

DRAFT ENVIRONMENTAL ASSESSMENT

MISSISSIPPI RIVER MAINLINE LEVEE
ST. JOHNS BAYOU OUTLET DITCH SCOUR REPAIR
NEW MADRID COUNTY MISSOURI

June 2023



U.S. Army Corps of Engineers
Regional Planning and Environment Division South
Memphis District

Mississippi River Mainline Levee
St. Johns Bayou Outlet Ditch Scour Repair
New Madrid County, Missouri

U.S. Army Corps of Engineers
Regional Planning and Environment Division South
Memphis District

TABLE OF CONTENTS

1.0	INTRODUCTION
1.1	Proposed Action
1.2	Purpose and Need for the Proposed Action
1.3	Authority for the Proposed Action
1.4	Prior Reports
1.5	Public Concerns
2.0	ALTERNATIVES
2.1	Alternative 1 – Future without Project Condition (No-Action)
2.2	Alternative 2 – Repair Scour Conditions in St. Johns Bayou Outlet Ditch with Rip-Rap
2.3	Alternative 3 – Repair Scour Conditions in St. Johns Bayou Outlet Ditch with Rip-Rap Alternatives
2.4	Preferred Alternative for the Proposed Project
3.0	AFFECTED ENVIRONMENT
3.0.1	Environmental Setting
3.0.2	Climate
3.0.3	Geology
3.1	Relevant Resources
3.1.1	Wetlands
3.1.2	Wildlife
3.1.3	Threatened and Endangered Species
3.1.4	Cultural Resources
3.1.5	Air Quality
3.1.6	Greenhouse Gasses
3.1.7	Hydrology and Water Quality
4.0	ENVIRONMENTAL CONSEQUENCES
4.1	Wetlands
4.2	Wildlife
4.3	Threatened and Endangered Species
4.4	Cultural Resources
4.5	Air Quality
4.6	Greenhouse Gasses
4.7	Hydrology and Water Quality
4.8	Hazardous, Toxic, and Radioactive Waste
4.9	Cumulative Impacts
5.0	COORDINATION
6.0	MITIGATION
7.0	COMPLIANCE WITH ENVIRONMENTAL LAWS AND REGULATIONS
7.1	Threatened and Endangered Species
7.2	Cultural Resources
7.3	Water Quality, State Certification
8.0	CONCLUSION
9.0	PREPARED BY
ATTACHMENTS	

DRAFT ENVIRONMENTAL ASSESSMENT

Mississippi River Mainline Levee St. Johns Bayou Outlet Ditch Scour Repair New Madrid County, Missouri

1.0 INTRODUCTION

The U.S. Army Corps of Engineers (USACE), Mississippi River Valley Division, Regional Planning and Environment Division South, has prepared this environmental assessment (EA) for the Memphis District (MVM) to evaluate the potential impacts associated with the proposed scour repair measures within the channel and along the banks of the St. Johns Bayou Outlet Ditch, near New Madrid, New Madrid County, Missouri (Figure 1).

This EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and the Council on Environmental Quality's Regulations (40 CFR 1500-1508), as reflected in the USACE Engineering Regulation ER 200-2-2. This EA provides sufficient information on the potential adverse and beneficial environmental effects to allow the MVM District Commander to make an informed decision on the appropriateness of an environmental impact statement (EIS) or a Finding of No Significant Impact (FONSI).

The Mississippi River and Tributaries (MR&T) Project is designed to reduce flood risk in the Mississippi River alluvial valley between Cape Girardeau, Missouri and the Head of Passes, Louisiana, by means of levees, floodwalls, floodways, reservoirs, bank stabilization and channel improvements in and along the Mississippi River and its tributaries. The MR&T Project, *Mississippi River Mainline Levees and Channel Improvement* (1976 EIS), as updated and supplemented by Supplement No. 1, *Mississippi River and Tributaries Project, Mississippi River Mainline Levee Enlargement and Seepage Control* (1998 SEIS), and Supplement No. 2, *Mississippi River and Tributaries Project, Mississippi River Mainline Levees* (2020 SEIS II) collectively identified potential areas and various Mississippi River Levee (MRL) reaches of the MR&T project that are in need of remedial measures necessary to stabilize deficient sections and to protect the structural integrity and stability of the MRL system.

Subsequent to the issuance of the 2020 SEIS II, during data analysis of 2020 flood reports and hydrologic surveys, stability and grade issues were identified at the confluence of the Mississippi River and St. Johns Bayou Outlet Ditch. It was therefore determined that scour conditions within and along the banks of St. Johns Bayou Outlet Ditch could potentially affect the MRL ability to function as designed. Therefore, funding was provided through the Infrastructure Investment and Jobs Act 117-58 (15 November 2021) to address these issues.

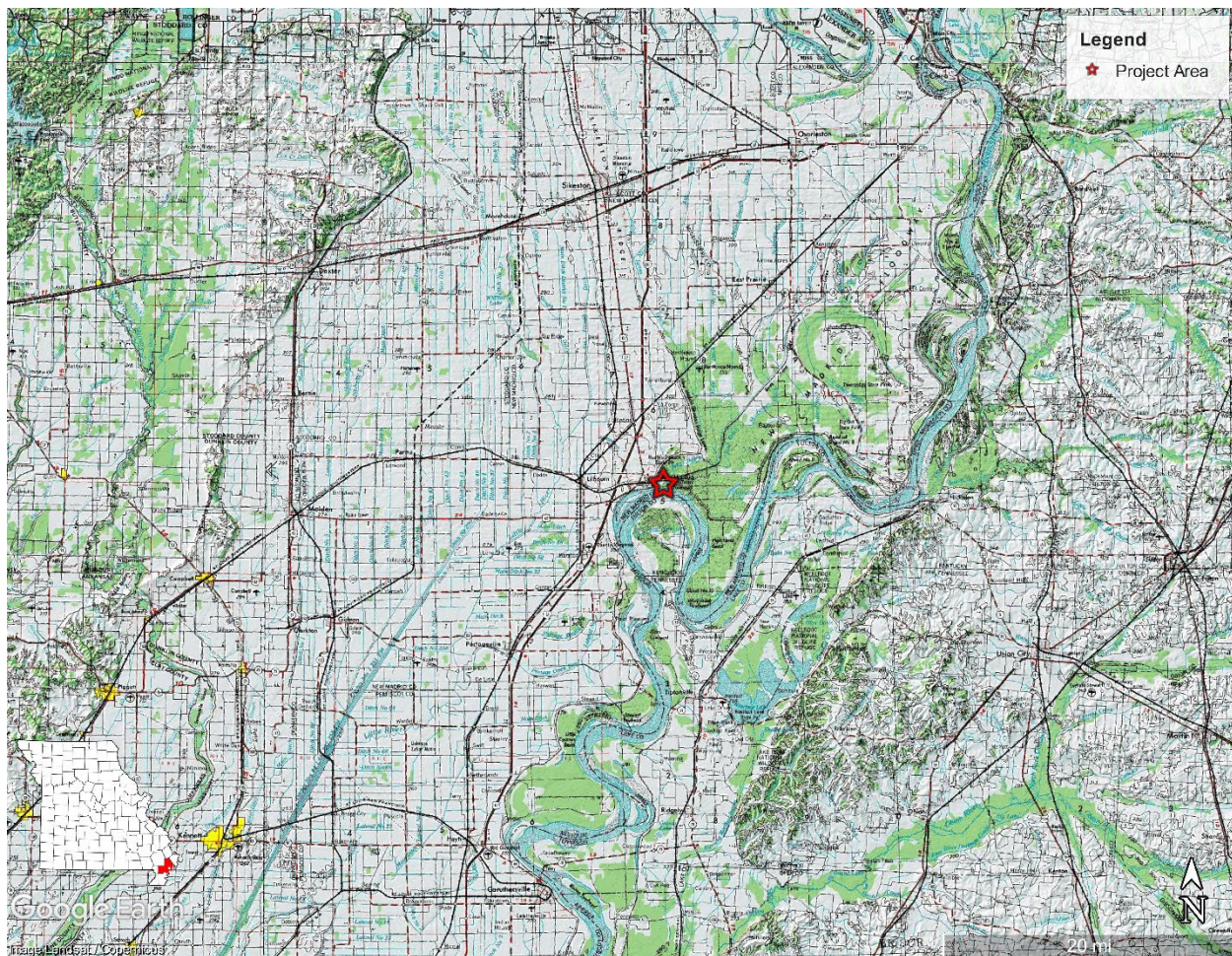


Figure 1. Proposed scour repair project area adjacent to the Mississippi River, New Madrid County, Missouri.

