U.S. Army Corps of Engineers,
Mississippi Valley Division, Vicksburg District

# Pearl River Basin, Mississippi Federal Flood Risk Management Project

## Draft Environmental Impact Statement

## June 2024

# Cover Page

Pearl River Basin, Mississippi Federal Flood Risk Management Project
Draft Environmental Impact Statement

Counties: Rankin and Hinds Counties, Mississippi

Lead Agency: U.S. Army Corps of Engineers (USACE), Mississippi Valley Division (MVD), Vicksburg District

Cooperating Agencies: U.S. Fish and Wildlife Service; Federal Emergency Management Agency; Mississippi Department of Environmental Quality; Mississippi Department of Wildlife and Fisheries Protection; Louisiana Department of Natural Resources; Mississippi Department of Archives & History

**Abstract:** The Pearl River Basin, Mississippi Federal Flood Risk Management Feasibility Study (study) for flood damage reduction in Rankin and Hinds Counties, Mississippi (study area), is authorized by Section 3104 of the Water Resources Development Act (WRDA) of 2007 which modified Section 401(e)(3) of WRDA 1986 to authorize the Secretary of the Army to construct the National Economic Development (NED) plan, or the Locally Preferred Plan (LPP), or some combination thereof, subject to certain determinations.

The Draft Environmental Impact Statement (DEIS) is an analysis of flood risk management plans that can be implemented under Section 3104. Alternatives considered and evaluated include a Non-Structural Plan (Alternative A1); the Locally Preferred Plan (Alternative C); the NED Plan (Combination of features with a weir (Alternative D)) and a Combination wo/weir Plan (Alternative E). The proposed project would have adverse impacts to the environment requiring mitigation along with an associated monitoring and an adaptive management plan.

The DEIS is available for a 45-day comment period. Comments must be submitted by July 22, 2024. The DEIS is available at: https://www.mvk.usace.army.mil/Missions/Programs-and-Project-Management/Project-Management/Pearl-River/. Submit comments to the following:

U.S. Army Corps of Engineers
Attention: Eric Williams, Chief, Environmental Branch, RPEDS
CEMVN–PDS, Room 136,
7400 Leake Avenue New Orleans, LA 70118
Email: PearlRiverFRM@usace.army.mil

# Executive Summary

The U.S. Army Corps of Engineers (USACE) has prepared this DEIS at the direction of the Assistant Secretary of the Army for Civil Works (ASA-CW). The purpose of the DEIS is to evaluate flood risk management alternatives that can be implemented under Section 3104 of WRDA 2007. Alternatives considered include the Non-Federal Interest Rankin-Hinds (NFI) final array of alternatives as described in their Section 211 Draft Final Integrated Feasibility Report and Environmental Impact Statement titled, "Pearl River Basin, Mississippi Federal Flood Risk Management Project, Hinds & Rankin Counties Integrated Final Feasibility Study & Environmental Impact Statement (NFI Section 211 Report)" dated June 22, 2022, and new alternatives developed through USACE and NFI collaboration (referred to as USACE-developed alternatives). The NFI alternatives evaluated include, a "nonstructural plan" (Alternative A), a "levee plan" (Alternative B) and a "channel clearing/weir/levee plan" (Alternative C). USACE-developed alternatives include a modified nonstructural plan proposing elevating/floodproofing/acquisition of structures (Alternative A1) and Combination Thereof (CTO) Alternatives which may combine Alternative A1 and flood damage risk reduction structural features with consideration of including a new weir (Alternative D) or no weir (Alternative E). USACE alternatives were developed based on analytical findings, public input and comment, and agency coordination.

The NFI Section 211 Report), responding to the Section 3104 authority, was submitted to the ASA-CW as a recommendation for Federal participation in flood risk management within the Pearl River Basin in Mississippi. The NFI Section 211 Report underwent an Independent External Peer Review and USACE Agency Technical Review (ATR) in 2018. Reviews were concluded in 2020.

This DEIS was prepared in accordance with the National Environmental Policy Act (NEPA),the Council on Environmental Quality (CEQ) NEPA implementing regulations (40 Code of Federal Regulations [CFR] Parts1500-1508), as reflected in the USACE Engineer Regulation (ER) 200-2-2 (33 CFR Part 230) and coordinating laws and regulations. This DEIS drew heavily on the NFI Section 211 Report. The NFI Section 211 Report is incorporated by reference and is available upon request.

**Authority:** This DEIS is authorized by Section 3104 of the Water Resources Development Act (WRDA) of 2007 (Public Law 110-114).

> *(a) In General- The project for flood damage reduction, Pearl River Basin, including Shoccoe, Mississippi, authorized by section 401(e)(3) of the Water Resources Development Act of 1986 (100 Stat. 4132), is modified to authorize the Secretary, subject to subsection ( c ), to construct the project generally in accordance with the plan described in the 'Pearl River Watershed, Mississippi, Feasibility Study Main Report, Preliminary Draft', dated February 2007, at a total cost of $205,800,000, with an estimated Federal cost of $133,770,000 and an estimated non-Federal cost of $72,030,000.*

*(b) Comparison of Alternatives- Before initiating construction of the project, the Secretary shall compare the level of flood damage reduction provided by the plan that maximizes national economic development benefits of the project and the locally preferred plan, referred to as the Lefleur Lakes plan, to that portion of Jackson, Mississippi, and vicinity, located below the Ross Barnett Reservoir Dam.*

*( c) Implementation of Plan-*

*( 1) IN GENERAL- If the Secretary determines under subsection (b) that the locally preferred plan provides a level of flood damage reduction that is equal to or greater than the level of flood damage reduction provided by the national economic development plan and that the locally preferred plan is environmentally acceptable and technically feasible, the Secretary may construct the project identified as the national economic development plan, or the locally preferred plan, or some combination thereof.*

*(2) CONSTRUCTION BY NON-FEDERAL INTERESTS- The Non-Federal interest may carry out the project under section 211 of the Water Resources Development Act of 1996 (33 U.S.C. 701b-13).*

*(d) Project Financing- In evaluating and implementing the project under this section, the Secretary shall allow the non-Federal interests to participate in the financing of the project in accordance with section 903(c) of the Water Resources Development Act of 1986 (100 Stat. 4184) if the detailed project report evaluation indicates that applying such section is necessary to implement the project.*

*(e) Non-Federal Cost Share- If the locally preferred plan is selected for construction of the project, the Federal share of the cost of the project shall be limited to the share as provided by law for the elements of the national economic development plan.*

Congressional resolutions adopted 9 May 1979 authorized studies of the Pearl River Watershed, Mississippi. The authorizations read as follows:

*Resolved by the Committee on Public Works and Transportation of the House of Representatives, United States, That the Board of Engineers for Rivers and Harbors is hereby requested to review the reports of the Chief of Engineers on Pearl River Basin, Mississippi and Louisiana, published as House Document Number 282, Ninety-Second Congress, Second Session, and other pertinent reports, with a particular view toward determining whether any further improvements for flood damage prevention and related purposes are advisable at this time. The alternatives are to be reviewed with local interests to insure a viable, locally supported project.*

*Resolved by the Committee on Public Works and Transportation of the House of Representatives, United States, That the Board of Engineers for Rivers and Harbors is hereby requested to review the report of the Chief of Engineers on*

> *the Pearl River and Tributaries, Mississippi, contained in House Document 441, 86th Congress, and other reports with a view to determining whether measures for prevention of flood damages and related purposes are advisable at this time, in Rankin County, Mississippi.*
>
> *Resolved by the Committee on Environment and Public Works of the United States Senate, That the Board of Engineers for Rivers and Harbors, created under Section 3 of the River and Harbor Act, approved June 13, 1902, and is hereby requested to review the reports of the Chief of Engineers on Pearl River Basin, Mississippi and Louisiana submitted in House Document Numbered 92-282, 92d Congress, 2nd Session and other pertinent reports with a view to determining whether any further improvements for flood damage prevention and related purposes are warranted at this time.*

The NFI Section 211 Report was completed under authority of Section 211 of WRDA 1996, pursuant to terms prescribed in the Memorandum of Agreement (MOA) executed July 19, 2012, between the NFI and the USACE.

**Study Area:** The Pearl River Basin, as shown later in Section 1, Figure 1-1, is located in the south central portion of Mississippi and in a small section of southeastern Louisiana. The Pearl River drains an area of 8,760 square miles consisting of all, or parts, of 23 counties in Mississippi and parts of three Louisiana parishes.

**Scope:** The “scope,” or extent of evaluation, for purposes of this DEIS includes the range of actions, alternatives, and impacts analyzed. Those impacts are direct, indirect, or cumulative. The scope includes the geographic range, as well as elements of the human-built and natural environment studied to determine all reasonable alternatives for flood control in the study area. This evaluation includes a preliminary determination of the NED Plan as required by Section 3104 Pearl River Basin, Mississippi, of WRDA 2007.

**Purpose:** The purpose of the DEIS is to evaluate flood risk management alternatives that could be implemented under Section 3104 of WRDA 2007.

**Need (Problems):** For more than 100 years, headwater flooding of the Pearl River (greater than 10 feet deep in some areas) has caused disruption to businesses and industry throughout the Jackson, Mississippi, metropolitan area. This area of flood risk includes 5,000 commercial and residential structures and affects a population of over 500,000. Numerous flood events have affected the Study Area, and most notably the Easter Flood of 1979, the May Flood of 1983, and the February flood of 2020. The 1979 event flooded transportation routes, homes, and businesses, causing damages that, at that time, totaled approximately $223 million. If the same event occurred in the present day, damages would surpass $1.2 billion. More recently, the Pearl River crested at 36.67 feet in Jackson on February 17, 2020, the third highest crest ever recorded. The communities sustaining the most devastation from this flood event were located in minority and low-income areas of Jackson.

**Planning Objectives:** As a result of the problem, the objectives below formed the basis for the evaluation of the final array of alternative plans.

- Reduce risk of flooding for the city of Jackson, MS and adjacent areas in Hinds and Rankin Counties, MS.
- Reduce flood risk to human life and well-being.
- Reduce flood risk to critical infrastructure (e.g., medical centers, schools, transportation, etc.).
- Provide long-term drinking water security for the city of Jackson, MS and adjacent areas served.
- Create a self-sustaining project that allows for minimal operation and maintenance cost.
- Minimize the potentially reasonably foreseeable impacts to downstream areas, the environment, and cultural resources.

Planning Opportunities: As a result of the objectives stated above, the following opportunities could be considered.

- Consider the regional economic impacts associated with the development of recreational opportunities along the Pearl River in the project area. Provide recreational opportunities along the Pearl River for the city of Jackson, MS and adjacent areas in Hinds and Rankin Counties, MS.
- Consider the regional economic impacts associated with the development of recreational opportunities along the Pearl River in the project area.

**Planning Constraints and Considerations:** A planning constraint identified was to avoid promoting development within the floodplain (in accordance with E.O. 11988) to the maximum extent practicable, which contributes to increased life safety risk. Planning considerations in the plan formulation process included:

- Avoid or minimize adverse impacts to:
  - Threatened or endangered (T&E) and protected species.
  - T&E designated critical habitat.
  - Water quality.
  - Cultural, historic, and Tribal trust resources.
  - Areas of EJ Concern.
- Avoid or minimize impacts to Hazardous, Toxic and Radioactive Waste Sites (HTRW).
- Maintain consistency with local floodplain management plans by not inducing flooding in other areas.
- Closely coordinate with operators of Ross Barnett Reservoir on operations and maintenance of minimum flows.

**Alternatives:** Alternatives considered in the evaluation were the NFI “nonstructural plan” (Alternative A), a “levee plan” (Alternative B) and a “channel improvement/weir/levee plan” (Alternative C). In addition to these alternatives, USACE, in collaboration with the NFI, developed two new flood risk management alternatives based on analytical findings, public comment, and agency coordination. They are a modified nonstructural plan proposing

elevating/floodproofing/acquisition of structures (Alternative A1) and Combination Thereof (CTO) Alternatives which may combine Alternative A1 and flood damage risk reduction structural features with consideration of including a new weir (Alternative D) or no weir (Alternative E). The NFI Alternatives A and B were determined to not be economically justified and were removed from further consideration early in the evaluation process (see Section 3). A description of the alternatives carried forward are summarized below. Refer to Section 3 for a more complete discussion.

Alternative A1 includes elevation of residential structures to the future 1 percent Annual Exceedance Probability (AEP) flood stage extending up to 13 feet (NAVD88) above ground level, and floodproofing of nonresidential structures up to 3 feet above the ground level within the cumulative percent AEP floodplain. Approximately 143 structures, 81 residential and 62 nonresidential, are included. The option of nonstructural property acquisition (buyout) on a voluntary basis is also included in the implementation plan. Participation in the non-structural plan would be on a voluntary basis by the individual property owners.

Total potential benefits based on 100 percent participation are used to assess potential non-structural plan viability. Based on a 100 percent participation, the project first cost of $50,243,000 is estimated to produce nearly $2,149,000 in net benefits with a benefit to cost ratio (BCR) of 2.2 (greatest net economic benefits) and is consistent with USACE policies for protecting the environment and applicable environmental laws and regulations. The expected annual damages in the without-project condition in the study area are $27,126,000 when accounting only for the flooding that occurs from the main stem of the Pearl River and the backwater flooding that occurs on the tributaries. Alternative A1 accrues a damage reduction of $4,040,000, approximately 15 percent of the without-project damages caused from flooding from the main stem of the Pearl River and backwater flooding on the tributaries.

Alternative C as described in the NFI Section 211 Report and Environmental Impact Statement is the NFI Recommended Plan and considered the Locally Preferred Plan (LPP) in this EIS. Alternative C consists of clearing and expanding a cross-sectional area of the river channel corridor to increase hydraulic conveyance, demolition of the existing weir near the J. H. Fewell Water Treatment Plant (WTP), construction of a new weir with a low-flow gate structure further downstream to create a year-round recreational lake and provide an alternative raw water supply intake location should one be needed in the future, improvements to Federal levees (excavated material plan), and upgrading an existing non-Federal levee into a Federalized ring levee around the Savanna Street Wastewater Treatment Plant (WWTP). Alternative C includes features to avoid and/or minimize impacts to Federally listed threatened, endangered, and protected species. This alternative would have adverse impacts to the environment requiring mitigation and compensatory habitat mitigation along with associated monitoring and adaptive management plans. Residual impacts associated with Alternative C include headwater flooding along the tributaries contributing to high frequency flooding; roadways being inundated by flood events in certain areas of the study area, impacting emergency services; and impacts to water distribution where flooding is not addressed.

Alternative C, as presented in the Section 211 Report, is not justified under the traditional USACE benefit-cost analysis. The LPP costs and benefits are presented as a range of costs and benefits due to the current level of design. The LPP estimated project first cost range between a low of $1,046,068,000 to a high of $ 2,122,260,000 to produce a range of net benefits of - $25,915,800 to - $66,300,800 with a BCR of 0.4 to 0.2. Alternative C accrues a damage reduction of $14,279,000, approximately 30 percent of the future without-project damages. Alternative C would accrue expected annual damage (EAD) reductions of $8,573,000, approximately 20 percent of the without-project EAD of $42,330,000.

Alternatives CTO with/without a weir. Section 3104 of the WRDA provided that the Secretary of the Army may select any or all of the features presented in other alternatives to form a "combination thereof" Plan so long as the combined features provide the same level of flood risk reduction as the NED Plan, or better. Various combinations of features were evaluated with and without a new weir (Alternatives D and E). The combination of features consists of the following:

- Alternative A1
- Reduced Excavation of Main Channel
- Federal levee improvements.
- New weir and fish ladder.
- Utilization of existing weir.
- Non-Federal levee improvements (Savanna Street WWTP).
- Levees.
- Countermeasures for Bridges.
- Mitigation features.
- Year-round recreational lake.

Alternative CTO w/weir (Alternative D) does not provide any flood control benefits, and construction of the weir necessitates additional pumping needs at existing levees as well as seepage protection in the form of berms and slurry walls on existing levee features upstream of the weir. However, the weir provides a lake surface for future water supply concerns, as well as adding attractive locations for recreation and future economic development. The proposed weir would result in an expanded, year-round recreational water body capable of supporting recreational facilities. Potential recreation sites would be limited to areas disturbed by construction and design of these facilities would be coordinated during PED (Figure 3-14). The potential recreational opportunities could include boat ramps, camping areas, fishing piers, trails, or wildlife viewing areas. The Alternative D CTO with weir alternative estimated project first cost range between a low of $487 million to a high of $655 million to produce a range of net benefits of $8.2 million to $1.6 million with a BCR of 1.4 to 1.1. Alternative CTO w/weir accrues benefits of $27.7 million, reducing the future without-project damages by approximately 50 percent.

The Alternative E CTO without weir alternative estimated project first cost range between a low of $399 million to a High of $508 million to produce a range of net benefits of $6.8 million

to $2.4 million with a BCR of 1.4 to 1.1. Alternative CTO wo/weir accrues project benefits of $22.4 million, reducing the future without-project damages by approximately 50 percent.

The economic summary contained within Table 3-8 indicates that the CTO without Weir Alternative provides the highest net benefits when assuming high costs. However, the anticipated costs of the alternatives are provided as an estimated range of low to high costs due to limited design maturity and the inability to sufficiently refine alternative costs. Should the high costs be reduced by as little as 15% for both CTO alternatives, a small reduction considering the wide range of cost and conservative nature of these anticipated costs, the Alternative D CTO with weir would provide the highest net benefits of the two CTO alternatives as indicated in Table 3-11 and could be considered the likely NED plan as a result.

Residual impacts for the CTO Alternative Plans are similar to Alternative C.

**National Economic Development:** While total potential benefits based on 100 percent participation are used to assess potential non-structural plan viability (Alternative A1), the actual average participation in non-structural flood risk reduction plans varies. A reasonable expectation for homeowner participation in a non-structural plan is 50 percent. Realization of this participation would mean that the Non-structural and Non-structural/Levee (assuming median cost) plans would be expected to produce approximately $1.075 and $1.508 million in Net Benefits respectively. By comparison the Structural plans, CTO wo/weir (Alt E) and CTO w/ weir (Alt D), assuming 85 percent of the high estimated costs, would produce approximately $5.305 and $5.413 million in Net Benefits respectively. The structural plans contain a non-structural sub element that has a set cost.

Preliminary economic analysis identified Alternative A1 as the likely NED Plan. However, significant uncertainties and risks are associated with the implementation of Alternative A1 including a potentially reduced participation rate from the assumed rate, the inability of residents to address ineligible project costs (i.e., bringing residential structures to code), and residual impacts that are not addressed by the alternative. Residual impacts include the headwater flooding along the tributaries contributing to high frequency flooding; roadways being inundated by flood events across the study area, impacting emergency services; and impacts to water distribution and wastewater treatment.

Net benefits for Alternative A1 were the highest among the assessed alternatives; however, these significant residual risks and the inability of this alternative to address the stated problems and objectives of the Project may prohibit selection of Alternative A1 as the NED plan.

Comparing the potential of the expected and variable outputs for all plans it appears that the plans likely to best meet the NED requirement would be one of the CTO structural plans, either without or with a weir. The possible difference in Net Benefits between the CTO w/weir and CTO wo/weir plans could range between $0.63 and $1.4 million. However, the difference between the total benefits between the CTO w/weir and CTO wo/weir plans is approximately $27.7 versus $22.4 million. An approximate difference of $5.3 million. The

structural plans also provide approximately 4 to 5 times the total damage reduction provided by the Non-structural plans. As a result, it can be reasonably expected that one of the CTO plans, likely the CTO w/weir, would be the NED plan.

