

MVD PLANNING DECISION DOCUMENT REVIEW PLAN

April 2022

Project Name: Mississippi River Hatchie/Loosahatchie, Mississippi River Mile 775-736, Tennessee and Arkansas

P2 Number: 445120

Decision Document Type: Feasibility Report with Integrated Environmental Assessment or Environmental Impact Statement (TBD when alternatives are developed and impacts are assessed)

Project Business Line: Ecosystem Restoration

District: Memphis District

District Contact: Jason Allmon, Project Manager, (901) 544-3832; Travis Creel, Senior Plan Formulator, (504) 862-1071; Sara Thames, Lead Plan Formulator, (601) 631-5894

Major Subordinate Command (MSC): Mississippi Valley Division (MVD), Vicksburg, MS

MSC Contact: Sarah Palmer, (601) 634-5910

Review Management Organization (RMO): Ecosystem Restoration National Planning Center of Expertise (ECO-PCX)

RMO Contact: Kathryn McCain (314) 296-1104

Key Review Plan Dates

Date of RMO Endorsement of Review Plan: Dec 16, 2021

Date of MSC Approval of Review Plan: Pending Feb 18, 2022

Date of IEPR Exclusion Approval: N/A

Has the Review Plan changed since RMO Endorsement? N/A

Date of Last Review Plan Revision: N/A

Date of Review Plan Web Posting: Pending

Date of Congressional Notifications: Pending

Milestone Schedule

	<u>Scheduled</u>	<u>Actual</u>	<u>Complete</u>
FCSA Execution:	Jul 16, 2021	Jul 30, 2021	Yes
Alternatives Milestone:	Jan 21, 2022	(enter date)	No
Tentatively Selected Plan:	Aug 29, 2022	(enter date)	No
Release Draft Report to Public:	Oct 31, 2022	(enter date)	No
Agency Decision Milestone:	Feb 13, 2023	(enter date)	No
Final Report Transmittal:	Nov 29, 2023	(enter date)	No
Senior Leaders Briefing:	May 06, 2024	(enter date)	No
Chief's Report:	Jul 01, 2024	(enter date)	No

Project Fact Sheet
February 2022

Project Name: Mississippi River Hatchie/Loosahatchie, Mississippi River Mile 775-736, Tennessee and Arkansas

Location: 39 mile reach (River Mile 775-736) of the MS River and surrounding batture, beginning at the mouth of the Hatchie River and extending south to the mouth of the Wolf River Harbor, Lauderdale, Tipton, and Shelby Counties, Tennessee and Mississippi and Crittenden Counties, Arkansas (Figure 1)

Purpose of Review Plan: This review plan establishes policy and procedures for the comprehensive accountable review strategy for the Mississippi River Hatchie/Loosatchie Feasibility Study by providing a process for review of all products through the lifecycle of the study. This Review Plan will ensure the quality and credibility of decisions and implementation of the study.

Authority: Water Resources Development Act (WRDA) of 2018, P.L. 115-270, Section 1202 Additional Studies.

(a) "LOWER MISSISSIPPI RIVER; MISSOURI, KENTUCKY, TENNESSEE, ARKANSAS, MISSISSIPPI, AND LOUISIANA.

- (1) IN GENERAL.-The Secretary is authorized to carry out studies to determine the feasibility of habitat restoration for each of the eight reaches identified as priorities in the report prepared by the Secretary pursuant to section 402 of the Water Resources Development Act of 2000, titled "Lower Mississippi River Resource Assessment; Final Assessment In Response to Section 402 of WRDA 2000" and dated July 2015.

(2) CONSULTATION.-The Secretary shall consult with the Lower Mississippi River Conservation Committee during each feasibility study carried out under paragraph (1)."

Sponsor: Lower Mississippi River Conservation Committee

Type of Study: Feasibility Report with Integrated Environmental Compliance

SMART Planning Status: 3x3x3 compliant

Project Area: The project area is a 39 mile reach of the Mississippi River and the surrounding batture (the riverside area between the levee and main channel on the Arkansas side and the riverside area between the natural ridge and main channel on the Tennessee side) beginning at the mouth of the Hatchie River and extending south to the mouth of the Wolf River Harbor (River Mile 775-736). The project area is located in Lauderdale, Tipton, and Shelby Counties, Tennessee and Mississippi and Crittenden Counties, Arkansas. The reach includes crossings, pools, side channels, old bendways, and wide overbank areas between west levee and east bluff (2-9 miles). In addition, there are three tributaries/river mouths in the reach (i.e., Hatchie, Loosahatchie, and Wolf Rivers). Meeman Shelby State Park, Fort Pillow State Park, the Lower Hatchie National Wildlife Refuge and JM Tulley Wildlife Management Area border this reach.