1.1 Proposed Action

The proposed project involves implementing scour repair measures within the channel and along the banks of the St. Johns Bayou Outlet Ditch to protect the MRL from potential erosion in New Madrid County, Missouri (Figure 2). Proposed project features consist of removing approximately three to four feet of the unconsolidated/non-stable substrate and replacing with rip-rap (R-2200 and R-400) and bedding material to stabilize the channel and bank shaping to repair scour and prevent additional erosion. It is anticipated the project would be completed in four phases (Figure 3); with Phase 1 being designed and advertised for contract in 2023, and Phases 2 – 4 being designed to the thirty five percent level in anticipation of future funding. Access to the project area would be from barge during high water, with State Highway WW, County Road 404, and levee roads providing additional access locations. Conventional earth moving equipment (e.g., bulldozers and excavators) would be used to construct the project. It is anticipated that approximately 230,000 cubic yards (CY) of material would be removed from St. Johns Bayou Outlet Ditch, 19,181 CY from Phase 1, the remaining from Phases 2 – 4, and placed on a maintained area adjacent to the site. It is estimated approximately 260,000 tons

(TN) of rip-rap and bedding material from a commercial source, 26,227 TN rip-rap and 4,001 TN bedding material in Phase 1, the remaining for Phases 2 – 4. As a result of this proposal, it is anticipated that approximately 3,754 linear feet of stream could potentially be impacted in Phases 2 – 4 requiring 9,382 of total credits according to the Missouri Stream Mitigation Method (MSMM). Compensatory mitigation requirements for stream impacts would be provided through in-stream and/or riparian buffer establishment as described in the MSMM while unavoidable impacts to wetlands would consist of reforesting 2 acres of prior converted cropland to bottomland hardwood forest. Additional details are provided in Section 6.0 (Mitigation) below.

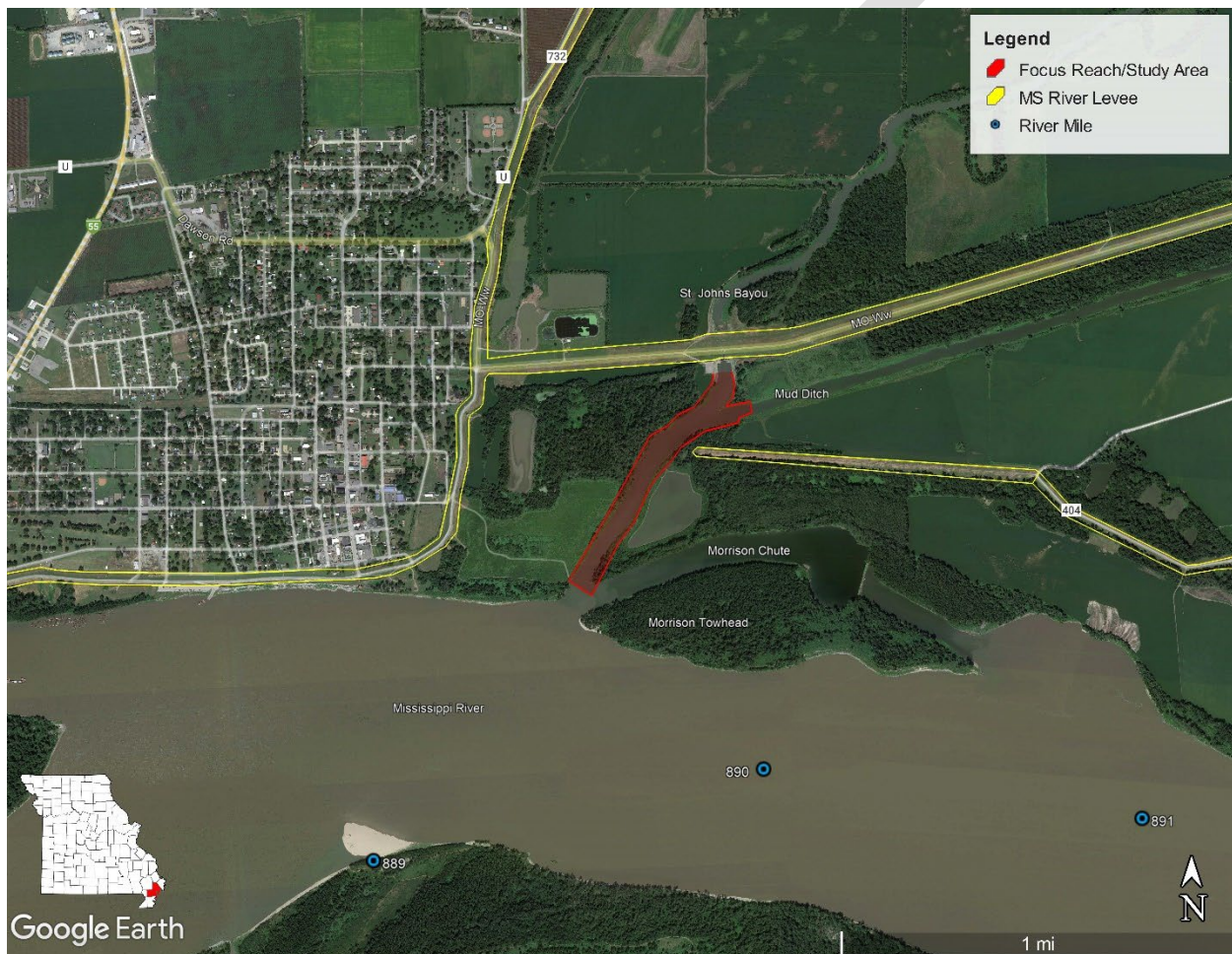


Figure 2. Location of proposed scour repair measures at St. Johns Outlet Ditch near the confluence with the Mississippi River, adjacent to the Mississippi River mainline levee, New Madrid County, Missouri.

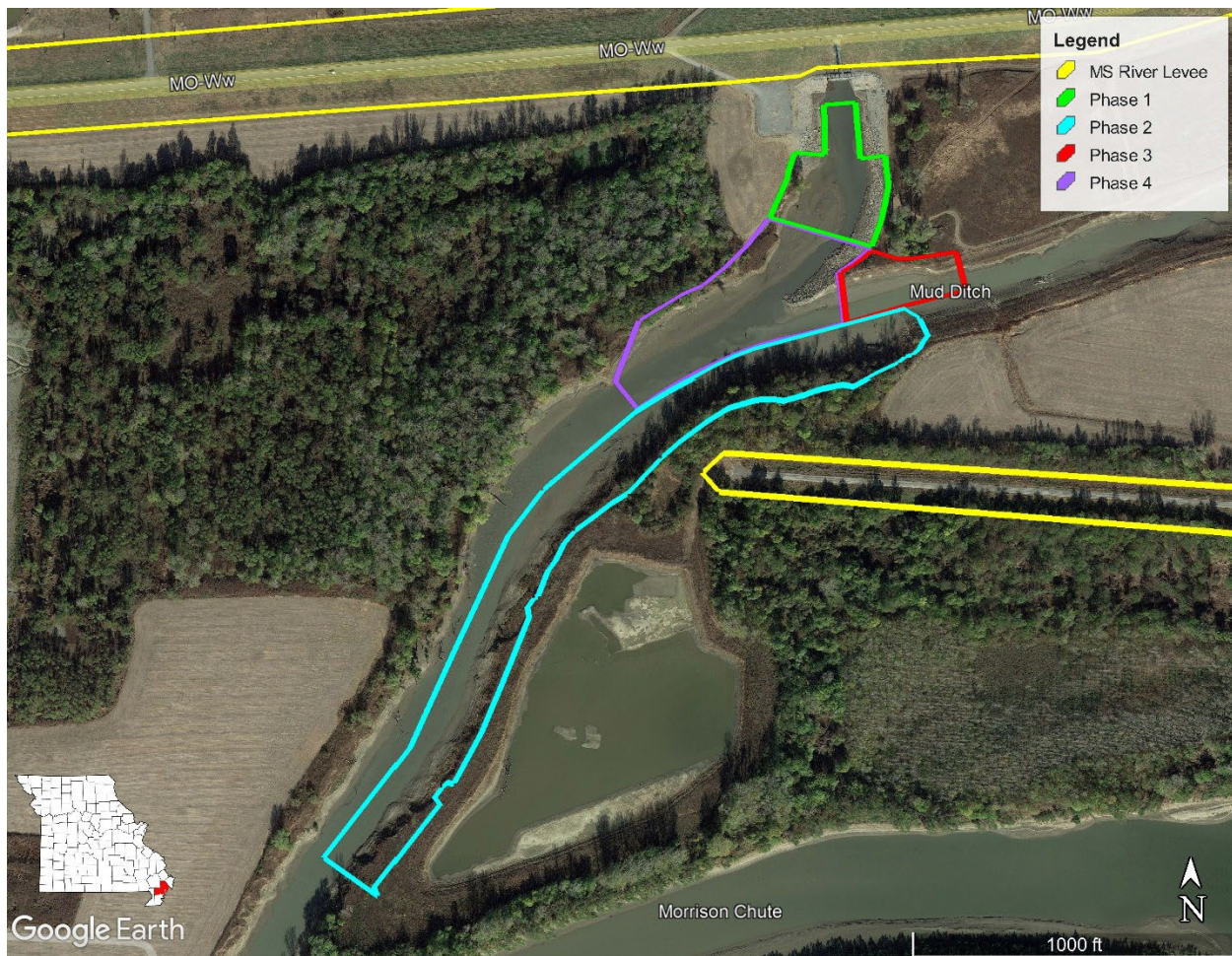


Figure 3. Proposed phases of scour repair measures at St. Johns Outlet Ditch, New Madrid County, Missouri.