Of the implementable alternatives assessed and considering the potential for varying cost or plan participation during implementation, the CTO with weir Alternative minimizes implementation risks, maximizes the difference between monetized benefits and costs, and satisfies the USACE Planning Principles and Guidelines (P&G) criteria of completeness, effectiveness, efficiency, and acceptability. Accordingly, the CTO with weir Alternative (Alt D) could be considered the NED plan.

**Environmental Compliance:** Important resources identified include but are not limited to migratory birds; threatened and endangered species (T&E) and protected species; wetlands; aquatic resources; essential fish habitat; water quality; air quality; Tribal resources; cultural resources; socioeconomics; EJ; agricultural lands; HTRW; recreation; aesthetics; and noise. Detailed descriptions of these resources and associated impact analyses are included respectively in Section 2 and Section 4 of this report.

Direct, indirect, and cumulative effects of the Final Array of Alternatives are addressed in the evaluation of the features and alternatives. The Project area includes mixed forested wetlands, emergent wetlands, mixed scrub-shrub wetlands, mixed upland forests, upland scrub-shrub, grassland, evergreen forest, and riverine habitat. Table E-1 displays the unavoidable habitat impacts and terrestrial mitigation requirements associated with the Pearl River Flood Risk Management (PR FRM) Project. A project specific mitigation plan would be developed during pre-construction engineering and design (PED) and included in a subsequent NEPA document(s). The goal of this mitigation plan will be to fully compensate, in kind, for the unavoidable impacts to significant fish and wildlife habitat resources that would occur due to implementation of the PR FRM project. The Interagency Mitigation Team (IMT), which includes the US Fish and Wildlife Service (the Service), US Army Corps of Engineers MVK, NFI and MDWFP, will work closely to complete a detailed mitigation plan. This mitigation plan will include all of the components set forth in laws, guidance, policy, and regulations. It should be noted that the Average Annual Habitat Units (AAHUs) of riverine impacts have not been adequately determined at this time. Based on current information, only estimated impacted acres are included. During PED, HEP models would be conducted using appropriate obligate riverine species to determine the habitat units of riverine habitat impacted and required for mitigation. The IMT agreed that the lacustrine habitat impacts would be self-mitigating with construction of alternative.

*Table E-1 - Unavoidable Fish and Wildlife Habitat Impacts requiring mitigation.*

| Habitat | Alt C Acres of Impact | CTO Acres of Impact | Alt C AAHUs | CTO AAHUs |
|---|---|---|---|---|
| Lacustrine/Open Water | 200 | 81 | 1,232 | 497 |
| BLH wet | 1,224 | 689 | 3,011 | 1,695 |

| | | | | |
|---|---|---|---|---|
| Swamp | 150 | 55 | 368 | 135 |
| Forested Uplands | 710 | 223 | 2,733 | 859 |
| Riverine* | 287 | 232 | TBD | TBD |

If the CTO without a weir was to be implemented, the riverine impacts of approximately 232 acres would no longer be incurred, and riverine mitigation would not be necessary. The terrestrial impacts would still be realized and so BLH, swamp, and forested uplands mitigation would still be required. Additionally, approximately 497 AAHUs of lacustrine habitat would require mitigation as there would be no weir to create a lake and therefore would not be self-mitigating.

*Fish and Wildlife Coordination Act.* The Service provided a Coordination Act Report (CAR) dated January 2020 in response to the EIS effort conducted by the NFI. They then provided a Draft CAR on August 23, 2023, in response to this effort. The Draft CAR is located in Appendix J. The Draft FWS recommendations and USACE responses are in Section 7.

*Endangered Species Act*. USACE is coordinating with The Service through development of a Biological Assessment which includes potential impacts to and features to avoid and minimize impacts to threatened and endangered species, bald eagles, and other protected species. Coordination with The Service is ongoing. No impacts to species are expected from Alternative A1. Based on currently available historical data, a review of current literature and studies, and with the employment of avoidance measures, the USACE has determined that Alternative C and CTO with a weir may affect but would not likely adversely affect the Northern Long Eared Bat (NLEB) and the Tricolored Bat (TCB); would likely adversely affect but not jeopardize the continued existence of the Gulf Sturgeon (GS), ringed map turtle, Alligator Snapping Turtle (AST), Pearl River Map Turtle (PRMT), Louisiana pigtoe, and monarch butterfly. Alternative CTO without a weir may affect but would not likely adversely affect the GS, NLEB, TCB, LA pigtoe, and monarch butterfly; would likely adversely affect the ringed map turtle, AST, and PRMT. Based upon the assessment completed, it was determined that Alternative C, CTO with a weir, and CTO without a weir would not result in an adverse modification to Gulf sturgeon critical habitat.

*Tribal Resources*. USACE is continuing to consult with Federally-Recognized Tribal Governments on a Government-to-Government basis as required in E.O. 13175 ("*Consultation and Coordination with Indian Tribal Governments*;" U.S. President 2000) and USACE Tribal Consultation Policy (December 05, 2023), as described in Section 2 of this report.

*Section 106 NHPA Consultation.* USACE is continuing to follow its Section 106 NHPA procedures described in Section 2 of this report to develop a project-specific PA in furtherance of USACE's Section 106 NHPA responsibilities for this Undertaking. The PA would then govern USACE's subsequent NHPA compliance efforts.

*Clean Water Act (CWA) Section 401, 402 and Section 404.* A Section 401 water quality certification would be obtained prior to construction of the proposed action. A Section 402 National Pollutant Discharge Elimination System (NPDES) permit will be obtained prior to construction. A Section 404(b)(1) report will be prepared and provided for public review and comment during PED.

*Environmental Site Assessment*. There is a high probability of encountering HTRW during construction with implementation of Alternative C or if implemented as part of the CTO Alternative. Prior to construction, an ASTM E 1527-13 Phase I & II ESA would be completed due the findings that were discovered during the NFI's reconnaissance of the study area. Please reference the HTRW section within the Environmental Consequence section of this document for additional information regarding any HTRW concerns.

*Environmental Justice*. The Flood Risk Management systems, Alternative C, A1, and CTO all benefit areas of EJ concern by reducing flood risk to those living in vulnerable communities. The vast majority of the study area is comprised of disadvantaged communities and would benefit from either alternative but to different degrees. The EJ assessment in Sections 4.2.2.11 - 4.2.2.14 discusses possible benefits and adverse impacts of each alternative.

**Public and Agency Coordination:** A Notice of Intent (NOI) was published in the Federal Register on May 18, 2023 (88 Fed. Reg. 31738) notifying the public of the USACE's intent to prepare a DEIS for the Pearl River Flood Risk Management Project, Pear River Watershed, Rankin and Hinds Counties, Mississippi and to conduct public outreach for a study to evaluate potential flood risk management features that can be implemented under Section 3104 WRDA of 2007.

Public outreach meetings were held in Slidell, LA and Jackson, MS, both virtually and in person, on May 23 and 24, 2023, respectively. The deadline for submitting comments to be considered in the DEIS planning process was June 30, 2023. There were 3,314 emails received containing approximately different 225 comments. A large number of the comment letters received were considered "form letters" representing the same comments; therefore, these were counted as a single comment made by multiple individuals. The majority of the comments received aligned with five primary themes. These themes consisted of: (1) environmental impacts including downstream effects, (2) ecosystem Impacts (wildlife, threatened & endangered species), (3) flood risk, (4) water supply, (5) and alternative formulation. The input received was considered during the assessment of the alternatives. See Section 9 and Appendix A: *Scoping Report*.

Cooperating and participating agencies include the United States Fish & Wildlife Service (The Service) Jackson, MS and Lafayette, LA offices; Federal Emergency Management Agency Region IV (FEMA); United States Environmental Protection Agency (EPA) Region 4; and Mississippi Department of Environmental Quality (MDEQ). Agencies invited to participate as participating agencies include: Mississippi Department of Wildlife, Fisheries and Parks (MDWFP), Mississippi Department of Mineral Resources (MDMR), Mississippi Natural Resources Conservation Service (MNRCS), Louisiana Department of Wildlife and

Fisheries (LDWF), Louisiana Department of Environmental Quality (LDEQ), Louisiana Department of Natural Resources (LDNR), Louisiana Coastal Protection and Restoration Authority (CPRA), and Mississippi Department of Archives & History (MDAH; SHPO). Federally-Recognized Tribes were invited to become Cooperating or Participating agencies for this Action; however, to-date, no Tribal governments have elected to participate in either role.

Participants in the Section 106 National Historic Preservation Act (NHPA) consultation process include RHDD, MDAH, the Advisory Council on Historic Preservation (ACHP), and the following Federally-Recognized Tribes that have expressed aboriginal interest in Mississippi and the Study Area: Alabama-Coushatta Tribe of Texas (ACTT), Chickasaw Nation (CN), the Choctaw Nation of Oklahoma (CNO), the Chitimacha Tribe of Louisiana (CTL), the Jena Band of Choctaw Indians (JBCI), the Mississippi Band of Choctaw Indians (MBCI; also holds reservation lands in close proximity to the Study Area), the Muscogee (Creek) Nation (MCN), Quapaw Nation (QN), and the Tunica-Biloxi Tribe of Mississippi (TBTL). The RHDD, MDAH, ACHP, QN, MBCI, and CNO are participating as consulting parties and are invited as signatory parties to the Section 106 Programmatic Agreement (PA).

**Incomplete or Unavailable Information:** Section 6.6 provides a discussion regarding incomplete or unavailable information to inform the alternative evaluation and assessment. constraints

**Timeline:** The 45-day review period begins 7 June 2024 and ends 22 July 2024. The Notice of Availability will be published in the Federal Register. Comments postmarked on or before the end of the 45-day public comment period will be considered.

Comments should be mailed or emailed to:

U.S. Army Corps of Engineers
Attention: Eric Williams, Chief, Environmental Branch, RPEDS
CEMVN–PDS, Room 136,
7400 Leake Avenue New Orleans, LA 70118
Email: PearlRiverFRM@usace.army.mil

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# SECTION 1
# Introduction

The USACE has prepared this DEIS at the direction of the ASA-CW. The purpose of the DEIS is to evaluate flood risk management alternatives that can be implemented under Section 3104 of WRDA 2007. Alternatives considered include the Non-Federal Interest (NFI) final array of alternatives as described in their Final Section 211 Report and new alternatives developed through USACE and NFI collaboration (referred to as USACE-developed alternatives). The NFI alternatives evaluated include, a "nonstructural plan" (Alternative A), a "levee plan" (Alternative B) and a "channel clearing/weir/levee plan" (Alternative C). USACE-developed alternatives include a modified nonstructural plan proposing elevating/floodproofing/acquisition of structures (Alternative A1) and a CTO (Combination Thereof) Alternative which may combine Alternative A1 and flood damage risk reduction structural features. The CTO Alternative is referenced in the Section 3104 authority. USACE alternatives were developed based on analytical findings, public input and comment, and agency coordination.

The NFI Final Section 211 Report, responding to the Section 3104 authority, was submitted to the ASA-CW as a recommendation for Federal participation in flood risk management within the Pearl River Basin in Mississippi. The NFI Draft Report underwent an Independent External Peer Review and USACE Agency Technical Review (ATR) in 2018. Reviews were not concluded until 2020.

The "scope" or extent of the evaluation for this DEIS includes the range of actions, alternatives, and impacts analyzed. Impacts identified and addressed are direct, indirect, or cumulative.

This DEIS was prepared in accordance with the NEPA and the CEQ NEPA implementing regulations (40 Federal CFR Parts 1500-1508), as reflected in the USACE Engineer Regulation (ER) 200-2-2 (33 CFR Part 230). This DEIS drew heavily on the NFI Section 211 Report to the extent that NFI project information was available, and the schedule and budget allowed. The NFI Section 211 Report is incorporated by reference and is available upon request.

## 1.1 STUDY AUTHORITY

This DEIS is authorized by Section 3104 of the Water Resources Development Act (WRDA) of 2007 (Public Law 110-114).

> *(a) In General- The project for flood damage reduction, Pearl River Basin, including Shoccoe, Mississippi, authorized by section 401(e)(3) of the Water Resources Development Act of 1986 (100 Stat. 4132), is modified to authorize the Secretary, subject to subsection ( c ), to construct the project generally in accordance*

*with the plan described in the 'Pearl River Watershed, Mississippi, Feasibility Study Main Report, Preliminary Draft', dated February 2007, at a total cost of $205,800,000, with an estimated Federal cost of $133,770,000 and an estimated non-Federal cost of $72,030,000.*

*(b) Comparison of Alternatives- Before initiating construction of the project, the Secretary shall compare the level of flood damage reduction provided by the plan that maximizes national economic development benefits of the project and the locally preferred plan, referred to as the Lefleur Lakes plan, to that portion of Jackson, Mississippi, and vicinity, located below the Ross Barnett Reservoir Dam.*

*( c) Implementation of Plan-*

*( 1) IN GENERAL- If the Secretary determines under subsection (b) that the locally preferred plan provides a level of flood damage reduction that is equal to or greater than the level of flood damage reduction provided by the national economic development plan and that the locally preferred plan is environmentally acceptable and technically feasible, the Secretary may construct the project identified as the national economic development plan, or the locally preferred plan, or some combination thereof.*

*(2) CONSTRUCTION BY NON-FEDERAL INTERESTS- The Non-Federal interest may carry out the project under section 211 of the Water Resources Development Act of 1996 (33 U.S.C. 701b-13).*

*(d) Project Financing- In evaluating and implementing the project under this section, the Secretary shall allow the non-Federal interests to participate in the financing of the project in accordance with section 903(c) of the Water Resources Development Act of 1986 (100 Stat. 4184) if the detailed project report evaluation indicates that applying such section is necessary to implement the project.*

*(e) Non-Federal Cost Share- If the locally preferred plan is selected for construction of the project, the Federal share of the cost of the project shall be limited to the share as provided by law for the elements of the national economic development plan.*

Congressional resolutions adopted 9 May 1979 authorized studies of the Pearl River Watershed, Mississippi. The authorizations read as follows:

*Resolved by the Committee on Public Works and Transportation of the House of Representatives, United States, That the Board of Engineers for Rivers and Harbors is hereby requested to review the reports of the Chief of Engineers on Pearl River Basin, Mississippi*

*and Louisiana, published as House Document Number 282, Ninety-Second Congress, Second Session, and other pertinent reports, with a particular view toward determining whether any further improvements for flood damage prevention and related purposes are advisable at this time. The alternatives are to be reviewed with local interests to insure a viable, locally supported project.*

*Resolved by the Committee on Public Works and Transportation of the House of Representatives, United States, That the Board of Engineers for Rivers and Harbors is hereby requested to review the report of the Chief of Engineers on the Pearl River and Tributaries, Mississippi, contained in House Document 441, 86th Congress, and other reports with a view to determining whether measures for prevention of flood damages and related purposes are advisable at this time, in Rankin County, Mississippi.*

*Resolved by the Committee on Environment and Public Works of the United States Senate, That the Board of Engineers for Rivers and Harbors, created under Section 3 of the River and Harbor Act, approved June 13, 1902, and is hereby requested to review the reports of the Chief of Engineers on Pearl River Basin, Mississippi and Louisiana submitted in House Document Numbered 92-282, 92d Congress, 2nd Session and other pertinent reports with a view to determining whether any further improvements for flood damage prevention and related purposes are warranted at this time.*

The NFI Section 211 Report was completed under authority of Section 211 of WRDA 1996, pursuant to terms prescribed in the Memorandum of Agreement (MOA) executed July 19, 2012, between the NFI and the USACE.

Table 1-1 lists the authorized flood risk management projects within the Pearl River watershed.

*Table1-1. Pearl River Flood Risk Management Project Authorizations*

| Year | Public Law | Relevance |
|---|---|---|
| 1960 | 86-645 | Authorized Jackson West and East Levees |
| 1983 | 98-63 | Authorized interim flood control plan |
| 1986 | 99-662 (401(e)(3)) | Authorized construction for the Pearl River Basin |
| 2007 | 110-114 (3104) | Modified authorization (WRDA 1986) to construct NED, LPP, or combination thereof subject to certain determinations and NFI may |

| | | |
|---|---|---|
| | | carry out project under Section 211 of WRDA 1996. |
| 2016 | 114-322 (1322(b)(4)(A)) | Instructs Secretary to expedite its review and decision, continues project's previous authorization and Section 211 status |
| 2018 | 115-270 (1176) | Instructs the Secretary to allow a project previously authorized under Section 211 to proceed after determining it is technically feasible (including assessment of potential downstream impacts), economically justified, and environmentally acceptable. * |

* The authority expired in October 2023; however, consistent with Section 1176 of WRDA 2018, the DEIS will assess potential downstream impacts to the Pearl River Basin.

## 1.2 STUDY AREA

The Pearl River Basin, as shown on Figures 1-1 and 1-2, is located in the southern-central portion of Mississippi and in a small section of southeastern Louisiana. It is bounded on the north by the Tombigbee River Basin, on the east by the Pascagoula River Basin, on the south by Lake Borgne and the Mississippi Sound, and on the west by the Mississippi River Basin and several coastal streams that drain the eastern portion of Louisiana. There are numerous lakes within the watershed but only a few of significant size. The largest of these is Ross Barnett Reservoir, which is located on the Pearl River about 12 miles northeast of downtown Jackson.

The Pearl River watershed lies within the East Gulf Coastal Plain, which is physiographically subdivided into the North Central Hills (or Plateau), Jackson Prairie, Southern Pine Hills, and Coastal Pine Meadows districts. Elevations in the watershed range from mean sea level (0.0 feet) to approximately 650 feet above sea level referenced to National Geodetic Vertical Datum (NGVD).

The Pearl River drains an area of 8,760 square miles consisting of all, or parts, of 23 counties in Mississippi and parts of three Louisiana parishes. The Pearl River Watershed is broken into the Upper Pearl, Middle Pearl-Strong, Middle Pearl-Silver, Bogue Chitto, and Lower Pearl. The focus for this study is on the Middle Pearl-Strong Basin (HUC-03180002). Both the Pearl River and all of the significant tributaries: Richland, Caney, Lynch, Town, Hanging Moss, Purple, White Oak, Eubanks, Prairie Branch, and Hog Creek have documented flooding, whether from flash flooding or riverine flooding, and repetitive flood loss damages are ongoing.

Municipalities within the study area include Jackson, Flowood, Pearl, and Richland. The study area includes parts of three counties--Madison, Hinds, and Rankin. Major tributaries of the Pearl River within the study area include Caney, Eubanks, Hanging Moss, Hog, Lynch, Prairie Branch, Purple, Richland and Town Creek, and additional communities with regards to impacts attributed to alternatives. The Study Area is primarily affected by headwater flooding caused by unusually heavy and intense rainfall over the upper Pearl River Watershed.

Per the NFI Section 211 report, the study area denotes the area that implementation of the project would potentially impact, which is different from the project area, the actual site the project would occupy.