Figure 1. Study Area Maps

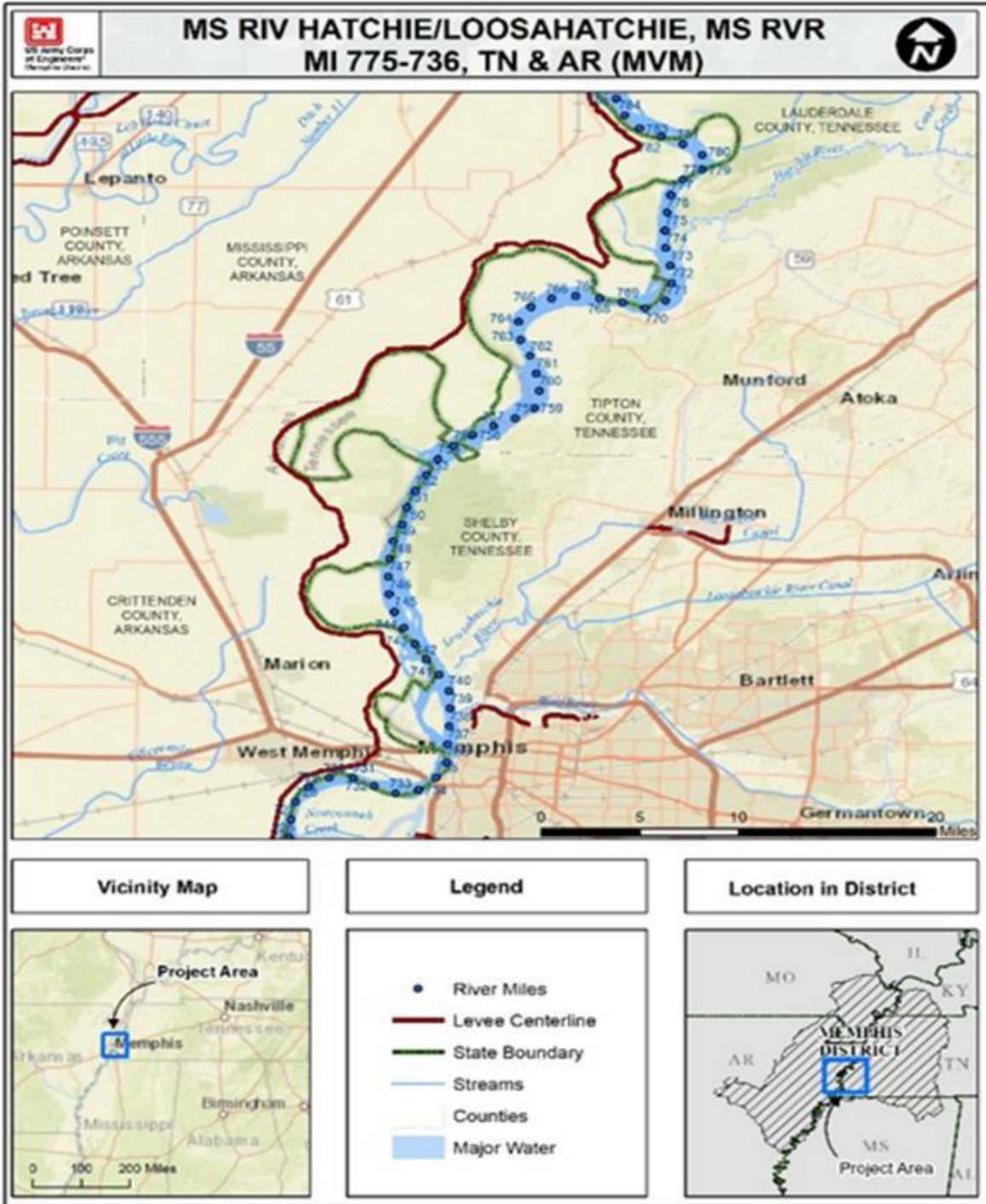
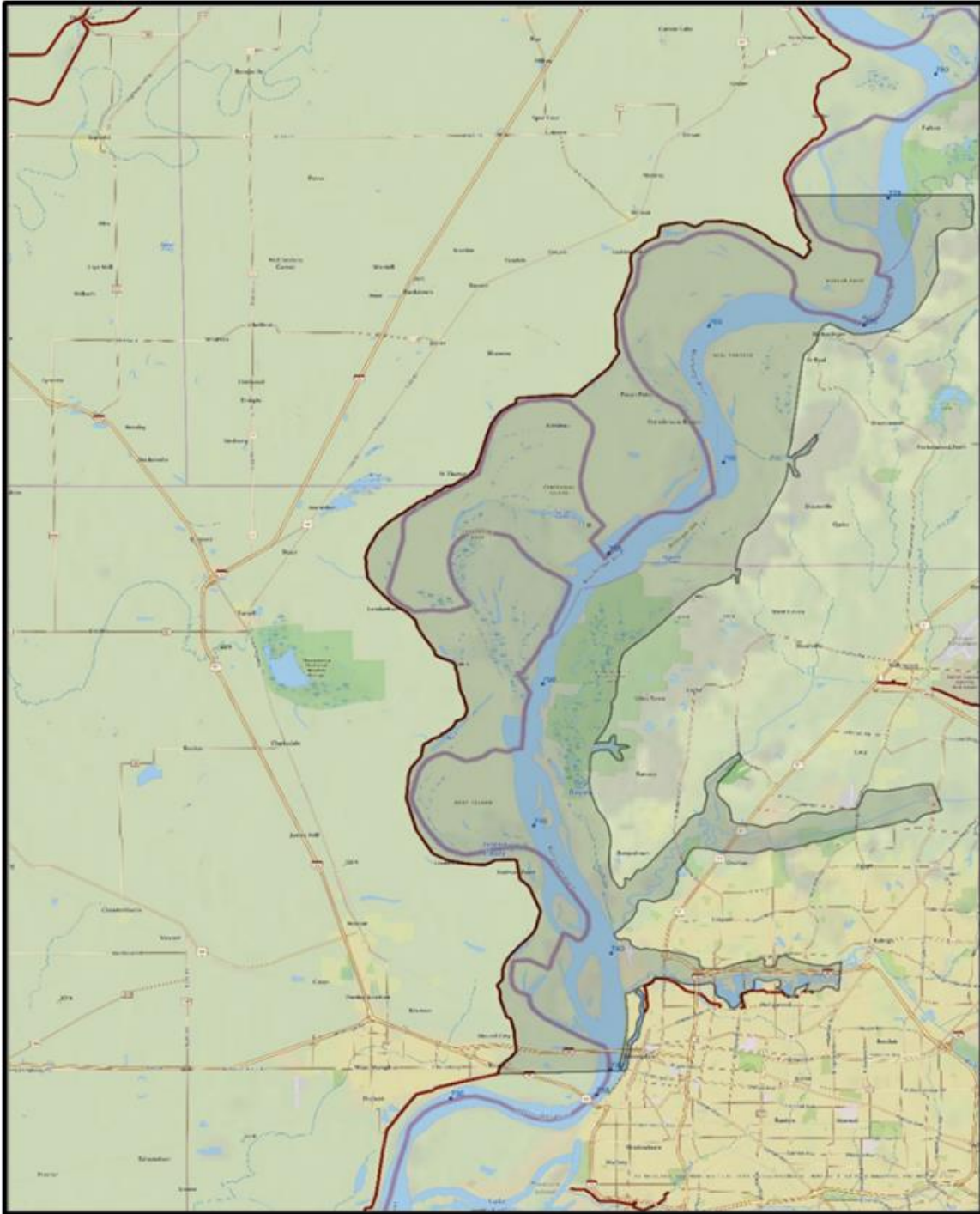


