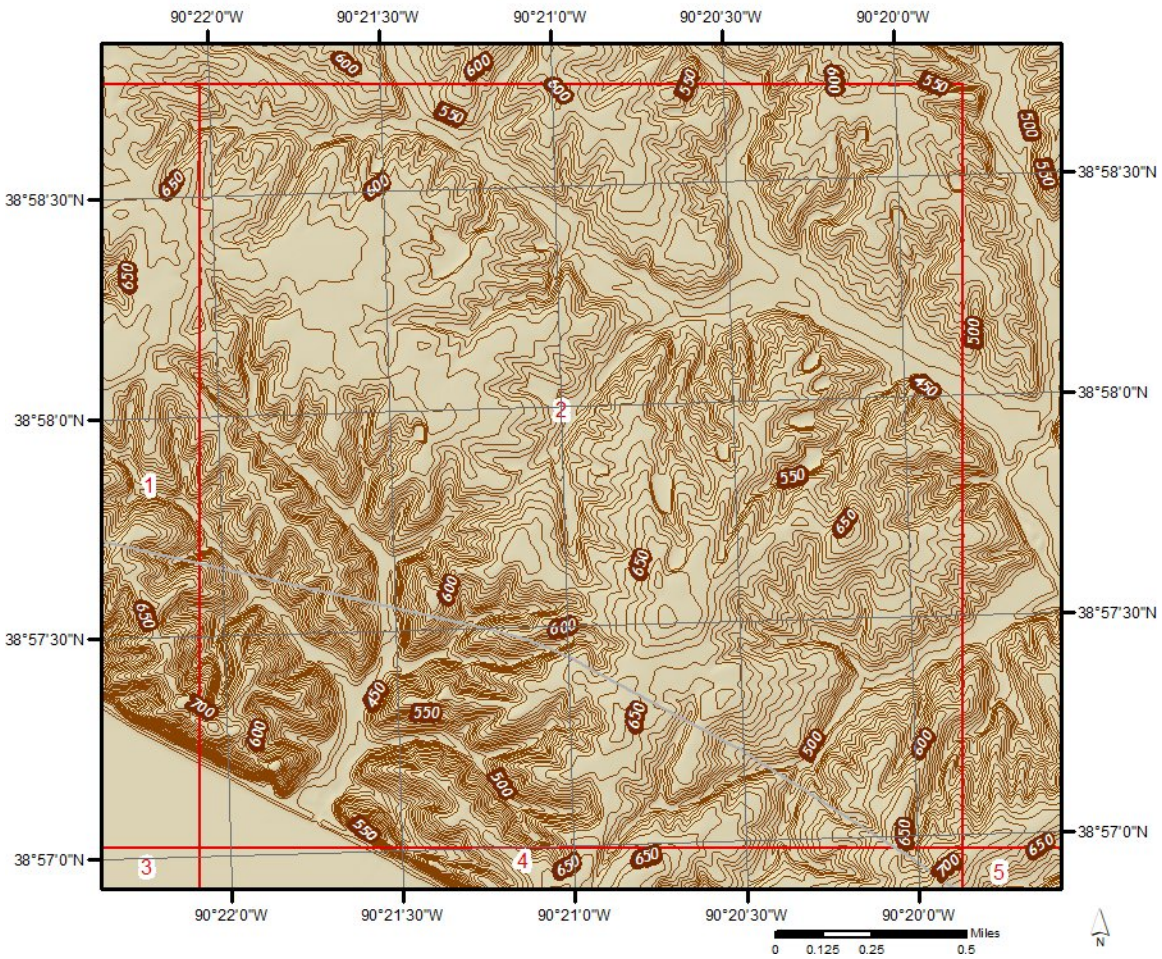
Elevation:	417.95 ft
Slope Direction:	N/A



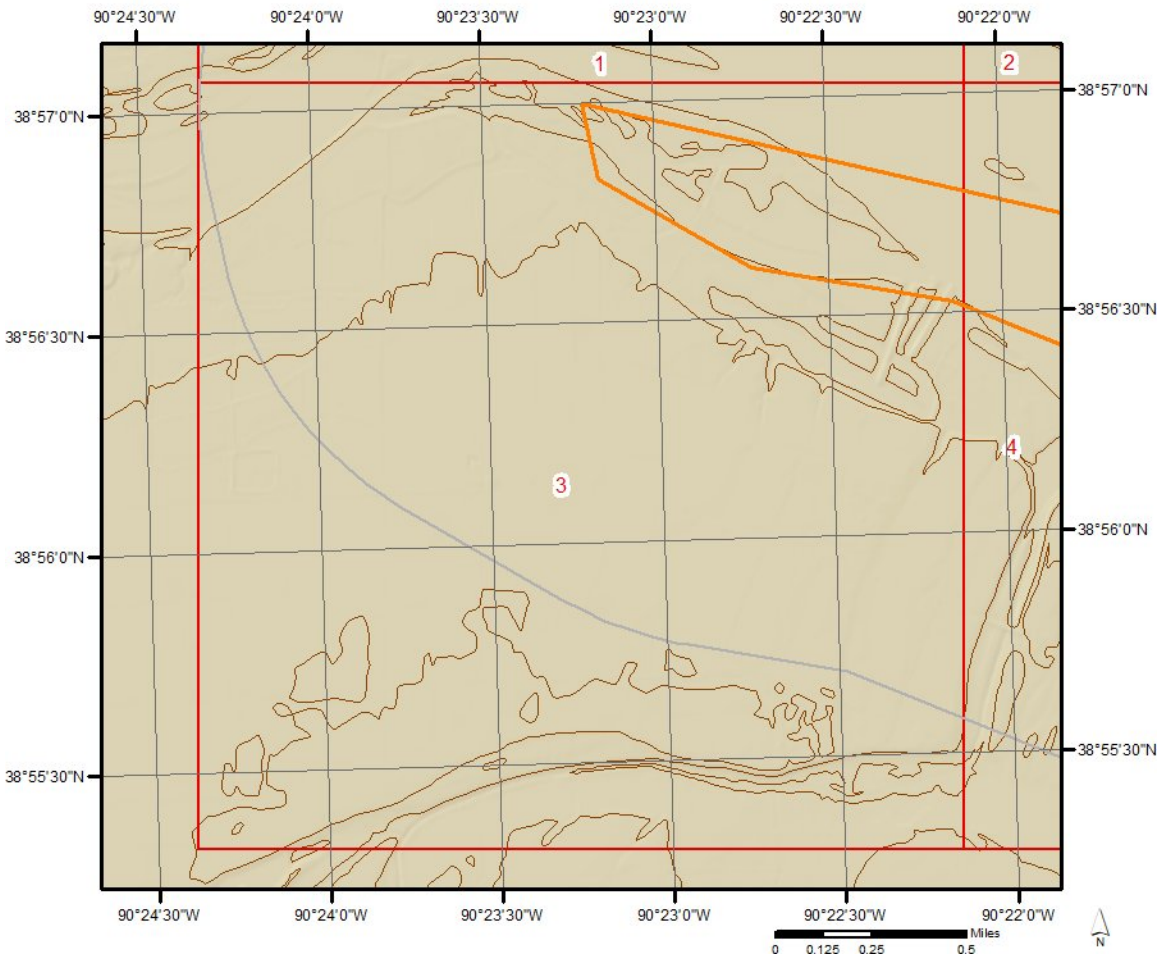
Topographic Information



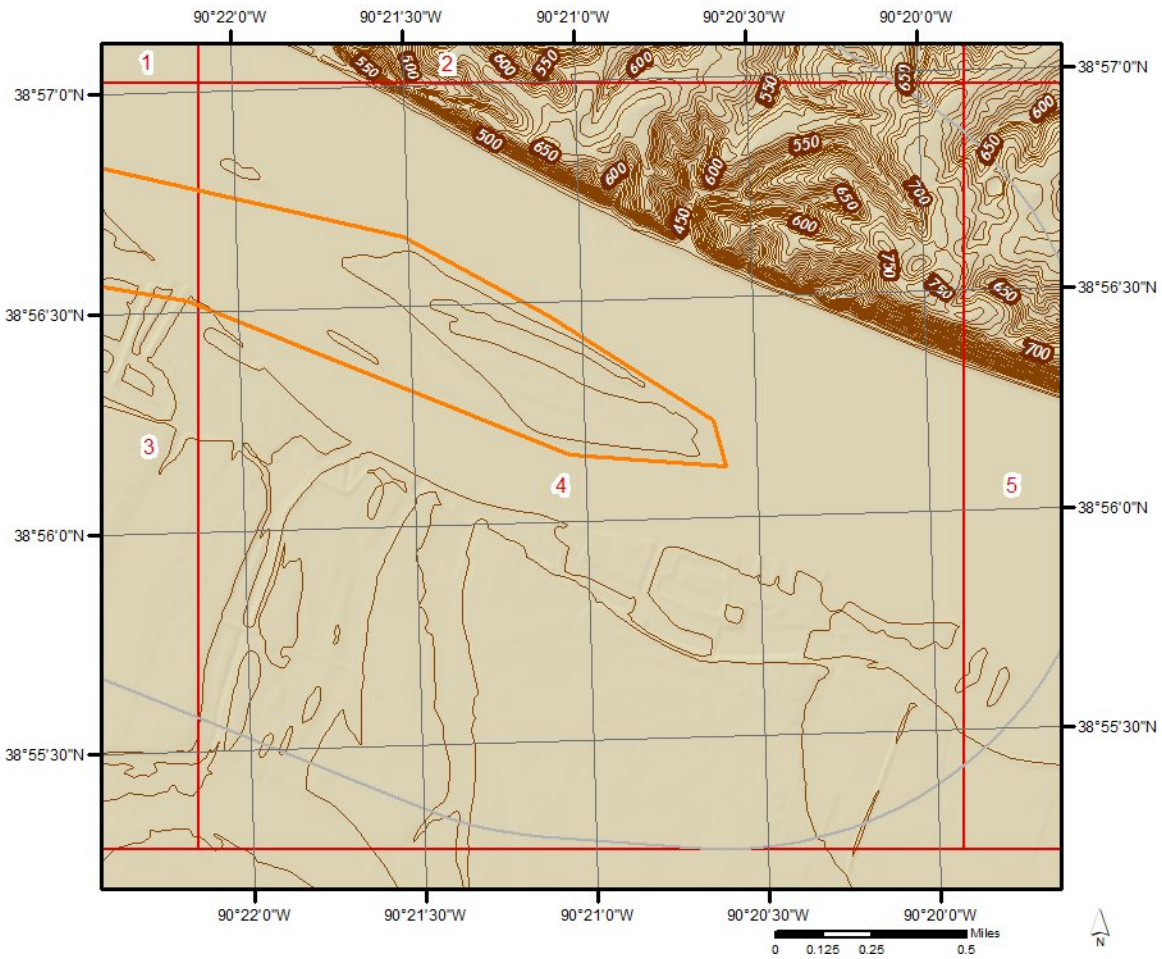
Topographic Information



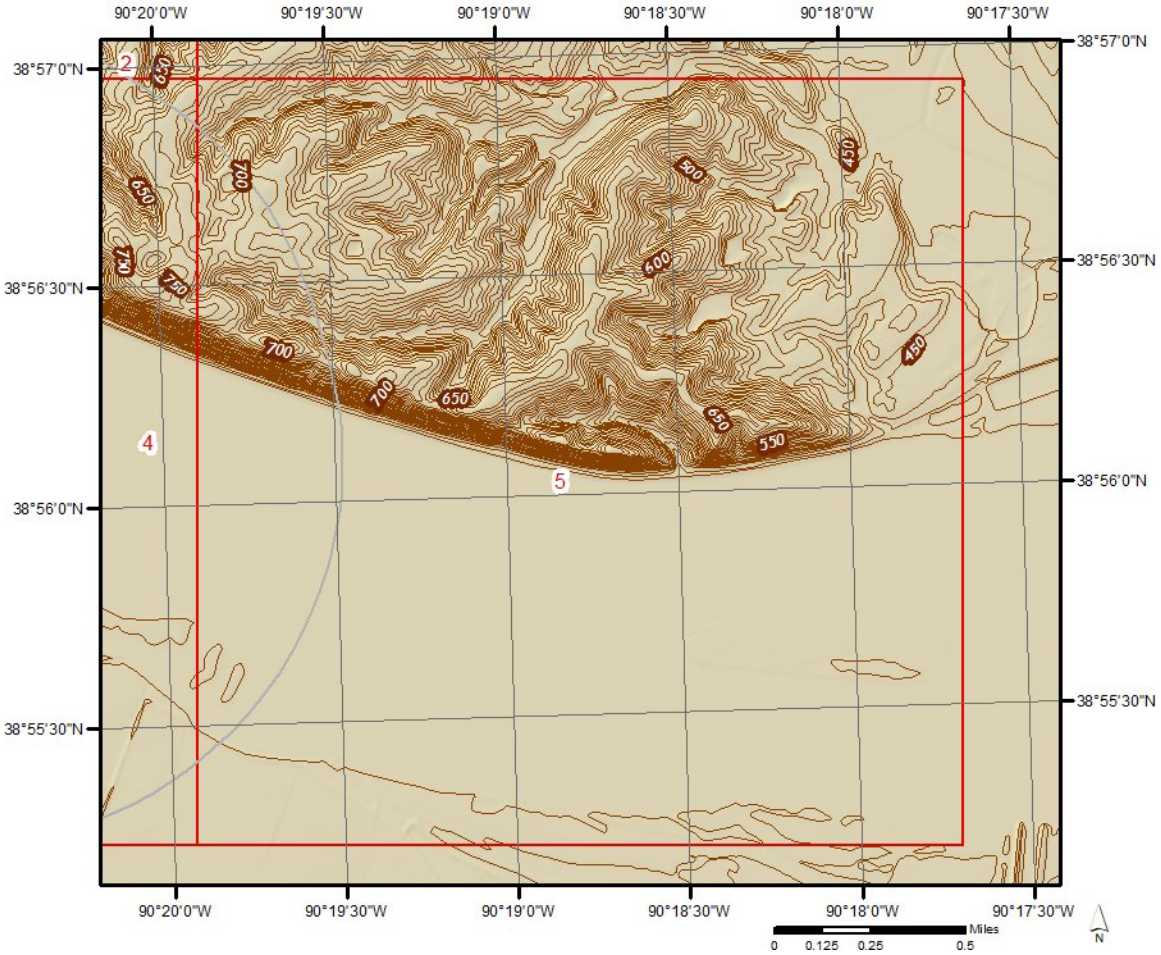
Topographic Information



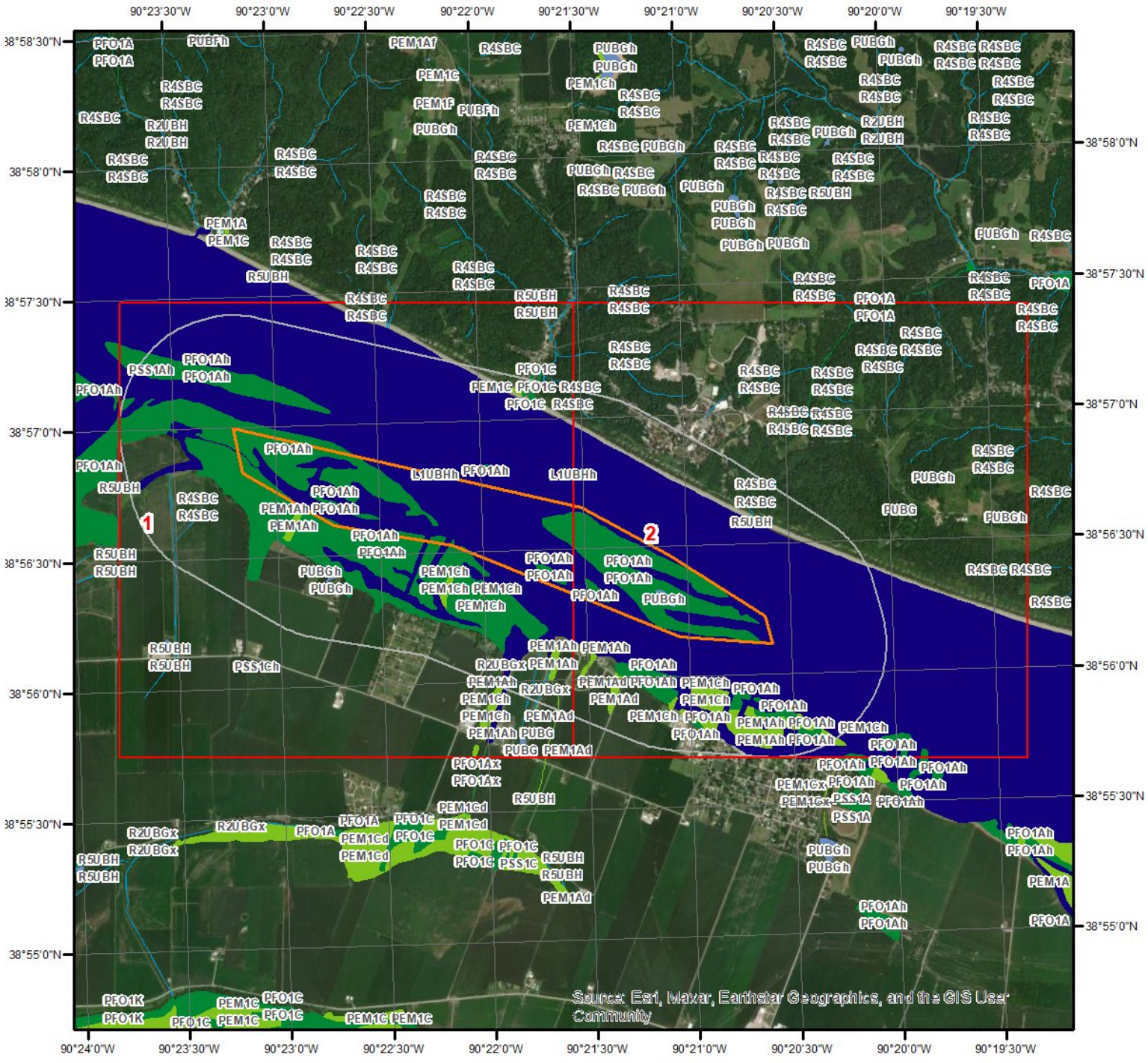
Topographic Information



Topographic Information



Hydrologic Information



Wetland

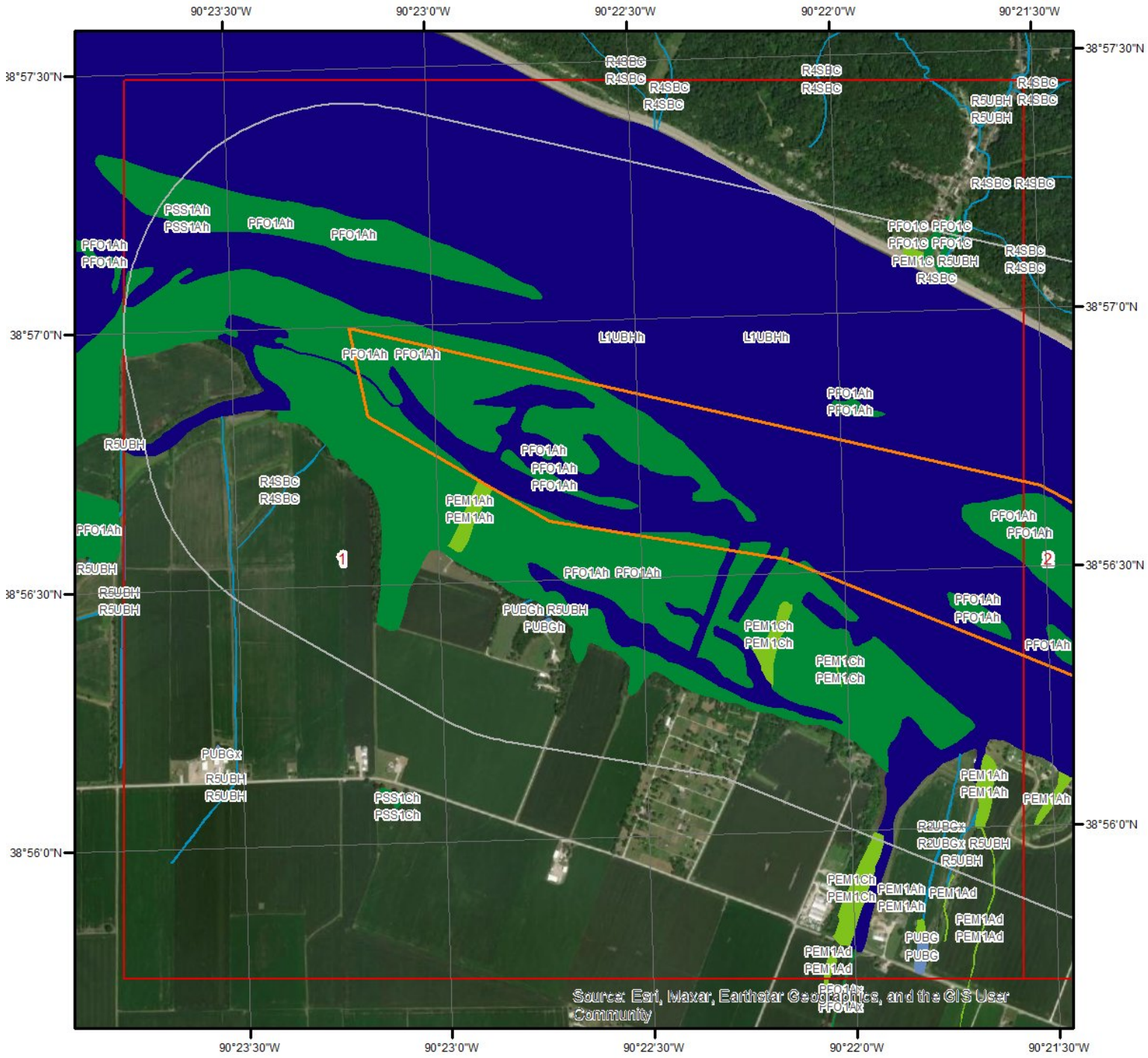
Miles
0 0.275 0.55 1.1
N

This map shows wetland existence using data from US Fish & Wildlife.
Data coverage is shown to the right. Gray indicates no data available in the area.

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

ERIS

Hydrologic Information



Wetland Type - Page 1

0 0.125 0.25 0.5 Miles

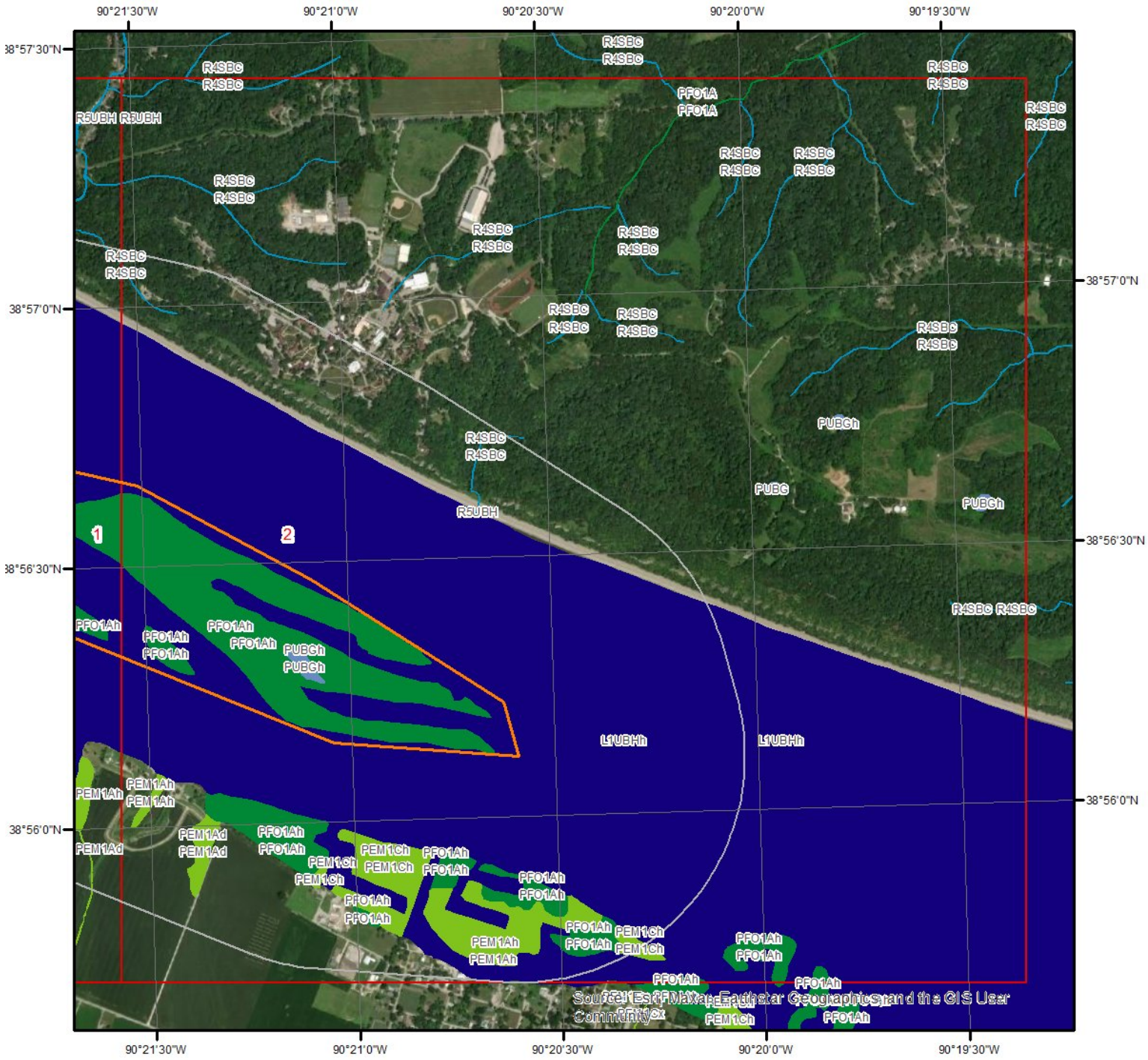
N

This map shows wetland existence using data from US Fish & Wildlife.
Data coverage is shown to the right. Gray indicates no data available in the area.

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

ERIS

Hydrologic Information



Wetland Type - Page 2

0 0.125 0.25 0.5 Miles

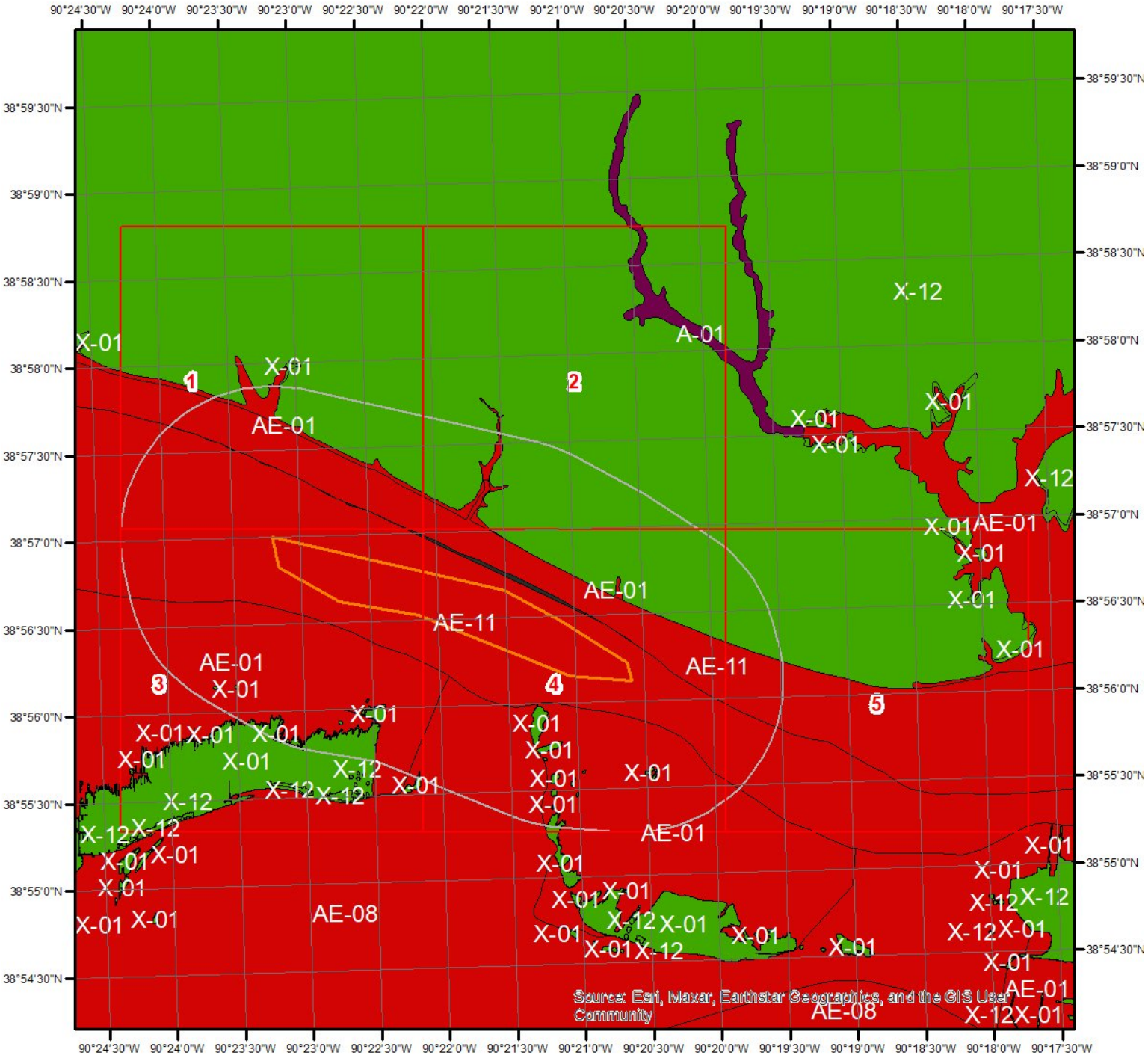
N

This map shows wetland existence using data from US Fish & Wildlife.
Data coverage is shown to the right. Gray indicates no data available in the area.

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

ERIS

Hydrologic Information

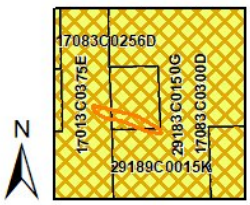


Flood Hazard Zones

Miles
0 0.2 0.4 0.8 1.2

This map shows FEMA flood hazard zones. FIRM panels are shown to the right, and blank indicates no data is available.

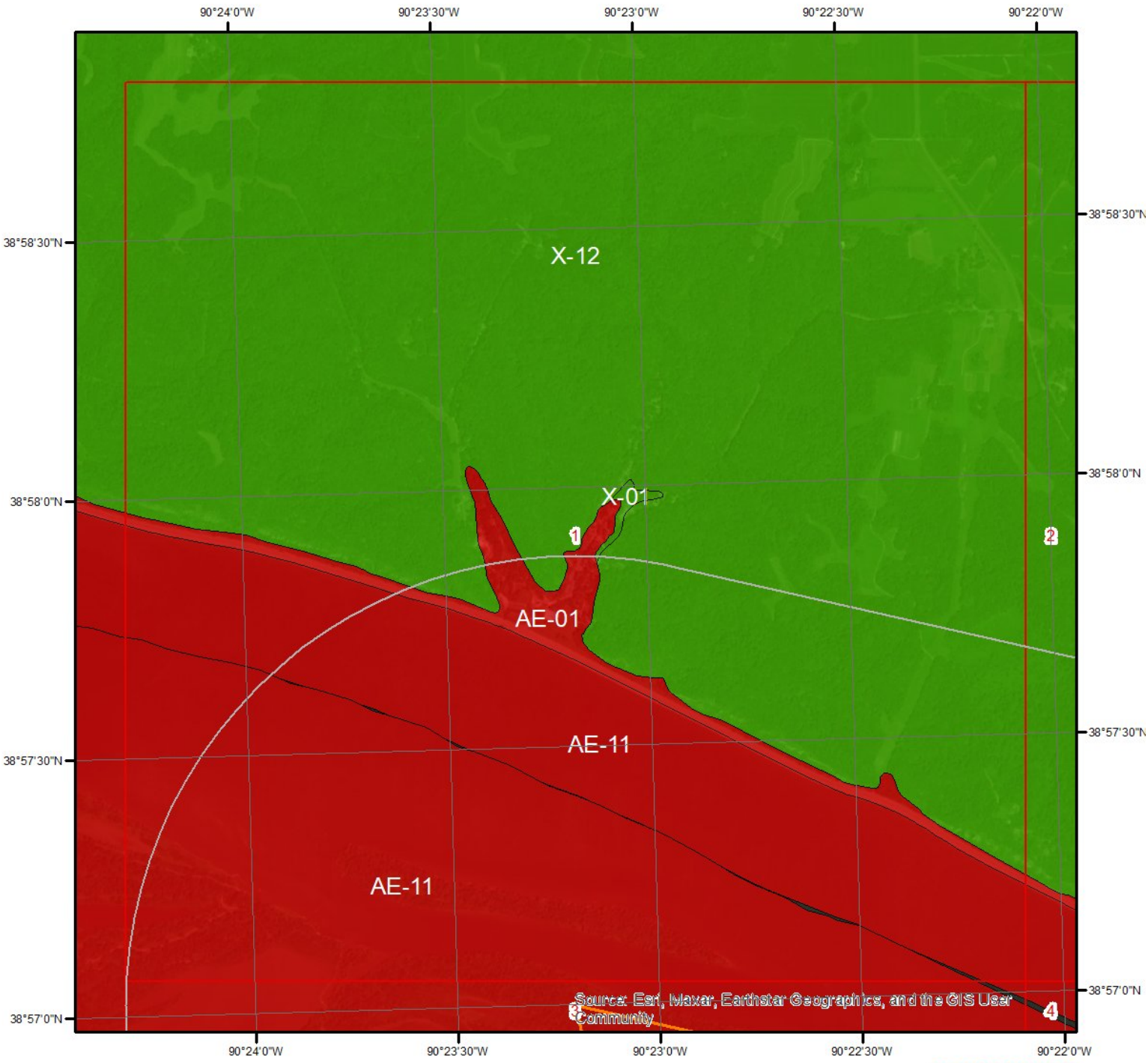
A	AO	X
A99	V	OPEN WATER
AE	VE	NOT POPULATED
AH	D	AREA NOT INCLUDED



Quadrangle(s): Florissant,MO; Jerseyville South,IL; Brighton,IL; Alton,IL; Otterville,IL; Grafton,IL; Saint

ERIS

Hydrologic Information



Flood Hazard Zones - Page 1

This map shows FEMA flood hazard zones. FIRM panels are shown to the right, and blank indicates no data is available.

Miles
0 0.2 0.4

N

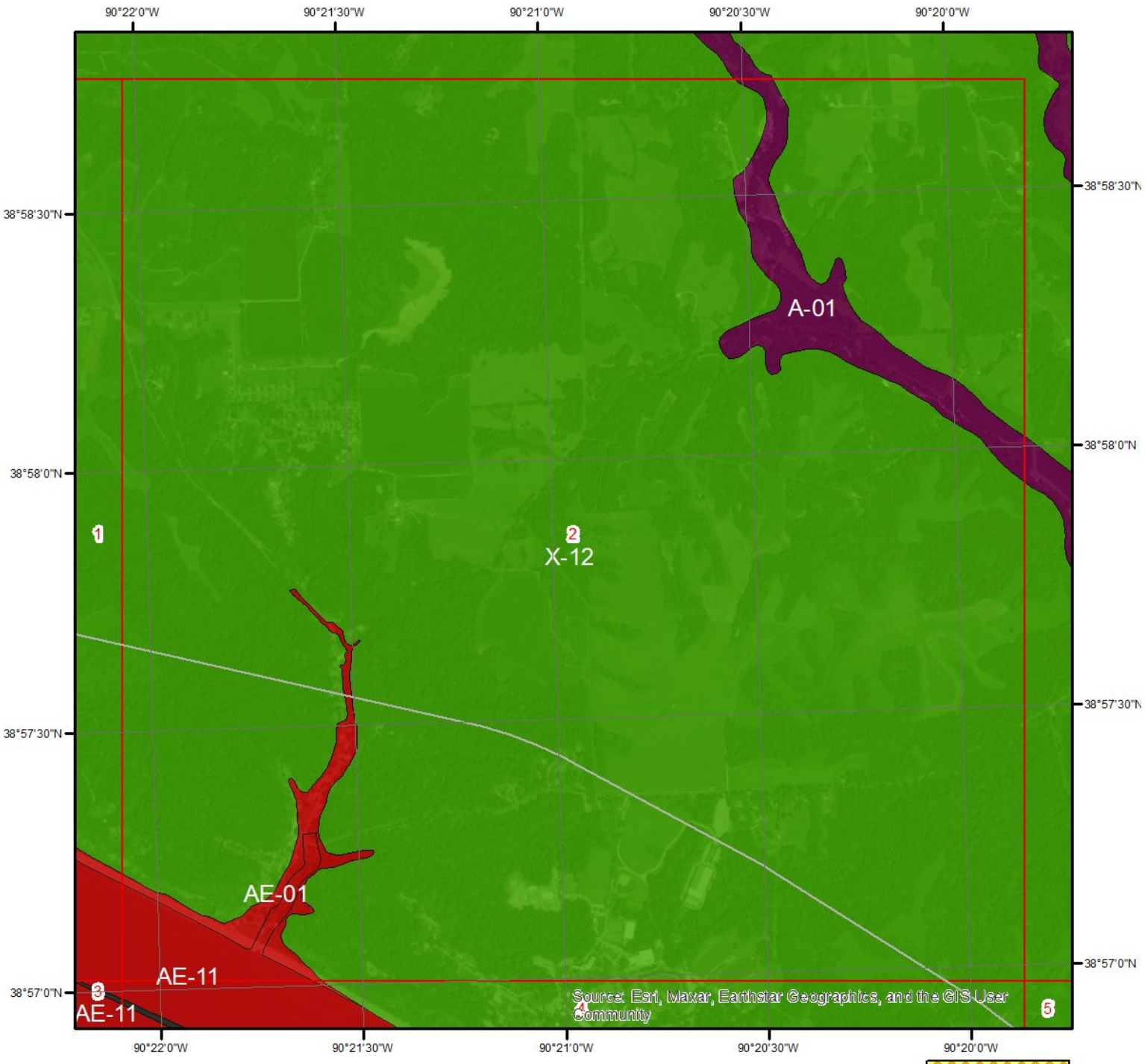
29183C0125G
17013C0375E
17083C0275D
29183C0160G

Quadrangle(s): Grafton,IL; Elsah,IL

A	AO	X
A99	V	OPEN WATER
AE	VE	NOT POPULATED
AH	D	AREA NOT INCLUDED

ERIS

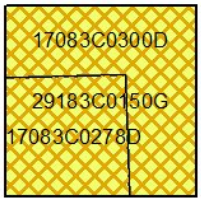
Hydrologic Information



Flood Hazard Zones - Page 2

This map shows FEMA flood hazard zones. FIRM panels are shown to the right, and blank indicates no data is available.

Miles
0 0.2 0.4

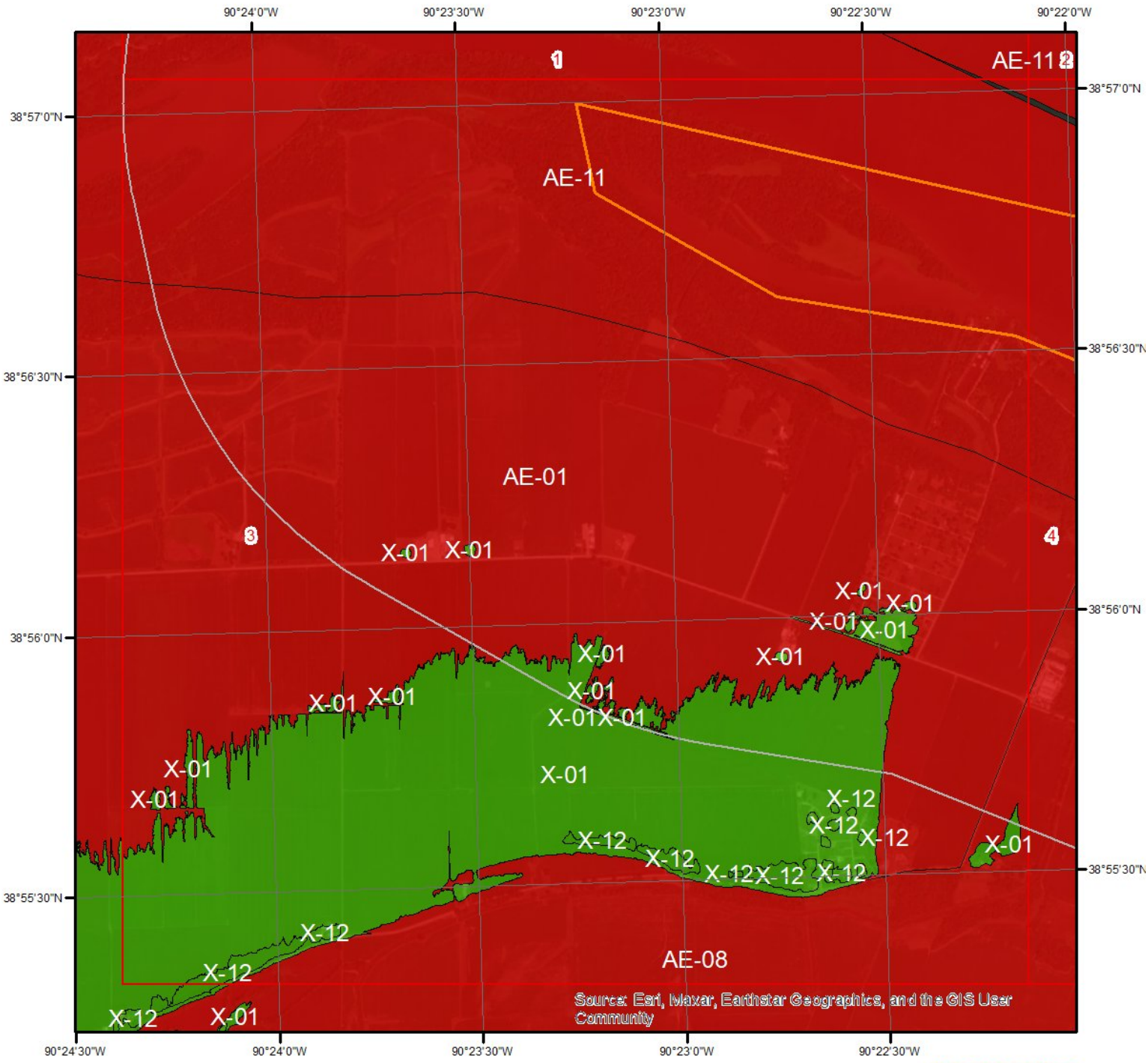


A	AO	X
A99	V	OPEN WATER
AE	VE	NOT POPULATED
AH	D	AREA NOT INCLUDED

Quadrangle(s): Elsah,IL

ERIS

Hydrologic Information

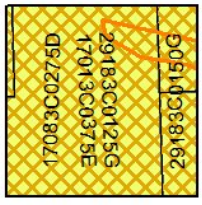


Flood Hazard Zones - Page 3

This map shows FEMA flood hazard zones. FIRM panels are shown to the right, and blank indicates no data is available.

Miles
0 0.2 0.4

N

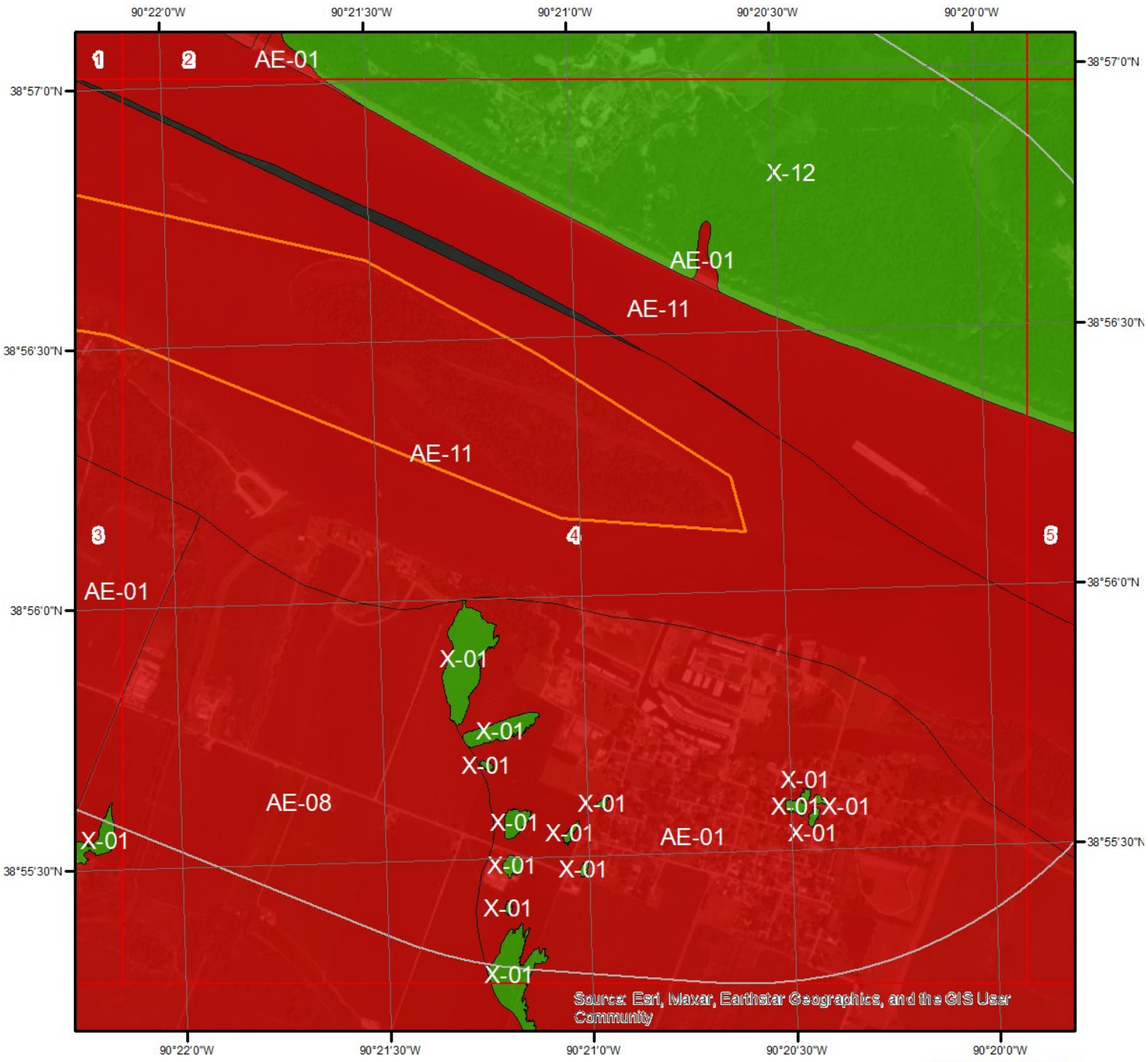


A	AO	X
A99	V	OPEN WATER
AE	VE	NOT POPULATED
AH	D	AREA NOT INCLUDED

Quadrangle(s): Grafton,IL; Elsah,IL

ERIS

Hydrologic Information



Flood Hazard Zones - Page 4

This map shows FEMA flood hazard zones. FIRM panels are shown to the right, and blank indicates no data is available.

Miles
0 0.2 0.4

N

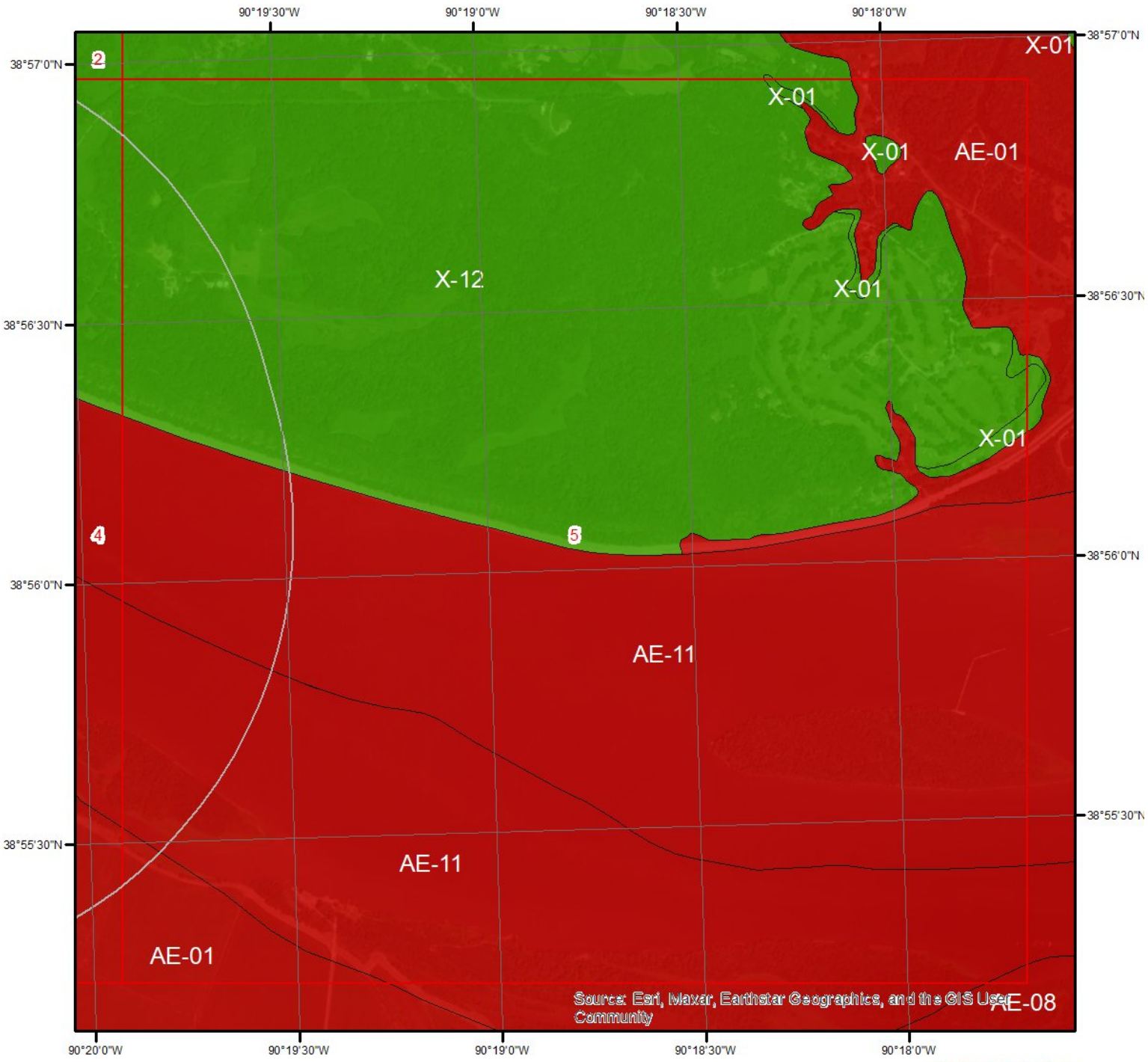
17083C0278D
29183C0150G
17083C0300D
29189C0015K

Quadrangle(s): Elsah,IL

A	AO	X
A99	V	OPEN WATER
AE	VE	NOT POPULATED
AH	D	AREA NOT INCLUDED

ERIS

Hydrologic Information



Flood Hazard Zones - Page 5

This map shows FEMA flood hazard zones. FIRM panels are shown to the right, and blank indicates no data is available.

Miles
0 0.2 0.4

N

17083C0300D
29183C0150G

Quadrangle(s): Elsah,IL

A	AO	X
A99	V	OPEN WATER
AE	VE	NOT POPULATED
AH	D	AREA NOT INCLUDED

ERIS

Hydrologic Information

The Wetland Type map shows wetland existence overlaid on an aerial imagery. The Flood Hazard Zones map shows FEMA flood hazard zones overlaid on an aerial imagery. Relevant FIRM panels and detailed zone information is provided below.
For detailed Zone descriptions please click the link: https://floodadvocate.com/fema-zone-definitions

Available FIRM Panels in area:	29183C0150G(effective:2016-01-20) 29183C0125G(effective:2016-01-20) 29189C0015K(effective:2015-02-04) 17013C0375E(effective:2010-12-17) 17083C0300D(effective:2009-04-02) 17083C0275D(effective:2009-04-02) 17083C0278D(effective:2009-04-02)

Flood Zone AE-01

Zone:	AE
Zone subtype:	

Flood Zone AE-08

Zone:	AE
Zone subtype:	AREA OF SPECIAL CONSIDERATION

Flood Zone AE-11

Zone:	AE
Zone subtype:	FLOODWAY

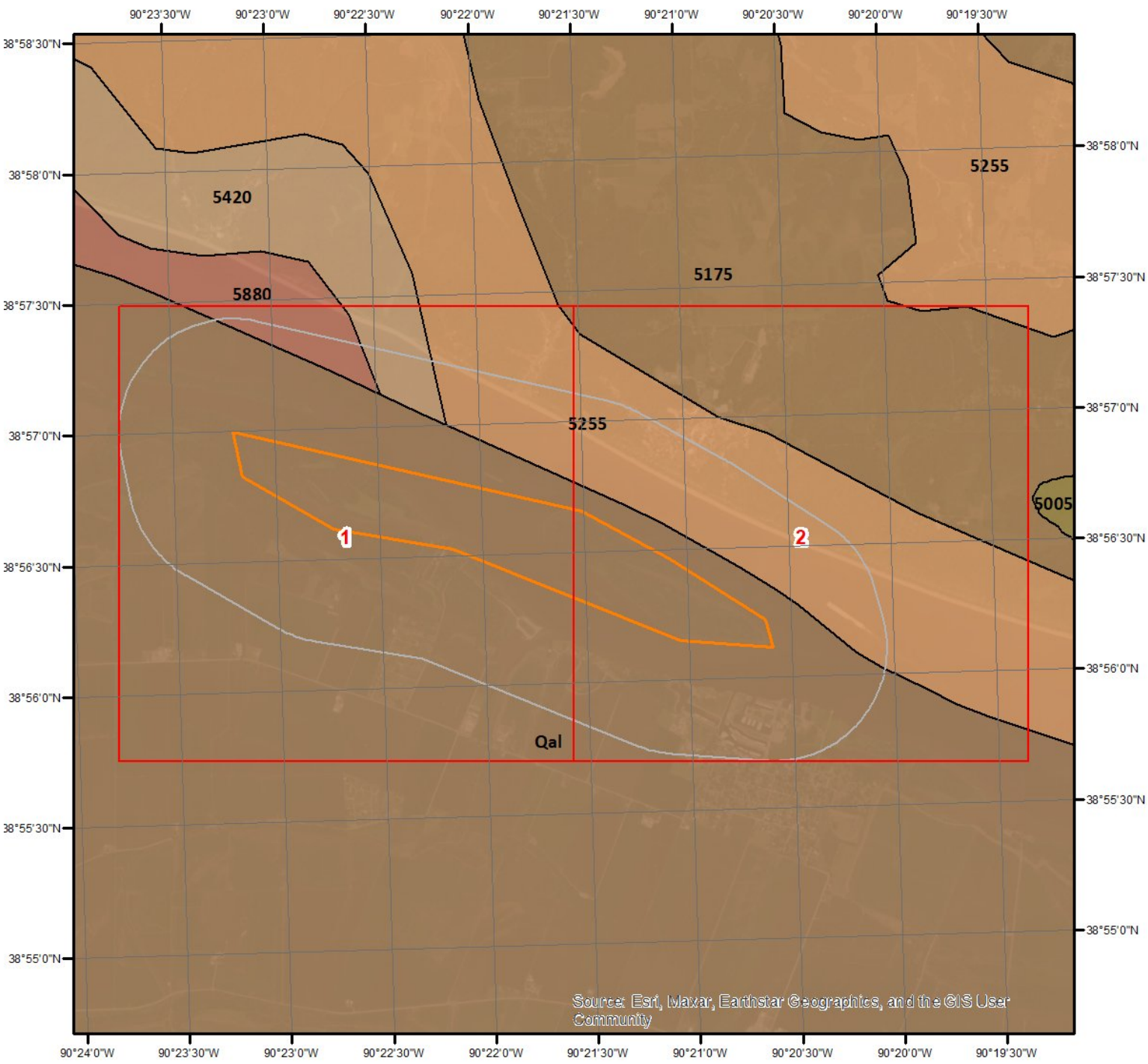
Flood Zone X-01

Zone:	X
Zone subtype:	0.2 PCT ANNUAL CHANCE FLOOD HAZARD

Flood Zone X-12

Zone:	X
Zone subtype:	AREA OF MINIMAL FLOOD HAZARD

Geologic Information



Geologic Units

0 0.75 1.5 Miles

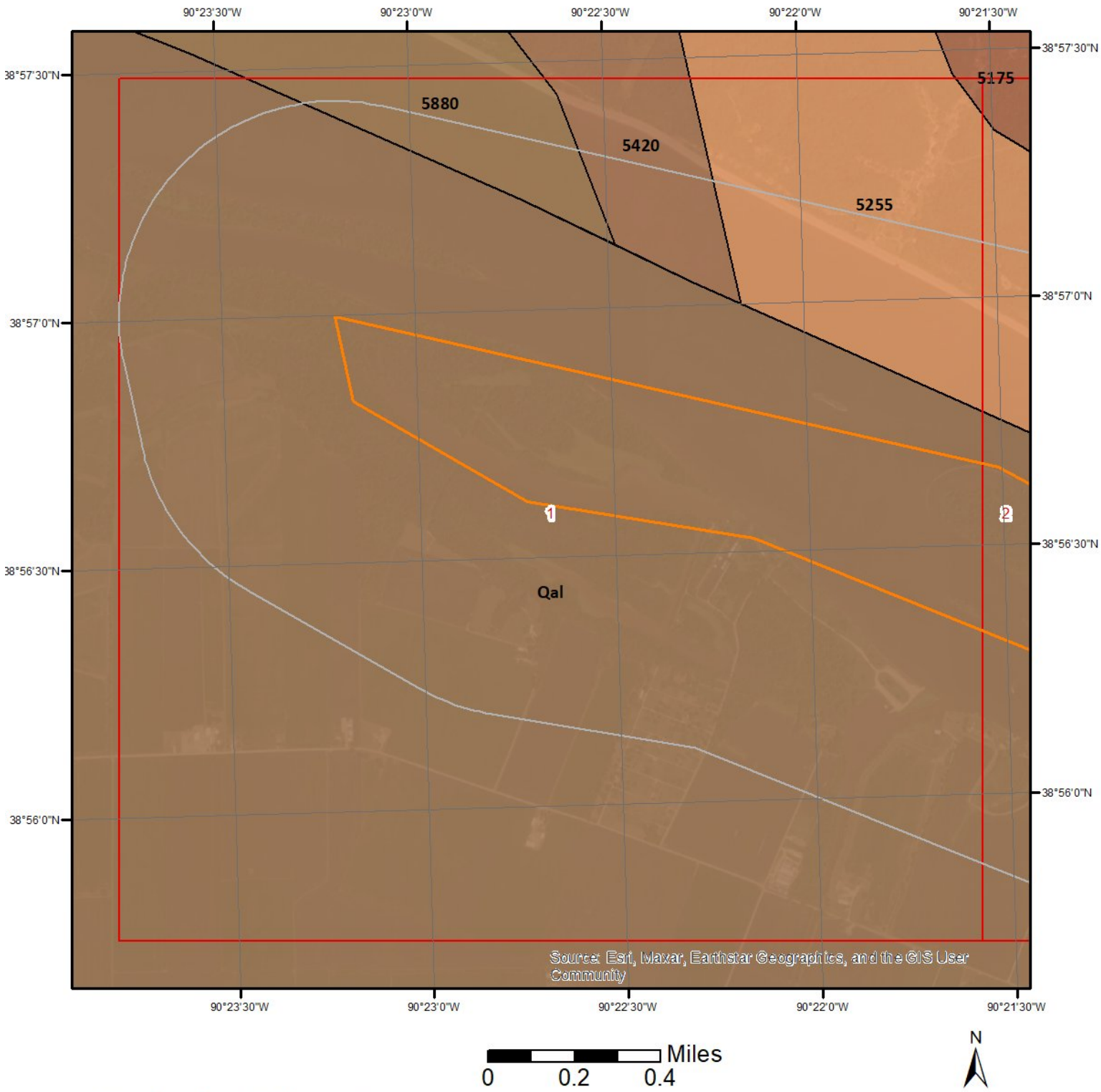
N

This maps shows geologic units in the area. Please refer to the report for detailed descriptions.

ERIS

0 0.4 0.8 1.6 Miles

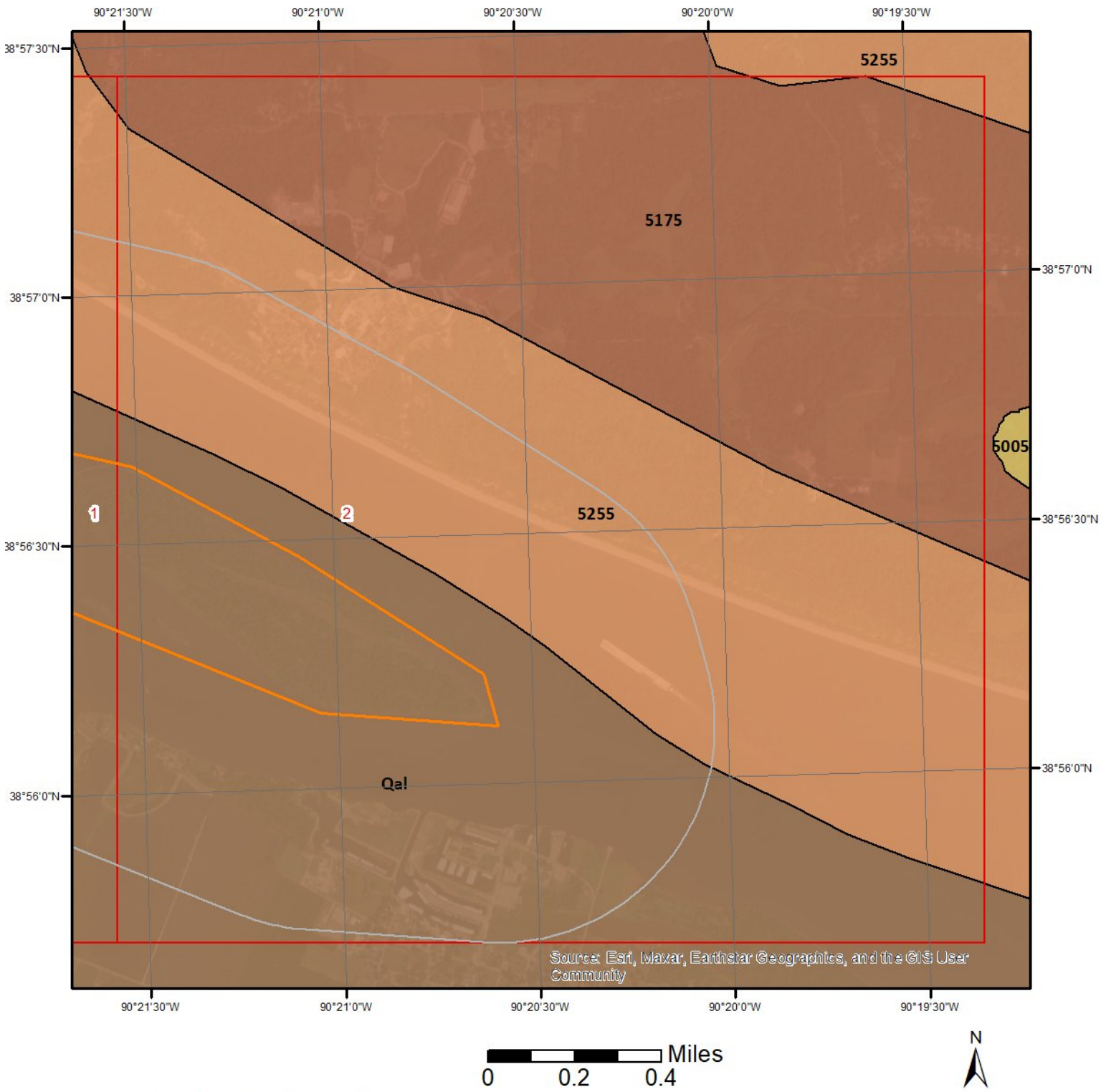
Geologic Information



Geologic Units - Page 1

This maps shows geologic units in the area. Please refer to the report for detailed descriptions.

Geologic Information



Geologic Units - Page 2

This maps shows geologic units in the area. Please refer to the report for detailed descriptions.

Geologic Information

The previous page shows USGS geology information. Detailed information about each unit is provided below.