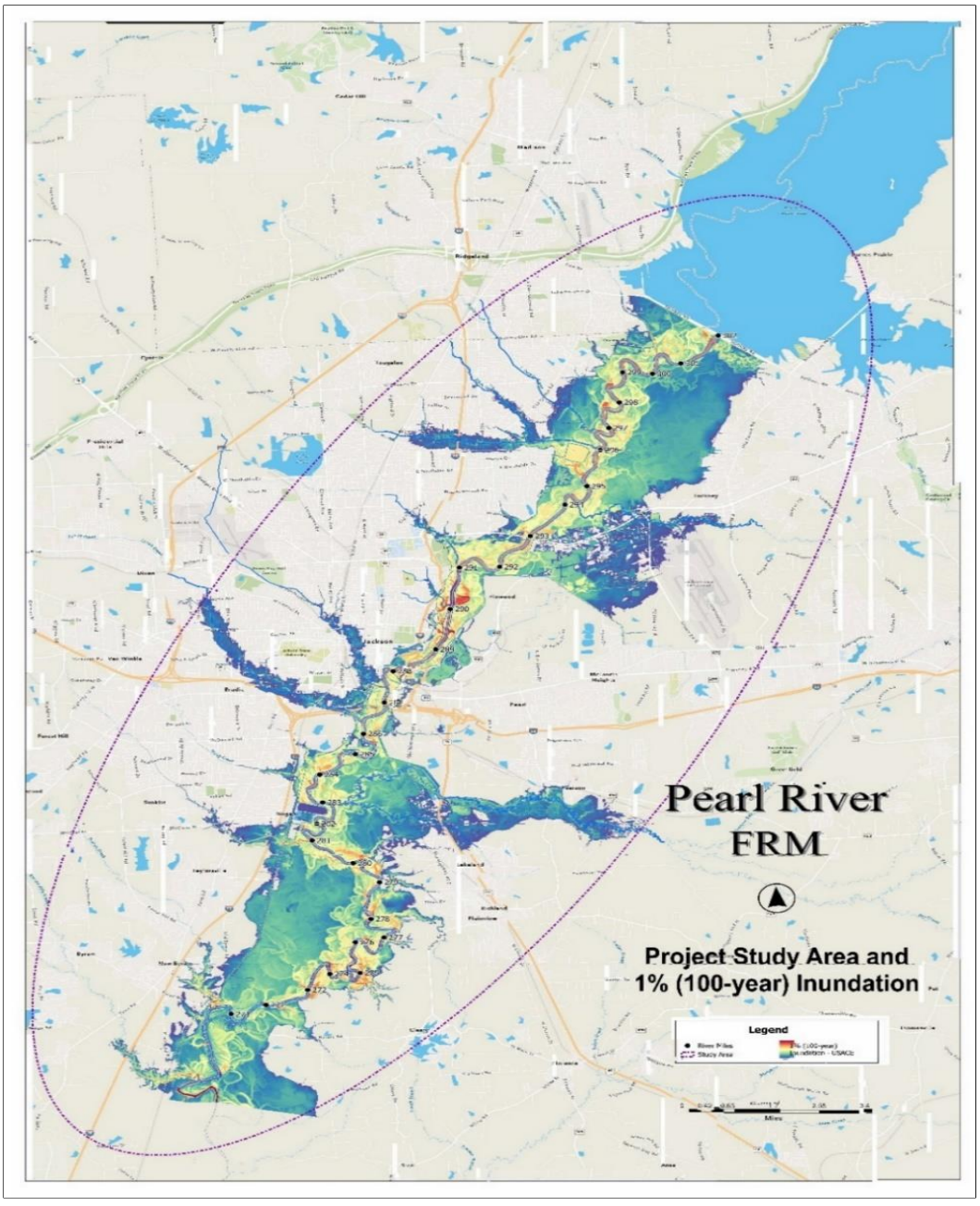



*Figure 1-1. Study Area*

### 1.2.1 **Project Area**

The project area comprises the Pearl River Basin between River Mile (RM) 270.0 just south of Byram, Mississippi, and RM 301.77 at the dam of Ross Barnett Reservoir. (The Ross Barnett Reservoir is a non-Federal project operated by the Pearl River Valley Water Supply District project primarily for water supply and recreation. However, the reservoir does participate and provide some flood reduction benefits.) The project area was examined to determine features and alternatives that would address the needs of the area and provide opportunities to reduce risk from flooding.

The project area relative to the Pearl River watershed Alternative C is shown in Figure 1-2 and Alternative CTO w/weir is shown in Figure 1-3. The project area would be limited to the area where specific improvements would be implemented.

## 1.3 SCOPE

The “scope,” or extent of evaluation, for purposes of this DEIS includes the range of actions, alternatives, and impacts analyzed. Those impacts are direct, indirect, or cumulative. The scope includes the geographic range, as well as elements of the human-built and natural environment studied to determine all reasonable alternatives for flood control in the study area. This evaluation includes a preliminary determination of the NED Plan as required by Section 3104 Pearl River Basin, Mississippi, of WRDA 2007.

The NFI Section 211 Report final array of alternatives included a “nonstructural plan” (Alternative A), a “levee plan” (Alternative B) and a “channel clearing/weir/levee plan” (Alternative C). In addition to these alternatives, USACE developed two new alternatives identified as a modified nonstructural plan proposing elevating/floodproofing/acquisition (Alternative A1) and a combination thereof plan to propose a combination of features to achieve flood damage risk reduction (Alternative CTO). Section 3 includes the discussion on the alternative formulation process. The terms weir vs dam and lake vs reservoir are used interchangeably throughout this report. The dam and reservoir as proposed meets the USACE Engineering Regulation (ER)1110-2-1156, Safety of Dams – Policy and Procedures. In addition, the term fish passage and fish ladder is used interchangeably. A fish ladder is also known as a fishway, fish pass, fish steps or fish cannon and is a structure on or around artificial and natural barriers to facility fish migration.

This DEIS was prepared with consideration of the USACE Planning Guidance Notebook (ER 1105-2-100), NEPA and CEQ guidance, and coordinating regulations, policies, and Executive Orders.

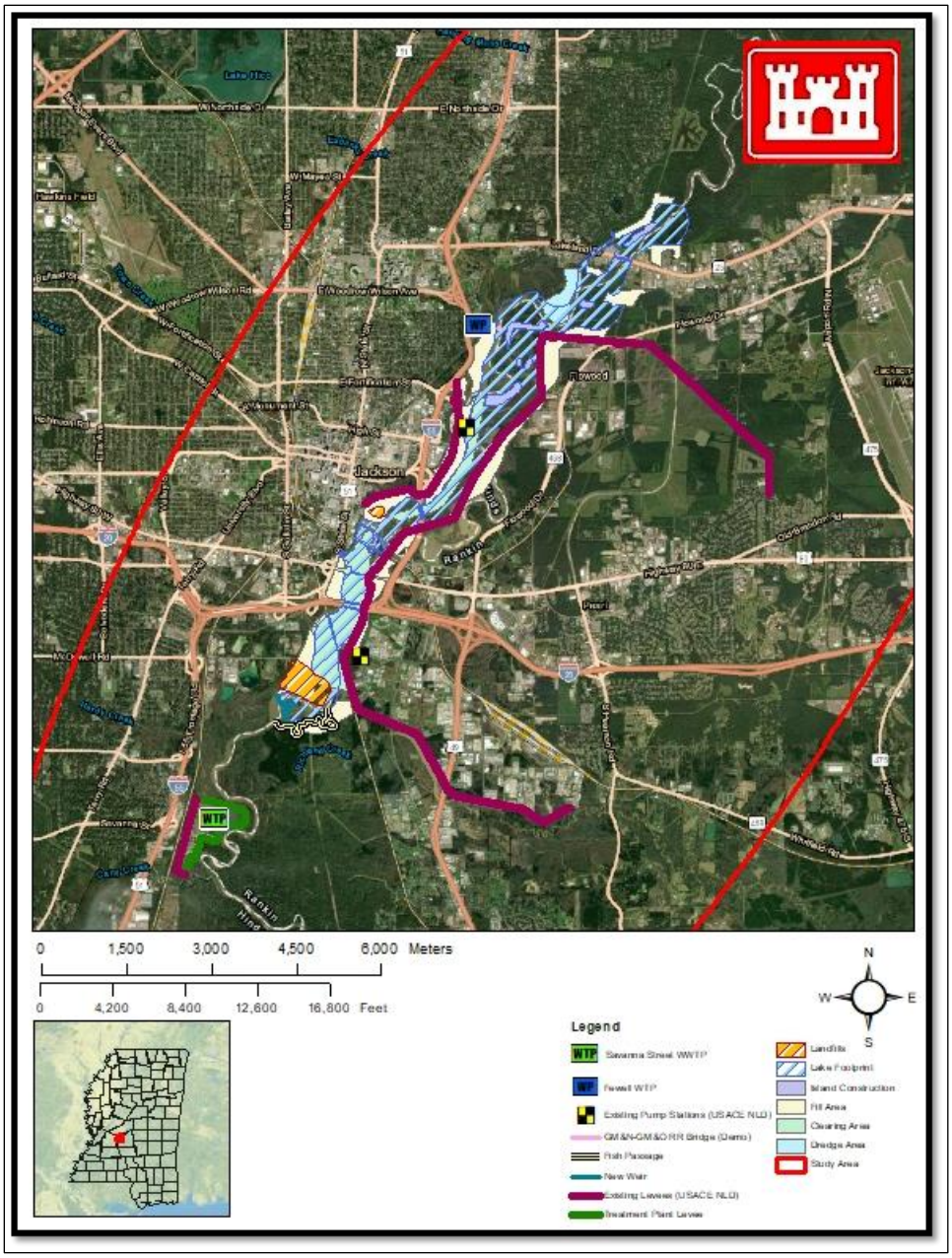



*Figure 1-2 LPP Project Area*

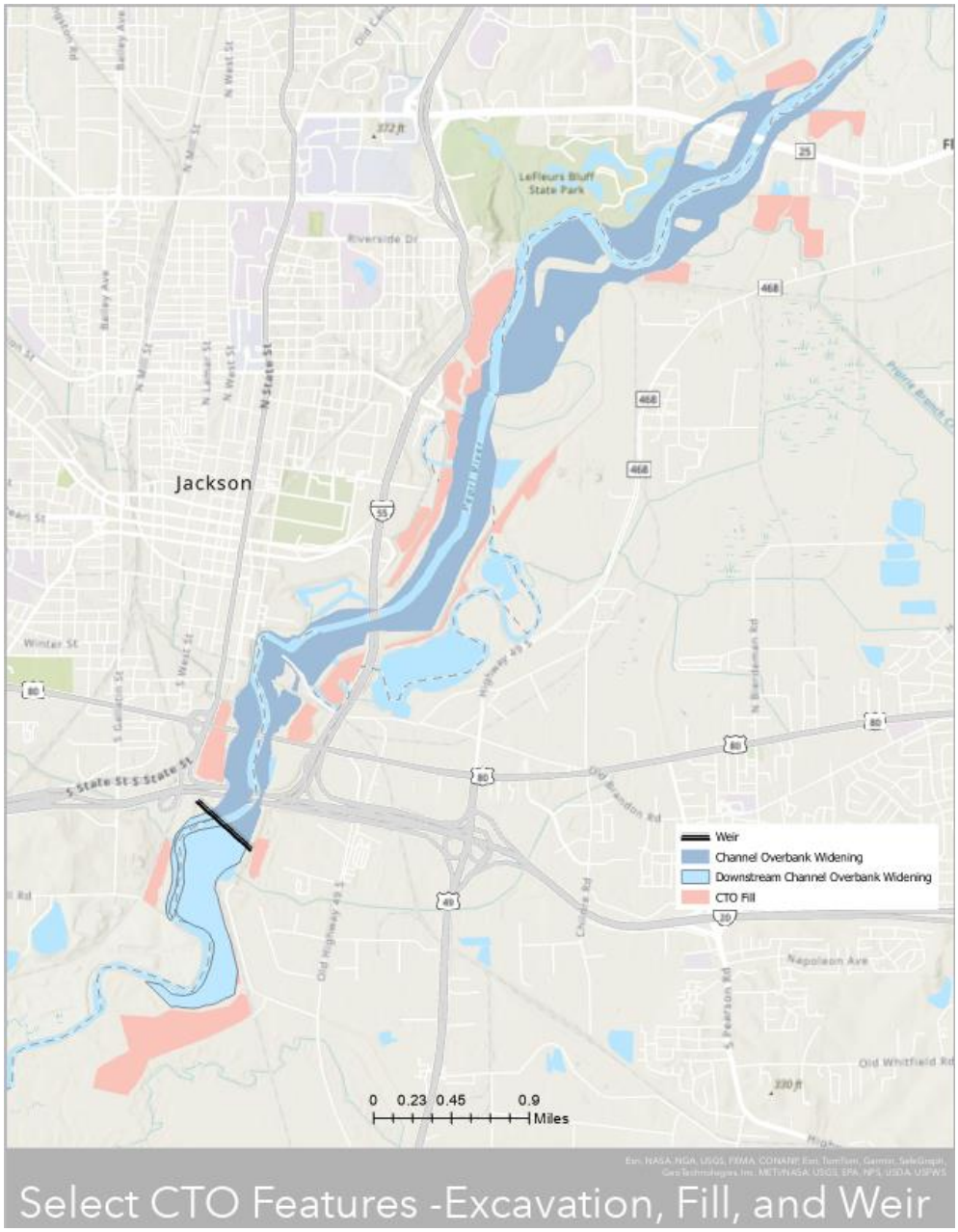



*Figure 1-3 CTO w/weir Project Area – NED Plan*

The analysis was conducted by a multi-disciplinary team comprised of professionals with expertise to identify the water resource problems, review and assess the NFI identified alternatives to determine if they meet USACE planning policies and guidelines, and identify additional alternatives to address the problems and need to reduce flooding in Rankin & Hinds Counties, MS. The NFI, cooperating and participating agencies are an integral part of the process. Throughout the process, the team coordinated with, and integrated input from,

the NFI and the USACE vertical team, which includes MVD, or the Major Subordinate Command (MSC), USACE Headquarters (HQUSACE) and the ASA-CW office.

## 1.4 PURPOSE AND NEED

The NFI Section 211 Report dated July 2022, was completed under Section 211 of WRDA 1996, in response to comments received from the 2018 IEPR Report and the 2020 USACE ATR Report. A summary of each of those reviews are provided in the below subsections. Per the NFI Section 211 report, the purpose is to provide a recommendation for Federal participation in the Pearl River, Mississippi, flood risk management along the Pearl River in

Hinds and Rankin Counties, Mississippi. Critical flood risk reduction needs were identified based on historic problems experienced within the study area. Over the past thirty years, multiple studies have been conducted on the Pearl River watershed ranging from reconnaissance level studies to feasibility level studies.

The most recent USACE report, the *Pearl River Watershed, Mississippi, Feasibility Study Main Report, Preliminary Draft*, dated February 2007 (2007 Preliminary Feasibility Study) included updated levee information from the 1996 study and an analysis of the Lefleur Lakes flood control plan. The Lefleur Lakes plan was the designated LPP in the 2007 report. As the LPP, the NFI would pay the additional project costs above the Federal share of the costs of the NED Plan.

### 1.4.1 Purpose

The purpose of the DEIS is to evaluate flood risk management alternatives that could be implemented under Section 3104 of WRDA 2007.

In conjunction with the EIS, a Commander's Report will be provided to the ASA-CW to support a decision by the Secretary of the Army regarding which alternative, if any, to implement. The Commander's Report will provide an overview of the study and compare levels of flood damage risk reduction of alternatives and assess the environmental acceptability, technical feasibility, and economic justification of the alternatives.

### 1.4.2 Need

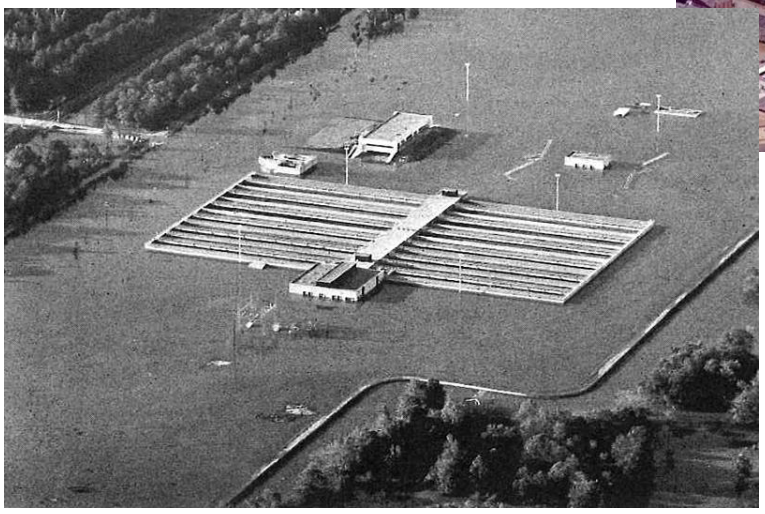
For more than 100 years, headwater flooding of the Pearl River (greater than 10 feet deep in some areas) caused disruption to businesses and industry throughout the Jackson, MS, metropolitan area. This area of flood risk currently includes 5,000 commercial and residential structures and affects a population of over 500,000.

Numerous flood events have affected the Area, most notably the Easter Flood of 1979, the May Flood of 1983 and the February flood of 2020. The 1979 event flooded transportation routes, homes, and businesses, causing damages that, at that time, totaled approximately $223 million. If the same event occurred in the present day, damages would surpass $1.2 billion. More recently, the Pearl River crested at 36.67 feet in Jackson on February 17, 2020, the third highest crest ever recorded. The communities sustaining the most devastation from

this flood event were Duttoville and Canton Club, two areas of EJ concern in Jackson (Figure 1-3 to 1-5) referenced in this report and Appendix E: *Environmental Justice*.

*Figure 1-3. Residential Flooding in Northeast Jackson*

*Figure 1-4. Flooding of Downtown Jackson, MS*



In the Rankin and Hinds portions of the Jackson metropolitan statistical area (MSA), there are more than 13,000 businesses employing over 180,000 people. As the capital of Mississippi, Jackson's downtown central business district, a flood-prone area, is home to many State and Federal offices. Flooding affects major transportation routes, including two

interstate highways, U.S. and four State highways, local streets, and major rail carriers. The average daily traffic count of commercial and vehicular traffic for the impacted highways and interstates ranges from 35,000 to 115,000 per Mississippi Department of Transportation

**Problems in the Study Area**

1. *Severe rainfall in the Upper Pearl River Watershed causes a high risk of downstream flooding in the Study Area, threatening approximately 44,000 people and 5,000 structures.*
2. *High risk of flooding threatens critical infrastructure, including an existing wastewater treatment facility.*
3. *Major transportation routes and evacuation routes become impassible and damaged during flood events in the Study Area.*
4. *Environmental justice communities are at the greatest risk to sustain damages from flooding.*

(MDOT) Traffic Count https://mdot.ms.gov/portal/traffic_volume. Flooding has caused significant infrastructure damage, including damage to the 46 million gallons per day Savanna Street WWTP, which serves the region, per the NFI Section 211 July 2022 Report.

Appendix P, Flood Risk and OSE Community Impacts, provides additional information on Community Impacts from repeated flooding.

## 1.5 EXISTING PROJECT AND PRIOR REPORTS

### 1.5.1 Existing Projects

Federal involvement in the Pearl River watershed in Mississippi, with respect to flood control features, dates to at least the early 1900s, while existing water projects date back to the early 1960s. Table 1-2 identifies prior USACE studies and reports concerning flood risk management (FRM) in the Pearl River watershed.

There are four Federally authorized FRM constructed projects in the study area:

1. The existing Federalized levees in the study area include the Jackson (Fairgrounds) and East Jackson levees that were initially completed in 1968 by the USACE as a result of the USACE FRM Survey Report of the Pearl River and Tributaries, Mississippi (1959). In 1984, an extension on the north end of the Fairgrounds levee was constructed to eliminate flanking of the levee. The locations of the levees are shown on Figure 1-6. These protective works consist of two earthen levees, four gated outlets, and six pumping stations. Some 5.34 miles of river channel work was involved in constructing the plan. The Fairgrounds levee protects approximately 800 acres in the Fairgrounds area of Jackson on the west side of the river. The longer, East Jackson levee protects 5,870 acres, including the town of Pearl and portions of Flowood and Richland. Currently, USACE has

certified the existing levees for the 1 percent annual chance exceedance flooding event.

2. In 1983, channel modification was conducted at the Highway 25 bridge, which consisted of removing material from the west bank of the Pearl River approximately 600 feet upstream and downstream of the bridge to increase the conveyance of the stream at that location. The Pearl River Basin Development District (PRBDD) completed this work in 1983. The location of this work is shown on Figure 1-6.