Figure 1. Study Area Maps (cont)



Problem Statement: The Mississippi River Levee system has disconnected much of the floodplain from the river. Flood risk management and navigation projects have altered bends and diverted flow from side channels. Extensive structural changes on the river's main-stem have disrupted the once dynamic ecosystem. There is less available habitat for federally listed threatened and endangered species including interior least tern, pallid sturgeon, and fat pocketbook mussels, and several other species. Modification and changes in the Lower Mississippi River (LMR) have resulted

in a number of extensive habitat changes including reductions in both vegetative diversity and forested habitat; extensive loss of connection between the river, its associated floodplain, and critical floodplain habitat; loss and disconnection of side channels, backwaters, and oxbows; decreased main channel and main channel border habitat diversity; loss of gravel bars, sandbars and islands; and a substantial increase in presence of invasive species.

There is a critical need to restore habitat and ecosystem function in the LMR in association with the continued operation of significant levee and navigation infrastructure. Specific opportunities include restoring vegetative diversity and forest habitats in the active floodplain; improving floodplain connectivity with the river; reconnection of side channels, backwaters, and floodplain lakes; restoration of sandbars and gravel bars; development and enhancement of islands; and increasing habitat diversity in the main channel and along the shoreline.

Federal Interest:

Habitat Scarcity: Anthropogenic changes to hydrology, geomorphology, and sediment dynamics resulted in loss of connectivity to adjacent sandbars, side channels, oxbows, and backwaters. These changes, coupled with associated clearing of overbank areas, resulted in significant declines to historic habitat. For example, rivercane was once a significant habitat throughout the LMR, but none of it remains in the project area. In addition to rivercane, bottomland hardwoods (BLH) were also prevalent throughout the project area, but the vast majority has been cleared. Sandbars were dynamic features of the natural river landscape; but maintenance of the navigation channel limits sandbar formation and most are now along the edges of the channel associated with dike fields.

Connectivity: Historically, the main channel of the Mississippi River was connected laterally to secondary and tertiary channels, backwaters, mudflats, etc., and the floodplain was wider, connecting the river to many habitat types. The main channel remains connected north to south; there is some intermittent connectivity of the main channel to other habitats, but little to no connectivity exists directly between the individual side channels, backwaters, etc.

Special Status Species: Eight active interior least tern (*Sternula antillarum*) colonies and fat pocketbook mussel (*Potamilus capax*, endangered) shells have been observed within the project area. The reach also had good potential for pallid sturgeon (*Scaphirhynchus albus*, endangered), and Indiana bat (*Myotis sodalis*, endangered).

Hydrologic Characteristics: The hydrologic and hydraulic regimes in this reach have been altered. High water events are contained in smaller area, and stages and velocity are higher in that reach. At low water, side channels and other areas no longer receive flow. The geomorphology of the floodplain and the river are both altered. Historically, the Mississippi River moved across the alluvial floodplain forming meander loops and secondary channels. The secondary channels varied in size and complexity but were always smaller than the main channel. Secondary channels were gained and lost as the river formed new courses. New side channels sometimes form in dike fields now. Aggradation and degradation in the river are managed to facilitate navigation. The river's influence on landform has been reduced. The river channel has been simplified and is less dynamic, the channel bed elevation is lower and the river is disconnected from 80% of the floodplain. New oxbow lakes cannot form.

Plan Recognition: The Mississippi River commission developed a 200-year working vision for the river to ensure that people can continue their lives on the Mississippi River. The vision balances the Nation's needs for security and flood damage reduction with environmental sustainability and recreation, infrastructure and energy, water supply and water quality, and navigation. The Lower Mississippi River Resource Assessment (LMRRA, sent to Congress in 2016) recommended this

study. The Lower Mississippi River Conservation Committee (LMRCC), the non-Federal sponsor, developed and continues to update the Restoring America's Greatest River initiative; this reach contains 17 features recommended in that plan. The U.S. Army Corps of Engineers (USACE) and U.S. Fish and Wildlife Service worked together to develop a conservation plan for three listed species that occur in this reach and recommended general actions to conserve these species. Government agencies, industries, municipalities and non-governmental organizations are joining forces through American's Inner Coast Summit, America's Watershed Initiative, and the Mississippi River Cities and Towns Initiative (MRCTI), to promote the river and highlight its needs. In 2013, the MRCTI signed a Memorandum of Common Purpose with the USACE with a goal to "perpetuate an era of cooperation and collaboration between the Mayors on the main stem Mississippi River and the USACE, to protect, sustain, and enhance the natural attributes and economic vitality of the Main Stem Mississippi River."