Geologic Unit 5255

Unit Name:	Lower Valmeyeran (Keokuk-Sedalia) Series
Unit Age:	Mississippian
Primary Rock Type:	limestone
Secondary Rock Type:	shale
Unit Description:	Lower Valmeyeran (Keokuk-Sedalia) Series

Geologic Unit 5420

Unit Name:	Kinderhookian Series
Unit Age:	Mississippian
Primary Rock Type:	limestone
Secondary Rock Type:	shale
Unit Description:	Kinderhookian Series

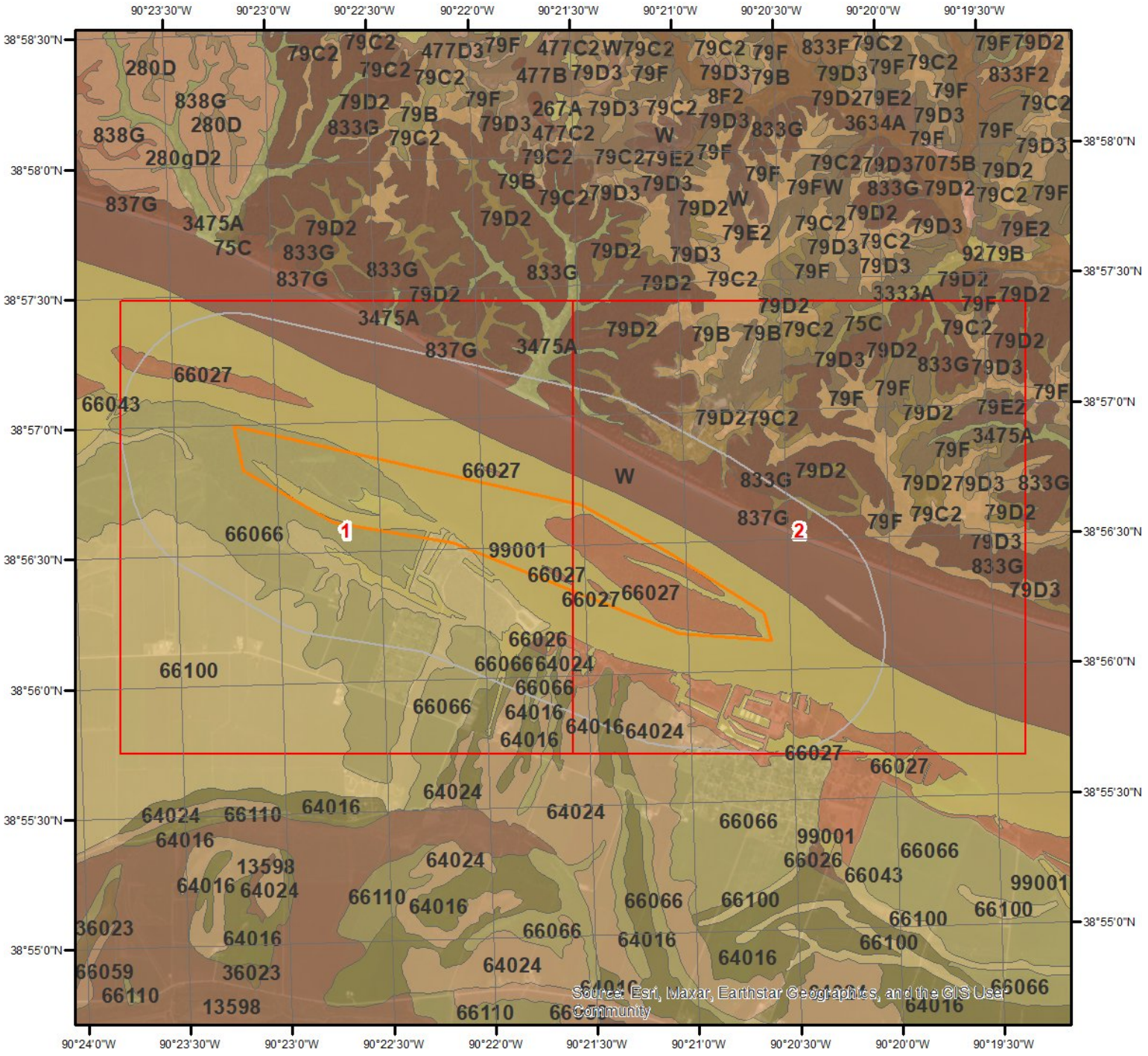
Geologic Unit 5880

Unit Name:	Middle Devonian
Unit Age:	Devonian
Primary Rock Type:	limestone
Secondary Rock Type:	shale
Unit Description:	Middle Devonian

Geologic Unit Qal

Unit Name:	HOLOCENE SERIES
Unit Age:	Phanerozoic | Cenozoic | Quaternary | Holocene
Primary Rock Type:	clay or mud
Secondary Rock Type:	silt
Unit Description:	HOLOCENE SERIES - Alluvium - clay, silt, sand, and gravel

Soil Information



SSURGO Soils

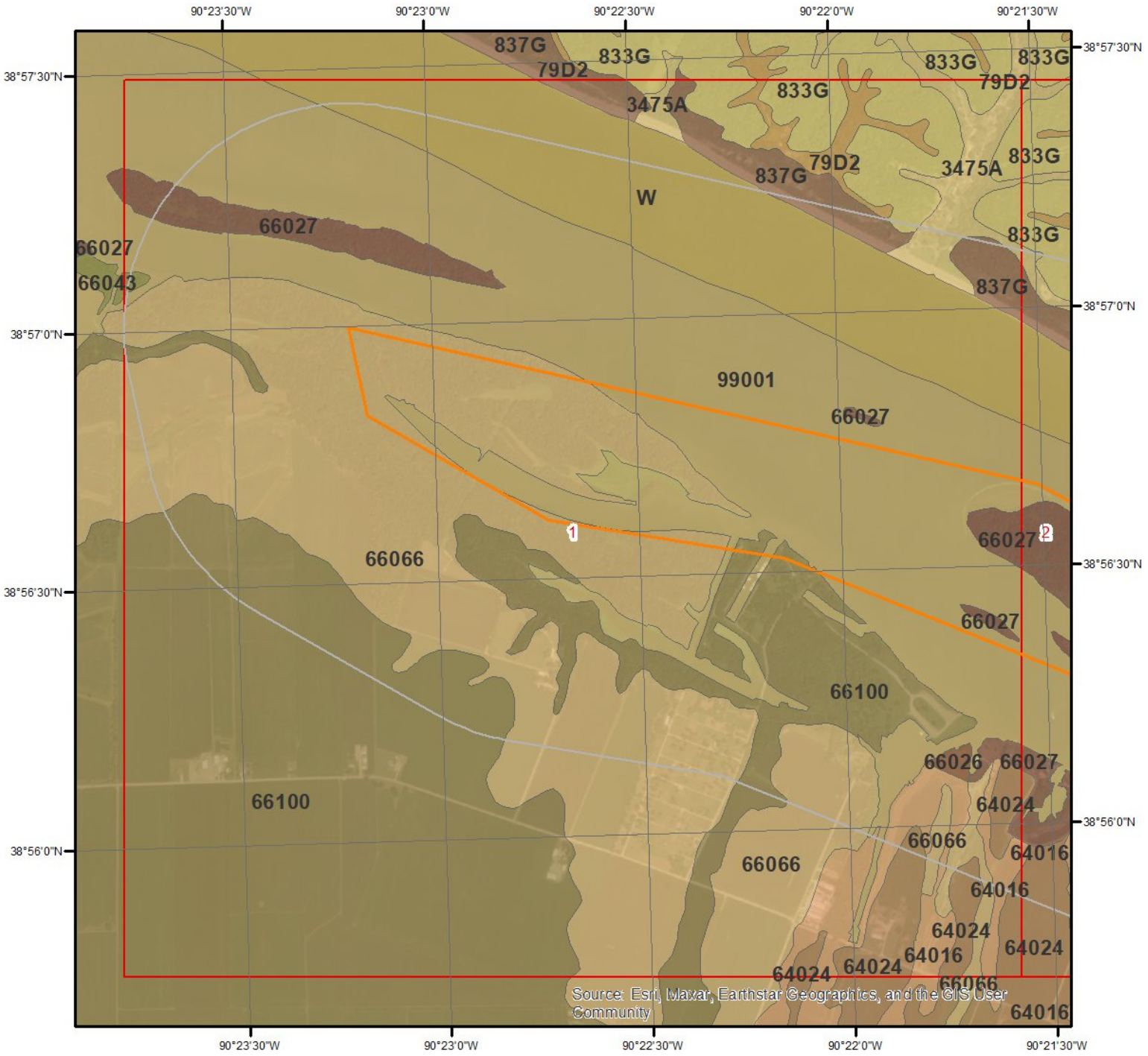
0 0.2 0.4 0.8 1.2 Miles

N

This maps shows SSURGO soil units around the target property. Please refer to the report for detailed soil descriptions.

ERIS

Soil Information



SSURGO Soils - Page 1

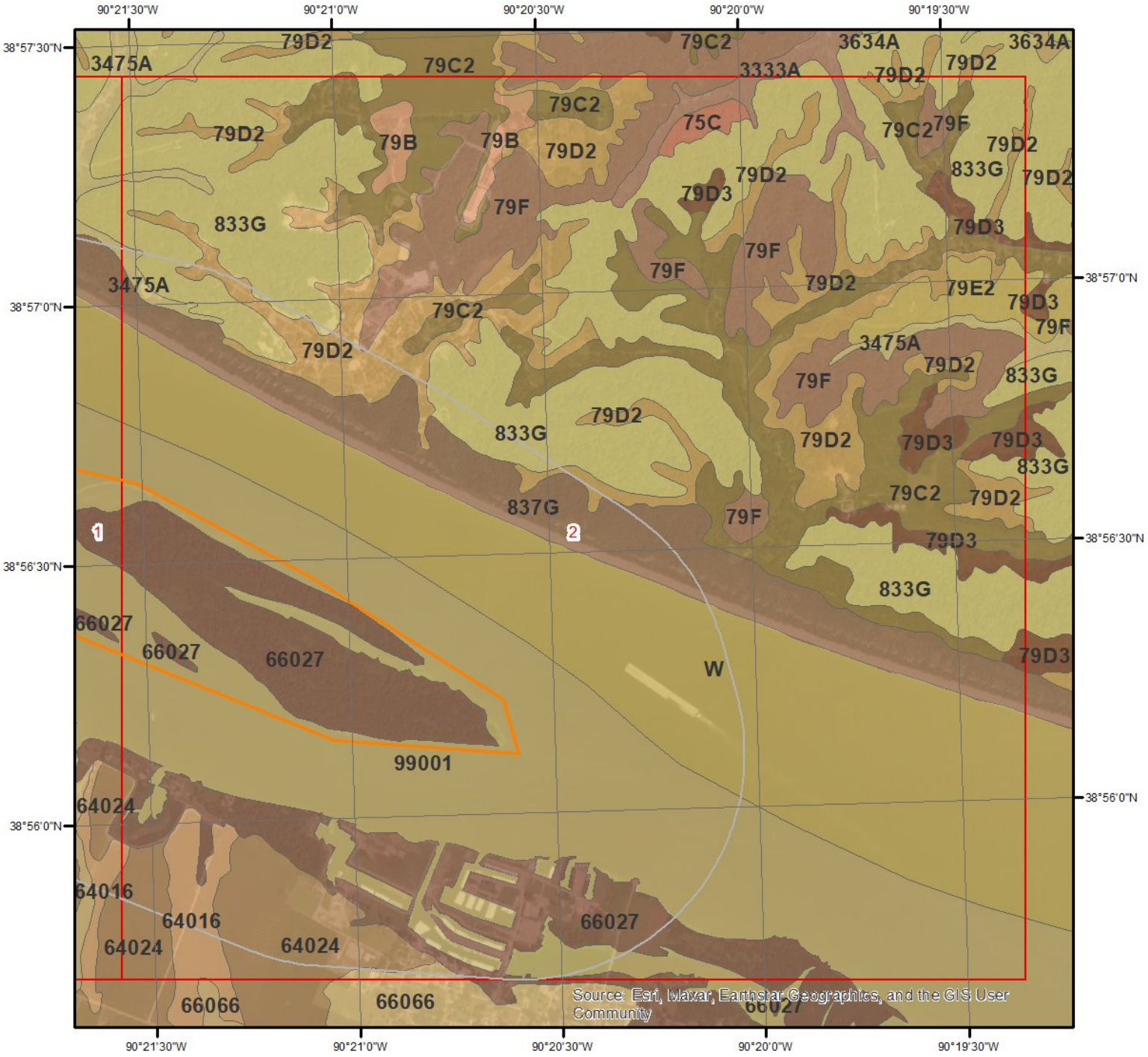
Miles
0 0.2 0.4

N

This maps shows SSURGO soil units around the target property. Please refer to the report for detailed soil descriptions.

ERIS

Soil Information



SSURGO Soils - Page 2

0 0.2 0.4 Miles

N

This maps shows SSURGO soil units around the target property. Please refer to the report for detailed soil descriptions.

ERIS

Soil Information

The previous page shows a soil map using SSURGO data from USDA Natural Resources Conservation Service. Detailed information about each unit is provided below.

Map Unit 3475A (0.22%)

Map Unit Name:	Elsah gravelly loam, 0 to 2 percent slopes, frequently flooded
Bedrock Depth - Min:	null
Watertable Depth - Annual Min:	null
Drainage Class - Dominant:	Well drained
Hydrologic Group - Dominant:	B - Soils in this group have moderately low runoff potential when thoroughly wet. Water transmission through the soil is unimpeded.

Major components are printed below

Elsah(90%)

horizon H1(0cm to 15cm)	Gravelly loam
horizon H2(15cm to 31cm)	Very gravelly loam
horizon H3(31cm to 152cm)	Very gravelly loam

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 3475A - Elsah gravelly loam, 0 to 2 percent slopes, frequently flooded

Component: Elsah (90%)
The Elsah component makes up 90 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood plains. The parent material consists of gravelly alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. This component is in the F115CY021IL Sandy Ploodplain Forest ecological site. Nonirrigated land capability classification is 2s. This soil does not meet hydric criteria.

Map Unit 64016 (0.29%)

Map Unit Name:	Blase silty clay loam, 0 to 2 percent slopes, rarely flooded
Bedrock Depth - Min:	null
Watertable Depth - Annual Min:	50cm
Drainage Class - Dominant:	Somewhat poorly drained
Hydrologic Group - Dominant:	C/D - These soils have moderately high runoff potential when drained and high runoff potential when undrained.

Major components are printed below

Blase(95%)

horizon Ap(0cm to 25cm)	Silty clay loam
horizon Bw(25cm to 81cm)	Silty clay
horizon 2C(81cm to 203cm)	Very fine sandy loam

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 64016 - Blase silty clay loam, 0 to 2 percent slopes, rarely flooded

Component: Blase (95%)
The Blase component makes up 95 percent of the map unit. Slopes are 0 to 2 percent. This component is on stream terraces, river valleys. The parent material consists of clayey alluvium over loamy alluvium. Depth to a root restrictive layer, strongly contrasting textural stratification, is 20 to 40 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is

moderate. This soil is rarely flooded. It is not ponded. A seasonal zone of water saturation is at 20 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 1 percent. This component is in the R115BY038MO Wet Terrace Prairie ecological site. Nonirrigated land capability classification is 2w. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 4 percent.

Map Unit 64024 (1.11%)

Map Unit Name:	DeSioux loam, 0 to 2 percent slopes, rarely flooded
Bedrock Depth - Min:	null
Watertable Depth - Annual Min:	145cm
Drainage Class - Dominant:	Well drained
Hydrologic Group - Dominant:	B - Soils in this group have moderately low runoff potential when thoroughly wet. Water transmission through the soil is unimpeded.

Major components are printed below

DeSioux(95%)

horizon Ap(0cm to 13cm)	Loam
horizon A(13cm to 104cm)	Loam
horizon Bw(104cm to 170cm)	Loam
horizon 2C(170cm to 203cm)	Stratified very fine sandy loam to silt loam

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 64024 - DeSioux loam, 0 to 2 percent slopes, rarely flooded

Component: DeSioux (95%)
The DeSioux component makes up 95 percent of the map unit. Slopes are 0 to 2 percent. This component is on stream terraces, river valleys. The parent material consists of alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is low. This soil is rarely flooded. It is not ponded. A seasonal zone of water saturation is at 57 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 3 percent. This component is in the R115BY037MO Loamy Terrace Prairie ecological site. Nonirrigated land capability classification is 1. This soil does not meet hydric criteria.

Component: Landes (5%)
Generated brief soil descriptions are created for major soil components. The Landes soil is a minor component.

Map Unit 66026 (0.01%)

Map Unit Name:	Blase silty clay loam, 0 to 2 percent slopes, frequently flooded
Bedrock Depth - Min:	null
Watertable Depth - Annual Min:	50cm
Drainage Class - Dominant:	Somewhat poorly drained
Hydrologic Group - Dominant:	C/D - These soils have moderately high runoff potential when drained and high runoff potential when undrained.

Major components are printed below

Blase(95%)

horizon A(0cm to 25cm)	Silty clay loam
horizon Bw(25cm to 81cm)	Silty clay
horizon 2C(81cm to 203cm)	Very fine sandy loam

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 66026 - Blase silty clay loam, 0 to 2 percent slopes, frequently flooded

Soil Information

Component: Blase (95%)
The Blase component makes up 95 percent of the map unit. Slopes are 0 to 2 percent. This component is on stream terraces, river valleys. The parent material consists of clayey alluvium over loamy alluvium. Depth to a root restrictive layer, strongly contrasting textural stratification, is 20 to 40 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is moderate. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 20 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 1 percent. This component is in the R115CY001MO Wet Floodplain Prairie ecological site. Nonirrigated land capability classification is 5w. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 4 percent.

Map Unit 66027 (1.46%)

Map Unit Name:	Carlow silty clay loam, 0 to 2 percent slopes, frequently flooded
Bedrock Depth - Min:	null
Watertable Depth - Annual Min:	15cm
Drainage Class - Dominant:	Poorly drained
Hydrologic Group - Dominant:	D - Soils in this group have high runoff potential when thoroughly wet. Water movement through the soil is restricted or very restricted.

Major components are printed below

Carlow(90%)

horizon A1(0cm to 18cm)	Silty clay loam
horizon A2(18cm to 61cm)	Silty clay loam
horizon Bg(61cm to 150cm)	Silty clay
horizon Cg(150cm to 165cm)	Stratified silt loam to silty clay

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 66027 - Carlow silty clay loam, 0 to 2 percent slopes, frequently flooded

Component: Carlow (90%)
The Carlow component makes up 90 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood-plain steps, river valleys. The parent material consists of alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is very high. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 6 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 3 percent. This component is in the R115CY001MO Wet Floodplain Prairie ecological site. Nonirrigated land capability classification is 5w. This soil meets hydric criteria.

Map Unit 66043 (0.02%)

Map Unit Name:	Portage clay, 0 to 2 percent slopes, frequently flooded, frequently ponded
Bedrock Depth - Min:	null
Watertable Depth - Annual Min:	15cm
Drainage Class - Dominant:	Very poorly drained
Hydrologic Group - Dominant:	D - Soils in this group have high runoff potential when thoroughly wet. Water movement through the soil is restricted or very restricted.

Major components are printed below

Portage(85%)

horizon A(0cm to 23cm)	Clay
horizon Bg1(23cm to 58cm)	Clay
horizon Bg2(58cm to 125cm)	Clay
horizon BCg(125cm to 203cm)	Silty clay

Component Description:

Minor map unit components are excluded from this report.

Soil Information

Map Unit: 66043 - Portage clay, 0 to 2 percent slopes, frequently flooded, frequently ponded

Component: Portage (85%)
The Portage component makes up 85 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood-plain steps, river valleys. The parent material consists of alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is very high. This soil is frequently flooded. It is frequently ponded. A seasonal zone of water saturation is at 6 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 4 percent. This component is in the R115BY042MO Ponded Floodplain Prairie ecological site. Nonirrigated land capability classification is 5w. This soil meets hydric criteria.

Map Unit 66066 (2.74%)

Map Unit Name:	Carlow silty clay loam, 0 to 2 percent slopes, occasionally flooded
Bedrock Depth - Min:	null
Watertable Depth - Annual Min:	0cm
Drainage Class - Dominant:	Poorly drained
Hydrologic Group - Dominant:	D - Soils in this group have high runoff potential when thoroughly wet. Water movement through the soil is restricted or very restricted.

Major components are printed below

Carlow(95%)

horizon Ap(0cm to 10cm)	Silty clay loam
horizon A(10cm to 28cm)	Silty clay
horizon Bg1(28cm to 43cm)	Silty clay loam
horizon Bg2(43cm to 65cm)	Silty clay
horizon Bg3(65cm to 112cm)	Clay
horizon Bg4(112cm to 200cm)	Clay

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 66066 - Carlow silty clay loam, 0 to 2 percent slopes, occasionally flooded

Component: Carlow (95%)
The Carlow component makes up 95 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood plains on river valleys. The parent material consists of clayey alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is very high. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 0 inches during April. Organic matter content in the surface horizon is about 4 percent. This component is in the R109XY031MO Wet Floodplain Prairie ecological site. Nonirrigated land capability classification is 3w. This soil meets hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Dockery (5%)
Generated brief soil descriptions are created for major soil components. The Dockery soil is a minor component.

Map Unit 66100 (34.72%)

Map Unit Name:	Portage clay, 0 to 2 percent slopes, occasionally flooded, frequently ponded
Bedrock Depth - Min:	null
Watertable Depth - Annual Min:	15cm
Drainage Class - Dominant:	Very poorly drained
Hydrologic Group - Dominant:	D - Soils in this group have high runoff potential when thoroughly wet. Water movement through the soil is restricted or very restricted.

Major components are printed below

Portage(85%)

horizon Ap(0cm to 23cm)	Clay

horizon Bg1(23cm to 58cm)	Clay
horizon Bg2(58cm to 125cm)	Clay
horizon BCg(125cm to 203cm)	Silty clay

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 66100 - Portage clay, 0 to 2 percent slopes, occasionally flooded, frequently ponded

Component: Portage (85%)
The Portage component makes up 85 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood-plain steps, river valleys. The parent material consists of alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is very high. This soil is occasionally flooded. It is frequently ponded. A seasonal zone of water saturation is at 6 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 4 percent. This component is in the R115BY042MO Ponded Floodplain Prairie ecological site. Nonirrigated land capability classification is 5w. This soil meets hydric criteria.

Map Unit 79D2 (0.26%)

Map Unit Name:	Menfro silt loam, 10 to 18 percent slopes, eroded
Bedrock Depth - Min:	null
Watertable Depth - Annual Min:	null
Drainage Class - Dominant:	Well drained
Hydrologic Group - Dominant:	B - Soils in this group have moderately low runoff potential when thoroughly wet. Water transmission through the soil is unimpeded.

Major components are printed below

Menfro(90%)

horizon H1(0cm to 20cm)	Silt loam
horizon H2(20cm to 112cm)	Silty clay loam
horizon H3(112cm to 203cm)	Silt loam

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 79D2 - Menfro silt loam, 10 to 18 percent slopes, eroded

Component: Menfro (90%)
The Menfro component makes up 90 percent of the map unit. Slopes are 10 to 18 percent. This component is on ground moraines. The parent material consists of loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is very high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. This component is in the F115CY005IL Loess Upland Forest ecological site. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map Unit 79F (0.39%)

Map Unit Name:	Menfro silt loam, 18 to 35 percent slopes
Bedrock Depth - Min:	null
Watertable Depth - Annual Min:	null
Drainage Class - Dominant:	Well drained
Hydrologic Group - Dominant:	B - Soils in this group have moderately low runoff potential when thoroughly wet. Water transmission through the soil is unimpeded.

Major components are printed below

Menfro(90%)

horizon H1(0cm to 23cm)	Silt loam

horizon H2(23cm to 132cm)	Silty clay loam
horizon H3(132cm to 203cm)	Silt loam

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 79F - Menfro silt loam, 18 to 35 percent slopes

Component: Menfro (90%)
The Menfro component makes up 90 percent of the map unit. Slopes are 18 to 35 percent. This component is on loess hills, uplands. The parent material consists of loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is very high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Map Unit 833G (1.72%)

Map Unit Name:	Goss-Menfro complex, 35 to 60 percent slopes
Bedrock Depth - Min:	null
Watertable Depth - Annual Min:	null
Drainage Class - Dominant:	Well drained
Hydrologic Group - Dominant:	B - Soils in this group have moderately low runoff potential when thoroughly wet. Water transmission through the soil is unimpeded.

Major components are printed below

Goss(60%)

horizon H1(0cm to 18cm)	Gravelly silt loam
horizon H2(18cm to 28cm)	Gravelly silt loam
horizon H3(28cm to 203cm)	Very gravelly silty clay

Menfro(30%)

horizon H1(0cm to 25cm)	Silt loam
horizon H2(25cm to 157cm)	Silty clay loam
horizon H3(157cm to 203cm)	Silt loam

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 833G - Goss-Menfro complex, 35 to 60 percent slopes

Component: Goss (60%)
The Goss component makes up 60 percent of the map unit. Slopes are 35 to 60 percent. This component is on hillslopes. The parent material consists of clayey residuum weathered from cherty limestone. Depth to a root restrictive layer, abrupt textural change, is 2 to 30 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. This component is in the F115CY010IL Chert Exposed Backslope Woodland, Chert Protected Backslope Forest ecological site. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Component: Menfro (30%)
The Menfro component makes up 30 percent of the map unit. Slopes are 35 to 60 percent. This component is on hillslopes. The parent material consists of loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. This component is in the F115CY008IL Loess Exposed Backslope Woodland, Loess Protected Backslope Forest ecological site. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Soil Information

Map Unit 837G (0.73%)

Map Unit Name:	Rock outcrop, limestone-Lacrescent complex, 35 to 60 percent slopes
Bedrock Depth - Min:	null
Watertable Depth - Annual Min:	null
Drainage Class - Dominant:	null
Hydrologic Group - Dominant:	null
Major components are printed below	
Lacrescent(30%)	
horizon H1(0cm to 53cm)	Channery silt loam
horizon H2(53cm to 97cm)	Very gravelly silt loam
horizon H3(97cm to 152cm)	Very flaggy silt loam

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 837G - Rock outcrop, limestone-Lacrescent complex, 35 to 60 percent slopes

Component: Rock outcrop (70%)
Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Component: Lacrescent (30%)
The Lacrescent component makes up 30 percent of the map unit. Slopes are 35 to 60 percent. This component is on bluffs. The parent material consists of Colluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. This component is in the R115CY003IL Loess Hill Prairie ecological site. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

Map Unit 99001 (47.92%)

Map Unit Name:	Water

No more attributes available for this map unit

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 99001 - Water

Component: Water (100%)
Generated brief soil descriptions are created for major soil components. The Water is a miscellaneous area.

Map Unit W (8.43%)

Map Unit Name:	Water

No more attributes available for this map unit

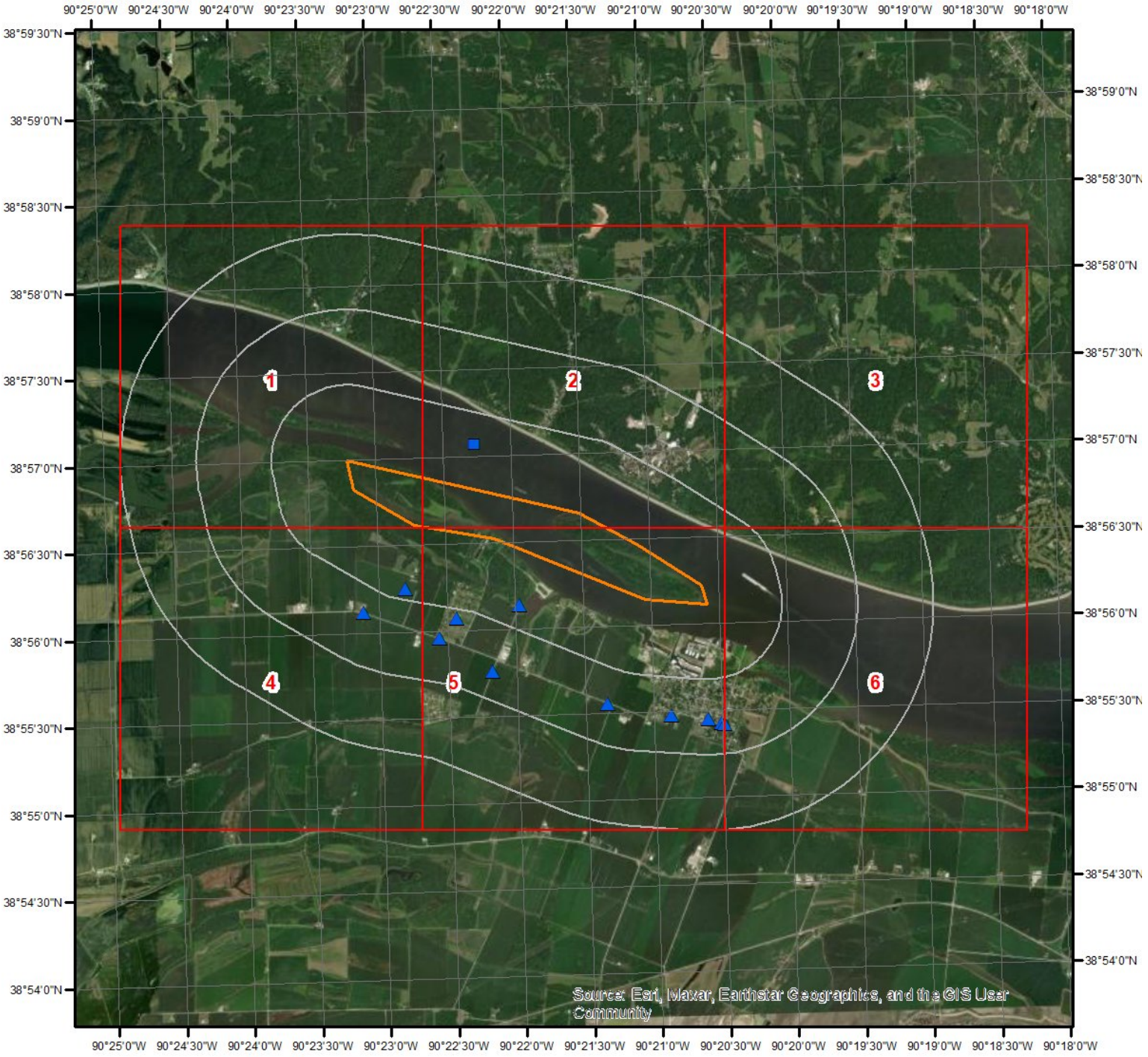
Component Description:

Minor map unit components are excluded from this report.

Map Unit: W - Water

Component: Water (100%)
Generated brief soil descriptions are created for major soil components. The Water is a miscellaneous area.

Wells and Additional Sources



Wells & Additional Sources

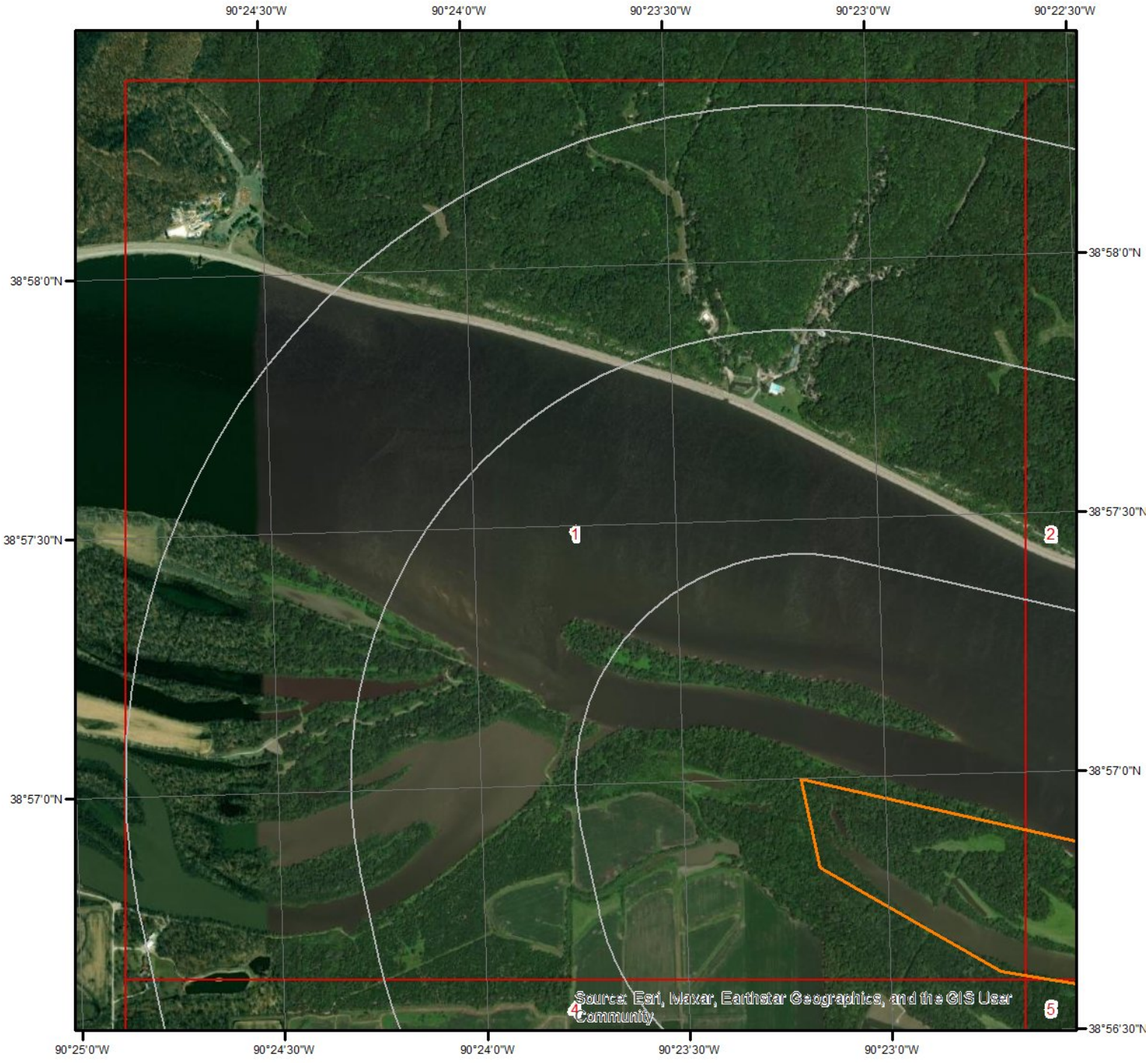
N

0 0.45 0.9 1.8 Miles

- Sites with Higher Elevation
- Sites with Same Elevation
- Sites with Lower Elevation
- Sites with Unknown Elevation
- OGW Sites with Higher Elevation
- OGW Sites with Same Elevation
- OGW Sites with Lower Elevation
- OGW Sites with Unknown Elevation

ERIS

Wells and Additional Sources



Wells & Additional Sources - Page 1

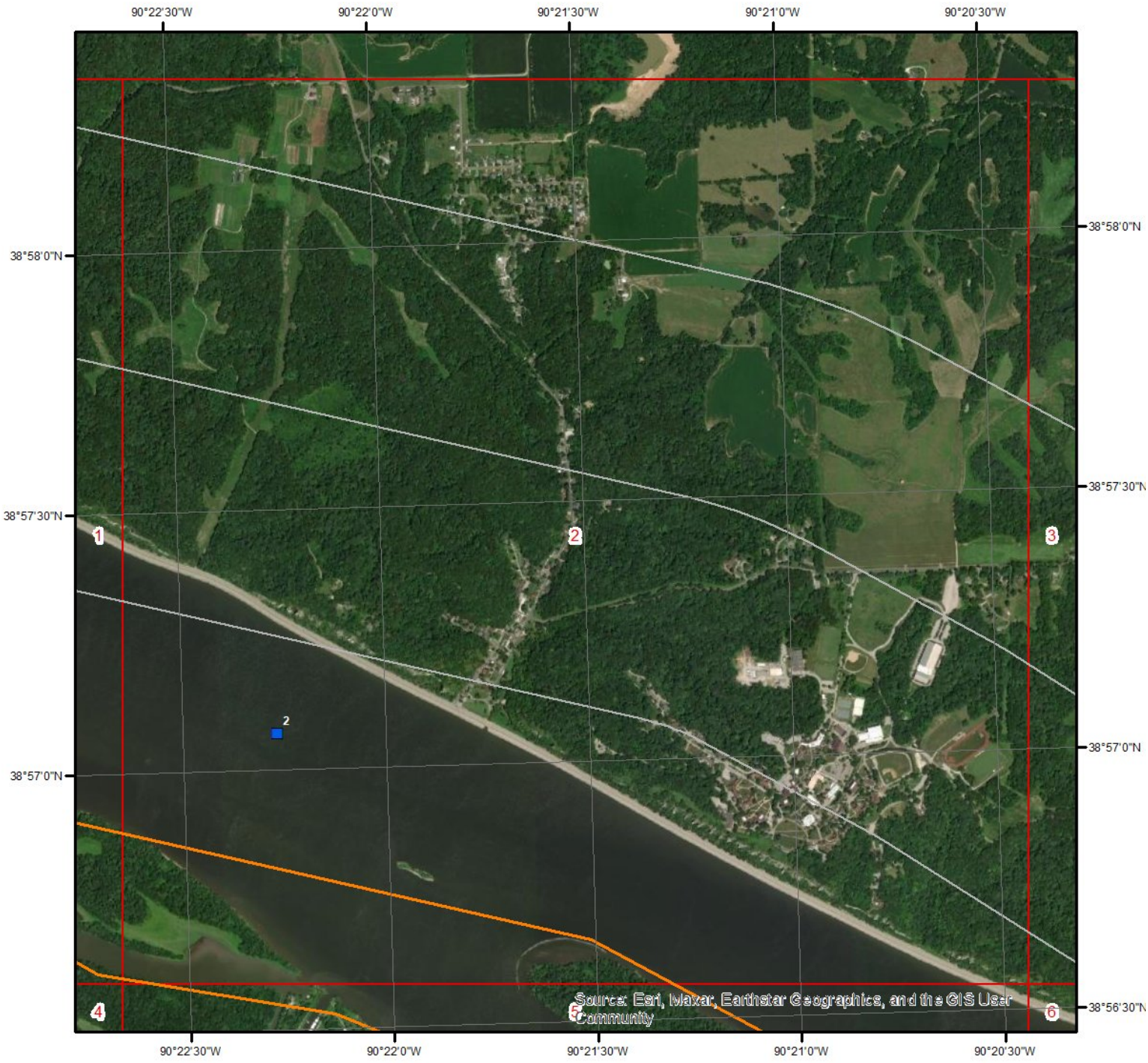
N

0 0.15 0.3 0.6 Miles

- Sites with Higher Elevation
- Sites with Same Elevation
- Sites with Lower Elevation
- Sites with Unknown Elevation
- OGW Sites with Higher Elevation
- OGW Sites with Same Elevation
- OGW Sites with Lower Elevation
- OGW Sites with Unknown Elevation

ERIS

Wells and Additional Sources



Wells & Additional Sources - Page 2

N

0 0.15 0.3 0.6 Miles

- Sites with Higher Elevation
- Sites with Same Elevation
- Sites with Lower Elevation
- Sites with Unknown Elevation
- OGW Sites with Higher Elevation
- OGW Sites with Same Elevation
- OGW Sites with Lower Elevation
- OGW Sites with Unknown Elevation

ERIS

Wells and Additional Sources



Wells & Additional Sources - Page 3

N

0 0.15 0.3 0.6 Miles

- Sites with Higher Elevation
- Sites with Same Elevation
- Sites with Lower Elevation
- Sites with Unknown Elevation
- OGW Sites with Higher Elevation
- OGW Sites with Same Elevation
- OGW Sites with Lower Elevation
- OGW Sites with Unknown Elevation

ERIS

Wells and Additional Sources



Wells & Additional Sources - Page 4

N

0 0.15 0.3 0.6 Miles

- Sites with Higher Elevation
- Sites with Same Elevation
- Sites with Lower Elevation
- Sites with Unknown Elevation
- OGW Sites with Higher Elevation
- OGW Sites with Same Elevation
- OGW Sites with Lower Elevation
- OGW Sites with Unknown Elevation

ERIS

Wells and Additional Sources



Wells & Additional Sources - Page 5

N

0 0.15 0.3 0.6 Miles

- Sites with Higher Elevation
- Sites with Same Elevation
- Sites with Lower Elevation
- Sites with Unknown Elevation
- OGW Sites with Higher Elevation
- OGW Sites with Same Elevation
- OGW Sites with Lower Elevation
- OGW Sites with Unknown Elevation

ERIS

Wells and Additional Sources



Wells & Additional Sources - Page 6

N

0 0.15 0.3 0.6 Miles

- Sites with Higher Elevation
- Sites with Same Elevation
- Sites with Lower Elevation
- Sites with Unknown Elevation
- OGW Sites with Higher Elevation
- OGW Sites with Same Elevation
- OGW Sites with Lower Elevation
- OGW Sites with Unknown Elevation

ERIS

Wells and Additional Sources Summary

Federal Sources

Public Water Systems Violations and Enforcement Data

Map Key	PWS ID	Distance (ft)	Direction
9	MO6010657	3980.82	SE

Safe Drinking Water Information System (SDWIS)

Map Key	ID	Distance (ft)	Direction
	No records found		

USGS National Water Information System

Map Key	Site Number	Distance (ft)	Direction
1	USGS-385608090215801	1838.61	S
2	USGS-05587455	1529.70	NNW
10	USGS-385527090203601	4018.48	SE
12	USGS-385525090202901	4251.07	SE

Wells from NWIS

Map Key	ID	Distance (ft)	Direction
	No records found		

State Sources

Oil and Gas Wells

Map Key	ID	Distance (ft)	Direction
	No records found		

Public Drinking Water Wells

Map Key	Unique ID	Distance (ft)	Direction
11	103950	4200.41	SE

Springs

Map Key	ID	Distance (ft)	Direction
	No records found		

Water Wells

Map Key	Ref No	Distance (ft)	Direction

Wells and Additional Sources Summary

3	00435651	2976.66	SW
4	00499286	2247.47	WSW
5	00517546	3750.53	SW
6	00517545	4329.00	SSW
7	00517547	3540.87	WSW
8	00517544	3876.60	SSE

Public Water Systems Violations and Enforcement Data

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
9	SE	0.75	3,980.82	437.11	PWSV

Address Line 2:	PO BOX 108
State Code:	MO
Zip Code:	63373-0000
City Name:	PORTAGE DES SIOUX
Address Line 1:	1525 WASHINGTON
PWS ID:	MO6010657
PWS Type Code:	CWS
PWS Type Description:	Community Water System
Primary Source Code:	GW
Primary Source Desc:	Groundwater
PWS Activity Code:	A
PWS Activity Description:	Active
PWS Deactivation Date:	
Phone Number:	636-899-0640

--Details--

Population Served Count:	345
City Served:	PORTAGEDESSIOUX
County Served:	St. Charles
State Served:	MO
Zip Code Served:	

USGS National Water Information System

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
1	S	0.35	1,838.61	432.01	FED USGS

Reporting Agency:	USGS Missouri Water Science Center
Site Number:	USGS-385608090215801
Station Name:	T48N R06E 08ACD1
Site Type:	Well
Latitude:	38.93560410000000
Longitude:	-90.3662256000000
Date Drilled:	19681003
Well Depth:	44.0
Well Depth Unit:	ft
Well Hole Depth:	44.0
W Hole Depth Unit:	ft
Formation Type:	Holocene Alluvium

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB

2	NNW	0.29	1,529.70	417.95	FED USGS

Reporting Agency: USGS Missouri Water Science Center
Site Number: USGS-05587455
Station Name: MISSISSIPPI RIVER BELOW GRAFTON, IL
Site Type: Stream
Latitude: 38.95115948000000
Longitude: -90.3712256000000
Date Drilled:
Well Depth:
Well Depth Unit:
Well Hole Depth:
W Hole Depth Unit:
Formation Type:

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
10	SE	0.76	4,018.48	435.65	FED USGS

Reporting Agency: USGS Missouri Water Science Center
Site Number: USGS-385527090203601
Station Name: T48N R06E 16AAD1
Site Type: Well
Latitude: 38.92421527000000
Longitude: -90.3434473000000
Date Drilled: 1967
Well Depth: 116
Well Depth Unit: ft
Well Hole Depth: 116
W Hole Depth Unit: ft
Formation Type: Holocene Alluvium

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
12	SE	0.81	4,251.07	434.17	FED USGS

Reporting Agency: USGS Missouri Water Science Center
Site Number: USGS-385525090202901
Station Name: T48N R06E 15BCB1
Site Type: Well
Latitude: 38.92365970000000
Longitude: -90.3415028000000
Date Drilled: 19670310
Well Depth: 116
Well Depth Unit: ft
Well Hole Depth: 116
W Hole Depth Unit: ft

Formation Type: Holocene Alluvium

Public Drinking Water Wells

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
11	SE	0.80	4,200.41	433.67	PWSW

Well No:	1	From CD:	Alluvium
Well ID:	13530	From TD:	Alluvium
Unique ID:	103950	Head:	33
Log ID:	0024852	Nitrate:	No
WWIMS ID:		Out Case Dep:	0
PWSS ID:	6010657	Out Case Size:	0
PWSS ID Ext:	6010657101	Pump Capacity:	150
IPWS:	MO6010657	Pump Depth:	50
IPWS Ext:	MO6010657101	Pump Manuf:	Grundfos
Local Name:	Well #1	Pump Test Da:	1990
Status:	Active	Pump Type:	Submersible
Facility Type:	City	Scrn Length:	10
Fed Type:	C	Scrn Size:	8
MDNR No:	6	Stand by Power:	No
MDNR Reg:	St. Louis	Stappr:	Yes
Drill Date:	1967	Static Lev:	17
Aban:	0	Surf Drain:	
Plug:	0	Top Case Elv:	442
Material:	Unconsolidated	Top Seal:	Split Ring
GWUDISW:		Tot Depth:	116
Bottom Seal:	Grout	VOC:	No
Case Depth:	106	Yield:	250
Case Height:	0	County:	St. Charles
Case Size:	8	Verloc:	No
Case Type:	Steel	Grnd Elev:	431
Meter:		DD Latitude:	38.92377
Chlor:	Yes	DD Longitude:	-90.34185
Draw Down:	20	Method:	DRG/MAP
Entry:	Yes	Accuracy:	33
Filter:	Yes	Location Status:	Verified
FIPS:	29183	Last Update:	2005/11/08

Water Wells

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
3	SW	0.56	2,976.66	437.79	WATER WELLS

Well No:		Drill Area:	AREA 5
FID:	88611	Elev:	0
Ref No:	00435651	Total Dpth:	18
Cert No:	B036603	Casing Len:	18

Wells and Additional Sources Detail Report

Well Type:	Abandoned	Casing Mat:	Steel
Well Use:	Domestic	SWL:	16
Well Yield:	0	Liner Len:	0
Date Compl:	2013/01/16 00:00:00+00	Liner Mat:	
From 1:	0	Liner Use:	
To 1:	0	Subdiv 1:	
From 2:	0	Subdiv 2:	
To 2:	0	Subdiv 3:	SW 1/4
From 3:	0	Twn No:	48
To 3:	0	Twn Dir:	N
From 4:	0	Rng No:	6
To 4:	0	Rng Dir:	E
From 5:	0	Sctn No:	8
To 5:	0	Cnty Fips:	183
From 6:	0	X:	38.9345164647571
To 6:	0	Y:	-90.3739076315531
Form 1:			
Form 2:			
Form 3:			
Form 4:			
Form 5:			
Form 6:			

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
4	WSW	0.43	2,247.47	436.77	WATER WELLS

Well No:	MW 6	Drill Area:	AREA 5
FID:	56100	Elev:	0
Ref No:	00499286	Total Dpth:	38
Cert No:	A163259	Casing Len:	0
Well Type:	Monitoring Well	Casing Mat:	
Well Use:	Monitoring	SWL:	0
Well Yield:	0	Liner Len:	0
Date Compl:	2008/07/16 00:00:00+00	Liner Mat:	
From 1:	0	Liner Use:	
To 1:	5	Subdiv 1:	
From 2:	5	Subdiv 2:	
To 2:	38	Subdiv 3:	
From 3:	0	Twn No:	0
To 3:	0	Twn Dir:	
From 4:	0	Rng No:	0
To 4:	0	Rng Dir:	
From 5:	0	Sctn No:	1692
To 5:	0	Cnty Fips:	183
From 6:	0	X:	38.9375071877978
To 6:	0	Y:	-90.3801942552511

Form 1:	SLT
Form 2:	SLTY CLY
Form 3:	
Form 4:	
Form 5:	
Form 6:	

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
5	SW	0.71	3,750.53	437.70	WATER WELLS

Well No:	MW 20	Drill Area:	
FID:	118828	Elev:	0
Ref No:	00517546	Total Dpth:	20.3
Cert No:	A218088	Casing Len:	0
Well Type:	Monitoring Well	Casing Mat:	
Well Use:	Piezometer	SWL:	0
Well Yield:	0	Liner Len:	0
Date Compl:	2017/09/25 00:00:00+00	Liner Mat:	
From 1:	0	Liner Use:	
To 1:	20	Subdiv 1:	
From 2:	0	Subdiv 2:	
To 2:	0	Subdiv 3:	
From 3:	0	Twn No:	0
To 3:	0	Twn Dir:	
From 4:	0	Rng No:	0
To 4:	0	Rng Dir:	
From 5:	0	Sctn No:	1692
To 5:	0	Cnty Fips:	183
From 6:	0	X:	38.9326854102416
To 6:	0	Y:	-90.3761048975566
Form 1:	BRN LEAN CLY		
Form 2:			
Form 3:			
Form 4:			
Form 5:			
Form 6:			

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
6	SSW	0.82	4,329.00	433.65	WATER WELLS

Well No:	MW 19	Drill Area:	
FID:	118826	Elev:	0
Ref No:	00517545	Total Dpth:	19.3
Cert No:	A218087	Casing Len:	0
Well Type:	Monitoring Well	Casing Mat:	
Well Use:	Piezometer	SWL:	0

Well Yield:	0	Liner Len:	0
Date Compl:	2017/09/25 00:00:00+00	Liner Mat:	
From 1:	0	Liner Use:	
To 1:	19	Subdiv 1:	
From 2:	0	Subdiv 2:	
To 2:	0	Subdiv 3:	
From 3:	0	Twn No:	0
To 3:	0	Twn Dir:	
From 4:	0	Rng No:	0
To 4:	0	Rng Dir:	
From 5:	0	Sctn No:	125
To 5:	0	Cnty Fips:	183
From 6:	0	X:	38.9293284762352
To 6:	0	Y:	-90.3696962043441
Form 1:	BRN LEAN CLY		
Form 2:			
Form 3:			
Form 4:			
Form 5:			
Form 6:			

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
7	WSW	0.67	3,540.87	436.31	WATER WELLS

Well No:	MW 21	Drill Area:	
FID:	118829	Elev:	0
Ref No:	00517547	Total Dpth:	20.3
Cert No:	A218089	Casing Len:	0
Well Type:	Monitoring Well	Casing Mat:	
Well Use:	Piezometer	SWL:	0
Well Yield:	0	Liner Len:	0
Date Compl:	2017/09/25 00:00:00+00	Liner Mat:	
From 1:	0	Liner Use:	
To 1:	20	Subdiv 1:	
From 2:	0	Subdiv 2:	
To 2:	0	Subdiv 3:	SW 1/4
From 3:	0	Twn No:	48
To 3:	0	Twn Dir:	N
From 4:	0	Rng No:	6
To 4:	0	Rng Dir:	E
From 5:	0	Sctn No:	7
To 5:	0	Cnty Fips:	183
From 6:	0	X:	38.9353099213202
To 6:	0	Y:	-90.3853822445011
Form 1:	BRN LEAN CLY		
Form 2:			

Wells and Additional Sources Detail Report

Form 3:
Form 4:
Form 5:
Form 6:

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
8	SSE	0.73	3,876.60	430.46	WATER WELLS

Well No:	MW 18	Drill Area:	
FID:	118824	Elev:	0
Ref No:	00517544	Total Dpth:	20
Cert No:	A218086	Casing Len:	0
Well Type:	Monitoring Well	Casing Mat:	
Well Use:	Piezometer	SWL:	0
Well Yield:	0	Liner Len:	0
Date Compl:	2017/09/27 00:00:00+00	Liner Mat:	
From 1:	0	Liner Use:	
To 1:	20	Subdiv 1:	
From 2:	0	Subdiv 2:	
To 2:	0	Subdiv 3:	
From 3:	0	Twn No:	0
To 3:	0	Twn Dir:	
From 4:	0	Rng No:	0
To 4:	0	Rng Dir:	
From 5:	0	Sctn No:	114
To 5:	0	Cnty Fips:	183
From 6:	0	X:	38.9259105073252
To 6:	0	Y:	-90.3557191494416
Form 1:	BRN LEAN CLY		
Form 2:			
Form 3:			
Form 4:			
Form 5:			
Form 6:			

Radon Information

This section lists any relevant radon information found for the target property.

No Radon Zone Level records found for the project property or surrounding properties.

Zone 1: Counties with predicted average indoor radon screening levels greater than 4 pCi/L
Zone 2: Counties with predicted average indoor radon screening levels from 2 to 4 pCi/L
Zone 3: Counties with predicted average indoor radon screening levels less than 2 pCi/L

No Indoor Radon Data records found for the project property or surrounding properties.

Appendix

Federal Sources

FEMA National Flood Hazard Layer — **FEMA FLOOD**

The National Flood Hazard Layer (NFHL) data incorporates Flood Insurance Rate Map (FIRM) databases published by the Federal Emergency Management Agency (FEMA), and any Letters Of Map Revision (LOMRs) that have been issued against those databases since their publication date. The FIRM Database is the digital, geospatial version of the flood hazard information shown on the published paper FIRMs. The FIRM Database depicts flood risk information and supporting data used to develop the risk data. The FIRM Database is derived from Flood Insurance Studies (FISs), previously published FIRMs, flood hazard analyses performed in support of the FISs and FIRMs, and new mapping data, where available.

Indoor Radon Data — **INDOOR RADON**

Indoor radon measurements tracked by the Environmental Protection Agency(EPA) and the State Residential Radon Survey.

Public Water Systems Violations and Enforcement Data — **PWSV**

List of drinking water violations and enforcement actions from the Safe Drinking Water Information System (SDWIS) made available by the Drinking Water Protection Division of the US EPA's Office of Groundwater and Drinking Water. Enforcement sensitive actions are not included in the data released by the EPA. Address information provided in SWDIS may correspond either with the physical location of the water system, or with a contact address.

Radon Zone Level — **RADON ZONE**

Areas showing the level of Radon Zones (level 1, 2 or 3) by county. This data is maintained by the Environmental Protection Agency (EPA).

Safe Drinking Water Information System (SDWIS) — **SDWIS**

The Safe Drinking Water Information System (SDWIS) contains information about public water systems as reported to US Environmental Protection Agency (EPA) by the states. Addresses may correspond with the location of the water system, or with a contact address.

Soil Survey Geographic database — **SSURGO**

The Soil Survey Geographic database (SSURGO) contains information about soil as collected by the National Cooperative Soil Survey at the Natural Resources Conservation Service (NRCS). Soil maps outline areas called map units. The map units are linked to soil properties in a database. Each map unit may contain one to three major components and some minor components.

U.S. Fish & Wildlife Service Wetland Data — **US WETLAND**

The U.S. Fish & Wildlife Service Wetland layer represents the approximate location and type of wetlands and deepwater habitats in the United States.

USGS Current Topo — **US TOPO**

US Topo topographic maps are produced by the National Geospatial Program of the U.S. Geological Survey (USGS). The project was launched in late 2009, and the term "US Topo" refers specifically to quadrangle topographic maps published in 2009 and later.

USGS Geology — **US GEOLOGY**

Seamless maps depicting geological information provided by the United States Geological Survey (USGS).

USGS National Water Information System — **FED USGS**

The U.S. Geological Survey (USGS)'s National Water Information System (NWIS) is the nation's principal repository of water resources data. This database includes comprehensive information of well-construction details, time-series data for gage height, streamflow, groundwater level, and precipitation and water use data.

Wells from NWIS — **FED USGS**

The U.S. Geological Survey's National Water Information System (NWIS) is the nation's principal repository of water resources data. The NWIS includes comprehensive information of well-construction details, time-series data for gage height, streamflow, groundwater level, and precipitation and water use data. This NWIW dataset contains select Site Types from the overall NWIS Sites data, limited to the following Group Site Types only: Groundwater Group Site Types: Well, Collector or Ranney type well, Hyporheic-zone well,

Interconnected Wells, Multiple wells; Spring Group Site Type: Spring; and Other Group Site Types: Aggregate groundwater use, Cistern.

State Sources

Oil and Gas Wells **OGW**

Oil and Gas Wells Data Collected by Missouri Department of Natural Resources.

Public Drinking Water Wells **PWSW**

The Public Drinking Water Wells data consists of community water supply wells in Missouri. This data was made available by the Missouri Department of Natural Resources to facilitate safe public drinking water systems and awareness.

Springs **SPRING**

Locations of known and probable spring locations as determined by review of U.S. Geological Survey topographic maps and field verification, made available by the Missouri Geological Survey.

Water Wells **WATER WELLS**

This data set provides information about certified water wells and is maintained by the Missouri Department of Natural Resources (DNR), Missouri Geological Survey (MGS), Geological Survey Program (GSP), Wellhead Protection Section (WHP).

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CITY DIRECTORY

Project Property:	*West Alton Phase I* *n/a* *Portage Des Sioux,MO*
Project No:	
Requested By:	*US Army Corps of Engineers*
Order No:	*23042100139*
Date Completed:	*April 25, 2023*

Environmental Risk Information Services
A division of Glacier Media Inc.
1.866.517.5204 | info@erisinfo.com | erisinfo.com

April 25, 2023
RE: CITY DIRECTORY RESEARCH
n/a
Portage Des Sioux,MO

Thank you for contacting ERIS for an City Directory Search for the site described above. Our staff has conducted a reverse listing City Directory search to determine prior occupants of the subject site and adjacent properties. We have provided the nearest addresses(s) when adjacent addresses are not listed. If we have searched a range of addresses, all addresses in that range found in the Directory are included.

Note: Reverse Listing Directories generally are focused on more highly developed areas. Newly developed areas may be covered in the more recent years, but the older directories will tend to cover only the "central" parts of the city. To complete the search, we have either utilized the ACPL, Library of Congress, State Archives, and/or a regional library or history center as well as multiple digitized directories. These do not claim to be a complete collection of all reverse listing city directories produced.

ERIS has made every effort to provide accurate and complete information but shall not be held liable for missing, incomplete or inaccurate information. To complete this search we used the general range(s) below to search for relevant findings. If you believe there are additional addresses or streets that require searching please contact us at 866-517-5204.

Search Criteria:
All of 2nd St
All of Riverview Dr
Search Notes:

Search Results Summary

Date	Source	Comment
2022	DIGITAL BUSINESS DIRECTORY	
2020	DIGITAL BUSINESS DIRECTORY	
2016	DIGITAL BUSINESS DIRECTORY	
2012	DIGITAL BUSINESS DIRECTORY	
2008	DIGITAL BUSINESS DIRECTORY	
2003	DIGITAL BUSINESS DIRECTORY	
2000	DIGITAL BUSINESS DIRECTORY	
1997	HAINES	
1991	HAINES	
1987	HAINES	
1981	HAINES	
1977	HAINES	

2022 2ND ST

SOURCE: DIGITAL BUSINESS DIRECTORY

1730 **JONES AIR & WATER**...*WATER TREATMENT EQUIP SVC & SUPLS*
1820 **FRANK CHOEN**...*RESIDENTIAL*

2022 RIVERVIEW DR

SOURCE: DIGITAL BUSINESS DIRECTORY

1545 **LONGSHOT SALOON**...*BARS*
1545 **MY RIVER HOME BOAT HARBOUR INC**...*BOAT DEALERS SALES & SERVICE*
1670 **RIVERSIDE BAR GRILL**...*RESTAURANTS*

2020 2ND ST

SOURCE: DIGITAL BUSINESS DIRECTORY

1820 **FRANK CHOEN**...*RESIDENTIAL*
1870 **SHELLY MCCLAIN**...*RESIDENTIAL*

2020 RIVERVIEW DR

SOURCE: DIGITAL BUSINESS DIRECTORY

NO LISTING FOUND

2016 2ND ST

SOURCE: DIGITAL BUSINESS DIRECTORY

1150 **ALTON WOOTTON**...*RESIDENTIAL*
1150 **MARY WOOTTON**...*RESIDENTIAL*
1671 **DONNA CRANGLE**...*RESIDENTIAL*
1671 **JAMES CRANGLE III**...*RESIDENTIAL*
1725 **EDWARD ROSE**...*RESIDENTIAL*
1725 **SHERYL ROSE**...*RESIDENTIAL*
1730 **EVERETT JONES JR**...*RESIDENTIAL*
1730 **JENNIFER JONES**...*RESIDENTIAL*
1765 **KARL BOSCHERT**...*RESIDENTIAL*
1770 **KATHARYN ROTHERMICH**...*RESIDENTIAL*
1770 **MARVIN ROTHERMICH**...*RESIDENTIAL*
1820 **FRANK CHOEN**...*RESIDENTIAL*
1920 **WARREN JONES**...*RESIDENTIAL*

2016 RIVERVIEW DR

SOURCE: DIGITAL BUSINESS DIRECTORY

NO LISTING FOUND

2012 2ND ST

SOURCE: DIGITAL BUSINESS DIRECTORY

1120 **SHARON COLLIGAN**...*RESIDENTIAL*
1150 **ALTON WOOTTON**...*RESIDENTIAL*
1150 **MARY WOOTTON**...*RESIDENTIAL*
1320 **RYAN BUCHANAN**...*RESIDENTIAL*
1485 **CHARLES SCHRAMM**...*RESIDENTIAL*
1550 **RICHARD CARPENTER**...*RESIDENTIAL*
1670 **J HENDRICKSON**...*RESIDENTIAL*
1670 **KATHERINE MCGRAW**...*RESIDENTIAL*
1671 **DONNA CRANGLE**...*RESIDENTIAL*
1725 **EDWARD ROSE**...*RESIDENTIAL*
1725 **SHERYL ROSE**...*RESIDENTIAL*
1730 **EVERETT JONES**...*RESIDENTIAL*
1730 **JENNIFER JONES**...*RESIDENTIAL*
1770 **EDNA ROTHERMICH**...*RESIDENTIAL*
1820 **CORREY MILLER**...*RESIDENTIAL*
1820 **NICK MATULEWICK**...*RESIDENTIAL*
1870 **CHARLES KULAGE**...*RESIDENTIAL*

2012 RIVERVIEW DR

SOURCE: DIGITAL BUSINESS DIRECTORY

1545 **MICHAEL DALLWITZ**...*RESIDENTIAL*
1545 **MICHAEL DALWITZ**...*RESIDENTIAL*
1670 **ROBERT SKRABACZ**...*RESIDENTIAL*

2008 2ND ST

SOURCE: DIGITAL BUSINESS DIRECTORY

1150 **DIANA CRITES**...*RESIDENTIAL*
1325 **JOHN & PAULA GRAF**...*RESIDENTIAL*
1580 **BOBBY WILLIAMS**...*RESIDENTIAL*
1620 **CLIFFORD P CAMP**...*RESIDENTIAL*
1620 **JOSHUA CAMP**...*RESIDENTIAL*
1620 **LARRY CAMP**...*RESIDENTIAL*
1670 **TODD A MCGRAW**...*RESIDENTIAL*
1725 **EDWARD G ROSE**...*RESIDENTIAL*
1730 **EVERETT JR JONES**...*RESIDENTIAL*
1770 **MARVIN J ROTHERMICH**...*RESIDENTIAL*
1775 **DIANE MOR**...*RESIDENTIAL*
1775 **KARL BOSCHERT**...*RESIDENTIAL*
1820 **FRANK J CHOEN**...*RESIDENTIAL*
1825 **G R BARSTOW**...*RESIDENTIAL*
1870 **S MCCLAIN**...*RESIDENTIAL*

2008 RIVERVIEW DR

SOURCE: DIGITAL BUSINESS DIRECTORY

1545 **DONNA DALLWITZ**...*RESIDENTIAL*
1545 **MICHAEL DALWITZ**...*RESIDENTIAL*
1670 **DAVID BUFFA**...*RESIDENTIAL*
1670 **ROBERT D SKRABACZ**...*RESIDENTIAL*

2003 2ND ST

SOURCE: DIGITAL BUSINESS DIRECTORY

1250 **HALL ST FRANCIS**...*RESIDENTIAL*
1325 **JOHN & PAULA GRAF**...*RESIDENTIAL*
1580 **J R HELLEMEYER**...*RESIDENTIAL*
1620 **CLIFFORD P CAMP**...*RESIDENTIAL*
1620 **LARRY CAMP**...*RESIDENTIAL*
1725 **EDWARD ROSE**...*RESIDENTIAL*
1730 **EVERETT JR JONES**...*RESIDENTIAL*
1770 **MARVIN J ROTHERMICH**...*RESIDENTIAL*
1825 **THOMAS BARSTOW**...*RESIDENTIAL*
1870 **RICHARD ACHE**...*RESIDENTIAL*
1970 **DEBRA MILLER**...*RESIDENTIAL*

2003 RIVERVIEW DR

SOURCE: DIGITAL BUSINESS DIRECTORY

1545 **MICHAEL DALWITZ**...*RESIDENTIAL*
1670 **ROBERT D SKRABACZ**...*RESIDENTIAL*

2000 2ND ST

SOURCE: DIGITAL BUSINESS DIRECTORY

1325 **PAULA CAMPBELL**...*RESIDENTIAL*
1580 **J R HELLEMEYER**...*RESIDENTIAL*
1620 **CLIFFORD P CAMP**...*RESIDENTIAL*
1620 **LARRY CAMP**...*RESIDENTIAL*
1725 **EDW G ROSE**...*RESIDENTIAL*
1730 **EVERETT JR JONES**...*RESIDENTIAL*
1770 **MARVIN J ROTHERMICH**...*RESIDENTIAL*
1820 **ROBT E BURNS**...*RESIDENTIAL*
1825 **THOS C BARSTOW**...*RESIDENTIAL*
1870 **RICHARD ACHE**...*RESIDENTIAL*
1920 **WARREN JONES**...*RESIDENTIAL*
1970 **DEBRA MILLER**...*RESIDENTIAL*

2000 RIVERVIEW DR

SOURCE: DIGITAL BUSINESS DIRECTORY

1545 **HENRY GEORGE**...*RESIDENTIAL*
1545 **TERRY & SUSAN MOR**...*RESIDENTIAL*

1997 **2ND ST**
SOURCE: HAINES

2ND 63373
PRTG DES SIOUX

WEALTH CODE 5 0

1325	●GRAF John	314-899-0436	6
	●GRAF Paula	314-899-0436	6
1525	●RICHARD Neuman	OO	+7
1580	HELLEMEYER J R	314-753-2435	
1620	●CAMP Clifford P	314-899-0313	9
	●CAMP Larry	314-899-0118	
1671	XXXX	OO	
1725	●ROSE Edw G	314-899-1007	4
1730	JONES Everett Jr	314-899-1918	3
1820	●BURNS Robert	OO	+7
1825	●BARSTOW Thos C	314-753-2628	5
1870	●ACHE Richard	314-899-1206	8
1920	●JONES Warren	OO	+7
1970	●MILLER Debra	314-899-0304	5

★ 0 BUS 14 RES 3 NEW

1997 **RIVERVIEW DR**
SOURCE: HAINES

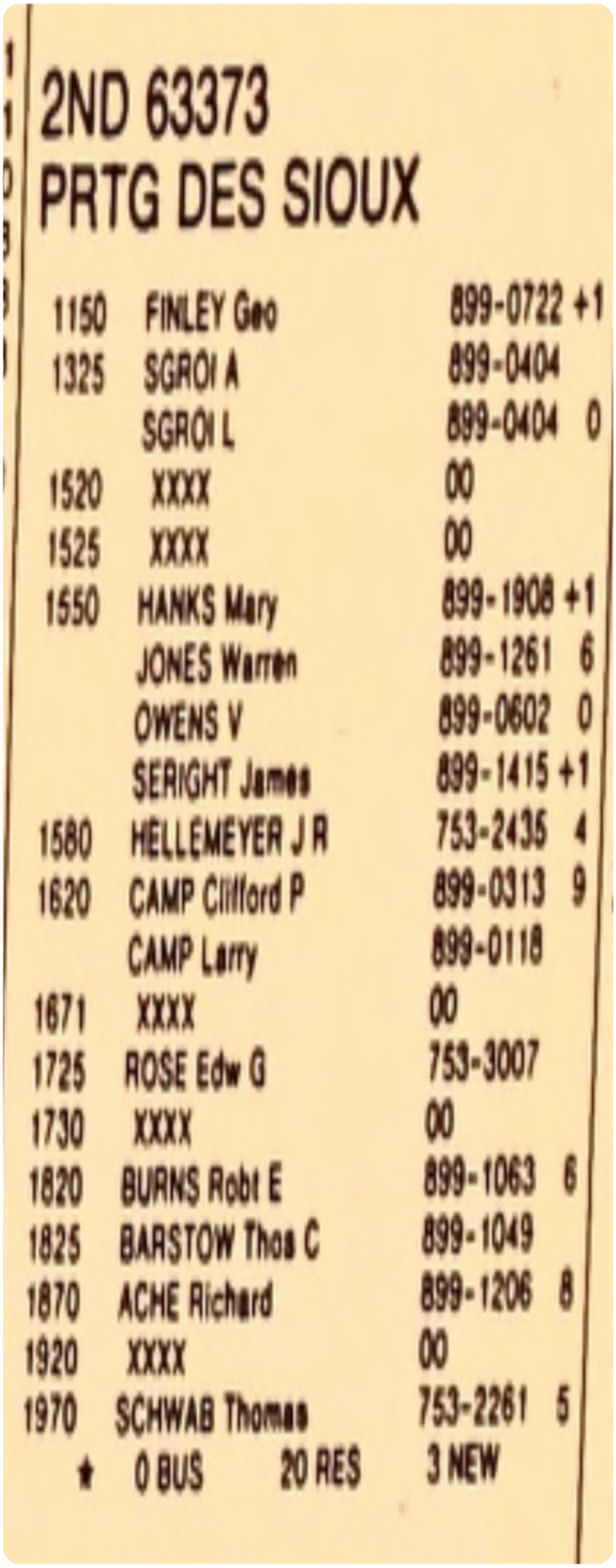
RIVERVIEW 63373
PRTG DES SIOUX

WEALTH CODE 5 0

1545	●DALWITZ Michael	314-899-1595	+7
1665	XXXX	OO	
1670	★PALISADES YACHT CLB	314-899-1093	
	SKRABACZ Robert D	314-899-1421	6

★ 1 BUS 3 RES 1 NEW

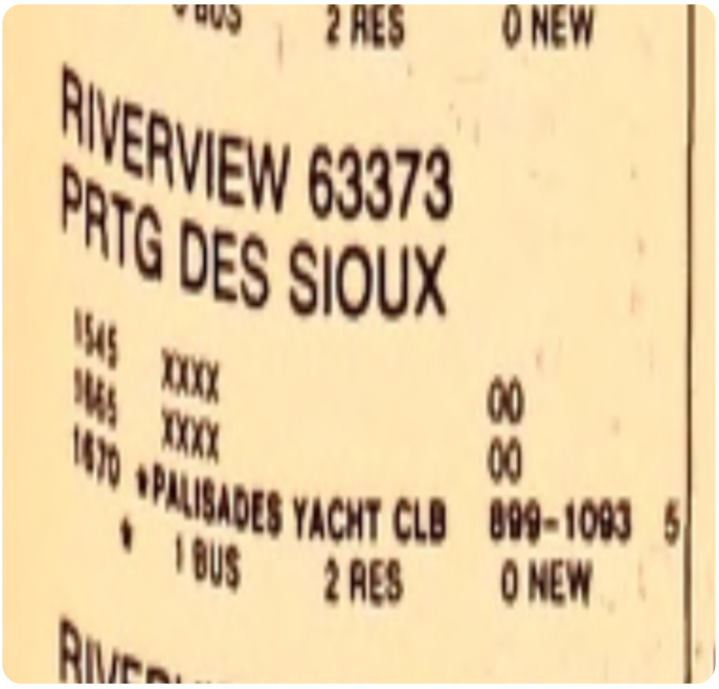
1991 **2ND ST**
SOURCE: HAINES



2ND 63373
PRTG DES SIOUX

1150	FINLEY Geo	899-0722 +1
1325	SGROI A	899-0404
	SGROI L	899-0404 0
1520	XXXX	00
1525	XXXX	00
1550	HANKS Mary	899-1908 +1
	JONES Warren	899-1261 6
	OWENS V	899-0602 0
	SERIGHT James	899-1415 +1
1580	HELLEMEYER J R	753-2435 4
1620	CAMP Clifford P	899-0313 9
	CAMP Larry	899-0118
1671	XXXX	00
1725	ROSE Edw G	753-3007
1730	XXXX	00
1820	BURNS Robt E	899-1063 6
1825	BARSTOW Thos C	899-1049
1870	ACHE Richard	899-1206 8
1920	XXXX	00
1970	SCHWAB Thomas	753-2261 5
*	0 BUS 20 RES	3 NEW

1991 **RIVERVIEW DR**
SOURCE: HAINES



2 RES 0 NEW

RIVERVIEW 63373
PRTG DES SIOUX

1545	XXXX	00
1865	XXXX	00
1870	*PALISADES YACHT CLB	899-1093 5
*	1 BUS 2 RES	0 NEW

RIVER

1987 **2ND ST**
SOURCE: HAINES

2ND 63373
PRTG DES SIOUX

1150	WESTMORELAND D	899-1008	5
	WESTMORELAND LYDIA	899-0304	+7
1520	STAHLSCHMIDT KATHY	753-2447	4
1525	VOGT ROBT	899-0831	6
1550.....	APARTMENTS		
	CALLAWAY DANNY	753-2016	5
	JONES WARREN	899-1261	6
	JONES WARREN	899-1193	+7
	ROBERTS K	899-1838	+7
	SANDERSON WESLEY	899-1300	+7
	WINNGER CINDY	753-2201	+7
1550.....			
1580	HELLEMEYER J R	753-2435	4
1620	CAMP LARRY	899-0118	0
1670	COMPTON V	899-1302	+7
	HOFFMAN CAROL	899-1605	
	HOFFMAN JOHN	899-1605	6
1671	KNICKMEYER L	753-3011	
	KNICKMEYER MARY	753-3011	5
1725	ROSE EDW G	753-3007	8
1730	XXXX	00	
1820	BURNS ROBT E	899-1063	6
1825	BARSTOW THOS C	899-1049	8
1870	WEBB CARL	899-0925	8
1920	LAMBERT KEVIN	899-1175	6
1970	SCHWAB THOMAS	753-2261	5
★	0 BUS 24 RES	6 NEW	

1987 **RIVERVIEW DR**
SOURCE: HAINES

RIVERVIEW 63373
PRTG DES SIOUX

1545	DALLWITZ MIKE	899-1127	+7
	★MY RIVER BOAT HARBR	899-0903	4
1665	BURKARTH FRANK	899-1522	6
1670	★PALISADES YACHT CLB	899-1083	5
★	2 BUS 2 RES	1 NEW	

1981 2ND ST

SOURCE: HAINES

2ND 63373
PRTG DES SIOUX

1520	XXXX	00	
1525	VOGT ROBT	753-2775	0
1550	CONNOYER VINCENT	753-2456	4
1620	CAMP LARRY	899-0118	0
1671	SAYLOR G E	899-0117	0
1725	ROSE EDWARD G	753-3007	8
1820	POELING LAWRENCE	753-2494	0
1825	BARSTOW THOMAS C	899-1049	8
1870	WEBB CARL	899-0925	8
1920	XXXX	00	
1970	KEMP ALLEN JR	753-3090	+1
NO #	CHICKEY JOHN F	899-0917	8
NO #	CHICKEY V	899-0917	8
NO #	HELLEMEYER J R	753-2435	

* 0 BUS 14 RES 1 NEW

1981 RIVERVIEW DR

SOURCE: HAINES

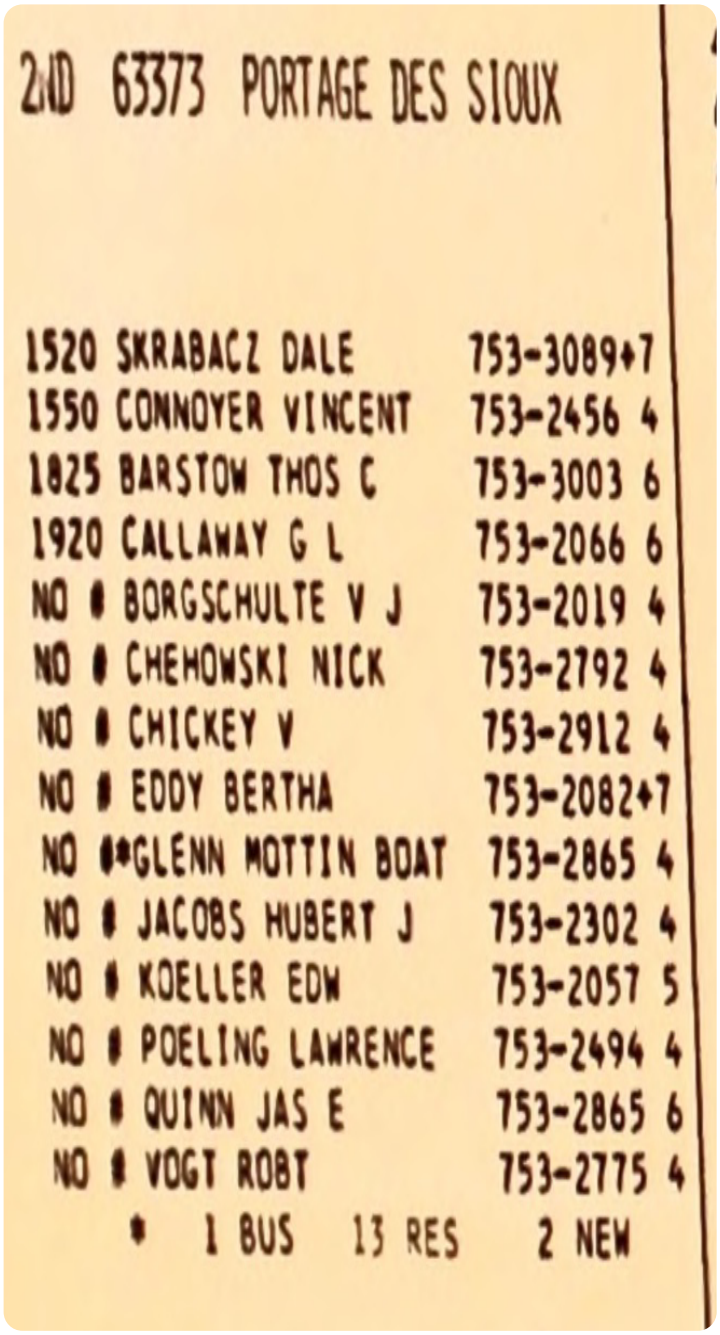
RIVERVIEW 63373
PRTG DES SIOUX

1670	SKRABACZ LEO	899-1093	0

* 0 BUS 1 RES 0 NEW

1977 2ND ST

SOURCE: HAINES



2ND 63373 PORTAGE DES SIOUX

1520 SKRABACZ DALE	753-3089+7
1550 CONNOYER VINCENT	753-2456 4
1825 BARSTOW THOS C	753-3003 6
1920 CALLAWAY G L	753-2066 6
NO # BORGSCHULTE V J	753-2019 4
NO # CHEHOWSKI NICK	753-2792 4
NO # CHICKEY V	753-2912 4
NO # EDDY BERTHA	753-2082+7
NO #*GLENN MOTTIN BOAT	753-2865 4
NO # JACOBS HUBERT J	753-2302 4
NO # KOELLER EDW	753-2057 5
NO # POELING LAWRENCE	753-2494 4
NO # QUINN JAS E	753-2865 6
NO # VOGT ROBT	753-2775 4

* 1 BUS 13 RES 2 NEW

1977 RIVERVIEW DR

SOURCE: HAINES

STREET NOT LISTED

HISTORICAL AERIALS

Project Property: West Alton Phase I
n/a
Portage Des Sioux MO

Project No:

Requested By: US Army Corps of Engineers

Order No: 23042100139

Date Completed: April 25,2023

Aerial Maps included in this report are produced by the sources listed above and are to be used for research purposes including a phase I report. Maps are not to be resold as commercial property. ERIS provides no warranty of accuracy or liability. The information contained in this report has been produced using aerial photos listed in above sources by ERIS Information Inc. (in the US) and ERIS Information Limited Partnership (in Canada), both doing business as 'ERIS'. The maps contained in this report do not purport to be and do not constitute a guarantee of the accuracy of the information contained herein. Although ERIS has endeavored to present information that is accurate, ERIS disclaims, any and all liability for any errors, omissions, or inaccuracies in such information and data, whether attributable to inadvertence, negligence or otherwise, and for any consequences arising therefrom. Liability on the part of ERIS is limited to the monetary value paid for this report.