3. In 1984, the PRBDD, acting as local sponsor, completed the floodway clearing plan that was a result of the 1981 USACE Reconnaissance Pearl River Basin Interim Report on Flood Control recommendations. The clearing occurred from about 0.5 miles below the old Jackson sanitary landfill to the Woodrow Wilson Bridge, a total of 3.3 river miles( Floodway Clearing Project). The project consisted of 237 acres of complete clearing, 20 acres of selective clearing, 89 acres of partial clearing, and the placement of 39,000 tons of riprap for protection around bridges. To offset unavoidable impacts to fish and wildlife associated with the clearing plan, approximately 320 acres of bottomland hardwood were acquired as mitigation.

4. In 1991, the U.S. Department of Agriculture Natural Resources Conservation Service flood control project for the Richland Creek Watershed was completed under Public Law 83-566. The project included land treatment features, three floodwater-retarding structures, and 17.6 miles of channel work. The plan provides a reduction in headwater flooding along Richland Creek and tributaries and along two relatively small streams in the common floodplain with the Pearl River.

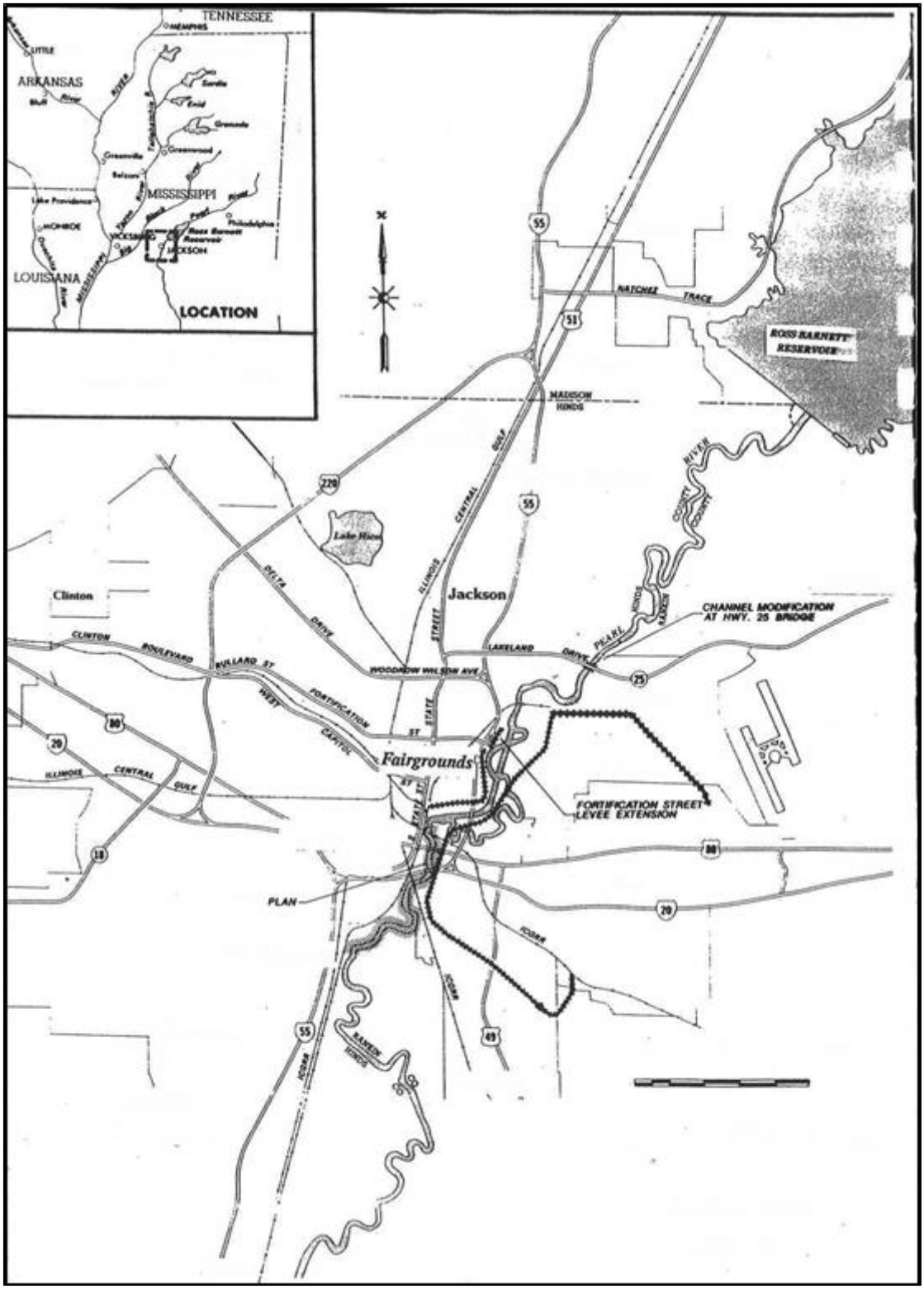



*Figure 1-6. Existing USACE FRM Projects in Study Area*

### 1.5.2 Ongoing Projects

Various local government entities are conducting work within the Pearl River Tributaries. In addition, the City of Jackson has committed funding for channel cleanout work, and coordination is ongoing to determine the scope of those efforts. Table 1-1 provides a listing of on-going projects by others and the status.

*Table 1-1 Ongoing Projects by Others*

| Project Name | Type of Project | Lead Agency | Stage of Project | Funding Source | Status of Completion |
|---|---|---|---|---|---|
| **HINDS COUNTY** | | | | | |
| Hanging Moss Creek | FRM; Streambank Stabilization | MS Soil & Water Conservation Commission | Planning; EA | NRCS Watershed and Flood Prevention Program (WFPO) | Planning Dec 2024 Design Dec 2025 Construction Dec 2028 |
| Lynch Creek – Pearl River | FRM; Streambank Stabilization | MS Soil & Water Conservation Commission | Planning; EA | NRCS Watershed and Flood Prevention Program (WFPO) | Planning Dec 2024 Design Dec 2025 Construction Dec 028 |
| Lake Ridgelea – Big Creek | FRM | MS Soil & Water Conservation Commission | Planning; EA | NRCS Watershed and Flood Prevention Program (WFPO) | Planning Dec 2024 Design Dec 2025 Construction Dec 2028 |
| White Oak Creek | Streambank Stabilization | Hinds County Board of Supervisors | Construction | MS State Legislature | Construction 2025 |
| Eubanks Creek | FRM; Streambank Stabilization | City of Jackson | Design | MS State Legislature | Design 2023 |
| Belhaven Creek | FRM; Streambank Stabilization | City of Jackson | Completed | City of Jackson | Completed 2022 |
| **RANKIN COUNTY** | | | | | |
| Rankin County Watershed Based Stormwater Mgmt Program (R1-29) | FRM; Streambank Stabilization & WQ restoration | Rankin County | Construction | ARPA, State and Local Fiscal Recovery Funds Program (SLFRF) | Construction 2026 |
| Richland Creek Watershed Improvements | FRM; Streambank Stabilization & WQ restoration | Rankin County | Design | USACE; NRCS | Planning completed. Planning Jan 2025 Construction Dec 2026 |
| Mill Creek & Pelahatchie Watershed Improvements | FRM; Streambank Stabilization & WQ restoration | Rankin County | Planning | USACE; NRCS; NRCS | Planning Jan 2024 Design Dec 2025 Construction Dec 2027 |
| Richland Creek - Sec 219 Environmental Infrastructure Watershed Improvements | FRM; Streambank Stabilization & WQ restoration | USACE | Planning | USACE; Rankin County | Planning April 2024 Design July 2025 Construction July 2026 |
| **MADISON COUNTY** | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Brashear Creek | FRM; Streambank Stabilization & WQ restoration | City of Ridgeland | Planning | Section 219 WRDA | TBD |
| Purple Creek Flood Mitigation & Restoration | FRM | City of Ridgeland | Planning | FEMA Pre-Disaster Mitigation | Planning Jan 2024<br>Design Dec 2025<br>Construction Dec 2026 |
| Purple Creek Basin Drainage Improvements & Stormwater Park | FRM; Streambank Stabilization & WQ restoration | City of Ridgeland | Design | ARPA, SLFRF Program | Design Sep 2024<br>Construction Dec 2026 |
| Brashear Creek and Hanging Moss Creek - Sec 219 Environmental Infrastructure Watershed Improvements | FRM; Streambank Stabilization & WQ restoration | USACE | Planning | USACE; Madison County | Planning March 2024<br>Design June 2025<br>Construction July 2026 |

A description of on-going projects by others is provided below. The number in front of the project name is the project ID number.

**Rankin County Projects**

**R1 Hydrologic Restoration of Stormwater Infrastructure near Reservoir East Subdivision:** Repair dam structure north of Holly Bush Road. Dredge three detention ponds south of Reservoir East Subdivision to original capacity levels. Clear obstructions, vegetation, and sediment from the unnamed tributary (UT) of Clarke Creek from Holly Bush Road southward to the outfall at Clarke Creek. Restore and/or increase hydraulic section along the reach, as well as stabilize bank sections as necessary.

**R2 Flood Mitigation UT Clark Creek near Hollybush Road:** Build detention upstream of the roadway to mitigate flooding and consider increasing hydraulic capacity of the drainage structure to aid with floodplain connectivity.

**R3 Indian Creek Bank Stabilization at Gunter-Shenandoah:** Runoff from storm events has resulted in Indian Creek overtopping Gunter Road. Streambank erosion is occurring due to the hydraulic constrictions of the site. Project would allow increased hydraulic capacity and include bank stabilization measures.

**R4 Stormwater Detention Restoration and Hydrologic Restoration near Live Oaks Subdivision:** Restore original capacity for detention ponds and increase hydraulic capacity of drainage ditches and channels in the area.

**R5 UT Richland Creek Bank Stabilization near Tara Road:** Create larger hydraulic capacity along the reach by clearing, potentially widening, and then stabilizing the portion of ditch that does not encroach on wetlands. Build detention facility along this section as well. The portion of channel that falls within federal wetlands should only be cleared of obstructions.

**R6 UT Neely Creek Ditch Flood Impacts at Hwy 80:** Remove, repair, and replace hydraulically inadequate structures along the reach.

**R7 Hydrologic Restoration near Mellomeade:** Increase hydraulic capacity of ditches, channels and drainage structures in the area to accommodate runoff evacuation.

**R8 Mill Creek Bank Stabilization:** Stabilization of banks along the reach providing adequate hydraulic section.

**R9 Vernon Jones:** Increase hydraulic opening under Vernon Jones, widen downstream section of ditch and stabilize banks.

**R10 UT Pelahatchie Creek Flood Mitigation – Pinebrook:** This project would address frequent localized flooding and erosion by increasing hydraulic capacity downstream of the site.

**R11 Oak Grove Ditch Bank Stabilization and Hydrologic Restoration:** Clear sediment, obstructions and vegetation from channel and restore hydraulic capacity. Stabilize banks as necessary.

**R12 UT Holcomb Branch in Deer Valley:** Runoff from storm events causes ponding on adjacent road; Project would allow increased hydraulic capacity and include bank stabilization measures.

**R13 Barnett Bend Stormwater Detention Restoration:** Clear sediment, obstructions and vegetation from channel and restore hydraulic capacity. Stabilize banks as necessary.

**R14 UT Mountain Creek Erosion Mitigation at Foster Road:** Roadway realignment needed to accommodate the hydraulic need of the channel at the location.

**R15 UT Steen Creek Bank Stabilization near White Road:** This project seeks to stabilize banks along the reach and insure adequate hydraulic capacity of the channel and any incidental structures along the reach.

**R16 UT Hog Creek Detention near Amanda Drive:** Clear debris, obstruction, and small caliper vegetation along the reach. Stabilize banks as needed. Build detention along the reach south of Henderson Road and west of Amanda Drive.

**R17 Steen Creek Relief - Aat White Road:** Replacement of bridge because of substandard load carrying capacity/substantial bridge roadway geometry deficiency. Stabilization of banks, as necessary, would aid in decreasing erosion, increasing water movement and provide re-establishment of floodplain connectivity. Activities would not cause degradation upstream or downstream of the proposed location.

**R18 Steen Creek Relief - B at White Road:** Replacement of bridge because of substandard load carrying capacity/substantial bridge roadway geometry deficiency. Stabilization of banks, as necessary, would aid in decreasing erosion, increasing water

movement and provide re-establishment of floodplain connectivity. Activities would not cause degradation upstream or downstream of the proposed location.

**R19 Holcomb Branch at Hickory Ridge:** The project requires replacement of bridge to restore hydraulic capacity and includes improvements to the hydrologic connectivity within the channel by clearing sediment, obstructions, and vegetation from channel which would also aid in re-establishing appropriate hydraulic capacity for movement of surface water runoff. Minor bank stabilization improvements would occur upstream and downstream of the bridge to alleviate erosional and sediment issues along the bridge.

**R20 UT Steen Creek at Erlich Road:** Replacement of bridge because of substandard load carrying capacity/substantial bridge roadway geometry deficiency. The project would consist of improving hydrologic connectivity within the channel by clearing sediment, obstructions, and vegetation from channel, which would also aid in re-establishing appropriate hydraulic capacity for movement of surface water runoff. Minor bank stabilization improvements would occur upstream and downstream of the bridge to alleviate erosional and sediment issues along the bridge.

**R21 UT Steen Creek at White Road:** Replacement of bridge because of substandard load carrying capacity/substantial bridge roadway geometry deficiency. The project would consist of improving hydrologic connectivity within the channel by clearing sediment, obstructions, and vegetation from channel, which would also aid in re-establishing appropriate hydraulic capacity for movement of surface water runoff. Minor bank stabilization improvements would occur upstream and downstream of the bridge to alleviate erosional and sediment issues along the bridge.

**R22 Butler Creek at Williams Road:** Replacement of bridge because of substandard load carrying capacity/substantial bridge roadway geometry deficiency. The project will consist of improving hydrologic connectivity within the channel by clearing sediment, obstructions, and vegetation from channel, which would also aid in re-establishing appropriate hydraulic capacity for movement of surface water runoff. Minor bank stabilization improvements would occur upstream and downstream of the bridge to alleviate erosional and sediment issues along the bridge.

**R23 Dry Creek at Thomasville Road:** Replacement of bridge because of substandard load carrying capacity/substantial bridge roadway geometry deficiency. The project would consist of improving hydrologic connectivity within the channel by clearing sediment, obstructions, and vegetation from channel, which would also aid in re-establishing appropriate hydraulic capacity for movement of surface water runoff. Minor bank stabilization improvements would occur upstream and downstream of the bridge to alleviate erosional and sediment issues along the bridge.

**R24 Squirrel Branch at Lowe Circle;** Replacement of bridge because of substandard load carrying capacity/substantial bridge roadway geometry deficiency. The project would consist of improving hydrologic connectivity within the channel by clearing sediment, obstructions, and vegetation from channel, which would also aid in re-establishing appropriate hydraulic

capacity for movement of surface water runoff. Minor bank stabilization improvements would occur upstream and downstream of the bridge to alleviate erosional and sediment issues along the bridge.

**R25 Hog Creek at Henderson Road:** Replacement of bridge because of substandard load carrying capacity/substantial bridge roadway geometry deficiency. The project would consist of improving hydrologic connectivity within the channel by clearing sediment, obstructions, and vegetation from channel, which would also aid in re-establishing appropriate hydraulic capacity for movement of surface water runoff. Minor bank stabilization improvements would occur upstream and downstream of the bridge to alleviate erosional and sediment issues along the bridge.

**R26 Purvis Creek at Diamond D Lake Road:** Replacement of bridge because of substandard load carrying capacity/substantial bridge roadway geometry deficiency. The project would consist of improving hydrologic connectivity within the channel by clearing sediment, obstructions, and vegetation from channel, which would also aid in re-establishing appropriate hydraulic capacity for movement of surface water runoff. Minor bank stabilization improvements would occur upstream and downstream of the bridge to alleviate erosional and sediment issues along the bridge.

**R27 Plummer Slough at Oakdale Road:** Replacement of bridge because of substandard load carrying capacity/substantial bridge roadway geometry deficiency. The project would consist of improving hydrologic connectivity within the channel by clearing sediment, obstructions, and vegetation from channel, which would also aid in re-establishing appropriate hydraulic capacity for movement of surface water runoff. Minor bank stabilization improvements would occur upstream and downstream of the bridge to alleviate erosional and sediment issues along the bridge.

**R28 Clear Creek Relief at Haynes Chapel Road A**: Stabilization of banks, as necessary, would aid in decreasing erosion, increasing water movement and provide re-establishment of floodplain connectivity. Activities would not cause any degradation upstream and downstream of the proposed location.

**R29 Clear Creek Relief at Haynes Chapel Road B:** Replacement of bridge because of substandard load carrying capacity/substantial bridge roadway geometry deficiency. The project would consist of improving hydrologic connectivity within the channel by clearing sediment, obstructions, and vegetation from channel, which would also aid in re-establishing appropriate hydraulic capacity for movement of surface water runoff. Minor bank stabilization improvements would occur upstream and downstream of the bridge to alleviate erosional and sediment issues along the bridge.

### 1.5.3 Prior Reports

Ongoing projects within the area that affect the hydrology and water resources, but are not FRM projects include the following:

O.B. Curtis Water Treatment Plant (WTP): On 29 August 2022, the city of Jackson declared a water system emergency and the State requested an emergency measures declaration. It was identified that the chemical composition of the water in Ross Barnett Reservoir, which supplies raw water to the O.B. Curtis WTP, changed such that it compromised the WTP's ability to function properly and cut off the water supply to more than 150,000 residents and businesses in Jackson. The next day, a federal state of emergency was declared, authorizing the Department of Homeland Security and FEMA to coordinate disaster relief efforts. The USACE received a FEMA mission assignment (MA) on 1 September 2022 to provide technical assistance to the city of Jackson. As part of the overall MA, USACE was tasked with developing a resiliency playbook to assist with long-term improvements to the Jackson water treatment facilities, O.B. Curtis and J.H. Fewell.

The Ross Barnett Reservoir: A Non-Federal project operated by the Pearl River Valley Water Supply District project, was constructed between 1960 and 1962 for the purposes of water supply and recreation. The dam and reservoir location are shown in Figure 1-6. Although the reservoir can and has provided some flood reduction during extreme events, it was not designed as a traditional flood control reservoir. In regard to existing conditions for this study, the Ross Barnett Reservoir is assumed to operate as a run-of-river dam, and the reservoir provides minimal reduction to peak discharges. This criterion is consistent with previous USACE flood control evaluations in the Pearl River watershed.

J. H. Fewell WTP: In 1915, to ensure a reliable source of water supply, the city of Jackson constructed a weir at the J. H. Fewell WTP identified on figure 1-2. Jackson's current water supply still draws on this weir, along with the O.B. Curtis WTP, which withdraws water from the Ross Barnett Reservoir.

Water and Wastewater Infrastructure Improvements: USACE, specifically MVK, entered into a project partnership agreement with the City of Jackson, Mississippi on 6 February 2023, as part of the Environmental Infrastructure Program, as authorized by Section 219 of WRDA 1992, as amended. The Section 219 authority provides for $125 million to the City of Jackson to provide water and wastewater infrastructure improvements to the area of Jackson. The first increment of work would be the purchase of a pump with a 100 million gallons per day capacity at the Savanna Street WWTP. The City of Jackson would determine future projects subject to Federal law and regulation.

Safe Drinking Water Act (SWDA): The EPA is authorized under Section 1442(b) of the SWDA to provide technical assistance and grants to states and public water systems to assist in responding to and alleviating emergency situations. For the city of Jackson, $600M has been appropriated, in which $150 million comes from SDWA Section 1442(b) of the SWDA and another $450 million from the Clean Water State Revolving Fund (SRF) grant funds. The SRF grant funds come from the EPA but are administered through the state.