Regionally Significant: The active floodplain of the LMR is a dynamic freshwater ecosystem that changes with the river's annual hydrologic regime. The nearly 3 million-acre floodplain is interspersed with abandoned channels, meander scars, and forests. These areas provide a diverse array of aquatic habitats and are connected to the river at high water. The river also supports over 90 freshwater fish species, approximately 50 native mussel species, and several federally listed threatened and endangered species.

Nationally Significant: The Mississippi Flyway hosts the world's largest bird migration, connecting life from the Arctic to South America. Over 300 species of migrating birds and approximately 70% of the Nation's migratory waterfowl use the flyway. The Mississippi River drains all or part of 31 states and 2 Canadian Provinces and is the third largest watershed in the world. It generates over \$150 billion a year in revenues and employs over 580,000 people in the lower river area. Recreation and tourism within the lower river corridor generate nearly \$17 billion in annual spending, supports thousands of businesses and employs over 240,000 people.

Relationship to Corps or Projects Funded by Other Agencies: The Mississippi River and Tributaries (MR&T) Project ensures navigation and flood risk management work together for maximum benefit to the nation. Locks and dams are not needed to maintain navigation in the lower river. All project features proposed would be designed to ensure they harmonize with the existing MR&T project features. The LMRCC completed several projects in the area with the cooperation of USACE including restoration of an 11-mile side channel at Loosahatchie Bar. Project monitoring has shown excellent ecological response to the project.

Goals and Objectives:

Goal: The Corps objective in ecosystem restoration planning study is to contribute to national ecosystem restoration (NER). Contributions to NER outputs are increases in the net quantity and/or quality of desired ecosystem resources. This project's specific NER planning will focus on restoration of ecological structure and function along the Mississippi River including secondary channels and other aquatic habitat; floodplain forests; and several scarce vegetative communities such as wetlands, canebrakes, riverfront forests, and BLH forests.

Objective #1: Increase quantity and/or quality of vegetated habitats and maintain a diverse vegetative mosaic in the floodplain to benefit native fish and wildlife resources (e.g., migratory birds and species of conservation concern) focusing on habitat such as: emergent, floating, and submersed aquatic vegetation; rivercane; BLH.

Objective #2: Improve quantity and/or quality of diverse large river habitats (sandbars, gravel bars, secondary channels, etc.) to support critical life history requirements of priority species.

Objective #3: Increase aquatic connectivity with the Mississippi River to improve quality of secondary channels, chutes, sloughs, backwater, oxbows, borrow pits, tributary mouths, and other floodplain waterbodies to support critical life history requirements of priority species.

Objective #4: Improve recreational opportunities and access to public spaces in study area.

Inventory and Forecast:

- Dominant land-use is agriculture and BLH followed by open water.
- Approximately 3,150ac are enrolled in NRCS Easements.
- Public lands (25,243ac)
- Forest conversion due to lack of historic hydrology in floodplains.
- Dominant land-use is expected to remain in agricultural production.
- No significant changes in land use have occurred during the past 20 years and none are anticipated.
- No significant changes in landownership is expected.
- Recreation is expected to remain highly valued in the area.
- Forest conversion due to lack of historic hydrology in floodplains will continue.
- Aquatic and terrestrial diversity is expected to continue to decline.
- No anticipated changes to flood risk management features or navigation operation are expected. The mainline levee is established so there is no potential for new hydrologic connections through secondary channels or establishment of oxbows, floodplains, etc.
- Project poses no significant threat to human life/public safety.

Measures and Alternatives:

Conversion of agricultural land to natural habitats through purchasing (high priority areas include: protect/convert higher elevation areas to BLH to act as wildlife corridors and refuges during high water events (e.g., access to Wappanocca NWR, Brandywine Island, etc.)).
Create canopy gaps in dense canopy forests.
Establish tree screens/buffer strips in areas where there is less than 300-ft width along the main channel.
Protect existing rivercane stands at those higher elevation stands (such as, natural levees and high elevation banks surrounding waterbodies near Brandywine Island).
Propagate/Establish rivercane at higher elevation locations within the floodplain (potential locations include: high elevations surrounding floodplain waterbodies and vegetating potential spoil piles from plug removals).
Install structures to increase velocity and uncover gravel bars buried in sand to benefit macroinvertebrates and potential pallid sturgeon spawning areas.
Install dike notches to protect and/or improve sandbars for nesting interior least terns.

Install woody debris traps to promote aquatic macroinvertebrate colonization and forage locations for riverine fish.
Install hardpoints as bank stabilization measure in ecologically sensitive areas (e.g., potentially couple with LWD traps in side-channels, protect island tips like at RM 754L where Lake Sturgeon have been documented).
Rehabilitate notched dikes or remove sediment plugs by dredging or excavation to connect secondary channels for sufficient time to allow various aquatic macroinvertebrate communities to complete their life cycles.
Examine tie-channels of oxbow lakes and other floodplain waterbodies to minimize head-cutting (e.g., grade control structures) and maintain periodic connectivity with river (e.g., dredging or removal of sediment).
Remove downstream barriers (e.g., increase connectivity of tie-in channels) and install weirs or control structures on upstream ends of waterbodies allowing Alligator Gar access to warm water in spring for spawning.
Optimize floodplain connections at Eagle Lake Refuge to increase habitat quality.
Examine tributary mouths for head-cutting and install grade control structures.
Provide opportunities for canoe/kayak access (e.g., primitive boat launch and create/support blue-way trails).
Install smaller dike notches on either side of a large notch to allow fisherman areas to anchor and access fishing opportunities.
Provide education and access to the LMR Ecosystem through signage, interpretive guidance and other approved cost shared facilities listed in EP 1165-2-502 (e.g., support the proposed City of Memphis Freshwater Institute).
Install more paved ramps along the Mississippi River to increase access.