Environmental Risk Information Services
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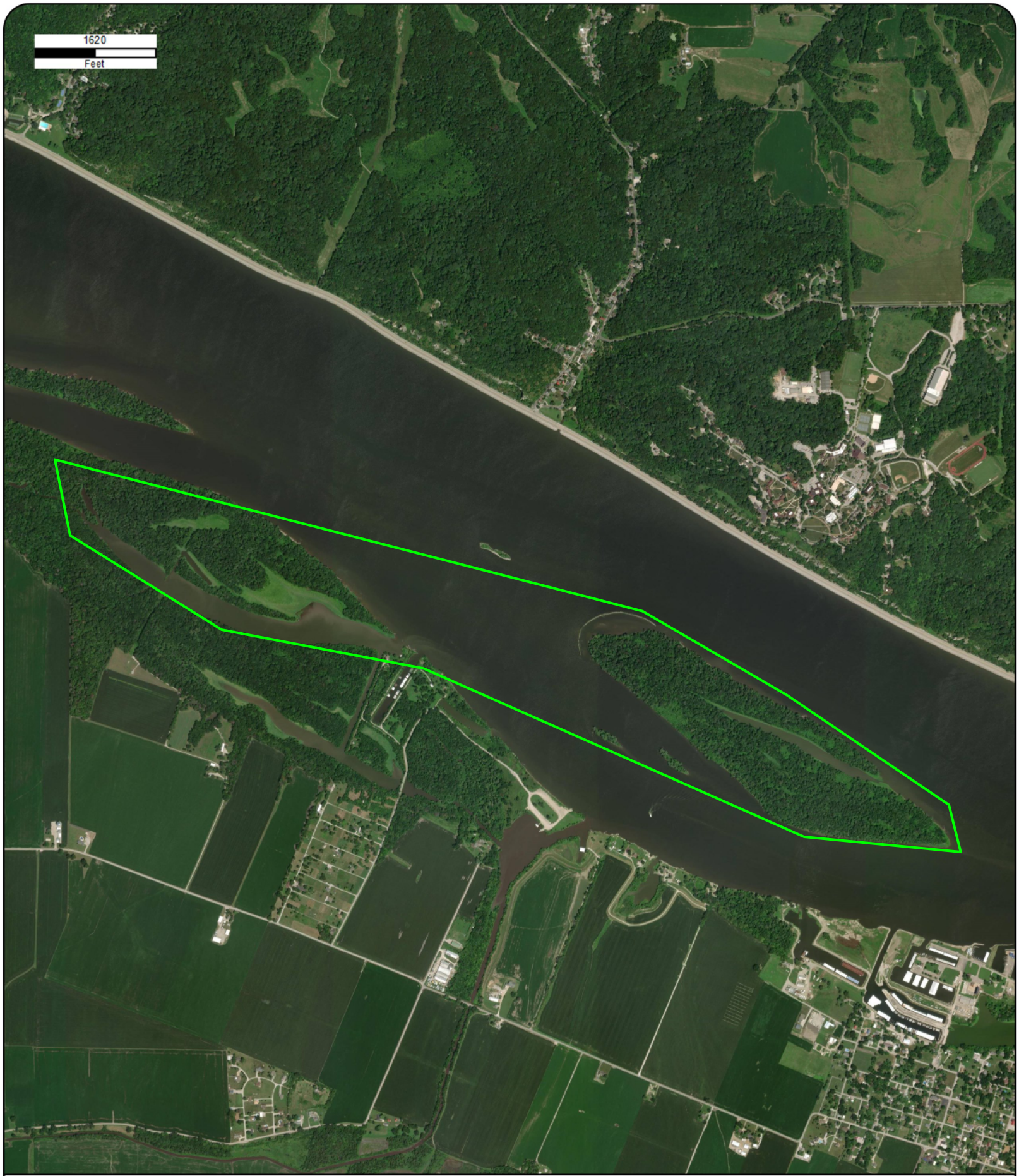
Date	Source	Scale	Comments
2022	MAXAR TECHNOLOGIES	1" = 1600'	
2020	United States Department of Agriculture	1" = 1600'	
2018	United States Department of Agriculture	1" = 1600'	
2016	United States Department of Agriculture	1" = 1600'	
2014	United States Department of Agriculture	1" = 1600'	
2012	United States Department of Agriculture	1" = 1600'	
2009	United States Department of Agriculture	1" = 1600'	
2006	United States Department of Agriculture	1" = 1600'	
1996	United States Geological Survey	1" = 1600'	
1985	United States Geological Survey	1" = 1600'	
1974	United States Geological Survey	1" = 1600'	
1968	United States Geological Survey	1" = 1600'	
1956	Army Mapping Service	1" = 1600'	
1941	Agricultural Stabilization & Conserv. Service	1" = 1600'	

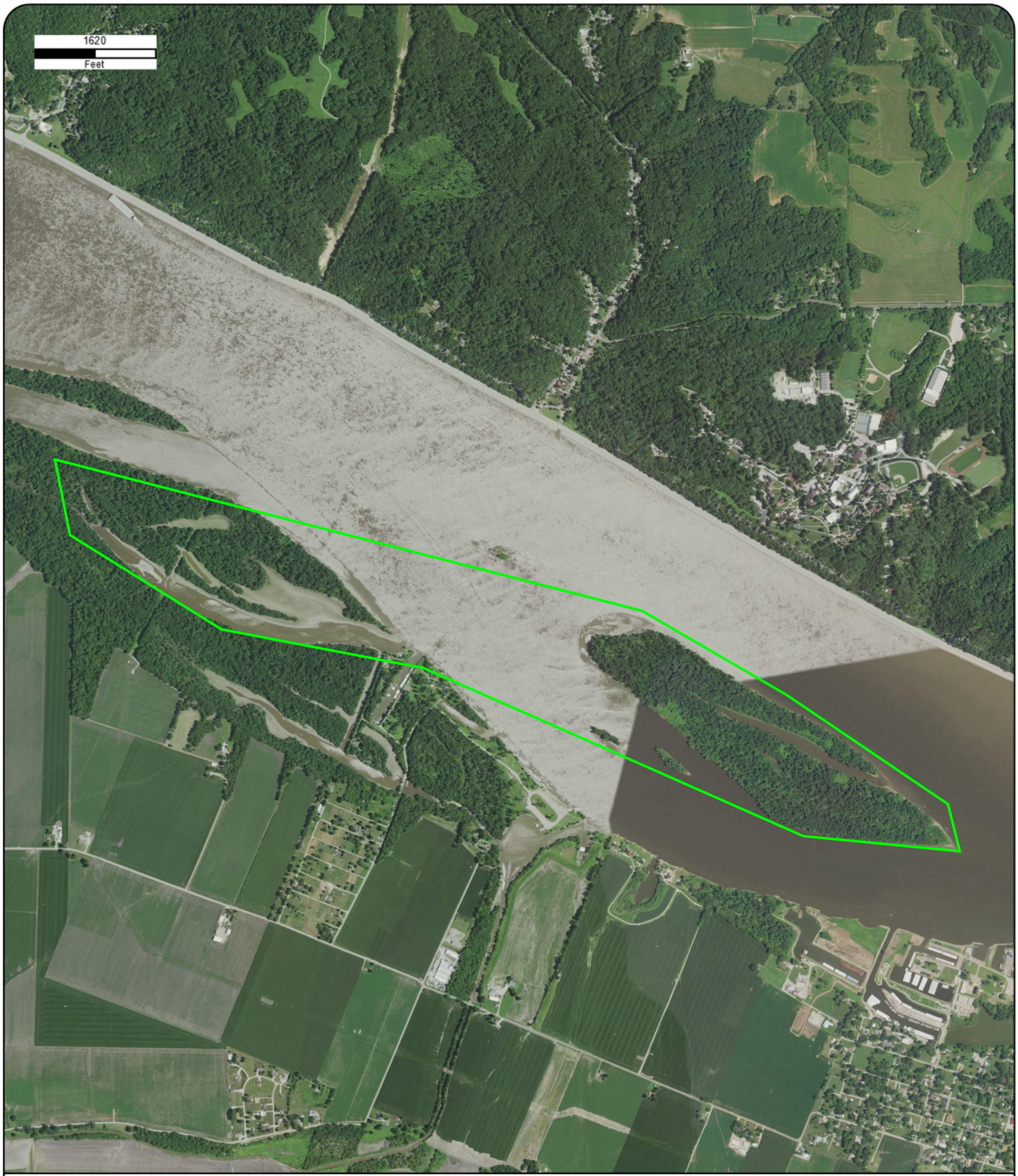


Year: 2022
Source: MAXAR
Scale: 1" = 1600'
Comment:

Address: n/a, Portage Des Sioux, MO
Approx Center: -90.36496062,38.94267315

Order No: 23042100139

ERIS

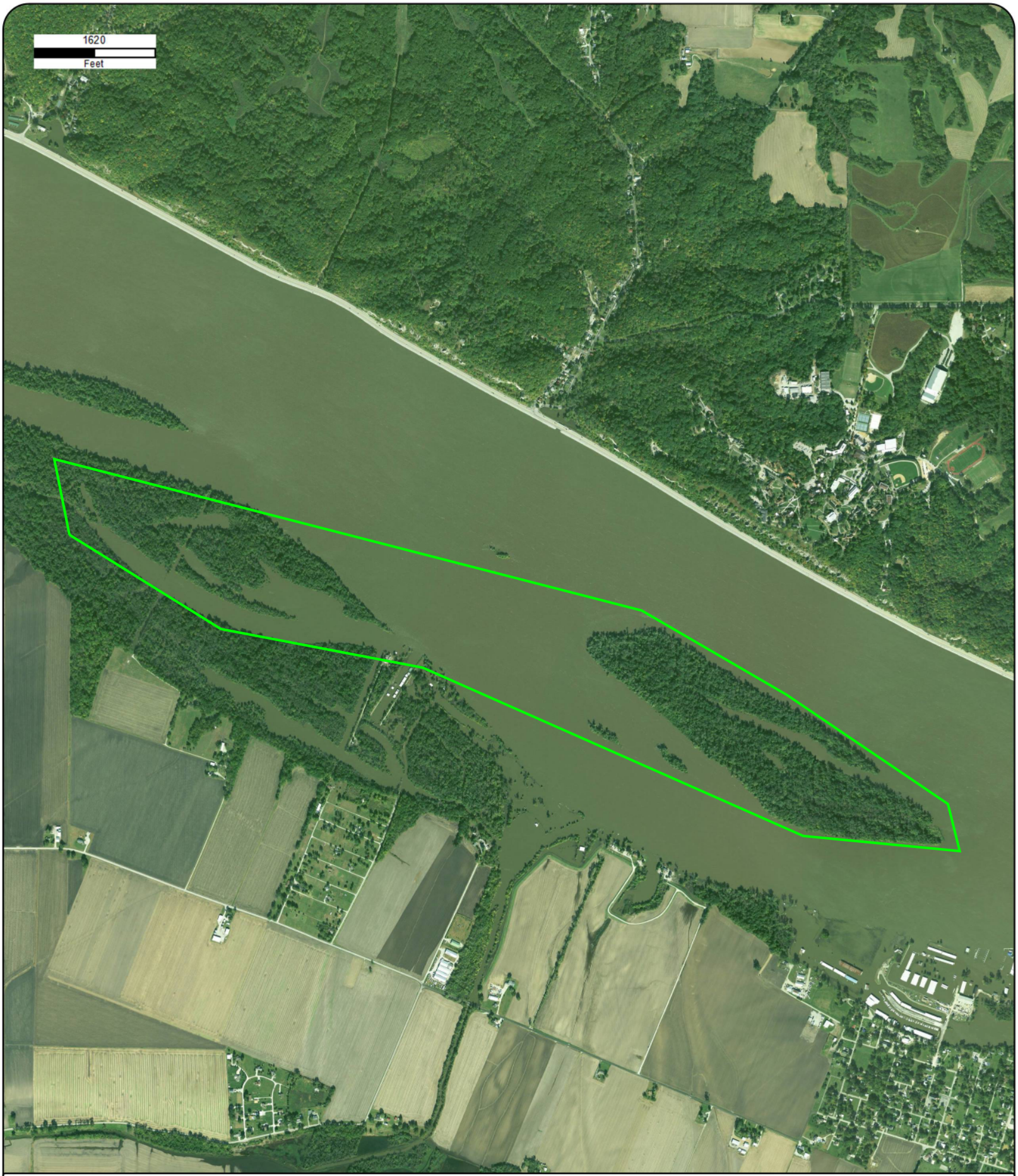


Year: 2020
Source: USDA
Scale: 1" = 1600'
Comment:

Address: n/a, Portage Des Sioux, MO
Approx Center: -90.36496062,38.94267315

Order No: 23042100139

ERIS

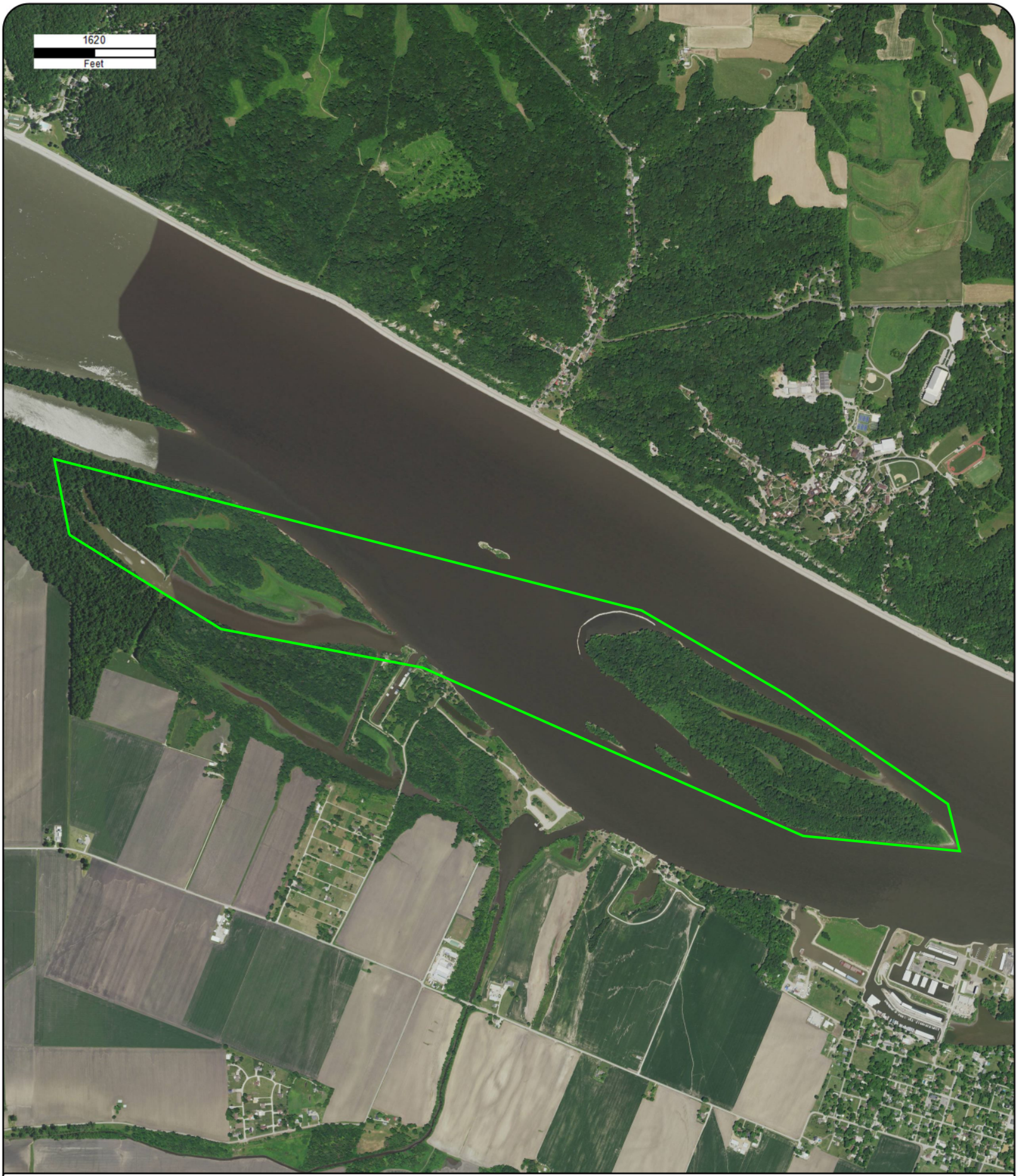


Year: 2018
Source: USDA
Scale: 1" = 1600'
Comment:

Address: n/a, Portage Des Sioux, MO
Approx Center: -90.36496062,38.94267315

Order No: 23042100139

ERIS

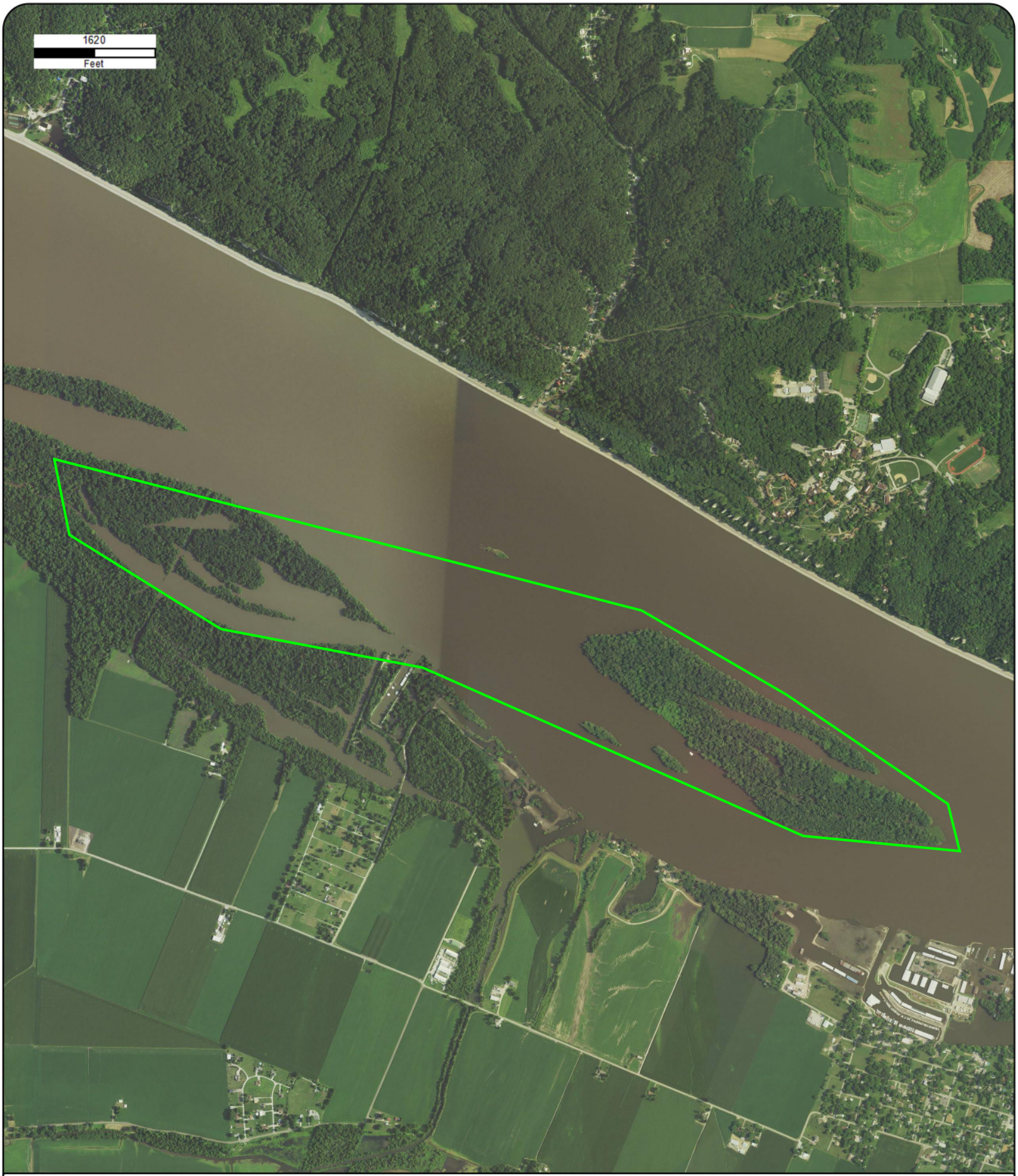


Year: 2016
Source: USDA
Scale: 1" = 1600'
Comment:

Address: n/a, Portage Des Sioux, MO
Approx Center: -90.36496062,38.94267315

Order No: 23042100139

ERIS

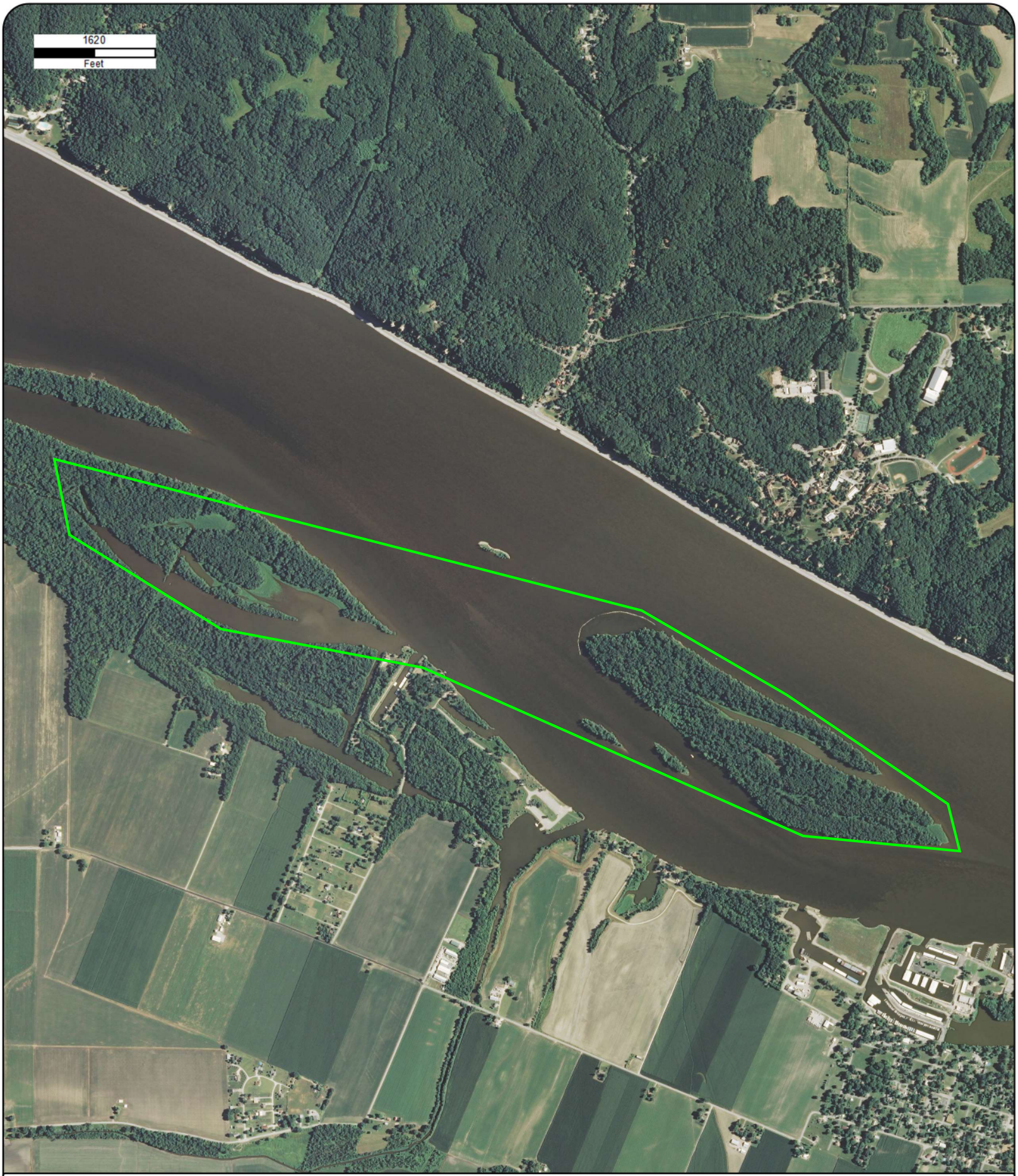


Year: 2014
Source: USDA
Scale: 1" = 1600'
Comment:

Address: n/a, Portage Des Sioux, MO
Approx Center: -90.36496062,38.94267315

Order No: 23042100139

ERIS

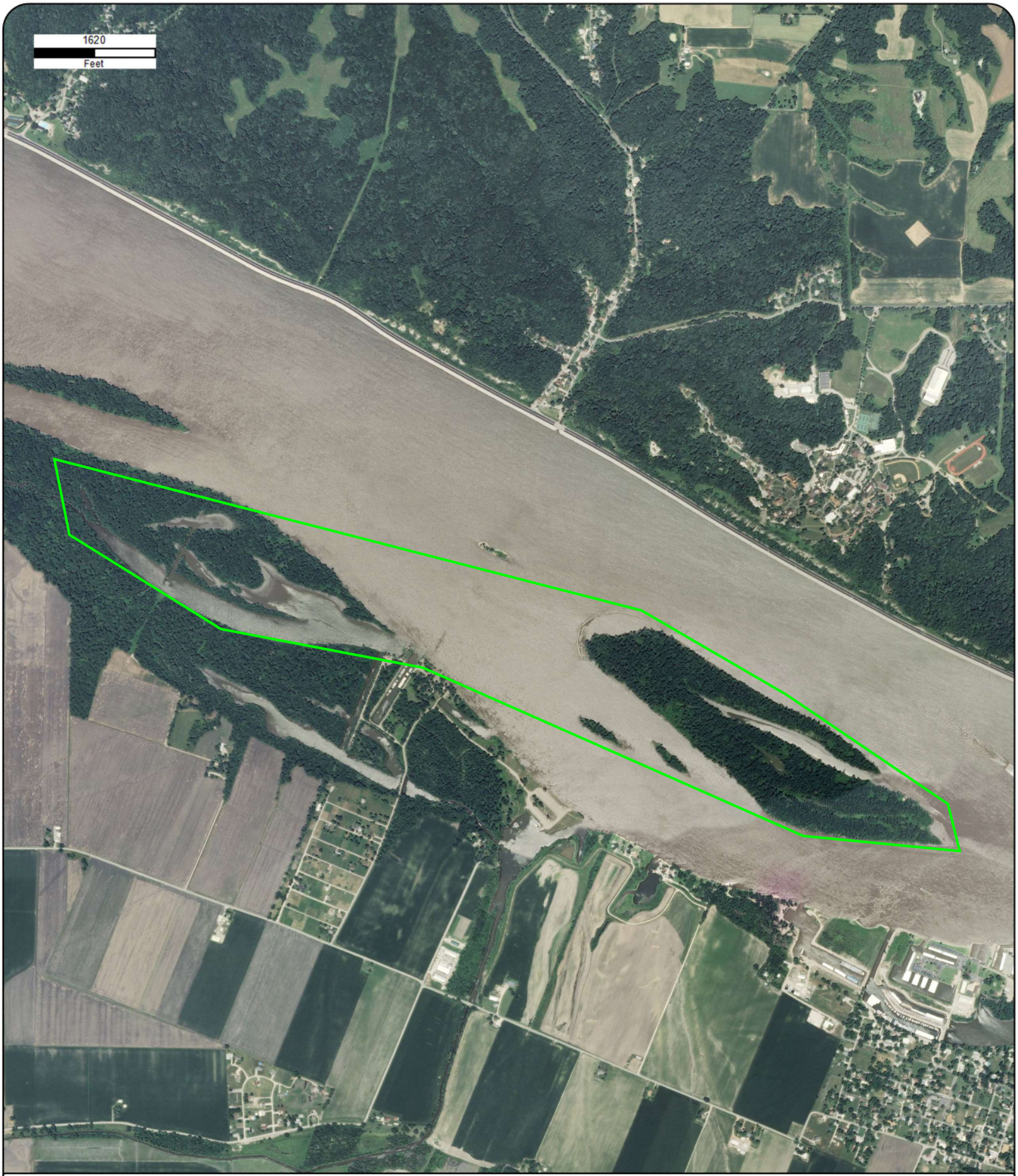


Year: 2012
Source: USDA
Scale: 1" = 1600'
Comment:

Address: n/a, Portage Des Sioux, MO
Approx Center: -90.36496062,38.94267315

Order No: 23042100139

ERIS

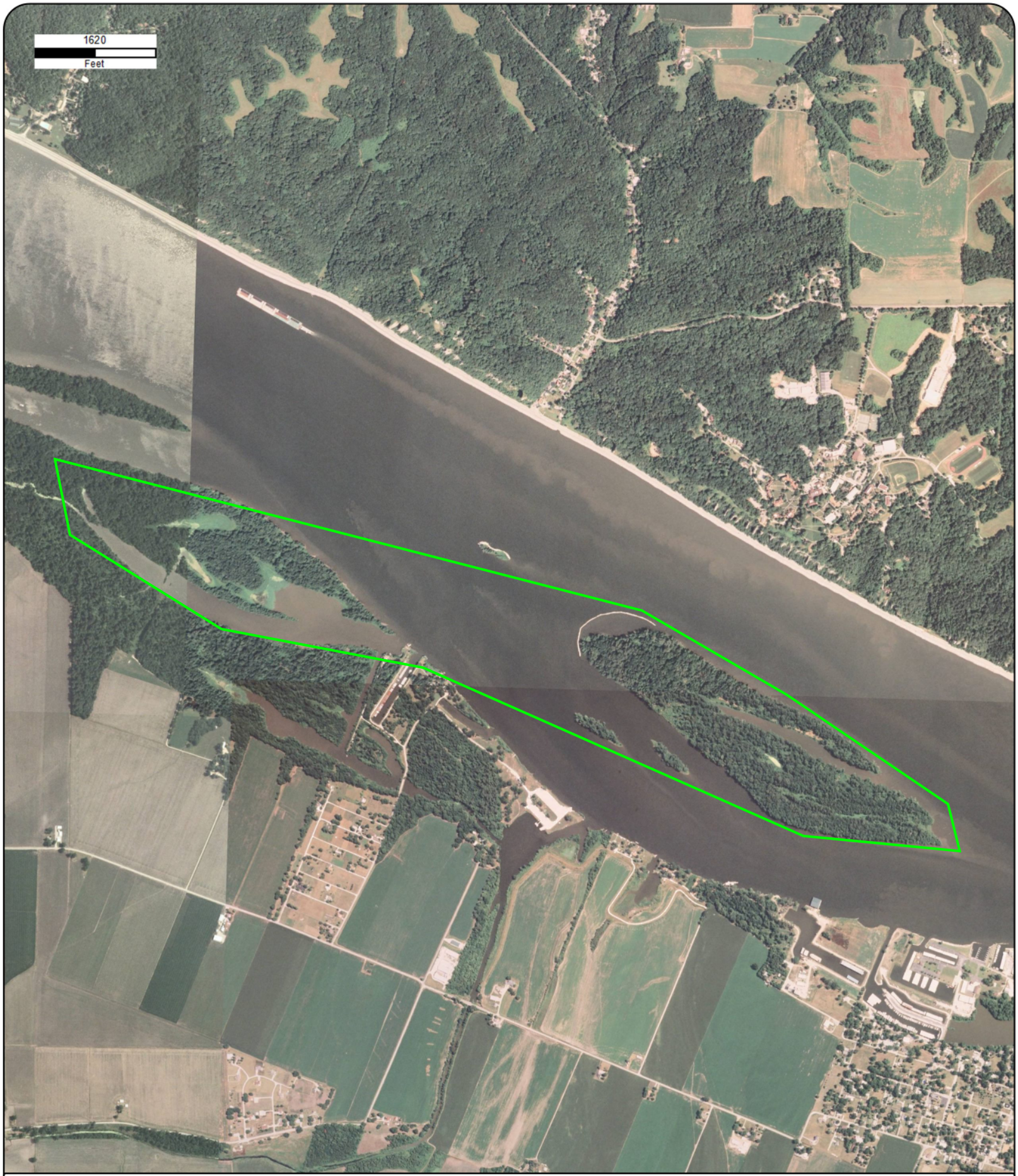


Year: 2009
Source: USDA
Scale: 1" = 1600'
Comment:

Address: n/a, Portage Des Sioux, MO
Approx Center: -90.36496062,38.94267315

Order No: 23042100139

ERIS

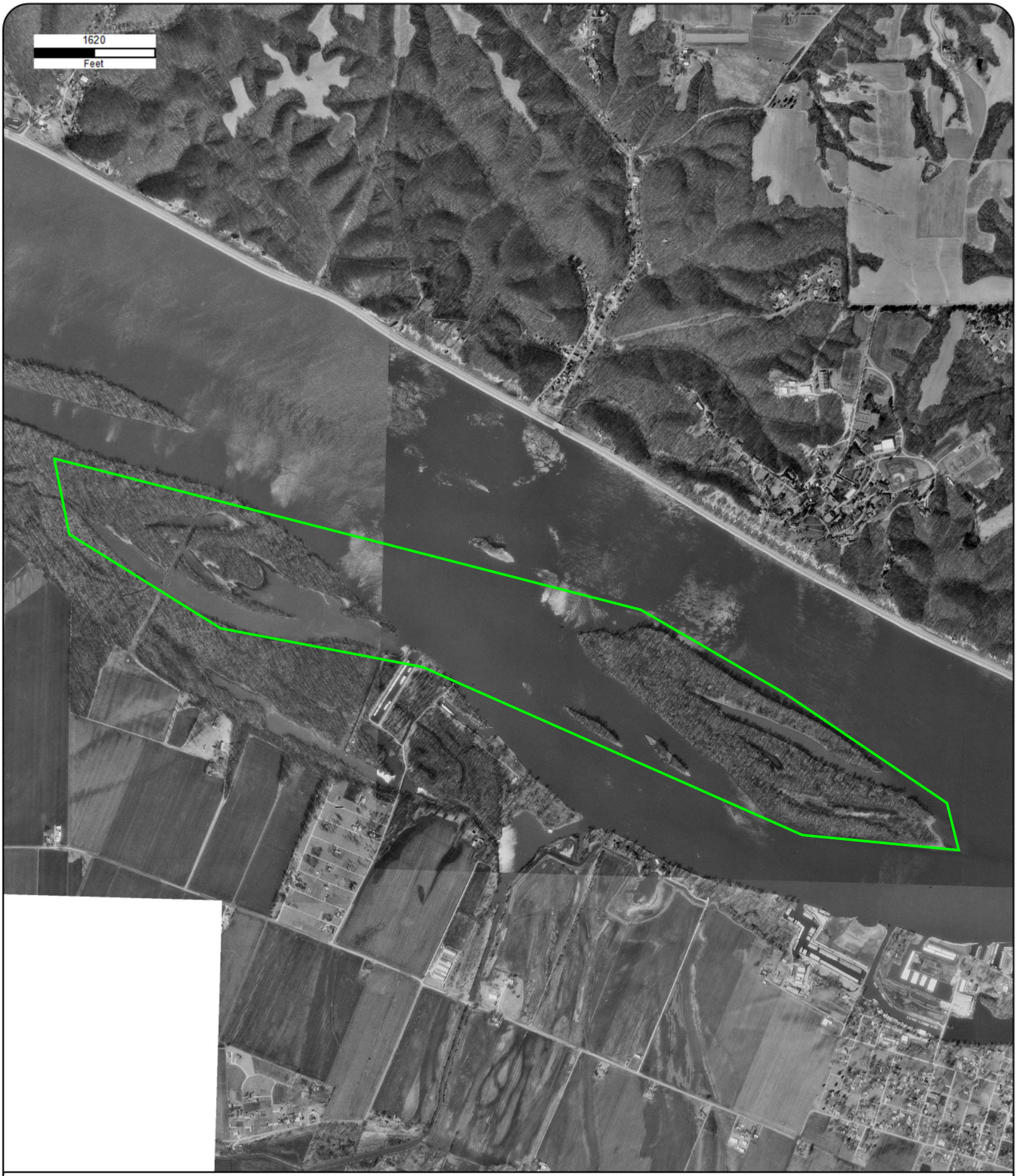


Year: 2006
Source: USDA
Scale: 1" = 1600'
Comment:

Address: n/a, Portage Des Sioux, MO
Approx Center: -90.36496062,38.94267315

Order No: 23042100139

ERIS



Year: 1996
Source: USGS
Scale: 1" = 1600'
Comment:

Address: n/a, Portage Des Sioux, MO
Approx Center: -90.36496062,38.94267315

Order No: 23042100139

ERIS



Year: 1985
Source: USGS
Scale: 1" = 1600'
Comment:

Address: n/a, Portage Des Sioux, MO
Approx Center: -90.36496062,38.94267315

Order No: 23042100139

ERIS



Year: 1974
Source: USGS
Scale: 1" = 1600'
Comment:

Address: n/a, Portage Des Sioux, MO
Approx Center: -90.36496062,38.94267315

Order No: 23042100139

ERIS

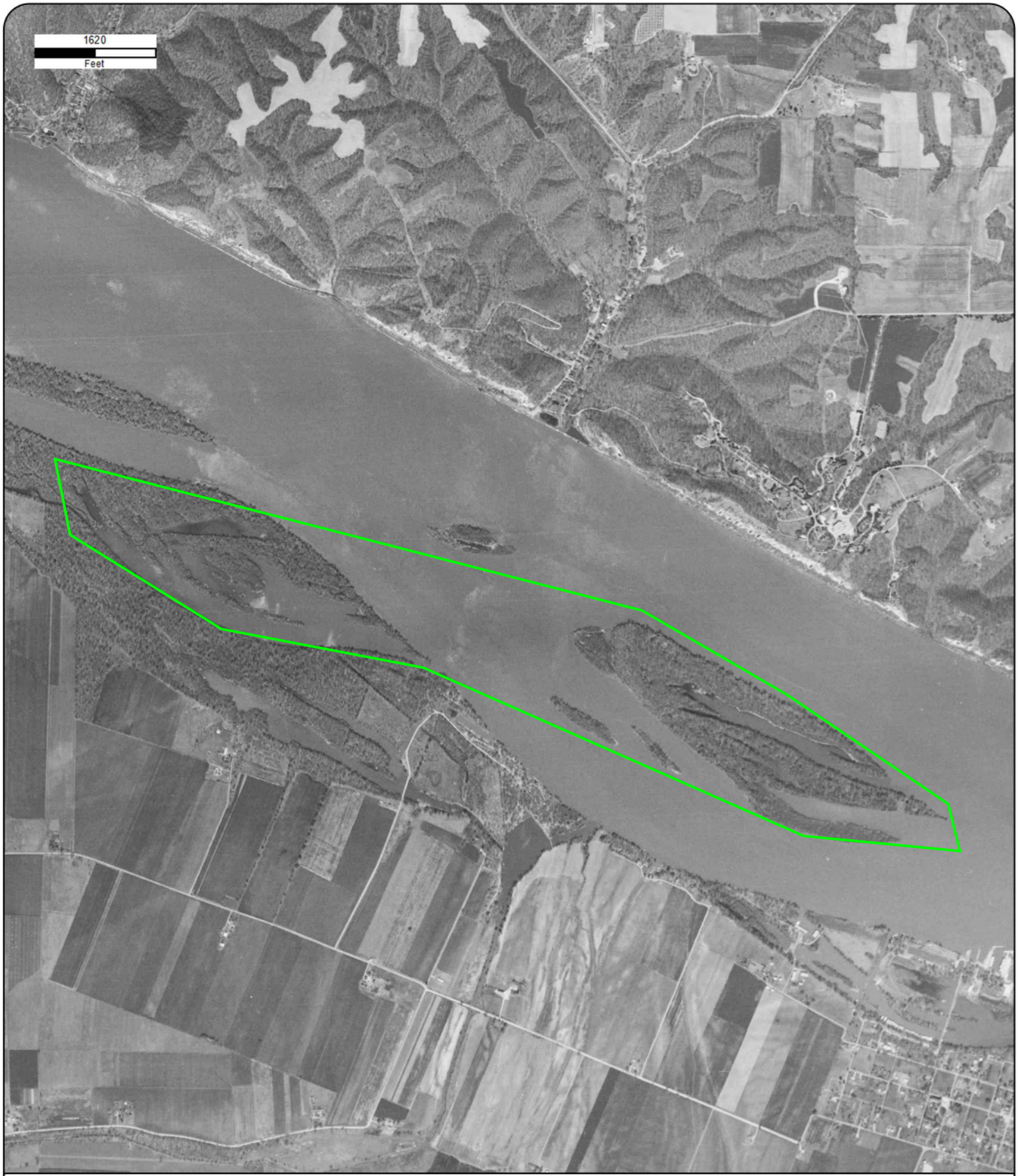


Year: 1968
Source: USGS
Scale: 1" = 1600'
Comment:

Address: n/a, Portage Des Sioux, MO
Approx Center: -90.36496062,38.94267315

Order No: 23042100139

ERIS

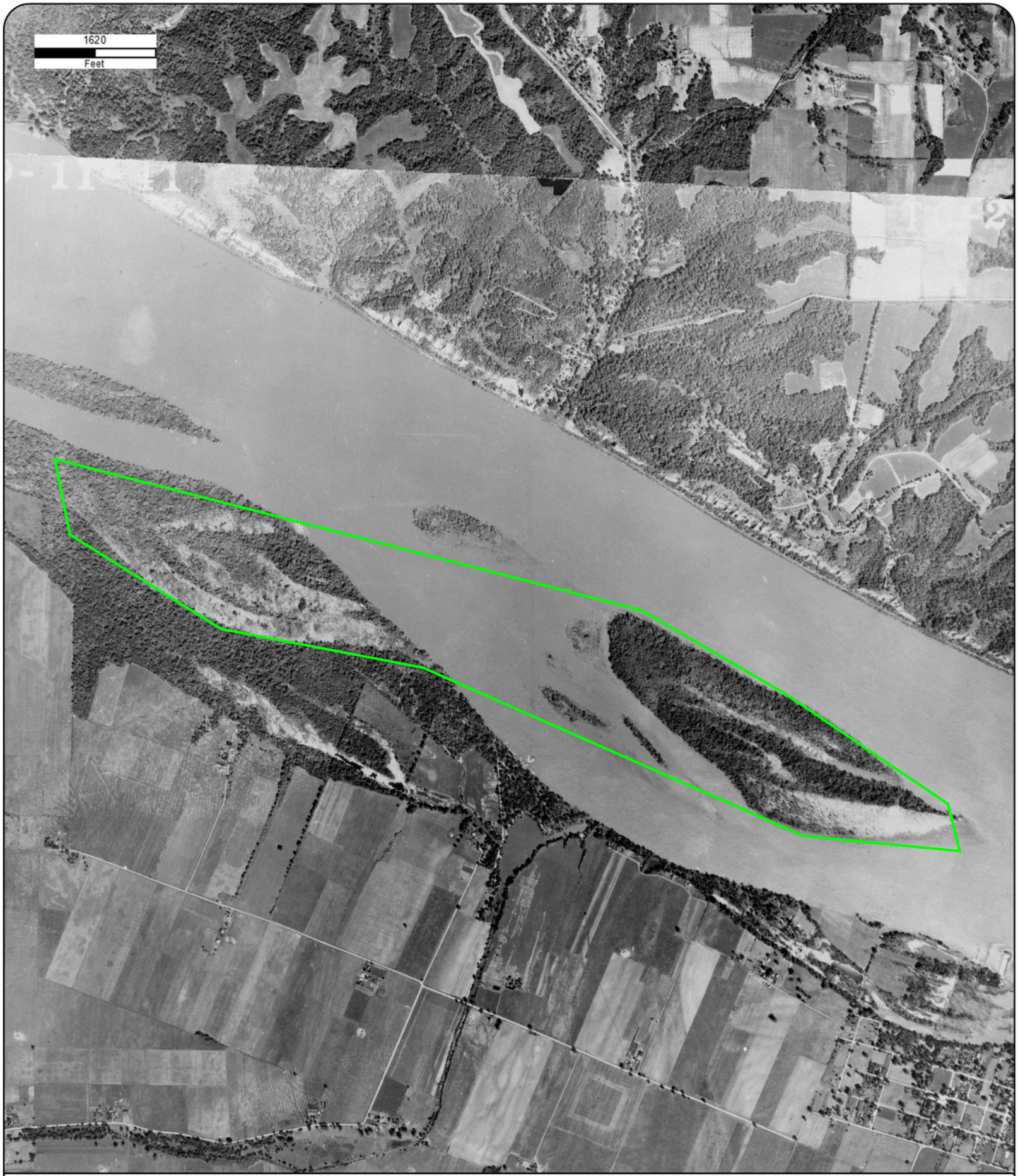


Year: 1956
Source: AMS
Scale: 1" = 1600'
Comment:

Address: n/a, Portage Des Sioux, MO
Approx Center: -90.36496062,38.94267315

Order No: 23042100139

ERIS



Year: 1941
Source: ASCS
Scale: 1" = 1600'
Comment:

Address: n/a, Portage Des Sioux, MO
Approx Center: -90.36496062,38.94267315

Order No: 23042100139

ERIS

TOPOGRAPHIC MAPS

Project Property:	West Alton Phase I n/a Portage Des Sioux MO None
Project No:	None
Requested By:	US Army Corps of Engineers
Order No:	23042100139
Date Completed:	April 24, 2023

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We have searched USGS collections of current topographic maps and historical topographic maps for the project property. Below is a list of maps found for the project property and adjacent area. Maps are from 7.5 and 15 minute topographic map series, if available.

Year	Map Series
2021	7.5
2015	7.5
1995	7.5
1979	7.5
1974	7.5
1968	7.5
1954	7.5
1954	15
1947	15
1946	15
1933	15

Topographic Map Symbology for the maps may be available in the following documents:
Pre-1947
Page 223 of 1918 Topographic Instructions
Page 130 of 1928 Topographic Instructions
1947-2009
Topographic Map Symbols
2009-present
US Topo Map Symbols

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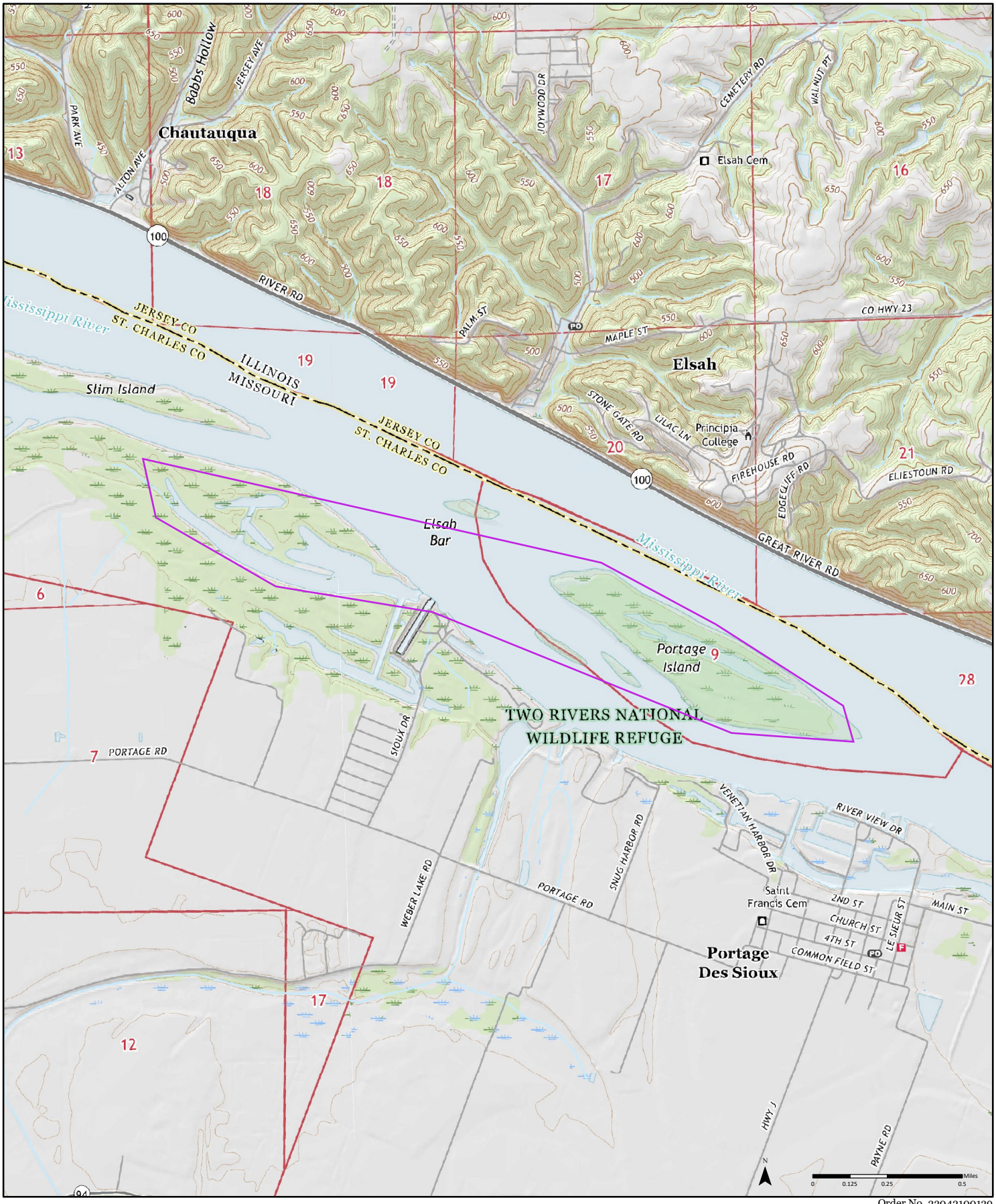


Order No. 23042100139

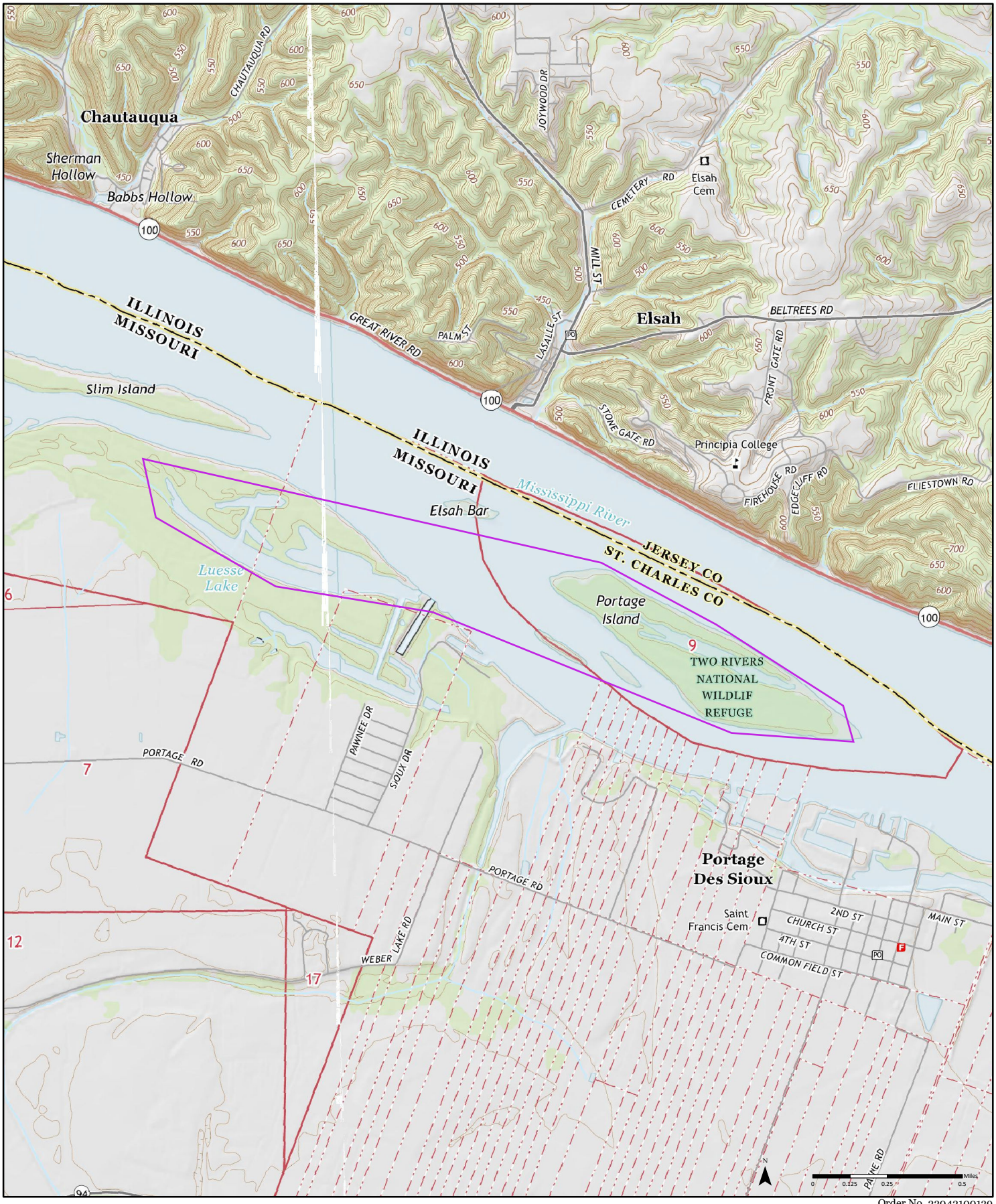
2021



Available Quadrangle(s): Grafton, IL
Elsah, IL

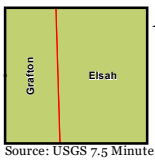
Source: USGS 7.5 Minute Topographic Map

ERIS



Order No. 23042100139

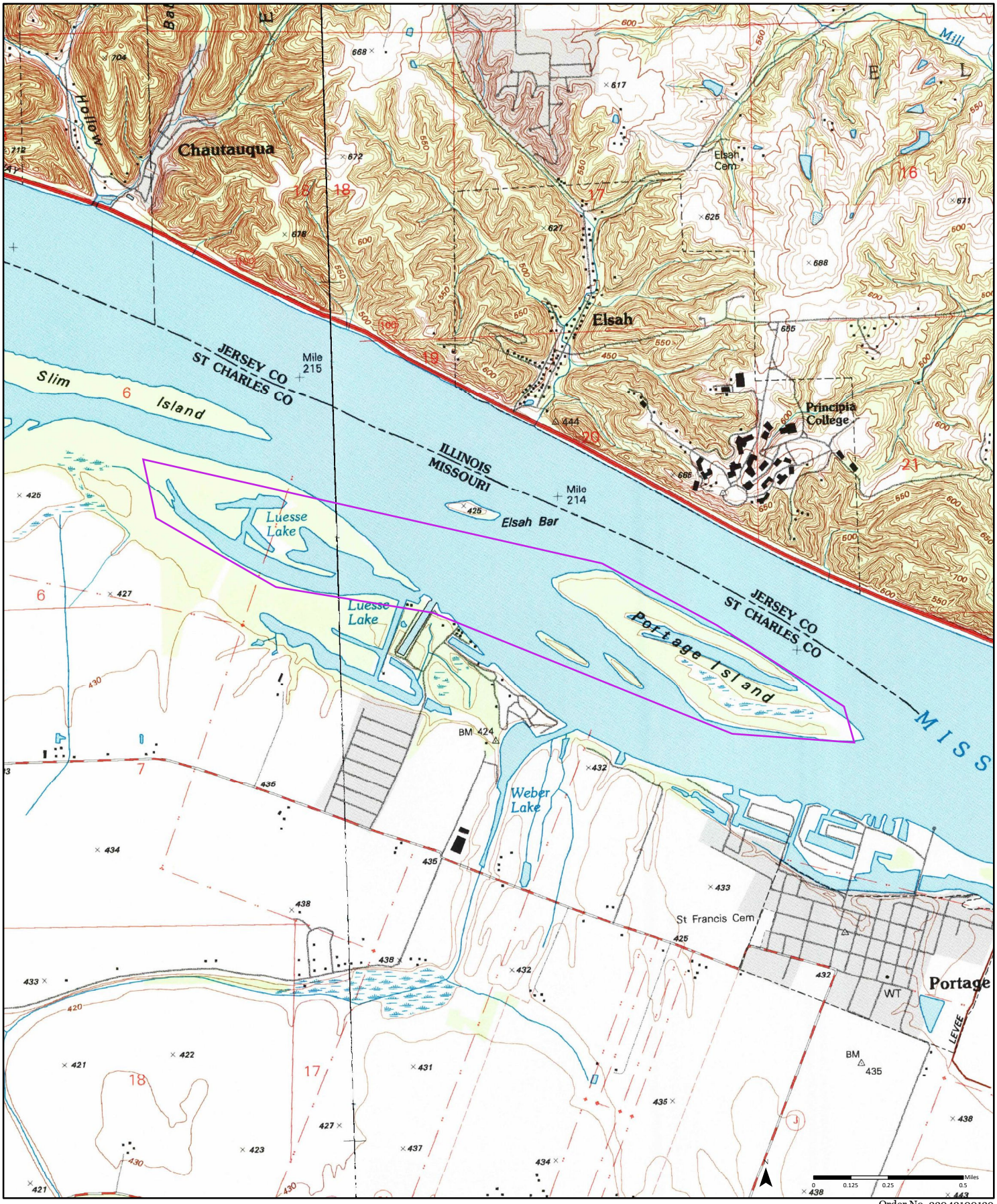
2015



Available Quadrangle(s): Grafton, IL
Elsah, IL

Source: USGS 7.5 Minute Topographic Map

ERIS

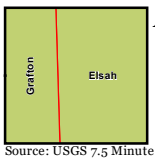


1995

(1-1995) *Aerial Photo Year: 1991*

(2-1995) *Aerial Photo Year: 1990*

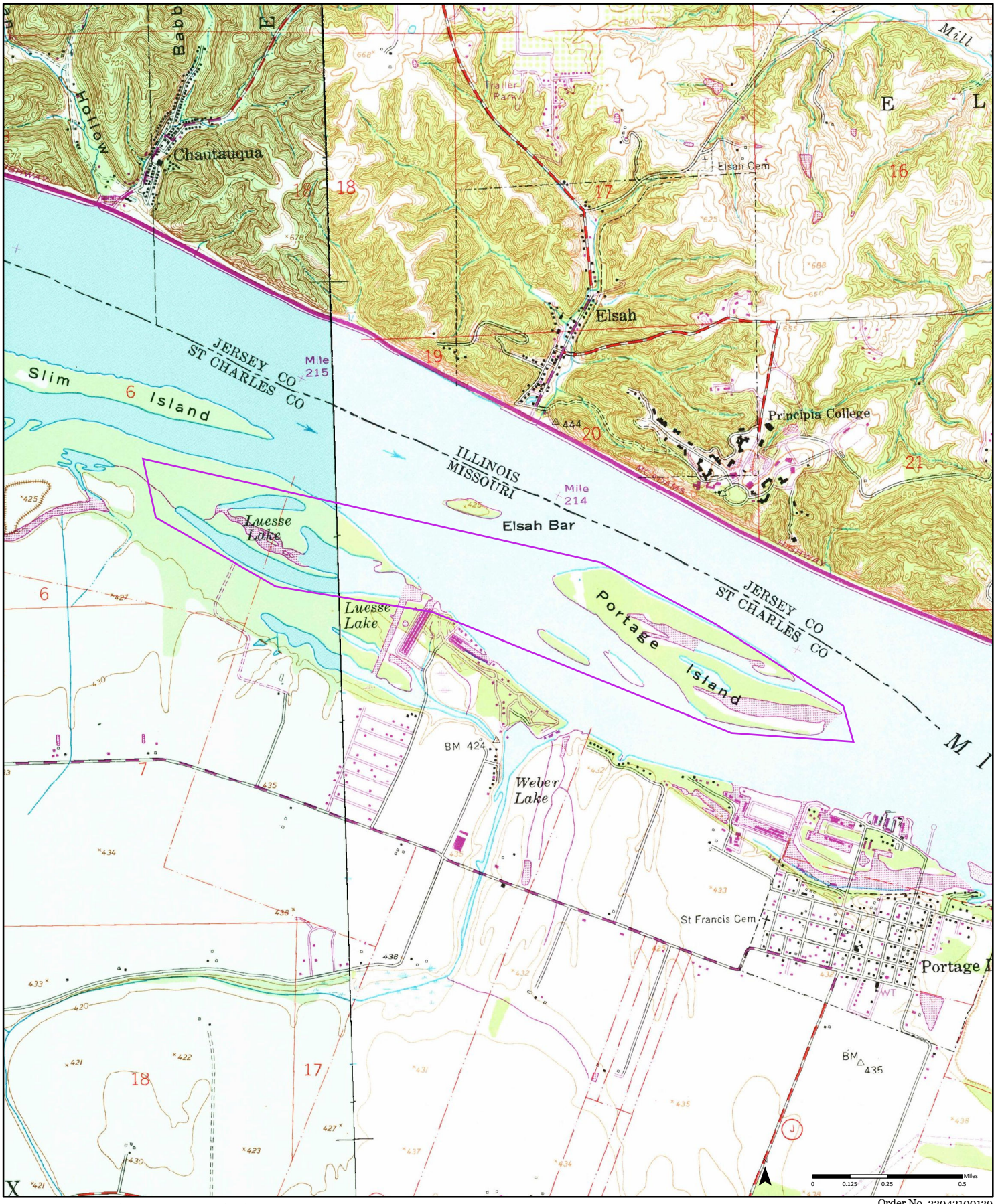
Order No. 23042100139



Available Quadrangle(s): Elsah, IL(1-1995)
Grafton, IL(2-1995)