*Table1-2. Prior USACE Studies and Reports*

| Project/Report | Relevant Dates | Status |
|---|---|---|
| USACE Survey study of the Pearl River and Tributaries, Mississippi | May 2, 1949: Authorization.<br>June 2, 1959: Report Released. | Completed construction of existing levees in 1968. |
| Comprehensive Survey of the Pearl River Basin, MS, and LA Report | 1970: Report Released Included Structural and NS features. | Projects were never implemented. |
| Edinburg Dam Phase I Design Memorandum | January 1972: Memo Released identifying only Edinburg Dam economically justified.<br>1974: WRDA authorized Edinburg Dam Project.<br>1980: No longer economically justified. | USACE re-evaluated in 2007. |
| Survey Report on the Feasibility of Flood Protection Measures for Town Creek at Jackson | August 1970: Report Released. | No economically feasible flood control plan for Town Creek was identified. |
| Three Continuing Authorities Program (CAP) Section 205 of the Flood Control Act of 1948 Study Report for Richland Creek in Rankin County | 1979: Report Released. | No economically feasible flood control plan for Richland Creek was identified. |
| Reconnaissance Pearl River Basin Interim Report on Flood Control | November 1981: Report Released with Four Point Plan developed.<br>1983: The Four Point Plan was authorized for construction in the FY 83 Supplemental Appropriations Bill. | May 1984: DM No. 1, "Flood Control for Jackson, Mississippi," contained documentation for the Four Point Plan with only the clearing plan moving forward at HWY 25. |
| CAP Section 205 of the Flood Control Act of 1948 Study Report for Sellers Creek in Ranking County | October 1984: Report Released. | No economically feasible flood control plan for Sellers Creek was identified. |
| The Pearl River Basin Interim Report on Flood Control | July 1985: Report Released with recommendation of Shoccoe Dam.<br>1986 WRDA: Authorized construction of Shoccoe Dam. | Shockoe Dam later identified as not implementable. |
| Carthage/Leake County, MS Interim Flood Control Report | February 1987: Report Released with recommendation of Shoccoe Dam, levees, and channel improvements. | Not implemented as later found to be not economically feasible. |
| CAP Section 205 Flood Control Study Report for Neely Creek | May 1988: Report Released with recommendation of 2 miles of channel enlargement on a tributary. | Later identified as not implementable due to NFI found the plan unacceptable. |
| Reconnaissance FRM and Bank Stabilization Study Report for Caney Creek, MS | November 1990: Report Released. | No economically justifiable plan was identified, and further studies were not recommended. |
| Draft Feasibility Flood Risk Reduction Report for Jackson Metropolitan Area, MS | 1996: DRAFT Report released with recommendation of the comprehensive levee plan. | July 1998: was found to be not implementable due to lack of local support. |
| DRAFT Flood Control, Pearl River Basin, Mississippi, Jackson Metropolitan Area, Mississippi, Feasibility and EIS | 2007: DRAFT Report released. No plan recommended but Comprehensive Levee Plan was economically justified and the Lefleur Lakes (LL) Plan was found not justified due to not meeting environmental policy objectives. | |
| ATR Summary Report for the Pearl River Watershed Integrated Feasibility Report and Environmental Impact Statement | June 2020: ATR of the draft and final report products from June 2017 to April 2020. ATR was closed with significant concerns that were identified during review of the final report documents. | |
| Letter Report for Water and Wastewater Infrastructure, Jackson, MS Savanna Street WWTP Improvements | December 2022: Mississippi Division approved the Letter Report for increment of work for the Savanna Street WWTP Improvements | |

# SECTION 2
# Affected Environment

## 2.1 Environmental Setting

The Pearl River watershed is located in the south-central portion of Mississippi and in a small part of southeastern Louisiana. It is bounded on the north by the Tombigbee River Basin, on the east by the Pascagoula River Basin, on the south by Lake Borgne and the Mississippi Sound, and on the west by the Mississippi River Basin and several coastal streams that drain the eastern portion of Louisiana. There are numerous lakes within the watershed but only a few of significant size. The largest of these is Ross Barnett Reservoir, which is located on the Pearl River about 12 miles northeast of downtown Jackson.

The Pearl River watershed lies within the East Gulf Coastal Plain, which is physiographically subdivided into the North Central Hills (or Plateau), Jackson Prairie, Southern Pine Hills, and Coastal Pine Meadows districts. These districts all cross the watershed generally in a northwesterly direction. Elevations in the watershed range from mean sea level (0.0 feet) to approximately 650 feet above sea level referenced to National Geodetic Vertical Datum (NGVD).

Sand and clay, in various proportions, constitute nearly all the immense prism of sedimentary deposits extending from the northern part of the watershed to the coast. Also, a few thin units of marl, limestone, and glauconitic and lignite material are present in several places. Individual sand beds are irregular in thickness, and few can be traced more than 5 miles.

The Pearl River is formed in Neshoba County, Mississippi, by the confluence of Nana Waya and Tallahaga Creeks and flows southwesterly for 130 miles to the vicinity of Jackson (including the 43-mile-long Ross Barnett Reservoir), then southeasterly for 233 miles to the head of its outlet channels, the Pearl and West Pearl Rivers. The width of the channel varies from about 100 to 300 feet between Jackson and Edinburg.

The United States Geological Survey published the frequencies of the 1979 and 1983 flood events at the Jackson gage, which were annual 0.5 percent and 2.86 percent chance exceedance events, respectively. Floods equivalent to the annual 20 percent to 10 percent chance exceedance events occurred on 21 March 1980; 14-17 April 1981; 6 December 1982; 8-9 April 1983; 5 May 1991; and 11 April 2014. Most recently, the Pearl River reached the third highest recorded crest in Jackson on 17 February 2020, peaking at 36.67 feet.

### 2.1.1 Climate, Weather Patterns, and Climate Change

Engineering and Construction Bulletin (ECB) 2018-14 provides guidance in the form of preparedness and resilience for climate change within planned, new, and existing USACE Projects. According to the guidance found in ECB 2018-14, paragraph 5.a., “Climate change information for hydrologic analyses includes direct changes to hydrology through changes in

temperature, precipitation, evaporation rates and other climate variables, as well as dependent basin responses to climate drivers, such as sedimentation loadings. The qualitative analysis required by this ECB should focus on those aspects of climate and hydrology relevant to the project's problems, opportunities, and alternatives, and include consideration of both past (observed) changes as well as projected, future (modeled) changes." Climate Change data from models are projected using Representative Concentration Pathway (RCP) 4.5 and RCP 8.5. RCP 4.5 represents a moderate/ medium approach that provides insight to future climate change conditions. RCP 8.5 represents a high approach that provides insight to future climate change conditions if there were minimal restrictions/ regulations. (Emissions Scenarios: RCPs | Climate Data Canada).

Currently, the climate within the study area is mild, humid, and primarily subtropical with abundant precipitation. The summers are long and hot, and the winters are short and mild. The average high temperature is 76°F and the average low temperature is 54°F. Average monthly temperatures range from 35°F in January to 92°F in July. According to the USACE Climate Hydrology Assessment Tool (CHAT), the annual 1-day temperature projection shows a steady increase of temperature within the study area.

The average annual rainfall in the study area is approximately 54.14 inches, and annual rainfall averages 4.51 inches per month. Normal monthly rainfall varies from 3.03 inches in September to 6.07 inches in December (https://usclimatedata.com). According to USACE CHAT analyzing the data between 1950 to 2023, between 2023 to 2100, the annual-accumulated precipitation shows a steady decrease of annual precipitation while the Drought Indicator: Annual-Maximum of Number of Consecutive Dry Days shows a steady increase of drought like conditions within the study area. Precipitation for 1 day events show a steady increase. However, Annual Streamflow shows steady to reduced trends between 2023 to 2100.

The Time Series Toolbox (https://climate.sec.usace.army.mil/tst_app/) was also used to analyze multiple time periods of concern, including the entire period of record for the Pearl River at Jackson, Mississippi Gage, from the construction of the Ross Barnett Reservoir to Present, and from 1980 to present (time period since last extreme event).

For all time periods analyzed, no statistically significant trends were detected by the t-Test, Mann-Kendall Test, or the Spearman Rank-Order Test.

### 2.1.2 Physiographic and Geologic Standpoint

As indicated by the *Geologic Map of Mississippi*, the geology of this area consists of outcrops of the Yazoo Clay Formation of the Jackson Group. The Yazoo Clay, named from exposures in the bluffs along the Yazoo River, outcrops along a northwest to southeast trending belt that extends from the Alabama State line to the edge of the Yazoo watershed in Yazoo County, Mississippi.

From a geological standpoint, the Pearl River Watershed is not a contained unit because formations extend beyond topographic divides into the adjoining stream basins. Generally speaking, the formations at the surface tend to be sedimentary and range from Eocene to

Recent. These formations dip in a southwest orientation throughout the northern three-fourths of the river watershed except where they are interrupted by structural features such as the Jackson Dome and other smaller salt domes.

The Yazoo Clay consists of homogeneous clays throughout, with the exception of the upper 50-foot interval which contains several thin limestones and bentonitic clay beds. The uniformity of the Yazoo Clay across the State indicates the uniformity of the near shore marine conditions present during deposition of the clay in upper Eocene time (approximately 40 million years ago). Unweathered Yazoo Clay is blue gray, slightly silty, fairly calcareous, massively bedded clay. Fresh Yazoo Clay weathers quickly to a dark olive-gray and then to a buff to tan clay. These color changes are irrespective of bedding. Alteration during weathering is accompanied by alternate swelling when wet and shrinking when dry so that bedding is soon obliterated. When the Yazoo Clay becomes wet or saturated, the swelling clay particles compress and further decrease the effective permeability of the Yazoo Clay. The Yazoo Clay is generally considered to be an impermeable formation and a barrier to contiguous groundwater aquifers or ponded surface waters.

Sand and clay, in various proportions, constitute nearly all the immense prism of sedimentary deposits extending from the northern part of the watershed to the coast. Also, a few thin units of marl, limestone, and glauconitic and lignite material are present in several places. Individual sand beds are irregular in thickness, and few can be traced more than 5 miles. However, predominantly sandy zones, as differentiated from predominantly clayey zones, can be correlated over wide areas, some throughout much of the watershed. The formations dip southwestward at 20 to 80 feet per mile throughout the northern three-fourths of the watershed, except where they are interrupted by such structural features as the Jackson Dome and many smaller salt domes. The rate of dip becomes steeper in the southern part of the watershed, where pronounced down warping toward the Mississippi River structural trough has resulted in a dip of 100 feet per mile or more.

### 2.1.3 Topography and Physiography

The Pearl River Watershed lies within the East Gulf Coastal Plain which is physiographically subdivided into the North Central Hills (or Plateau), Jackson Prairie, Southern Pine Hills and Coastal Pine Meadows districts. These districts all cross the watershed generally in a northwesterly direction.

The proposed Project Area lies within the Jackson Prairie topographic region. The Jackson Prairie Belt is one of two physiographic regions in Mississippi containing prairies and is known as a “Blackland Prairie”. One of ten topographic regions in the State of Mississippi, the Jackson Prairie Belt extends across the central portion of the State from the edge of the Loess Bluff Region to the eastern border of the state. The Jackson Prairie Belt is characterized by gently rolling terrain with black, fertile soils. More specifically, the Project Area contains gently rolling terrain with elevations that range from approximately 280 feet NGVD to approximately 220 feet NGVD.

### 2.1.4 Pearl River Watershed and Land Cover

The Pearl River drains nearly 78,000 square miles in Mississippi and 900 in Louisiana, running from Edinburg, Mississippi to near the Rigolets at the Gulf of Mexico. Furthermore, the Pearl River Watershed is comprised of the Upper, Middle, and Lower Watersheds (Figure 2-1)

The lower Pearl River Watershed (LPRW) is the southern part of the Pearl River flowing out of the Ross Barnett Reservoir that eventually flows into the Gulf of Mexico. The watershed covers an area of approximately 12,500 square kilometers and contains areas of 19 counties in both Mississippi and Louisiana. Major tributaries of the LPRW are the Strong River, which contributes flow just below Rankin County, and the Bogue Chitto, which meets the Pearl River north of Pearl River, Louisiana. The land uses of the LPRW are mainly composed of forests, wetlands, pastures, and urban areas. Most of the soils are classified as hydrologic soil group D and C and are mostly coarse-loamy in texture. The watershed is known for experiencing periodic flooding, and some of these floods have caused significant damage to damage to infrastructure.

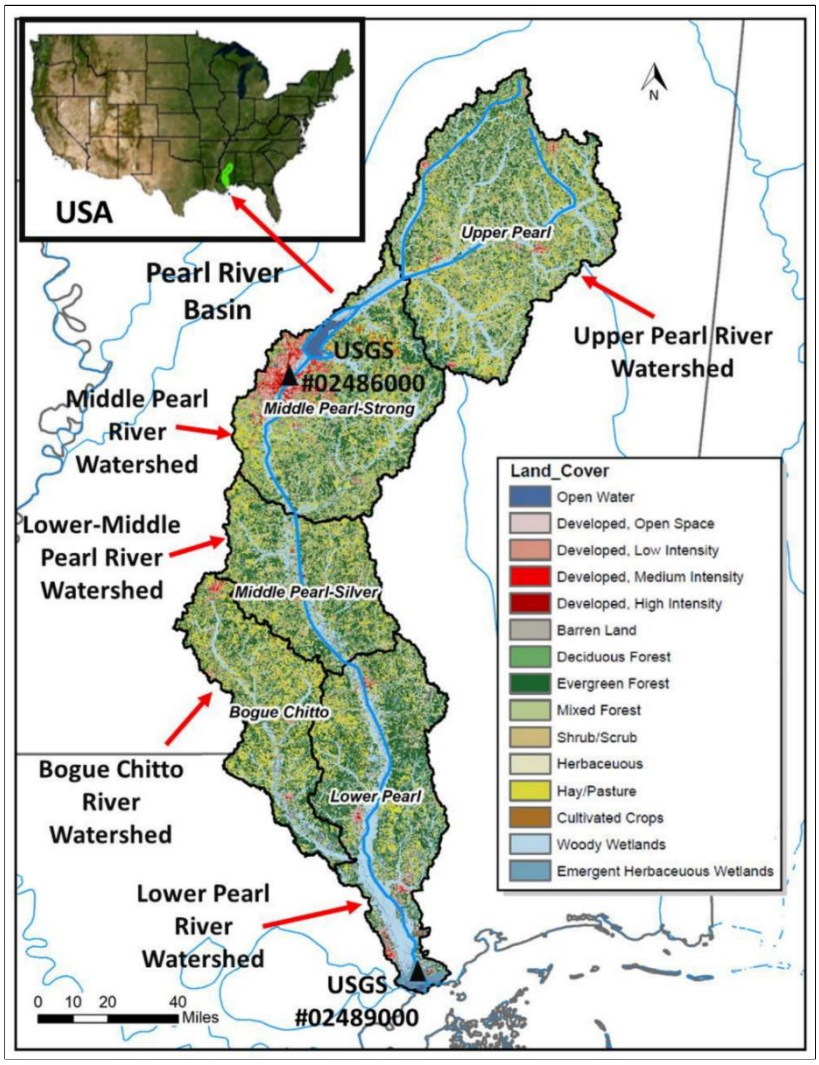



*Figure 2-1. Pearl River Watershed source Mississippi Dept of Environmental Quality*

### 2.1.5 Hydrologic Conditions

Previous Events: There have been numerous flood events that have affected the study area, most notably the Easter Flood of 1979, the May Flood of 1983, and the February 2020 flood event. The 1979 event flooded transportation routes, homes, and businesses, causing damages that, at that time, totaled approximately $223 million. If the same event occurred in the present day, damages would surpass $1.2 billion. More recently, the Pearl River crested at 36.67 feet in Jackson on February 17, 2020, the third highest crest ever recorded. The communities sustaining the most devastation from this flood event were located in minority and low-income areas of Jackson.

History of Region/River: The Pearl River drains nearly 78,000 square miles in Mississippi and 900 square miles in Louisiana, running from Edinburg, Mississippi to near the Rigolets at the Gulf of Mexico. Spanish Explorers discovered the river in 1519. In 1699, Jean-Baptiste Le Moyne, Sieur de Bienville named the stream La Riviere des Perles-- a translation of the Acolapissa Indian name. In 1732, Lt. Sieur Louis Joseph Guillaume de Regis du Roullet explored the Pearl River from Source to Mouth. He noted a raft of driftwood choking the lower river. (National Geographic 2023) Mississippi became a State in 1817 and in 1820. A new capital city was founded on the Pearl River, at LaFleur's Bluff, a small village founded by French-Canadian trader Louis Lefleur. (The City of Jackson Mississippi 2023)

The Choctaw was the first steamboat to make it to Jackson in 1835, and by 1840 there was regular traffic along the river, likely only traveling as far north as Jackson during higher river stages. (Sea Coast Echo 2022) By 1856, the Pearl, which had been cleared, became threatened environmentally. Planters and rivermen cut off river bends to increase the water's flow rate and to shorten distances along the river, but this loss of pool increased flooding. In addition, timber clearance on the banks increased silting and erosion. Nevertheless, the Pearl remained a key transportation highway until the late-nineteenth century. (Mississippi Encyclopedia 2018)

Earliest Recorded Flooding Events 1874-1902: The earliest recorded events are a series of floods occurring between 1874 and 1902. Peak stage/flow measurements are available from 1874, and stage data are available at the Jackson gage from 1901 to the present. The floods of April 25, 1874, December 5, 1880, and April 21, 1900, were added to the gage record from data provided by local residents and newspaper records. Periodic weather observations are also available from 1849-1871 and 1873-1876 prior to the gage development to help inform the historical flood record. The 1902 event was the historical flood of record with a recorded discharge of 85,000 cubic feet per second (cfs). (Grice 2006, USGS 2023).

J.H. Fewell WTP and Weir-1915: In 1915, to ensure a reliable source of water supply, the city of Jackson constructed a weir at the J. H. Fewell WTP (see Figure 1-2). Per Rankin-Hinds, this weir has been improved over time, the last of which was in the 1980s'. Jackson's current water supply still draws on this weir, along with the O.B. Curtis WTP, which withdraws water from the Ross Barnett Reservoir.

Ross Barnett-1965: The Ross Barnett Reservoir is a 33,000-acre impoundment just upstream of Jackson, Mississippi. The lake provides water supply for the city of Jackson and various recreational opportunities. Construction began in 1960, and the lake reached full pool by 1965. The Pearl River Valley Water Supply District maintains the reservoir between 296 to 297.5 feet. Although the reservoir does not have a flood reduction mission, in recent years the reservoir has been operating under large inflow events in conjunction with the Lower Mississippi River Forecast Center and MVK, to implement future informed releases within the lake limits to delay or decrease peak releases for events with a forecasted peak discharge above 35,000 cfs. The principal spillway consists of ten 40-foot (width) by 21-foot (height) gates with a discharge capacity of 180,000 cfs. The emergency spillway is a fuse

plug type with a discharge capacity of 70,000 cfs. (State of Mississippi 2023; FTN Associates 2011)

Bridges in the Area- 1960s: There are many road crossings throughout the project reach, many of which were constructed in the 1960's. Table 2-1 is a listing of each crossing from upstream to downstream.