1.2 Purpose and Need for the Proposed Action

There is a need to design, build, maintain, operate, and repair the mainline MRL to ensure that the levee system does not fail in a flood event. A catastrophic failure of the MRL, at any point, would likely inundate land, structures, and result in consequences to humans and a variety of flora and fauna. Physical integrity of every section of levee or floodwall is vital to ensuring the ability of the system to minimize the risk of levee failure. Additionally, stabilization of the St. Johns Bayou Outlet Ditch channel and banks would reduce risk of land use and/or site condition modification at two adjacent MRL mitigation tracts (Figure 4).



Figure 4. Mitigation tracts adjacent to the St. Johns Bayou Basin, New Madrid County, Missouri.

1.3 Authority for the Proposed Action

The proposed action is authorized as part of the Flood Control Act of 1928, as amended.

1.4 Prior Reports

This EA has been prepared because additional rights of way are needed and potential environmental impacts may occur beyond that originally described in the 1976 EIS and associated supplements, the 1998 SEIS and 2020 SEIS II, respectively. Subsequent to the publication of those documents, it was determined that scour conditions within and along the banks of St. Johns Bayou Outlet Ditch could potentially affect the MRL ability to function as designed. The 1976 EIS and 1998 and 2020 SEIS's are incorporated herein by reference.

1.5 Public Concerns

Public concerns exist regarding the ability of the MRL to contain floodwaters during a flood event. Scour and erosion could potentially undermine the levee causing it to breach if unabated, thus posing a threat of flooding. A levee breach could inundate surrounding lands and residential areas, threaten the lives and property of residents within the flooded areas, and displace and/or impact a variety of flora and fauna. The record level flooding of the Mississippi River in May 2011 has heightened public concerns.

2.0 ALTERNATIVES

2.1 Alternative 1 – Future without Project Condition (No-Action)

In the future without project condition (no-action), the proposed action would not be constructed. The no-action alternative could result in increased scour and bank erosion within St. Johns Bayou Outlet Ditch during flood conditions. This could eventually lead to levee failure during a major flood event.

2.2 Alternative 2 – Repair Scour Conditions in St. Johns Bayou Outlet Ditch with Rip-Rap

This alternative would involve repairing scour within the channel and erosion along the banks of St. Johns Bayou Outlet Ditch in four separate phases via removal of three to four feet of the unconsolidated/non-stable substrate, bank shaping to repair scour/erosion, and placement of rip-rap (*i.e.*, R-2200 and R-400) and bedding stone to stabilize the channel and banks.

2.3 Alternative 3 – Repair Scour Conditions in St. Johns Bayou Outlet Ditch with Rip-Rap Alternatives

This alternative would involve repairing scour within the channel and erosion along the banks of St. Johns Bayou Outlet Ditch in four separate phases as described for Alternative 2. However, in contrast to the placement of rip-rap and bedding stone, stabilization methods such as articulated concrete and geotextile mattress products were considered.

2.4 Preferred Alternative for the Proposed Project

A hydrologic computer model of the project system was developed which determined the worst-case velocities and erosion forces for use in evaluating potential stabilization methods and materials known to be capable of withstanding the aforementioned model results. It was determined that all protective materials considered would be effective at withstanding predicted velocities and erosion forces. Additionally, analysis was performed to determine if excavation depth could potentially induce seepage at adjacent MRL locations. The results indicate that soil material at the flowline of the ditch is sufficient so that increased ditch depth excavation does not correlate to increased seepage risk at the adjacent MRL segment. Although mattress alternatives could potentially reduce the required depth of channel excavation, design constraints associated with dredging depth can be removed from consideration leaving cost as the final screening factor. Therefore, when considering cost of implementation, as analyzed

mattress products are more costly, rip-rap was determined to be the most efficient solution to resist the determined velocities and erosion forces.

Therefore, two alternatives were considered practicable and carried forward for detailed analysis: Alternative 1 (No Action); and Alternative 2 (Repair Scour Conditions in St. Johns Bayou Basin with Rip-Rap). After careful consideration of the alternatives, it was determined that alternative 1 (no-action) was unacceptable because of risks to human life and property. If scour problems are not addressed, levee failure could ultimately result. All factors considered, alternative 2 is the most practical solution for seepage control and is the preferred alternative for the proposed project assessed in this EA.

Furthermore, as the proposed project is presented in phases, Phase 1 has been awarded funding through the 2022 Infrastructure Investment and Jobs Act and would be designed to construction specifications. Phases 2 – 4 of the project are eligible for fiscal year 2025 funding and are anticipated to be designed to approximately thirty-five percent design specifications. As such, all analysis contained in the following assumes a “worst-case” type analysis (*i.e.*, complete resource impacts within project phase footprint) for Phases 2 – 4, although future plans would likely incorporate avoid and minimize measures during design development. Additionally, state Water Quality Certification and Section 7 consultation is being requested for only the Phase 1 portion of the project at this time. Future state Water Quality Certification requests and Section 7 consultation are anticipated for Phases 2 – 4 as funding is awarded and plans developed.

3.0 AFFECTED ENVIRONMENT

3.0.1 Environmental Setting

The proposed scour repair items are located in New Madrid County, Missouri. During the fall of 2022, USACE biologists performed a site assessment of the proposed project area and vicinity. Properties on the landside of the levee and interior of the adjacent highway are dominated by large, row crop agricultural production. Low lying portions of the area are often inundated by run-off, seepage, and backwater during high water on the Mississippi River and local rain events. In the batture (riverside of the levee), land is primarily occupied by bottomland hardwood forest and borrow pits previously used in levee construction. Tree species in the batture adjacent to the project areas generally consist of cottonwood, sugarberry, silver maple, hickory, sycamore, cypress, black willow and various types of oaks.

At the St. Johns Bayou Outlet Ditch Phase 1 project site (Figure 5), the existing condition of the outlet ditch proposed to be re-shaped and receive fill is that of one previously disturbed through scour events associated with high Mississippi River stages and downstream proximity from the St. Johns Bayou Outlet Structure (Figures 6 and 7). The proposed spoil location was a prior borrow site used for the New Madrid Floodway closure levee adjacent to the St. Johns Bayou Outlet Ditch and Mud Ditch which is currently subject to routine disturbance (*e.g.*, brush hog) and/or agricultural production with few scattered trees along the western boundary (Figure 8). The left descending bank of the Phase 1 project reach, adjacent to the proposed spoil location, has been previously lined with rip-rap in its entirety while the right descending bank is experiencing scour downstream of prior rip-rap placement below the Outlet Structure.