Risk Identification and Key Assumptions:

Risks:

- Several ecological models may be required to fully capture the benefits associated with the diverse environmental aspects.
- It may be challenging to find willing landowners to participate in ecosystem restoration.
- Future land uses within the project area are unknown.

Assumptions:

- Understanding of the existing conditions.
- Connection threshold to floodplain waterbodies.
- Lack of information on BLH composition/trends and rivercane establishment/long-term success.

1. FACTORS AFFECTING THE LEVELS AND SCOPE OF REVIEWS

Mandatory Decision on Conducting IEPR (Section 6.4 of ER 1165-2-217)

- Is the estimated total project cost, including mitigation, greater than \$200 million? **No, not anticipating cost greater than \$200 million.**
- Has the Governor of an affected state requested a peer review by independent experts? **No**
- Has the Chief of Engineers determined the project study is controversial due to significant public dispute over the size, nature or effects of the project or the economic or environmental costs or benefits of the project (including but not limited to projects requiring an Environmental Impact Statement)? **No**

Discretionary/Risk-Informed Assessment on Conducting IEPR (Section 6.5 of ER 1165-2-217). When none of the three mandatory triggers for IEPR are met, MSC Commanders have the discretion to conduct IEPR based on a risk informed assessment of the expected contribution of IEPR to the project.

Discretionary Decision (Section 6.5.1 of ER 1165-2-217). Section 2034 of the Water Resources Development Act of 2007 (hereafter referred to as Section 2034), outlines the requirements for considering whether to subject a study to peer review where IEPR is discretionary. IEPR is discretionary when the head of a federal or state agency charged with reviewing the project study determines that the project is likely to have a significant adverse impact on environmental, cultural, or other resources under the jurisdiction of the agency after implementation of proposed mitigation plans and he/she requests an IEPR.

- Has the head of a federal or state agency charged with reviewing the study determined that the project is likely to have a significant adverse impact on environmental, cultural, or other resources under the jurisdiction of the agency after implementation of proposed mitigation plans and he/she requests an IEPR? **No**

Risk-Informed Decision (Section 6.5.2 of ER 1165-2-217). Beyond the mandatory and discretionary requirements in Section 2034, PDTs must make a recommendation based on a risk-informed assessment of whether or not conducting IEPR would substantially benefit or add value to the project study and provide the rationale for the recommendation in the RP. This assessment and documentation in the RP will consider a variety of factors to indicate whether the covered subject matter (including data, use of models, assumptions, and other scientific and engineering information) has life safety concerns, is novel, is controversial, is precedent setting, has significant interagency interest, or has significant economic, environmental and social effects to the Nation.

- Does the Study present significant life safety concerns? **No**
- Is the Study expected to cover novel subject matter? **No**
- Is the Study controversial? **No**
- Is the Study precedent setting? **No**
- Is the Study a matter of significant interagency interest? **No**

- Is the Study expected to have significant economic, environmental and social effects to the Nation? No

Level and Scope of Review.

- Will the study likely be challenging? While all studies have challenges, this feasibility study is not expected to be unusually difficult or present challenges that cannot be overcome through coordination and technical expertise.
- Provide a preliminary assessment of where the project risks are likely to occur and assess the magnitude of those risks. Land ownership (e.g. locating willing sellers) within the study area is a low magnitude risk. Private landowners willingness to participate is an expected low magnitude risk. Unknown future land use changes is a low magnitude risk. Any planned actions/projects by other Federal, State, or local agencies is a low magnitude risk. Existing bank erosion within the study area could impact some ecosystem improvement measures, if not considered in project design. This is a low risk as measures will be evaluated throughout the planning process. Impacts to structures that could be considered for the National Register of Historic Places, such as bridges or culverts, is a low magnitude risk, and no locations have been identified at present. No significant negative impacts to threatened or endangered species are anticipated.
- Is the project likely to be justified by life safety or is the study or project likely to involve significant life safety issues? No, this is an ecosystem restoration study that will avoid any induced flooding.
- Is the information in the decision document or anticipated project design likely to be based on novel methods, involve innovative materials or techniques, present complex challenges for interpretation, contain precedent-setting methods or models, or present conclusions that are likely to change prevailing practices? No
- Does the project design require redundancy, resiliency, and/or robustness, unique construction sequencing, or a reduced or overlapping design/construction schedule? No
- Is the project expected to have more than negligible adverse impacts on scarce or unique tribal, cultural, or historic resources? TBD, but not expected.
- Is the project expected to have substantial adverse impacts on fish and wildlife species and their habitat prior to the implementation of mitigation measures? No, as an ecosystem restoration study, the purpose of the study is to select a plan that reasonably maximizes fish and wildlife resources.
- Is the project expected to have, before mitigation measures, more than a negligible adverse impact on an endangered or threatened species or their designated critical habitat? No, as an ecosystem restoration study, the purpose of the study is to select a plan that reasonably maximizes fish and wildlife resources.

Assessment of the District Chief of Engineering. The District Chief of Engineering does not anticipate any significant threats to human life associated with the study or failure of the project and will continue to assess.

2. REVIEW EXECUTION PLAN

This section describes each level of review to be conducted. Based upon the factors discussed in Section 1, this study will undergo the following types of reviews:

District Quality Control. All decision documents will undergo DQC. This internal review process covers basic science and engineering work products. It fulfils the project quality requirements of the Project Management Plan.