*Table 2-1. Local Bridges and Construction Date (Road Crossings: Clarion Leger 2023)*

| Bridge Location | Date of Construction |
|---|---|
| Highway 25 (West) | 1965/2001 |
| Highway 25 (East) | 1965/2001 |
| Highway 25 Relief (West) | 1965/2001 |
| Highway 25 Relief (East) | 1965/2001 |
| Abandoned Railroad (GM&O) | 1927 (Historical Marker Database) |
| I-55 over Pearl (North) | 1967/1998 |
| I-55 over Pearl (South) | 1967/1997 |
| Woodrow Wilson (Old Brandon Road) | 1925 |
| KCS Railroad (Gulf, Mobile and Ohio RR) | 1838/1868 (Newspapers.com 2023) |
| US Highway 80 | 1938 |
| I20 (West) | 1965 |
| I20 (East) | 1965/1998 |
| Canadian National Railroad | Unknown |

Federal Levees and Channel Straightening-1960s (Figure 2-2): The Jackson Fairgrounds and East Jackson Levees were authorized in the Flood Control Act of 1960, with construction completed in 1968. This work included two earthen embankments, 5.34 miles of river channel work, four gated outlets, and two pumping plants. (Rankin Hinds 2021).


*Figure 2-2. Levees and Channel Straightening* *Source: (Rankin Hinds 2021)*

The Savanna Street Wastewater Treatment Plant-*circa* 1970 Source: (https://frs-public.epa.gov/ords/frs_public2/fii_query_dtl.disp_program_facility?p_registry_id=110000727394) (Figure 2-3), also known as the Jackson Publicly Owned Treatment Works was constructed between 1971-1973 on the western bank of the Pearl River south of the I-20 crossing. In 2012 the city of

Jackson entered a Consent Decree with the EPA, which included this structure. As of March 20, 2023, this facility was listed as significant/category 1 Noncompliance.


*Figure 2-3. Savanna Wastewater Treatment Plant*

([https://echo.epa.gov/detailed-facility-report?fid=110000727394#summary](https://echo.epa.gov/detailed-facility-report?fid=110000727394#summary)) (EPA 2023) Work by multiple entities is currently ongoing at this facility to move toward compliance. The wastewater treatment plant is surrounded by the 2.69 mile Jackson-East Jackson Flood Control Project Levee System.

April 1979 (Figure 2-4; 2-5; 2-6): The winter of 1978-1979 was exceptionally wet, December and January received at least 150 percent above normal rainfall, and February through April 9 also received well above average precipitation in 1979. On April 11, 1979, a squall line associated with a slow-moving cold front began to move over the area. Four to five inches of rainfall fell over the Jackson Metropolitan Area and induced flash flooding. The National Weather Service office in the Jackson area measured 4.5 inches of rainfall accumulation in just over an hour. (NWS 2023a, b)

The cold front continued to western Mississippi on April 12, 1979, and became stationary. Eight to ten inches of rain fell over the headwaters of the Pearl, Noxubee, and Tombigbee Rivers in one day. Total rainfall for the basin for the event is shown in the graphic below. (NWS 2023a, b).

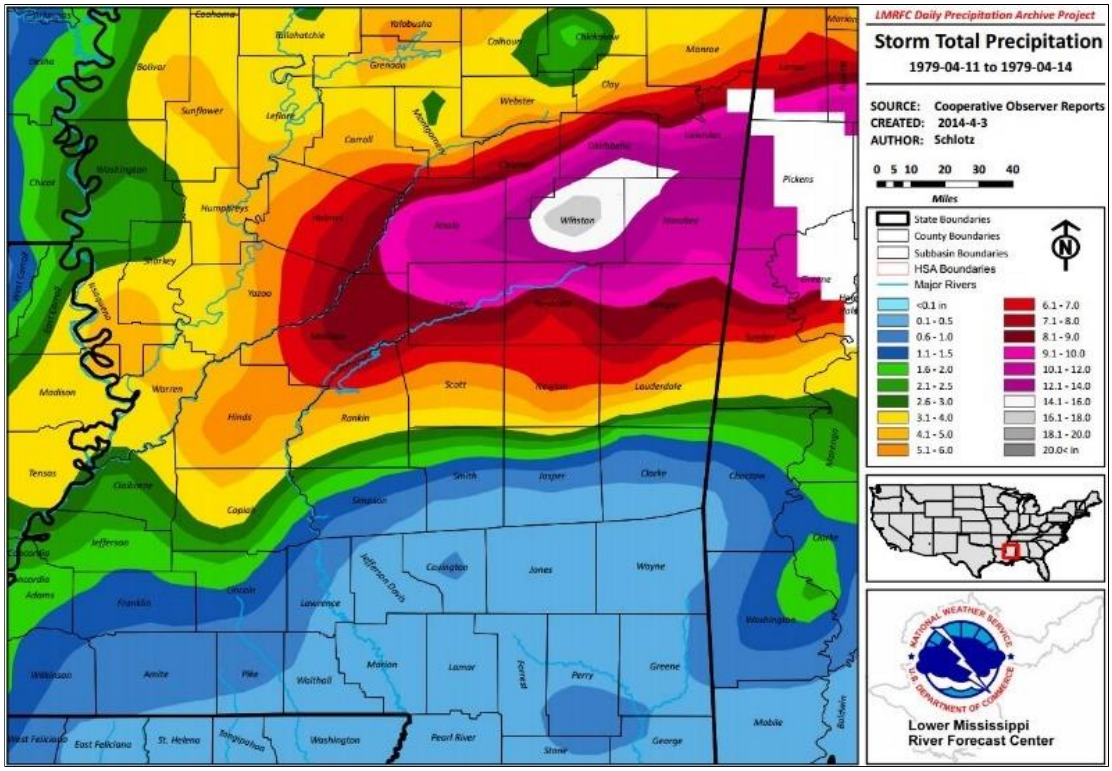



*Figure. 2-4. Total Rainfall 1979 Event* *(Source: (NWS 2023a))*

At 6 a.m. Friday morning, April 13, 1979, the river was at 33.5 feet and rising rapidly. The water due to river flooding began impacting some homes and businesses at about 34 feet. Later in the day, reservoir officials (after coordination with USACE and NWS) decided to try and lower the reservoir pool to provide storage for large inflows forecasted in the next few days. By April 14, 1979, the historic flood of record (1902-37.5 feet) was exceeded, and stage continued to rise rapidly. I-55 South was closed at approximately 5 p.m. on April 14, 1979, when water began to encroach in multiple places. (NWS 2023a, b).

On Easter Sunday, April 15, 1979, wide streams of water began to overtop the fairground levee. Workers attempted to plug the gaps but were unable to stop the floodwaters from flanking the levee at Fortification Street. By late Monday the Ross Barnett Dam, which now held a record pool, began showing signs of stress, and emergency workers reinforced weak spots. Peak flows into the Reservoir were estimated at 160,000 cfs. (NWS 2023a, b)

On the Rankin County side of the river, hundreds perhaps thousands of volunteers worked feverishly night and day to keep the levees intact. By the time they had finished, they had added about 3 feet to their levee. (NWS 2023a, b)

The river crested at 43.28 feet around 3 p.m. on Tuesday, April 17, 1979. Many homes in the northeast section of the city were under water for a week. Many businesses in the downtown area were flooded by backwater from a creek that runs through town. Other businesses were impacted when the river flanked around the levee. (NWS 2023a, b).

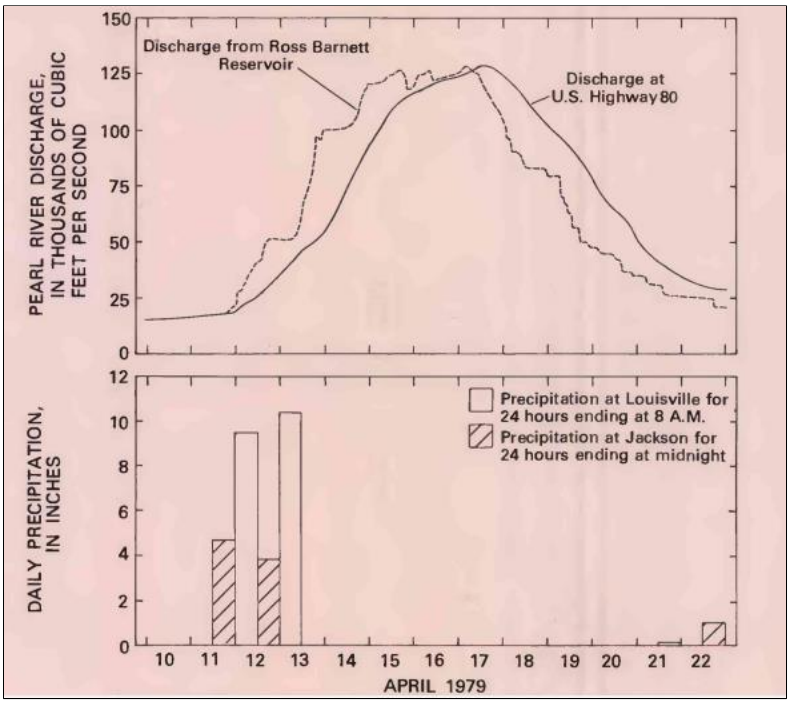



*Figure. 2-5. 1979 Routing-USGS Publication (Source: USGS 2023d)*

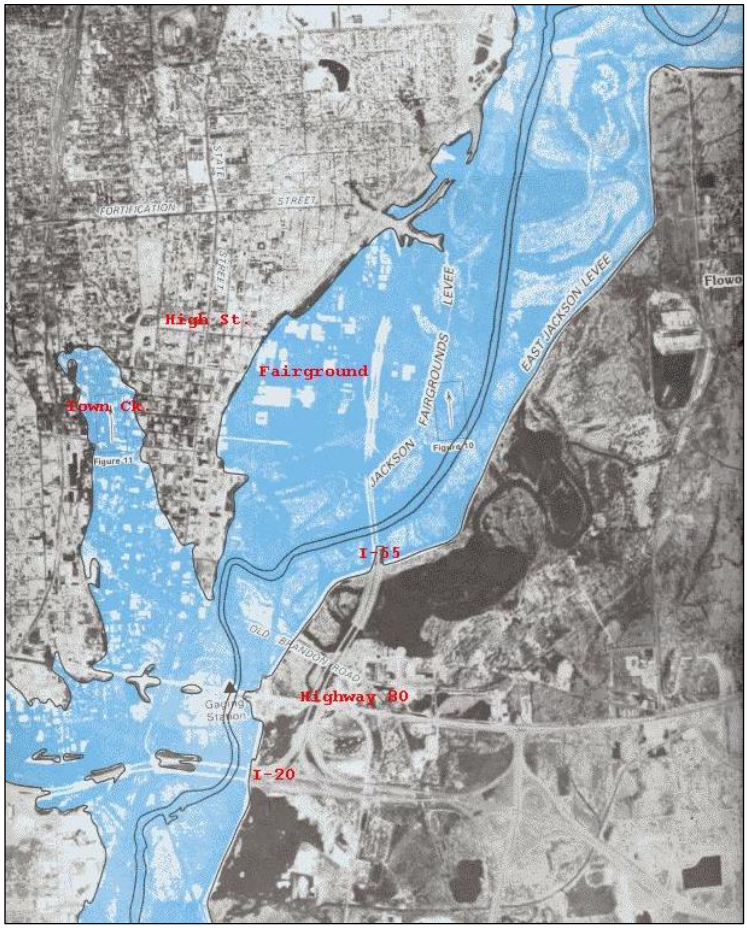



*Figure. 2-6. Inundation Extent 1979 Flood (Source: USGS 2023a)*

April 1983: In May 1983 another severe rainfall in the upper Pearl River Basin generated a peak inflow into the Ross Barnett Reservoir of 117,000 cfs. Downstream of the dam, the peak at the Jackson gage was 78,000 cfs. The resulting peak stage at the Jackson Gage was 39.6 feet, the second highest recorded peak stage. (Rankin Hinds 2021)

Levee Extension – 1984 (Figure 2-7): The Fortifications Street Levee Extension to the Jackson Fairgrounds levee was completed in 1984. This extension involved building up Fortification at the I-55 Northbound Access Ramp, adding a side fill levee on the river side of the ramp, and providing dikes across the Interstate 55 median and the ditch on the west side of the southbound lane of the interstate. (USACE 1985)

*Figure. 2-7. 1984 Levee Extension to Prevent Flanking*

Clearing-1983 to 1985 - In 1983, channel modification was conducted at the Highway 25 bridge, which consisted of removing material from the west bank of the Pearl River approximately 600 feet upstream and downstream of the bridge to increase the conveyance of the stream at that location. The Pearl River Basin Development District completed this work in 1983.

A 3.3-Mile-long overbank clearing, and channel enlargement work was also authorized in the Supplemental Appropriations Act of 1983 and completed in 1985. This project consisted of 237 acres of complete clearing, 20 acres of selective clearing, 89 acres of partial clearing, and the placement of riprap around some bridges. The Pearl River Basin Development District was also the sponsor of this activity.

Additional Pump Capacity - The Jackson East Levee Pumping Station consists of four 67,000 gallon per minute or 150 cubic feet per second (cfs) pumps. Three of these pumps are contained in the same building and were constructed in 1968. In 1993, the local sponsor constructed an additional pump adjacent to the existing pumping station. The pump platform was placed in the approach channel to the existing gravity structure. (USACE 2012a)

Three identical pumps are installed in the Fairgrounds Pumping Station. The station was constructed in 1966 as part of the Jackson Flood Control Project. The station capacity was increased in 1996 by the addition of a new 42 inches vertical shaft pump rated at 44.56 CFSat 15 feet. The station has a total pumping capacity of 89.34 CFS when pumping against a static head of 19.0 feet. (USACE 2012b)

Mowing/Spraying- 2013/2014 - The Pearl River Basin Development District areas of Operation and Maintenance (O&M) responsibility were transferred to the Rankin-Hinds Pearl River Flood and Drainage Control District when the PRBDD closed its doors in 2018. The district no longer had adequate funding due to decreased participation and lack of grants and Federal funding. (Thompson 2017)

The excess vegetation was removed from these locations and regular O&M was resumed in the 2013/2014 time period.

February 2020 - A very wet January and February, led to a saturated river system. Between February 10 and 13, a swath of 5 to 10 inches of rain fell over the Pearl, Big Black, and Tombigbee Rivers (Figure 2-8). (NWS 2023c).

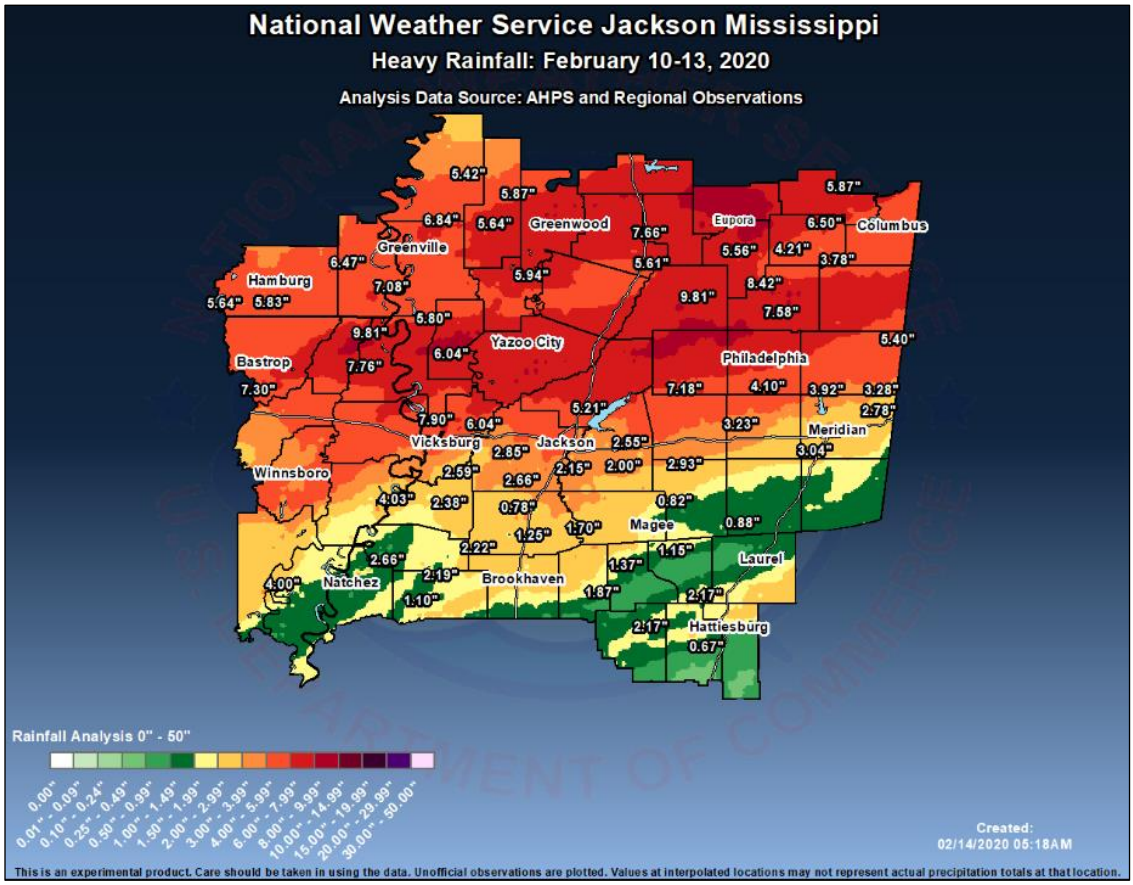



*Figure. 2-8. 2020 Rainfall Totals* *(Source: USGS 2023c)*

The river crested at 36.7 feet at the Jackson Gage on February 17, 2020, and was the third highest crest of the gage's period of record (Figure 2-9). Roughly 120 homes and businesses were damaged from the flood, and many more businesses and homes were temporarily inaccessible due to roadway overtopping. No levees were overtopped during this event. (NWS 2023c).

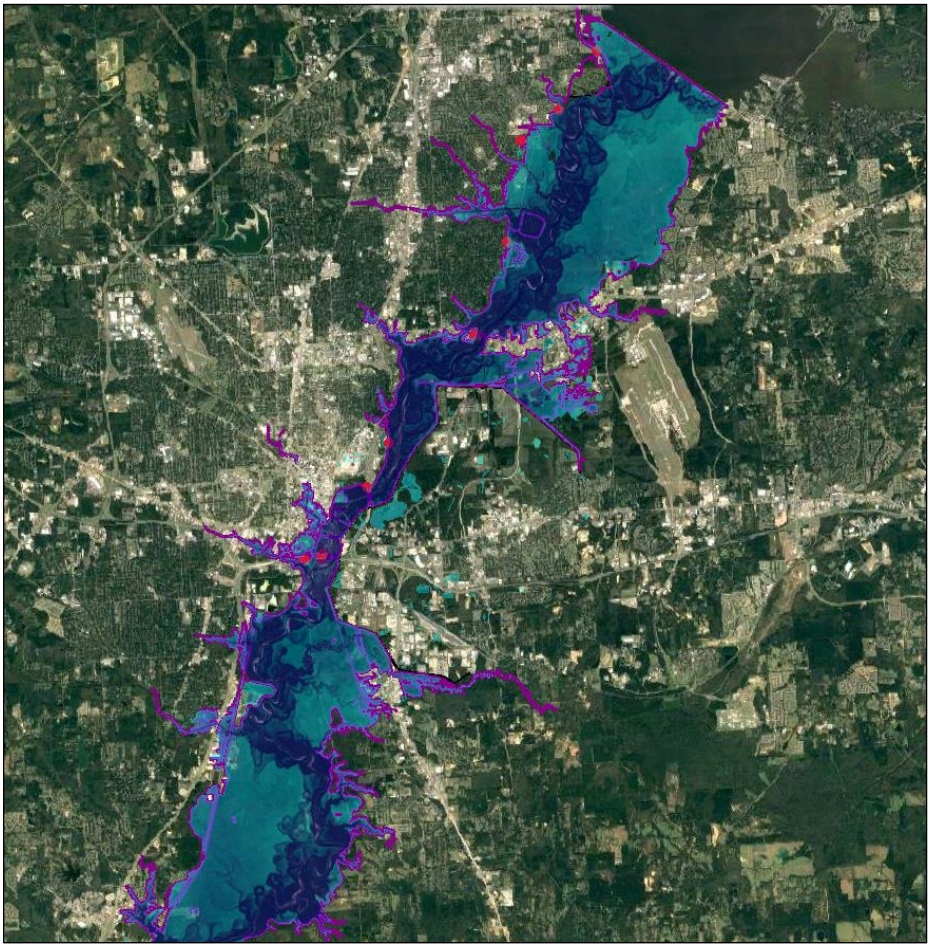


*Figure 2-9. 2020 Inundation Extent*

Loading differences: Another factor to consider in the existing condition is that the Pearl River appears to be passing more cubic feet per second (cfs) at similar water level stages than it did in the past (Figure 2-11 and Table 2-2). This was seen during the 2020 event when neighbors north of Lakeland Drive were experiencing flooding more than expected with a 38 feet river stage at the Jackson gauge while areas south of Lakeland Drive (Figure 2-10), particularly in downtown Jackson, were experiencing flood patterns more typical of previous events (NWS 2023c).