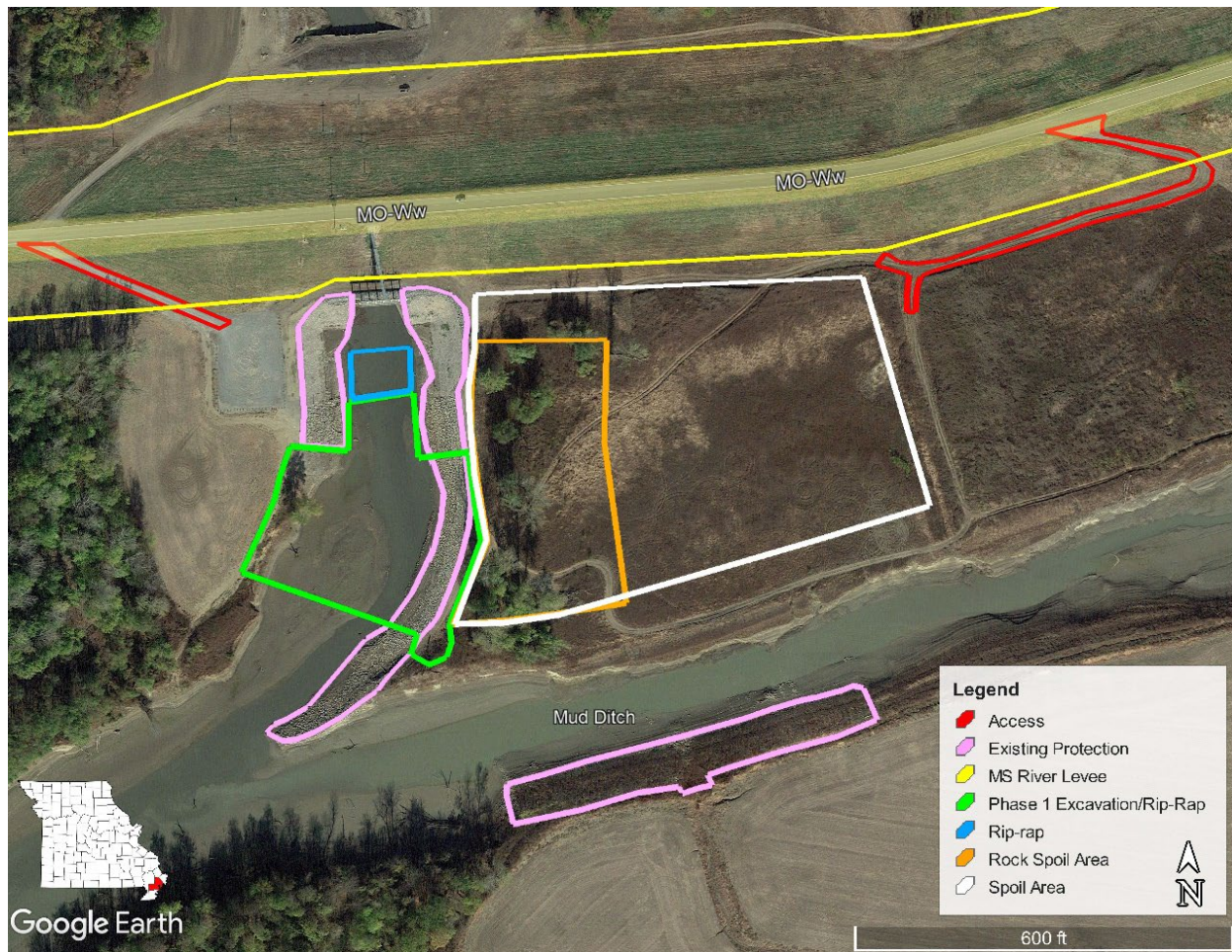


Figure 5. Phase 1 project area of St. Johns Bayou Outlet Ditch Scour Repair, New Madrid County, Missouri.



Figure 6. Existing condition of the Phase 1 project area channel and banks near the outlet structure, St. Johns Bayou Outlet Ditch Repair Project, New Madrid County, Missouri.



Figure 7. Existing Phase 1 project area scour conditions (left) and left descending bank (right), St. Johns Bayou Outlet Ditch Repair Project, New Madrid County, Missouri.



Figure 8. Existing condition of the proposed spoil location as seen from the Setback Levee east of the St. Johns Bayou outlet structure, New Madrid County, Missouri.

At the St. Johns Bayou Outlet Ditch Phase 2 – 4 project sites (Figure 8), the existing condition of the outlet ditch proposed to be re-shaped and receive fill is similar to that of Phase 1 in which high Mississippi River stages and associated velocities have eroded the banks and led to scour conditions (Figures 9 –10). Likewise, Phase 2 and 4 project areas have rip-rap along the left descending bank, although not for the entirety. In contrast to Phase 1, there are vegetated riparian areas in Phase 2 (0.8 acres) and Phase 4 (0.2 acres) project areas.

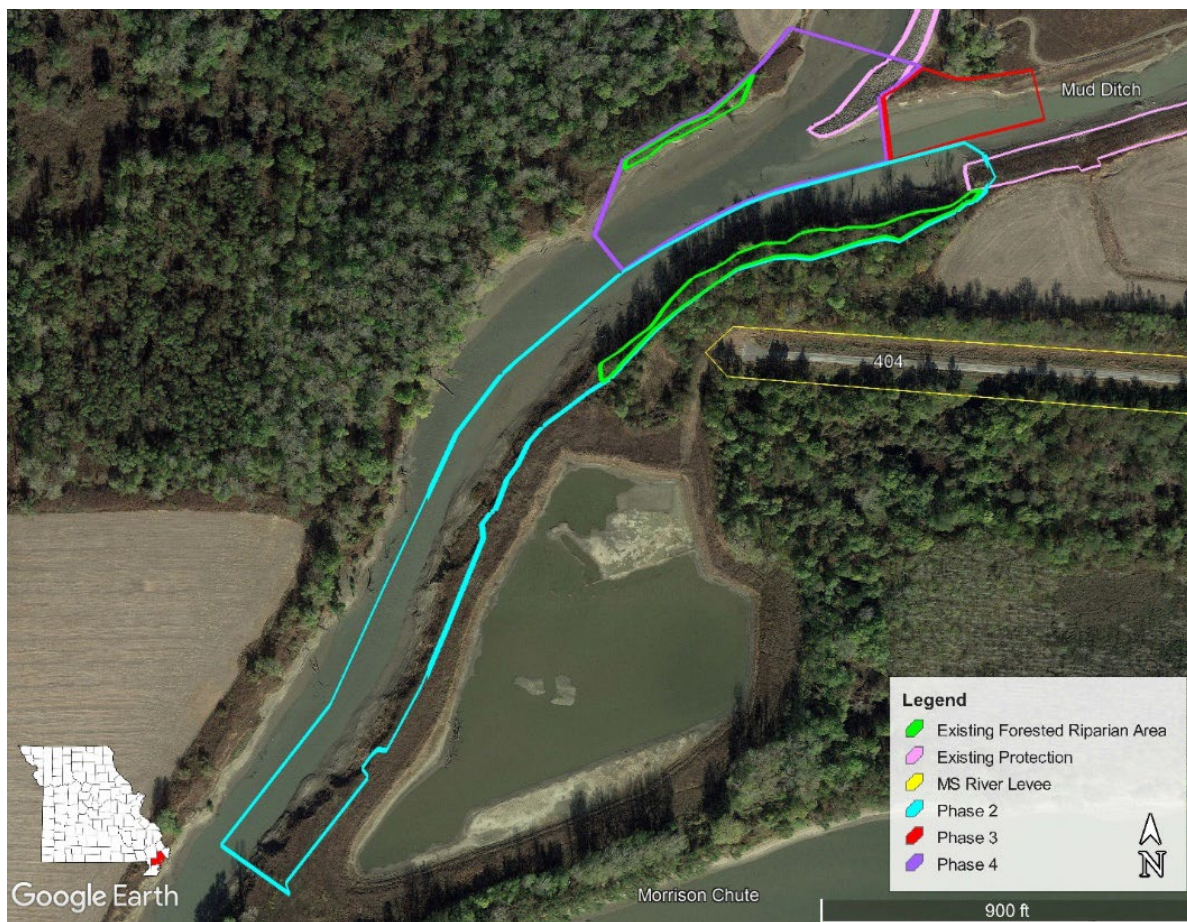


Figure 8. Phase 2 – 4 project areas of St. Johns Bayou Outlet Ditch Scour Repair, New Madrid County, Missouri.



Figure 9. Phase 2 project area (left descending bank) along the of St. Johns Bayou Outlet Ditch in background, Phase 4 project area (right descending bank) in foreground, New Madrid County, Missouri.



Figure 10. Phase 3 project area (left) and Phase 2 project area (right) in background taken from Phase 4 project area (right), visible in foreground, New Madrid County, Missouri.

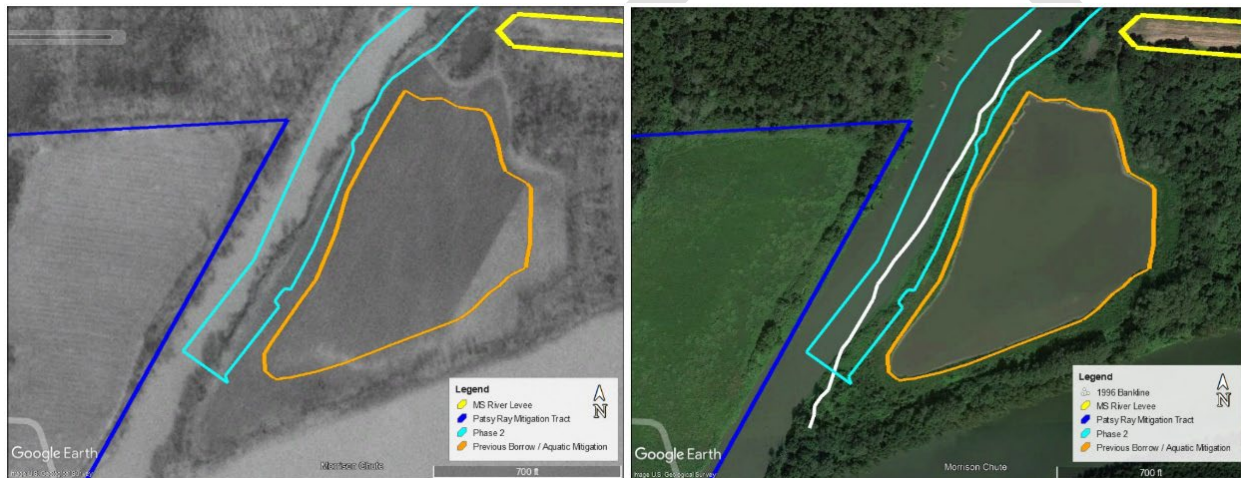


Figure 11. Aerial photos from 1996 (left) and 2021 (right) showing eroding bank in Phase 2 project area near MRL mitigation sites, New Madrid County, Missouri.