Source: USGS 7.5 Minute Topographic Map

ERIS



1979

(1-1974) *Aerial Photo Year: 1974* *Photo Revision Year: 1974*

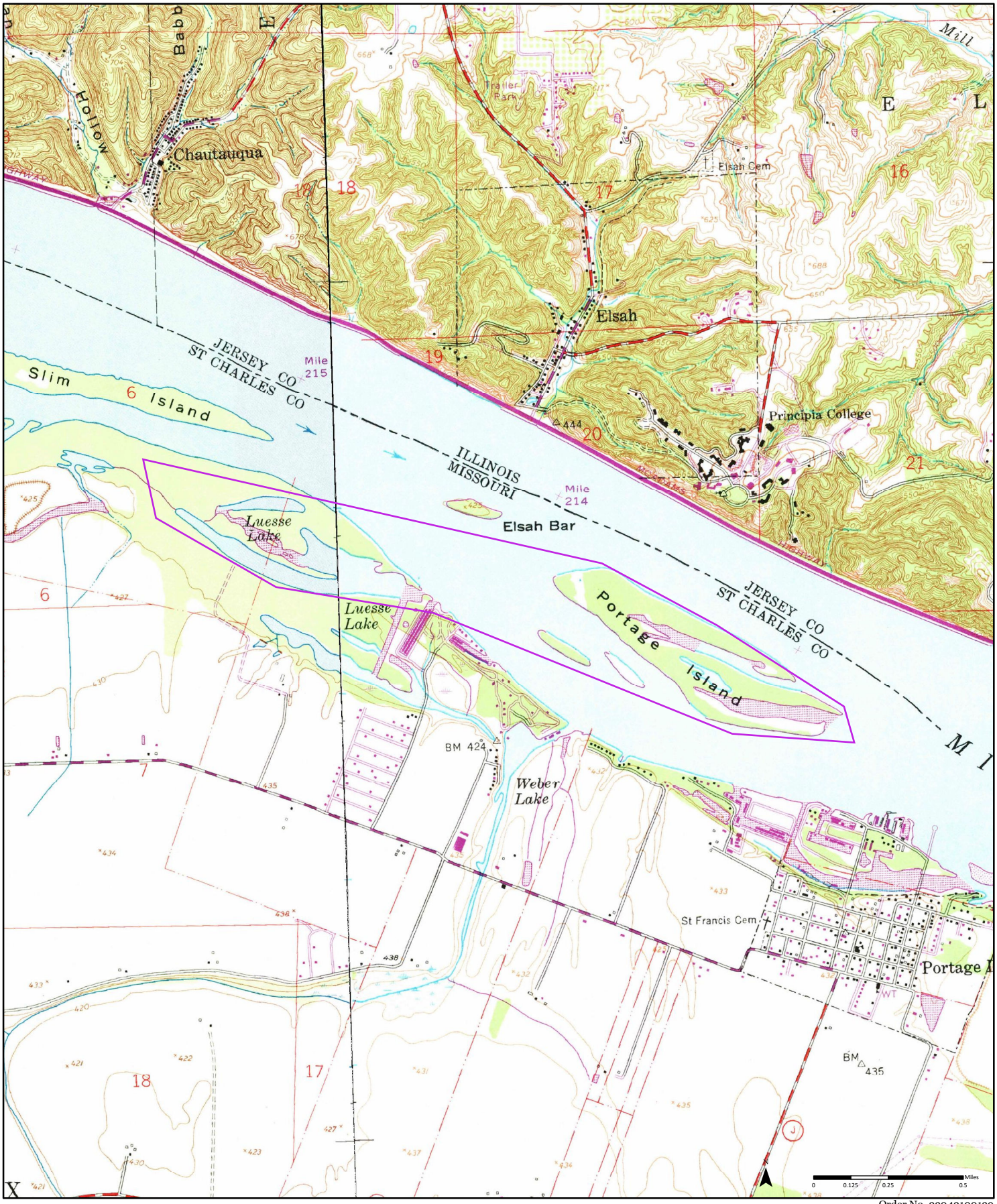
(2-1979) *Aerial Photo Year: 1974* *Photo Revision Year: 1974*

Order No. 23042100139



Available Quadrangle(s): Elsah, IL(1-1974)
Grafton, MO(2-1979)

Source: USGS 7.5 Minute Topographic Map

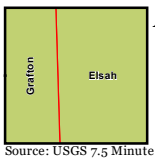


1974

(1-1974) Aerial Photo Year: 1974
Photo Revision Year: 1974

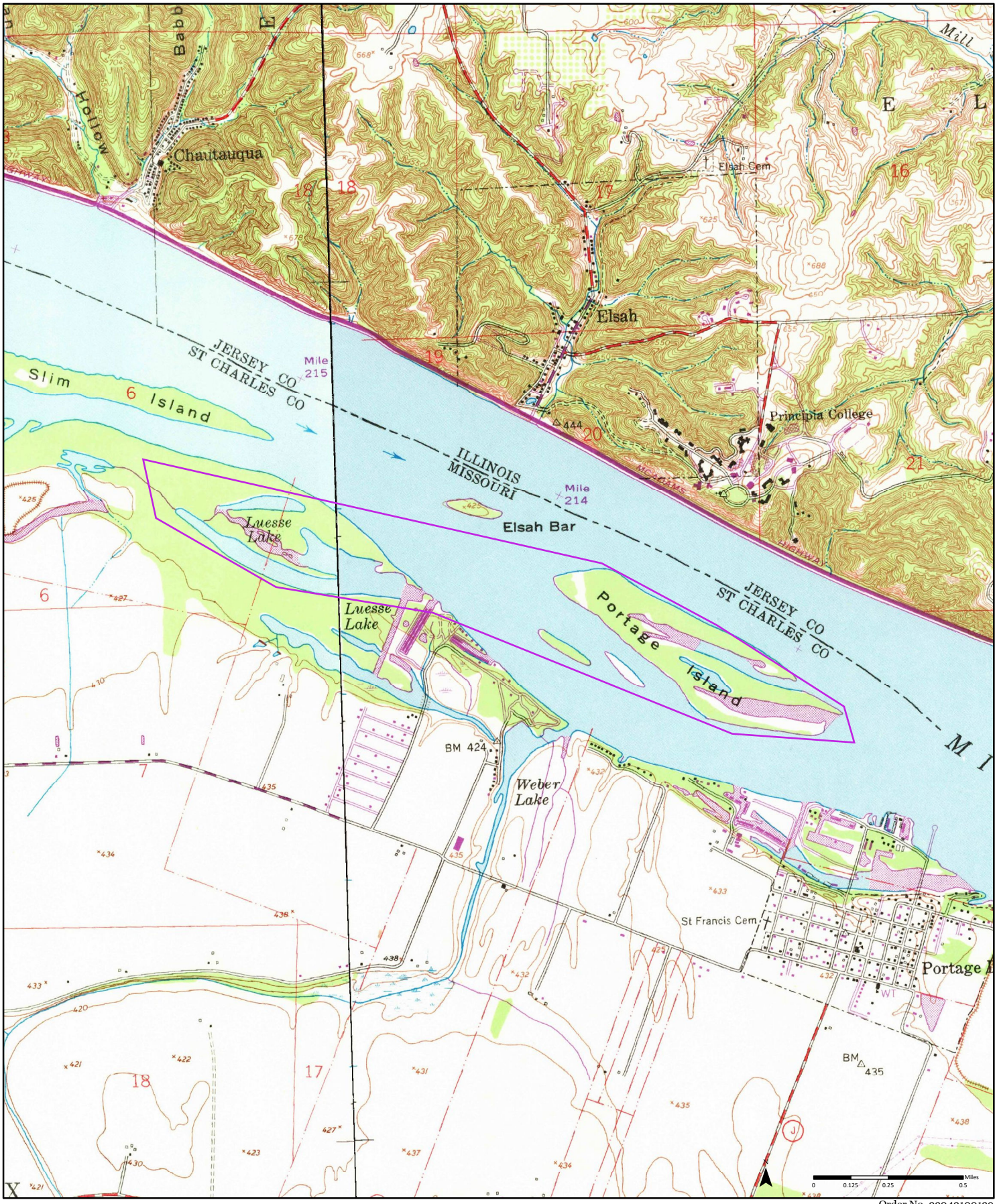
(2-1974) Aerial Photo Year: 1974
Photo Revision Year: 1974

Order No. 23042100139



Available Quadrangle(s): Elsah, IL(1-1974)
Grafton, MO(2-1974)

Source: USGS 7.5 Minute Topographic Map



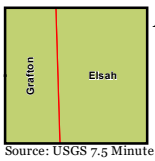
1968

(1-1968)
Aerial Photo Year: 1968
Photo Revision Year: 1968

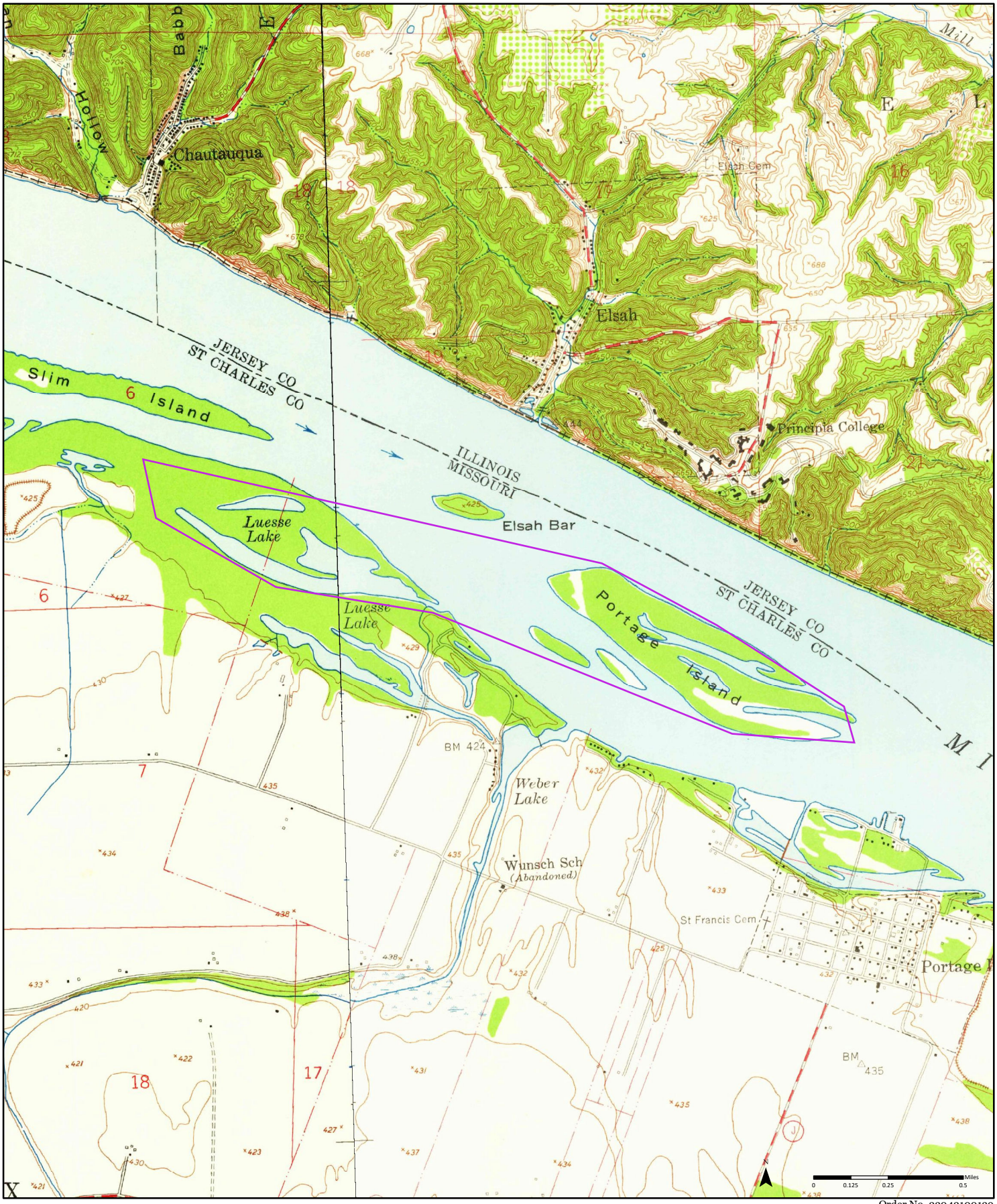
(2-1968)
Aerial Photo Year: 1968
Photo Revision Year: 1968

Order No. 23042100139

Available Quadrangle(s): Elsah, IL(1-1968)
Grafton, MO(2-1968)



Source: USGS 7.5 Minute Topographic Map



1954

(1-1954) *Aerial Photo Year: 1952*

(2-1954) *Aerial Photo Year: 1952*

Order No. 23042100139



Available Quadrangle(s): Grafton, MO(1-1954)
Elsah, IL(2-1954)

Source: USGS 7.5 Minute Topographic Map



1954 (1-1954)

Aerial Photo Year: 1952

Order No. 23042100139

Available Quadrangle(s): St Charles, MO(1-1954)



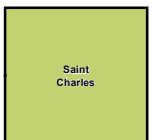
Source: USGS 15 Minute Topographic Map



Order No. 23042100139

1947

Available Quadrangle(s): St Charles, MO



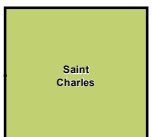
Source: USGS 15 Minute Topographic Map



1946

Order No. 23042100139

Available Quadrangle(s): St Charles, MO



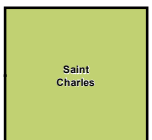
Source: USGS 15 Minute Topographic Map



Order No. 23042100139

1933

Available Quadrangle(s): Saint Charles, MO



Source: USGS 15 Minute Topographic Map

SUPPLEMENTARY MATERIALS B: PHOTO DOCUMENTATION FROM SITE VISIT


Luesse Lake: Site Reconnaissance
• Wetland Enhancement Area
• Tree Clearing Area
• Dredge Cut Area
204
203



West Alton Lake: Fill site and dredge cut features.



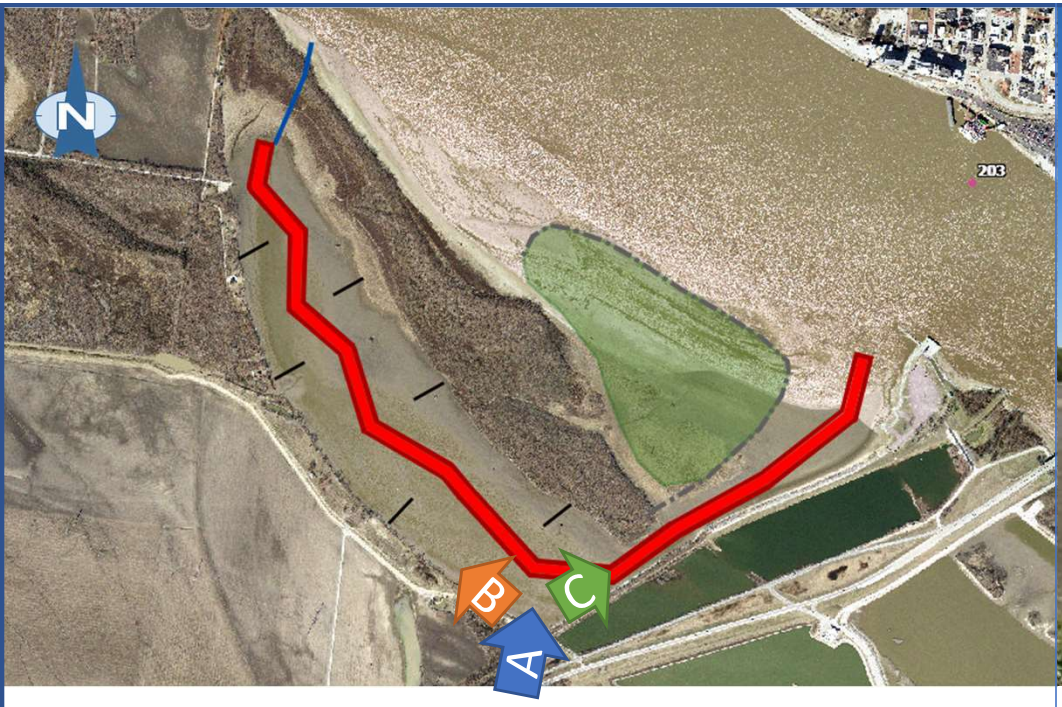
Mud flats designated for becoming an upland fill site. Photo taken on 04/21/23.



Mud flats designated for becoming an upland fill site facing northwest. Photo taken on 04/21/2023.



A duck hunting blind on the mud flats designated for becoming an upland fill site. Photo taken on 04/21/2023.



West Alton Lake: Fill site and dredge cut features.



Southern end of the dredge cut facing north with a view of a duck blind. Photo taken on 04/21/23.



Southern end of the dredge cut facing northwest. Photo taken on 04/21/2023.



Southern end of the dredge cut facing northeast. Photo taken on 04/21/2023.



West Alton Lake: Fill site and dredge cut features.



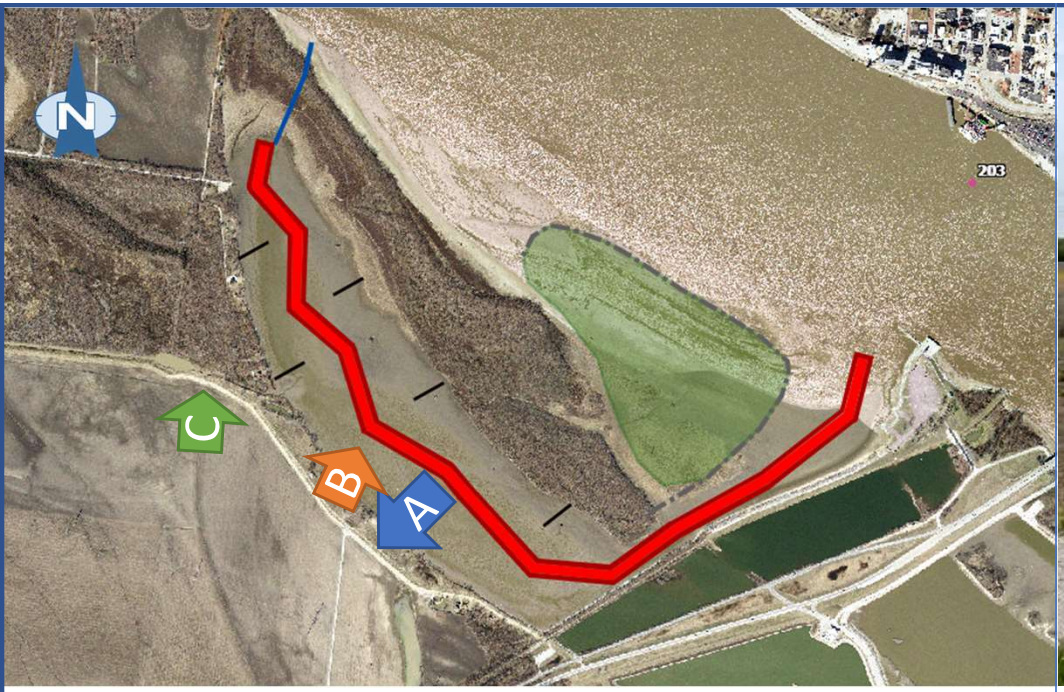
Southwestern end of the dredge cut facing northwest with a view of the levee and a duck blind. Photo taken on 04/21/23.



Southwestern end of the dredge cut with a view of concrete pilings from an old dock. Photo taken on 04/21/2023.



A drainage pipe from an agricultural adjoining property flowing to the dredge cut area. Photo taken on 04/21/2023.



West Alton Lake: Fill site and dredge cut features.



A drainage pipe from an agricultural adjoining property flowing to the dredge cut area. Photo taken on 04/21/2023.



Southwestern end of the dredge cut with a view of a tank in the sediment. Photo taken on 04/21/2023.



A drainage pipe from an agricultural adjoining property flowing to the subject property. Photo taken on 04/21/2023.



West Alton Lake: Fill site and dredge cut features.



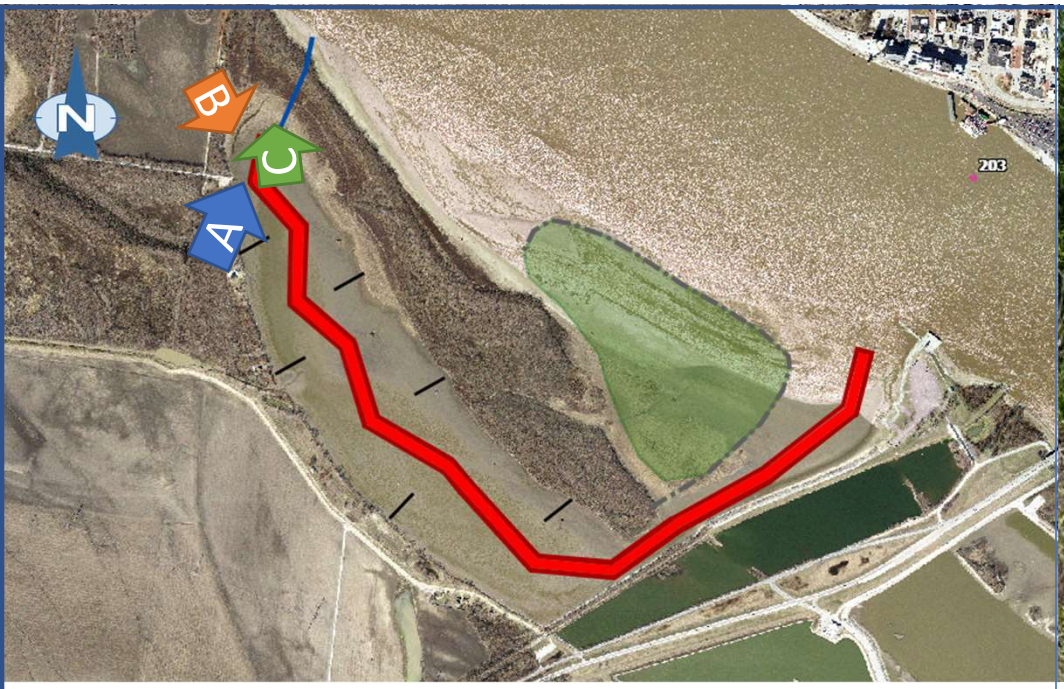
A drainage creek on the site property flowing into the dredge cut area. Photo taken on 04/21/2023.



Northwestern end of the dredge cut area. Photo taken on 04/21/2023.



Northwestern end of the dredge cut area. Photo taken on 04/21/2023.



West Alton Lake: Fill site and dredge cut features.



Northwestern end of the dredge cut. Photo taken on 04/21/2023.



North end of the dredge cut area facing south. Photo taken on 04/21/2023.



North end of the dredge cut area facing north. Photo taken on 04/21/2023.



West Alton Lake: Fill site and dredge cut features.



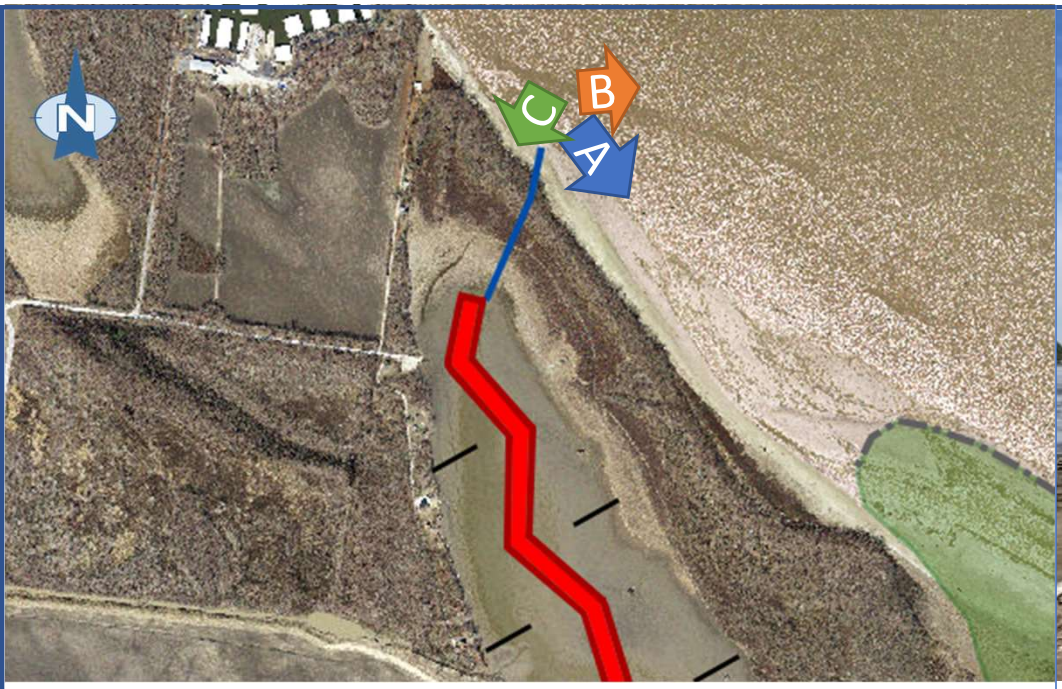
North end of the designated cut area facing south. Photo taken on 04/21/2023.



North end of the designated cut area facing north. Photo taken on 04/21/2023.



North end of the designated cut area facing northwest. Photo taken on 04/21/2023.



West Alton Lake: Fill site and dredge cut features.



North end of the designated cut area facing southeast. Photo taken on 04/21/2023.



North end of the designated cut area facing east. Photo taken on 04/21/2023.



Two 55-gallon drums found on the north end of the designated cut area. Photo taken on 04/21/2023.





West Alton MO

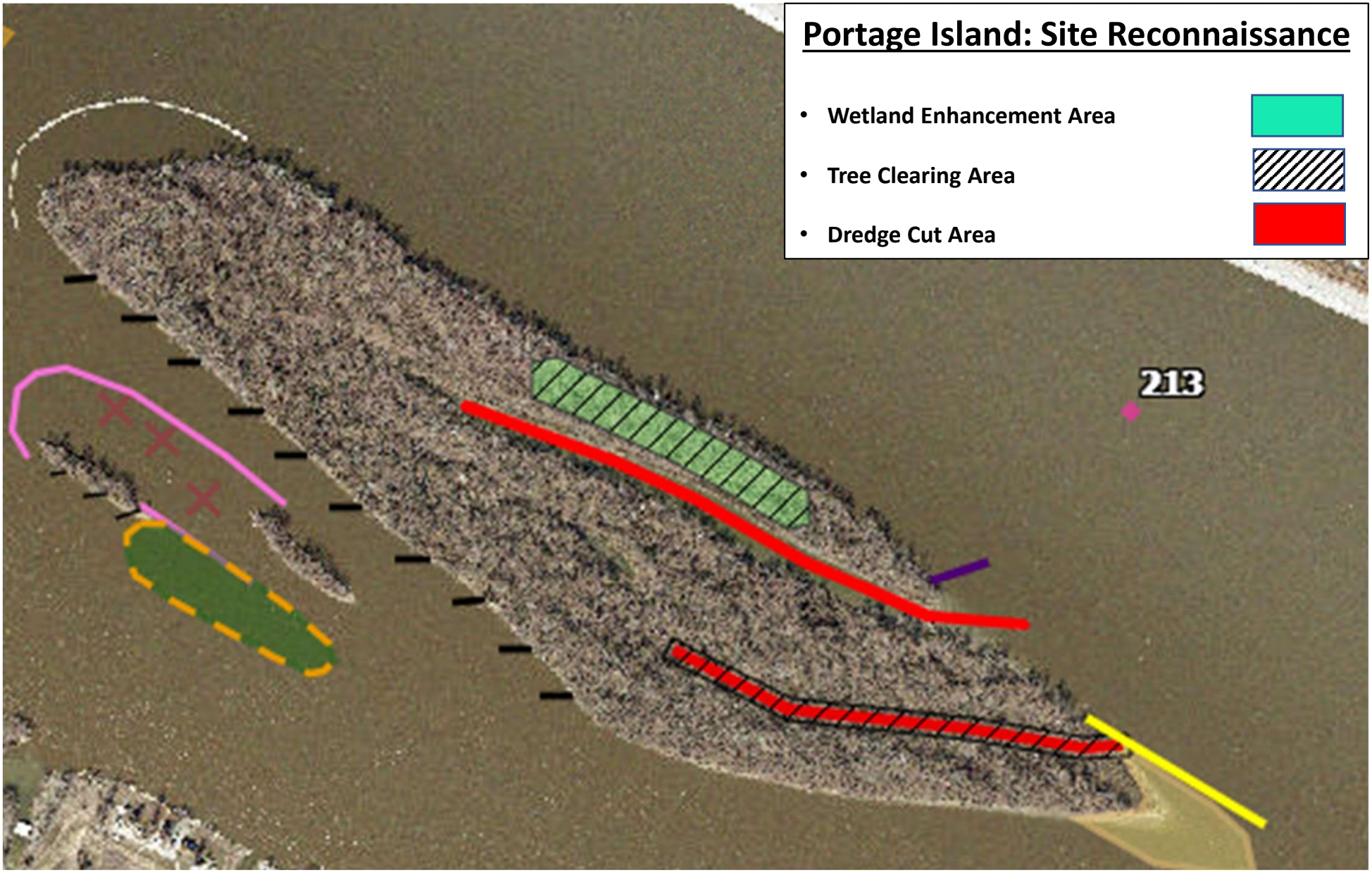
74°E (T) **LAT:** 38.880728 **LON:** -90.207761 ±13ft ▲ 414ft

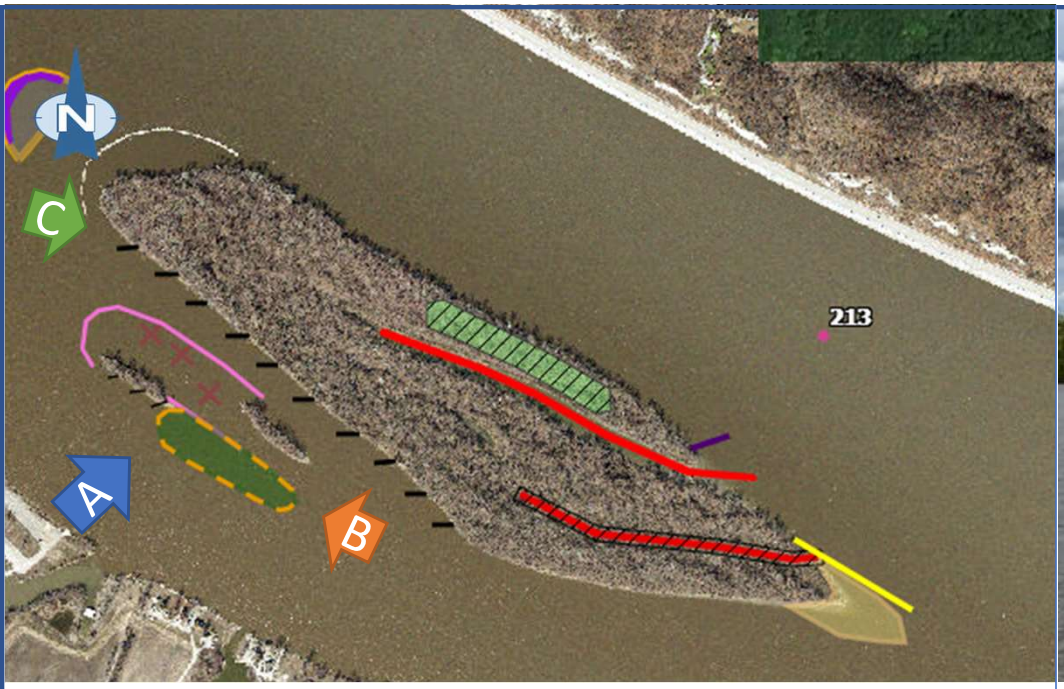


West Alton MO

125°SE (T) **LAT:** 38.880750 **LON:** -90.207719 ±13ft ▲ 412ft




Portage Island: Site Reconnaissance
• Wetland Enhancement Area
• Tree Clearing Area
• Dredge Cut Area
213



Portage Island: Fill site and dredge cut features.



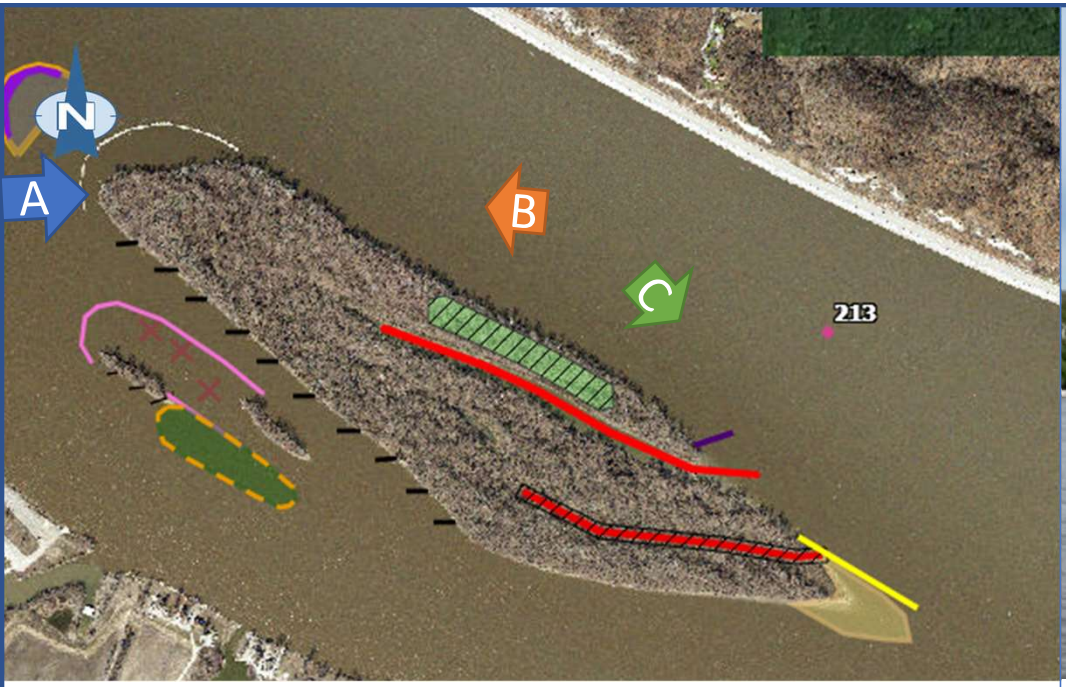
Southern boarder of Portage Island. Photo taken on 04/21/2023.



Islands south of Portage Island designated as a fill site. Photo taken on 04/21/2023.



North end of the island facing south. Photo taken on 04/21/2023.



Portage Island: Fill site and dredge cut features.



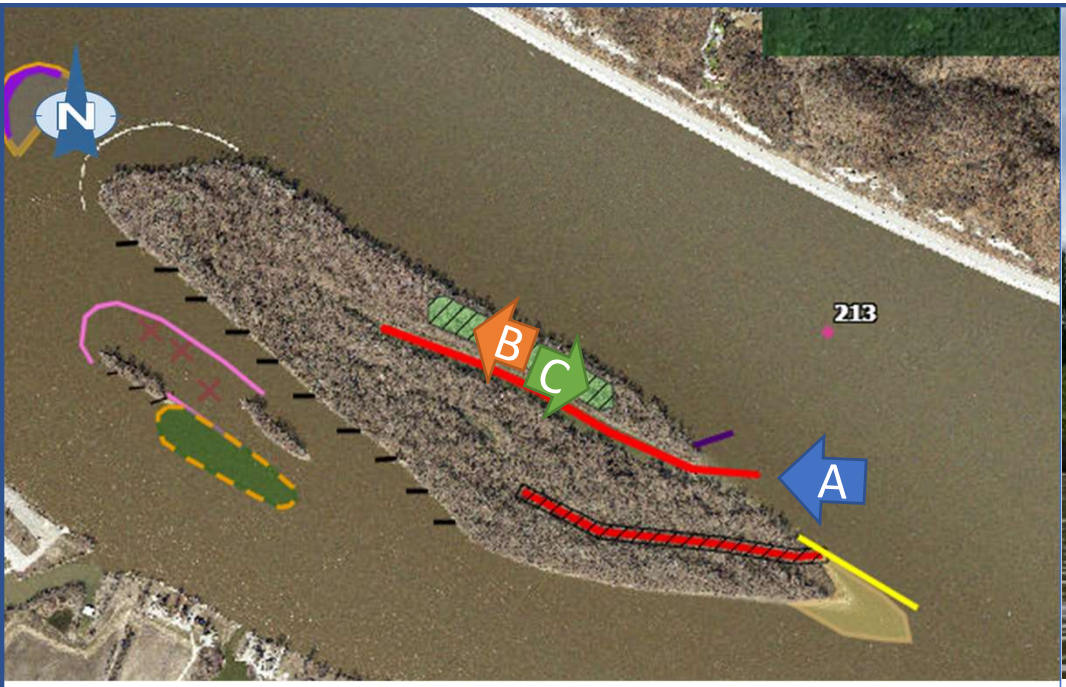
North end of the island with debris from fallen trees. Photo taken on 04/21/2023.



The north side of the island facing northwest. Photo taken on 04/21/2023.



The north side of the island facing southeast. Photo taken on 04/21/2023.



Portage Island: Fill site and dredge cut features.



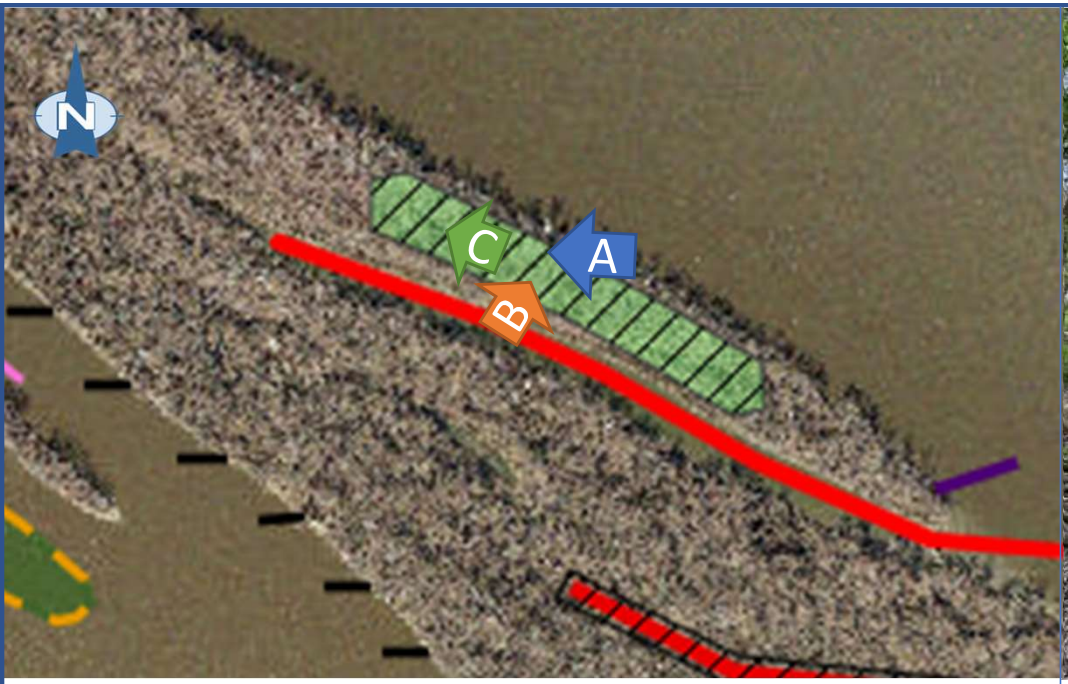
Mouth of the designated dredge cut area. Photo taken on 04/21/2023.



Forest designated for becoming an upland fill site facing southeast. Photo taken on 04/21/2023.



Forest designated for becoming an upland fill site facing northwest. Photo taken on 04/21/2023.



Portage Island: Fill site and dredge cut features.



Forest designated for becoming an upland fill site with an empty 55 gallon drum. Photo taken on 04/21/2023.



Forest designated for becoming an upland fill site with an abandoned gas can. Photo taken on 04/21/2023.



Cleared forest designated for becoming an upland fill site facing northwest. Photo taken on 04/21/2023.



Portage Island: Fill site and dredge cut features.



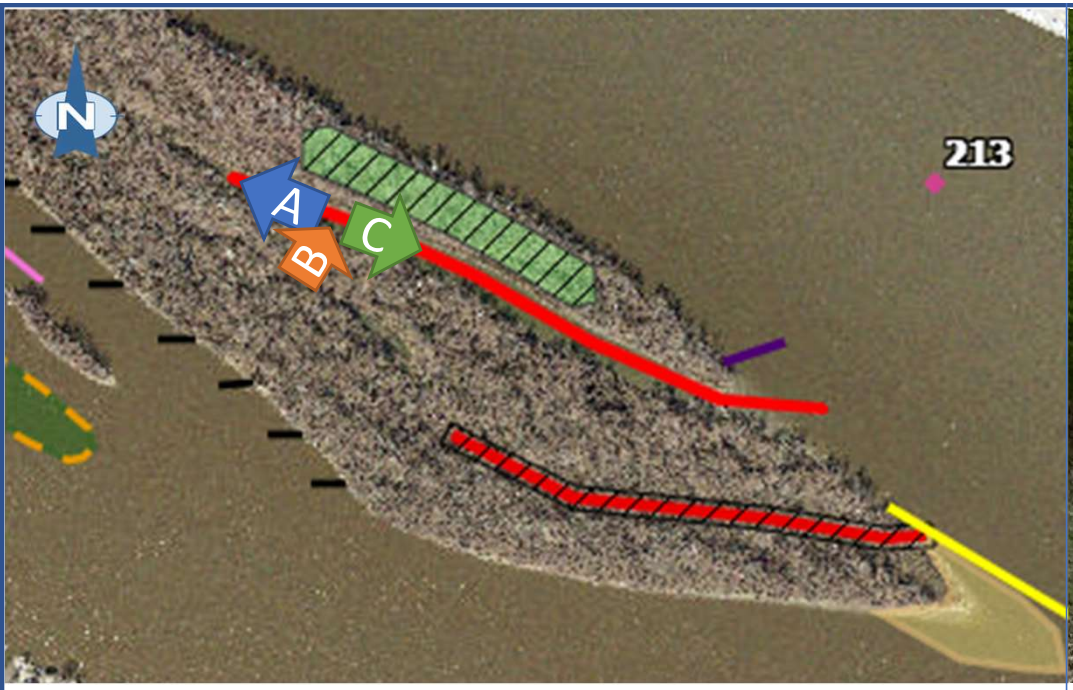
Cleared forest designated for becoming an upland fill site facing northwest. Photo taken on 04/21/2023.



Abandoned tank forest designated for becoming an upland fill site. Photo taken on 04/21/2023.



Northern most corner of the dredge cut area. Photo taken on 04/21/2023.



Portage Island: Fill site and dredge cut features.



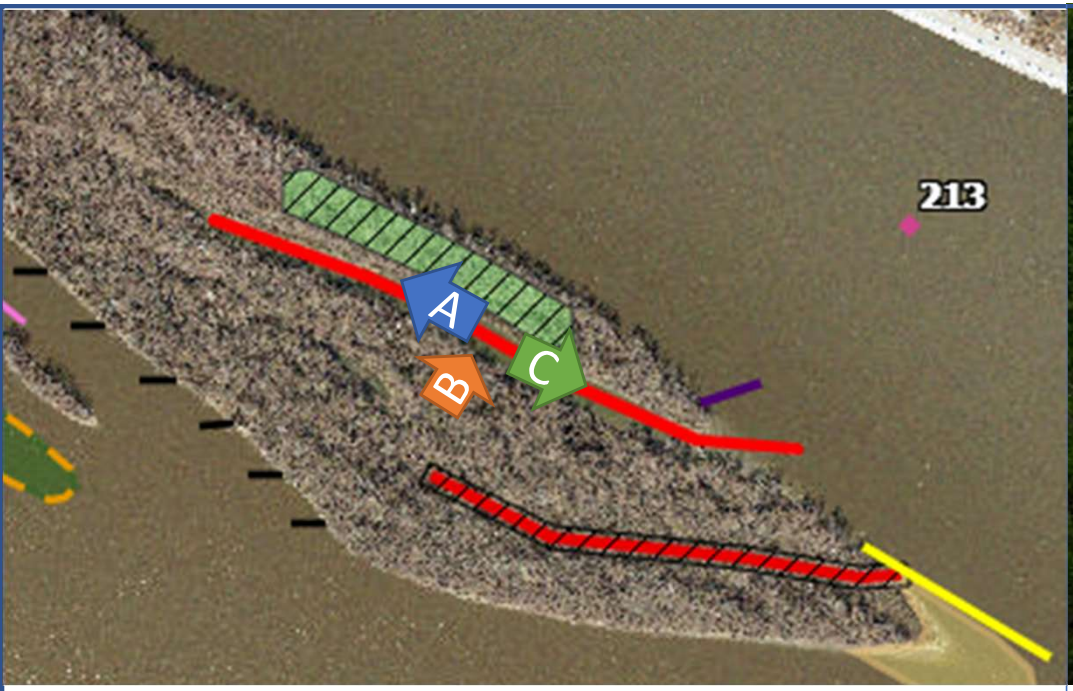
North end of the designated cut area facing northwest. Photo taken on 04/21/2023.



North end of the designated cut area facing north. Photo taken on 04/21/2023.



North end of the designated cut area facing southeast. Photo taken on 04/21/2023.



Portage Island: Fill site and dredge cut features.



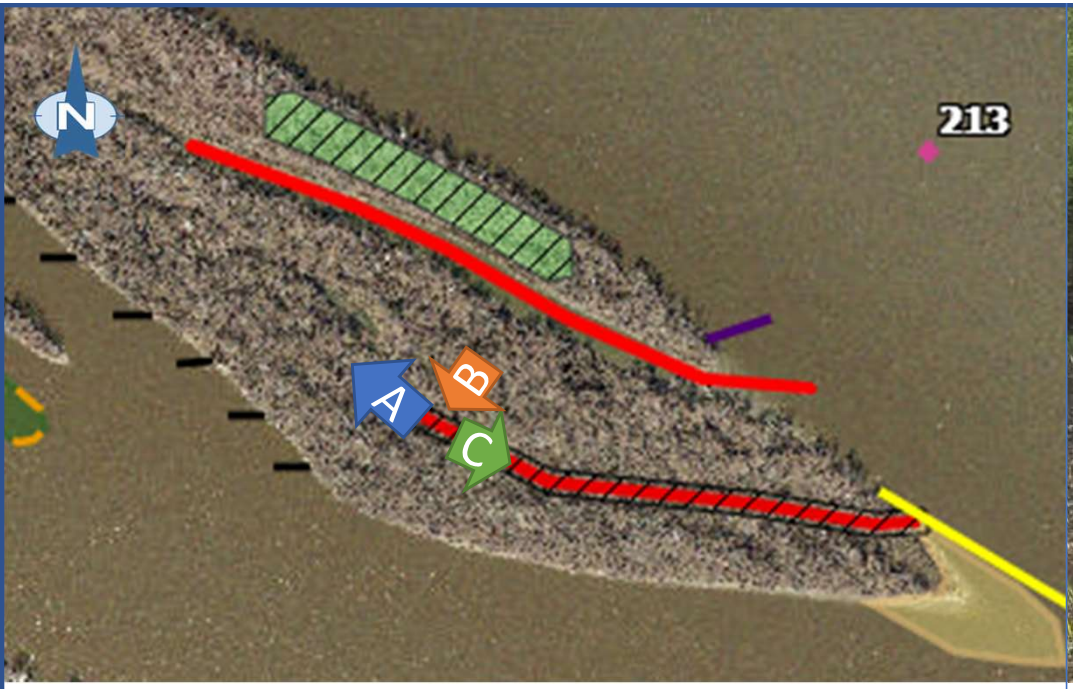
Middle of the designated cut area facing northwest. Photo taken on 04/21/2023.



Middle of the designated cut area facing north. Photo taken on 04/21/2023.



Middle of the designated cut area facing southeast. Photo taken on 04/21/2023.



Portage Island: Fill site and dredge cut features.



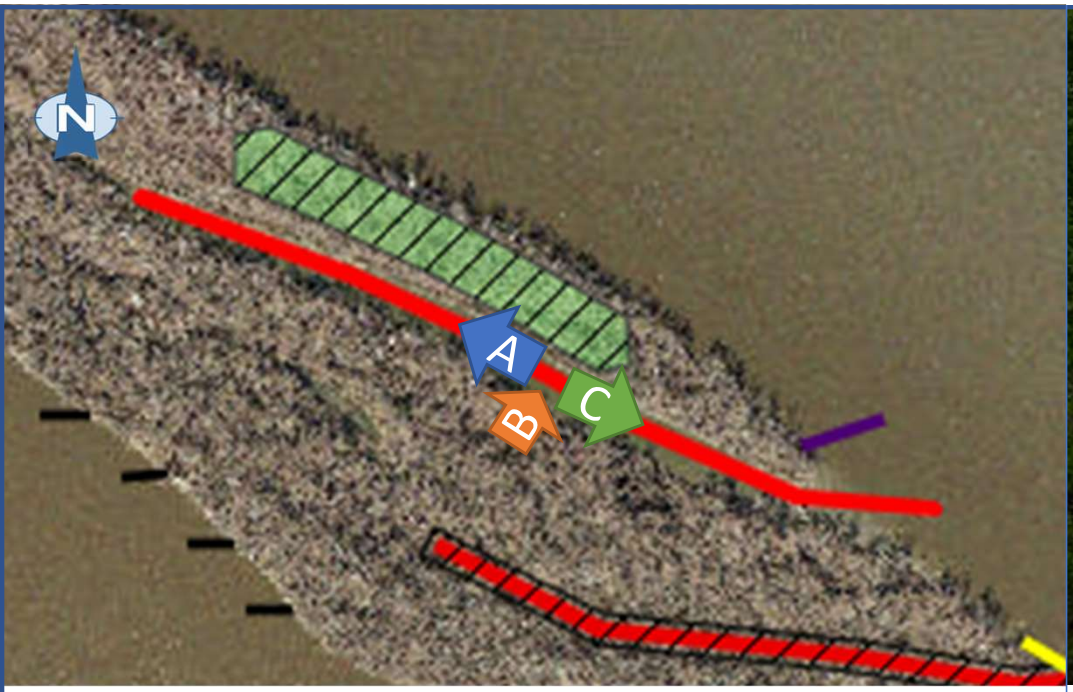
North end of the southern designated cut area facing northwest. Photo taken on 04/21/2023.



North end of the southern designated cut area facing south. Photo taken on 04/21/2023.



North end of the southern designated cut area facing southeast. Photo taken on 04/21/2023.



Portage Island: Fill site and dredge cut features.



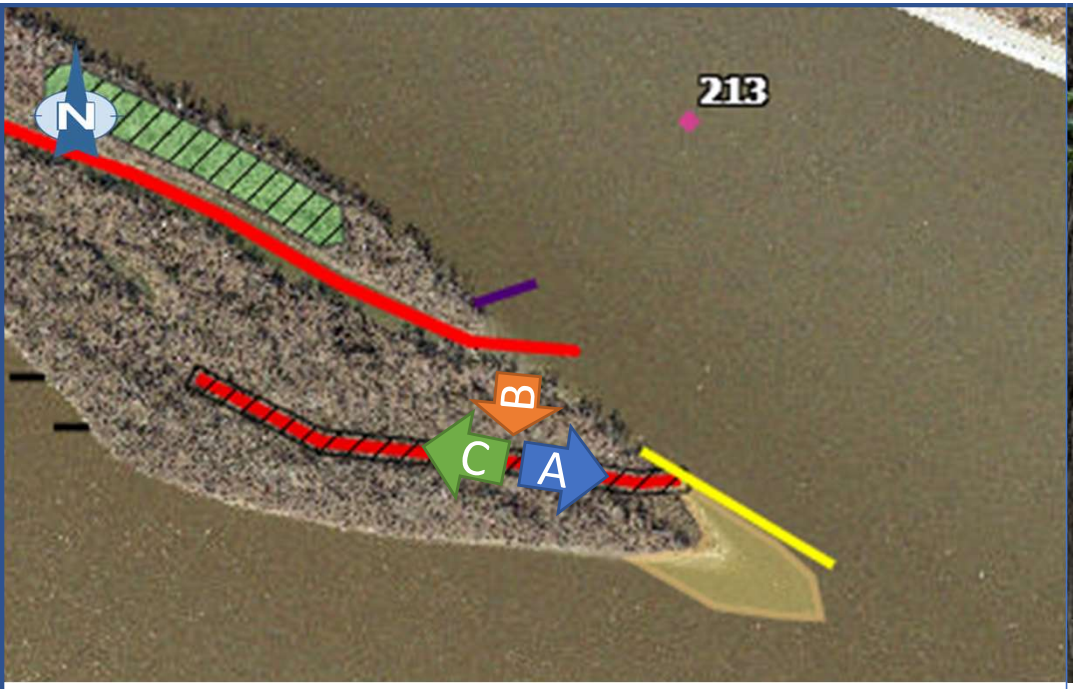
Southern end of the designated cut area facing northwest. Photo taken on 04/21/2023.



Southern end of the designated cut area facing north. Photo taken on 04/21/2023.



Southern end of the designated cut area facing southeast. Photo taken on 04/21/2023.



Portage Island: Fill site and dredge cut features.



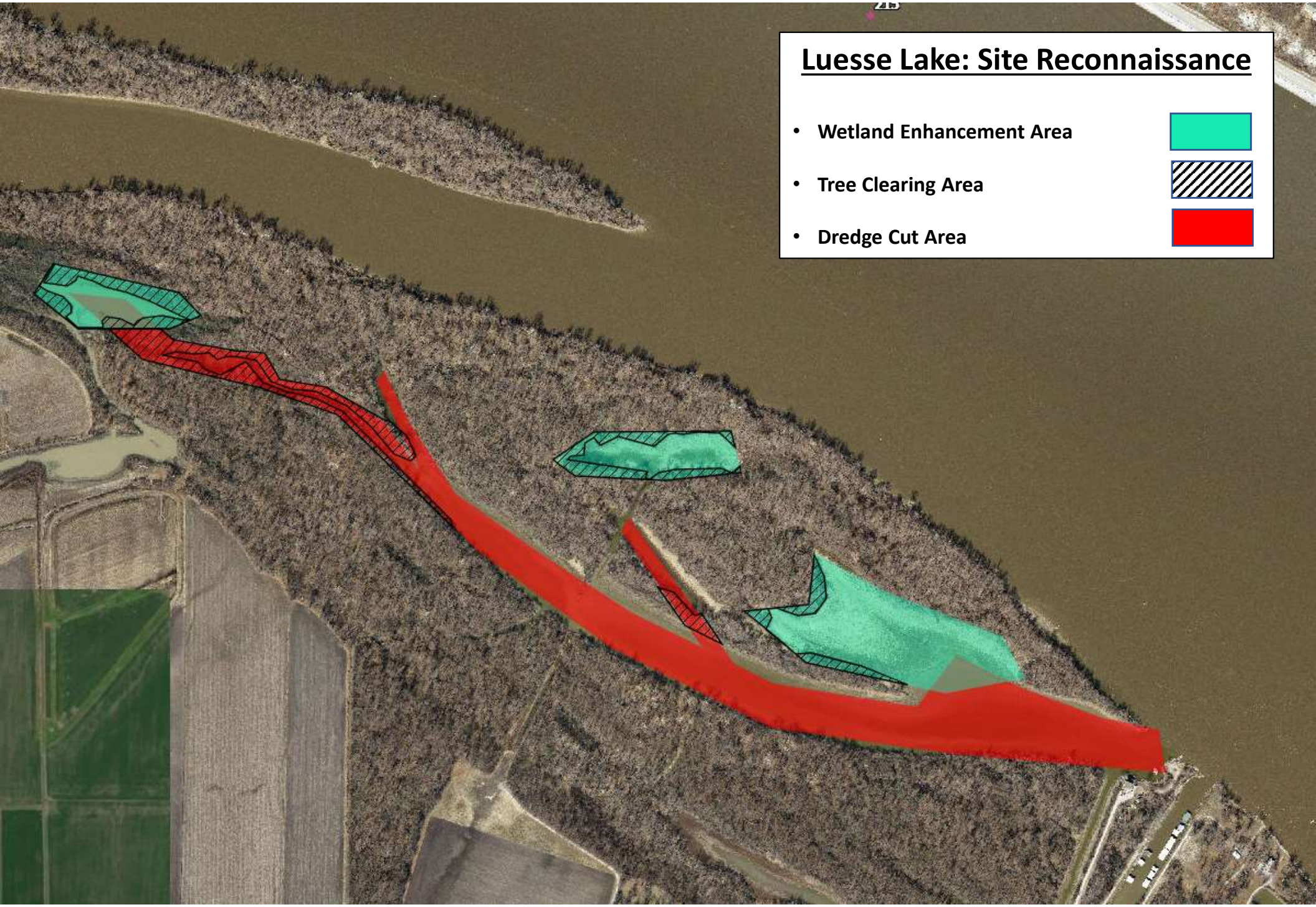
Southern end of the southern designated cut area facing southeast. Photo taken on 04/21/2023.



Southern end of the southern designated cut area facing south. Photo taken on 04/21/2023.



Southern end of the southern designated cut area facing northwest. Photo taken on 04/21/2023.


Luesse Lake: Site Reconnaissance
• Wetland Enhancement Area
• Tree Clearing Area
• Dredge Cut Area



Luesse Lake: Propose tree clearing and wetland enhancement areas. Duck blind observed in area.



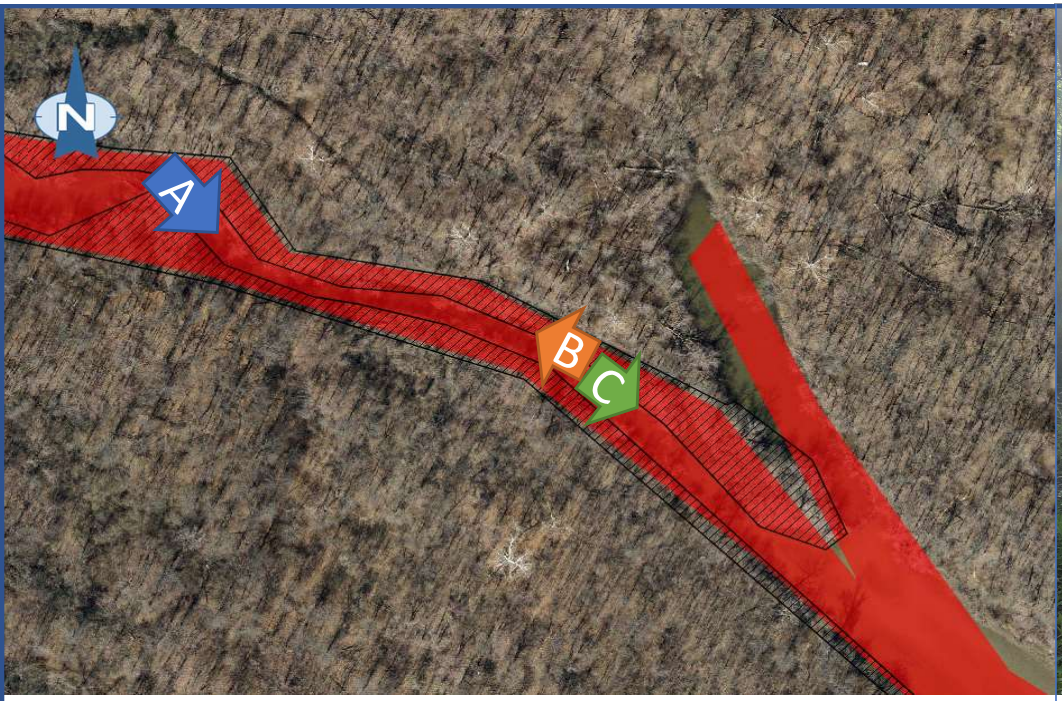
Photo taken on 04/24/23.



Photo taken on 04/24/2023.



Photo taken on 04/24/2023.



Luesse Lake: Proposed tree clearing, and dredge cut areas.



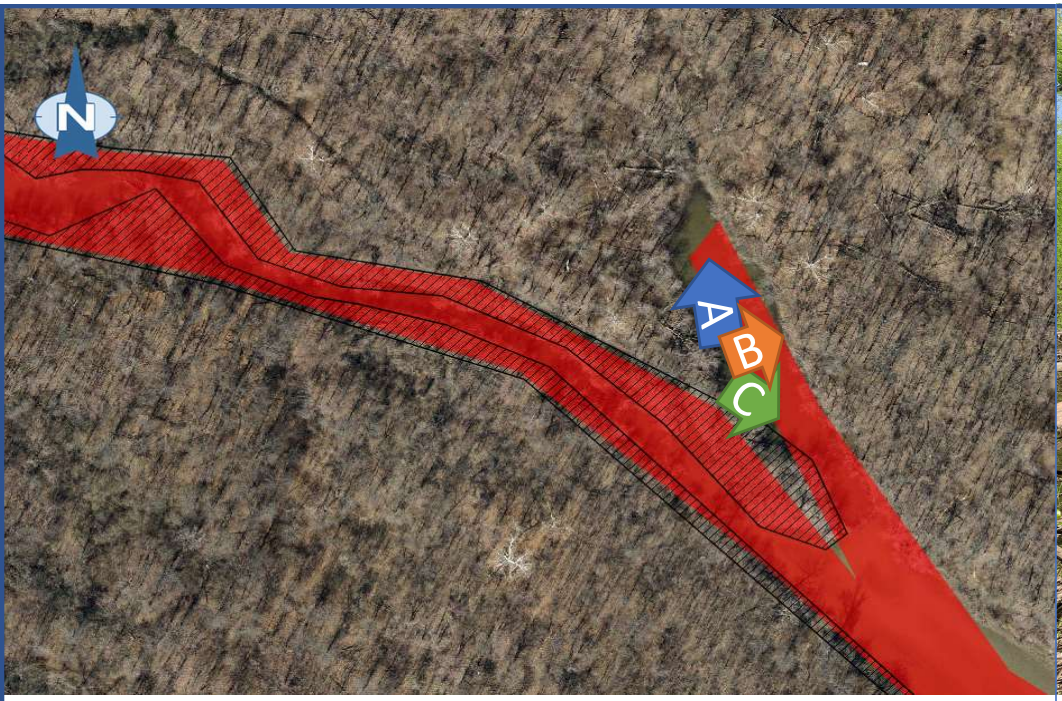
Photo taken on 04/24/23.



Photo taken on 04/24/23.



Photo taken on 04/24/23.



Luesse Lake: Proposed tree clearing, and dredge cut areas.



Photo taken on 04/24/23.



Photo taken on 04/24/23.



Photo taken on 04/24/23.



Luesse Lake: Proposed tree clearing, and dredge cut areas.



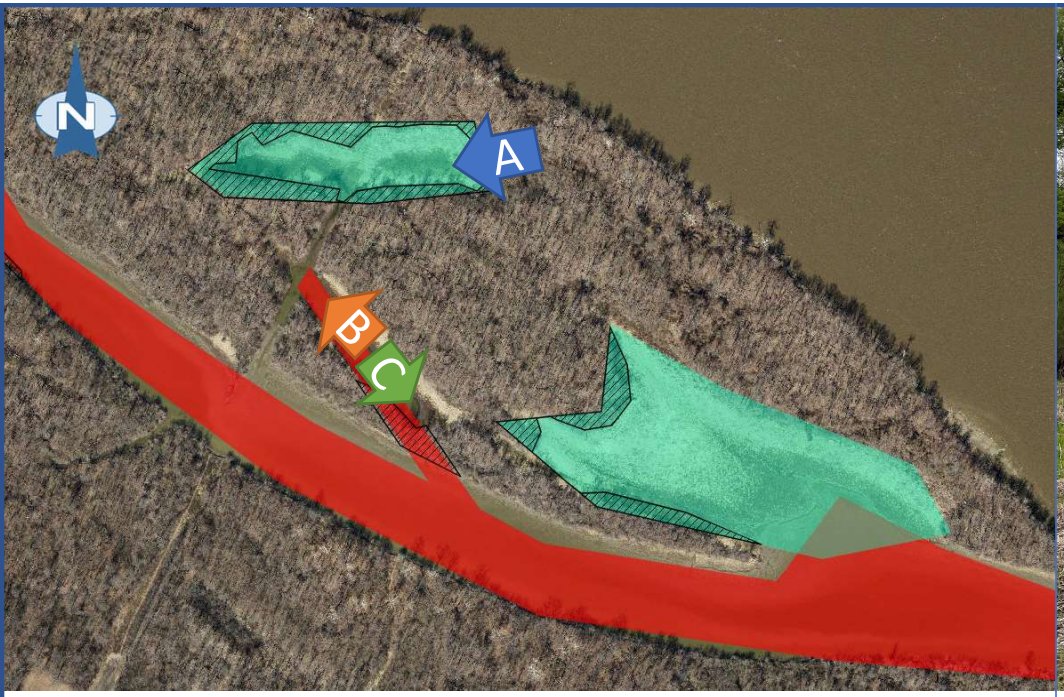
Photo taken on 04/24/23.



Photo taken on 04/24/23.



Photo taken on 04/24/23.



Luesse Lake: Proposed tree clearing, wetland enhancement and dredge cut areas.



Photo taken on 04/21/23.



Photo taken on 04/21/2023.



Photo taken on 04/21/2023.



Luesse Lake: Proposed tree clearing, and wetland enhancement areas.



Photo taken on 04/24/23.



Photo taken on 04/24/23.



Photo taken on 04/24/23.



Luesse Lake: Proposed wetland enhancement and dredge cut areas.



Photo taken on 04/24/23.



Photo taken on 04/24/23.



Photo taken on 04/24/23.



Luesse Lake: Proposed dredge cut area.



Photo taken on 04/21/23.



Photo taken on 04/21/23.



Photo taken on 04/21/23.

SUPPLEMENTARY MATERIALS C: INTERVIEW QUESTIONNAIRE

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, ST. LOUIS DISTRICT
100 Arsenal Street
ST. Louis, Missouri 63118

REPLY TO ATTENTION OF:

The United States Army Corps of Engineers will be performing a Phase I Environmental Site Assessment (ESA) for the West Alton Lake HREP. The purpose of this assessment is to document the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment. Please note that minor insignificant conditions (*de minimis*) are not recognized environmental conditions.

The Phase I ESA does not test for hazardous substances or petroleum. Rather the assessment will derive property condition information from three sources: (1) local and federal records review; (2) a physical site visit; and (3) communication with individuals knowledgeable of a property. The enclosed questionnaire is intended to full fill the communication component for this assessment.

This effort will assist environmental professionals identify recognized environmental conditions within and surrounding Luesse Lake. We ask that you answer the following questions below to the best of your knowledge. We understand that, in some circumstances, you may have little or no information. Still, we encourage you to complete and return the questionnaire as soon as possible. This will allow us to reflect the fact that the questionnaire was completed when we issue our report as it is required.

Please complete the enclosed questionnaire and return it to either of the contacts listed below no later than May 10, 2023. If at any time you have questions or concerns, please contact:

Travis J Schepker		Ashley Edwards
Environmental Specialist		Environmental Specialist
U.S. Army Corps of Engineers	And/or	U.S. Army Corps of Engineers
Phone: (314) 960-7278		Phone: (314) 913-2614
Email: travis.j.schepker@usace.army.mil		Email: Ashley.edwards@usace.army.mil

Respectfully,

Ashley Edwards
Environmental Specialist

Luesse Lake Questionnaire

Name ____Brian Stoff_____ Date Completed___11MAY2023_____

Address___301 Riverlands Way, West Alton, MO 63386_____PIN: _____

1. What is your association to the subject property (Legal Owner, Land Manager, Lessee, etc.)? How many years have you held this association?