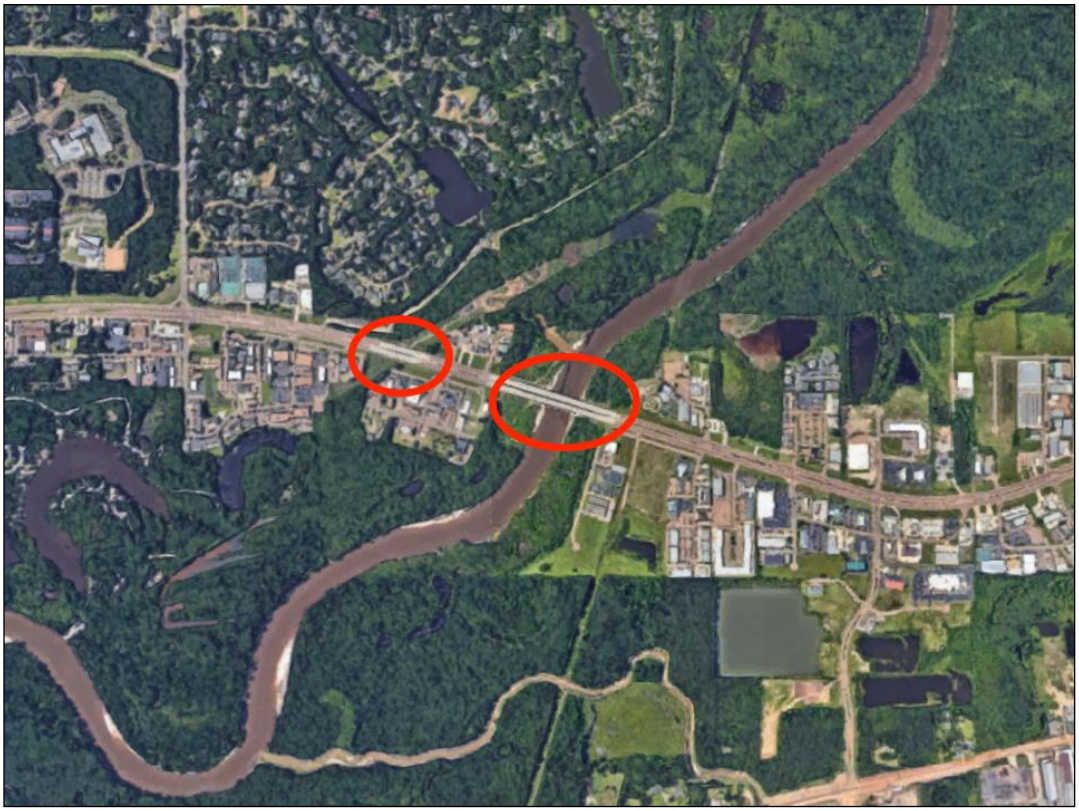


*Figure. 2-10. Lakeland Drive/HWY 25 Bridge and Overflow Bridge*

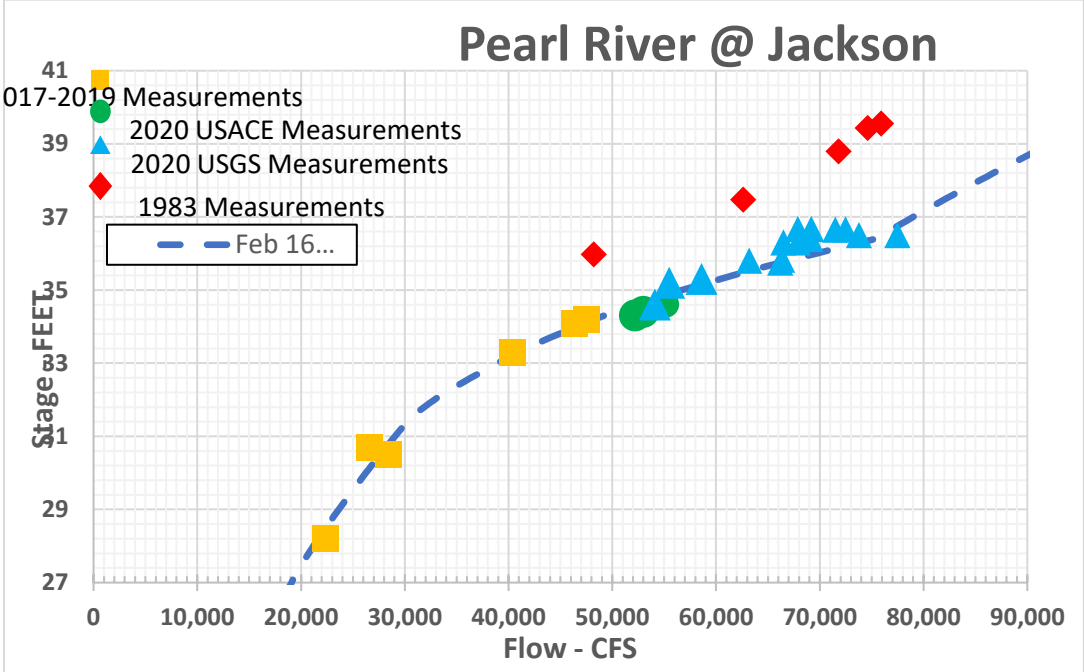



*Figure 2-11. Updated Rating Curve with Discharge Measurements*

*Table 2-2. 1983 and 2020 Stage and Flow Data*

| Flood Event Year | Ross Barnett Release (CFS) | Flow at Hwy 80 Gage (CFS) | Elevation at Hwy 80 Gage (Feet, NAVD 88) |
|---|---|---|---|
| 1983 | 85,000 (prev. 78,000) | 79,500 | 272.9 |
| 2020 | 78,361 | 77,300 | 270.0 |

### 2.1.6 Ross Barnett Release Discrepancy

Along with the channel efficiency adjustments, the Ross Barnett Reservoir releases were underestimated prior to 1999. It is noted in the 1999 Downstream Impact and Reservoir Regulation Flood Control and Development Plan for the Jackson Metropolitan Area (1999) that “part of the problem may be in the way the reservoir calculated discharge at its gate…Also study of the gate construction plans indicates that the cables which elevate the

gates, produce lift in excess of the amount calculated. Based on analysis, the reservoir is understating discharges during major floods (such as the 1979 flood) by about 10%." Table 2-3 indicate that at the maximum pool of 300 feet MSL (1979 was at elevation 299.9) flows could have been miscalculated by as much as 15,000 cfs.

This revises the original 1979 Ross Barnett Discharge from 124,500 CFS to 137,000 CFS, and the 1983 peak discharge from 78,000 to 85,000. The Ross Barnett Reservoir operators updated their reporting method in at some point between the 1983 flood event and the 1999 report described in the section and therefore all recent peaks are considered valid.

*Table:2-3. Rating Adjustments at the Ross Barnett Reservoir*

| **Water @ 300' MSL** | | | |
|---|---|---|---|
| **Gate Elevation** | **Calculated Flow Rate** | **Reported Flow Rate** | **Discrepancy** |
| 288 | 125,500 | 112,000 | 13,500 |
| 289 | 135,000 | 121,000 | 14,000 |
| 290 | 144,000 | 131,400 | 12,600 |
| 291 | 154,000 | 139,000 | 15,000 |
| 292 | 163,500 | 149,000 | 14,500 |

## 2.2 RELEVANT RESOURCES

This section contains a description of relevant resources that exist within the study area. The relevant resources described 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. Relevance based on institutional recognition means that the importance of an environmental resource is acknowledged in the laws, adopted plans, and other policy statements of public agencies, Federally-Recognized Tribes, and private groups. Relevance based on public recognition means that some segment of the general public recognizes the importance of an environmental resource. Relevance based on technical recognition means that the importance of an environmental resource is based on scientific or technical knowledge or judgment of critical resource characteristics. See Appendix K: *Environmental*, for a summary of the institutional, technical, and public importance of these resources.

### 2.2.1 Natural Environment

**Wetland Resources**

The Project Area is located within the Pearl River Basin, including parts of both Hinds and Rankin Counties as well as the Jackson Metropolitan Area. The Project Area consists mainly of undeveloped forested land historically influenced by urban development and previous flood control management. It encompasses the Pearl River channel and its tributaries as well as adjacent riparian, wetland, and interspersed upland habitats.

Wetland habitats identified within the area include forested wetlands, scrub-shrub wetlands, emergent wetlands, cypress/tupelo sloughs, open water, and wetland drains. The information below is summarized from more detailed habitat descriptions included in the 2020 US Fish and Wildlife Service Coordination Act Report and the 2014 Habitat Evaluation Procedures (HEP) Report, both included in Appendix D of the NFI DEIS, and the Wetlands Determination and Delineation Report included as Appendix D in the NFI DEIS.

The majority of wetland habitat in the Project Area consists of mixed hardwood and pine forest. This habitat type is directly associated with the Pearl River and tributaries or depressions where acorns and other mast settle after flood waters recede. These forested wetlands contribute to water control and purification, groundwater recharge, soil enrichment, and erosion control. Typical vegetation includes hardwoods such as sweetgum, various oaks, red maple, and tupelo gum as well bald cypress and loblolly pine in the over-story; maple, box elder, water oak, hornbeam, and green ash in the mid-story; and privet, switch cane, palmetto, and holly in the understory. These forested wetlands are important wildlife habitat.

Cypress/tupelo sloughs are also interspersed throughout the Project Area in locations associated with old river meanders that experience permanent to semi-permanent inundation. These sloughs function to facilitate hydrology within the area, to support stabilization of the hydro-period, and to provide nutrient cycling and wildlife habitat.

Scrub-shrub and emergent wetlands are also found within the Project Area where conditions support these habitat types. Scrub-shrub wetlands in the Project Area are either naturally regenerating cutover or found within floodway management areas and are important for flood relief. Typical vegetation for this habitat type includes sweetgum, American elm, willow elk, box elder, button bush, red maple, privet, and various briars and grasses. These areas typically experience inundation and saturated soils. Emergent wetlands are found in areas that have been actively cleared (e.g., for transmission line rights-of-way or for flood relief management) and experience seasonal flooding. Typical vegetation in this habitat type includes rushes and sedges as well as other species such as smartweed and lizard’s tail.

Other wetland habitats found in the Project Area include open water and wetland drains. Open water areas are typically associated with man-made impoundments or ponds. This habitat type functions to assist in flood storage capacity. Wetland drains are depressional features vegetated with species typical of emergent and scrub-shrub wetlands in the area. They facilitate hydrology and drainage by directing stormwater and flood water into connected sloughs and streams.

**Forested Uplands**

Upland forests are known to occur throughout the Project Area. The predominant tree species found within the upland forest habitats generally contain pine timber stands, as well as mixed pine and hardwood stands. Mixed pine and hardwood forests provide excellent food and shelter for a variety of game and nongame species. Pine forests are the chief habitat for some birds such as the pine warbler, brown-headed nuthatch, and Bachman's warbler.

Forested uplands are currently impacted by conversion of land uses, development activities such as construction of roads, pipelines, and utilities, invasive and exotic species, fire suppression, physical damage from timber harvesting, and contamination by chemicals (herbicides, fertilizers).

**Aquatic and Fisheries Resources and Water Bottoms**

The study area is located within the Pearl River watershed, containing the Pearl River, Ross Barnett Reservoir, numerous tributaries, and several other smaller lakes such as Mayes and Crystal Lake. The identified study area provides a variety of riverine, lacustrine, palustrine and wetland habitats for aquatic resources.

The Pearl River is a meandering river with many established point bars. While sand bars are present, they are often mixed with finer sediments such as clay and mud. The main channel consists of mostly fine to medium sands. Instream structure is moderate along the banks in the form of trees, bushes, and fallen logs. Weirs at the northern and southern ends of the study area inhibit flow. Additionally, sediment load is restricted by the Ross Barnett Reservoir weir. The Pearl River at the Jackson gauge has an average flow of around 5000 cfs and a mean depth of 5.4 ft.

The Pearl River system supports a variety of freshwater fish species. There are 124 species of freshwater fishes known to occur within the system. The fish assemblage is dominated by minnows (27 species), darters (22 species), suckers and sunfish (14 species each) (Killgore et al., 2006). The Ross Barnett Reservoir, Pearl River, related tributaries, and lakes are utilized for recreational fishing opportunities by the local population. Common exploitable fish species are found within the study area are Largemouth Bass, White Bass, Bluegill, Redear Sunfish, White Crappie, Black Crappie, Channel Catfish, and Blue Catfish. Additionally, there is a known mussel bed north of the low head dam near LeFleur Bluff State Park that is inhabited by almost 20 different mussel species including several rare species (Weiland 2000).

**Wildlife**

Though the Project Area is located within the Jackson metropolitan area and habitat quality has been somewhat reduced by urban development and management associated with previously completed flood control projects, the floodplain areas along the river continue to support game and non-game wildlife. The larger Pearl River Basin supports a high diversity of varied wildlife species, and most common species are found in the Project Area. For example, the forested floodplain provides low to high quality habitat mammals, ducks and migratory waterfowl, and neotropical migratory birds.

Mammal species found in the Project Area include white-tailed deer, swamp and cottontail rabbits, fox squirrels, coyotes, armadillos, bobcats, nutria, beavers, skunks, opossums, deer mice, raccoons, minks, nutria, muskrats, and cotton rats. A recent phenomenon in the Project Area is the introduction of feral (wild) hogs, considered an invasive species. Feral hogs have been recently observed within the more southern portions of the Project Area, and it can be assumed that they would continue to migrate and spread throughout the Project Area.

The mix of various floodplain habitats in the Project Area supports a wide variety of birds including common species such as blue birds, blue jays, and American robins along with other songbird species such as brown thrashers, Eastern Meadowlarks, and indigo buntings. Wetland habitats in the Project Area support species such as herons, egrets, ibises, rails, cormorants, pelicans, stilts, sandpipers, gulls, terns, and barred owls. The area also occasionally hosts populations of eastern wild turkey, which is an important game bird in the state.

In addition, the Pearl River channel along with associated tributaries, lakes, and sloughs in the Project Area support significant populations of migratory waterfowl on a seasonal basis, including wood ducks and mallards, as well as other migratory species such as mourning doves. The river watershed also supports populations of many species of freshwater fish and shellfish, common reptiles including turtles and snakes, and common amphibian species.

**Threatened, Endangered, and Protected Species**

In consultation with the Service and through a search on the U.S. Fish and Wildlife Service (Service) Information for Planning and Consulting (IPaC) site, conducted on March 21, 2023, resulted in a list of species that should be considered when assessing the impacts of this project. That list includes the Gulf sturgeon, ringed sawback (ringed map) turtle, Northern long-eared bat, Pearl River map turtle, alligator snapping turtle, and monarch butterfly. Email correspondence with the Service dated March 21, 2023, confirmed this list, and concluded that the monarch butterfly, as a candidate species, has no legal regulations under the Endangered Species Act. However, on April 21, 2023, email correspondence with The Service stated that they had been informed to expect a listing decision on the monarch butterfly in the near future. Therefore, USACE has decided to include the monarch butterfly in this analysis. On April 10, 2023, the Service informed USACE via email (attached) that the Louisiana pigtoe and the tricolored bat had been recently proposed for listing. Therefore, those two species would also be assessed.

Gulf sturgeon (*Acipenser oxyrhynchus desotoi*) (Threatened)

The Gulf sturgeon (GS) is an anadromous fish (ascending rivers from the sea for breeding) that have historically inhabited coastal rivers from the Mississippi in Louisiana to the Tampa Bay in Florida. The GS is one of two geographically dispersed subspecies of the Atlantic Sturgeon (Acipenser oxyrhynchus). The GS is characterized by a sub-cylindrical body that is imbedded with bony plates or “scutes.” The snout of the fish is greatly extended and

bladelike and includes four fleshy barbells in front of the mouth. They generally range in size from 6 to 8 feet in length and are typically light brown to dark brown in color. They benthic feeders – they feed on organisms located in or on the bottom, such as crabs, grass shrimp, lancets, brachiopods, and marine worms.

Recent studies for the GS have not been conducted in this reach of the Pearl River and survey data from this area is not prevalent. However, in 2021, a GS was detected above the waterworks sill in LeFleur's Bluff State Park and in 2022 the same sturgeon was detected closer to the spillway of Ross Barnet (Michael J. Andres, Ph.D., personal communication January 12, 2023). There are also unconfirmed sightings of GS as far upstream as the City of Jackson, Mississippi, in Hinds County (Morrow et. al. 1996; Lorio 2000; Slack, pers. comm. 2002). There have been 24 GS captured by commercial fishermen, eight of which being captured within the project area and the most recent of those captures occurring in 2008.

GS have been historically and are currently being impacted by incidental catch in other fisheries, habitat losses associated with the construction of water control structures including dams and sills, and declining water quality. Dam construction in several of the rivers has severely restricted the sturgeon’s access to historic migration routes and spawning areas.

On March 19, 2003, The Service and NMFS published the Final Rule in the Federal Register designating critical habitat for the GS. Based upon the identified physical and biological features (PBFs) for the GS, The Service and NMFS identified a total of fourteen (14) Critical Habitat Units. Critical Habitat Unit 1 covers the proposed project area and includes the Pearl River System in St. Tammany and Washington Parishes in Louisiana and Walthall, Hancock, Pearl River, Marion, Lawrence, Simpson, Copiah, Hinds, Rankin, and Pike Counties in Mississippi. Of the 7 PBFs identified for Gulf sturgeon critical habitat, riverine spawning sites and riverine aggregation (resting) areas are not present in the action area. The PBFs found in the Action Area are food, flow regime, water quality, sediment quality, and migratory pathways.

Ringed Sawback (ringed map) Turtle *(Graptemys oculifera)* (Threatened)
The Ringed Sawback (map) Turtle is a small (7.5 to 22 cm) narrow-headed turtle with laterally compressed, black, spine-like vertebral projections and a slightly serrated posterior carapacial margin. The carapace is dark olive-green and each pleural has a broad yellow or orange circular mark. The ringed map turtle is a wholly carnivorous species, with insects and mollusks constituting their principal diet. In addition, they are also thought to be opportunistic in their feeding habits with fish and carrion as occasional food sources. The ringed map turtle’s habitat is typically riverine with a moderate current and numerous basking structures. This species has also been observed in oxbow lakes that are connected or disconnected from the main river system.

Populations are known to occur within the Pearl River system from the Neshoba County, Mississippi headwaters area, southward downstream through St. Tammany Parish, Louisiana. The ringed map turtle populations are restricted primarily to the main channel of the Pearl River and the lower portions of its largest tributary, the Bogue Chitto River. To

date, the highest densities of turtles have been documented in two survey areas, above the Ross Barnett Reservoir and below the Ross Barnett Reservoir dam southward to approximately MS Highway 25, upstream of the proposed Project Area. Ringed map turtles are found throughout all reaches of the Pearl River.