3.0.2 Climate

Average monthly temperatures in the general project area range from 30 degrees Fahrenheit in January to 81 degrees Fahrenheit in July. Maximum temperatures can exceed 100 degrees Fahrenheit and minimum temperatures can go below minus 10 degrees. Annual precipitation ranges from 25 to 80 inches with a normal or average of approximately 50 inches. The heaviest rainfall generally occurs in the winter-spring period of January through May. The growing season has a length of approximately seven months with the first and last killing frost occurring in the early parts of November and April, respectively.

3.0.3 Geology

The proposed project area is located in the Mississippi River alluvial plain. Soils in the project area are predominantly Commerce and Sharkey silty clay. Commerce soils consist of deep,

somewhat poorly drained, moderately slowly permeable soils. Sharkey soils consist of very deep, poorly and very poorly drained, very slowly permeable soils.

3.1 Relevant Resources

This section contains a description of relevant resources that could be impacted by the project. The relevant resources (Table 1) described in this section are those recognized by laws; executive orders; regulations; and other standards of National, state, or regional agencies and organizations; technical or scientific agencies, groups, or individuals; and the general public. The following resources have been considered and found to not be affected by the alternatives under consideration: aesthetics, agricultural lands, environmental justice, freshwater marshes, freshwater lakes, fisheries, municipal facilities, municipal utilities, roadways, recreation, socio-economic, and state-designated scenic streams.

Table 1. Relevant resources potentially impacted by St. Johns Outlet Ditch Scour Repair project implementation.

Resource	Institutionally Important	Technically Important	Publicly Important
Wetlands	Clean Water Act of 1977, as amended; Executive Order 11990 of 1977, Protection of Wetlands; Coastal Zone Management Act of 1972, as amended; and the Estuary Protection Act of 1968., EO 11988, and Fish and Wildlife Coordination Act.	They provide necessary habitat for various species of plants, fish, and wildlife; they serve as ground water recharge areas; they provide storage areas for storm and flood waters; they serve as natural water filtration areas; they provide protection from wave action, erosion, and storm damage; and they provide various consumptive and non-consumptive recreational opportunities.	The high value the public places on the functions and values that wetlands provide. Environmental organizations and the public support the preservation of wetlands.
Wildlife	Fish and Wildlife Coordination Act of 1958, as amended and the Migratory Bird Treaty Act of 1918.	They are a critical element of many valuable aquatic and terrestrial habitats; they are an indicator of the health of various aquatic and terrestrial habitats; and many species are important commercial resources.	The high priority that the public places on their esthetic, recreational, and commercial value.
Threatened and Endangered Species	The Endangered Species Act of 1973, as amended; the Marine Mammal Protection Act of 1972; and the Bald Eagle Protection Act of 1940.	USACE, U.S. Fish and Wildlife Service, NRCS, U.S. Environmental Protection Agency, and Mississippi Department of Natural Resources cooperate to protect these species. The status of such species provides an indication of the overall health of an ecosystem.	The public supports the preservation of rare or declining species and their habitats.
Cultural Resources	National Historic Preservation Act of 1966, as amended; the Native American Graves Protection and Repatriation Act of 1990; and the Archeological Resources Protection Act of 1979.	State and federal agencies document and protect sites. Their association or linkage to past events, to historically important persons, and to design and construction values; and for their ability to yield important information about prehistory and history.	Preservation groups and private individuals support protection and enhancement of historical resources.
Air Quality	Clean Air Act of 1963 and Executive Order 13990.	State and federal agencies recognize the status of ambient air quality in relation to the National Ambient Air Quality Standards.	Virtually all citizens express a desire for clean air.
Hydrology and Water Quality	Clean Water Act of 1977 and the Fish and Wildlife Coordination Act.	State and federal agencies recognize value of fisheries and good water quality. The National and state standards are established to assess water quality.	Environmental organizations and the public support the preservation of water quality and fishery resources and the desire for clean drinking water.

3.1.1 Wetlands

Existing Conditions

Within Phases 1 and 3 of the project area, wetland habitat has not been noted. The adjacent riparian areas have been previously disturbed through rip-rap placement and proposed spoil locations are subject to routine disturbance (e.g., brush hog) or agricultural usage. Within Phases 2 and 4 of the project area, roughly less than 1.0 combined acre of riparian bottomland hardwoods occur alongside portions of St. Johns Outlet Ditch, 0.16 acres along the right descending bank of Phase 4 and 0.76 acres at the left descending bank of Phase 2 (Figure 7), respectively.

As described in the 2020 SEIS II, the hydrogeomorphic approach (HGM) was used to document the functional value of wetland conditions within the MRL project area. The HGM method addresses several wetland subclasses, including the riverine overbank subclass noted in Phases 2 and 4. Wetland function is expressed as functional capacity units (FCU), which reflect both the quantity and quality of wetland functional values. FCU were determined by multiplying the functional capacity index (FCI) value of each function by the acreage affected. FCI values ranged from 0 to 1, with 1 representing optimal wetland value. Average annual functional capacity units (AAFCUs) are then evaluated over a 50-year period of analysis to determine mitigation requirements in similar approach applied to the AAHUs described above. The average of the six functional scores (*i.e.*, Detain Floodwater, Detain Precipitation, Cycle Nutrients, Export Organic Carbon, Maintain Plant Communities, and Provide Fish and Wildlife Habitat) were used to determine potential impacts and mitigation requirements.

Therefore, following the HGM approach, the riparian bottomland hardwood areas within Phases 2 and 4 of the project area are anticipated to provide approximately 0.8 AAFCU over the 50-year period of analysis (Table 2).

Table 2. Anticipated annual functional capacity units provided by riparian bottomland hardwood areas within Phase 2 and 4 project areas.				
Existing Landcover	Acres	FCI	FCU	FCU BTW YRS
Forest	0.92	0.90	0.8	
FWOP Conditions				
Target Year - 5		0.90	0.8	4
Target Year - 10		0.90	0.8	4
Target Year - 20		0.90	0.8	8
Target Year - 35		0.90	0.8	12
Target Year - 50		0.90	0.8	12
Sum of FCUs				41
FWOP AAFCU (50 yrs)			0.8	

3.1.2 Wildlife

Existing Conditions

Wildlife species that could be expected to be found within the project area include coyotes, deer, raccoons, opossums, rabbits, gray and fox squirrels, muskrats, mice, rats, shrews, songbirds, turtles, snakes, amphibians, and other small animals typically found along the Mississippi River levees. Additionally, as low water conditions in the fall of 2022 permitted reasonable access, USACE biologists conducted a freshwater mussel survey within the proposed project reaches (Figure 12). At all three survey locations, no live mussels were collected. However, dead and relic fragile papershell (*Leptodea fragilis*), bluefer (*Potamilus purpuratus*), and giant floater (*Pyganodon grandis*) specimens were noted in the project area.



Figure 12. Mussel survey locations (left) and biologist conducting a mussel survey within the proposed project area (right), St. Johns Bayou Outlet Ditch, New Madrid County, Missouri.

3.1.3 Threatened and Endangered Species

Existing Conditions

According to results obtained from the U.S. Fish and Wildlife Service (USFWS) Information, Planning, and Conservation (IPaC) conservation planning tool, there are a total of six threatened, endangered, candidate, or proposed threatened or endangered species that could potentially inhabit the immediate project area. These species are the gray bat (*Myotis grisescens*), Indiana bat (*Myotis sodalis*), northern long-eared bat (*Myotis septentrionalis*) (NLEB), tricolored bat (*Perimyotis subflavus*), alligator snapping turtle (*Macrochelys temminckii*), and the pallid sturgeon (*Scaphirhynchus albus*). Additionally, no critical habitats were reported within the project area for any potential species. Of these species, only the gray bat, Indiana bat, NLEB, tricolored bat, and alligator snapping turtle could potentially utilize the habitat within the project area. As sturgeon utilize the nearby Mississippi River, they are not found within the proposed project area.