   Land Manager – 5 years

2. What is the current land use (residential, commercial, industrial)? Are you aware of prior uses?

   Forest and Wildlife Management, low density recreation

3. Has there ever been any type of spill (oil products, chemicals, etc.) on this property? If so, what was spilled and approximately how many gallons? Were state or local officials informed?

   None

4. Was the property ever used as a dump site (metal, tires, glass, chemical containers, old drums, etc.), either household or industrial?

   No

5. Were there or are there any storage tanks either underground or aboveground? If so, what did they store, gasoline, fuel oil, etc.? Did they leak and were they removed?

   No

6. Are there any wells on this property? If possible, please classify wells as active, abandoned, or closed.

   No

7. Were there or are there any wastewater treatment facilities (septic systems, lagoons, etc.) on this property?

   No

8. Was there or are there any transformers, capacitors, or hydraulic equipment which could have contained Polychlorinated Biphenyls (PCBs)?

   No

9. Are there any burn pits on this property? If yes, please define materials commonly burned.

   No

10. Are there any buildings on this property? Are you aware of the year built? Are any of the buildings known to contain asbestos or lead based paint?

    No

11. Are there any pipelines are on the property? If yes, what are they transporting?

    Yes – Gas transmission pipeline, Hazardous liquid pipeline

12. Does the subject property require any special environmental permits such as, but not limited to, National Pollution Discharge Elimination System Permit?

    No

13. Do operations on this property require tracking through the USEPA Section Seven Tracking System (SSTS)? The SSTS is a system developed by the USEPA to manage pesticide production in the United States. If yes, please define pesticides produced, quantities, and general storage system(s).

    No

14. Are there any Tier II facilities on this property? Tier II facilities are those facilities required by the USEPA to report storage of hazardous chemicals above certain threshold quantities. If yes, please define chemicals produced, quantities, and general storage system(s).

    No

15. Is the subject property listed as a Hazardous Waste Generator by the EPA (Resource Conservation and Recovery Act or RCRA)? If yes, please define waste generated, quantities, and general storage system(s).

    No

16. Are there any additional environmental conditions not listed above that you feel are relevant for this assessment? This may include, but should not be limited to, special permits from local/state agencies, adjacent land-use practices, and naturally occurring conditions.

    No

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, ST. LOUIS DISTRICT
100 Arsenal Street
ST. Louis, Missouri 63118

REPLY TO ATTENTION OF:

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The Phase I ESA does not test for hazardous substances or petroleum. Rather the assessment will derive property condition information from three sources: (1) local and federal records review; (2) a physical site visit; and (3) communication with individuals knowledgeable of a property. The enclosed questionnaire is intended to full fill the communication component for this assessment.

This effort will assist environmental professionals identify recognized environmental conditions within and surrounding West Alton Bay. We ask that you answer the following questions below to the best of your knowledge. We understand that, in some circumstances, you may have little or no information. Still, we encourage you to complete and return the questionnaire as soon as possible. This will allow us to reflect the fact that the questionnaire was completed when we issue our report as it is required.

Please complete the enclosed questionnaire and return it to either of the contacts listed below no later than May 10, 2023. If at any time you have questions or concerns, please contact:

Travis J Schepker		Ashley Edwards
Environmental Specialist		Environmental Specialist
U.S. Army Corps of Engineers	And/or	U.S. Army Corps of Engineers
Phone: (314) 960-7278		Phone: (314) 913-2614
Email: travis.j.schepker@usace.army.mil		Email: Ashley.edwards@usace.army.mil

Respectfully,

Ashley Edwards
Environmental Specialist

West Alton Bay Questionnaire

Name ____Brian Stoff_____ Date Completed___11MAY2023_____

Address___301 Riverlands Way, West Alton, MO 63386_____PIN: _____

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   Land Manager – 5 years

2. What is the current land use (residential, commercial, industrial)? Are you aware of prior uses?

   Forest and wildlife management, low density recreation

3. Has there ever been any type of spill (oil products, chemicals, etc.) on this property? If so, what was spilled and approximately how many gallons? Were state or local officials informed?

   None

4. Was the property ever used as a dump site (metal, tires, glass, chemical containers, old drums, etc.), either household or industrial?

   No

5. Were there or are there any storage tanks either underground or aboveground?
   If so, what did they store, gasoline, fuel oil, etc.? Did they leak and were they removed?

   No

6. Are there any wells on this property? If possible, please classify wells as active, abandoned, or closed.

   No

7. Were there or are there any wastewater treatment facilities (septic systems, lagoons, etc.) on this property?

   No

8. Was there or are there any transformers, capacitors, or hydraulic equipment which could have contained Polychlorinated Biphenyls (PCBs)?

   No

9. Are there any burn pits on this property? If yes, please define materials commonly burned.

   No

10. Are there any buildings on this property? Are you aware of the year built? Are any of the buildings known to contain asbestos or lead based paint?

    No

11. Are there any pipelines are on the property? If yes, what are they transporting?

    No

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    No

16. Are there any additional environmental conditions not listed above that you feel are relevant for this assessment? This may include, but should not be limited to, special permits from local/state agencies, adjacent land-use practices, and naturally occurring conditions.

    No

From: Stoff, Brian W CIV USARMY CEMVS (USA)
To: Schepker, Travis J CIV USARMY CEMVS (USA); Cosgriff, Robert John CIV USARMY CEMVS (USA)
Subject: RE: Phase I ESA Questionnaire for West Alton HREP
Date: Wednesday, May 31, 2023 11:13:36 AM

I can't find anyone that knows anything about it. The only thing I can figure out is from looking back on google earth, and I think it's been there since about 2011 (if I'm looking at the right object).

-Brian

From: Schepker, Travis J CIV USARMY CEMVS (USA) <Travis.J.Schepker@usace.army.mil>
Date: Friday, May 26, 2023 at 10:46 AM
To: Stoff, Brian W CIV USARMY CEMVS (USA) <Brian.W.Stoff@usace.army.mil>, Cosgriff, Robert John CIV USARMY CEMVS (USA) <Robert.J.Cosgriff@usace.army.mil>
Subject: RE: Phase I ESA Questionnaire for West Alton HREP

Thanks Brian,

We recently completed a site visit at West Alton Lake and noticed a relatively large drum (250 gallon???) in the middle of West Alton Lake (see attached). This is a bit of a guess, but based on where I believe I took a photo from I would guess that it is located around 38.881033°, -90.208098°.

I did not have the courage to walk across the mud flat that day, so I was unable to get a good view. Any chance somebody from your shop has inspected the drum in the past? I would typically disregard smaller 55 gallon drums, but the size of this one made it difficult to pass up.

Alternatively, I wasn't sure if you had a contact from MDC that may have some additional information?

From: Stoff, Brian W CIV USARMY CEMVS (USA) <Brian.W.Stoff@usace.army.mil>
Sent: Thursday, May 11, 2023 6:58 AM
To: Schepker, Travis J CIV USARMY CEMVS (USA) <Travis.J.Schepker@usace.army.mil>; Cosgriff, Robert John CIV USARMY CEMVS (USA) <Robert.J.Cosgriff@usace.army.mil>
Cc: Edwards, Ashley N CIV (USA) <Ashley.Edwards@usace.army.mil>
Subject: RE: Phase I ESA Questionnaire for West Alton HREP

See attached.

-Brian

From: Schepker, Travis J CIV USARMY CEMVS (USA) <Travis.J.Schepker@usace.army.mil>
Sent: Thursday, April 27, 2023 2:51 PM
To: Stoff, Brian W CIV USARMY CEMVS (USA) <Brian.W.Stoff@usace.army.mil>; Cosgriff, Robert John CIV USARMY CEMVS (USA) <Robert.J.Cosgriff@usace.army.mil>
Cc: Edwards, Ashley N CIV (USA) <Ashley.Edwards@usace.army.mil>

Subject: Phase I ESA Questionnaire for West Alton HREP

Hi Rob and Brian,

I was hoping one of you would be available to assist in filling out the enclosed questionnaires for Luesse Lake and West Alton Bay. The questionnaires are required for the HTRW component of the West Alton HREP.

Fairly certain you guys have completed these before (probably for Ben Greeling or Rick Archeski). Please let me know if you have any questions or concerns. Also available to set up a Teams call and go through the questions if that makes things easier.

VR

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UPPER MISSISSIPPI RIVER RESTORATION

DRAFT FEASIBILITY REPORT

WITH INTEGRATED ENVIRONMENTAL ASSESSMENT

WEST ALTON ISLANDS HABITAT REHABILITATION AND ENHANCEMENT PROJECT

Appendix G: Engineering

US Army Corps of Engineers®
St. Louis District

Mississippi River
Miles 203-215.5
St. Charles County, Missouri
Project Partners: Missouri Department of Conservation & U.S. Fish and Wildlife Service

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1.0 Introduction

1.1 Project Location

In 2022 and 2023, the United States Army Corps of Engineers, St. Louis District (USACE) conducted an Adaptive Hydraulics (AdH) model study in Pool 26 of the Upper Mississippi River between River Miles (RM) 218 – 202 (the model does extend beyond these RMs, but it is not calibrated beyond these RMs). This study is intended to develop and evaluate alternatives to restore ecosystem structure and function at three project sites (Luesse Lake, Portage Island, and West Alton Bay) by constructing projects to improve side channel, island, and wetland habitats. The results of the modeling were utilized to determine the efficacy of various alternative measures. These measures were then utilized in a planning model to determine the suite of measures to be included in the Tentatively Selected Plan (TSP) for this project.

The project areas can be found at: Luesse Lake, approximate RMs 215.0 to 214.1, Portage Island, approximate RMs 214.2 to 212.7 and West Alton Bay, approximate RMs 204.4 to 203.0. The location of each site is shown in Figure 1.



Figure 1. Luesse Lake, Portage Island, and West Alton Bay Potential Project Location

1.2 Project Purpose and Need

The goal of any potential project is to restore and improve the quality and diversity of backwater, side-channel, sandbar, island, wetland, and floodplain forest resources within the study area. The objectives identified to meet this goal are to:

- Restore diversity of bathymetry, flow, and connectivity of aquatic areas throughout project area (side channels, main channel, off channel, backwaters, etc.)
- Restore diverse island mosaics throughout project area (sand bars, islands; reduce wind fetch and wave impacts)
- Restore native vegetation diversity and structural complexity throughout potential project area (wetlands, forests, etc.)

1.3 Historical Analysis

The 1,823-acre study area begins two river miles upriver from Melvin Price Locks and Dam and continues up the Missouri side of the Mississippi River to approximately three river miles downstream of the Mississippi and Illinois River confluence. Starting in 1824, the Department of the Army was tasked with removing navigation impediments in the Mississippi River through actions such as snag removal and dredging. Later authorizations in 1866, 1878, 1907, and the 1930s charged the USACE with creating increasingly deep navigation channel conditions until the present 9-foot navigation channel depth requirement was authorized. A variety of methods have been used over this period of time to maintain navigation channel depth during low flow, including maintenance dredging, construction of dikes and closing structures, riverbank stabilization, and pool regulation through construction and management of the present-day lock and dam system on the Illinois and Upper Mississippi Rivers. Levee construction began on the UMRS in the 1880s to provide flood protection. This action allowed conversion of formerly natural floodplain habitats to agriculture and development to occur. In the study area, 6.31 acres of land were converted to agriculture which included portions of Luesse Lake and Portage Island by the 1890s.

The existing river training structures in the study area are shown in Figure 2 (Luesse Lake), Figure 3 (Portage Island), and
Figure 4 (West Alton Bay). More detailed information about these structures can be found in Table 1.



Figure 2. River Training Structures near Luesse Lake

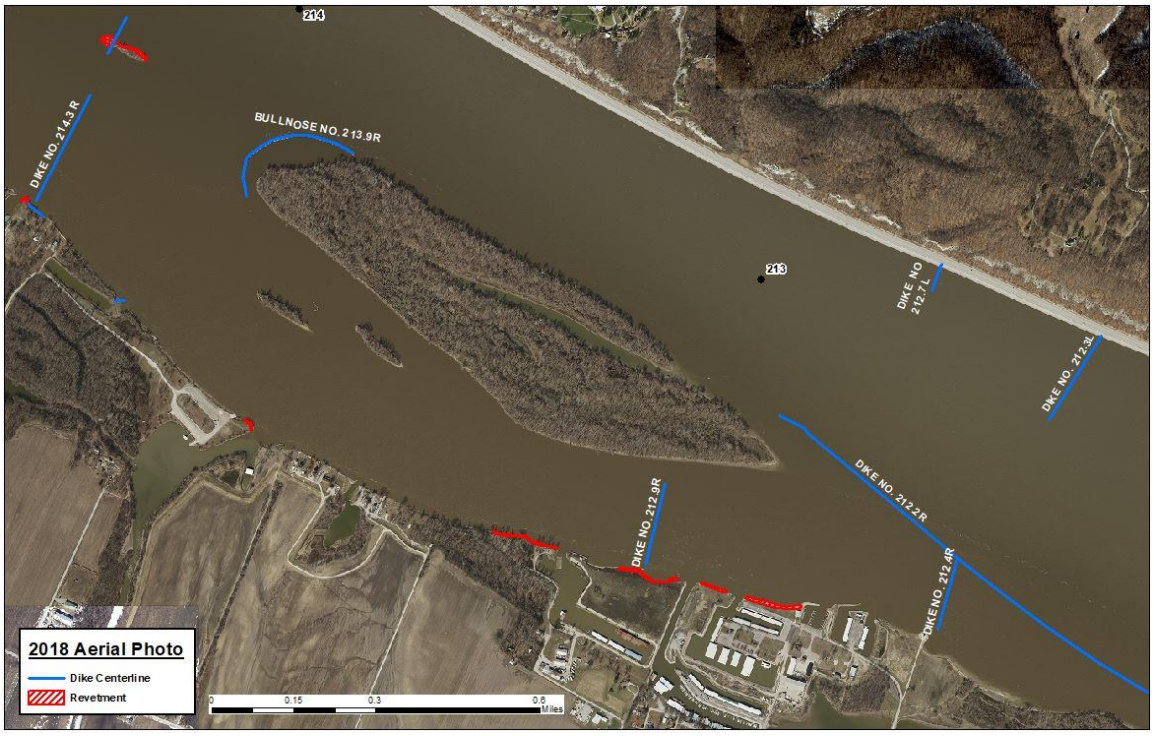


Figure 3. River Training Structures near Portage Island



Figure 4. River Training Structures near West Alton Bay

Table 1. Details of River Training Structures within the Project Area

Project Area	Structure Name	Construction Material	Length (ft)	Elevation (ft NAVD88)	Date Constructed
Luesse Lake	Dike No. 214.7 R	Unknown	1,575	400-405	Unknown
	Dike No. 214.3 R	Stone	1,541	400-408	1991
	Toe Dike 214.3 R	Stone	196	419	Unknown
Portage Island	Dike No. 214.0 R	Stone	90	420	1991
	Bullnose 213.9 R	Stone	1,510	422	2005
	Dike No. 212.9 R	Unknown	800	402-407	Unknown
	Dike No. 212.7 L	Wooden Pile	264	407	Unknown
	Dike No. 212.3 L	Wooden Pile	955	405	Unknown
	Dike No. 212.4 R	Wooden Pile	706	410	Unknown
	Dike No. 212.2 R	Wooden Pile	6,900	390-405	Unknown
West Alton Bay	Dike No. 204.4 R	Stone	6,130	388-404	Unknown
	L&D 26 Remnant Weir	Concrete/ Stone	995	390-394	Unknown
	Dike No. 202.5 R	Unknown	990	395-400	Unknown

2.0 River Gage Data

River gage data was used as boundary conditions in the model, as well as for model calibration and validation. Table 2 lists the name of each gage, the location, and the application in the project.

Table 2. Gage Data

Gage Name	Location	Application in Project
USGS 05586100 ILLINOIS RIVER AT VALLEY CITY, IL	61.3 miles above the mouth of Illinois River	Upstream Flow Boundary
USACE Mississippi River at L&D 25 (Lower)	241.2 miles above the mouth of the Ohio River	Upstream Flow Boundary
USGS 05514500 Cuivre River near Troy, MO	20 miles above the mouth of the Cuivre River	Upstream Flow Boundary
USGS 05514860 Dardenne Creek at Old Town St. Peters, MO	9 miles above the mouth of Dardeene Creek	Upstream Flow Boundary
Mississippi River at Mel Price L&D (Upper)	201.1 miles above mouth of the Ohio River	Downstream Water Surface Elevation Boundary
USGS 05587450 Mississippi River at Grafton, IL	218.0 miles above the mouth of the Ohio River	Water Surface Elevation Calibration
Mississippi River at Alton, IL	203 miles above the mouth of the Mississippi River	Water Surface Elevation Calibration

3.0 AdH Model Building

Multiple items are necessary to develop and calibrate an AdH model: boundary conditions, a numerical mesh file, a hot start file, a computational environment, and calibration (and validation) results.

3.1 Boundary Conditions

On the Mississippi River, the upstream boundary condition is the combination of the discharge from Lock and Dam 25 (LD25), Cuivre River, and Dardeene Creek. Cuivre River and Dardeene Creek are two of the larger tributaries between LD25 and the

confluence of the Mississippi and Illinois Rivers. The addition of these tributaries does not seem necessary during dry conditions, but when they approach floodstage (as defined by the National Weather Service) there is a noticeable discrepancy in downstream water surface elevations (WSEs) if they are not included. These tributaries were applied as boundary conditions at the upstream end of the model (as opposed to their exact geographic location) for model simplicity. This leads to some minor error in the timing of hydrographs for the calibration and validation events; however, this does not affect the results of the alternative testing because those are run as quasi-steady flows. The upstream extent of the model on the Mississippi River is approximately two river miles downstream of LD25 (downstream of initial geomorphic changes of the dam, such as scour holes) to reduce unnecessary complexity in the model.

On the Illinois River, ideally, the upstream boundary condition and model extent would be at La Grange Lock and Dam (the upstream extent of Pool 26). However, to save time in the modeling process, the model only extends approximately four miles upstream of Hardin, Illinois. The closest discharge data to the model extent is approximately 40 miles upstream at Valley City, Illinois. The Illinois River is very confined by levees between Valley City and Hardin, Illinois so there is minimal attenuation between the two locations. Lastly, testing was performed to ensure that the modeled flow scenarios did not cause the Mississippi River to back water up the Illinois to the model extents, which would cause unrealistic results due to the upstream boundary not extending the full pool.

Figure 5 shows the outline of the model extents, the location of the applied boundary conditions, and descriptions of each boundary condition.

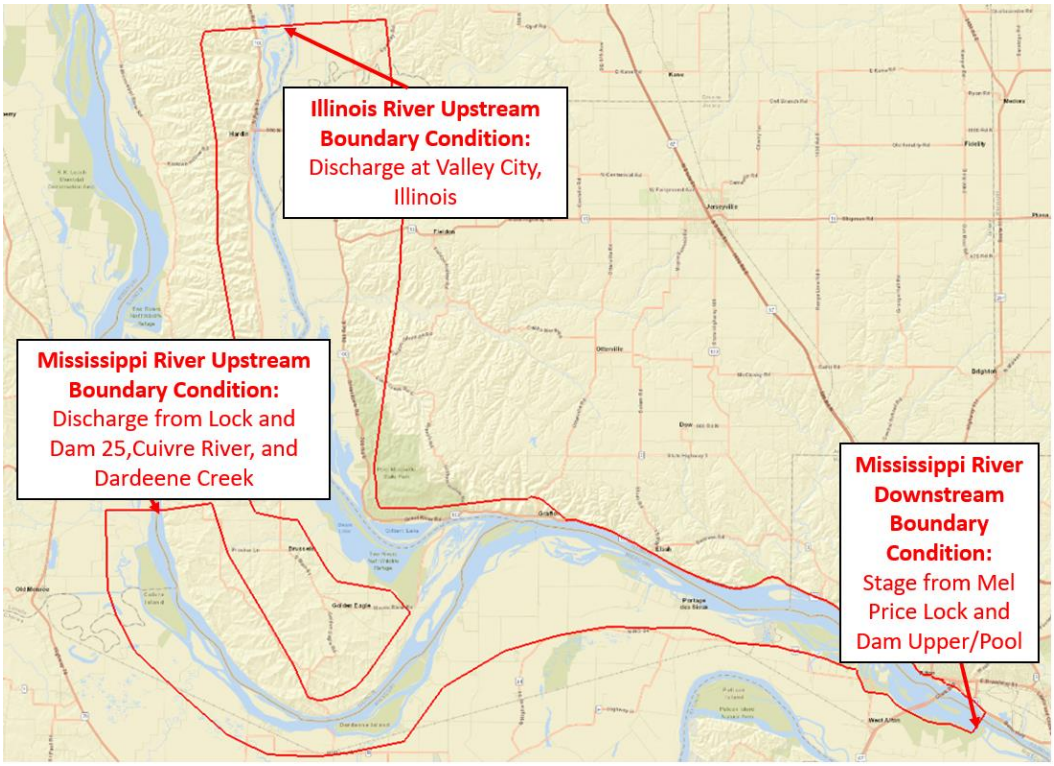


Figure 5. Model Extents and Boundary Conditions

3.2 Modeled Flows

For developing and evaluating alternatives, engineers chose a range of discharges based on historical hydrograph data that represented a range of river conditions including environmental pool, max drawdown, and open river flow conditions. The most recent applicable days were used, since the model is calibrated towards recent data; however, a high flow from 2019 was also included to test the model during higher flows. Table 3 shows an overview of the flow and stage data for Pool 26 associated with each river condition evaluated.

The Upper Mississippi River System Flood Flow Frequency Study (FFFS) (USACE 2004) has the most up to date Annual Exceedance Probabilities (AEPs) for this study area. Table 4 shows the WSEs and flows that correspond to AEPs at Grafton.

Table 3. Flow Conditions for Alternative Development and Evaluation

Date	River Condition	Flow at Grafton (cfs)	Elev. at Grafton (ft NAVD88)	Elev. at Mel Price L&D (Upper) (ft NAVD88)
07/20/2022	Environmental Pool	10,400	418.55	417.67
04/08/2022	Max Drawdown	218,000	420.18	413.13
05/07/2022	Open River	285,000	424.48	419.35

Table 4. Annual Exceedance Probabilities at Grafton, Illinois (USACE 2004)

Annual Exceedance Probability (%)	Water Surface Elevation (ft NAVD88)	Flow (cfs)
50	423.62	254,000
20	428.91	321,000
10	430.72	360,000
4	433.62	408,000
2	436.12	446,000
1	438.42	488,000
0.5	440.62	529,000
0.2	442.42	585,000

Note: WSEs were originally reported in the FFFS in NGVD29. They were converted to NAVD88 using a conversion factor of -0.58 feet.

3.3 Mesh Development

The mesh file defines the finite element mesh by assigning coordinates and elevations to nodes located at the vertices of the various elements, and defining a nodal connection table, indexed by the element numbers, that defines the element mesh. The mesh is then generated by using triangular elements and nodes at various spacing which are then draped onto an elevation data set to create a two-dimensional (2D) surface mesh. The node spacing was generally no more than 150 feet in calibrated portions of the channel, with spacing at important measures as little as 10 feet (spacing in the overbanks are up to 300 ft). The mesh for this particular study underwent several rounds of mesh refinement to capture the desired level of detail.

3.4 Model Extents

The model began upstream, 1 mile downstream of LD 25 on the Mississippi River and slightly upstream of Hardin, Illinois on the Illinois River. The downstream boundary of the model is Mel Price Lock and Dam.

3.5 Elevation Data

The elevation data used to create the AdH computational mesh was compiled using multiple datasets that covered both above and below the water surface. The elevation sources included a combination of both Light Detection and Ranging

surveys (LiDAR) and bathymetric survey data of the subsurface of the river. In most cases, LiDAR data is typically used to collect elevation data above the water surface while hydrographic or bathymetric surveys are used to collect elevation data below the water surface due to water clarity. Once compiled and converted (using North American Vertical Datum Conversion (VERTCON)) to NAVD88, the surveys were merged with priority going to the most recent dataset to create a single elevation dataset representing all areas above and below the waterline within the numerical model mesh domain to a 2-meter resolution. Table 5 lists the elevation datasets used to create the mesh. The terrain elevations are shown in Figure 6.

There was minimal current bathymetric data along the west side of Slim Island (upstream of Luesse Lake). Manual edits of the elevation data were made along the west side of Slim Island until the modeled velocities matched the measured velocity data (see cross section 3 in Figure 13 and cross section 10 in Figure 17). This manual manipulation of the elevation data was upstream of the project areas; therefore, it should not adversely impact the quality of results in the project areas.

Table 5. Source of Elevation Datasets

Survey	Survey Type	Vertical Datum	Year
Bolters Bar Multibeam	*Bathymetric*	*NGVD 29*	*2015*
Comprehensive Main Channel	*Bathymetric*	*NAVD 88*	*2020*
Comprehensive Main Channel	*Bathymetric*	*NGVD 29*	*2019*
Comprehensive Side Channel	*Bathymetric*	*NGVD 29*	*2018*
Illinois Comprehensive Main Channel	*Bathymetric*	*NGVD 29*	*2022*
Multibeam 218	*Bathymetric*	*NAVD 88*	*2020*
Multibeam 204 – 200	*Bathymetric*	*NAVD 88*	*2019*
Multibeam 218 – 217	*Bathymetric*	*NGVD 29*	*2018*
Multibeam 218 – 217	*Bathymetric*	*NGVD 29*	*2017*
Multibeam 203	*Bathymetric*	*NGVD 29*	*2016*
Piasa Dike Surveys	*Bathymetric*	*NGVD 29*	*2015*

Mel Price Scour Survey	*Bathymetric*	*NAVD 88*	*2022*
Multibeam Structure Survey 205 – 204	*Bathymetric*	*NAVD 88*	*2020*
Project Multibeam Surveys	*Bathymetric*	*NAVD 88*	*2022*
Project Single Beam Surveys	*Bathymetric*	*NAVD 88*	*2022*
Alton LiDAR	*LiDAR*	*NAVD 88*	*2016*
Pool 26 LiDAR	*LiDAR*	*NAVD 88*	*2016*

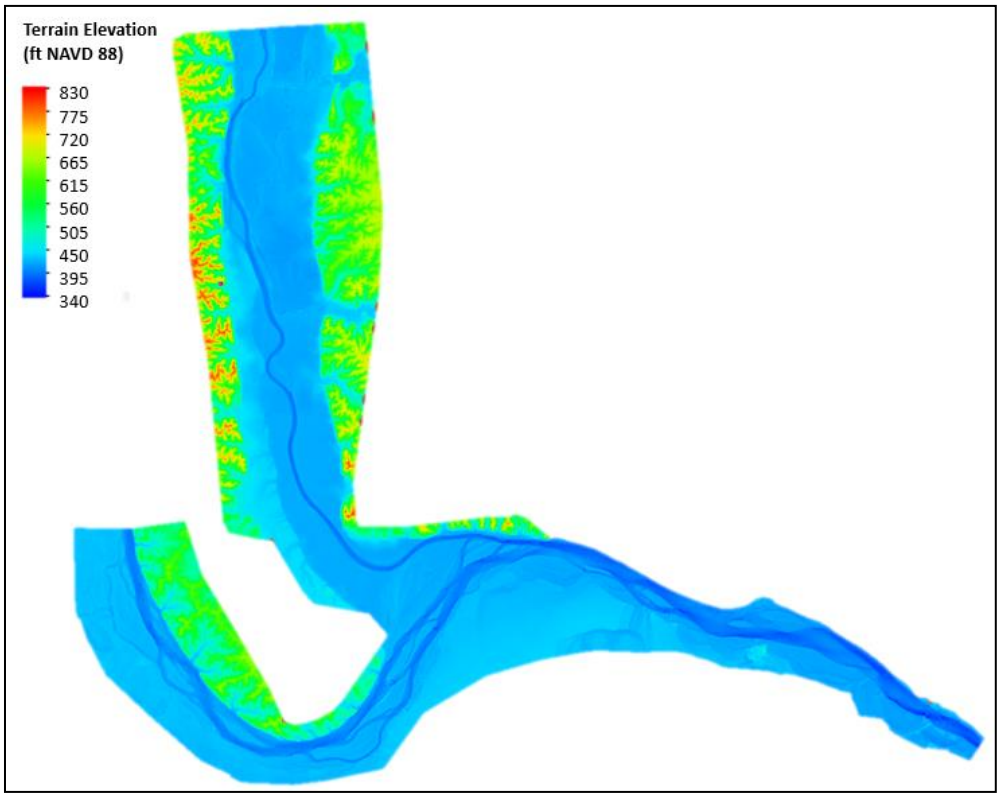


Figure 6. Hydraulic Model Terrain Elevations

3.6 Roughness Values

Following the creation of the numerical model mesh file, roughness values were assigned to all elements based on the element's corresponding material type. The material boundaries were based on aerial imagery and LiDAR elevation data.

The initial Manning's n-values were obtained from Open-Channel Hydraulics, (Chow 1959), and were adjusted within acceptable ranges to achieve model calibration. The roughness values used within this model study can be seen in Table 6. The material assignments used for the TSP at Luesee Lake, Portage Island, and West Alton Bay are shown in Figure 7, Figure 8, and

Figure 9.

Table 6: Manning's n-values

AdH Material	Manning's n Roughness Coefficient
Main Channel	*0.025*
Side Channel	*0.027*
Backwater Areas	*0.040*
Dense Woods	*0.100*
Urban, Pavement	*0.055*
Grass Farmland	*0.035*
Islands	*0.080*
Sand Islands	*0.026*
River Training Structures, Piasa Construction Features, Bridge Pier	*0.027*



Figure 7. Material Types at Luesee Lake

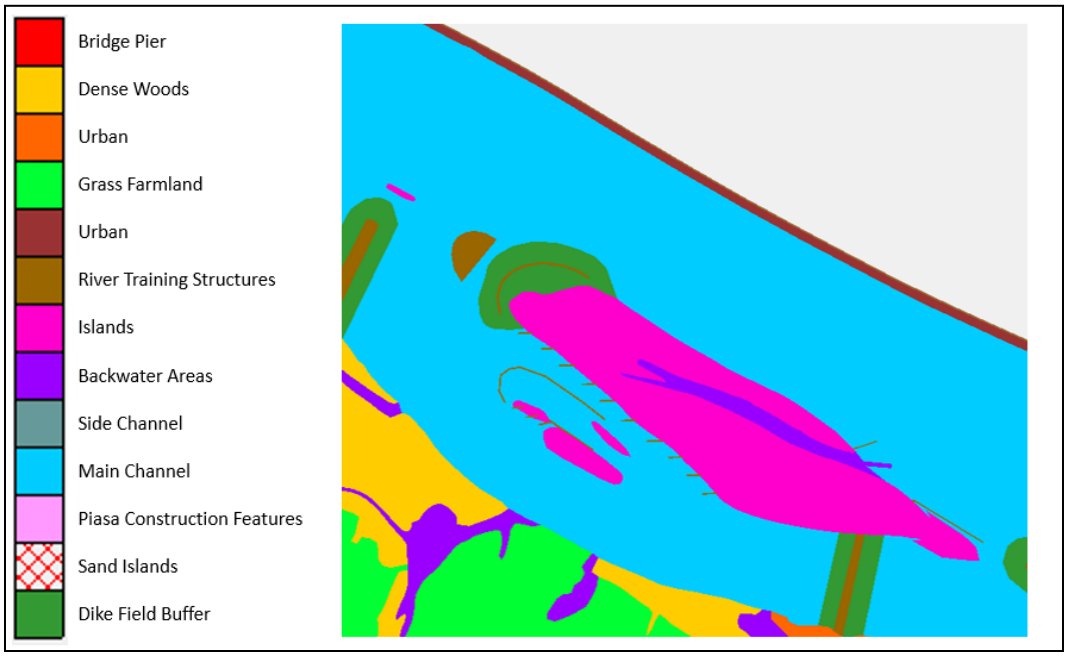


Figure 8. Material Types at Portage Island

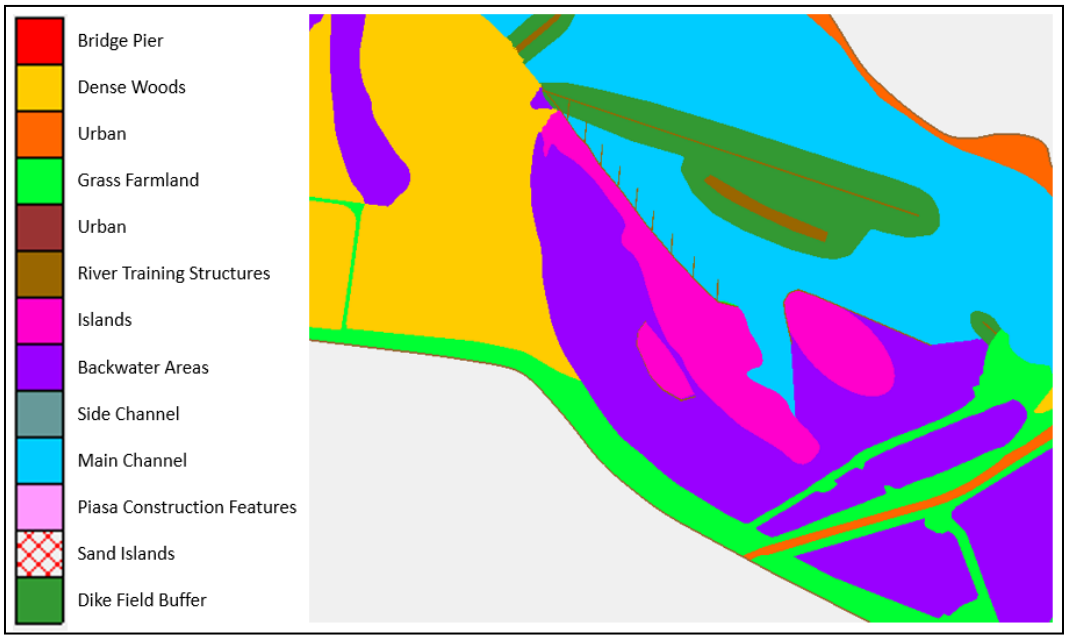


Figure 9. Material Types at West Alton Bay

3.7 Hotstart File

The hotstart file is used to specify initial conditions or restart conditions for any given model. This file establishes an initial depth of water and velocity when available.

The hotstart file for initial runs for this study was a constant WSE; however, that WSE varied depending on which flow condition was being simulated first in the model run. Model runs were allowed to run a sufficient amount of time to reach steady state conditions before any results were used.

3.8 Computational Environment

The compilation of numerical modeling results was executed on the U.S. Army Corps of Engineer Research and Development Center's (ERDC) High-Performance Computing (HPC) supercomputer Onyx and the Coastal Hydraulics Lab (CHL) private HPC, Jim.

3.9 Calibration and Validation

To calibrate and validate the model, the observed gage data was compared to modeled results. The model calibration focused on two different dates in 2022: May 9 (an open flow river condition) and July 21 (a pooled river condition). WSE and velocity data were available for both dates.

The calibrated region of the model extends from Grafton, Illinois to slightly downstream of Alton, Illinois. The model is not calibrated outside of this region, and results from regions that are not calibrated should only be used qualitatively (e.g., to show if there has been a WSE rise in that area between proposed and existing conditions).

Modeled WSEs can be compared to gage WSEs at both ends of the calibrated region of the model with the gages located at Grafton, Illinois and Alton, Illinois.

On both calibration dates, May 9, 2022 and July 21, 2022, USACE collected Acoustic Doppler Current Profiler (ADCP) data in the river along approximately 10 cross sections in the calibrated region of the model, as shown in

Figure 12 and Figure 16.

May 9, 2022 - Open River Calibration

For the open river calibration run, the modeled WSEs at the Grafton Gage were lower than the gage data (about 0.5' lower). At the Alton Gage modeled WSEs higher than the gage data (about 1.0' higher). Modeled and measured cross sectional velocities generally followed the same trend other than at cross section 12,

where the modeled velocities were lower than measured. Since cross section 12 is located between project areas no adjustments were made to made to the model. The comparison of modeled versus measured WSEs for the open river calibration flow can be seen in Figure 10 and Figure 11 at the Grafton gage and Alton gage, respectively.

Figure 12 shows an aerial view of the locations of ADCP collection, and Figure 13 shows the cross-sectional view of the results of the ADCP collection.

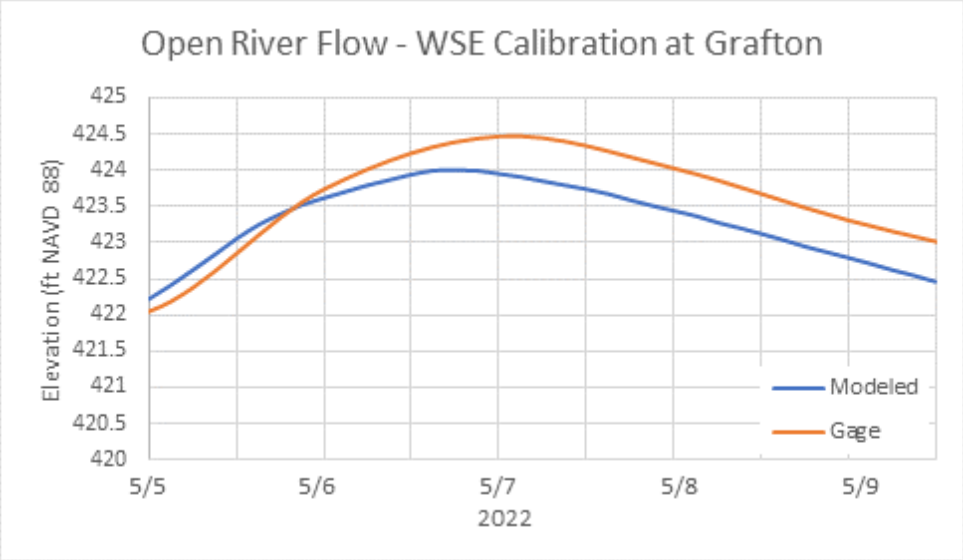


Figure 10. Open River Flow – WSE Calibration at Grafton

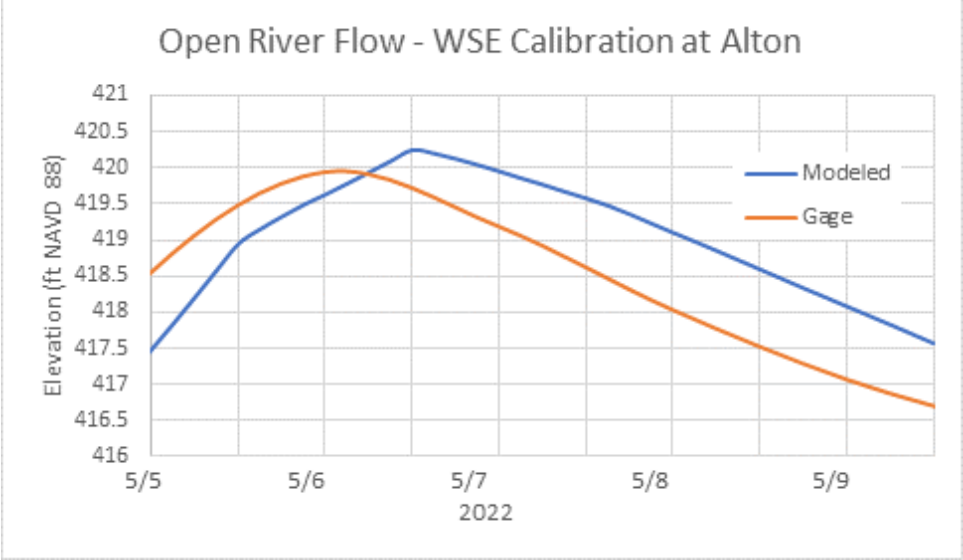
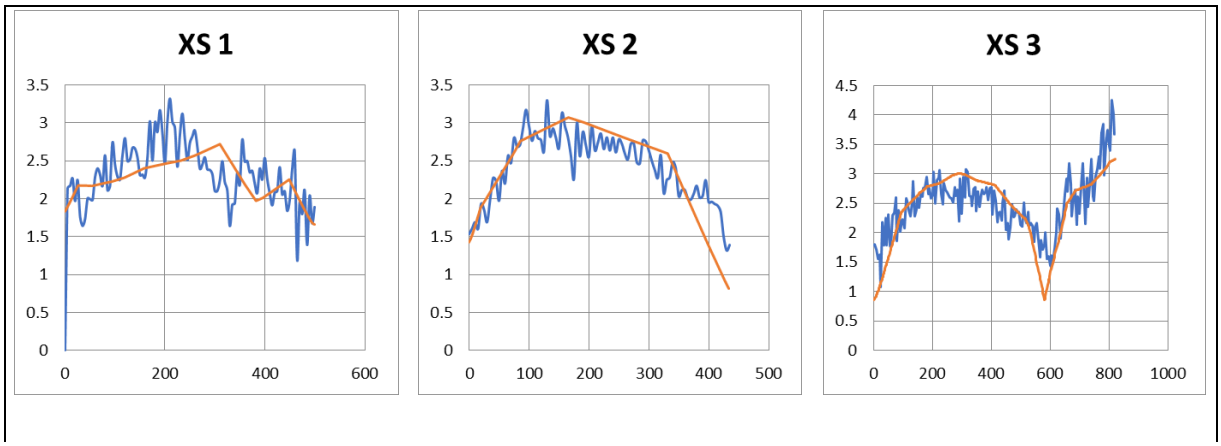


Figure 11. Open River Flow – WSE Calibration at Alton



Figure 12. Open River (May 9, 2022) ADCP Collection Aerial View of Cross Sections



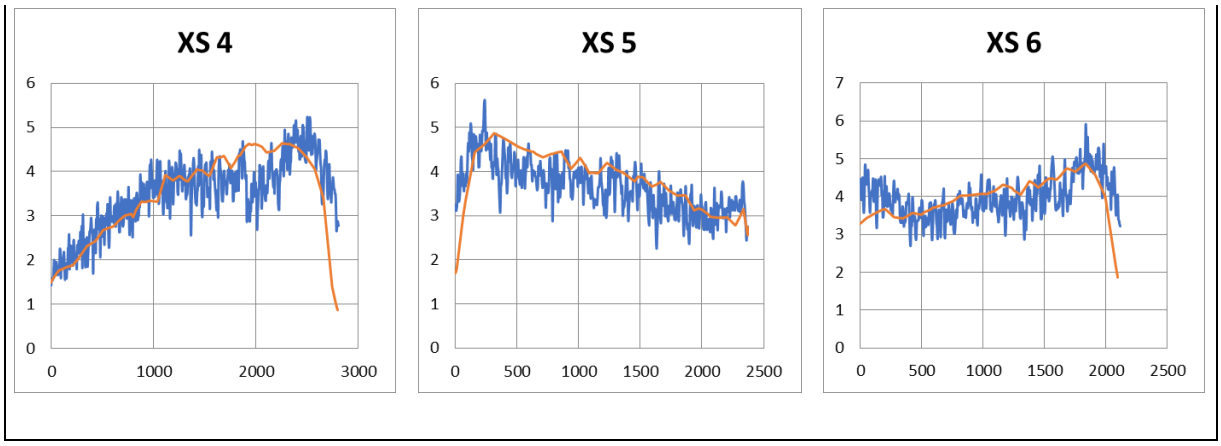
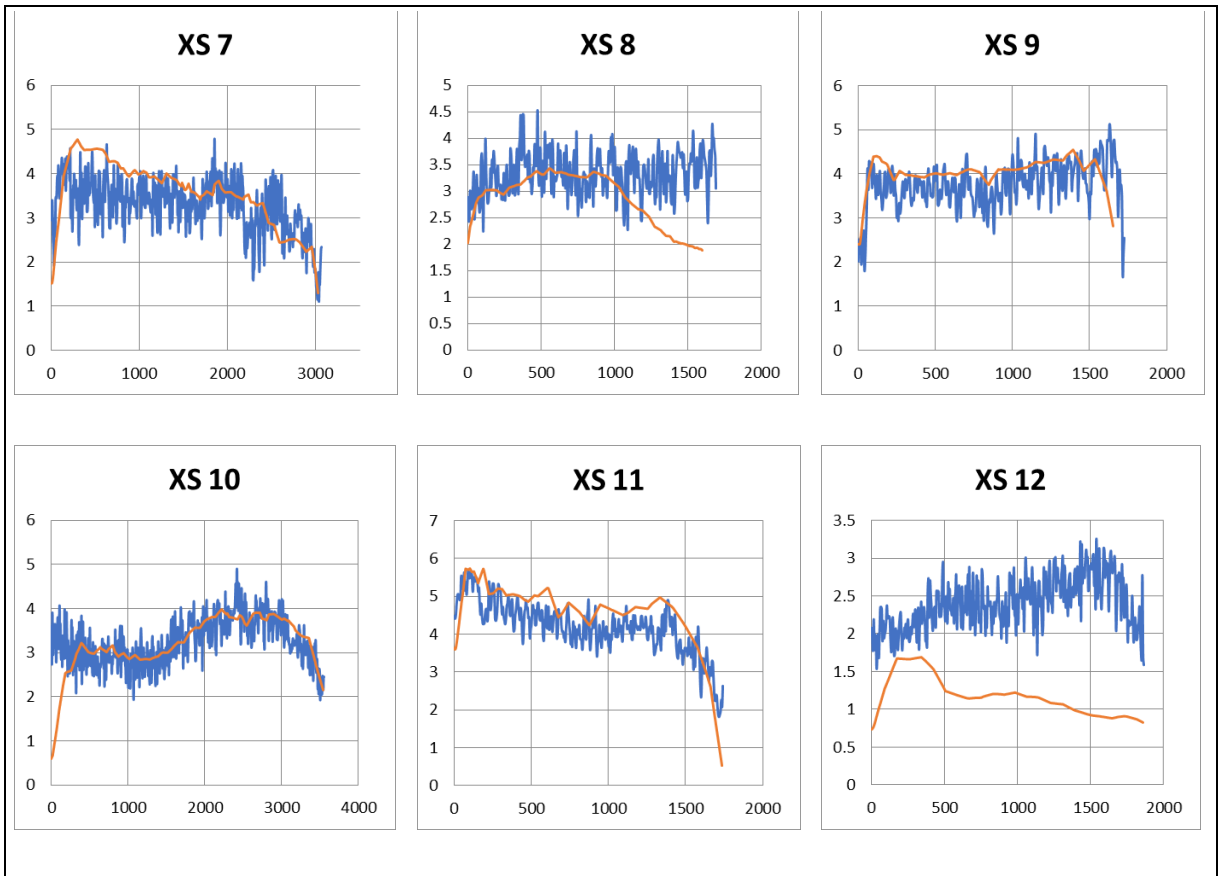


Figure 13. Open River (May 9, 2022) ADCP Collection Cross Section Views - Note: Y-axis represents velocity in feet per second, X-axis represents stationing in feet



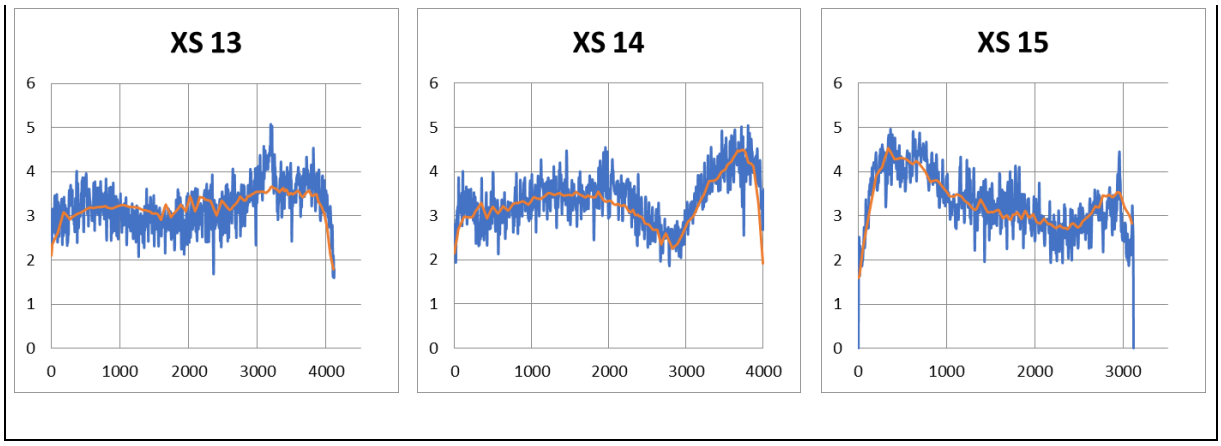


Figure 13 (continued). Open River (May 9, 2022) ADCP Collection Cross Section Views - Note: Y-axis represents velocity in feet per second, X-axis represents stationing in feet

July 21, 2022 - Environmental Pool Calibration

For the environmental pool calibration run, the modeled WSEs at the Grafton Gage were higher than the gage data (about 0.5' higher). At the Alton Gage modeled WSEs higher than the gage data (less than 0.25' higher). Modeled and measured cross sectional velocities generally followed the same trend. The comparison of modeled versus measured WSEs for the environmental pool calibration flow can be seen in Figure 14 and Figure 15 at the Grafton gage and Alton gage, respectively. Figure 16 shows an aerial view of the locations of ADCP collection, and Figure 17 shows the cross-sectional view of the results of the ADCP collection.

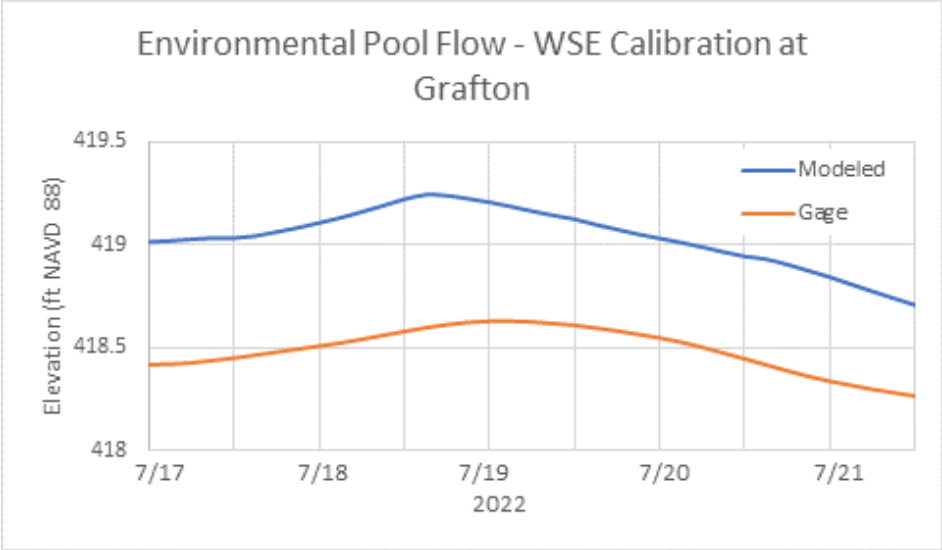


Figure 14. Environmental Pool Flow – WSE Calibration at Grafton

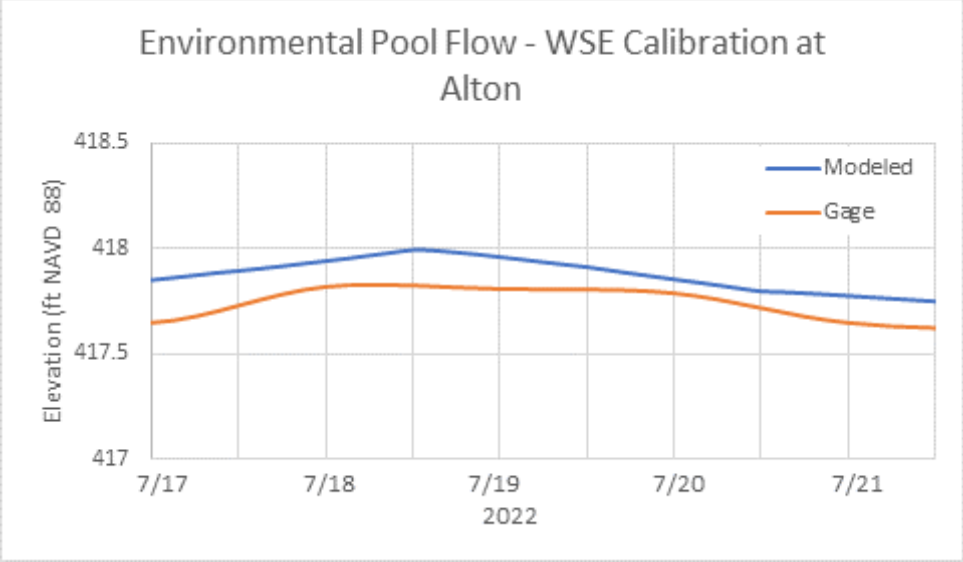


Figure 15. Environmental Pool Flow – WSE Calibration at Alton



Figure 16. Pool River Condition (July 21, 2022) ADCP Collection Aerial View of Cross Sections

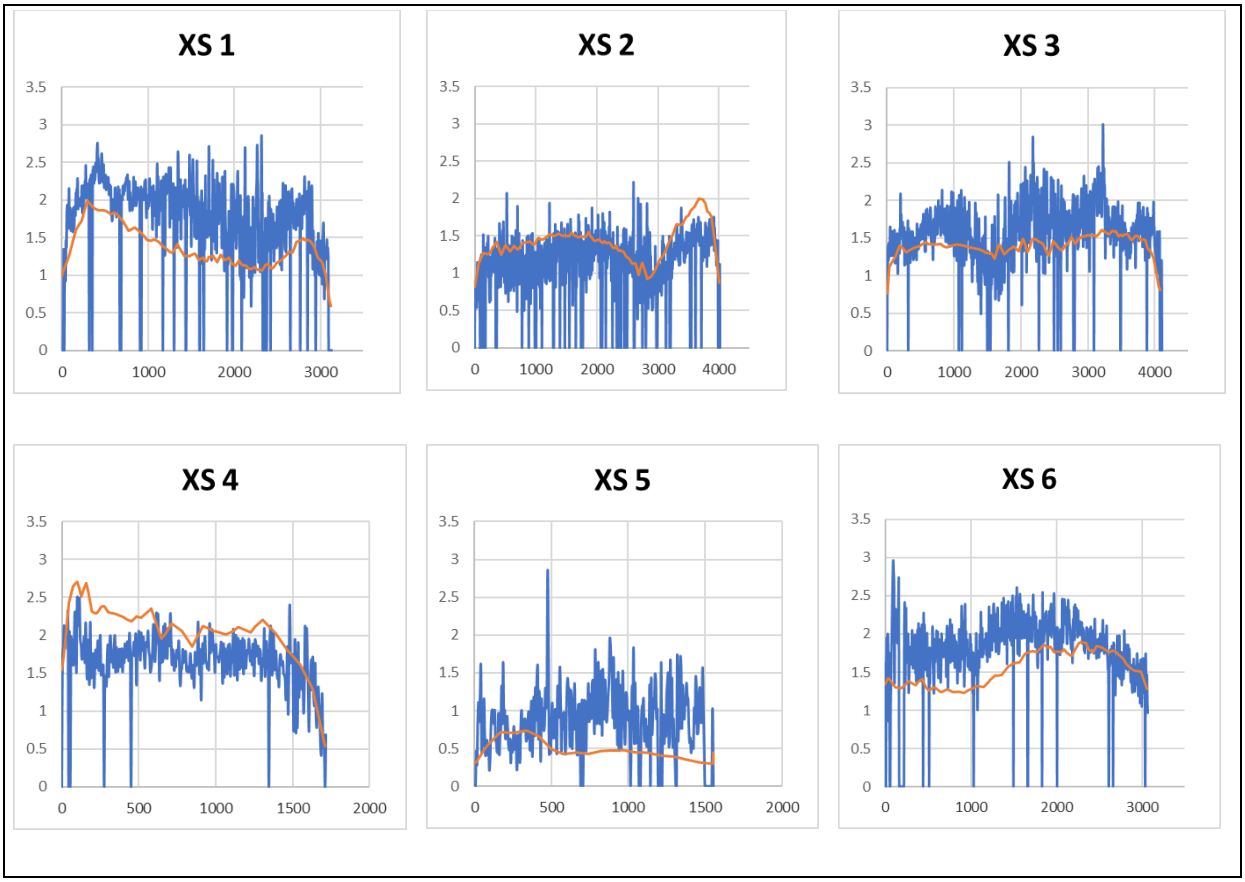
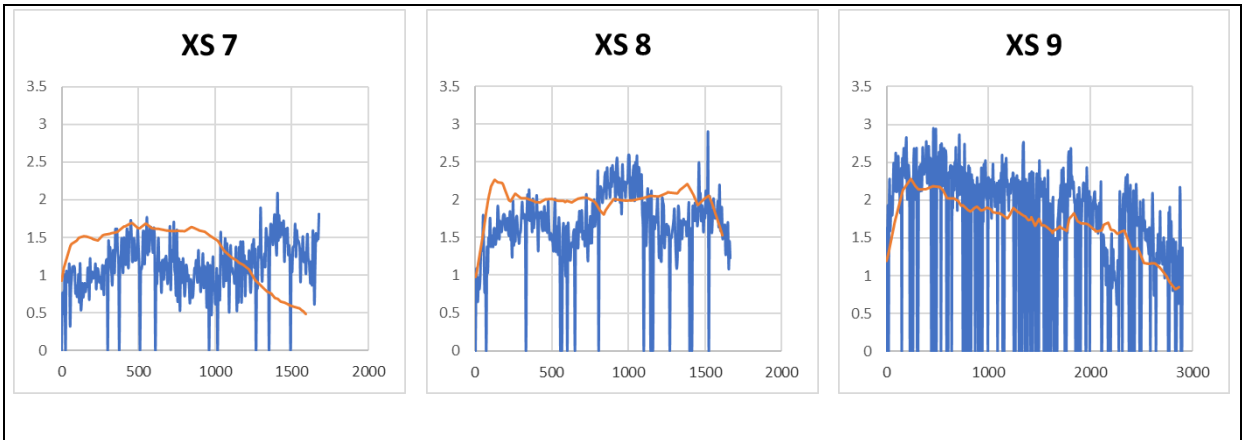


Figure 17. Open River (May 9, 2022) ADCP Collection Cross Section Views - Note: Y-axis represents velocity in feet per second, X-axis represents stationing in feet



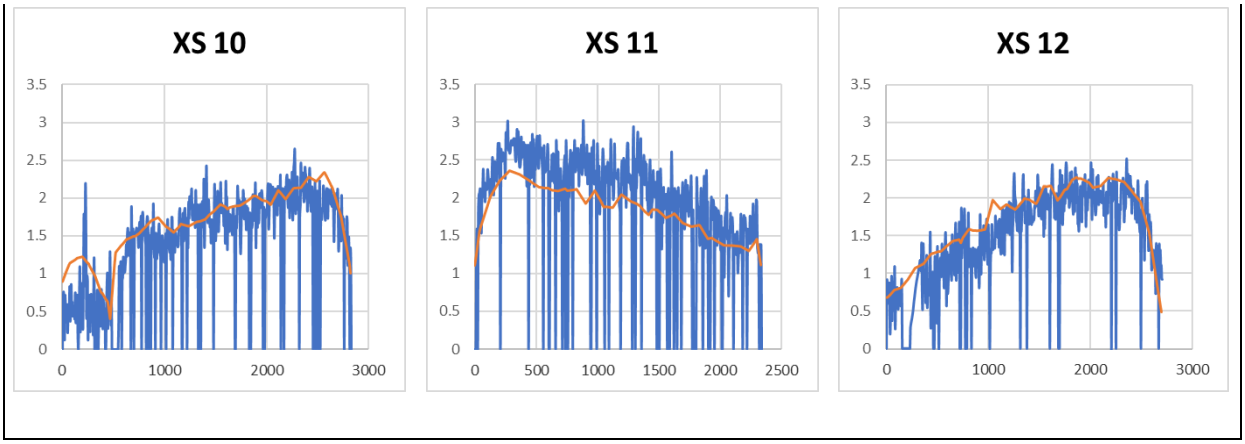


Figure 17 (continued). Open River (May 9, 2022) ADCP Collection Cross Section Views - Note: Y-axis represents velocity in feet per second, X-axis represents stationing in feet

3.10 Validation

After calibrating the model to WSE and velocity data on two different dates, a final check or validation, was run to ensure the model produced reasonable results for a larger range of flows. The model was validated to five months of WSE data (from January 1, 2022 to May 31, 2022) at the Grafton and Alton, Illinois gages.

Note that there is a data gap for the Illinois River at Valley City discharge data from 4/15/2022 – 4/25/2022. Discharge data was interpolated for the missing dates.

Modeled WSEs at Grafton are generally within 0.5 ft of the gage data during the 5-month range of flows and are within 1.0 ft of the gage data for the entire 5-months. Modeled WSEs at Alton are within 0.5 ft of the gage data throughout the 5-months. The WSE comparison between modeled and measured values at the Grafton and Alton gages are shown in Figure 18 and Figure 19, respectively.

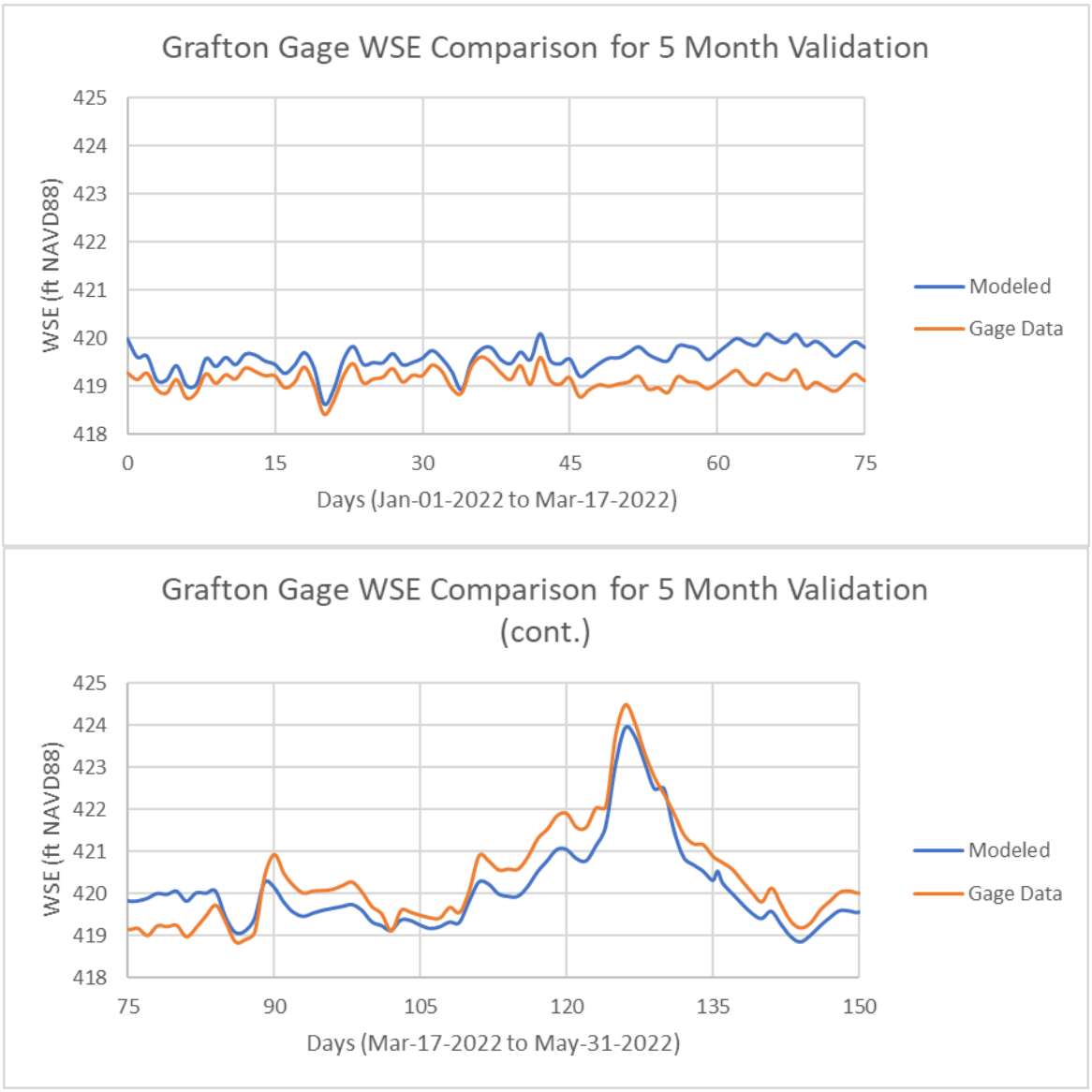


Figure 18. Grafton Gage WSE Comparison for 5-month WSE Validation

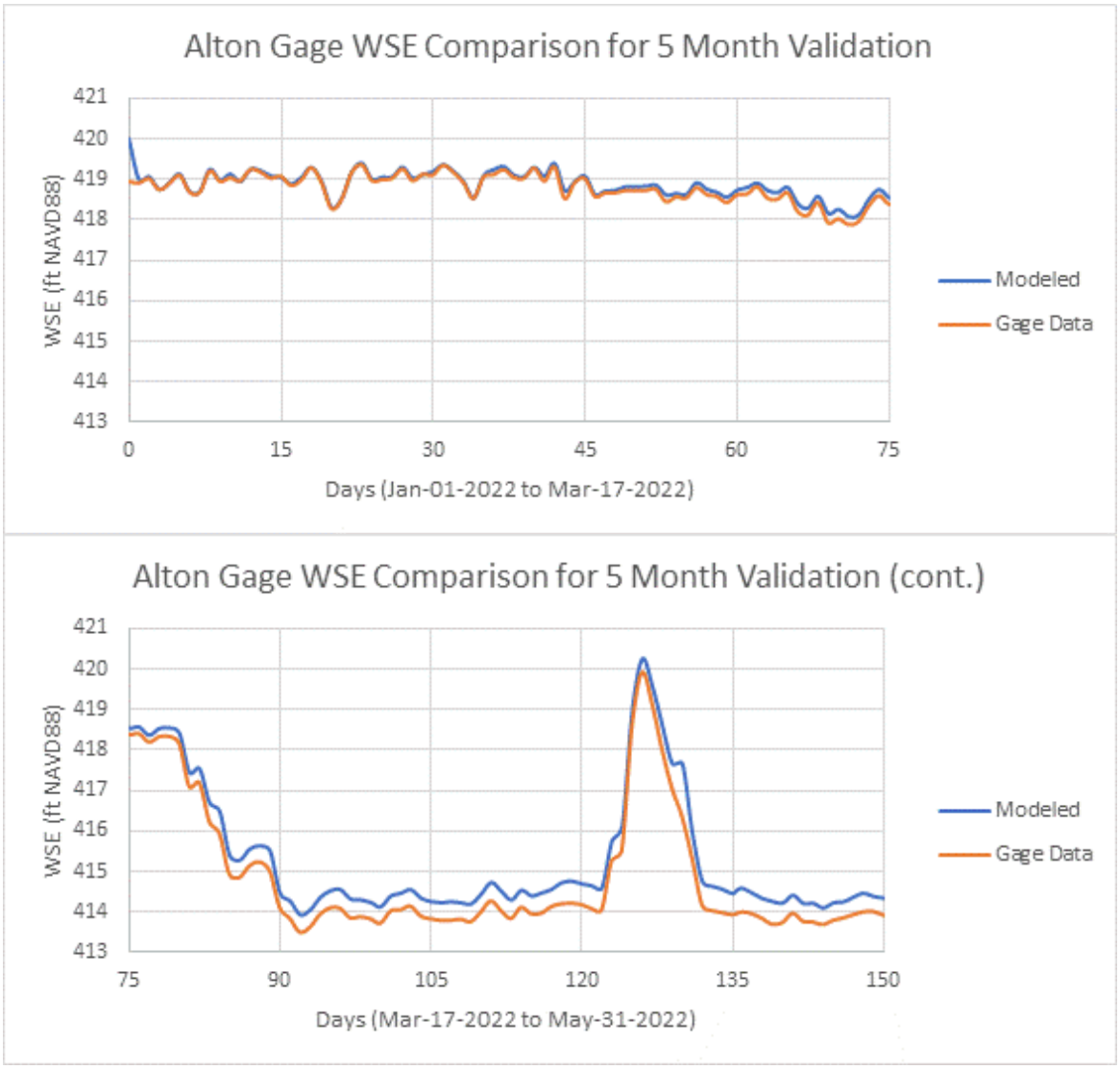


Figure 19. Alton Gage WSE Comparison for 5-month WSE Validation

4.0 TSP Alternatives

4.1 Proposed Design Measures – Dimensions and Quantities

The intermediate alternative design measures were selected as the TSP at each of the project sites. The TSP at each of the sites is shown visually in Figure 20, Figure 21, and Figure 22. Additionally, the proposed dimensions and draft quantities of the design measures are shown in Table 7, Table 8, and Table 9. Both the figures and tables follow the same site ordering: Luesse Lake, Portage Island, then West Alton Bay. Typical sections for a dike and Gradual Sloped Revetment (GSR) are shown in Figure 23 and Figure 24, respectively. Note that the dimensions and quantities will be further refined during the Preconstruction, Engineering and Design (PED) phase of the potential project.