Agency Technical Review. ATR will be performed by a qualified team from outside the home district that is not involved in the day-to-day production of the project/product. These teams will be comprised of certified USACE personnel. The ATR team lead will be from outside the home MSC.

Cost Engineering Review. All decision documents will be coordinated with the Cost Engineering Mandatory of Expertise (MCX). The MCX assisted in determining the expertise needed on the ATR. The MCX will provide the Cost Engineering certification. The RMO is responsible for coordinating with the MCX for the reviews. These reviews occur as part of ATR.

Model Review and Approval/Certification. EC 1105-2-412 mandates the use of certified or approved models for all planning work to ensure the models are technically and theoretically sound, compliant with USACE policy, computationally accurate, and based on reasonable assumptions.

Policy and Legal Review. All decision documents will be reviewed for compliance with law and policy. ER 1105-2-100, Appendix H, and Director’s Policy Memorandum 2019-01, both provide guidance on policy and legal compliance reviews. These reviews culminate in determinations that report recommendations and the supporting analyses and coordination comply with law and policy, and warrant approval or further recommendation to higher authority by the home MSC Commander.

Public Review. The district will post the Review Plan and approval memo on the district internet site. Public comment on the adequacy of the Review Plans will be accepted and considered.

Table 1 provides the schedules and costs for reviews. The specific expertise required for the teams are identified in later subsections of this plan covering each review. These subsections also identify requirements, special reporting provisions, and sources of more information.

Table 1: Schedule and Costs of Reviews

Product(s) to undergo Review	Review Level	Start Date	End Date	Cost	Complete
Draft Feasibility Report / EA or EIS	Focused Array Review	01/10/22	01/14/22	\$12,000	No
Draft Feasibility Report / EA or EIS	District Quality Control	08/01/22	09/29/22	\$60,000	No
Draft Feasibility Report / EA or EIS	Agency Technical Review	10/17/22	12/15/22	\$75,000	No

Draft Feasibility Report / EA or EIS	Policy and Legal Review	10/17/22	12/15/22	n/a	No
Final Feasibility Report / EA or EIS	District Quality Control	08/14/23	09/15/23	\$45,000	No
Final Feasibility Report / EA or EIS	Agency Technical Review	10/02/23	11/13/23	\$35,000	No
Final Feasibility Report / EA or EIS	Policy and Legal Review	11/20/23	12/20/23	n/a	No

a. DISTRICT QUALITY CONTROL

The home district will manage DQC and will appoint a DQC Lead to manage the local review (see ER 1165-2-217, section 4.4.2.1). Table 2 identifies the required expertise for the DQC team. The DQC Team members should not be involved in the production of any of the products reviewed.

Table 2: Required DQC Expertise

DQC Team Disciplines	Expertise Required
DQC Lead	A professional with at least 10 years of USACE civil works planning experience or a combination of education and with extensive experience, preparing civil works decision documents and conducting DQC. The lead may also serve as a reviewer for a specific discipline (such as planning, economics, environmental resources, etc.).
Planning	A senior water resources planner with 5 years of experience in urban Flood Risk Management and Ecosystem Restoration Projects. Measures include dike notching, installation of dikes and weirs, sediment removal, terrestrial habitat restoration such as BLH and emergent wetlands, and aquatic habitat restoration.
Economics	An economist with 10 years experience in Ecosystem Restoration Projects, as well as the IWR Planning Suite (CEICA) and HEC-FDA models used in the study. The reviewer should have a background in developing economic simulation models and analysis for large, and complex regional investigations. Should have extensive experience in analyzing flood risk management projects, to include nonstructural alternatives, in accordance with ER 1105-2-100, the Planning Guidance Notebook.
Environmental Resources	A biologist/ecologist/environmental engineer with experience in the terrestrial and aquatic restoration; NEPA documentation review for compliance with current policy; and review of quality and applicability of ecosystem benefits evaluations using models.
Cultural Resources	Cultural Resource Specialist with experience in historic properties, Native American sites, Federal lands, and programmatic agreements; USACE Civil Works projects; and compliance with cultural resource laws and USACE policies.
Hydrology/Hydraulic Engineering	Senior Engineer with at least 5 to 10 years experience in ecosystem restoration projects including structural and non-structural alternatives and the HEC-RAS, model.

Civil Design	Senior Engineer with at least 5 to 10 years experience in ecosystem restoration projects to include detention, channel modification, grade control and stream bank stabilization.
Geotechnical	Senior Engineer with at least 5 to 10 years experience in ecosystem restoration features to include detention, channel modification, grade control and stream bank stabilization.
Cost Engineering	The Cost Engineer should have at least 15 years experience or combined equivalent of education and experience assessing ecosystem restoration features to include detention, channel modification, grade control and stream bank stabilization.
Real Estate	Senior Real Estate Specialist with experience in ecosystem restoration policy, urban land acquisition and appraisal, and LERRDS.

Documentation of DQC. Quality Control will be performed continuously. A specific certification of DQC completion will be prepared at the draft and final report stages. Documentation of DQC will follow the District Quality Manual and the MSC Quality Management Plan. Dr. Checks will be used for documentation of DQC comments. An example DQC Certification statement is provided in ER 1165-2-217 (Appendix D).

Documentation of completed DQC will be provided to the MSC, RMO and ATR Team leader prior to initiating an ATR. The ATR team will examine DQC records and comment in the ATR report on the adequacy of the DQC effort.

b. AGENCY TECHNICAL REVIEW

The ATR will assess whether the analyses are technically correct and comply with guidance, and that documents explain the analyses and results in a clear manner. The RMO will manage the ATR. The review will be conducted by an ATR Team whose members are certified to perform reviews. Lists of certified reviewers are maintained by the various technical Communities of Practice (see ER 1165-2-217, section 5.5.3. Table 3 identifies the disciplines and required expertise for this ATR Team (also see Attachment 1 - the ATR Team roster.