In the fall of 2022, USACE biologists conducted a site assessment of the project area. Potential impact areas were examined for the presence of suitable/potential habitat for the aforementioned bat species as well as channel conditions during the low water period. Dominant tree species include sugarberry, silver maple, cottonwood, sycamore, and black willow. Although the presence of trees larger than 3 inches diameter at breast height (DBH) were noted, there are no known maternity roost trees or hibernaculum in the vicinity of the project area.

3.1.4 Cultural Resources

Existing Conditions

A literature review and cultural resources survey within the project's Area-of-Potential-Effect (APE) were completed by the MVM archaeologist in the summer of 2021. The investigation revealed no significant cultural resources within the St. Johns Bayou Outlet Ditch Scour Repair APE.

3.1.5 Air Quality

Existing Conditions

The proposed project area is in attainment for all air quality standards. Although air emissions would not require a permit, best management practices shall be used throughout construction to minimize air pollution.

3.1.6 Greenhouse Gasses

Carbon dioxide (CO₂) is the primary greenhouse gas emitted from human activities, chiefly through combustion of fossil fuels. Additionally, carbon levels in soil used for agricultural purposes tend to decrease over time as carbon is oxidized and released into the atmosphere. Contrarily, forested lands reduce the amount of CO₂ in the atmosphere through sequestration during photosynthesis, returning oxygen to the atmosphere as a byproduct. Increasing quantities of atmospheric greenhouse gases have resulted in measurable changes to the Earth's surface and ecosystems. CO₂ equivalent is a unit that represents the warming effect of any given greenhouse gas on the global climate and is calculated by multiplying the mass of the gas by its warming potential, which describes the relative potency and residence time of the gas in the atmosphere. Thus, using a CO₂ equivalent provides a common scale for measuring effects of different gases. The estimated existing and with-project CO₂ equivalent conditions consist of the anticipated emissions produced by project area vehicular and construction emissions as well as anticipated carbon release from agricultural land soils.

The social cost of greenhouse gas emissions (SC-GHG) is an estimate of the monetized damages associated with incremental increases in greenhouse gas emissions and is intended to include changes in net agricultural productivity, human health, property damage from increased flood risk, and the value of ecosystem services. The SC-GHG is intended to be used

for alternative comparison purposes and is determined as: SC-GHG = CO₂ equivalent (metric tons) X social cost in dollars per metric ton of carbon dioxide or \$51/metric ton.

Existing Conditions

New Madrid County, Missouri, has a population of approximately 16,434 that is estimated to own and/or operate roughly 12,145 gas-powered and 456 diesel-powered vehicles. Anticipated emissions generated by vehicles and equipment were calculated using South Coast Air Quality Management Data. Of the 431,998 acres within the county, approximately 300,000 acres are estimated to be in agricultural production and utilize conventional tillage practices. To estimate carbon losses on agricultural areas, a rate of carbon loss of 45.91 lbs/acre/year was used.

Therefore, it is estimated that existing vehicle emissions and agricultural carbon soil losses contribute approximately 232,584,774 lbs of CO₂ equivalent to the atmosphere within New Madrid County on an annual basis, representing a daily social cost of approximately \$14,740.91 (Table 3).

Table 3. Estimated existing annual vehicle emissions, agricultural soil carbon losses, and social cost of greenhouse gas emissions, New Madrid County, Missouri.								
	CO	NOx	ROG	SOx	PM ₁₀	PM _{2.5}	CO ₂	CH ₄
Passenger Vehicle Emissions* (Lb/mile)	0.00397866	0.00035150	0.00048658	0.00001072	0.00009661	0.00006839	1.11019931	0.00004121
Total Vehicle Emissions (lbs/year)	579,850	51,228	70,914	1,562	14,080	9,967	161,800,447	6,006
Heavy Duty Truck Emissions** (lb/mile)	0.00478830	0.01098794	0.00096142	0.00004106	0.00055427	0.00042597	4.21520828	0.00004480
Total lbs/year	26,202	60,126	5,261	225	3,033	2,331	23,065,620	245
Total Vehicle Emissions/year	606,051	111,354	76,175	1,787	17,113	12,298	184,866,067	6,251
Agricultural Carbon (lbs/yr)	--	--	--	--	--	--	13,773,000	--
CO ₂ Equivalent***	232,584,774							
Annual Social Cost GHG Emissions (\$51/metric ton)	\$5,380,433							
Existing Daily Social Cost GHG Emissions (\$51/metric ton)	\$14,740.91							

*2022 Emission Factors for On-Road Passenger Vehicles & Delivery Trucks EMFAC2007 (version 2.3)
 ** 2022 Emission Factors for On-Road Heavy-Duty Diesel Trucks
 *** CO₂eq = X*CO + X*CO₂ + Y*N₂O + Z*CH₄; Where X = 100 Year Global Warming Potential for Carbon Monoxide and Carbon Dioxide = 1; Y = 100 Year Global Warming Potential for Nitrous Oxide = 298; Z = 100 Year Global Warming Potential for Methane = 25; per CFR Title 40 Chapter I Subchapter C Part 98: Table A-1 Global Warming Potentials

3.1.7 Hydrology and Water Quality

Existing Conditions

Water flow within the St. Johns Outlet Ditch is dependent on rainfall within the St. Johns Bayou Basin and backwater from the from the adjacent Mississippi River. The land adjacent to project area are also subject to backwater effects of the Mississippi River and hydrologic effects from geographic location at the confluence of the Birds Point-New Madrid Frontline and MRL Setback Levees. St. Johns Bayou Outlet Ditch typically has increased amounts of flowing water during periods of heavy rain and high river stages in the spring and contrary to lower water flow conditions in the fall and winter periods.

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 Wetlands

Future Conditions with No Action

Without implementation of the proposed action, wetland habitats within the project area are expected to remain as noted in Existing Conditions, provided that the adjacent channel and banks remain stable. However, a major flood event could negatively impact project area flora and fauna through displacements, scour, and excess deposition of sand and gravel.

Future Conditions with the Proposed Action

With implementation of the proposed action, there would be no anticipated wetland impacts associated with Phases 1 and 3. However, at Phase 2 and 4 project locations, approximately less than 1.0 combined acre (0.16 acres along the right descending bank of Phase 4 and 0.76 acres at the left descending bank of Phase 2), providing an anticipated 0.8 AAFCU (41 FCU), of riparian bottomland hardwoods would be cleared alongside portions of St. Johns Outlet Ditch and replaced with bank stabilization material.

To mitigate for the loss of 0.8 AAFCU (0.92 acres) in Phases 2 and 4, approximately 2 acres of prior converted cropland would be restored to bottomland hardwood forest as described in Section 6.0 (Mitigation) below.

4.2 Wildlife

Future Conditions with No Action

Without implementation of the proposed action, the wildlife resources within the project area are expected to remain as noted in Existing Conditions.

Future Conditions with the Proposed Action

With implementation of Phases 1 and 3 of the proposed action, as no tree clearing is proposed, impacts to wildlife resources would be limited to temporary dispersal and disturbance from the construction equipment and related noise. In addition to the temporary effects noted with Phases 1 and 3, roughly less than 1.0 acre of bottomland hardwood forest would be cleared from Phase 2 and 4 project areas. However, once the project is completed, wildlife species would be expected to return to the project area. The loss of habitat and temporary disturbance would not adversely impact the general populations of wildlife species within the region, as extensive forested areas and suitable habitat is readily available within the vicinity of the project area, specifically riverside of the levee. To mitigate for the loss of 0.92 acres of bottomland hardwood forest associated with Phases 2 and 4, approximately 2 acres of prior converted cropland would be restored to bottomland hardwoods as described in the Mitigation Section (6.0) below.

4.3 Threatened and Endangered Species

Future Conditions with No Action

Without implementation of the proposed action, threatened and endangered species within the project area are expected to remain as noted in existing conditions.

Future Conditions with the Proposed Action

Pursuant to Section 7 of the Endangered Species Act, as amended, USACE has determined that the proposed action associated with the Phase 1 project area would have no effect on the gray bat, Indiana bat, NLEB, tricolored bat, alligator snapping turtle, or the pallid sturgeon. Additionally, no evidence of bald eagles, or their nests, were observed at any project Phase location. The bald eagle is no longer listed as a threatened species, but is still protected by the Bald and Golden Eagle Act and the Migratory Bird Treaty Act.

Please note an effect determination has not been made and USFWS concurrence not sought at this time regarding Phases 2 – 4 of the project. It is anticipated Section 7 consultation for Phases 2 – 4 would occur during future design phases, which would likely incorporate avoid and minimize measures and include refined project footprints.

4.4 Cultural Resources

Future Conditions with No Action

Without implementation of the proposed action, cultural resources are expected to remain as noted in Existing Conditions. However, continued seepage could lead to a levee failure during a major flood event, potentially impacting cultural resources.