Estimated dredging quantities were calculated using 3D Analyst in ArcGIS. All dredging quantities estimated a 20% loss in material during placement in the containment sites. Stone structure quantities estimates were determined using the Stone Quantity Computation Sheet. The Stone Quantity Computation Sheet provides a quantity of stone per linear foot of structure height in half foot increments for peaked, 6 foot and 10 foot crown widths.

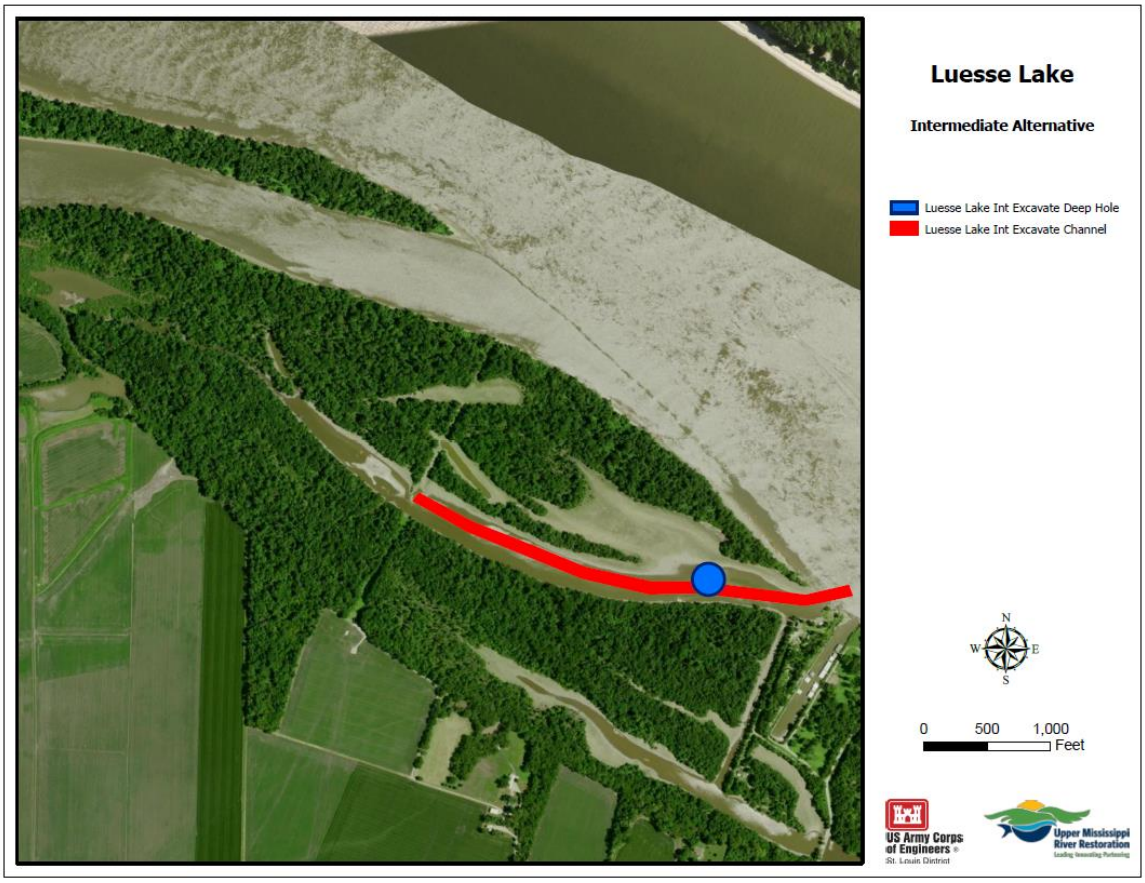


Figure 20. Proposed Measures for Intermediate Alternative at Luesse Lake

The excavation limits at Luesse Lake considers an existing utility that runs from the mainland to the peninsula. Existing utilities will be further investigated during PED.

Table 7. Luesse Lake - Proposed Dimensions and Draft Quantities of Design Measures

Proposed Measure (construction material)	**Elevation** (feet NAVD88)	**Width** (feet)	**Length** (feet)	**Quantities** (as specified)
Excavate Channel (dredge material)	409	100	3,600	145,300 cubic yards
Excavate Deep Hole	409	200	200	26,800 cubic yards

(dredge material)				

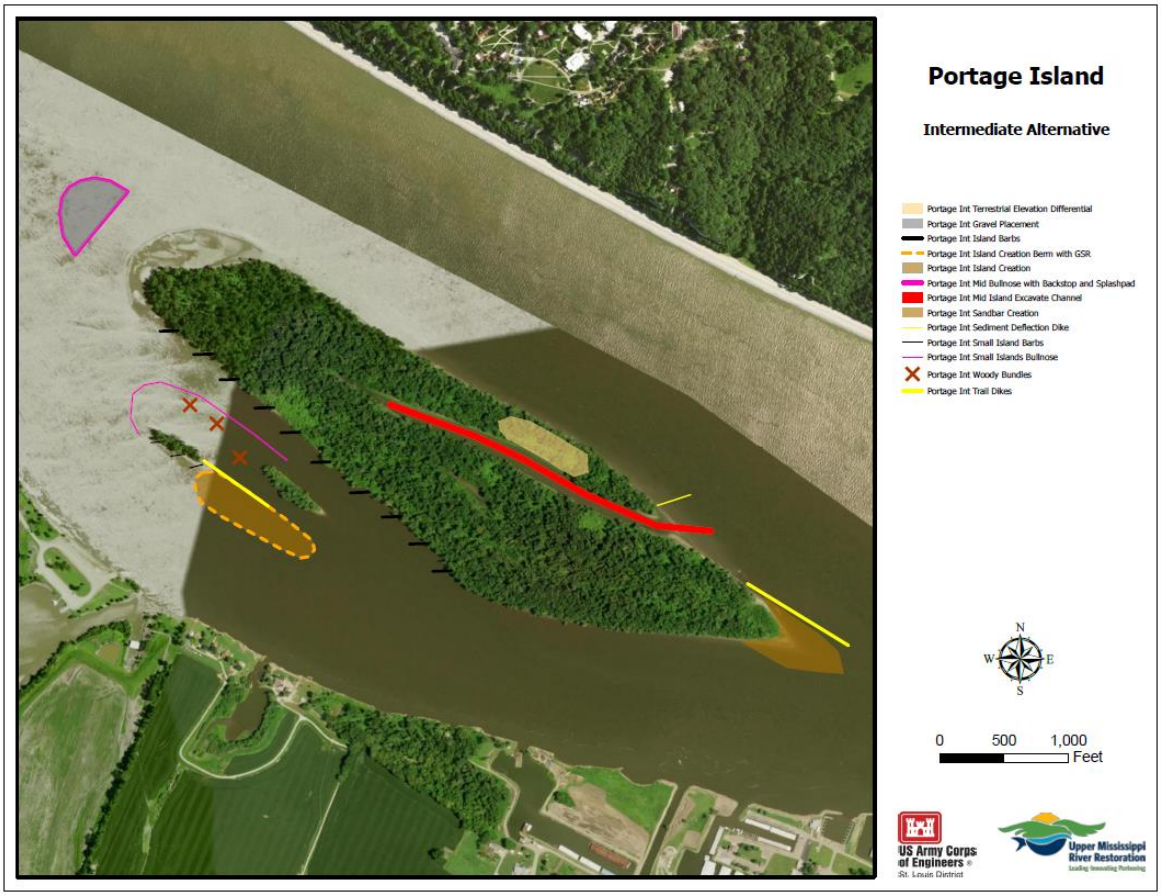


Figure 21. Proposed Measures for Intermediate Alternative at Portage Island

Table 8. Portage Island - Proposed Dimensions and Draft Quantities of Design Measures

Proposed Measure (construction material)	**Elevation** (feet NAVD88)	**Width** (feet)	**Length** (feet)	**Quantities** (as specified)
Mid Island Excavate Channel (dredge material)	409	50	2,650	45,300 cubic yards
Terrestrial Elevation Differential (dredge material)	426	200	800	23,600 cubic yards

Terrestrial Elevation Differential (area of tree removal)	N/A	200	800	3.39 acres
Soil berm for dredge containment (dredge material)	426	TBD	1,800	3,900 cubic yards
Sandbar Creation (dredge material)	island tip to 417.5-418 (sloped)	350	750	40,800 cubic yards
Island Creation (dredge material)	418	250	1,020	87,400 cubic yards (5.54 acres)
Island Creation Berm with GSR (The crown is A-stone, and the GSR is C-stone)	418	2 (crown width)	1,070 ft long upstream to downstream	2 ft crown: 24,480 tons GSR: 23,800 tons
Trail Dike, downstream Island tip (A-stone)	421	6 (crown width)	930	37,300 tons
Sediment deflection dike, dredged channel entrance (A-stone)	421	6 (crown width)	275	6,600 tons
Mid Bullnose with Backstop and Splashpad (A-stone)	417	6 (crown width)	1,150	23,600 tons
Portage Island barbs (A-stone)	421 to bed (sloped)	2 (crown width)	150	9,300 tons
Small Island barbs (A-stone)	421 to bed (sloped)	2 (crown width)	100	1,200 tons

Woody Bundles (wood timbers, concrete block anchors, cabling)	N/A	1-2	12+	15 wood timbers, 3 concrete block anchors, cabling
Gravel Placement (3"-4" stone size)	1 foot above existing bed	570	380	5,815 cubic yards (3.03 acres)
Small islands bullnose (A-stone)	421	6 (crown width)	2,330	28,368 tons

Note: N/A indicates that the attribute did not apply to the specific feature

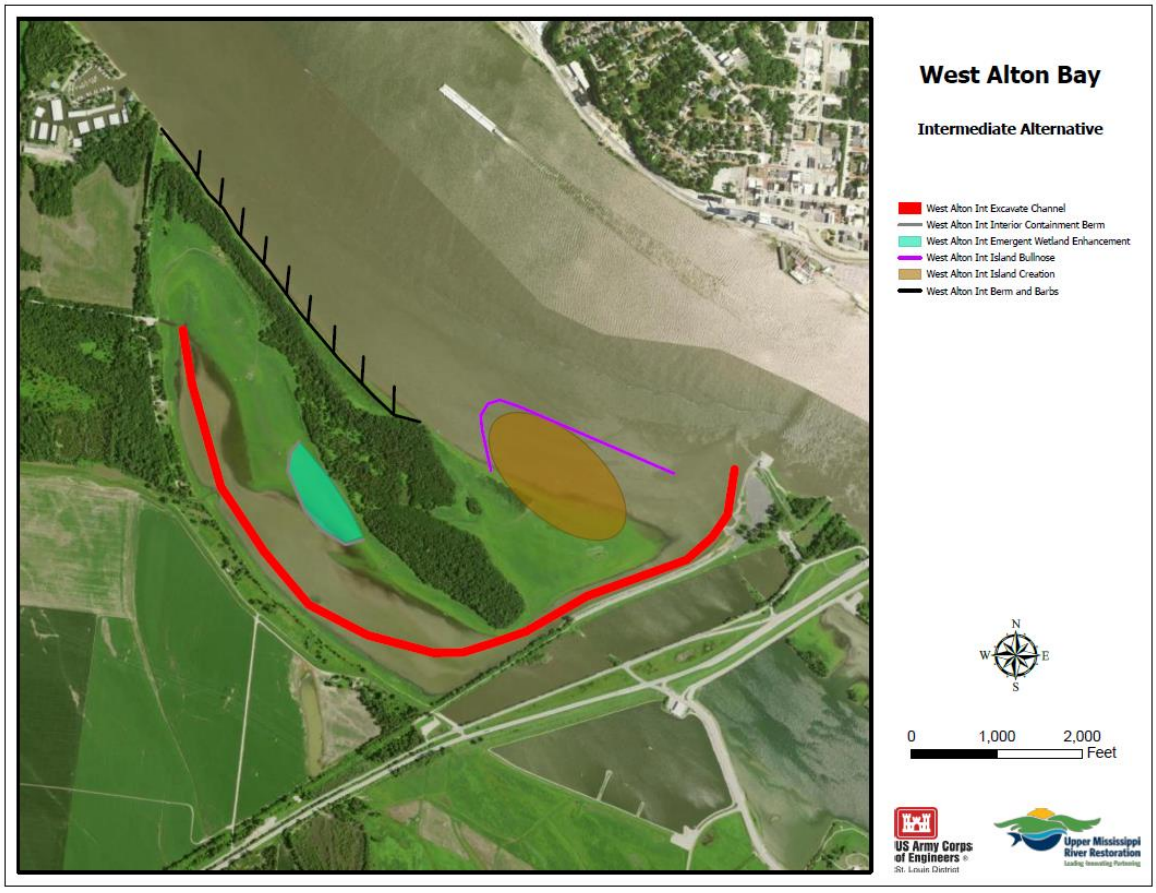


Figure 22. Proposed Measures for Intermediate Alternative at West Alton Bay

Table 9. West Alton Bay - Proposed Dimensions and Draft Quantities of Design Measures

Proposed Measure (construction material)	**Elevation** (feet NAVD88)	**Width** (feet)	**Length** (feet)	**Quantities** (as specified)
Berm and Barbs (A-stone)	Berm: 421 (2 feet above terrestrial area) Barbs: 421 to bed (sloped)	Berm: 2 (crown width) Barbs: 2 (crown width)	Berm: 4,650 Barbs: 320	22,500 tons
Excavate Channel (dredge material)	408	100	9,000	273,700 cubic yards
Emergent Wetland Enhancement (construction? material)	418	420	1,290	29,600 cubic yards (10.51 acres)
Interior Containment Berm (A-stone)	418	2 (crown width)	1,750	5,700 tons
Island Bullnose (A-stone)	420	6 (crown width)	3,200	37,200 tons
Island Creation (dredge material)	418	1,000	1,900	199,100 cubic yards (35.12 acres)

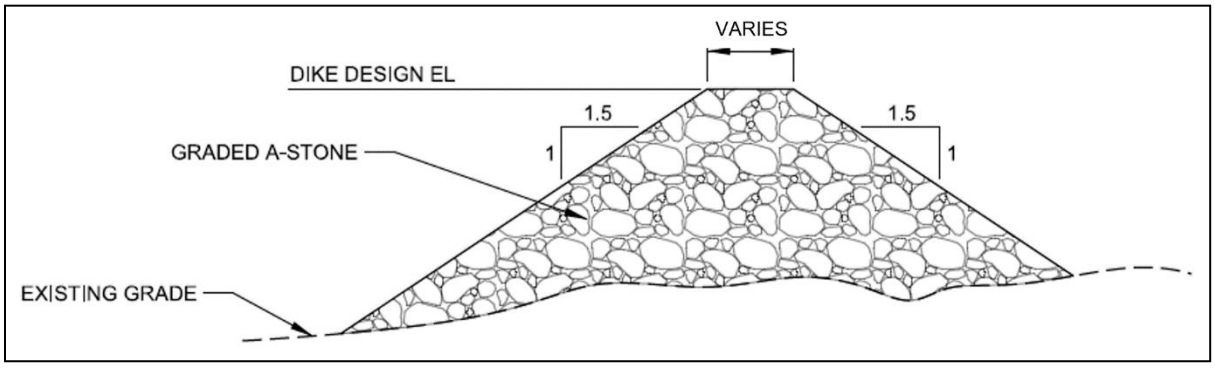


Figure 23. Typical Dike Section

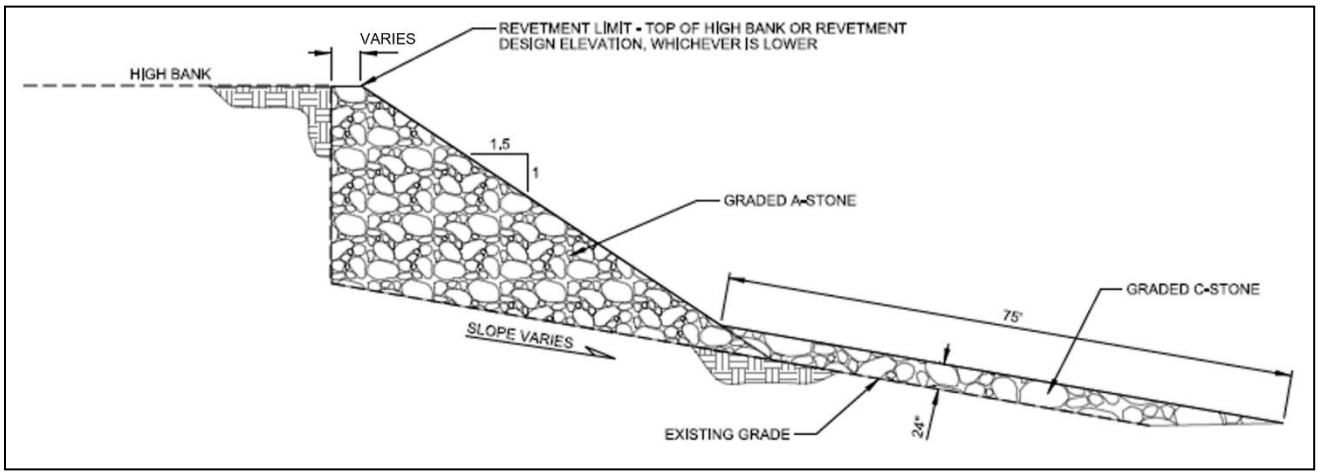


Figure 24. Typical Gradual Sloped Revetment Section

4.2 Alternatives Testing

After calibration and validation, the hydraulic model was used for alternative testing. The minimum, intermediate, and maximum alternatives at Luesse Lake, Portage Island, and West Alton Bay were all evaluated using the hydraulic model. Adjustments were made to each of these alternatives to make them all hydraulically viable options. The hydraulic results of the TSP (the intermediate alternative) are discussed and shown visually in this section.

The results at Luesse Lake and Portage Island are shown together in Figure 25. The first part of the figure shows the terrain elevations for the existing and proposed conditions. The following three parts of the figure show velocity magnitudes (and direction) for three flow conditions: environmental pool, max drawdown, and open river. The material boundaries (the boundaries inform the model where manning's n-values can change) are also shown on the velocity plots so the area can be easier visualized. Little to no change in velocities is seen from the addition of measures at Luesse Lake, since these measures are all contained within backwater areas. For all three flow conditions shown, the addition of measures around Portage Island constrict the flow area (particularly within the side channel) leading to an increase in velocities in main channel and the remaining portion of the side channel. Further analyses should be performed during PED to verify that the sediment deflection dike upstream of the dredge cut on Portage Island will help keep the outlet of the dredge cut clear of sediment deposits.

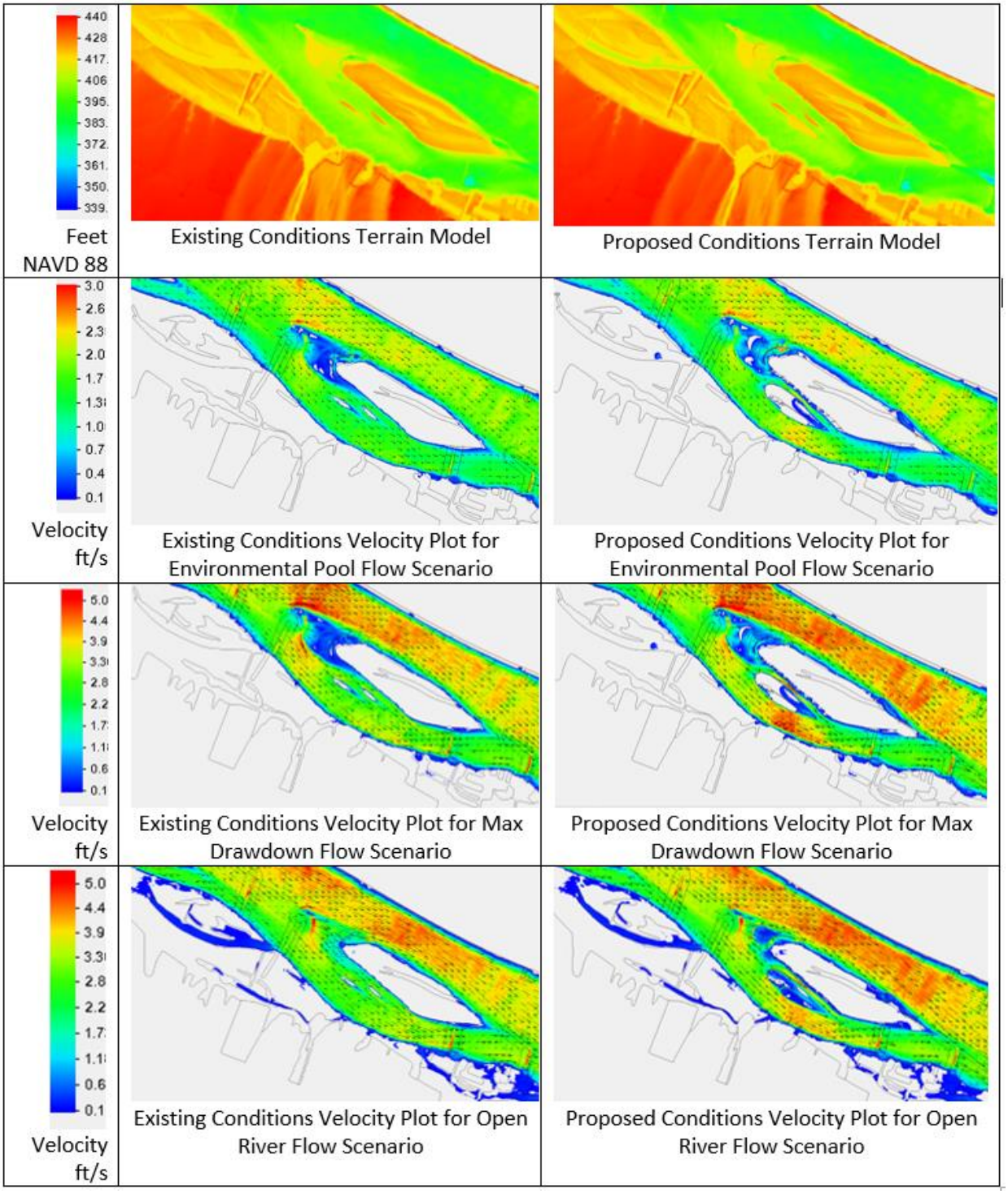


Figure 25. Hydraulic model results at Luesse Lake and Portage Island

The results at West Alton Bay are shown together in Figure 26. Similar to Figure 25, the first part of the figure shows the terrain elevations for the existing and proposed conditions. The following three parts of the figure show velocity magnitudes (and direction) for three flow conditions: environmental pool, max drawdown, and open river. The material boundaries (the boundaries inform the model where manning's n-values can change) are also shown on the velocity plots so the area can be easier visualized. The proposed measures at West Alton Bay are mostly out of moving water during max drawdown, leading to little difference in velocities between the existing and proposed conditions for this flow scenario. At environmental pool, there are decreased velocities near the proposed island creation and bullnose; however, since the velocities in this area are low during the existing conditions, the addition of the island creation and bullnose has no noticeable effect on the velocities in the main channel. The biggest effects of the proposed measures at West Alton Bay can be seen at an open river flow condition. In addition to the decreased velocities due to the addition of the island creation and bullnose (as discussed for the environmental pool condition), the berm and barb causes less overtopping (and water movement) in the backwater area. These changes still have little to no effect on the velocities in the main channel. A discussion of impacts to WSE can be found in section 6.0 No Rise Requirements.

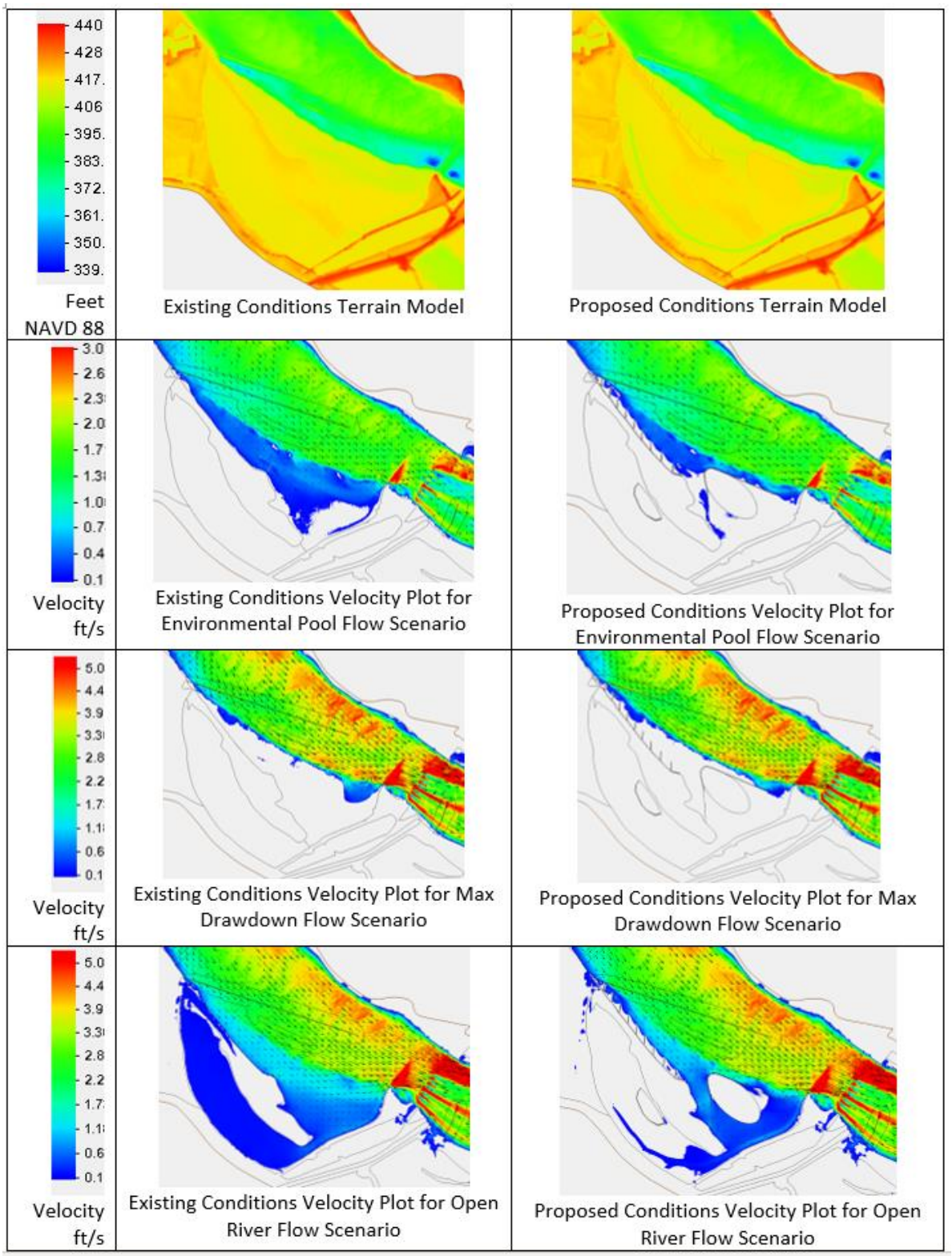


Figure 26. Hydraulic model results at West Alton Bay

5.0 Navigation Impacts

The proposed conditions were analyzed for potential impacts to navigation on the Mississippi River. Looking at a range of flows (environmental pool, max drawdown, and open river), this was checked in two ways: 1) a comparison of flow in the main channel between the existing and proposed conditions, and 2) the difference of velocities in the main channel between the existing and proposed conditions.

For the main channel flow comparisons between existing and proposed conditions, Luesse Lake and Portage Island were lumped together due to their close proximity. This location showed main channel flow increases ranging from two to three percent for all of the flow conditions. At West Alton Bay, there was a zero percent flow change for each of the flow scenarios evaluated. Since there is not a significant decrease in flows, this part of the analysis did not indicate that there would be negative impacts to navigation.

The proposed measures induced localized slower velocities around the measures, but the decreases in velocities do not propagate into the main navigation channel. There are velocity increases in the main navigation channel near Portage Island. The greatest increases in velocity occur for the Max Drawdown and Open River flow conditions. The greatest increases are less than 0.6 ft/s (approximately a 15% increase). There are no noticeable increases in velocity in the main channel near West Alton Bay. With no noticeable decreases in velocity and minimal increases in velocity in the main navigation channel, the velocity comparison did not indicate a negative navigational impact.

Overall, the proposed conditions are assumed to have no negative impacts to navigation conditions.

6.0 No Rise Requirements

A no-rise analysis was performed to document impacts to flood events due to the proposed changes. The existing conditions model was validated to WSEs from the Upper Mississippi River System Flood Flow Frequency Study (FFFS) (USACE 2004). Then, the existing conditions model was modified for the proposed conditions, and water surface profiles were compared.

For the no rise analysis, flows and WSEs from the FFFS were used in the model, then the WSE of the AdH model and 2004 FFFS were compared for the 50%, 20%, 10%, 4%, 2%, 1%, 0.5%, and 0.2% AEPs. The results of this comparison can be seen inFigure 27.

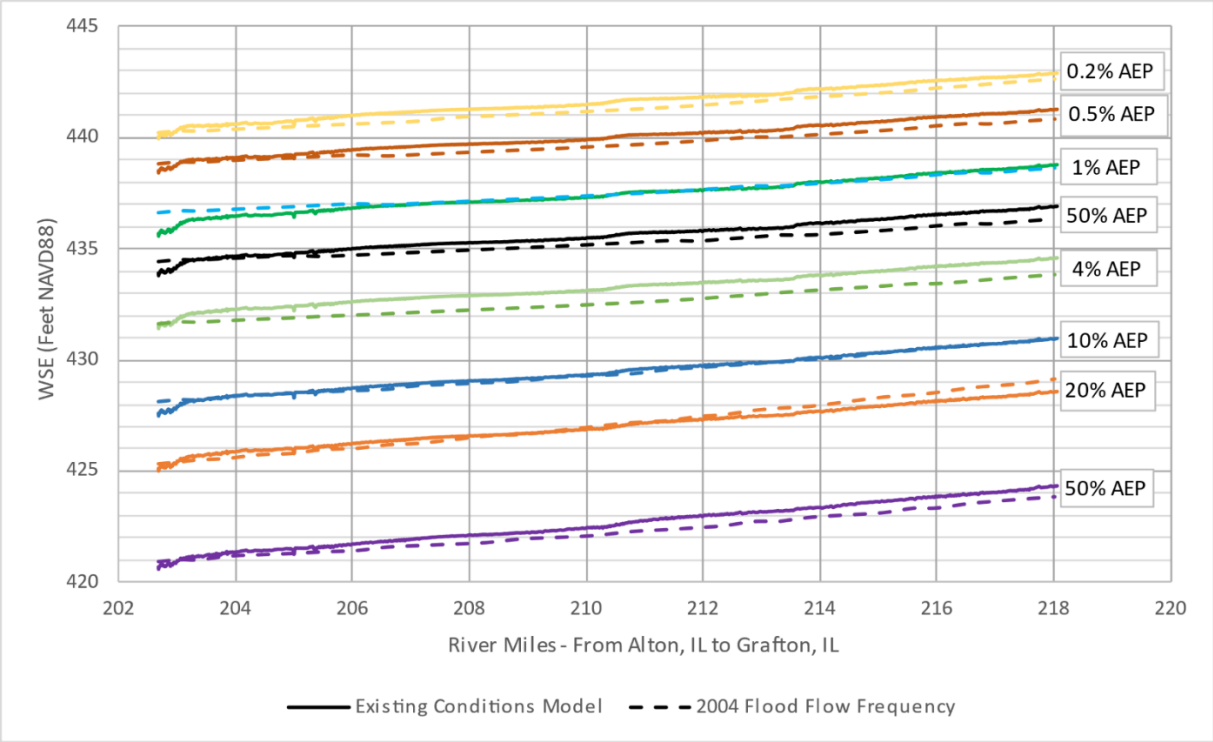


Figure 27. Comparison of Existing Conditions and 2004 FFFS WSEs

As seen in Figure 27, modeled WSEs are generally within 0.5 feet of the WSEs from the 2004 FFFS with slightly better matches for the 10% and 1% AEPs. These WSE comparisons are comparable to the WSE comparisons during the initial calibration to lower flows, and therefore no adjustments were made to the model.

After the proposed measures were incorporated into the AdH model, WSE comparisons were made between the existing and proposed AdH model results. These results showed minimal rise along the main channel of the Mississippi River. The maximum rise along the main channel of the Mississippi River was shown to be 0.07 feet and 0.02 feet for the 50% and 1% AEPs, respectively. The maximum decrease in WSE along the main channel of the Mississippi River was shown to be -0.01 feet and -0.02 feet for both the 50% and 1% AEPs, respectively. The 2- and 100-year rise profile comparisons are broken up by the Mississippi River from Alton, Illinois to Grafton, Illinois (Figure 29); the Illinois River from Grafton, Illinois to Hardin, Illinois (Figure 30); and the Mississippi River from Grafton, Illinois to RM 232 on the Mississippi River (*Figure 31*). The location of these WSE comparisons is shown graphically by three uniquely colored polylines in Figure 28.

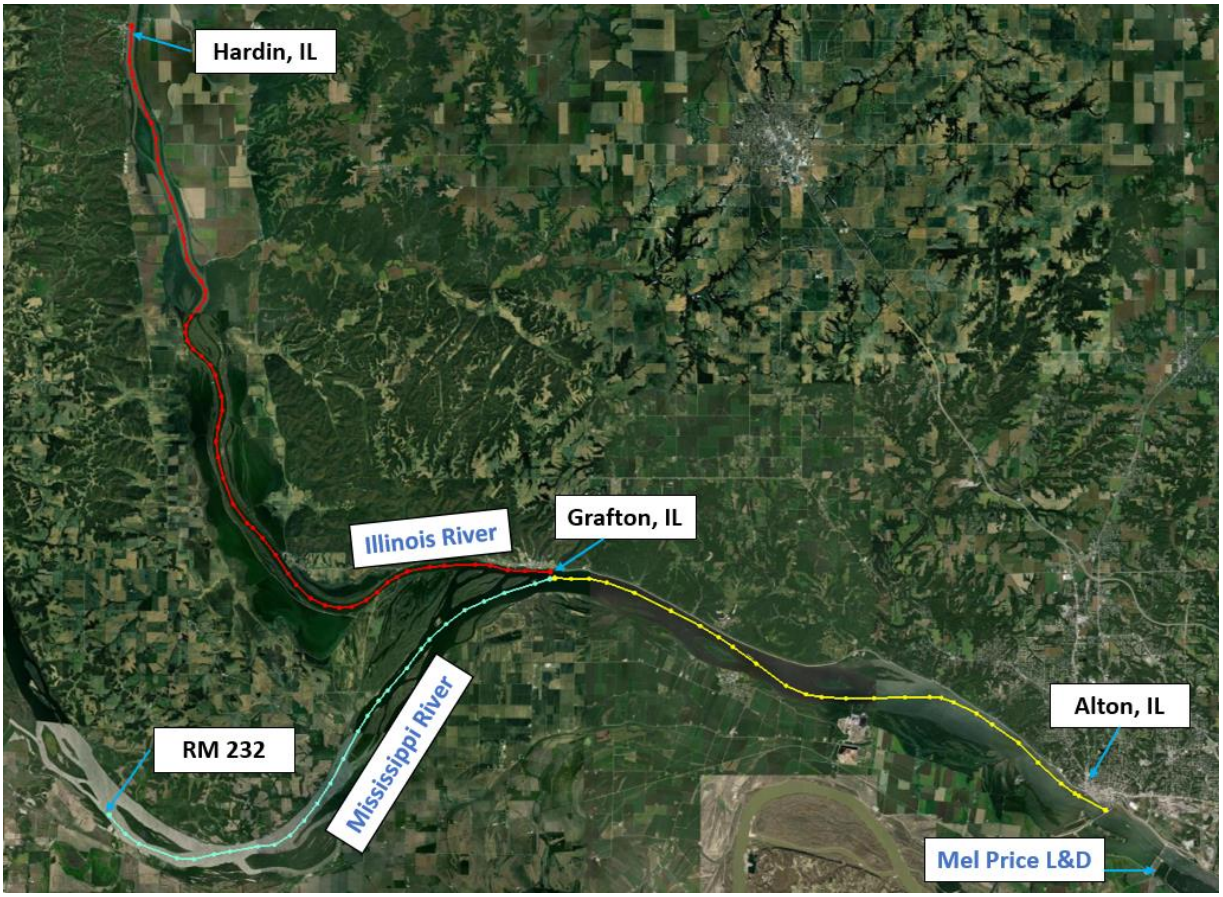


Figure 28. WSE Comparison Lines

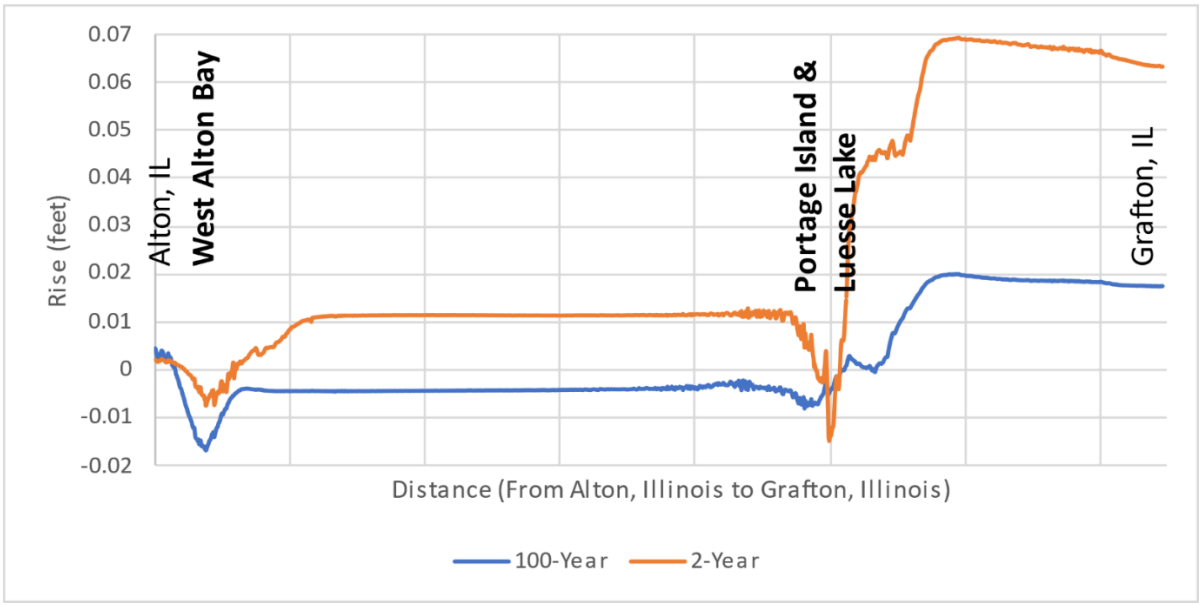


Figure 29. WSE Comparison (Proposed minus Existing) for Mississippi River from Alton, Illinois to Grafton, Illinois

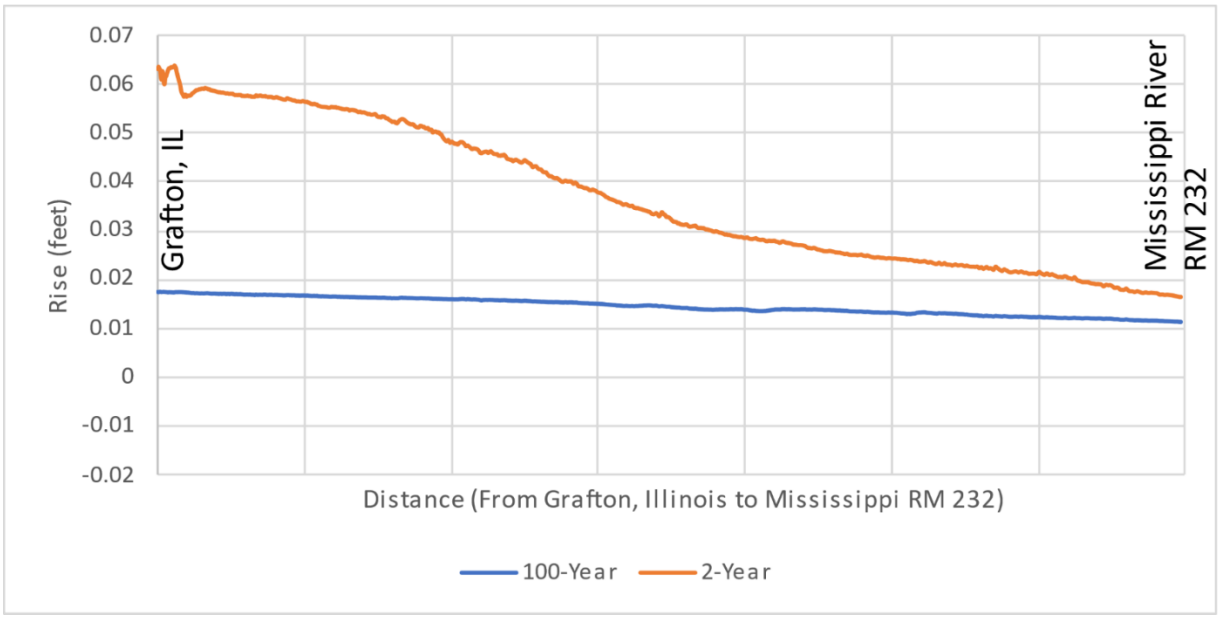


Figure 30. WSE Comparison (Proposed minus Existing) for Mississippi River from Grafton, Illinois to RM 232

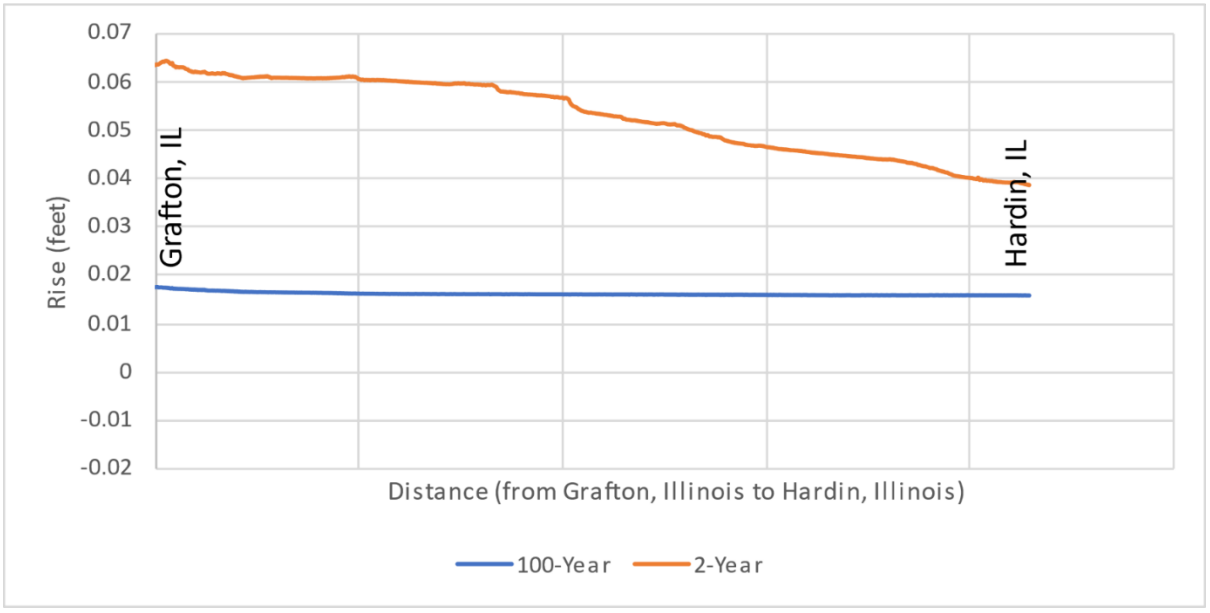


Figure 31. WSE Comparison (Proposed minus Existing) for Illinois River from Grafton, Illinois to Hardin, Illinois

In Figure 29, localized decreases in the 'rise' can be seen near the project locations because velocities are increased around the measures. Upstream of Portage Island (also in Figure 29) the model shifts towards a greater difference between the WSEs

because some flow (about 0.2% of the total flow for the 50% AEP) is being backed up due to the measures. However, this model does not account for scour or bed mobility. In practice, increased velocities will lead to sediment movement, decreasing bed elevations, allowing the flow to move past the project area.

General inferences about rise can be taken from the model for the areas upstream of the confluence of the Mississippi and Illinois Rivers. As seen in Figure 30and *Figure 31*, he 'rise' decreases the further it goes upstream. Greater impacts can be seen further upstream on the Illinois River because it is less steep.

In addition to the impacts to the main channel, the model also shows more localized impacts for areas of concern. There is an area of backwater lakes across the river from Grafton, Illinois on the Missouri side of the Mississippi River (upstream of the project areas). The 2D model can quantitatively show changes in water surface elevation through color overlaid on the area of concern, as indicated in the figure legends. Note that a rise of greater than 0.1 feet. is shown in red. For the 50% AEP, the model is showing increased rise (maximum of 0.75 – 0.10 feet) in these lakes as compared to the main channel, as shown in Figure 32. The rise in these lakes is from additional backwater; however, as previously mentioned, this is a static bed model, which does not represent the actual conditions of the river. Increased velocities will cause bed mobility, increasing flow, lowering the rise seen in this area.

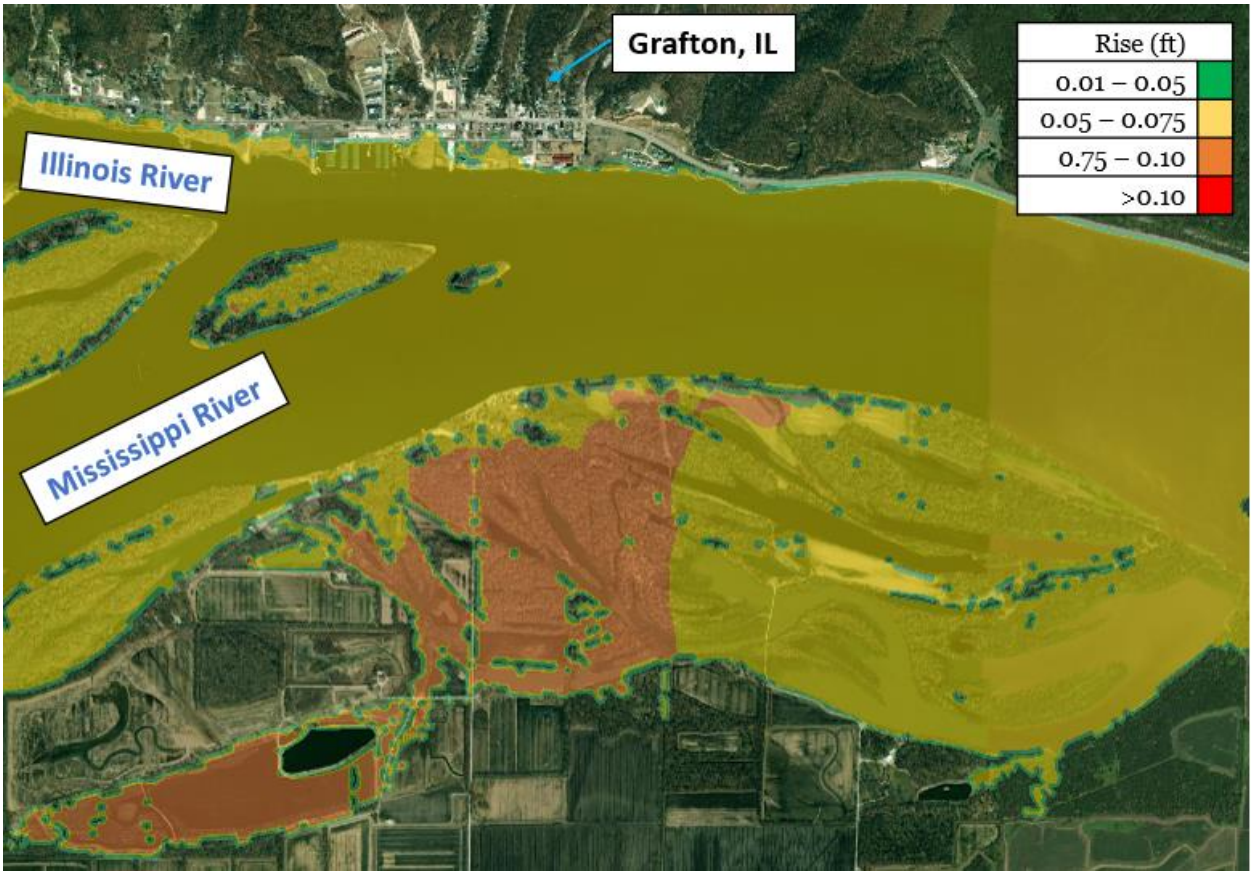


Figure 32. Rise in Backwater Lakes Upstream of Project Areas.

The findings close to the project areas are similar to the findings in the main channel; the rise is higher for the 50% AEP than the 1% AEP. These impacts can be seen in Figure 33(Luesse Lake and Portage Island project areas) and Figure 34(West Alton Bay project area).

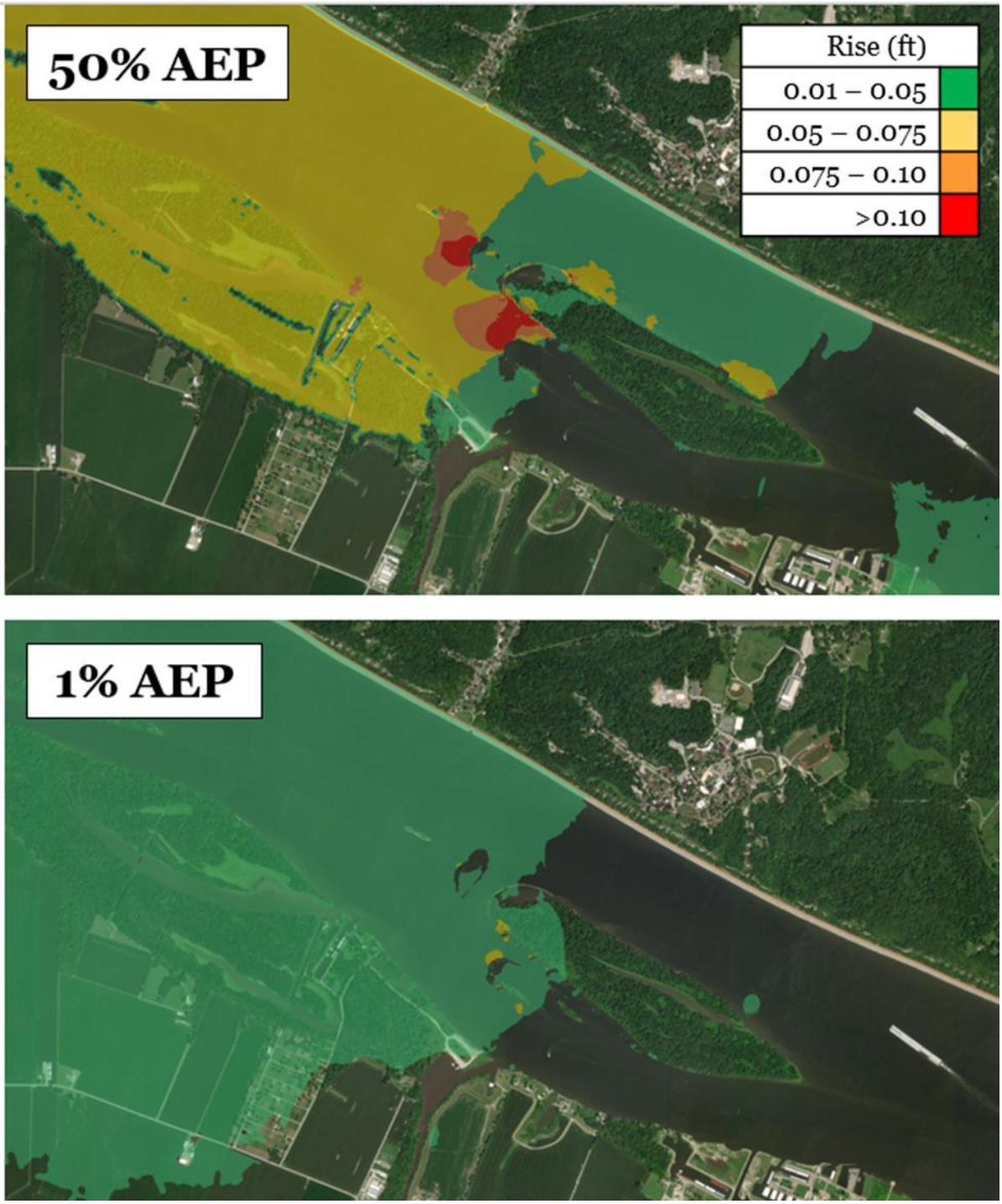


Figure 33. Project Impacts around Portage Island and Luesse Lake.

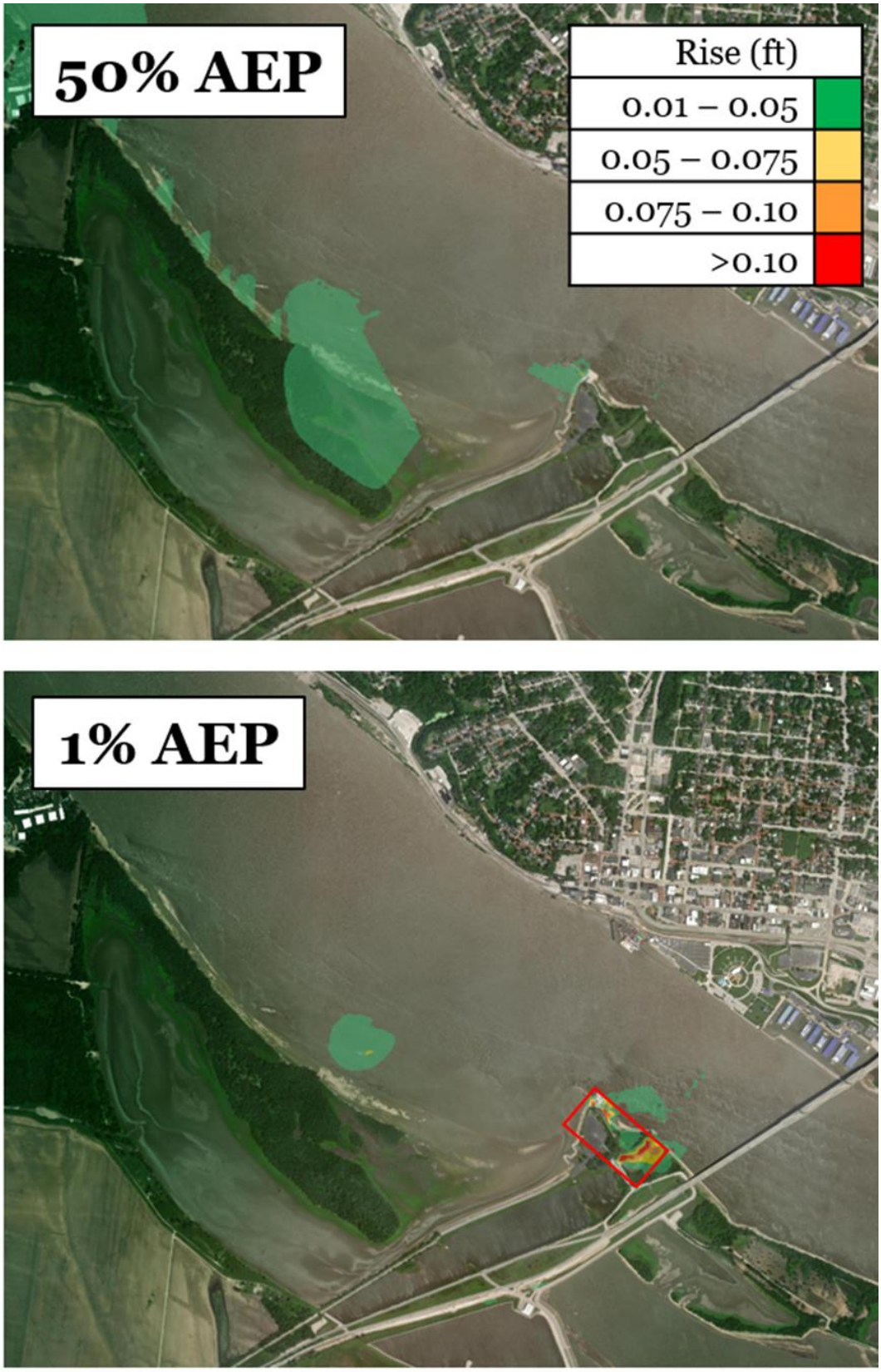


Figure 34. Project Impacts around West Alton Bay.

Figure 33 shows two areas with rise over 0.1 feet directly upstream of proposed measures for the 50% AEP. Localized rise in these areas is expected, and the rise is contained within federal lands. Figure 34shows rise over 0.1 feet in the federally owned Lincoln Shields Recreation Area (called out by a red rectangle in the figure) for the 1% AEP. This modeled rise is due to a lack of model resolution over the land in this area, which is causing unrealistic simulated flow over the old railroad in this area (approximately 3 percent of the total 1% AEP event). However, due to time constraints and this being federal land, the model resolution was not added to remove the simulated rise greater than 0.1 feet in this area.

In summary, this analysis shows a maximum main channel rise of 0.02' and a decrease in WSE of 0.02' for the 1% AEP. In addition, the 50% AEP showed a maximum main channel rise in WSE of 0.07' and a decrease in WSE of 0.01'. The 50% AEP also showed impacts greater than 0.1' directly upstream of two of the proposed measures; however, this rise is expected and on federal land. In summary, other than on federally owned land, impacts of this project lead to a rise of no more than 0.07'. The increase does not exceed the Illinois Department of Natural Resources (IDNR) restriction of 0.1' for urban areas (or 0.5' for rural areas) proving that the impacts from the proposed measures are within acceptable limits. More details of the no-rise analysis can be found in the No-Rise Report, which follows the H&H report in this appendix.

7.0 Conclusions

In summary, an AdH model was used to develop and evaluate alternatives to restore ecosystem structure and function at Luesse Lake, Portage Island, and West Alton Bay. The calibration and validation effort yielded WSEs within 1.0' of gage data at Grafton, Illinois and Alton, Illinois. Modeled velocities followed the same general trends as measured velocities around project areas. This hydraulic model was then used to evaluate the project alternatives. The TSP does not show any negative impacts to navigation or any significant WSE rise.

UPPER MISSISSIPPI RIVER RESTORATION

DRAFT FEASIBILITY REPORT

WITH INTEGRATED ENVIRONMENTAL ASSESSMENT

WEST ALTON ISLANDS HABITAT REHABILITATION AND ENHANCEMENT PROJECT

Appendix H: Climate Assessment

US Army Corps of Engineers ®
St. Louis District

Mississippi River
Miles 203-215.5
St. Charles County, Missouri
Project Partners: Missouri Department of Conservation & U.S. Fish and Wildlife Service

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West Alton Islands Habitat Rehabilitation and Enhancement Project Climate Change Assessment

1.0 ECB 2018-14 Analysis of Potential Climate Change Vulnerabilities

This assessment is performed to highlight existing and future challenges facing the study area due to climate change and is conducted in accordance with United States Army Corps of Engineers' (USACE) Engineering Construction Bulletin (ECB) 2018-14, *Guidance For Incorporating Climate Change Impacts To Inland Hydrology In Civil Works Studies, Designs, and Projects*, revised 19 August 2022. In accordance with ECB 2018-14, this evaluation identifies potential climate change vulnerabilities for the West Alton Islands Habitat Rehabilitation and Enhancement Project (HREP). The study area is separated into three project sites (Luesse Lake, Portage Island, and West Alton Bay) that are located on the right descending bank of the Mississippi River between River Miles (RM) 203-215.5 in St. Charles County, MO. This assessment highlights existing and future climate change driven risks for the study area. Study background information can be found in the main report, and more general background information on climate change driven risk can be found in ECB 2018-14.

2.0 Study Background

West Alton Islands HREP aims to restore the island and backwater complexes through increased flow diversity and hydraulic connectivity. The goal of any potential project is to restore and improve the quality and diversity of backwater, side-channel, sandbar, island, wetland, and floodplain forest resources within the study area. The objectives identified to meet this goal are to:

- Restore diversity of bathymetry, flow, and connectivity of aquatic areas throughout project area (side channels, main channel, off channel, backwaters, etc.)
- Restore diverse island mosaics throughout project area (sand bars, islands; reduce wind fetch and wave impacts)
- Restore native vegetation diversity and structural complexity throughout potential project area (wetlands, forests, etc.)

Human alterations to the Upper Mississippi River (UMR) channel along with land use changes in the floodplain and UMR basin over the past two centuries have altered hydrology in the study area. These alterations have decreased side-channel, backwater, sandbar, island, and wetland habitat diversity and quality in the study area. The existing stressors are expected to remain, resulting in a continued decline in habitat quality. The proposed project outlines an opportunity to improve habitat quality and diversity in the study area. The specific problems as they relate to the study area include:

1. Backwater sedimentation can affect the overall habitat quality through poor water quality, shallow depths, and loss of connectivity. Loss of connectivity can also result in fish entrapment.

2. Loss of side channel flow and depth diversity decreases habitat function and availability for native riverine species.
3. Loss of sandbars and islands reduce available habitat for aquatic and terrestrial species and accelerate bank and island erosion resulting from increased wind and wave action.
4. Loss of topographic and hydrologic diversity reduces vegetative community diversity and wildlife resources (e.g. forage, invertebrate production, and nesting sites and resting sites).

Ecosystem restoration is the focus of this analysis because the proposed project aims to restore the island complex through increased flow diversity and hydraulic connectivity. Future climate conditions may impact the establishment and design of project measures. As indicated by the U.S Geological Survey (USGS) in their 2022 report, *Ecological Status and Trends of the Upper Mississippi and Illinois Rivers*, hydrologic indicator variables most relevant to the ecological health of a watershed are defined as annual discharge (maximum, mean, and minimum), duration of high discharges (exceeding the 20% annual exceedance probability (AEP) discharge), and monthly mean discharge. Thus, to analyze the effects of climate change on ecosystem restoration measures for this study, the annual average streamflow records are evaluated since they are representative of flows impacting project measures throughout the year.

3.0 Literature Review

The *Fourth National Climate Assessment* (NCA4) and the USACE *Civil Works Technical Report CWTS-2015-13,* as well as state and watershed specific resources published by the National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (NCEI) and the U.S. Geological Survey (USGS) are the basis for this literature review. The focus of these references is on summarizing trends in historic, observed temperature, precipitation, and streamflow records, as well providing an indication of future, climate-changed hydrology based on the outputs from Global Climate Models (GCMs). For this assessment, background on observed and projected temperature and precipitation is provided as context for the impact that they have on observed and projected streamflow.

The NCA4 considers climate change research at both a national and regional scale (USGCRP, 2018). *Civil Works Technical Report CWTS-2015-13* was published as part of a series of regional summary reports covering peer-reviewed climate literature. The 2015 USACE Technical Reports cover 2-digit, United States Geological Survey (USGS), hydrologic unit code (HUC) watersheds in the United States (U.S). West Alton Islands are located in 2-digit HUC 07, the Upper Mississippi Region (USACE, 2015) and in the NCA4 Midwest climate region.

In many areas, temperature, precipitation, and streamflow have been measured since the late 1800s and provide insight into how the hydrology in the study area has changed over the past century. GCMs are used in combination with different representative concentration pathways (RCPs) reflecting projected radiative forcings up to year 2100 to model future climate. Radiative forcings encompass the change in net radiative flux due to external drivers of climate change, such as, for example changes in carbon dioxide or land use/land cover. Projected temperature and precipitation results can be transformed to regional and local scales (a process called downscaling) for use as inputs in precipitation-runoff models (Graham, Andreasson, and Carlsson, 2007). Uncertainty is inherent to projections of temperature and precipitation due to the GCMs, RCPs, downscaling methods, and many assumptions needed to create projections (USGCRP, 2017). When applied, precipitation-runoff models introduce an additional layer of

uncertainty. However, these methods represent the best available science to predict future hydrologic variables (e.g. precipitation, temperature, streamflow). Many researchers use multiple GCMs and RCPs in their studies to understand how various model assumptions impact results (Gleckler et al., 2008).

Temperature. Based on observed temperature records, the annual, average air temperature between 1986 and 2016 for the Midwest has increased by 1.26°F from the 1901-1960 annual average temperature (USGCRP, 2017). Increasing temperatures can accelerate snowmelt and lengthen the frost-free season (Carelton and Hsiang, 2019; Liu, Goodrick, and Stanturf, 2013; Woodward, Perkins, and Brown, 2010). Many studies indicate a change in the seasonality in the region, marked by increasing winter temperatures and early spring melt (Schwartz, Ault, and Betancourt, 2013; Wang et al., 2009; Wolter et al., 2015; Westby, Lee, and Black, 2013). GCM based, projections of temperature for the Midwest show a statistically significant increase in both annual, average temperature and the number extreme heat days over the next century (Vavrus and Behnke, 2014).

In Missouri, observed temperatures have risen almost 1°F since the beginning of the 20th century (NOAA, 2022). Temperatures since 2000 have been higher than any other historical period, apart from the Dust Bowl in the early 1930s. Warming has been concentrated in the winter and spring, but recent summers have experienced much higher nighttime minimum temperatures (slightly above Dust Bowl levels), while daytime maximum temperatures have stayed near the long-term average. Winter warming has also been characterized by higher nighttime minimum temperatures.

Precipitation. Average, annual precipitation in the Midwest has increased by 5% to 15% from the first half of the last century (1901–1960) as compared to present day (1986–2015). The amount of rain falling in extreme rain events (1% AEP storm events), has increased by 42% from 1958 to 2016 (USGCRP, 2018). According to the NCA4, GCM based projections indicate that winter and spring precipitation in the Midwest could increase by up to 30% by the end of the century. Precipitation increases of 10-15% are projected in winter and spring for 2-digit HUC 07 from 2070–2099 relative to 1986–2015. However, in the summer and fall, projected precipitation amounts are not expected to change significantly. A northward shift in the rain–snow transition zone in the central and eastern United States is projected by end of the 21st century causing large areas that are currently snow dominated in the cold season to be rainfall dominated (USGCRP, 2017; Ning and Bradley, 2015).

Recently, Missouri has experienced an increase in the number of extreme precipitation events. Winter and spring precipitation are projected to increase in Missouri, while summer precipitation may decrease. For much of the state, more than 40% of the total annual precipitation occurs within the 10 wettest days of the year (NOAA, 2022). Overall, extreme precipitation events are projected to become more intense. Drought intensity is also projected to increase; rising temperatures increasing evaporation rates will facilitate longer and hotter summer droughts.

Streamflow. Observed streamflow trends are strongly influenced by precipitation, temperature, and other factors such as land use and land cover in a region, groundwater dynamics, drainage patterns, channel geomorphology, and regulation. In the Upper Mississippi Region (2-digit HUC 07), multiple studies have identified increasing trends in the observed, annual, average streamflow (Novotny and Stefan, 2007; Mauget, 2004; Small, Islam, and Vogel, 2006) and in the observed, annual, mean/median baseflow (Juckem et al., 2008; Xu et al., 2013). Seasonally, studies have reported increasing annual, minimum, 7-day, low flows in the fall (Small, Islam, and Vogel, 2006) and annual, average, 7-day, low flows in the fall and winter (Novotny and

Stefan, 2007). Some studies have found that annual peaks are increasing in the spring and summer (Novotny and Stefan, 2007).

The 2020, USACE *Mississippi River Geomorphology and Potamology* (MRG&P) *Study* also indicates that annual water yield, annual maximum daily water yield, and annual maximum 7-day water yield are increasing throughout the Upper Mississippi River Basin (USACE, 2020). Water yield represents discharge per unit of watershed area. For the 2020 USGS study, water yield was normalized by total annual precipitation to differentiate between the influence of altered precipitation versus other drivers of change in hydrologic response. Evaluations of precipitation-normalized water yield indicate that changes to water management and land use/cover in the Upper Mississippi River Basin are exacerbating increases in water yield (Simon et al., 2020). There is little to no consensus in the literature regarding changes in projected streamflow in the Upper Mississippi Region.

Ecosystem Health. Based on a 2022 report generated by the USGS, the following variables are critical to ecosystem health and have changed overtime: annual discharge (maximum, mean, and minimum), duration of high discharges (exceeding the 20% AEP discharge), and monthly mean discharge. Results from the 2022 USGS report indicate that mean and minimum annual discharges are increasing at the USGS gages at Winona, Minnesota (05378500) and Keokuk, Iowa (05474500). The duration of high discharges has also increased from 1940 to 2019 for all gages analyzed. Significant increases in annual maximum discharges were detected for the Keokuk, Iowa (05474500) and Valley City, Illinois (05586100) USGS gages. Based on an analysis of monthly, mean discharges, large increases in May mean discharges were identified for all three Mississippi River gages analyzed. There is some evidence that the maximum in monthly, mean discharge for a given year has shifted from occurring in April to either May or June.