Table 3: Required ATR Team Expertise

ATR Team Disciplines	Expertise Required
ATR Lead (the ATR Lead should be from outside of the home MSC)	A senior professional with extensive experience preparing Civil Works decision documents and conducting ATR. The lead should have the skills to manage a virtual team through an ATR. The lead may serve as a reviewer for a specific discipline (such as planning).
*Planning	A Senior or Certified Planner with experience in ecosystem restoration projects.
Economics	Senior economist with experience in ecosystem restoration projects, IWR-Planning suite.
*Environmental Compliance	Senior Environmental Compliance Specialist with experience in ecosystem restoration projects to include terrestrial and aquatic restoration of riparian freshwater and BLH ecosystems; NEPA documentation review for compliance with current policy; and

	review of quality and applicability of ecosystem benefits evaluations using ecological/habitat models.
Cultural Resources	Senior Specialist with experience in historic properties, Native American sites, and programmatic agreements; USACE Civil Works projects; and compliance with cultural resource laws and policies.
Hydrology and Hydraulic Engineering & Climate Preparedness and Resilience CoP	Senior Engineer with ecosystem restoration project experience including structural and non-structural alternatives and HEC-RAS models. Also, a member of the Climate Preparedness and Resiliency Community of Practice (CoP) certified to perform ATR for ecosystem restoration projects.
Civil Design	Senior Engineer with experience in Flood Risk Management and Ecosystem Restoration Projects.
Geotechnical	Senior Engineer with experience in ecosystem restoration projects. A subject matter expert in multi-discipline ecosystem restoration analysis to ensure consistent and appropriate identification, analysis, and written communication of risk and uncertainty.
Cost Engineering	The Cost Engineer will have experience in ecosystem restoration features, understanding and experience in USACE processes, contracting acquisition procedures, estimating software (MCACES) and cost regulations (such as ER1110-1-1300, ER1110-2-1302, ETL1110-2-573) is required.
Real Estate	Senior Specialist with experience in Ecosystem Restoration including policy considerations, land acquisition and appraisal, and LERRDS.

* Study requires reviewers certified in Environmental Compliance and Ecosystem Restoration Planning. These can be filled by Planning, Environmental, or some combination of both.

Documentation of ATR. DrChecks will be used to document all ATR comments, responses and resolutions. Comments should be limited to those needed to ensure product adequacy. All members of the ATR team will use the four part comment structure (see ER 1165-2-217, Section 5.8.3). If a concern cannot be resolved by the ATR team and PDT, it will be elevated to the vertical team to resolve using the ER 1165-2-217 issue resolution process. Concerns will be closed in DrChecks by noting the concern has been elevated. The ATR Lead will prepare a Statement of Technical Review (see ER 1165-2-217, Section 5.11), for the draft and final reports, certifying that review issues have been resolved or elevated. ATR will be certified when all concerns are resolved or referred to the vertical team, and the ATR documentation is complete.

c. INDEPENDENT EXTERNAL PEER REVIEW

(i) Assessment of IEPR Conditions and Factors.

Section 1 of this Review Plan assesses the factors affecting the levels and scopes of reviews including IEPR. These factors include three mandatory conditions (cost of a project, request by the Governor of an affected state, or a determination by the Chief of Engineers) that independently require performance of IEPR. Additional discretionary factors or scenarios may also lead to the performance of IEPR. A risk-informed decision regarding the performance of IEPR is made through assessment of both the mandatory conditions and discretionary factors.

Decision of IEPR. IEPR is not planned for this study. The project does not meet any of the three mandatory conditions in WRDA 2007, Section 2034 requiring IEPR including: determination by

the Chief as controversial; requested IEPR by the Governor; or project cost of \$200 million or more. As documented in Section 1, additional discretionary questions have also been addressed as negative. There are no significant adverse environmental impacts driving another Agency to request IEPR. No substantial adverse impacts on fish and wildlife species, species listed as endangered or threatened under the Endangered Species Act or their designated critical habitat is expected. There are no significant life safety concerns and no novel methods used for this study. There are no complex challenges or precedent setting methods/model and the study is not likely to change prevailing practices.

d. SAFETY ASSURANCE REVIEW

Safety Assurance Reviews are managed outside of the USACE and are conducted on design and construction products for hurricane, storm and flood risk management projects, or other projects where existing and potential hazards pose a significant threat to human life. In some cases, significant life safety considerations may be relevant to planning decisions. These cases may warrant the development of relevant charge questions for consideration during reviews such as ATR or IEPR. In addition, if the characteristics of the recommended plan warrant a Safety Assurance Review, a panel will be convened to review the design and construction activities before construction begins, and until construction activities are completed, on a regular schedule.

Decision on Safety Assurance Review. A Safety Assurance Review decision will be made later.

e. MODEL CERTIFICATION OR APPROVAL

EC 1105-2-412 mandates the use of certified or approved models for all planning activities to ensure the models are technically and theoretically sound, compliant with USACE policy, computationally accurate, and based on reasonable assumptions. Planning models are any models and analytical tools used to define water resources management problems and opportunities, to formulate potential alternatives to address the problems and take advantage of the opportunities, to evaluate potential effects of alternatives and to support decision making. The use of a certified/approved planning model does not constitute technical review of a planning product. The selection and application of the model and the input and output data is the responsibility of the users and is subject to DQC, ATR, and IEPR.