Future Conditions with the Proposed Action

With implementation of the proposed action, no historic properties are anticipated to be affected. Additionally, there are no historic properties listed in or determined eligible for inclusion in the National Register of Historic Places in the project's APE. No additional cultural resources investigations are recommended prior to project implementation. However, should an inadvertent discovery be made during construction, the resource would be evaluated, assessed for effects, avoided if possible, and mitigated in accordance with federal statutes and regulations (36 CFR, Part 800).

4.5 Air Quality

Future Conditions with No Action

Without implementation of the proposed action, no change in air quality would occur.

Future Conditions with the Proposed Action

With implementation of the proposed action, project-related equipment would produce small amounts of engine exhaust during construction activities. The temporary, minor impacts to air quality would be localized to the project area and would not affect area residents. The project area would still be in attainment for all air quality standards. Additionally, best management practices would be used throughout the construction to minimize air pollution.

4.6 Greenhouse Gasses

Future Conditions with No Action

Without implementation of the proposed action, vehicular emissions and agricultural soil carbon loss, and therefore the social cost of GHG emissions, are expected to remain as noted in Existing Conditions.

Future Conditions with the Proposed Action

With implementation of Phase 1 of the proposed action, it is estimated that approximately 58,065 lbs of CO₂ equivalent would be emitted via construction equipment (*i.e.*, excavators and bulldozer operated at 320 hours), roughly equivalent to a social cost of \$26.34 (Table 4). Therefore, implementation of Phase 1, considering the anticipated project life, proposed construction activities, and area vehicular emissions and agricultural soil carbon loss, would result in a daily social cost of \$14,740.91 to New Madrid County (Table 4), an approximate \$0.02 daily increase over existing conditions.

Table 4. Estimated construction emissions and social cost of greenhouse gas, St. Johns Bayou Outlet Ditch Repair, Phase 1, New Madrid County, Missouri.								
	CO	NOx	ROG	SOx	PM ₁₀	PM _{2.5}	CO ₂	CH ₄
500 HP Excavator Emissions* (lb/hr)	0.4522	0.4014	0.1031	0.0023			234.0000	0.0093
Total Excavator Emissions (lbs)	145	128	33	1	0	0	74,880	3
250 HP Bulldozer Emissions* (lb/hr)	0.3749	0.6513	0.1013	0.0019			166.0000	0.0091
Total Excavator Emissions (lbs)	60	104	16	0	0	0	26,560	1
Construction CO ₂ Equivalent**	58,065							
Construction Social Cost GHG Emissions (\$51/metric ton)	\$26.34							
With-Project Avg. Daily Social Cost GHG Emissions (\$51/metric ton)***	\$14,740.93							
* 2023 SCAB Fleet Average Emission Factors (Diesel)								
** CO ₂ eq = X*CO + X*CO ₂ + Y*N ₂ O + Z*CH ₄ ; Where X = 100 Year Global Warming Potential for Carbon Monoxide and Carbon Dioxide = 1; Y = 100 Year Global Warming Potential for Nitrous Oxide = 298; Z = 100 Year Global Warming Potential for Methane = 25; per CFR Title 40 Chapter I Subchapter C Part 98: Table A-1 Global Warming Potentials								
*** Assumes 50-year project life								

As plans have not yet reached construction level design for Phases 2 – 4 of the project, refined predictions regarding anticipated GHG emissions, and associated social cost, cannot yet be made. However, when correlated for construction hours and equipment, it is anticipated emissions from future phases would be similar to those reported for Phase 1.

4.7 Hydrology and Water Quality

Future Conditions with No-Action

Without implementation of the proposed action, hydrology and water quality within the project area would be as noted in Existing Conditions.

Future Conditions with the Proposed Action

With implementation of Phase 1 of the proposed action, hydrology landside of the levee would be as noted in Existing Conditions. Impacts to water quality within St. Johns Outlet Ditch and the adjacent Mississippi River would be minimal or have no effect, as the river normally carries a heavy sediment load and that the project action would be conducted during high water periods. Turbidity and suspended solids would be increased to minor degrees during construction. However, best management practices (e.g., silt fences, seeding) would be employed throughout construction to minimize impacts. Any temporary impacts to water quality would be anticipated to return to normal shortly after construction ceases. Thus, no significant impacts to water quality would occur as a result of Phase 1 implementation. A Section 404(b)(1) Evaluation has been prepared for the Phase 1 of the proposed project action and is included as an attachment. A state water quality certification is requested from the State of Missouri, Department of Natural Resources.

Please note state water quality certification for Phases 2 – 4 is not being sought at this time. It is anticipated additional coordination with MDNR and requests for water quality certification would occur during future design phases. However, considering the overall fewer previous maintenance activities, less existing rip-rap, and greater adjacent forested area, potential stream impacts for Phases 2 – 4 of the proposed project were calculated using the MSMM. According to the MSMM, approximately 9,382 credits would be required to mitigate stream impacts associated with Phases 2 – 4 of the project (Table 5). To mitigate for the loss of 9,382 stream credits, in-stream features or riparian buffers would be utilized according to the MSMM as described in the Mitigation Section (6.0) below.

Table 5. Missouri Stream Mitigation Method adverse impact factors worksheet, St. Johns Bayou Outlet Ditch Repair Phases 2 - 4.

Stream Type Impacted	Ephemeral			Intermittent			Perennial		
	0.3			0.4			0.8		
Priority Waters	Tertiary			Secondary			Primary		
	0.1			0.4			0.8		
Existing Condition	Functionally Impaired			Moderately Functional			Fully Functional		
	0.1			0.8			1.6		
Impact Duration	Temporary			Permanent					
	0.05			0.3					
Impact Activity	Clearing	Utility Crossing	Below Grade Culvert	Armor	Detention Facility	Morpho-logic Change	Impound-ment	Pipe	Fill
	0.05	0.15	0.3	0.5	0.75	1.5	2	2.2	2.5
Linear Impact Calculation	0.0002 multiplied by linear feet of stream impact recorded in each column below								
Factor				Phase 2		Phase 3		Phase 4	
Stream Type Impacted				0.8		0.8		0.8	
Priority Waters				0.4		0.4		0.4	
Existing Condition				0.1		0.1		0.1	
Impact Duration				0.3		0.3		0.3	
Impact Activity				0.5		0.5		0.5	
Linear Impact Calculation				0.519		0.074		0.1578	
Sum of Factors (M)				2.619		2.174		2.2578	
Linear Feet of Stream Impact (LF)				2,595.0		370.0		789.0	
Credits (C) = M x LF				6,796.3		804.4		1,781.4	
* Compensation Ratio									
Total Credits Required from all Columns =						9,382.1			
<p>* Compensation Ratio - when the Corps determines that a third party mitigation source is acceptable to fulfill compensatory mitigation requirements the total credits determined on this worksheet shall be applied to mitigation banks or in-lieu fee programs at a 1:1 ratio when the impact area is within an approved service area. However, an increased compensation ratio may be used at the Corps discretion when an impact occurs beyond the geographic service area of an approved mitigation bank or in-lieu fee</p>									

4.7 Hazardous, Toxic, and Radioactive Waste

Pursuant to (ER) 1165-2-132, USACE assumes responsibility for the reasonable identification and evaluation of all Hazardous, Toxic, and Radioactive Waste (HTRW) contamination within the vicinity of proposed actions. ER 1165-2-132 identifies that HTRW policy is to avoid the use of project funds for HTRW removal and remediation activities. A record search has been conducted of the Environmental Protection Agency's (EPA) EnviroMapper for Envirofacts web site (<https://www.epa.gov/emefdata/em4ef.home>). The web site was checked for any superfund sites, toxic releases, or hazardous waste sites within the vicinity of the proposed project area. Additionally, a site inspection of the proposed project was conducted by USACE personnel during the fall of 2022. The environmental record search and site survey conducted did not identify the presence of any hazardous or suspected hazardous wastes in the project area. As a result of these assessments, it was concluded that the probability of encountering HTRW is low. If any hazardous waste/substance is encountered during construction activities, the proper handling and disposal of these materials would be coordinated with the EPA and applicable state agencies.

4.8 Cumulative Impacts

The Council on Environmental Quality's (CEQ) regulations (40 CFR 1500-1508) implementing the procedural provisions of the National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. 4321 et seq.) define cumulative effects as "the impact on the environment which results from the incremental impact of the action when added to other past, present, or reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions (40 CFR 1508.7)". Cumulative Effects can result from individually minor but collectively significant actions taking place over a period of time."

A final SEIS, the 2020 SEIS II, was completed in November 2020 to address remaining authorized work on the MRL feature of the MR&T project. However, the scour conditions at the proposed project locations were not anticipated when the SEIS was completed. Impacts of the proposed project action were evaluated during the preparation of this EA on the natural and human environment. A total of approximately 0.92 acres of wetlands and 3,754 linear feet of stream and associated stream bank would be impacted by the proposed project action. The proposed mitigation would include restoring approximately 2.0 acres of agricultural land to high quality bottomland hardwood forest and providing 9,382 compensatory stream credits according to the MSMM. The impacts associated with the proposed project activities should not have any significant adverse cumulative effects on the environment in addition to those reported in the 1998 SEIS and 2020 SEIS II.