Water quality analysis presented in the 2022 USGS report indicates that total suspended sediment (TSS) concentrations associated with mean discharges have decreased long-term in many reaches and tributaries of the Upper Mississippi River. The most significant changes have been observed in Lock and Dam (L&D) pools 4 and 8. Phosphorus loads in all the L&D pools analyzed (pools 4, 8, 13, and 26) on the Upper Mississippi River have also decreased long-term. Although there are no long-term, significant trends in dissolved oxygen (DO) for the portions of the Upper Mississippi River assessed, low DO in backwater areas has been observed more frequently in the summer than in winter.

The concentration of submersed aquatic vegetation (SAV) is considered the primary indicator of aquatic vegetative health in the Upper Mississippi River. High prevalence of SAV (generally >50-percent) indicates quality habitat for waterfowl. Aquatic vegetation analysis identified trends in SAV in L&D pools 4, 8, and 13. The prevalence of SAV in L&D pools 4 and 8 increased by 30% from 2002 to 2010. Since 2010, SAV concentrations at these two locations have plateaued. The prevalence of SAV in L&D 13 ‘s pool increased from 1998 to 2008. Since 2009, SAV concentrations have been decreasing in L&D 13’s pool. Additionally, since 2000, increases in aquatic plant species diversity have been observed in L&D pools 4 and 8. In the L&D 8 and 13’s pools, a positive trend in emergent vegetation has been recorded. Emergent vegetation provides habitat for aquatic species. No trends in aquatic vegetation were found within the lower portion of the Upper Mississippi River (L&D Pool 26).

Summary. Within the literature reviewed, there is evidence that temperature, precipitation, and streamflow have increased over the observed period of record within the Upper Mississippi Watershed. Trends in water quality within the Upper Mississippi Watershed indicate decreases in total phosphorus and total suspended solids. Aquatic vegetation analysis indicates increases

in SAV in L&D pools 4, 8, and 13 in early 2000s through 2010. SAV concentrations have plateaued through 2019. Projections of future climate show strong consensus on increases in future temperature, and moderate consensus on increases in future precipitation. There is little to no consensus related to trends in future streamflow. Figure 1 from the 2015 USACE *Civil Works Technical Report CWTS-2015-13* provides a visual summary of the trends in observed and projected hydrometeorological variables for 2-digit HUC 07, the Upper Mississippi Region.

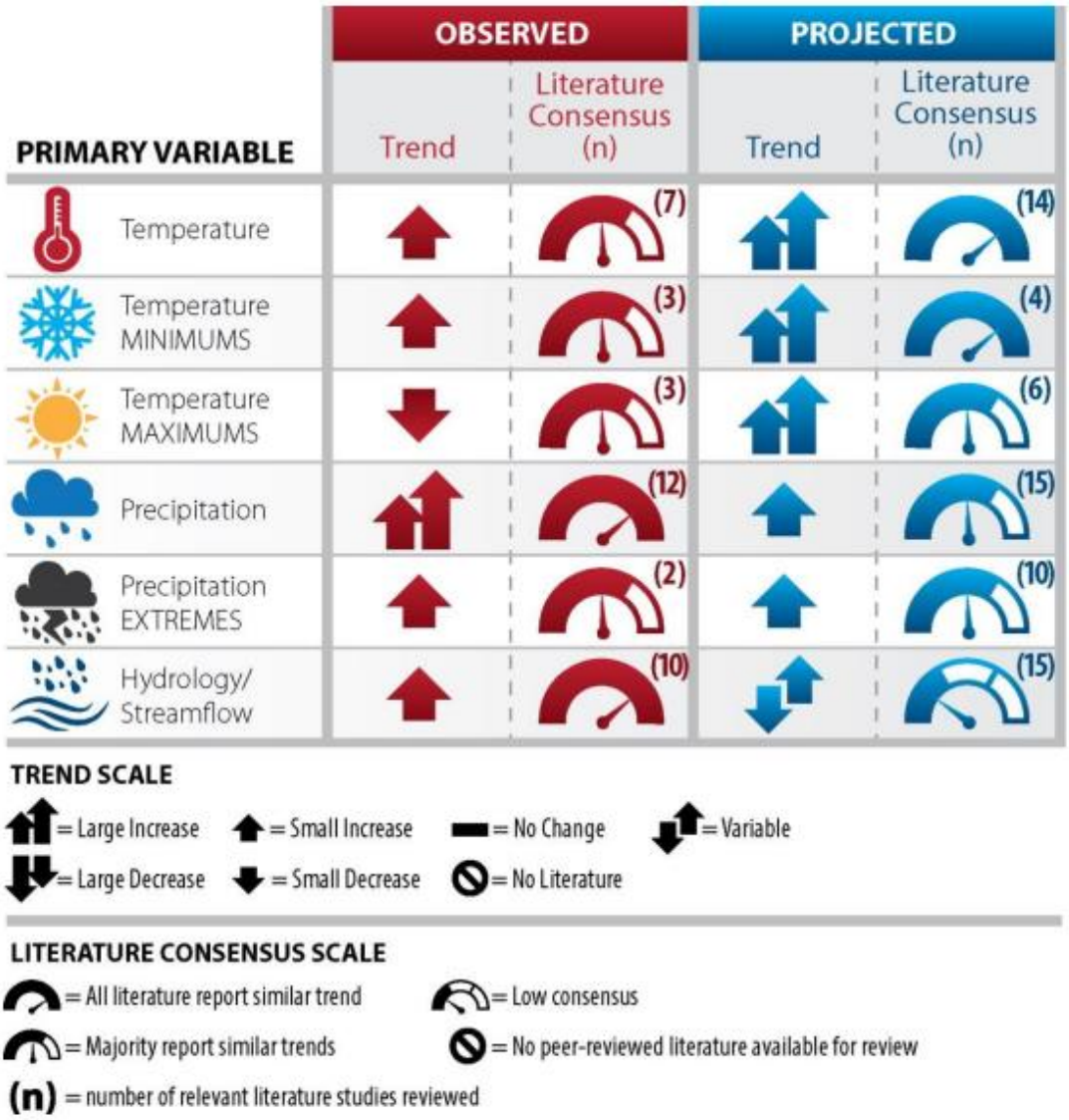

Figure 1. Summary matrix of UMR (HUC 07) observed and projected climate trends (USACE, 2015)

4.0 Nonstationarity Detection and Trend Analysis

The assumption that hydrologic timeseries are stationary (their statistical characteristics are unchanging) in time underlies many traditional hydrologic analyses. Statistical tests can be used to test this assumption using the techniques outlined in USACE Engineering Technical Letter (ETL) 1100-2-3, *Guidance for Detection of Nonstationarities* (2017). The USACE Time Series

Toolbox (TST) tool is a web-based tool that performs the statistical tests described in the guidance. Average, annual streamflow is analyzed for the West Alton Islands Project because project measures are vulnerable to damage from flows during the first few years of establishing habitat. Average annual streamflow is most representative of flows measures experience throughout the year (Van Appledorn, 2022). In the long-term, project measure elevations need to be designed so that they can withstand future conditions. More frequent overtopping of project measures can have adverse effects on overwintering habitat and floodplain forests.

Observed, average annual discharge for the Mississippi River at Grafton, Illinois (USGS # 05587450) was pulled from USGS using the TST tool. Because the streamflow record analyzed has been generated based on a flow-stage rating curve, the quality of the data was verified using observed, flows are not exact. If unverified, changes in the flow-stage rating curve applied can introduce a source of nonstationarity and/or uncertainty into the streamflow record. This should be taken into consideration when interpreting the results of trend and nonstationarity analysis. Based on this evaluation no discrepancies were found in the Mississippi River at Grafton, Illinois streamflow record.

The Mississippi River at Grafton, Illinois gage captures 171,300 square miles of drainage area and is influenced by regulation from the L&Ds on the Mississippi and Illinois Rivers. The upstream L&D on the Mississippi River is L&D 25, and the upstream L&D on the Illinois River is La Grange L&D. L&D 25 and La Grange L&D both went into operation in 1939. The general objective of the L&Ds is to maintain the authorized nine-foot navigation channel on the Mississippi and Illinois Rivers. The L&Ds maintain the minimum storage of water required for navigation at all times and any additional water volume is outflowed. Consequently, operation of the L&Ds does not have a significant impact on annual, average streamflow. The TST tool is applied to detect nonstationarities and trends for the period of record from water year 1987 to water year 2022.

As shown in Figure 2, the average flow record observed at Grafton, Illinois has no evidence of a nonstationarity. A strong nonstationarity is one that demonstrates a degree of consensus, robustness and a significant increase or decrease in the sample mean and/or variance. No changes in distribution, mean, or variance can be observed in the data. Linear and monotonic trends are evaluated using the t-test, Mann-Kendall and Spearman Rank Order tests. The significance of trends is evaluated using a 0.05 level of significance threshold (p-value<0.05 is considered statistically significant). Trend analysis did not indicate a statistically significant trend for the 1987-2022 (in water years) period of record by the t-Test (p-value= 0.48618), Mann-Kendall test(p-value=0.48726), or Spearman Rank-Order (p-value=0.44447) test, see trendline in Figure 3.

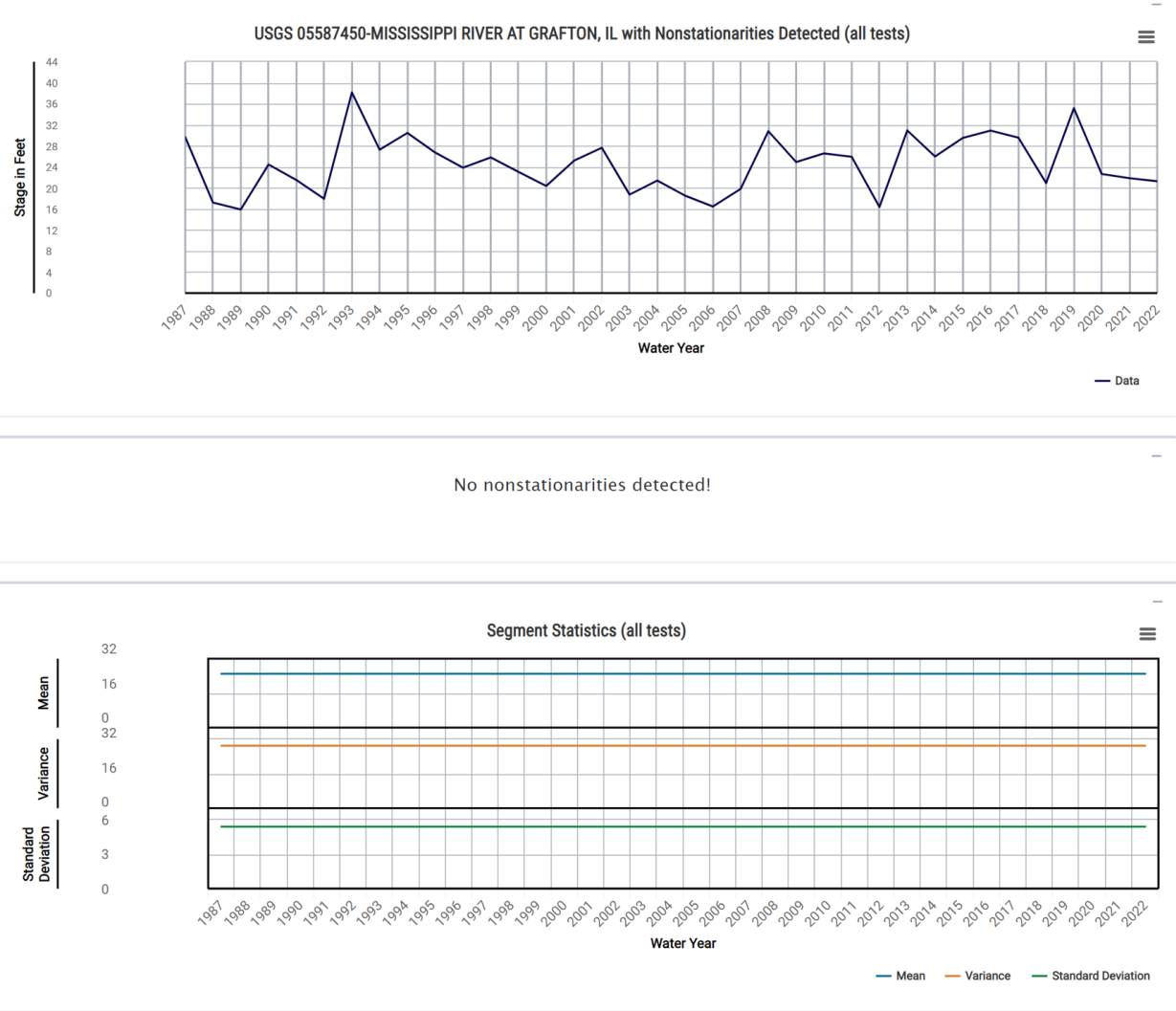

Figure 2. Time Series Toolbox Output for Annual Average Streamflow for the Mississippi River at Grafton, Illinois.

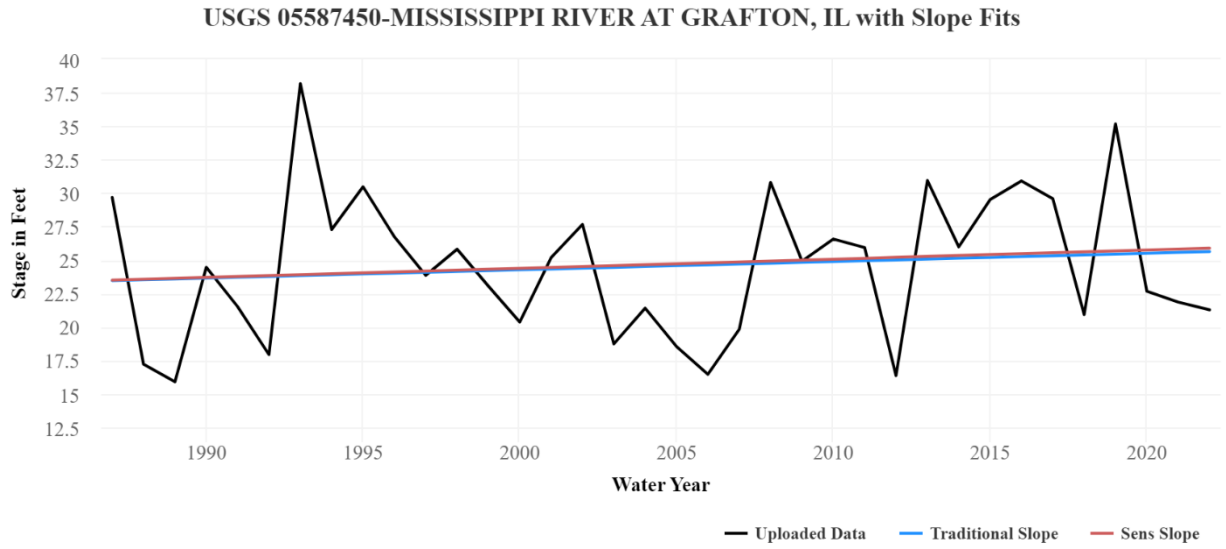

Figure 3. Trend Analysis for Annual Average Streamflow for the Mississippi River at Grafton, Illinois.

5.0 Climate Hydrology Assessment Tool (CHAT)

The USACE Climate Hydrology Assessment Tool (CHAT) displays various simulated, historic and future, climate-changed streamflow, temperature, and precipitation outputs derived from 32 GCMs. The CHAT uses Coupled Model Intercomparison Project Phase 5 (CMIP5) GCM meteorological data outputs that have been statistically downscaled using the Localized Constructed Analogs (LOCA) method. GCMs rely on scenarios representing different pathways to a given atmospheric concentration of greenhouse gas emissions (GHG) referred to as representative concentration pathways (RCPs). RCPs describe the change in radiative forcing at the end of this century, as compared with pre-industrial conditions. Projected hydroclimate data in the CHAT for 2006 to 2099 are produced using two future scenarios: RCP 4.5 (where greenhouse gas emissions stabilize by the end of the century) and RCP 8.5 (where greenhouse gas emissions continue to increase throughout the century). Simulated output representing the historic period of 1951 to 2005 is generated using a reconstitution of historic GHG emissions.

To analyze runoff, LOCA-downscaled GCM outputs are used to force an unregulated, Variable Infiltration Capacity (VIC) hydrologic model. Areal runoff from VIC is then routed through a stream network using MizuRoute. Outputs represent the daily in-channel, routed streamflow for each stream segment – valid at the stream segment endpoint. Since the runoff is routed, the streamflow value associated with each stream segment is a representation of the cumulative flow, including all upstream runoff, as well as the local runoff contributions to that specific segment. Within the CHAT, streamflow output can be selected by stream segment and precipitation/temperature output can be selected for a given 8-digit HUC watershed.

West Alton Islands are in 4-digit HUC 0711 (Upper Mississippi-Salt). The 8-digit HUC of interest specific to the study area is the Peuque-Piasa watershed (HUC07110009). Mississippi River stream segments 07000009 and 07000010 transect the upper portions of the study area (Luesse Lake and Portage Island). Mississippi River stream segment 07000013 transects the lower portion of the study area (West Alton Bay). Piasa Creek, a small tributary in comparison to the size of the Mississippi River, is the only tributary stream segment (shown in CHAT) between the upper and lower portions of the study area. For this analysis, the most downstream stream segment (07000013) of the relatively short (12.5 mile stretch of the Upper

Mississippi River) study area was used. Figure 4 and Figure 5 show the range of the modeled, annual-mean 1-day streamflow and annual-maximum 1-day temperature output presented for the historic period (1951-2005) and the future period (2006-2099). The annual-mean 1-day streamflow is analyzed for this assessment to investigate if and how potential, future streamflow conditions will change. Annual-maximum 1-day temperature is analyzed for this assessment as a proxy for water temperature. The range of data is indicative of the uncertainty associated with projected, climate-changed streamflow and temperature.

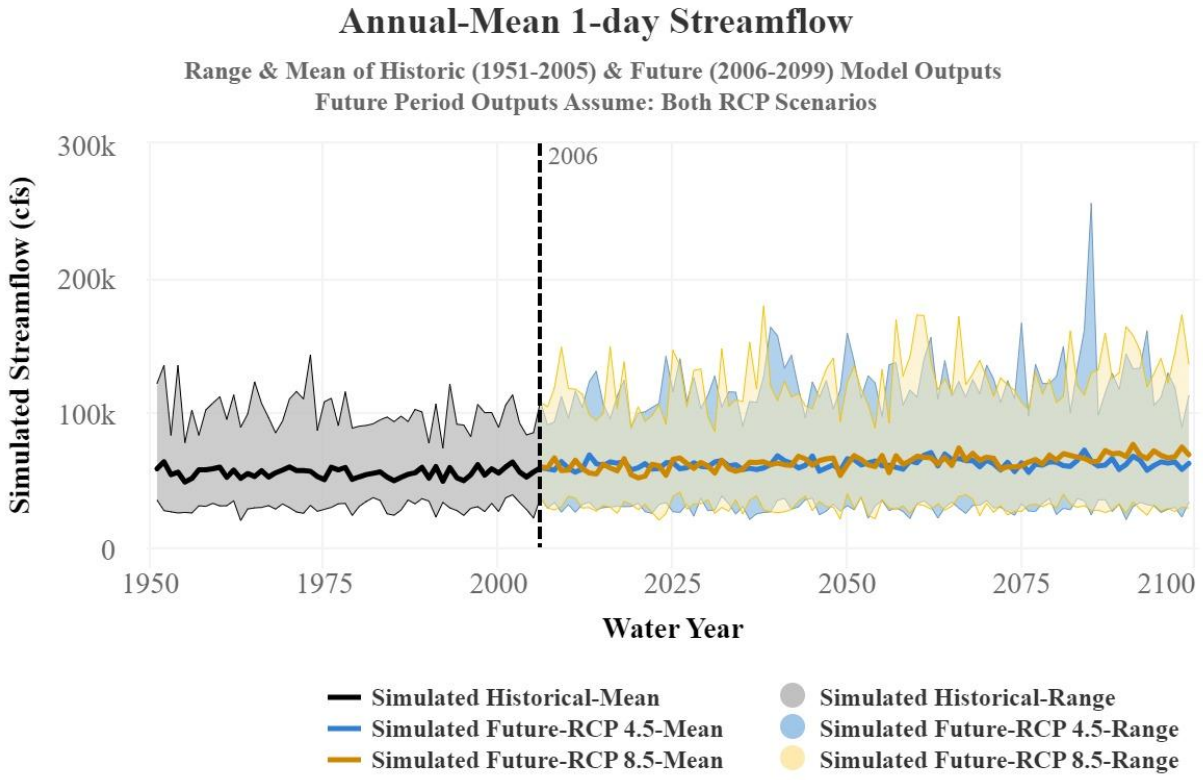

Figure 4. Range of Annual-Mean 1-day Streamflow Model Output for the Peuque-Piasa watershed (HUC07110009) Stream Segment: 07000013

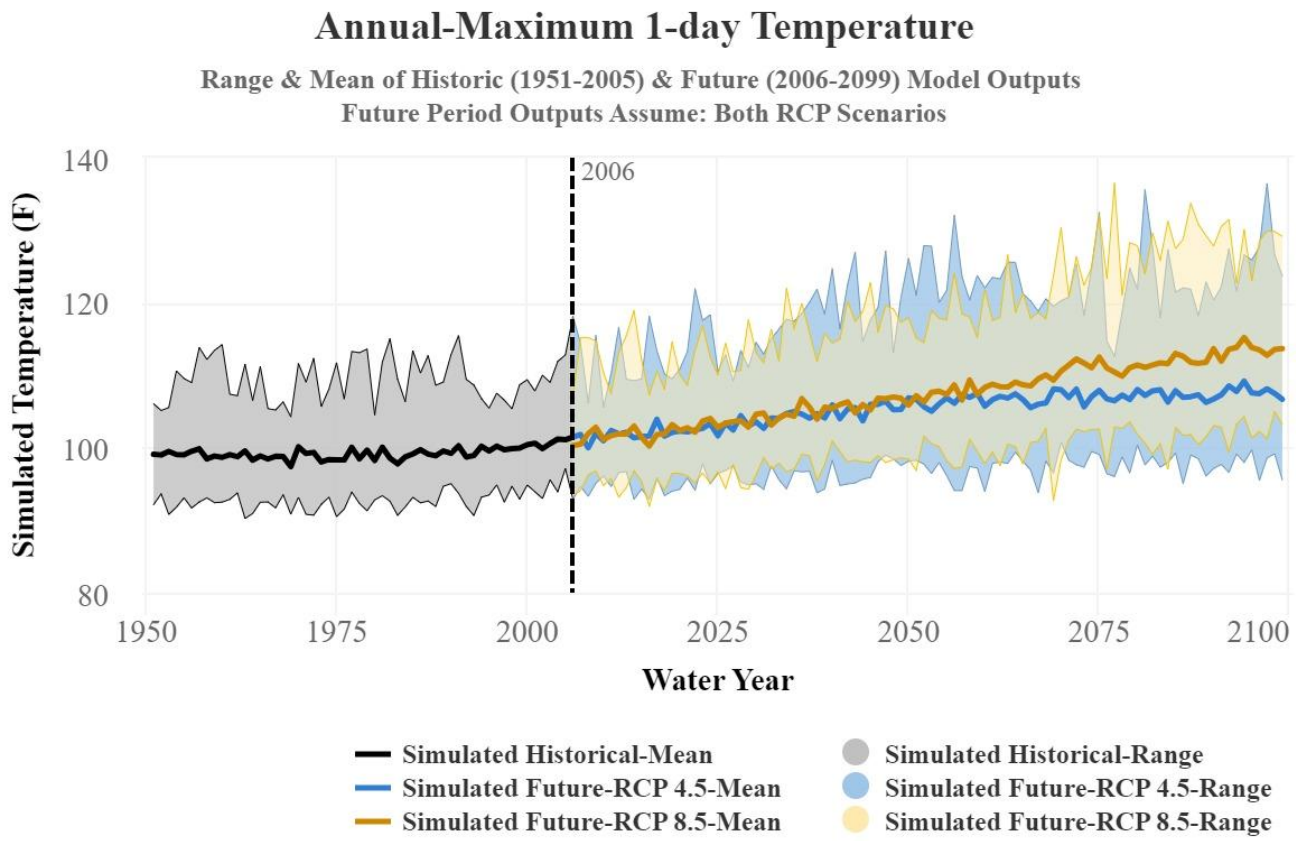

Figure 5. Range of Annual Maximum 1-day Temperature Model Output for the Peuque-Piasa watershed (HUC07110009) Stream Segment: 07000013

For the Peuque-Piasa watershed (HUC07110009) trends are evaluated using the t-Test, Mann-Kendall and Spearman Rank-Order tests. All three statistical tests are applied using a 0.05 level of significance (p-values<0.05 are considered statistically significant). As displayed in Figure 6, the directionally and magnitude of change in statistically significant trends in annual-mean streamflow are evaluated using the slope of the fitted linear regression relationship. The results of the three statistical tests and the slopes associated with identified, statistically significant trends are presented in Table 1. The mean of the 32 projections of simulated, annual-mean streamflow for the future period (2006-2099) shows a statistically significant, positive trend for the Peuque-Piasa watershed (HUC07110009) Stream Segment: 07000013 when RCP 4.5 and RCP 8.5 are assumed. For the future period when RCP 4.5 is assumed, the trendline has a slope of 27.3 cfs a year, which equates to a 1,365 cfs change in the average annual-mean streamflow over a 50-year period. For the future period when RCP 8.5 is assumed, the trendline has a slope of 118.6 cfs a year, which equates to a 5,930 cfs change in the average annual-mean streamflow over a 50-year period. When the CHAT is used to evaluate the change in Epoch-Mean of simulated annual-mean streamflow it is found that the median change from the base Epoch (1976-2005) to the mid-century epoch (2035-2064) is 11.0% and 14.8% for RCP 4.5 and RCP 8.5 emission scenarios, respectively. By the end-century epoch (2070-2099) the change relative to the base period is 12.2% and 20.6% for the RCP 4.5 and RCP 8.5 emission

scenarios, respectively. There is no statistically significant trend in simulated, historic flows (1951-2005).

Table 1. Trend Analysis of Average Model Output: Annual – Mean 1-day Streamflow Peuque-Piasa watershed (HUC07110009) Stream Segment: 07000013

Trend Analysis	Historic (1951-2005)	Future (2006-2099)		Historic (1951-2005)			Future (2006-2099)					
		RCP 4.5	RCP 8.5				RCP 4.5			RCP 8.5		
	p-values			Statistically Significant? (<0.05)	Slope (cfs/year)	Direction	Statistically Significant? (<0.05)	Slope (cfs/year)	Direction	Statistically Significant? (<0.05)	Slope (cfs/year)	Direction
t-Test	0.902	0.0339	$4.77x10^{-12}$	No	-3.8754	↓	Yes	27.28	↑	Yes	118.57	↑
Mann-Kendall	0.805	0.0337	$<2.2x10^{-16}$	No			Yes			Yes		
Spearman Rank Order	0.843	0.0326	$1.6x10^{-12}$	No			Yes			Yes		

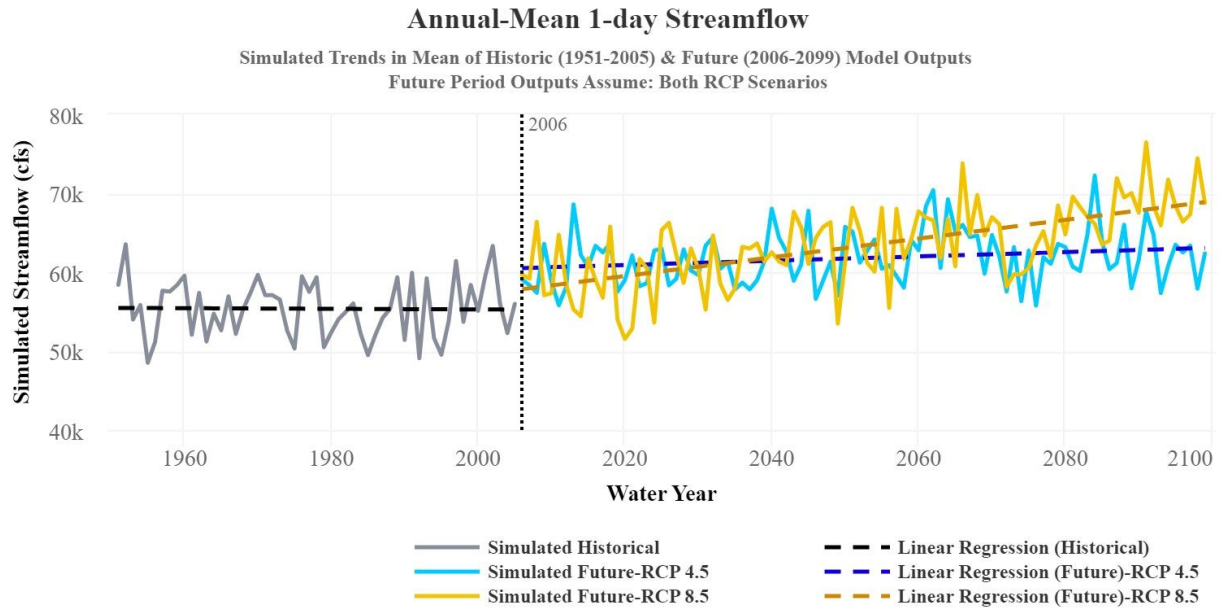

Figure 6. Trend Analysis of Average Model Output: Annual-Mean 1-day Streamflow Peuque-Piasa watershed (HUC07110009) Stream Segment: 07000013

For the mean of the 32 projections (per RCP) of annual-maximum 1-day temperatures, the results of the three statistical tests and the slopes associated with statistically significant trends are presented in Table 2 and Figure 7. The mean of the simulated, annual-maximum temperature projections (future period: 2006-2099) shows a statistically significant, positive trend for Peuque-Piasa watershed under both the moderate (RCP 4.5) and higher (RCP 8.5) emission scenarios. Both outputs project a significant magnitude of change in temperature over the next fifty years. The CHAT computes a trendline slope of 0.07°F per year for the lower emission scenario, which would be a 3.5°F increase in maximum temperature over a 50-year period. The CHAT computes a trendline slope of 0.15°F per year for the RCP 8.5 emission scenario, which would be a 7.5°F increase in maximum temperature over a 50-year period. There is also a statistically significant increasing trend in simulated, historic temperatures between 1951 and 2005 (slope of 0.03°F per year). When the CHAT is used to evaluate the change in Epoch-Mean of simulated annual-maximum temperature it is found that the median change from the base Epoch (1976-2005) to the mid-century epoch (2035-2064) is 5.6°F for RCP 4.5 and 6.6°F for RCP 8.5. By the end-century epoch (2070-2099) the change relative to the base period is 6.4°F for RCP 4.5 and 11.6°F for RCP 8.5.

Table 2. Trend Analysis of Average Model Output: Annual Maximum Temperature for Peuque-Piasa watershed (HUC07110009) Stream Segment: 07000013

Trend Analysis	Historic (1951-2005)	Future (2006-2099)		Historic (1951-2005)			Future (2006-2099)					
		RCP 4.5	RCP 8.5				RCP 4.5			RCP 8.5		
	p-values			Statistically Significant? (<0.05)	Slope (°F/year)	Direction	Statistically Significant? (<0.05)	Slope (°F/year)	Direction	Statistically Significant? (<0.05)	Slope (°F/year)	Direction
t-Test	$5.3x10^{-5}$	$<2.2x10^{-16}$	$<2.2x10^{-16}$	Yes	0.0263	↑	Yes	0.0741	↑	Yes	0.1452	↑
Mann-Kendall	0.00025	$<2.2x10^{-16}$	$<2.2x10^{-16}$	Yes			Yes			Yes		
Spearman Rank Order	0.000109	$<2.2x10^{-16}$	$<2.2x10^{-16}$	Yes			Yes			Yes		

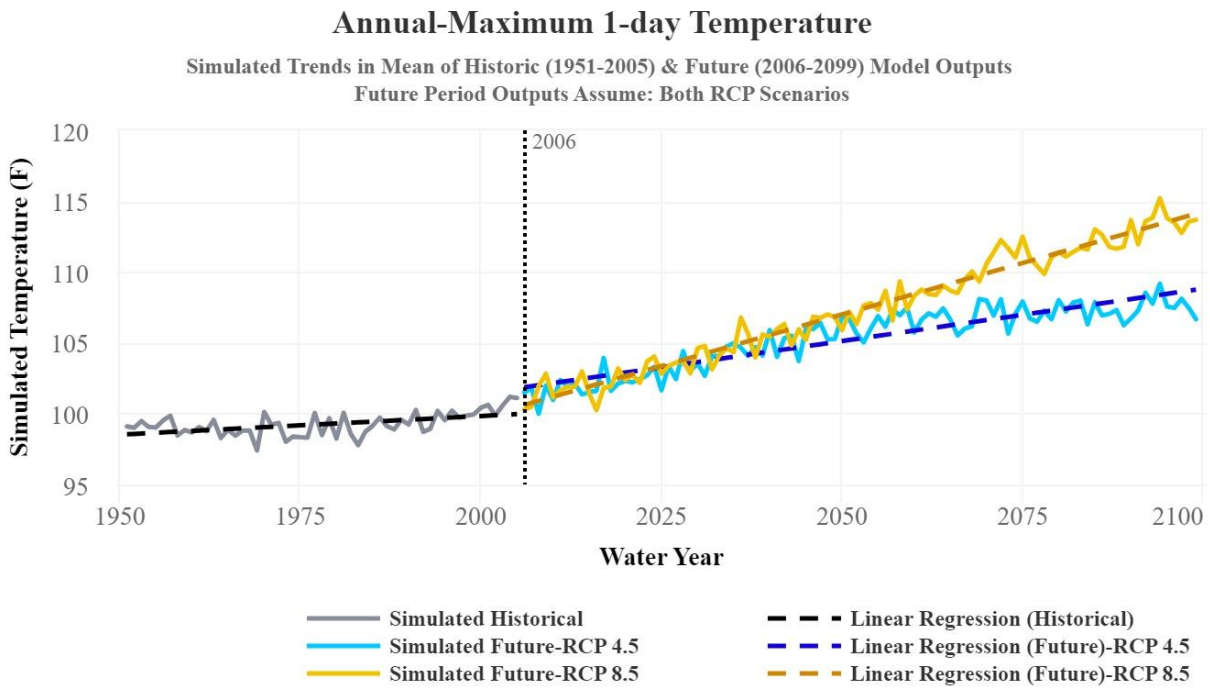

Figure 7. Historic and Projected trends in historic and projected 1-day annual maximum temperatures for the Peuque-Piasa watershed (HUC07110009) Stream Segment: 07000013

The CHAT provides streamflow and temperature outputs analyzed comparatively by describing simulated changes in monthly streamflow and temperature between different epochs (time periods). Monthly streamflow and temperature output is analyzed by determining the mean of the monthly value for the variable of interest for each GCM for three epochs: 1976-2005 (baseline), 2035-2064 (mid-century), and 2075-2099 (end of century). The difference between GCM/Month/Epoch means are determined for both the baseline vs. mid-century and baseline vs. end of century epochs and results are presented as boxplots. These boxplots provide insight into both the range of results and the seasonality of changes in streamflow and temperature overtime.

For stream segment 07000013 in the Peuque-Piasa watershed (HUC07110009), changes in epoch-mean of simulated monthly mean streamflow are presented in Figure 8. For the stream segment of the Mississippi River analyzed, it appears that for the mid-century epochs October through May mean flows are increasing more with those flows derived using RCP 8.5 than those derived by assuming RCP 4.5. Similarly, it appears that for the end of century epochs October and December through June are increasing more with those flows derived use RCP 8.5 than those derived by assuming RCP 4.5. Increases in flow are observed November through June for the mid-century and end of the century epochs. July-September flows appear to be stagnating regardless of what RCP is assumed for both epochs and RCPs analyzed.

For the Peuque-Piasa watershed, simulated maximum temperatures for both the mid-century epoch (2035-2064) and the end-century epoch (2070-2099) are increasing relative to historic temperature simulations (1976-2005) for all months and both RCPs. For the mid-century comparisons, 3.6°F increases or greater in temperature are projected under RCP 8.5 for all

months. Larger changes in temperature are projected by the end of century. As compared to the temperature changes projected by mid-century, for the 2070-2099 epoch, there are larger differences in results where RCP 8.5 was assumed versus RCP 4.5. When RCP 8.5 is assumed, over 10°F of warming is projected from May to October. All RCP 8.5 comparisons show greater than 5°F of warming. When RCP 4.5 is assumed, between 4°F to 7°F of warming is projected for all months. Increases in maximum air temperature, particularly in the summer (June-August), are likely to increase water surface temperatures. This has the potential to adversely impact water quality by decreasing DO in backwater areas within the study area.

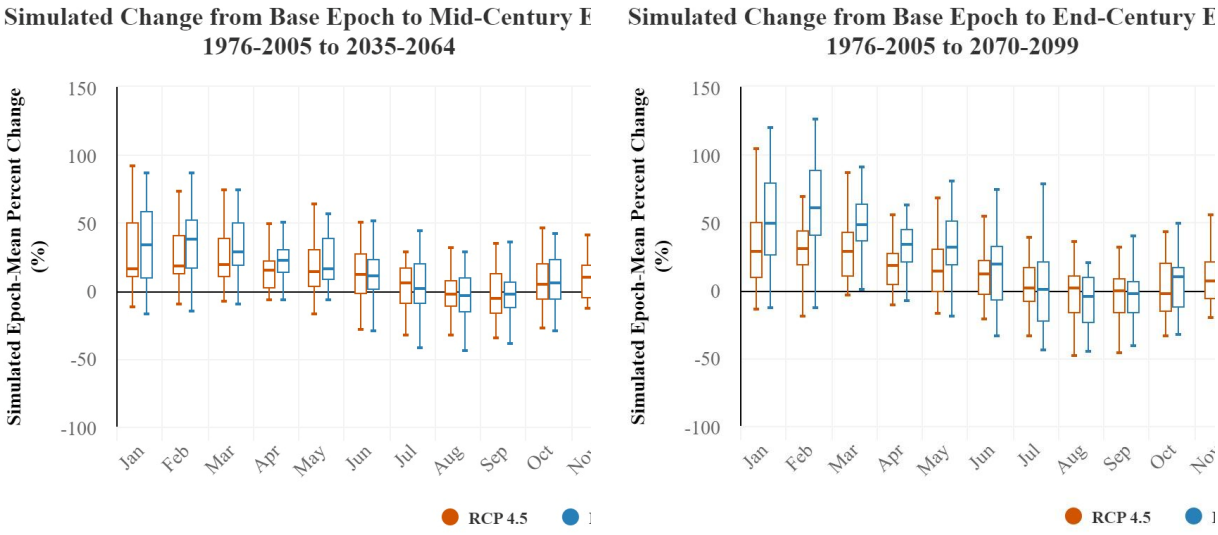

Figure 8. Change in Epoch-Mean of Simulated Monthly Mean Streamflow - Peuque-Piasa watershed (HUC07110009) Stream Segment: 07000013

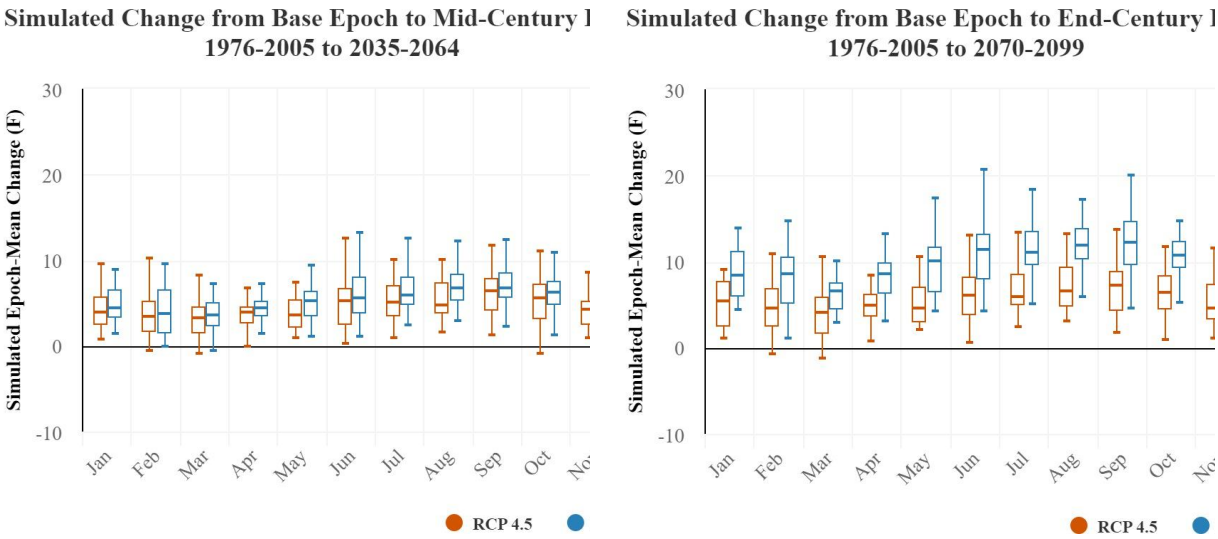

Figure 9. Change in Epoch-Mean of Simulated Monthly Maximum Temperature - Peuque-Piasa watershed (HUC07110009) Stream Segment: 07000013

6.0 Vulnerability Assessment

The USACE Climate Change Vulnerability Assessment (VA) Tool facilitates a screening level, comparative evaluation of climate change exposure to projects for a selected USACE business line in a given 4-digit HUC watershed relative to the other 4-digit HUC watersheds within the continental United States (CONUS). A series of indicator variables are computed and aggregated into a vulnerability score using the weighted-order, weighted-average (WOWA) approach. The tool uses the CMIP5 GCM based Bias Corrected, Spatially Disaggregated (BCSD) VIC dataset (2014) to define projected, hydrologic, and meteorologic inputs to the tool's WOWA scores.

The WOWA scores and indicator variable values are available for two subsets of simulations (wet- top 50% by cumulative runoff projections and dry- bottom 50% by cumulative runoff projections). Data are available for three epochs. The epochs include a historic period (Base epoch) and two 30-year, future epochs (centered on 2050 and 2085). The Base epoch is not based on projections and so it is not split into a wet and dry subset. Watersheds with WOWA scores specific to a given business line, that fall within the top 20% of WOWA scores for watersheds in the CONUS are identified as being vulnerable to climate change impacts. The projected datasets incorporated into VA scores contain considerable uncertainty. Some of this uncertainty is reflected by the differences in results for each of the subset-epoch combinations.

The tool is applied using the default, National Standards Settings and for the ecosystem restoration business line. Indicators used to compute the Ecosystem Restoration WOWA score include: change in sediment load due to change in future precipitation, cumulative monthly runoff variation relative to mean annual runoff, runoff elasticity (ratio of streamflow runoff change to precipitation change), macroinvertebrate index of biotic condition, local mean annual runoff, low flow reduction, percent of freshwater plant communities at risk, and two indicators of flood magnification (indicator of how much high flows are projected to change over time).

As shown in Figure 10, compared to the other 4-digit HUC watersheds in the CONUS, the Upper Mississippi-Salt (HUC 0711) watershed has a climate change vulnerability score in the top 20% for the ecosystem restoration business line for the dry subset of the 2085 epoch. This comparative evaluation implies the watershed is vulnerable to future climate change impacts. Results indicate that for the select metrics incorporated into the tool, this watershed may be more exposed to potential climate change impacts relative to other watersheds in the CONUS.

As can be seen in Figure 10 and Table 3, the dominant indicator variable contributing to the Ecosystem Restoration business line VA score for the Upper Mississippi-Salt (HUC 0711) watershed is (8) At Risk Freshwater Plants for all epoch and subset combinations. The WOWA score changes by more than 1% between the 2050 and 2085 epochs for both the wet and dry subsets. The percentage by which the indicator variable contributes to the VA score does not significantly change over time. Because this indicator variable is not dependent on computed, GCM based changes in future hydrology (temperature, precipitation, streamflow) this indicator variable value is constant over time.

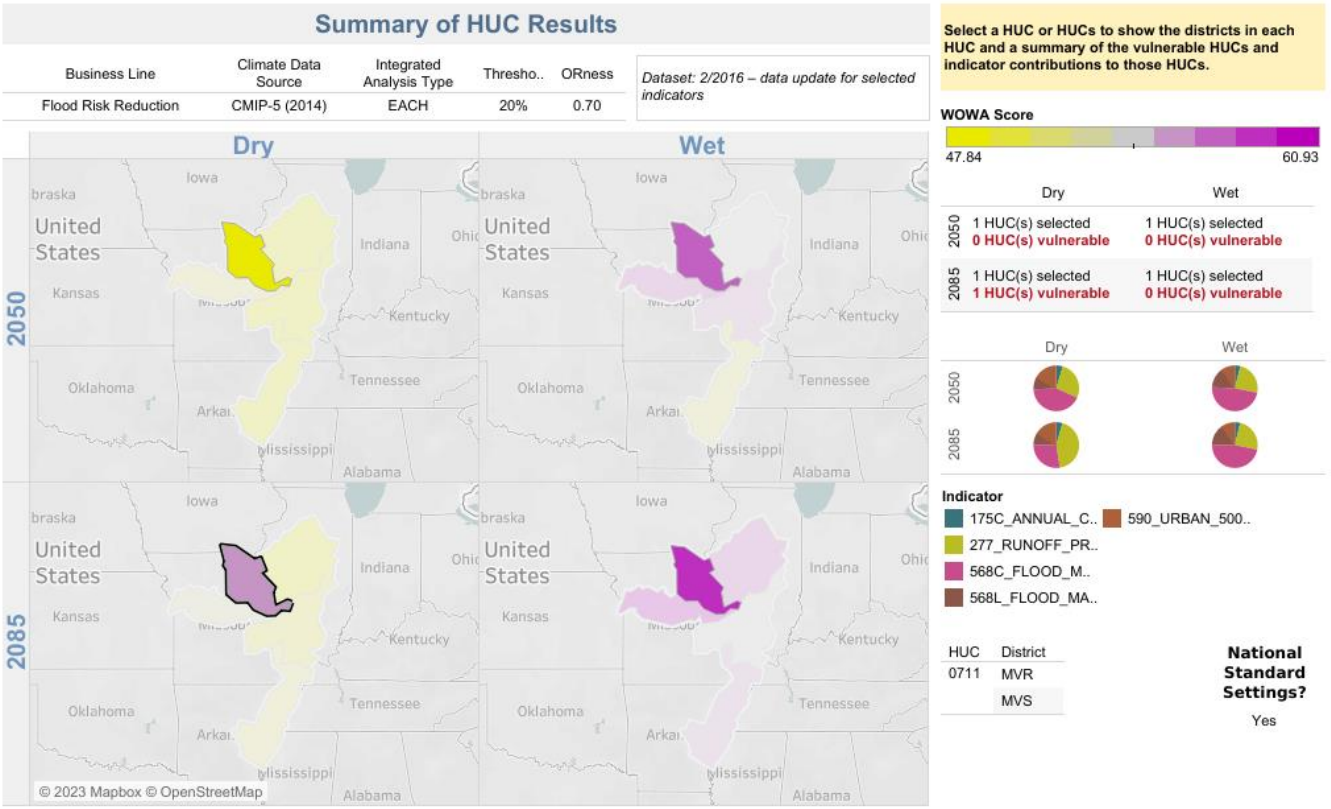

Figure 10. Output of the Vulnerability Assessment tool - Upper Mississippi-Salt watershed

Table 3. VA Tool Output- Upper Mississippi-Salt (HUC 0711) - Ecosystem Restoration

Subset	Epoch	VA Score	% Change in VA Score (2050 to 2085)	Dominant Indicator	Dominant Indicator % Change (2050 to 2085)	
					Contribution to Overall WOWA Score	Indicator Value
WET	2050	71.261	+1.11%	8- At Risk Freshwater Plants	0.00%	Constant Overtime
	2085	72.053		8- At Risk Freshwater Plants		
DRY	2050	70.646	+2.10%	8- At Risk Freshwater Plants	0.00%	Constant Overtime
	2085	72.130		8- At Risk Freshwater Plants		

7.0 Conclusion

West Alton Islands HREP aims to restore the island complex through increased flow diversity and hydraulic connectivity. The goal of any potential project is to restore and improve the quality and diversity of backwater, side-channel, sandbar, island, wetland, and floodplain forest resources within the study area.

Proposed project measures include the following:

- Excavation: in backwaters and in deep pockets
- Island creation and sandbar development
- Emergent wetland enhancement
- Terrestrial elevation diversity
- Constructing river training structures: bullnoses, hard points, berms, barbs, gravel bars, woody bundles, trail dikes, and sediment deflection structures

Based on the weight of evidence presented in this assessment, climate change impacts are anticipated to affect the study area's hydrology over the project's 50-year life cycle. Available climate change literature suggests a warmer and wetter climate in the future. There are statistically significant increasing trends in both the observed and projected flow data analyzed specific to this study area. As flow increases, floodplain forest habitat may be inundated more often. There is also evidence that temperatures are increasing in the study area which may negatively affect water quality and aquatic habitat. Table 4 indicates potential residual risks for this project due to climate change, along with a qualitative rating of how likely those residual risks are to materialize and undermine project measures resulting in harm to the study area.

Within the Upper Mississippi River Region climate change poses a potential risk to ecosystems due to the likelihood of the region experiencing shifts in the flow regime and increases in temperature in the future. Projects, like the West Alton Islands project will serve to offset some of this risk by enhancing ecosystems and improving resiliency. The standard practices used to design and construct USACE ecosystem restoration projects include a degree of resilience because measures are typically designed to accommodate a wide range of flow conditions. Thus, it is unlikely that climate change induced increases in flow will undermine project measures. It is likely that increasing temperatures will place added stress on the ecosystem in the future. Ecosystem restoration standard design practices have been generated based on lessons learned from successful projects constructed between 1981 and 2015. The majority of these standards are listed in the 2012 *Upper Mississippi River Restoration (UMRR) Design Handbook* (USACE 2012).

Even though USACE ecosystem restoration projects can already be considered inherently resilient, it would be worthwhile to consult with experts in habitat creation and maintenance to see if there are any additional opportunities to incorporate additional innovative, resilient measures into the final design without incurring a significant change in cost. Added resilience should be targeted at ensuring project measures can withstand higher flows (and higher water surface elevations) and greater periods of inundation. A potential mechanism by which to accomplish this is to explore the development of an adaptive management plan, whereby if conditions are observed to be changing in the future, certain project measures can be designed and/or flagged to accommodate the flexibility to be modified in response to changing future conditions.

Table 4. Residual Risk Due to Climate Change

Project Measure	Trigger	Hazard	Harm	Qualitative Likelihood	Justification of Likelihood Rating
Excavation	Increased discharge and water surface elevation (WSE)	Future flood volumes may be greater than at present	Increased sedimentation may fill in side channels and reduce available backwater habitat	Likely	Side channels are currently already aggrading, without proper adaptive management they may continue to aggrade with increased inundation periods.
Island creation and sandbar development	Increased discharge and WSE	Future flood volumes may be greater than at present	This will extend the duration and extent of island inundation resulting in habitat degradation and erosion.	Unlikely	The island design height is above what is recommended to establish and maintain floodplain plant communities.
Wetland enhancement	Increased discharge and WSE	Future flood volumes may be greater than at present	Increased sedimentation and water surface elevation may degrade or reduce suitable habitat	Unlikely	Due to environmental pool management practices, it is unlikely that increased water surface elevation would be allowed to destroy wetland habitat.
Topographic diversity	Increased discharge and WSE	Future flood volumes may be greater than at present	Increased water surface elevation may nullify benefits of increased terrestrial elevation	Likely	If the pool level is held higher coinciding with increase in discharge, higher elevations will graduate to longer annual inundation periods.
Constructing river training structures	Increased discharge and WSE	Future flood volumes may be greater than at present	Increased sedimentation and water surface elevation may degrade or bury structures	Unlikely	Structures are designed for multiple flow conditions; Flow conditions are unlikely to meet sustained conditions that would degrade or bury structures

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UPPER MISSISSIPPI RIVER RESTORATION

FEASIBILITY REPORT

WITH INTEGRATED ENVIRONMENTAL ASSESSMENT

WEST ALTON ISLANDS HABITAT REHABILITATION AND ENHANCEMENT PROJECT

Appendix I: Real Estate

US Army Corps of Engineers ®
St. Louis District

Mississippi River
Miles 295-288
Pike County, Missouri

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EXHIBIT A – PROJECT STUDY AREA 12

1. PURPOSE

This Real Estate Plan (REP) has been prepared to present the real estate requirements and support the proposed Upper Mississippi River Restoration (UMRR) Habitat Rehabilitation and Enhancement Project (HREP) at West Alton Island, authorized and by the Water Resources Development Act (WRDA) of 1986 (P.L. 99-662), Section 1103, for the Upper Mississippi River Plan. This REP identifies Lands, Easements, and Rights-of-Way (LER) necessary to complete the Project. The federal Sponsor for this Project is the U.S. Fish and Wildlife Service (USFWS). The Non-Federal Sponsor for this project is the Missouri Department of Conservation (MDC).

The study area (*Figure 1*) is located on lands held in Fee Simple and Easements, by the United State of America and managed by the USACE, USFWS and MDC, as part of the General Plan Lands. Included areas are part of the General Plan Lands Agreement between the USACE and the USFWS. USFWS has a Cooperative Agreement for Management of USACE General Plan Lands between the USFWS and MDC for all areas in the study area. As stated in these agreements, the lands and waters will be managed as a national wildlife refuge to enhance fish and wildlife. Responsibility for the operation, maintenance, rehabilitation, replacement, and repair of any potential project would be the responsibility of MDC, except for Portage Island, which will be the responsibility of USFWS.

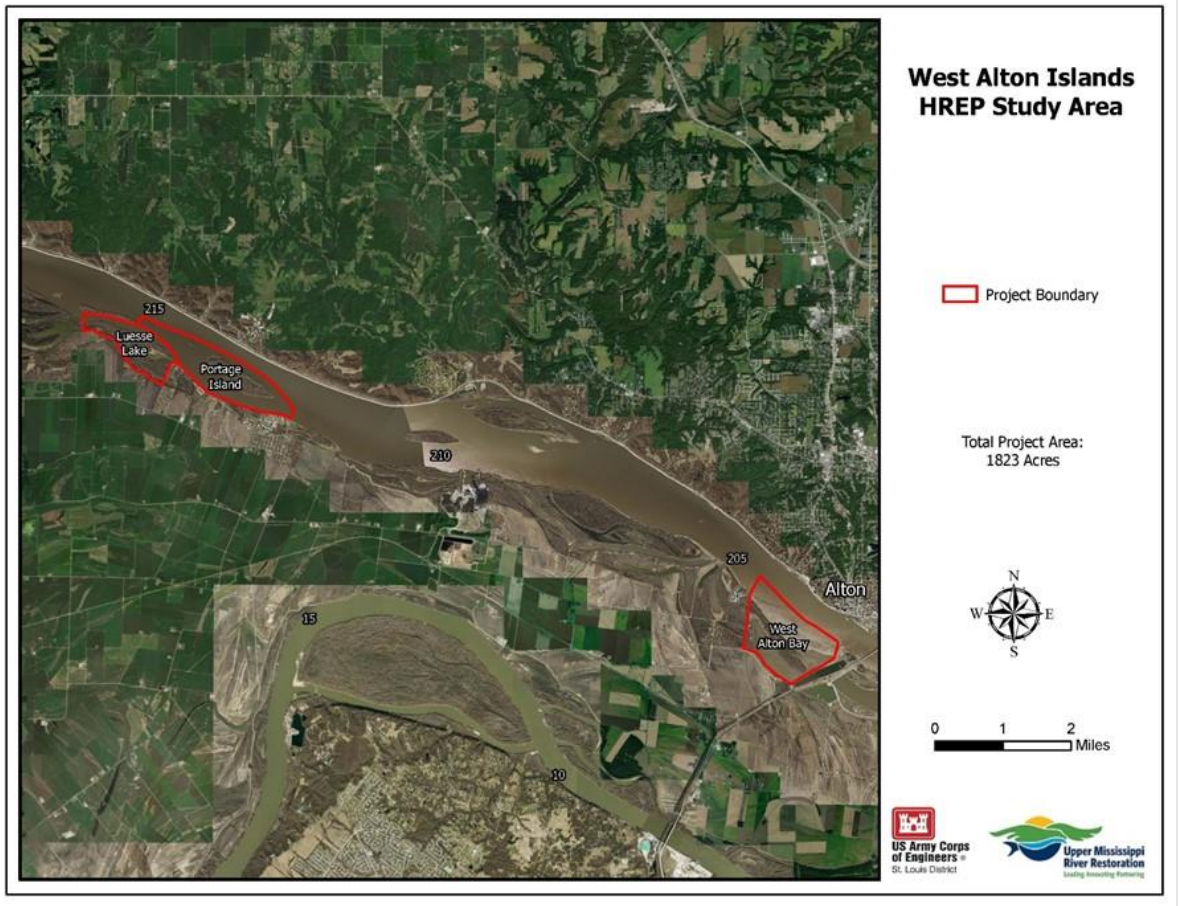

Figure 1: West Alton Is. HREP Study Area

The West Alton Islands study area is approximately 1,823 acres of island, side channel, backwater, and floodplain forest habitats located on the right descending bank of the Mississippi River in St.

Charles County, Missouri between River Miles (RM) 203 and 215.5. The study area lies within Pool 26 of the Upper Mississippi River System, a reach beginning below Lock and Dam 25 (RM 241.4) near Cap au Gris, Missouri, and ending at Melvin Price Lock and Dam (L&D) (RM 200.8) at Alton, IL. The study area encompasses West Alton Bay, Portage Island and side channel, and Luesse Lake. *Figure 2* and 3 provide a vicinity map and Pool 26 location map for the West Alton Islands HREP.

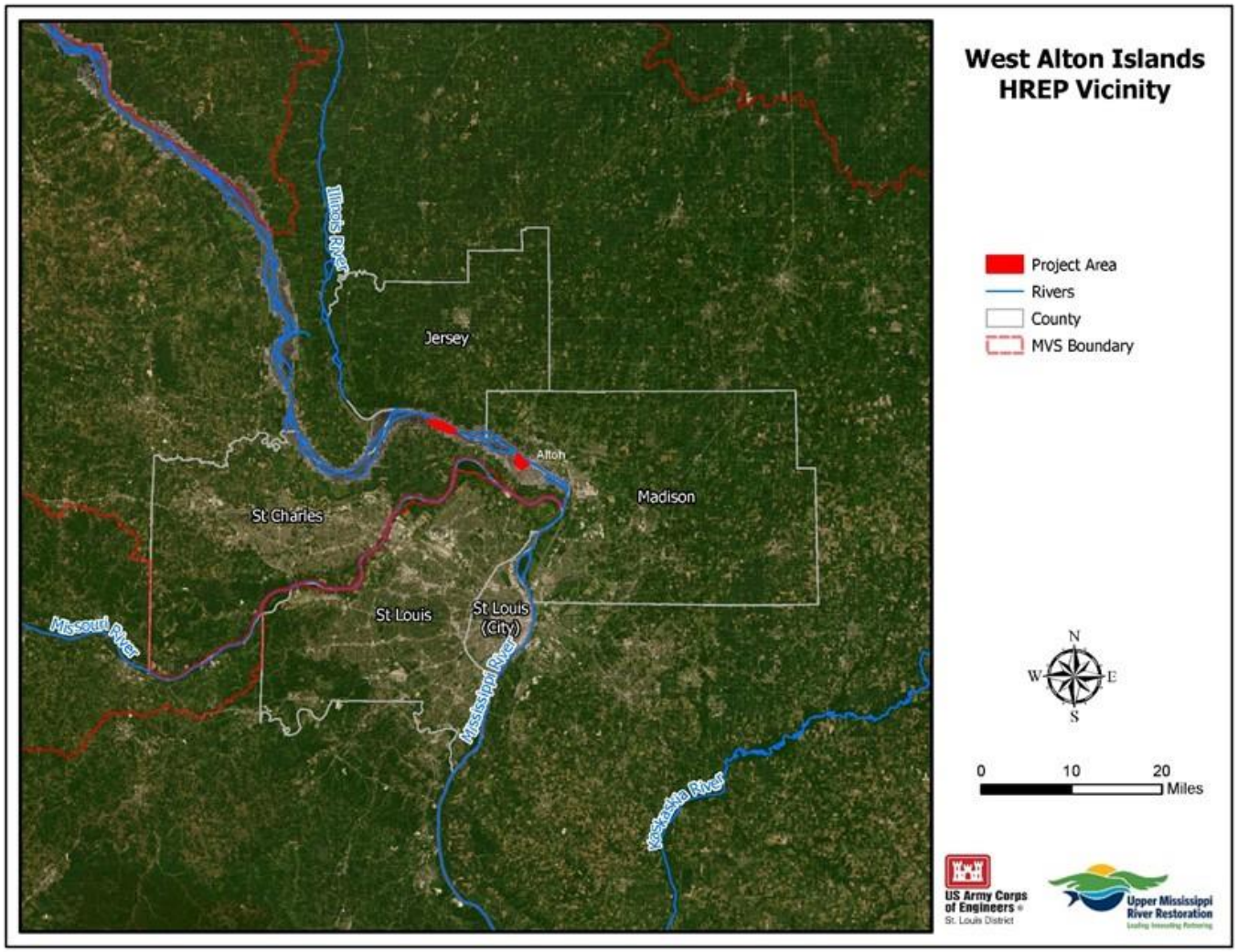

Figure 2: West Alton Islands HREP Vicinity

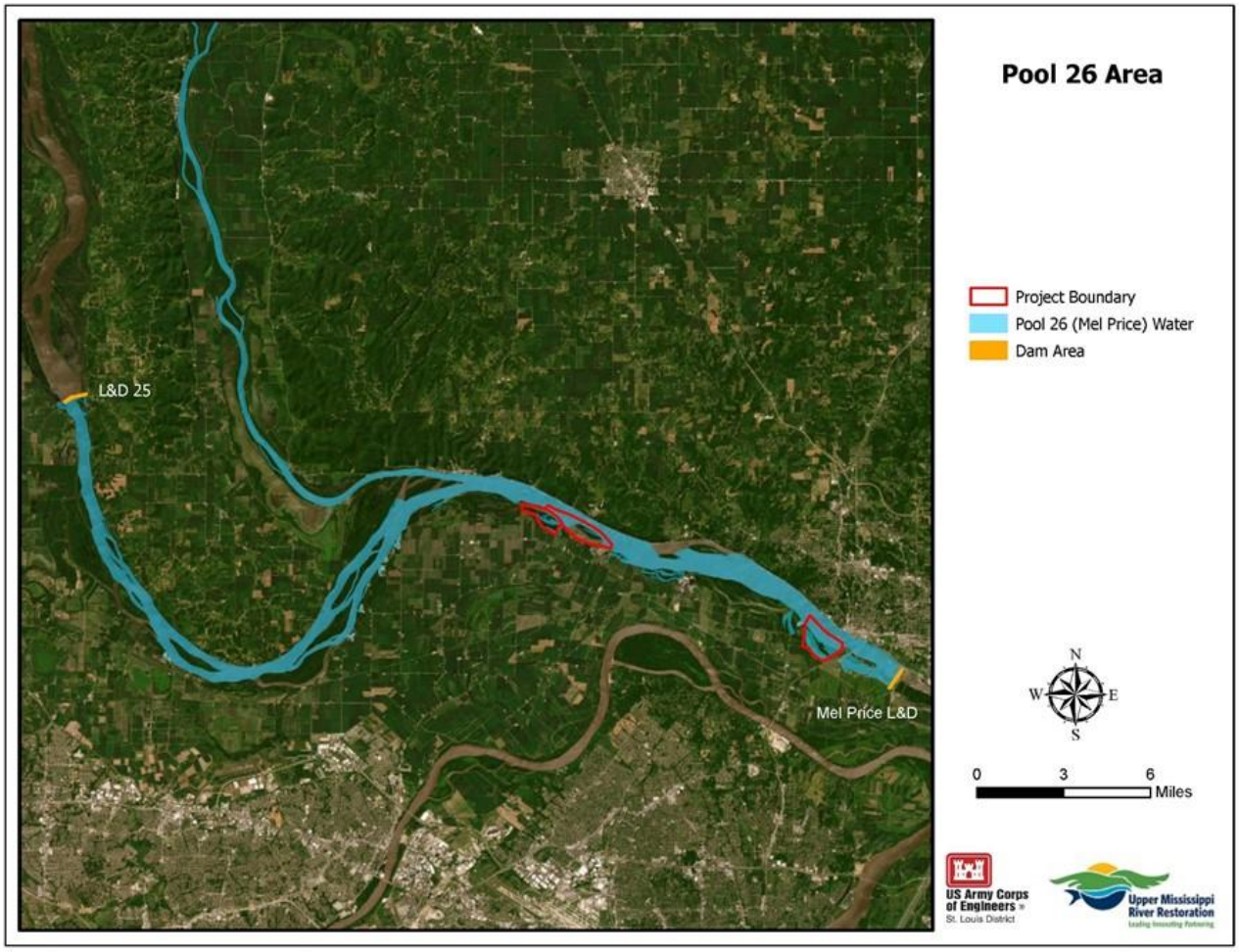

Figure 3: West Alton Is. HREP - Pool 26 View

The goal of the project is to restore and improve the quality and diversity of backwater, side-channel, sandbar, island, wetland, and floodplain forest resources within the study area. The objectives identified to meet this goal are to:

- Restore diversity of bathymetry, flow, and connectivity of aquatic areas throughout project area (side channels, main channel, off channel, backwaters, etc.)
- Restore diverse island mosaics throughout project area (sand bars, islands; reduce wind fetch and wave impacts)
- Restore native vegetation diversity and structural complexity throughout potential project area (wetlands, forests, etc.)

The interagency planning team, which includes biologists, engineers, and planners from the USACE, MDC, and USFWS, developed a series of measures for consideration to address the identified objectives. The final list of measures included:

- Excavation– Without Benching
- Island creation
- Sandbar/Mudflat creation
- Terrestrial Elevation Diversity
- Emergent Wetland Enhancement
- Sediment Deflection Dike
- Trail Dike
- Hard Points (Barb & Vane)
- Berm and Barb
- Bullnose
- Island Protection- Gradual Slope Revetment (GSR)
- Containment Berm
- Deep Water Pocket
- Woody Bundle
- Gravel Bar

Plan Selection. The Tentatively Selected Plan (Plan) for the West Alton Islands HREP (Intermediate Alternative) is shown below in *Table 1* and Figures 4,5 and 6. It consists of multiple measures to restore and improve the aquatic ecosystem structure and function by implementation of the following:

Table 1: Summary of Tentatively Selected Plan Measures

	Measures	West Alton Bay	Portage Island	Luesse Lake
1	**Excavation without Benching**	X	X	X
2	**Island Creation**	X	X	
3	**Gradual Slope Revetment (GSR) around Island**		X	
4	**Containment Berm**	X		
5	**Bullnose**		X	
6	**Sandbar/Mudflat Creation**		X	
7	**Emergent Wetland Enhancement**	X	X	
8	**Terrestrial Elevation Diversity**		X	
9	**Hard Points (Barb & Vane)**		X	
10	**Woody Bundle**		X	
11	**Trail Dike**		X	
12	**Sediment Deflection Dike**		X	
13	**Gravel Bar**		X	
14	**Berm and Barbs**	X		
15	**Deep Water Pocket**		X	X

The Plan was identified as the National Environmental Restoration (NER) Plan. For ecosystem restoration projects, the plan that maximizes ecosystem benefits compared to

costs is selected as the NER Plan. The Plan is a best buy alternative that yields 817 net average annual habitat units (AAHUs) at an average cost of $1,406 per AAHU (FY2023 price level; FY2023 federal discount rate of 2.5%). It best meets the study objectives and has sponsor support from MDC and USFWS. Implementation of the Plan would increase the quality and quantity of ecosystem resources and meet the needs for a large variety of native aquatic species. The project outputs are also consistent with the goals and objectives of the UMRR.

2. LANDS, EASEMENTS, AND RIGHTS-OF-WAY (LER)

All Project measures are located on lands in which the United States of America holds Fee Simple and Easement rights on. These rights are managed by the USACE, USFWS and MDC, as part of the General Plan Lands.