Table 4: Planning Models. The following models may be used to develop the decision document:

Model Name and Version	Brief Model Description and How It Will Be Used in the Study	Certification / Approval
Obligate Riverine Model (Option 1)	This proposed model would correlate in-stream fish and aquatic macroinvertebrate communities with hydrogeomorphic attributes of the LMR to develop suitability index values. A regional use certification would allow for use in future LMRRR conservation reaches.	Pending certification for regional use. It could be scaled down for one-time use.
River Condition Index (Option 2)	This proposed model would include a multi-scale watershed assessment condition index that incorporates the complete condition of LMR habitats including hydrology/hydraulics, geomorphology, water quality, and plant and animal habitat. A regional use certification would allow for use in future	Pending certification for regional use. It could be scaled

	LMRRA conservation reaches. This model would be similar to the Stream Condition Index (SCI) model that was recently developed for a MVM Ecosystem Restoration Project in Desoto County, MS.	down for one-time use.
Envirofish	The model assesses fish spawning and rearing habitat up to the 5-year floodplain for optimal habitat, and the 2-year floodplain for sub-optimum habitat. HSI values would be based on hydrologic connectivity with the main river channel using recently collected data from the Ecohydrology study conducted under MVD's Mississippi River Geomorphology and Potamology Program and inter-agency team concurrence.	Version 2 is pending certification for regional use. Version 1 was approved for one-time uses for other studies.
Hydrogeomorphic Model (HGM)	This model provides an approach for assessing the function of the forested wetlands that occur in the Mississippi Alluvial Valley.	Regionally Certified
Habitat Evaluation Procedures	HEP is a species-habitat approach to impact assessment and habitat quality for selected evaluation species. (Species have not yet been identified).	Regionally Certified
Duck Use Days	The Duck Use Days model provides quantitative methods to estimate duck-use days based on daily energetic requirements of waterfowl species to determine incremental benefits and impacts of land and water resource development projects on waterfowl habitats and populations in the Mississippi Alluvial Valley during the nonbreeding season.	Regionally Certified
Alligator Gar Habitat Suitability Index (HSI)	This model, developed by the U.S. Fish and Wildlife Service, provides an approach to define and quantify Alligator Gar spawning habitat suitability throughout those areas of the Mississippi Alluvial Valley subject to direct inundation by the LMR. The model combines spatial data products that defined floodplain inundation extent, inundation frequency, and temperature with existing layers of physical habitat structure to define and quantify spawning habitat suitability.	Pending approval for use.

EC 1105-2-412 does not cover engineering models used in planning. The responsible use of well-known and proven USACE developed and commercial engineering software will continue. The professional practice of documenting the application of the software and modeling results will be followed. The USACE Scientific and Engineering Technology Initiative has identified many engineering models as preferred or acceptable for use in studies. These models should be used when appropriate. The selection and application of the model and the input and output data is still the responsibility of the users and is subject to DQC, ATR, and IEPR.

Table 6: Engineering Models. These models may be used to develop the decision document:

Model Name and Version	Brief Model Description and How It Will Be Used in the Study	Approval Status
HEC-RAS 6.1 or 6.2 (if available)	The software performs 1-D steady and unsteady flow river hydraulics calculations and has capability for 2-D (and	HH&C

(River Analysis System)	combined 1-D/2-D) unsteady flow calculations. It will be used for steady flow analysis to evaluate the future without-project and future with-project conditions.	CoP Preferred Model
HEC-RAS-1 and 2D	Developed and maintained by the Hydrologic Engineering Center (HEC). Project may use 1-D Steady Flow and 1-D Unsteady Flow. HEC-RAS 1-D is commonly used for: Water surface profiles over long reaches; Depth averaged velocities; Rainfall impact; Sediment transport. HEC-RAS 2D is commonly used for 2-D flow simulation over large domains such as: Rivers, Canals, Flood Plains, Estuaries, Rainfall Catchment Areas; large scale simulations with long durations. Both models have been used extensively in the project area.	CoP Preferred
Micro-Computer Aided Cost Engineering System (MCACES) MII Version 3.0	MCACES is a cost estimation model. This model will be used to estimate costs for the feasibility study.	Certified

f. POLICY AND LEGAL COMPLIANCE REVIEW

Policy and legal compliance reviews for draft and final planning decision documents have been delegated to the MSC (see Director’s Policy Memorandum 2019-01).

(i) Policy Review.

The policy review team will be selected through the collaboration of the MSC Chief of Planning and Policy and the HQUSACE Chief of the Office of Water Project Review. The team is identified in Attachment 1 of this Review Plan. The makeup of the Policy Review team may be drawn from Headquarters (HQUSACE), the MSC, the Planning Centers of Expertise, and other review resources as needed.

- The Policy Review Team will be invited to participate in key meetings during the development of decision documents as well as SMART Planning Milestone meetings. These engagements may include In-Progress Reviews, Issue Resolution Conferences or other vertical team meetings plus the milestone events.
- The input from the Policy Review Team will be documented in a Memorandum for the Record (MFR) produced for each engagement with the team. The MFR will be distributed to all meeting participants.
- In addition, teams may choose to capture some of the policy review input in a risk register if appropriate. These items should be highlighted at future meetings until the issues are resolved. Any key decisions on how to address risk or other considerations will be documented in an MFR.

(ii) Legal Review.

Representatives from the Office of Counsel will be assigned to participate in reviews. Members may participate from the District, MSC and HQUSACE. The MSC Chief of Planning and Policy will coordinate membership and participation with the office chiefs.

- In some cases legal review input may be captured in the MFR for the particular meeting or milestone. In other cases, a separate legal memorandum may be used to document the input from the Office of Counsel.
- Each participating Office of Counsel will determine how to document legal review input.

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