5.0 COORDINATION

The proposed action, draft EA, and Finding of No Significant Impact (FONSI) have been coordinated with members of the project interagency environmental team (IAT) through distribution of the draft EA. The IAT is comprised of representatives from USACE, USFWS, EPA, the Missouri Department of Conservation and the Missouri Department of Natural

Resources. In addition, this EA is being coordinated with these agencies: Missouri State Historic Preservation Office, federally recognized tribes, and other interested parties.

6.0 MITIGATION

With implementation of alternative 2, approximately 1.0 acre (0.8 AAFCU) of wetlands within project Phases 2 and 4 would be impacted by the proposed project. Utilizing mitigation analysis described in the 2020 SEIS II, approximately 2.0 acres of reforested prior converted cropland would be required to mitigate the impact (Table 6).

Mitigation	Acres	FCI	FCU	FCU BTW YRS
Target Year - 0	1.7	0.17	0.3	
Target Year - 5		0.20	0.3	1
Target Year - 10		0.41	0.7	3
Target Year - 20		0.55	0.9	8
Target Year - 35		0.62	1.1	15
Target Year - 50		0.63	1.1	15
Sum of FCUs				42
Mitigation AAFCU (50 yrs)				0.8

Wetland mitigation requirements for Phases 2 and 4 would consist of planting bottomland hardwood species and restoring hydrology, if applicable, within tracts of cleared agricultural land. Mitigation is anticipated to be located in the vicinity of the project area, in New Madrid or Mississippi counties, Missouri; and acquisition would occur as part of the ongoing overall MRL mitigation acquisition effort. The 2020 SEIS II mitigation plan for the mitigation tracts would be followed and success not be declared until conditions specified in the document are achieved.

Additionally, as proposed scour control measures have potential to affect multiple resources (*i.e.*, wetlands and stream habitat), some mitigation measures (*e.g.*, riparian buffer strips) have potential to compensate for multiple resources. Mitigation that compensates for impacts to multiple resources is usually of greater incremental value than that which does not. Therefore, it is anticipated compensatory mitigation required by the MSMM for adverse in-stream impacts (Table 5) associated with Phases 2 – 4 would be mitigated by establishment of riparian buffer strips. According to the MSMM, a 50-foot riparian buffer established along both banks of a previously un-buffered area stream for approximately 5,519 feet would fully offset Phase 2 – 4 anticipated adverse stream impacts (Table 7).

Table 7. Riparian buffer worksheet, 50-foot riparian buffer establishment, St. Johns Bayou Outlet Ditch Repair.

Stream Type	Ephemeral	Intermittent	Perennial		
	0.15	0.2	0.4		
Priority Waters	Tertiary	Secondary	Primary		
	0.05	0.2	0.4		
Net Benefit	Riparian Restoration/Establishment, and Preservation Factors (select values from Table 1) (also see Minimum Buffer Width (MBW) page 15)				
Supplemental Buffer Credit	Condition: Buffer established, enhanced or preserved on both streambanks. To calculate: (Net Benefit Stream Side A + Net benefit Stream Side B) / 2				
Site Protection	USACE approved w/o 3rd party grantee	USACE approved w/ 3rd party grantee			
	0.05	0.2			
Credit Schedule	Schedule 1	Schedule 2	Schedule 3		
	0.15	0.05	0		
Temporal Lag	Over 20	10 to 20	5 to 10		
	-0.3	-0.2	-0.1		
Factors	Net Benefit 1	Net Benefit 2	Net Benefit 3	Net Benefit 4	Net Benefit 5
Stream Type	0.4				
Priority Waters	0.2				
Net Benefit	Side A	0.5			
	Side B	0.5			
Supplemental Credit	0				
Site Protection	0.2				
Credit Schedule	Side A	0.05			
	Side B	0.05			
Temporal Lag	-0.2				
Sum Factors (M) =	1.7				
Linear Feet of Stream Buffered	5,519.0				
Credits (C) = M x LF	9,382.3				
Total Riparian Credits Generated from all Columns =			9,382.3		

**Mississippi River Mainline Levee
St. Johns Bayou Outlet Ditch Scour Repair
New Madrid County, Missouri**

**U.S. Army Corps of Engineers
Regional Planning and Environment Division South
Memphis District**

7.0 COMPLIANCE WITH ENVIRONMENTAL LAWS AND REGULATIONS

Environmental compliance for the proposed action would be achieved upon: coordination of this draft EA and draft FONSI with appropriate agencies, organizations, and individuals for their review and comments; receipt of a Water Quality Certificate from the State of Missouri; public review of the Section 404(b)(1) Public Notice; and signature of the Section 404(b)(1) Evaluation. The draft FONSI would not be signed until the proposed action achieves environmental compliance with applicable laws and regulations, as described above.

7.1 Threatened and Endangered Species

In the fall of 2022, USACE biologists conducted a site assessment of the project area. Potential impact areas were examined for the presence of suitable/potential habitat for the USFWS provided official species list. Pursuant to Section 7 of the Endangered Species Act, as amended, USACE has determined that implementation of Phase 1 of the proposed project would have no effect on the gray bat, Indiana bat, NLEB, tricolored bat, alligator snapping turtle, or the pallid sturgeon. Additionally, no evidence of bald eagles, or their nests, were observed at any project Phase location. The bald eagle is no longer listed as a threatened species, but is still protected by the Bald and Golden Eagle Act and the Migratory Bird Treaty Act.

Please note an effect determination has not been made and USFWS concurrence not sought at this time regarding Phases 2 – 4 of the project. It is anticipated Section 7 consultation for Phases 2 – 4 would occur during future design phases.

7.2 Cultural Resources

A literature review and cultural resources survey within the project's APE were completed by the MVM archaeologist in the fall of 2022. The investigation revealed no significant cultural resources within the project's APE and no historic properties are anticipated to be affected as a result of the proposed project. Therefore, no additional cultural resources investigations are recommended prior to project implementation. However, should an inadvertent discovery be made during construction, the resource would be evaluated, assessed for effects, avoided if possible, and mitigated in accordance with federal statutes and regulations (36 CFR, Part 800). Concurrence from the Missouri State Historic Preservation Office is requested with this draft EA.

7.3 Water Quality, State Certification

Impacts to water quality within the St. Johns Outlet Ditch and adjacent Mississippi River would be minimal or have no effect, as both the outlet ditch and river normally carry a heavy sediment load. Thus, no significant impacts to water quality would occur as a result of the proposed project. A Section 404(b)(1) Evaluation was prepared for the proposed project action and is included as an attachment. A state water quality certification for actions associated with Phase 1 of the project is requested from the State of Missouri, Department of Natural Resources with this draft EA.

8.0 CONCLUSION

The proposed action involves implementing scour control measures in four phases within and along the banks of the St. Johns Bayou Outlet Ditch. Although potential environmental impacts requiring compensatory mitigation were not noted for construction associated with Phase 1, a total of approximately 1.0 acres of wetlands and 3,754 linear feet of stream could potentially be impacted in Phases 2 – 4. To mitigate for the impact, approximately 2.0 acres of cleared agricultural land would be restored to bottomland hardwoods in addition to, or conjunction with, establishing a 50-foot riparian buffer for approximately 5,519 feet along both banks of a previously un-buffered area stream.

This office has assessed the environmental impacts of the proposed action and has determined that the proposed work is expected to have only minor impacts on wildlife, air quality, and hydrology. Impacts to wildlife and air quality would be temporary and would be expected to return to existing conditions after completion of the project action. The proposed project would have no impacts upon freshwater marshes, freshwater lakes, state designated scenic streams, prime and unique farmlands, cultural resources, municipal facilities, municipal utilities, roadways, recreation, aesthetics, socio-economic, or environmental justice. Also, no significant adverse impacts would occur to wetlands, aquatic resources/fisheries, wildlife, threatened and endangered species, hydrology/water quality, air quality, or the human environment. Therefore, a supplemental EIS is not required.

9.0 PREPARED BY

This EA and FONSI were prepared by Mr. Joshua M. Koontz, USACE biologist, with cultural resources information provided by Ms. Pam Lieb, USACE archeologist. For additional information, contact Mr. Joshua M. Koontz at (901) 544-3975, or by email at joshua.m.koontz@usace.army.mil, or by mail at USACE Memphis District, Attn: Joshua M. Koontz, 167 North Main St., RM-B202, Memphis, TN 38103-1894.

ATTACHMENTS

Attachment A – Section 404(b)(1) Evaluation