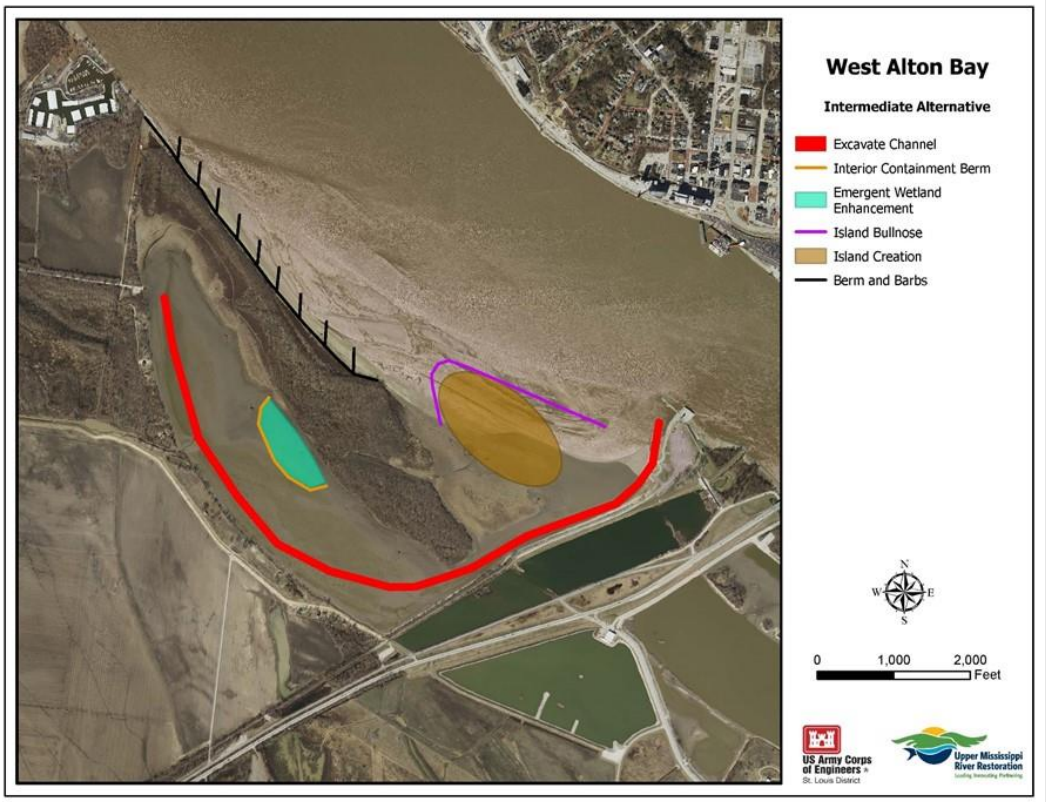

Figure 4: Tentatively Selected Plan- West Alton Bay

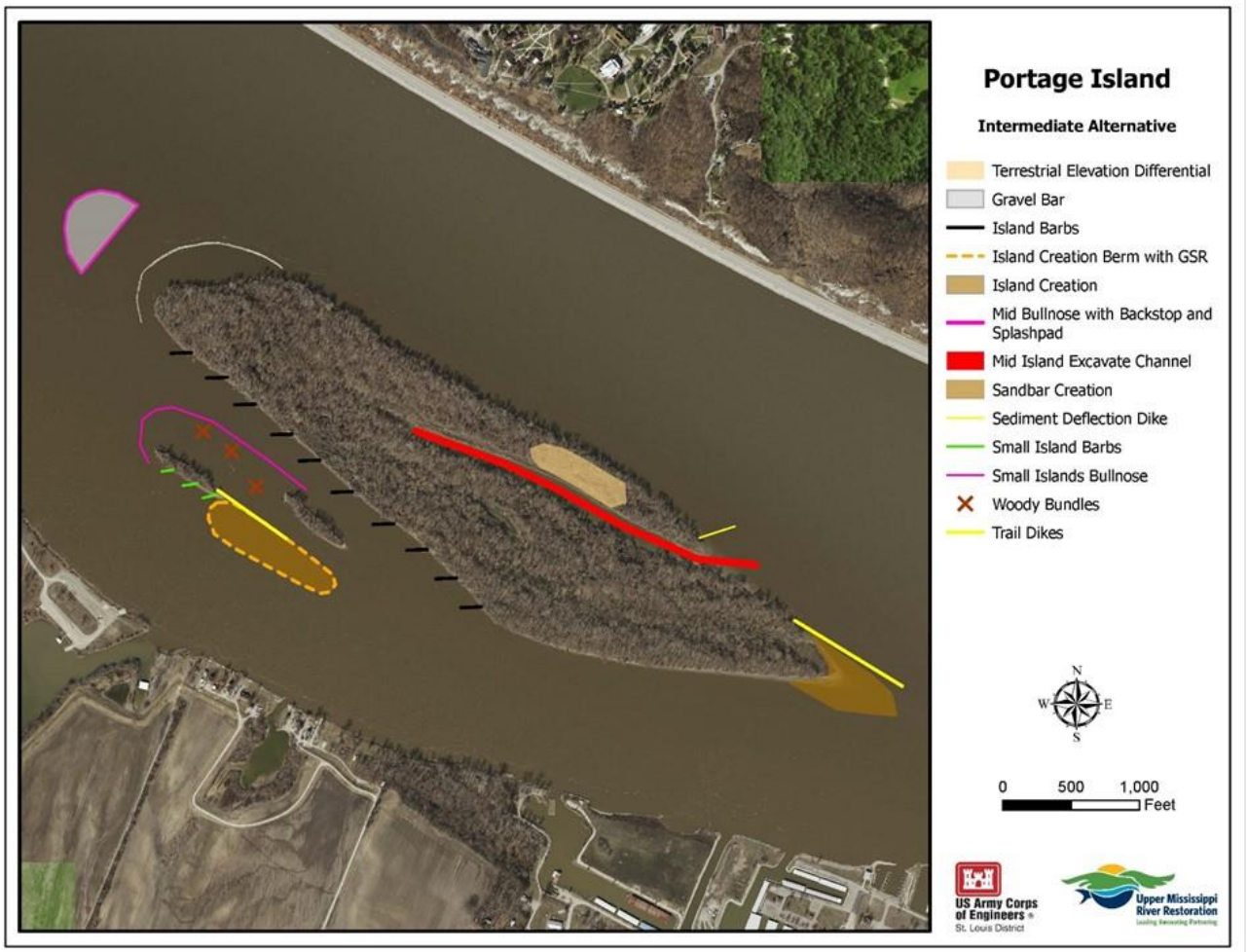

Figure 5: Tentatively Selected Plan- Portage Is.

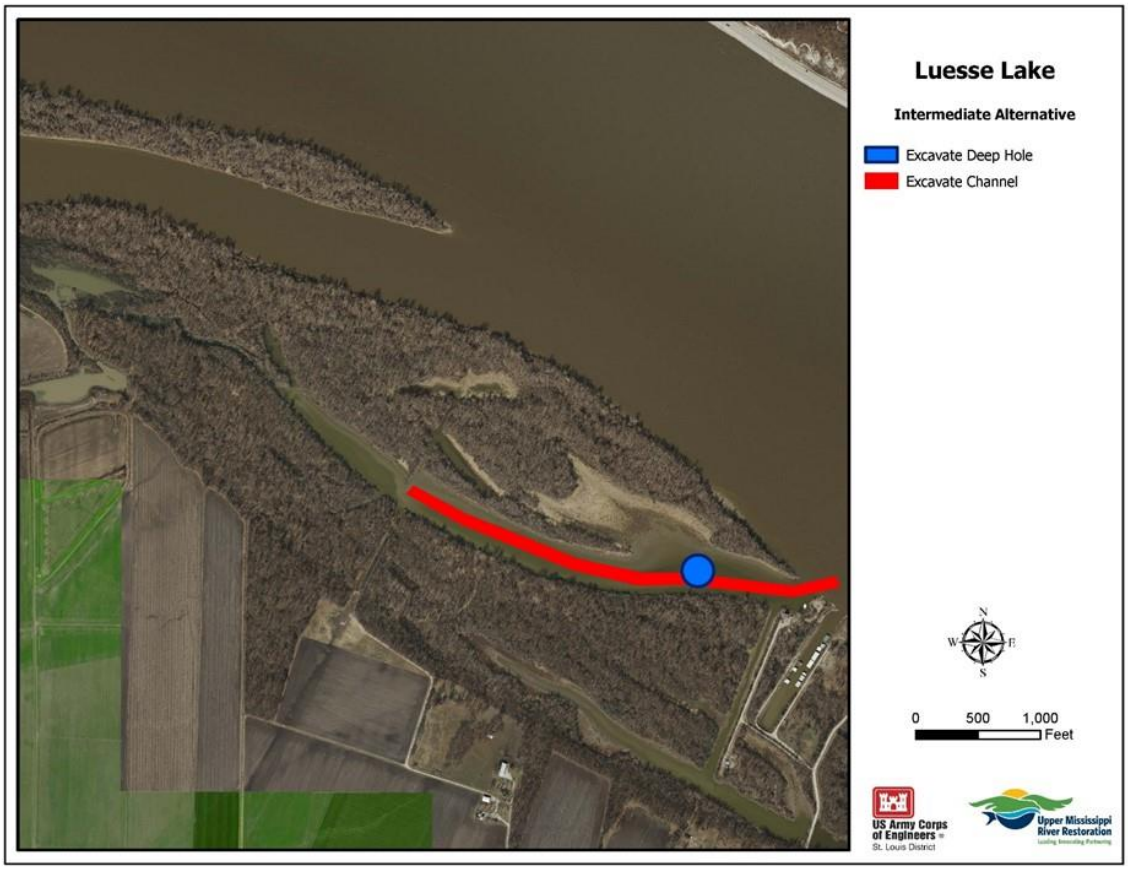

Figure 6: Tentatively Selected Plan - Luesse Lake

3. SPONSOR-OWNED LER

All Project measures are located on lands in which the United States of America has land rights on. These rights are managed by the USACE, USFWS and MDC, as part of the General Plan Lands.

4. NON-STANDARD ESTATES

No non-standard estates are required for implementation of this Project.

5. EXISTING FEDERAL PROJECTS

There are no other federal projects in the vicinity.

6. FEDERALLY OWNED LANDS

The West Alton Islands Project located on lands in which the United States of America hold Fee Simple and Easement rights on. These rights are managed by the USACE, USFWS and MDC, as part of the General Plan Lands.

7. NAVIGATION SERVITUDE

This project does serve a purpose which is in the aid of navigation. The UMRR Program, was authorized by Congress, utilizing powers granted by the United State Constitution, Article 1, Section 8, Clause 3 through the Water Resources Development Act of 1986 for the restoration and sustainability of the river's multiple uses.

Therefore, the use of navigation servitude is available for the Project.

8. MAPPING

A map of the site location is included as Exhibit A.

9. INDUCED FLOODING

Appendix G – Hydrologic and Hydraulic Engineering section conducted a no-rise analysis to document impacts to flood events due to the proposed changes. This analysis shows a maximum main channel rise of 0.02' and a decrease in WSE of 0.02' for the 1% AEP. In addition, the 50% AEP showed a maximum main channel rise in WSE of 0.07' and a decrease in WSE of 0.01'. The 50% AEP also showed impacts greater than 0.1' directly upstream of two of the proposed measures; however, this rise is expected and on federal land. In summary, other than on federally owned land, impacts of this project lead to any rise greater than 0.07'. The increase does not exceed the IDNR restriction of 0.1' for urban areas (or 0.5' for rural areas) proving that the impacts from the proposed measures are within acceptable limits.

10. BASELINE COST ESTIMATE

No baseline cost estimate is necessary from a real estate perspective since this project is located on lands held in Fee Simple and via Easements by the United States of America and no sponsor oversight, as it relates to real estate, is necessary. $20,000 is estimated for USACE real estate involvement during the planning and design phase.

11. RELOCATION ASSISTANCE BENEFITS

None of the proposed features require the Project to provide temporary or permanent relocation benefits to residential, farm or business entities.

12. MINERAL ACTIVITY

There are no known mineral rights or activities affecting the study area.

13. SPONSOR ASSESSMENT

The Federal and No-Federal Sponsor have the legal authority and power to execute as part of the General Plan Lands.

14. ZONING

No known zoning ordinances are proposed.

15. SCHEDULE OF LAND ACQUISITION MILESTONES

There are no lands, easements, or rights-of-way required for this project.

16. FACILITY OR UTILITY RELOCATIONS

There are no requirements for facility or utility relocations.

17. HTRW

Section 8 of the HTRW appendix (page16) Environmental professional opinion, based on the data and resources available for this assessment, it is the Environmental Professional's opinion that the Project area contains no major sites of interest that would impact the Project's cost or schedule. The environmental impact for the migration of off-site contaminants onto the Project area is negligible.

Therefore, a Phase II ESA is not recommended.

18. LANDOWNER ATTITUDE

There is no known landowner opposition to this Project.

19. NOTIFICATION TO THE SPONSOR REGARDING THE RISKS ASSOCIATED WITH LAND ACQUISITION BEFORE EXECUTION OF THE PROJECT PARTNERSHIP AGREEMENT (PPA)

All Project measures are located on lands in which the United States of America hold in Fee Simple and via Easements. These rights are managed by the USACE, USFWS and MDC, as part of the General Plan Lands.

20. OTHER RELEVANT REAL ESTATE ISSUES

No other known relevant real estate issues exist.

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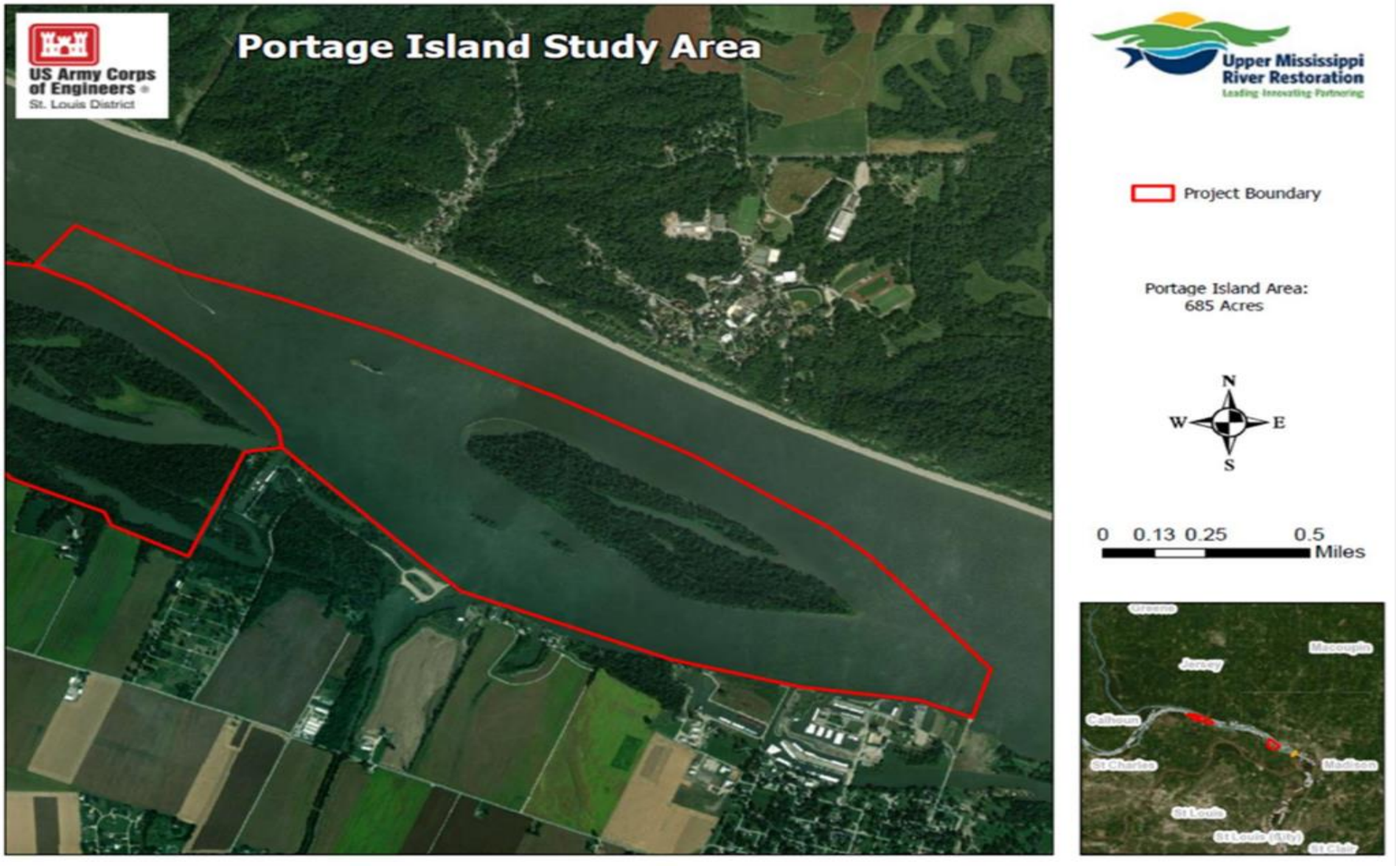
EXHIBIT A – PROJECT STUDY AREA




West Alton Bay Study Area
US Army Corps of Engineers
St. Louis District
Upper Mississippi River Restoration
Leading Innovating Partnering
Project Boundary
West Alton Bay Area:
745 Acres
N
W
E
S
0 0.1 0.2 0.4
Miles
Greene
Macoupin
Jersey
Calhoun
St Charles
Madison
St Louis
St Louis (City)
St Clair



UPPER MISSISSIPPI RIVER RESTORATION
FEASIBILITY REPORT
WITH INTEGRATED ENVIRONMENTAL ASSESSMENT

WEST ALTON ISLANDS HABITAT REHABILITATION AND ENHANCEMENT PROJECT

Appendix K: Cost

US Army Corps of Engineers ®
St. Louis District

Mississippi River
Miles 203-215.5
St. Charles County, Missouri
Project Partners: Missouri Department of Conservation & U.S. Fish and Wildlife Service

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Appendix H. Cost

1 COST ESTIMATE SUMMARY

1.1 GENERAL

The scope of this study focuses on evaluating proposed management measures that would restore structure, function, and processes of the backwater, side-channel, island, sandbar, floodplain wetland, and floodplain forest within the West Alton Islands Habitat Rehabilitation and Enhancement Project (HREP). This study follows the U.S. Army Corps of Engineers' (USACE's) six-step planning process specified in Engineer Regulation (ER) 1105-2-100 and is consistent with agency goals. The process identifies and responds to problems and opportunities and provides a flexible and rational framework to make decisions. Additionally, the process allows the interested public and stakeholders to be fully aware of the basic assumptions employed, data analyzed, risks/uncertainties identified, and significant implications of each alternative plan (including the No Action alternative). The development and comparison of alternatives allows for the ultimate identification of the National Ecosystem Restoration (NER) Plan. The NER Plan reasonably maximizes ecosystem restoration benefits compared to costs. The NER Plan also considers information that cannot be quantified, such as environmental significance, scarcity, socioeconomic impacts, and historic properties.

The West Alton Islands study area is approximately 1,823 acres of island, side channel, backwater, and floodplain forest habitats located on the right descending bank of the Mississippi River in St. Charles County, Missouri between River Miles (RM) 203 and 215.5. The study area lies within Pool 26 of the Upper Mississippi River System, a reach beginning below Lock and Dam 25 (RM 241.4) near Cap au Gris, Missouri, and ending at Melvin Price Lock and Dam (L&D) (RM 200.8) at Alton, IL. The study area encompasses West Alton Bay, Portage Island and side channel, and Luesse Lake.

The objectives for the West Alton Islands HREP are as follows.

a. Restore bathymetric flow and connectivity diversity of aquatic areas throughout study area (side channel, main channel, off channel, backwaters, etc)

b. Restore diverse island mosaics throughout study area (sand bars, islands; reduce wind fetch and wave impacts)

c. Restore native vegetation diversity and structural complexity throughout study area (wetlands, forests, etc.)

The final array of alternatives include:

- No Action
- Minimum Alternative
- Intermediate Alternative
- Maximum Alternative

The measures included in each Alternative are listed by area:
Minimum Alternative: These measures were identified as some of the simplest and most cost-effective ways to address the objectives.

- West Alton Bay: excavation (at mouth of backwater), island creation, gradual slope revetment, deep water pocket
- Portage Island: excavation (existing backwater), island creation, terrestrial elevation diversity, sandbar/mudflat creation, trail dike, gravel bar
- Luesse Lake: excavation (at mouth of backwater into wetland area), emergent wetland enhancement

Intermediate Alternative: These measures were identified as a unique combination that would address all three objectives.

- West Alton Bay: excavation (without benching), island creation, bullnose, emergent wetland enhancement (using excavated material), berm and barbs
- Portage Island: excavation (existing backwater), island creation, barbs, gradual slope revetment, woody bundles, sandbar/mudflat creation, trail dike, bullnose, sediment deflection dike, gravel bar, terrestrial elevation diversity
- Luesse Lake: excavation (south of pipeline), deep water pocket

Maximum Alternative: These measures were identified as a unique combination that would maximally address all three objectives.

- West Alton Bay: excavation (with benching), island creation, hard points, gradual slope revetment, overflow weir
- Portage Island: excavation (existing backwater – without benching), excavation (remnant backwater- without benching), island creation, barbs, gradual slope revetment, woody bundles, terrestrial elevation diversity, sandbar/mudflat creation, trail dike, sediment deflection dike, bullnose, gravel bar
- Luesse Lake: excavation (with benching), emergent wetland enhancement

A detailed cost estimate, abbreviated risk analysis, and construction schedule were developed for the recommended plan: Intermediate Alternative.

1.2 BASIS OF COST ESTIMATE

The cost estimate has been prepared based on current concept designs and site-specific information available to date.

Quantities were developed by MVS Hydrologic and Hydraulics Branch and were based on current surveys of the project areas. Surfaces were developed from the surveys in ArcGIS and were utilized to calculate cut and fill quantities for the different project features. There is a possibility quantities may increase during construction but cost impacts would be considered minimal and is captured in the applied contingencies and abbreviated risk analysis as a possible risk with marginal impacts.

Cost estimate was developed using MCACES and CEDEP. MCACES was used to develop the stone placement and land-based work cost, and CEDEP was used to develop the channel excavation cost. A material cost for A stone and C stone was received from Tower Rock Stone

Co. The wage rates were developed using Davis Bacon, Heavy & Highway construction for St. Charles County, MO MO20230001 08/18/2023. The MII 2022 Equipment Region 5 was used for equipment rates. The 2022 Cost Book was used.

1.3 CONTINGENCIES

The Abbreviated Risk Analysis process indicated a 28.9% construction contingency based on associated project risks for the Tentatively Selected Plan (TSP).

1.4 PLANNING, ENGINEERING, AND DESIGN (PED)

Planning, engineering, and design costs are based on historical data of similar projects in the St. Louis District. Recommended percentages by the cost MCX were taken into consideration as well. 18% of the construction cost was used to determine the PED costs. The Adaptive Management and Monitoring costs were estimated by the Environmental Planner. This amount was equivalent to 1.85% of the construction cost, so the total PED amount is 19.85% of the construction cost.

1.5 CONSTRUCTION MANAGEMENT

Construction Management costs are based on historical data of similar projects in the St. Louis District. Recommended percentages by the cost MCX were taken into consideration as well. 10% of the construction cost was used to determine the CM costs.

****** TOTAL PROJECT COST SUMMARY ******

PROJECT: **West Alton Islands Habitat Rehabilitation and Enhancement Project**
PROJECT NO: P2 472175
LOCATION: Upper Mississippi River

DISTRICT: **St. Louis District** **PREPARED:** **8/10/2023**
POC: **CHIEF, COST ENGINEERING, Brandon Lewis**

This Estimate reflects the scope and schedule in report; UMRR Feasibility Report with Integrated Environmental Assessment - West Alton Islands Habitat Rehabilitation and Enhancement Project

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)						TOTAL PROJECT COST (FULLY FUNDED)			
						Program Year (Budget EC): 2023									
						Effective Price Level Date: 1 OCT 22									
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	**TOTAL ($K)**	Spent Thru: **1-Oct-22** ($K)	**TOTAL FIRST COST** ($K)	INFLATED (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*		*K*	*L*	*M*	*N*	*O*
06	FISH & WILDLIFE FACILITIES	$17,497	$5,687	32.5%	$23,184	0.0%	$17,497	$5,687	$23,184	$0	$23,184	12.3%	$19,641	$6,383	$26,024
	CONSTRUCTION ESTIMATE TOTALS:	$17,497	$5,687		$23,184	0.0%	$17,497	$5,687	$23,184	$0	$23,184	12.3%	$19,641	$6,383	$26,024
01	LANDS AND DAMAGES	$0	$0	-	$0	-	$0	$0	$0	$0	$0	-	$0	$0	$0
30	PLANNING, ENGINEERING & DESIGN	$3,473	$565	16.3%	$4,038	0.0%	$3,473	$565	$4,038	$0	$4,038	12.5%	$3,906	$636	$4,542
31	CONSTRUCTION MANAGEMENT	$1,750	$322	18.4%	$2,072	0.0%	$1,750	$322	$2,072	$0	$2,072	15.2%	$2,016	$371	$2,388
	PROJECT COST TOTALS:	$22,720	$6,574	28.9%	$29,294		$22,720	$6,574	**$29,294**	$0	**$29,294**	12.5%	$25,564	$7,390	$32,954

ESTIMATED TOTAL PROJECT COST: **$32,954**

_____ **CHIEF, COST ENGINEERING, Brandon Lewis**

_____ **PROJECT MANAGER, Abigail Hoyt**

_____ **CHIEF, REAL ESTATE, Lynn Hoerner**

_____ **CHIEF, PLANNING, xxx**

_____ **CHIEF, ENGINEERING, David Busse**

_____ **CHIEF, OPERATIONS, xxx**

_____ **CHIEF, CONSTRUCTION, xxx**

_____ **CHIEF, CONTRACTING,xxx**

_____ **CHIEF, PM-PB, xxxx**

_____ **CHIEF, DPM, xxx**

**** CONTRACT COST SUMMARY ****

PROJECT: West Alton Islands Habitat Rehabilitation and Enhancement Project
DISTRICT: St. Louis District
PREPARED: 8/10/2023
LOCATION: Upper Mississippi River
POC: CHIEF, COST ENGINEERING, Brandon Lewis
This Estimate reflects the scope and schedule in report; UMRR Feasibility Report with Integrated Environmental Assessment - West Alton Islands Habitat Rehabilitation and Enhancement Project

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 10-Aug-23 Effective Price Level: 1-Oct-22				Program Year (Budget EC): 2023 Effective Price Level Date: 1 OCT 22								
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	RISK BASED CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Mid-Point Date	INFLATED (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*P*	*L*	*M*	*N*	*O*
	STAGE 1 - Stone Placement and Land Based Work													
06	FISH & WILDLIFE FACILITIES	$10,055	$3,268	32.5%	$13,323	0.0%	$10,055	$3,268	$13,323	2026Q4	11.7%	$11,234	$3,651	$14,885
	CONSTRUCTION ESTIMATE TOTALS:	$10,055	$3,268	32.5%	**$13,323**		$10,055	$3,268	$13,323			$11,234	$3,651	$14,885
01	LANDS AND DAMAGES	$0	$0	0.0%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
30	PLANNING, ENGINEERING & DESIGN													
2.5%	Project Management	$251	$41	16.3%	$292	0.0%	$251	$41	$292	2025Q2	9.7%	$276	$45	$321
1.0%	Planning & Environmental Compliance	$101	$16	16.3%	$117	0.0%	$101	$16	$117	2025Q2	9.7%	$110	$18	$128
7.0%	Engineering & Design	$704	$115	16.3%	$818	0.0%	$704	$115	$818	2025Q2	9.7%	$772	$126	$898
1.0%	Reviews, ATRs, IEPRs, VE	$101	$16	16.3%	$117	0.0%	$101	$16	$117	2025Q2	9.7%	$110	$18	$128
1.0%	Life Cycle Updates (cost, schedule, risks)	$101	$16	16.3%	$117	0.0%	$101	$16	$117	2025Q2	9.7%	$110	$18	$128
1.0%	Contracting & Reprographics	$101	$16	16.3%	$117	0.0%	$101	$16	$117	2025Q2	9.7%	$110	$18	$128
3.0%	Engineering During Construction	$302	$49	16.3%	$351	0.0%	$302	$49	$351	2026Q4	14.9%	$347	$56	$403
1.5%	Planning During Construction	$151	$25	16.3%	$175	0.0%	$151	$25	$175	2026Q4	14.9%	$173	$28	$201
1.9%	Adaptive Management & Monitoring	$186	$30	16.3%	$216	0.0%	$186	$30	$216	2026Q4	14.9%	$214	$35	$248
0.0%	Project Operations	$0	$0	16.3%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
31	CONSTRUCTION MANAGEMENT													
8.0%	Construction Management	$804	$148	18.4%	$953	0.0%	$804	$148	$953	2026Q4	14.9%	$924	$170	$1,094
0.0%	Project Operation:	$0	$0	18.4%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
2.0%	Project Management	$201	$37	18.4%	$238	0.0%	$201	$37	$238	2026Q4	14.9%	$231	$43	$274
	CONTRACT COST TOTALS:	$13,057	$3,778		$16,835		$13,057	$3,778	**$16,835**			$14,612	$4,225	**$18,837**

****** TOTAL PROJECT COST SUMMARY ******

****** CONTRACT COST SUMMARY ******

PROJECT: West Alton Islands Habitat Rehabilitation and Enhancement Project
DISTRICT: St. Louis District
PREPARED: 8/10/2023
LOCATION: Upper Mississippi River
POC: CHIEF, COST ENGINEERING, Brandon Lewis
This Estimate reflects the scope and schedule in report; UMRR Feasibility Report with Integrated Environmental Assessment - West Alton Islands Habitat Rehabilitation and Enhancement Project

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: / Effective Price Level:			10-Aug-23 / 1-Oct-22	Program Year (Budget EC): / Effective Price Level Date:			2023 / 1 OCT 22					
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Mid-Point Date	INFLATED (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*P*	*L*	*M*	*N*	*O*
	STAGE 2 - Channel Excavation													
06	FISH & WILDLIFE FACILITIES	$7,442	$2,419	32.5%	$9,860	0.0%	$7,442	$2,419	$9,860	2027Q1	13.0%	$8,407	$2,732	$11,139
	CONSTRUCTION ESTIMATE TOTALS:	$7,442	$2,419	32.5%	**$9,860**		$7,442	$2,419	$9,860			$8,407	$2,732	$11,139
01	LANDS AND DAMAGES	$0	$0	0.0%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
30	PLANNING, ENGINEERING & DESIGN													
2.5%	Project Management	$186	$30	16.3%	$216	0.0%	$186	$30	$216	2026Q2	13.1%	$210	$34	$245
1.0%	Planning & Environmental Compliance	$74	$12	16.3%	$87	0.0%	$74	$12	$87	2026Q2	13.1%	$84	$14	$98
7.0%	Engineering & Design	$521	$85	16.3%	$606	0.0%	$521	$85	$606	2026Q2	13.1%	$589	$96	$685
1.0%	Reviews, ATRs, IEPRs, VE	$74	$12	16.3%	$87	0.0%	$74	$12	$87	2026Q2	13.1%	$84	$14	$98
1.0%	Life Cycle Updates (cost, schedule, risks)	$74	$12	16.3%	$87	0.0%	$74	$12	$87	2026Q2	13.1%	$84	$14	$98
1.0%	Contracting & Reprographics	$74	$12	16.3%	$87	0.0%	$74	$12	$87	2026Q2	13.1%	$84	$14	$98
3.0%	Engineering During Construction	$223	$36	16.3%	$260	0.0%	$223	$36	$260	2027Q1	15.7%	$258	$42	$300
1.5%	Planning During Construction	$112	$18	16.3%	$130	0.0%	$112	$18	$130	2027Q1	15.7%	$129	$21	$150
1.9%	Adaptive Management & Monitoring	$138	$22	16.3%	$160	0.0%	$138	$22	$160	2027Q1	15.7%	$159	$26	$185
0.0%	Project Operations	$0	$0	16.3%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
31	CONSTRUCTION MANAGEMENT													
8.0%	Construction Management	$595	$110	18.4%	$705	0.0%	$595	$110	$705	2027Q1	15.7%	$689	$127	$816
0.0%	Project Operation:	$0	$0	18.4%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
2.0%	Project Management	$149	$27	18.4%	$176	0.0%	$149	$27	$176	2027Q1	15.7%	$172	$32	$204
	CONTRACT COST TOTALS:	$9,663	$2,796		$12,459		$9,663	$2,796	**$12,459**			$10,952	$3,165	**$14,117**

Abbreviated Risk Analysis

Project (less than $40M): **West Alton Habitat Rehabilitation and Enhancement Project** **Alternative: Intermediate**

Project Development Stage/Alternative: **Feasibility (Recommended Plan)**

Risk Category: **Moderate Risk: Typical Project Construction Type** **Meeting Date: 8/29/2023**

Total Estimated Construction Contract Cost = $ 17,497,004

	CWWBS	Feature of Work	Estimated Cost		% Contingency	$ Contingency	Total
	01 LANDS AND DAMAGES	Real Estate	$ -		0%	$ -	$ -
1	06 FISH AND WILDLIFE FACILITIES	**Stage 1 - Stone Placement and Land Based Work**	$ 10,055,455		40%	$ 4,000,703	$ 14,056,158
2	06 FISH AND WILDLIFE FACILITIES	**Stage 2 - Channel Excavation**	$ 7,441,549		23%	$ 1,686,185	$ 9,127,734
3			$ -		0%	$ -	$ -
4			$ -		0%	$ -	$ -
5			$ -		0%	$ -	$ -
6			$ -		0%	$ -	$ -
7			$ -		0%	$ -	$ -
8			$ -		0%	$ -	$ -
9			$ -		0%	$ -	$ -
10			$ -		0%	$ -	$ -
11			$ -		0%	$ -	$ -
12	All Other	**Remaining Construction Items**	$ -	*0.0%*	0%	$ -	$ -
13	30 PLANNING, ENGINEERING, AND DESIGN	**Planning, Engineering, & Design**	$ 3,473,155		16%	$ 565,065	$ 4,038,220
14	31 CONSTRUCTION MANAGEMENT	**Construction Management**	$ 1,749,700		18%	$ 322,314	$ 2,072,014
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MUST INCLUDE JUSTIFICATION SEE BELOW)					$ -	

Totals				
Real Estate	$ -	0%	$ -	$ -
Total Construction Estimate	$ 17,497,004	32.50%	$ 5,686,888	$ 23,183,892
Total Planning, Engineering & Design	$ 3,473,155	16.27%	$ 565,065	$ 4,038,220
Total Construction Management	$ 1,749,700	18.42%	$ 322,314	$ 2,072,014
Total Excluding Real Estate	**$ 22,719,859**	**28.94%**	**$ 6,574,267**	**$ 29,294,126**
		Base	**50%**	**80%**
Confidence Level Range Estimate ($000's)		$22,720k	$26,664k	$29,294k

* 50% based on base is at 5% CL.

Fixed Dollar Risk Add: (Allows for additional risk to be added to the risk analsyis. Must include justification. Does not allocate to Real Estate.	

West Alton Habitat Rehabilitation and Enhancement Project

Feasibility (Recommended Plan)

Abbreviated Risk Analysis

Meeting Date: 29-Aug-23

Risk Level

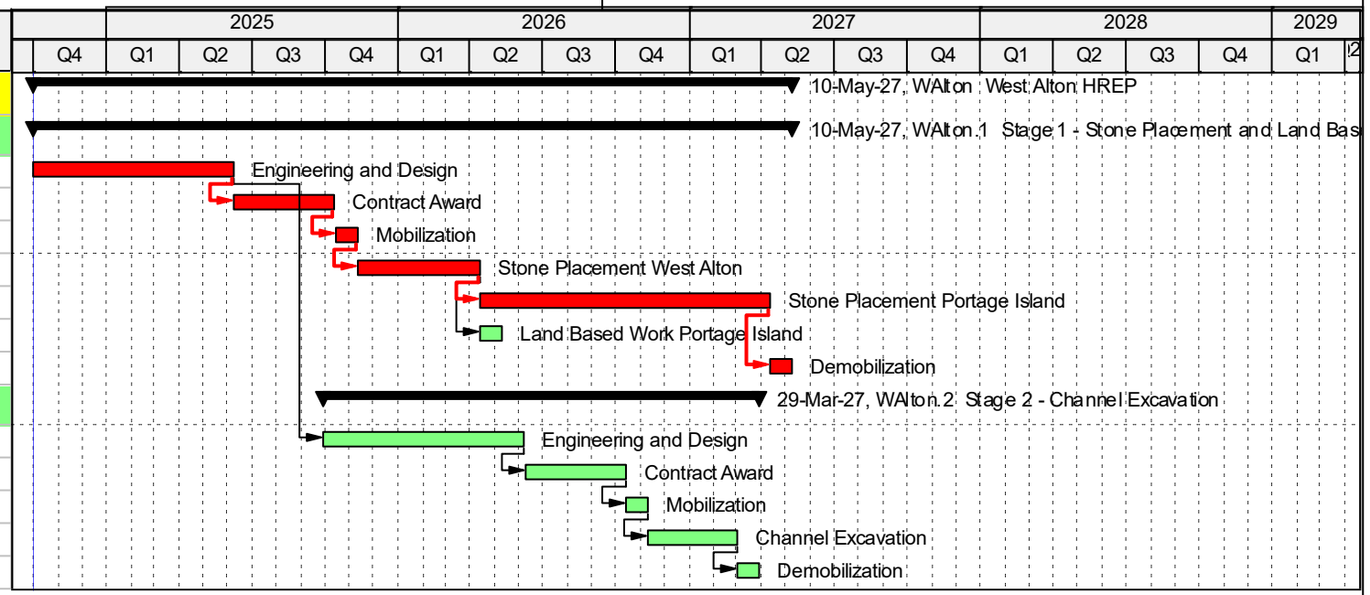
	Negligible	Marginal	Moderate	Significant	Critical
Very Likely	2	3	4	5	5
Likely	1	2	3	4	5
Possible	0	1	2	3	4
Unlikely	0	0	1	2	3

Risk Register

Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level
Project Management & Scope Growth				**Maximum Project Growth**		**75%**
PS-1	Stage 1 - Stone Placement and Land Based Work	• Potential for scope growth, added features? • Project accomplishes intent? • Funding Difficulties?	No concern for added features. Modeling has brought down the risk of the project not accomplishing the intent. Funding may be difficult because of the magnitude of this portion of the project and the typical amount of construction funds received each year. Additional mob & demobs may be needed.	Marginal	Possible	1
PS-2	Stage 2 - Channel Excavation	• Potential for scope growth, added features? • Project accomplishes intent? • Funding Difficulties?	No concern for added features. Modeling has brought down the risk of the project not accomplishing the intent. Funding may be difficult because of the magnitude of this portion of the project and the typical amount of construction funds received each year. Additional mob & demobs may be needed.	Marginal	Possible	1
PS-13	Planning, Engineering, & Design	• Funding Difficulties? • Sufficient Staffing/Support?	If funding is not available and project needs to be separated into additional construction stages, additional labor funding would be required for separate plans and specs development and contract awards.	Marginal	Possible	1
PS-14	Construction Management	• Funding Difficulties?	Funding may be difficult because of the magnitude of the portion of the project and the typical amount of construction funds received each year. Several mob and demobs will be needed. Increasing the construction management time.	Marginal	Possible	1
Acquisition Strategy				**Maximum Project Growth**		**30%**
AS-1	Stage 1 - Stone Placement and Land Based Work	• Contracting plan firmly established? • Limited bid competition anticipated?	It is anticipated that the work will be done using an IDIQ contract. Recent IDIQ contract for rock placement only received a single proposal. Risk that there will be limited competition for this work.	Marginal	Possible	1
AS-2	Stage 2 - Channel Excavation	• Contracting plan firmly established? • Limited bid competition anticipated?	It is anticipated that the work will be done using an IDIQ contract. Recent IDIQ contract for dredging received 5 proposals and provided great value to the government.	Marginal	Unlikely	0
AS-13	Planning, Engineering, & Design		No concern that the acquisition strategy will affect the planning, engineering, and design.	Negligible	Unlikely	0
AS-14	Construction Management		No concern that the anticipated acquisition strategy will affect the construction management.	Negligible	Unlikely	0
Construction Elements				**Maximum Project Growth**		**25%**
CON-1	Stage 1 - Stone Placement and Land Based Work	• High risk or complex construction elements, site access, in-water? • Potential for construction modification and claims?	Flood/water level may impact construction, but it less likely at this location due to the relatively consistent water level in the pool. Threatened & endangered species may also impact the construction schedule.	Marginal	Possible	1
CE-2	Stage 2 - Channel Excavation	• High risk or complex construction elements, site access, in-water? • Potential for construction modification and claims?	Flood/water level may impact construction, but it less likely at this location due to the relatively consistent water level in the pool. Dredge efficiency will be affected by woody debris. Threatened & endangered species may also impact the construction schedule.	Marginal	Possible	1
CE-13	Planning, Engineering, & Design		No concern that the construction elements will affect the planning, engineering, and design.	Negligible	Unlikely	0

CE-14	Construction Management	• High risk or complex construction elements, site access, in-water? • Potential for construction modification and claims?	Flood/water level may impact construction, but it less likely at this location due to the relatively consistent water level in the pool. Dredge efficiency will be affected by woody debris. Threatened & endangered species may also impact the construction schedule.	Marginal	Possible	1
Specialty Construction or Fabrication				**Maximum Project Growth**		**65%**
SC-1	Stage 1 - Stone Placement and Land Based Work	Not applicable		Negligible	Unlikely	0
SC-2	Stage 2 - Channel Excavation	Not applicable		Negligible	Unlikely	0
SC-13	Planning, Engineering, & Design	Not applicable		Negligible	Unlikely	0
SC-14	Construction Management	Not applicable		Negligible	Unlikely	0
Technical Design & Quantities				**Maximum Project Growth**		**30%**
T-1	Stage 1 - Stone Placement and Land Based Work	• Level of confidence based on design and assumptions? • Possibility for increased quantities due to loss, waste, or subsidence? • Sufficient investigations to develop quantities?	Technical lead provided quantities based on most recent surveys. The area does not experience frequent changes. The quantities included a 20% contingency. It is possible there will be a quantity increase, but would cause marginal impacts to cost.	Marginal	Possible	1
T-2	Stage 2 - Channel Excavation	• Level of confidence based on design and assumptions? • Possibility for increased quantities due to loss, waste, or subsidence? • Sufficient investigations to develop quantities?	Technical lead provided quantities based on most recent surveys. The area does not experience frequent changes. The quantities included a 20% contingency. It is possible there will be a quantity increase, but would cause marginal impacts to cost.	Marginal	Possible	1
T-13	Planning, Engineering, & Design		Adaptive Management is included in the PED. AM estimate was provided by the PDT. It is uncertain the amount of Adaptive Management that will be required and it could increase.	Moderate	Possible	2
T-14	Construction Management		The CM of this project will not change based on the quantities developed for this project.	Negligible	Unlikely	0
Cost Estimate Assumptions				**Maximum Project Growth**		**35%**
EST-1	Stage 1 - Stone Placement and Land Based Work	• Site accessibility, transport delays, congestion?	It's possible some my need to be placed by land based equipment because of shallow areas. Site access will make it difficult to build. The KTR may use different equipment than assumed to complete the work.	Moderate	Very LIKELY	4
EST-2	Stage 2 - Channel Excavation	• Site accessibility, transport delays, congestion?	Contaminants are not expected. Phase 1 HTRW survey is complete and no concerns were found. Phase 2 survey is not required. Assumed hydraulically dredged and piped to placement areas.	Moderate	Unlikely	1
EST-13	Planning, Engineering, & Design		PED percentage is typical for ecosystem restoration project and unlikely to increase.	Negligible	Unlikely	0
EST-14	Construction Management	• Site accessibility, transport delays, congestion?	Construction management costs may increase with the difficult construction of West Alton.	Moderate	Possible	2
External Project Risks				**Maximum Project Growth**		**40%**
EX-1	Stage 1 - Stone Placement and Land Based Work	• Potential for severe adverse weather? • Unanticipated inflations in fuel, key materials? • Funding Constraints	is a possibility that a key material, such as rock, and fuel, could experience a cost increase affecting the construction cost of the project. Historic levels of inflation have recently been experienced.	Moderate	Possible	2
EX-2	Stage 2 - Channel Excavation	• Potential for severe adverse weather? • Unanticipated inflations in fuel, key materials? • Funding Constraints	are no materials required for the channel excavation, but there is a possibility that fuel, could experience a cost increase affecting the construction cost of the project. Historic levels of inflation have recently been experienced.	Moderate	Possible	2
EX-13	Planning, Engineering, & Design		Weather impacts and fuel/material increases will not affect the cost of PED or CM.	Negligible	Unlikely	0
EX-14	Construction Management		Weather impacts and fuel/material increases will not affect the cost of PED or CM.	Negligible	Unlikely	0

Activity ID	Activity Name	Planned Duration	Start	Finish
WAlton	**West Alton HREP**	680	01-Oct-24	10-May-27
WAlton.1	**Stage 1 - Stone Placement a**	680	01-Oct-24	10-May-27
A1000	Engineering and Design	180	01-Oct-24	09-Jun-25
A1010	Contract Award	90	10-Jun-25	13-Oct-25
A1020	Mobilization	20	14-Oct-25	10-Nov-25
A1030	Stone Placement West Alton	110	11-Nov-25	13-Apr-26
A1040	Stone Placement Portage Island	260	14-Apr-26	12-Apr-27
A1120	Land Based Work Portage Island	20	14-Apr-26	11-May-26
A1050	Demobilization	20	13-Apr-27	10-May-27
WAlton.2	**Stage 2 - Channel Excavatic**	390	30-Sep-25	29-Mar-27
A1060	Engineering and Design	180	30-Sep-25	08-Jun-26
A1070	Contract Award	90	09-Jun-26	12-Oct-26
A1080	Mobilization	20	13-Oct-26	09-Nov-26
A1090	Channel Excavation	80	10-Nov-26	01-Mar-27
A1110	Demobilization	20	02-Mar-27	29-Mar-27



Actual Work | Critical Remaining Work | Su...
Remaining Work | Milestone

TASK filter: All Activities

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West Alton HREP

2/28/2023

West Alton - Minimum

**Excludes Real Estate & Mitigation Costs

ITEM	ESTIMATED AMOUNT	
Mobilization and Demobilization	$1,600,000	
Dredging		
Dredging Cut at Backwater Entrance	$35,970	
Deeper Dredged Pocket	$549,450	
Rock Berms, A-Stone		
A-Stone Upstream Berm	$217,525	
A-Stone Downstream Berm	$357,525	
SUBTOTAL:	$2,760,470	
E & D :	$500,000	18%
S & A :	$280,000	10%
Contingency:	$1,239,000	35%
TOTAL COST:	**$4,779,470**	

West Alton HREP

2/28/2023

West Alton - Intermediate

**Excludes Real Estate & Mitigation Costs

ITEM	ESTIMATED AMOUNT
Mobilization and Demobilization	$1,600,000
Dredging	
Dredging Cut at Backwater Area	$3,011,250
Rock Berms, A-Stone	
Berm and Barb	$786,800
Interior Containment Berm	$198,450
Stone Bullnose to Protect Dredge	$1,303,750
SUBTOTAL:	$6,900,250
E & D :	$1,240,000
S & A :	$690,000
Contingency:	$3,091,000
TOTAL COST:	**$11,921,250**

	18%
	10%
	35%

West Alton HREP

2/28/2023

West Alton - Maximum

**Excludes Real Estate & Mitigation Costs

ITEM	ESTIMATED AMOUNT
Mobilization and Demobilization	$1,600,000
Dredging	
Dredging Cut at Backwater Area	$5,391,540
Rock Berms	
Alternating Hard Points, A-Stone	$189,700
Revetment Ring Berm, A-Stone	$300,300
Revetment Ring Berm, C-Stone	$404,800
Overland Weir	
Concrete	$2,472,330
Filter Material	$58,552
Bedding Material	$234,208
Excavation	$1,077,297
Clear & Grubbing	$22,220
Pervious Material	$220,507
Seeding	$4,960
Rip Rap	$11,532
Geotextile	$1,068
SUBTOTAL:	$11,989,014
E & D :	$2,160,000
S & A :	$1,200,000
Contingency:	$5,372,000
TOTAL COST:	**$20,721,014**

	18%
	10%
	35%

West Alton HREP

2/28/2023

Portage Island - Minimum

**Excludes Real Estate & Mitigation Costs

ITEM	ESTIMATED AMOUNT	
Mobilization and Demobilization	$1,600,000	
Dredging		
Dredge Interior Channel on Island	$498,630	
Tree Removal	$38,080	
Sediment Deflection Dike, A-Stone	$1,304,100	
Gravel Bar Placement	$246,560	
SUBTOTAL:	$3,687,370	
E & D :	$660,000	18%
S & A :	$370,000	10%
Contingency:	$1,651,000	35%
TOTAL COST:	**$6,368,370**	

West Alton HREP

2/28/2023

Portage Island - Intermediate

**Excludes Real Estate & Mitigation Costs

ITEM	ESTIMATED AMOUNT
Mobilization and Demobilization	$1,600,000
Dredging	
Dredge Interior Channel on Island	$498,630
Soil Berm	$74,100
Tree Removal	$38,080
Rock Berm, C-Stone	$949,600
Rock Structures, A-Stone	
Rock Berm	$856,800
Sediment Deflection Dike, DS Island Tip	$1,304,100
Sediment Deflection Dike, Dredged Channel	$229,425
Small Island Bullnose	$992,950
Bullnose Midway Between Elsah and Portage	$827,575
10 Portage Island Barbs	$326,375
3 Small Island Barbs	$43,750
Wood Bundles	$75,000
Gravel Bar Placement	$267,490
SUBTOTAL:	$8,083,875
E & D :	$1,460,000
S & A :	$810,000
Contingency:	$3,624,000
TOTAL COST:	**$13,977,875**

	18%
	10%
	35%

West Alton HREP

2/28/2023

Portage Island - Maximum

**Excludes Real Estate & Mitigation Costs

ITEM	ESTIMATED AMOUNT
Mobilization and Demobilization	$1,600,000
Dredging	
Dredge Interior Channel on Island	$498,630
Dredge Lower Interior Channel	$626,505
Soil Berm	$127,490
Tree Removal	$118,720
Rock Berm, C-Stone	$949,600
Rock Structures, A-Stone	
Rock Berm	$856,800
Sediment Deflection Dike, DS Island Tip	$1,304,100
Sediment Deflection Dike, Dredged Channel	$229,425
Small Island Bullnose	$992,950
Bullnose midway between Elsah and Portage	$827,575
10 Portage Island Barbs	$326,375
3 Small Island Barbs	$43,750
Wood Bundles	$75,000
Gravel Bar Placement	$267,490
SUBTOTAL:	$8,844,410
E & D :	$1,590,000
S & A :	$880,000
Contingency:	$3,960,000
TOTAL COST:	**$15,274,410**

18%	
10%	
35%	

West Alton HREP

2/28/2023

Luesse Lake - Minimum

3/7/2023

**Excludes Real Estate & Mitigation Costs

ITEM	ESTIMATED AMOUNT	
Mobilization and Demobilization	$1,400,000	
Dredging		
Dredge Cut	$384,010	
Dredge for Wetland Creation	$178,420	
Tree Removal	$13,440	
SUBTOTAL:	$1,975,870	
E & D :	$360,000	18%
S & A :	$200,000	10%
Contingency:	$888,000	35%
TOTAL COST:	**$3,423,870**	

West Alton HREP

2/28/2023

Luesse Lake - Intermediate

3/7/2023

**Excludes Real Estate & Mitigation Costs

ITEM	ESTIMATED AMOUNT	
Mobilization and Demobilization	$1,400,000	
Dredging		
Dredge Cut	$1,598,025	
Dredge Deep Hole	$294,305	
SUBTOTAL:	$3,292,330	
E & D :	$590,000	18%
S & A :	$330,000	10%
Contingency:	$1,474,000	35%
TOTAL COST:	**$5,686,330**	

West Alton HREP

2/28/2023

Luesse Lake - Maximum

**Excludes Real Estate & Mitigation Costs

ITEM	ESTIMATED AMOUNT	
Mobilization and Demobilization	$1,400,000	
Dredging		
Dredge Cut	$6,743,660	
Dredge for Wetland Creation	$271,975	
Tree Removal	$62,720	
SUBTOTAL:	$8,478,355	
E & D :	$1,530,000	18%
S & A :	$850,000	10%
Contingency:	$3,800,000	35%
TOTAL COST:	**$14,658,355**	

UPPER MISSISSIPPI RIVER RESTORATION

DRAFT FEASIBILITY REPORT

WITH INTEGRATED ENVIRONMENTAL ASSESSMENT

WEST ALTON ISLANDS HABITAT REHABILITATION AND ENHANCEMENT PROJECT

Appendix K: Economics

US Army Corps of Engineers ®
St. Louis District

Mississippi River
Miles 203-215.5
St. Charles County, Missouri
Project Partners: Missouri Department of Conservation & U.S. Fish and Wildlife Service

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1.0 Cost Effective and Incremental Cost Analyses

1.1 Introduction

For environmental planning, where traditional benefit-cost analysis is not possible because costs and benefits are expressed in different units, two analytical methods are used to assist Corps planners in the decision process. First, cost effectiveness (CE) analysis is conducted to ensure that the least cost solution is identified for each possible level of environmental output. Subsequent incremental cost analysis (ICA) of the cost-effective solutions is conducted to reveal changes in costs for increasing levels of environmental outputs. In the absence of a common measurement unit for comparing the non-monetary benefits with the monetary costs of environmental plans, cost effectiveness and incremental cost analysis are valuable tools to assist in decision making.

It is important to keep in mind that the most useful information developed by these two methods is what it tells decision makers about the relative relationships among solutions – that one will likely produce greater output than another, or one is likely to be more costly than another – rather than the specific numbers that are calculated. Furthermore, these analyses will usually not lead, and are not intended to lead, to a single best solution (as in economic cost-benefit analysis); however, they will improve the quality of decision making by ensuring that a rational, supportable approach is used in considering and selecting alternative methods to produce environmental outputs.

To perform the CE/ICA, use was made of the IWR Planning Suite Decision Support Software developed by the US Army Corps of Engineers Institute for Water Resources (IWR). IWR Planning Suite has been developed to assist with plan comparison by conducting cost effectiveness and incremental cost analyses, identifying the plans which are the best financial investments (“Best Buys”), and displaying the effects of each on a range of decision variables. The software is available via the IWR Planning Suite Internet. The latest version (2.0.9.34) has been certified for use by USACE Headquarters, meaning that it has been reviewed and certified by the appropriate Planning Center of Expertise (PCX) and represents a corporate approval that the model is sound and functional.

1.1.2 Cost Effective Solutions (CE)

In cost effectiveness analysis, it is necessary to filter out plans that produce the same output level as another plan but cost more; or cost the same amount or more than another plan but produce less output. This CE analysis was performed by the IWR planning model.

Table 1 displays the expected environmental outputs in terms of average annual habitat units along with the total first cost, interest during construction, average annual construction cost, and total average annual cost for each of the restoration alternatives and No Action plans. In this instance all five alternatives in addition to the No Action alternative are cost effective.

1.1.3 Cost Effective and Incrementally Justified (Best Buy Plans)

The final step in the analysis is to determine which subset of the cost-effective solutions is also incrementally justified. These solutions, also known as Best Buy Plans or Best Buy Alternatives, are those plans that provide increases in benefits at the lowest average cost (per habitat unit). The IWR Planning model was run to make the necessary calculations producing the results shown in Table 2. In this case, all minimum, intermediate, and max

alternatives are the Best Buy Plans. The No Action alternative is always, by default, a Best Buy Plan as well.

Included in Table 2 are the incremental costs per habitat unit for the Best Buy Plans. Incremental cost is calculated by dividing the difference between the solution's costs by the difference between the solution's outputs. Reviewing this table with the incremental cost information now allows the decision maker to make the following comparisons of alternative restoration plans and to progressively ask "Is it worth it?"

As noted previously, neither cost effectiveness analysis nor incremental cost analysis will tell the decision maker what choice to make. However, the information developed by both analyses will help the decision maker make a more-informed decision and, once a decision is made, better understand its consequences in relation to other choices. Figure 1 shows the full range of solutions and highlights the cost-effective solutions and the incrementally justified (Best Buy) solutions. Figure 2 shows the incremental cost and output for the Best Buy Plans.

Table 1. Summary of Outputs (AAHUs) and Costs

Name of Alternative	First Cost	Interest During Construction	Average Annual Construction	Average Annual Cost	AAHUs	Cost Effective
No Action	$ -	$ -	$ -	$ -	-	Best Buy
Minimum	$ 12,201,710	$ 306,949	$ 533,389	$ 560,361	348	Best Buy
Intermediate	$ 26,465,455	$ 665,772	$ 1,206,476	$ 1,206,476	425	Best Buy
Maximum	$ 42,443,779	$ 1,067,726	$ 1,930,651	$ 1,930,651	470	Best Buy

Note: Costs are shown at the 2023 price level and were annualized using the current FY24 Federal discount rate of 2.75 percent over a 50-year period of analysis.

Table 2. Best Buy Plans and Incremental Costs (AAHUs)

Name of Alternative	AAHUs	First Cost	Interest During Construction	Average Annual Cost	Average Annual Cost per AAHU	Additional Average Annual Cost	Additional Output (AAHUs)	Incremental Cost (per AAHU)
No Action	-	$ -	$ -	$ -	$ -	$ -	-	$ -
Minimum	348	$ 12,201,710	$ 306,949	$ 560,361	$ 1,610	$ 560,361	348	$ 1,610
Intermediate	425	$ 26,465,455	$ 665,772	$ 1,206,476	$ 2,839	$ 646,115	77	$ 8,391
Maximum	470	$ 42,443,779	$ 1,067,726	$ 1,930,651	$ 4,108	$ 724,175	45	$ 16,093

Note: Costs are shown at the 2023 price level and were annualized using the current FY24 Federal discount rate of 2.75 percent over a 50-year period of analysis.

Figure 1. Full Range of Solutions

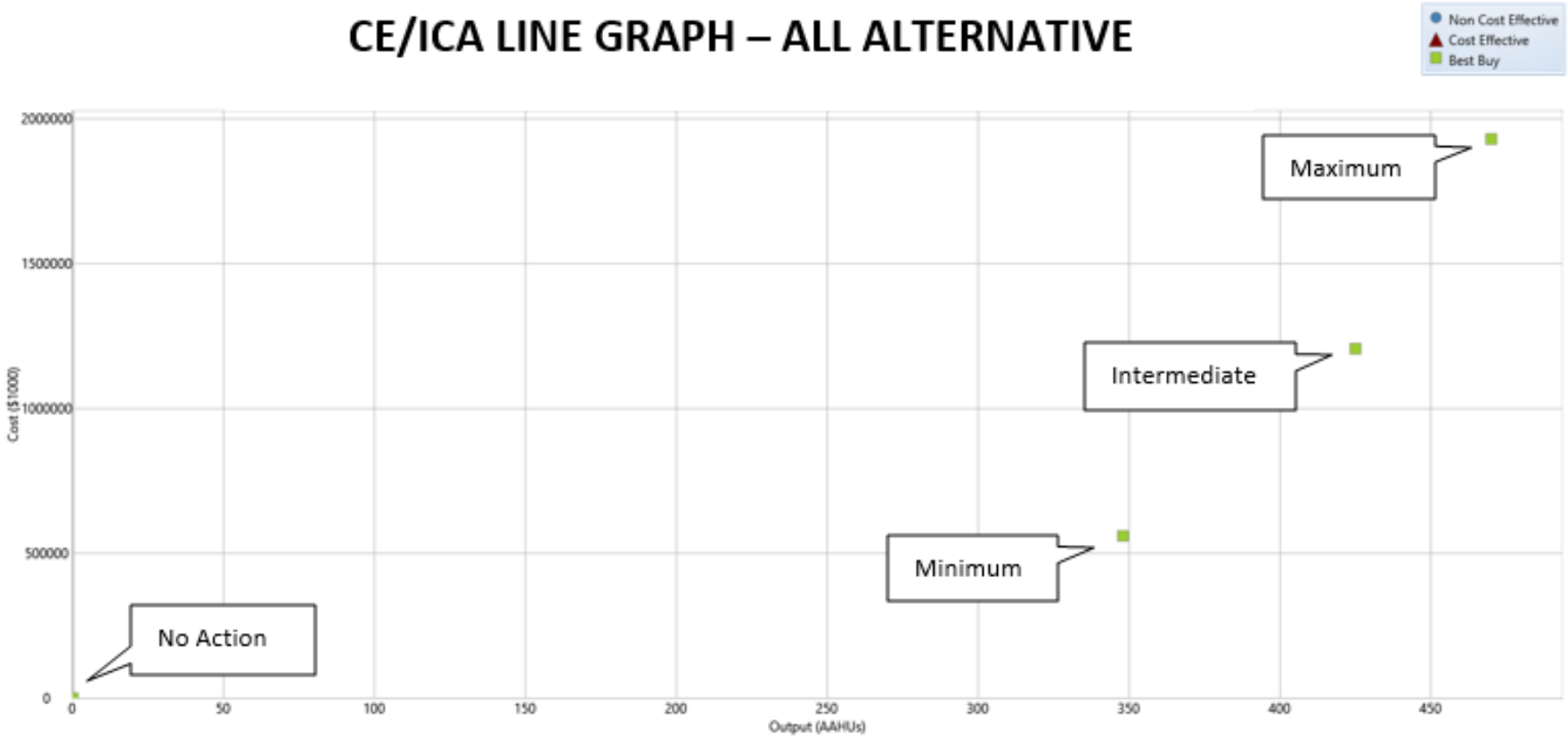
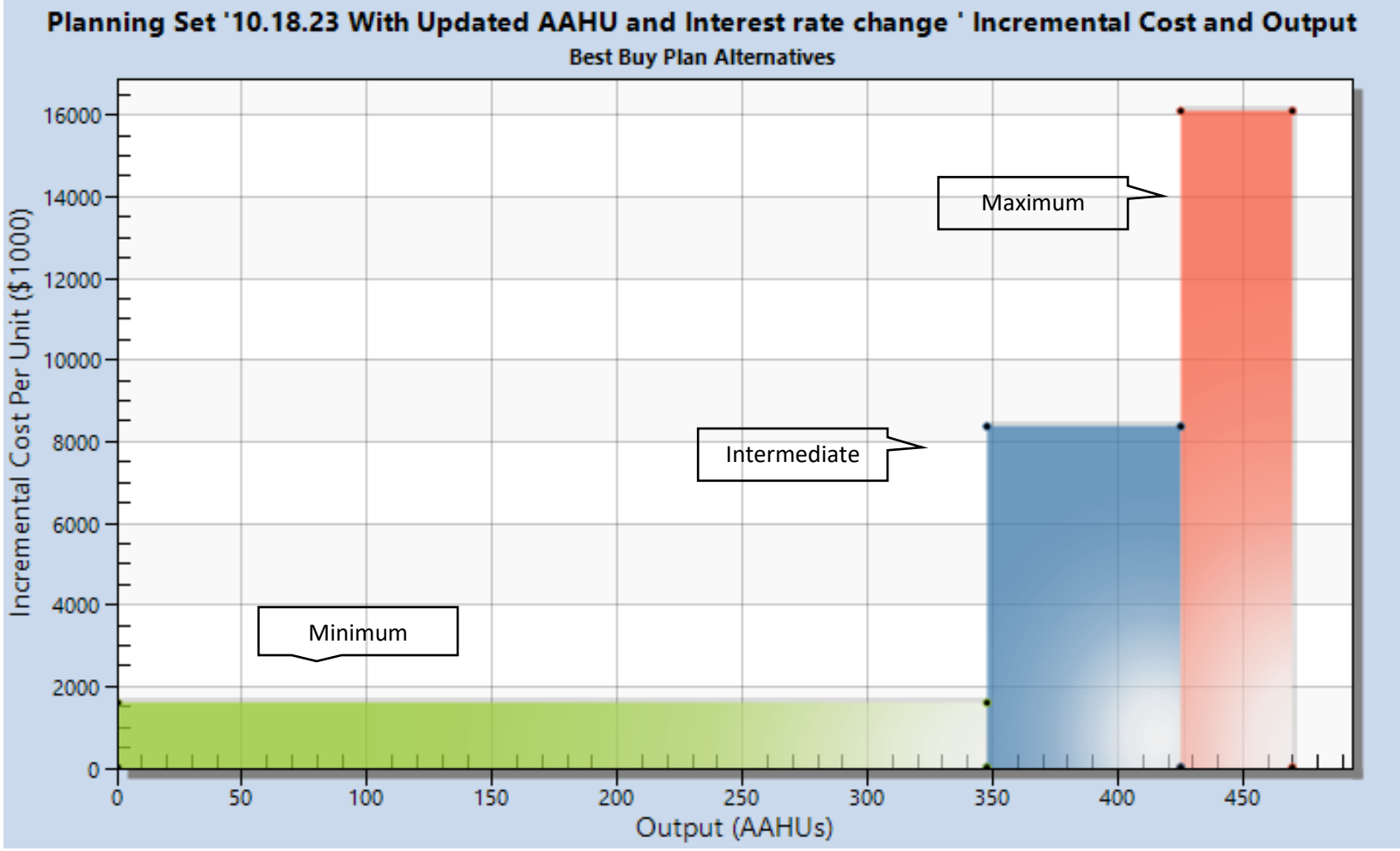


Figure 2. Incremental Cost of Best Buy Plans



2.0 Regional Economic Development

2.1 RECONS Model

The U.S. Army Corps of Engineers (USACE) Institute for Water Resources, Louis Berger, and Michigan State University have developed a regional economic impact modeling tool, RECONS (Regional ECONomic System), that provides estimates of jobs and other economic measures such as labor income, value added, and sales that are supported by USACE programs, projects, and activities. This modeling tool automates calculations and generates estimates of jobs, labor income, value added, and sales through the use of IMPLAN®'s multipliers and ratios, customized impact areas for USACE project locations, and customized spending profiles for USACE projects, business lines, and work activities. RECONS allows the USACE to evaluate the regional economic impact and contribution associated with USACE expenditures, activities, and infrastructure.

2.2 Results

Table 3. Local, State, and National Impacts: Maximum

Area	Local Capture	Output	Jobs*	Labor Income	Value Added
Local					
Direct Impact		$35,710,217	638.4	$30,135,621	$13,151,737
Secondary Impact		$34,748,071	203.9	$10,638,039	$18,950,790
Total Impact	$35,710,217	$70,458,288	842.3	$40,773,660	$32,102,528
State					
Direct Impact		$37,901,951	705.9	$34,153,966	$16,953,284
Secondary Impact		$52,350,843	281.9	$16,796,286	$28,489,881
Total Impact	$37,901,951	$90,252,794	987.8	$50,950,252	$45,443,165
US					
Direct Impact		$42,422,748	992.7	$38,635,082	$24,728,196
Secondary Impact		$93,122,435	412.4	$29,044,044	$50,332,202
Total Impact	$42,422,748	$135,545,183	1,405.2	$67,679,127	$75,060,397

* Jobs are presented in full-time equivalence (FTE)

Table 4. Local, State, and National Impacts: Intermediate

Area	Local Capture	Output	Jobs*	Labor Income	Value Added
Local					
Direct Impact		$22,266,800	398.1	$18,790,809	$8,200,653
Secondary Impact		$21,666,862	127.1	$6,633,258	$11,816,603
Total Impact	$22,266,800	$43,933,662	525.2	$25,424,067	$20,017,256
State					

Direct Impact		$23,633,437	440.2	$21,296,413	$10,571,075
Secondary Impact		$32,642,920	175.8	$10,473,180	$17,764,621
Total Impact	$23,633,437	$56,276,357	616.0	$31,769,593	$28,335,696
US					
Direct Impact		$26,452,341	619.0	$24,090,575	$15,419,055
Secondary Impact		$58,065,697	257.2	$18,110,165	$31,384,213
Total Impact	$26,452,341	$84,518,039	876.2	$42,200,740	$46,803,268

* Jobs are presented in full-time equivalence (FTE)

Table 5. Local, State, and National Impacts: Minimum

Area	Local Capture	Output	Jobs*	Labor Income	Value Added
Local					
Direct Impact		$10,265,950	183.5	$8,663,369	$3,780,853
Secondary Impact		$9,989,353	58.6	$3,058,217	$5,447,961
Total Impact	$10,265,950	$20,255,303	242.1	$11,721,585	$9,228,814
State					
Direct Impact		$10,896,028	202.9	$9,818,560	$4,873,719
Secondary Impact		$15,049,786	81.0	$4,828,585	$8,190,252
Total Impact	$10,896,028	$25,945,815	284.0	$14,647,145	$13,063,972
US					
Direct Impact		$12,195,664	285.4	$11,106,788	$7,108,846
Secondary Impact		$26,770,777	118.6	$8,349,563	$14,469,469
Total Impact	$12,195,664	$38,966,441	404.0	$19,456,351	$21,578,314

* Jobs are presented in full-time equivalence (FTE)