Decline in populations of the ringed map turtle have been attributed to habitat modifications, primarily associated with dredging and/or other navigational and flood control projects, water quality degradation, over-collecting of the species for the pet trade, recreational activities may also cause habitat destruction, predation of nests, and direct mortality associated with recreational and commercial fishing and boating (USFWS 2019).

Northern Long-eared Bat (NLEB) (*Myotis septentrionalis*) (Endangered)
NLEB, a wide-ranging bat species, found in 37 states in North America, typically overwinters in caves or mines and spends the remainder of the year in forested habitats. The NLEB individuals are typically approximately 3.0 to 3.7 inches in length with a wingspan of approximately 9.0 to 10.0 inches. The bat is distinguished by its long ears, particularly when compared to the other bats in the same genus, Myotis. The primary diet for the NLEB is insects including moths, flies, leafhoppers, caddisflies, and beetles.

At this point, the Service does not have survey data that would indicate what the migration patterns are for the NLEB. More specifically, little is known whether the available summertime woodland habitat present within the Project Area is being utilized by the NLEB. No existing data is available that would indicate that the NLEB currently utilizes the Project Area during the summer migration. However, the Service has identified what is referred to as the White-Nose Syndrome Buffer Zone that includes all areas within 150 miles of the boundaries of U.S. counties or Canadian districts where the fungus has previously been detected. The established buffer zone includes both Hinds and Rankin Counties within the Project Area.

The NLEB is one of the species of bats that have been most impacted by the spread of the white-nose syndrome (WNS) disease and has experienced significant declines in populations because of the disease's spread. Secondary threats to the NLEB include the disturbance of roosts and hibernation areas, forest management practices, and forest habitat modifications (development, wind power development).

Pearl River map turtle (PRMT) *(Graptemys pearlensis)* (Proposed Threatened)
The PRMT is a moderate-sized highly aquatic turtle found in the Pearl River drainage area of Louisiana and Mississippi. It exhibits a high-domed shell with a median keel, featuring salient spines on the rear portions of the anterior vertebral scutes. The PRMT is a wholly carnivorous species, with insects and mollusks constituting their principal diet. In addition, they are also thought to be opportunistic in their feeding habits with fish and carrion as occasional food sources.

The PRMT is endemic to the Pearl River drainage in Mississippi and Louisiana. Rankin and Hinds Counties are included in the Counties with known records for the species in the State of Mississippi. This species has also been reported in upper reaches of the Ross Barnett

Reservoir. PRMTs can be found within the project area despite the lack of a well-defined riparian buffer, lack of preferred habitat, sedimentation accumulation, relatively low stream velocities, lack of basking habitat, and a smaller percentage of sandbars. It has been shown in studies that population densities for the species are higher above and below the project area.

Climate change, poor water quality, habitat degradation, invasive species, collection, dredging and channelization, impoundment of rivers, and disease all influence the persistence of the Pearl River map turtle.

Alligator Snapping Turtle (AST) *(macrochelys temminckii)* (Proposed Threatened)
The AST is the largest freshwater species of turtle in North America and is among the most aquatic. ASTs are characterized as having a large head, long tail, and an upper jaw with a hooked beak. They have three keels with posterior elevations on the scutes of the carapace, which is dark brown and often found with algae growth adding to the overall camouflage of the turtle. ASTs are hunters and scavengers that feed on fish, mollusks, and other turtles as well as frogs, snakes, snails, small mammals, insects, and aquatic plants.

The AST is found within river systems that flow into the Gulf of Mexico, extending from right before the Suwannee River in Florida to the San Antonio River in Texas. Currently, the species is known to occur in Alabama, Arkansas, Florida, Georgia, Illinois, Kentucky, Louisiana, Missouri, Mississippi, Oklahoma, Tennessee, and Texas. ASTs are usually associated with the deeper waters of large rivers, major tributaries, bayous, canals, swamps, lakes, ponds, and oxbows. Hatchlings and juveniles, in comparison, are usually associated with shallower waters. In general, the species uses shallower water in early summer and deeper depths in late summer and mid-winter, which may be a thermoregulatory shift (Fitzgerald and Nelson 2011).

The Service divides the AST range into seven analysis units. The analysis unit focused on in relation to the project area is the Alabama unit which encompasses eastern Mississippi, western Alabama, and small parts of Louisiana and Florida. The Pearl River is listed under the Alabama unit as a water body that currently or historically supported ASTs.

Adult harvest (legal and illegal), incidental catch in other fisheries, habitat alteration due to activities such as dams, dredging, deadhead logging, removal of riparian cover, channelization, stream bank erosion, siltation, and land use adjacent to rivers, nest predation, climate change, and disease influence the existence of the alligator snapping turtle.

Louisiana Pigtoe (LA pigtoe)*(pleurobema riddellii)* (Proposed Threatened)
The LA pigtoe is a medium-sized freshwater mussel (shell lengths to greater than 62 mm) with a brown to black, triangular to subquadrate shell without external sculpturing, sometimes with greenish rays. They occur in gravel and coarse sandy substrates of rivers and streams. Mussels are filter feeders that rely on natural, high quality (pollutant free) flowing water of sufficient volume to support their life cycle, and that of their host fishes, which are essential for reproduction.

The range of the LA pigtoe extends into portions of east Oklahoma, southeast Arkansas, south Louisiana, and west Mississippi. LA pigtoe currently occupies areas across seven major river basins (San Jacinto, Neches, Sabine, Big Cypress-Sulphur, Red, Calcasieu-Mermentau, and Pearl). However, within the Pearl River, the LA pigtoe is only found in in the project area and a portion of the west Pearl.

Degraded water quality, altered hydrology, substrate changes, habitat fragmentation, direct mortality, invasive species, and climate change all influence the existence of the LA pigtoe.

Tricolored Bat (TCB) (*perimyotis subflavus*) (Proposed Endangered)

TCB is one of the smallest bats in eastern North America and is distinguished by its unique tricolored fur that appears dark at the base, lighter in the middle, and dark at the tip (Barbour and Davis 1969, p. 115). TCB primarily roost in foliage of live and dead trees in the spring, summer, and fall, and hibernate in caves and other subterranean habitats during the winter. TCB are opportunistic feeders feeding on small insects such as moths, beetles, flies, wasps, and flying ants.

TCB are known to occur in 39 states, one of which is Mississippi, Washington D.C., 4 Canadian Provinces, Guatemala, Honduras, Belize, Nicaragua, and Mexico.

The TCB has been impacted by the spread of the WNS disease and has experienced significant declines in populations because of the disease's spread. Other threats to the TCB include wind related mortality due to wind power development, climate change, and habitat loss.

Monarch Butterfly (*danaus plexippus)* (Candidate Species)
Adult monarch butterflies are large (3 to 4 inches) and conspicuous, with bright orange wings surrounded by a black border and covered with black veins. The black border has a double row of white spots, present on the upper side of the wings. Milkweed and flowering plants are needed for monarch habitat. Adult monarchs feed on the nectar of many flowers during breeding and migration, but they can only lay eggs on milkweed plants.

Migratory individuals in eastern North America predominantly fly south or southwest to mountainous overwintering grounds in central Mexico, and migratory individuals in western North America generally fly shorter distances south and west to overwintering groves along the California coast into northern Baja California (Solensky 2004).

The eastern population of monarchs overwinter in Mexico, where this microclimate is provided by forests primarily composed of oyamel fir trees (Abies religiosa). Migratory monarchs in the western population primarily overwinter in groves along the coast of California and Baja California which include blue gum eucalyptus (Eucalyptus globulus), Monterey pine (Pinus radiata), and Monterey cypress (*Hesperocyparis macrocarpa*) (Griffiths and Villablanca 2015). Monarch butterflies are found throughout North America and are highly likely to utilize portions of the project area.

Loss and degradation of habitat from conversion of grasslands to agriculture, widespread use of herbicides, logging/thinning at overwintering sites in Mexico, senescence, and incompatible management of overwintering sites in California, urban development, drought, exposure to insecticides, drought, and effects of climate change are all factors in the decline of the monarch population.

Other Protected Species

Other protected species, specifically bald eagles and migratory birds, have potential to be present in the study area. Bald eagles are protected under the Bald and Golden Eagle Protection Act (BGEPA) and the Migratory Bird Treaty Act (MBTA). Currently, 1,093 species of birds are protected under the MBTA.

The bald eagle was near extinction approximately forty years ago throughout most of its range. Habitat destruction and degradation, illegal shooting, and the contamination of its food source, largely as a consequence of DDT, decimated the eagle population. However, the banning of DDT, habitat protection, and conservation features through the ESA, have afforded a remarkable recovery for the species. The bald eagle was removed from the endangered species list in 2007 but continues to be protected under the BGEPA and the MBTA.

Many of the 1,093 species of birds protected under the Migratory Bird Treaty Act are experiencing population declines due to increased threats across the landscape. Millions of acres of bird habitat are lost or degraded every year due to development, agriculture, and forestry practices. In addition, millions of birds are directly killed by human-caused sources such as collisions with man-made structures such as windows and communication towers.

Bald eagles' nest in tall trees (usually cypress or pine in this area) near water and typically in the months of October through May. Migratory birds have varying nesting behaviors and seasons depending on the species. Conservatively, the nesting season for migratory birds is February 15 through September 15. Wading/water birds typically nest in trees or shrubs near water. Shorebirds typically nest on ground level in sand, small rocks, dunes, or ground vegetation. Many migratory birds (other than wading/water birds and shorebirds) are opportunistic nesters and would nest in trees, shrubs, building overhangs, house gutters, etc.

**Soils and Prime and Unique Farmlands**

Information obtained from the *Soil Survey of Hinds County, Mississippi* and the *Soil Survey of Rankin County, Mississippi* indicates that the three primary soil association units (General Soil Map Units) underlying the proposed project area consists of the Cascilla-Arkabutla and Tippo-Leverett-Guyton soil associations in Rankin County and the Cascilla-Bonn-Deerford soil association in Hinds County.

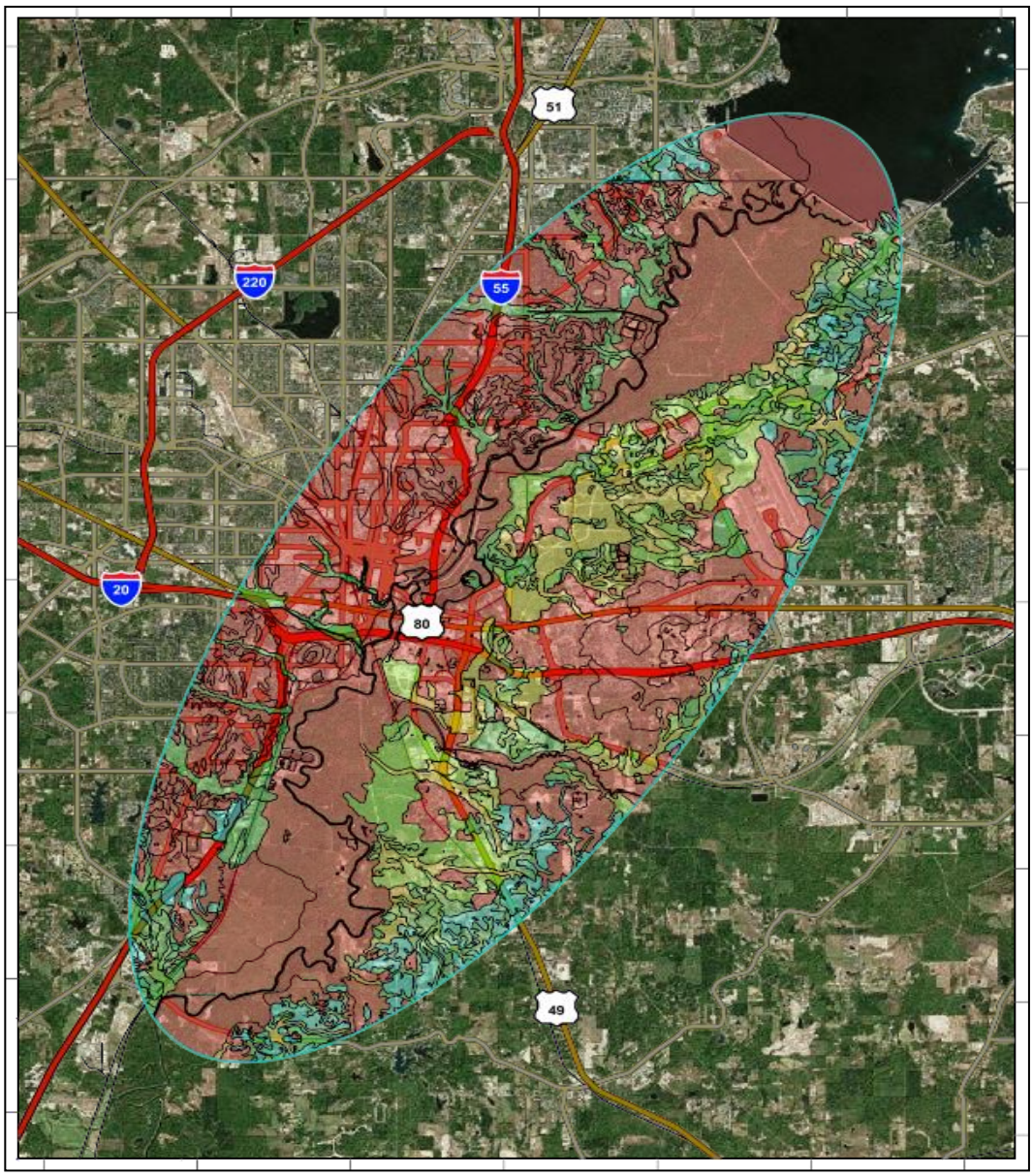
The Cascilla-Arkabutla soil association in Rankin County consists of the well-drained Cascilla soils that formed in silty alluviums near the low scarps and on the slightly higher elevations on natural levees of flood plains along the Pearl River. The Arkabutla soils are

somewhat poorly drained and formed in broad flats and in small depressions along the Pearl River. The Tippo-Leverett-Guyton soil association is also found in the Rankin County area. The Tippo soils consist of somewhat poorly drained, nearly level soils that formed in silty alluvium and are typically found on low stream terraces and flood plains along the Pearl River. Leverett soils are deep, well-drained soils that formed in silty alluvium and are found on low stream terraces along the Pearl River as well. The Guyton soils consist of deep, poorly-drained, nearly level soils that formed in silty alluvium. These soils are typically found on low stream terraces and flood plains along the Pearl River as well.

The Cascilla-Bonn-Deerford soil association is found within the Hinds County portion of the Project Area. These soils are frequently flooded and found in the flood plains of the Pearl River. Bonn soils are typically found in broad, level areas and in depressions. The Deerford soils are generally found in the slightly higher areas of the broad flats.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. Unique farmland is land other than prime farmland that is used for the production of specific high-value food and fiber crops, such as citrus, tree nuts, olives, cranberries, and other fruits and vegetables. It has the special combination of soil quality, growing season, moisture supply, temperature, humidity, air drainage, elevation, and aspect needed for the soil to economically produce sustainable high yields of these crops when properly managed. Approximately 250 acres or 9.8 percent of the land within the project area is currently in agricultural use. An additional 384 acres or 15.0 percent are classified as hay fields (National Land Cover Database). This is the only readily available data that depicts actual acreages within the project boundary. Prime and unique farmland are located within the study area but not specifically within the Project Area. Soils found in agricultural areas include: Tippo silt loam (prime farmland if protected from flooding) and Tippo Urban land (not prime farmland) complex. Coordination with the Mississippi State Office of the Natural Resources Conservation Service regarding prime farmland was completed on 17 June 2023.

The project area denoted by the light blue oval in Figure 2-12 represents approximately 79,400 acres. Farmland classification identifies prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978 (NRCS, 2023; Appendix C: *Agency Coordination*).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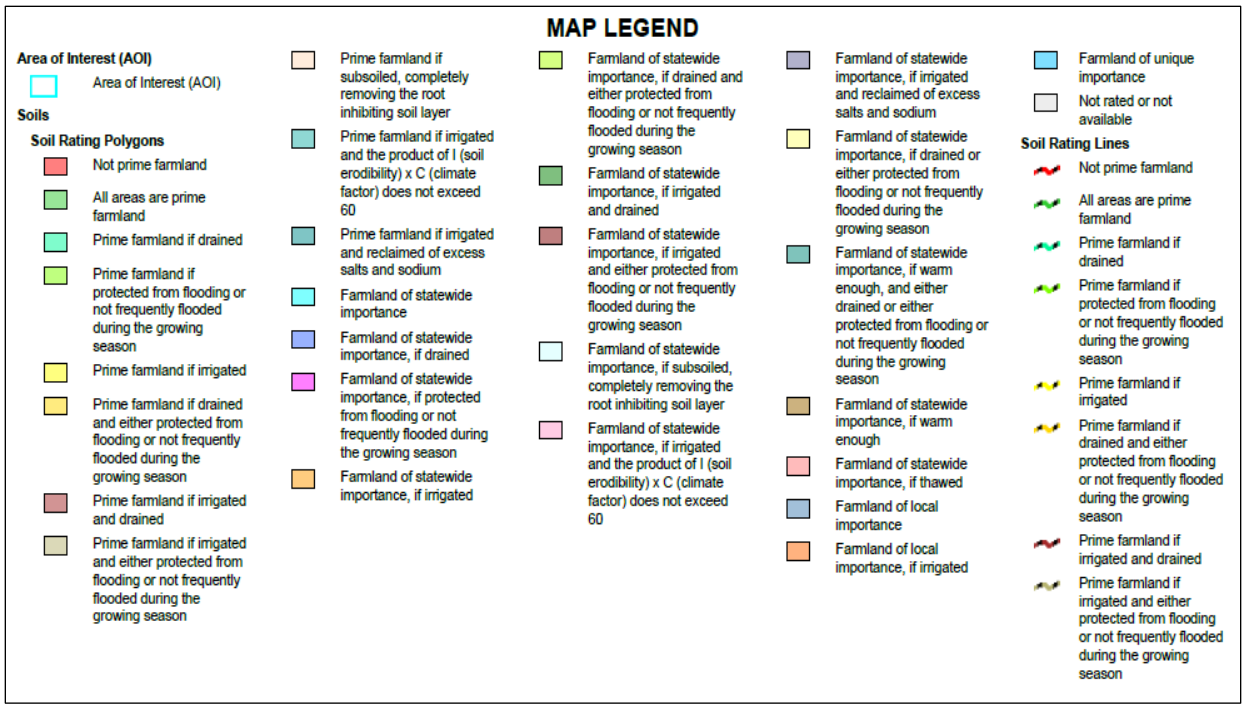


*Figure 2-12. Prime and unique farmland classification in the Study Area.* *(Source: NRCS, web soil survey National Cooperative Soil Survey)*

## Water Quality

Anthropogenic and human activities occurring in various land uses throughout the Pearl River watershed can potentially affect water quality. Each land use can either improve or deteriorate water quality, depending on the management practices taking place. The primary land use in the LPRW is forestland, which is important for clean surface water because it can absorb rainfall to slow runoff, maintain water temperature, refill underground aquifers, and provide habitats for fish and wildlife (MDEQ 2000). Wetlands make up another major land use in the watershed that also serve to improve water quality by absorbing and filtering sediments and other contaminants. Pasturelands have cattle production and poultry litter application, while agricultural lands have fertilizer and pesticide applications as well as tillage operations (MDEQ 2000). These practices can be a threat to water quality, especially if they are not managed appropriately. Developing urban areas can also deteriorate water quality by allowing contaminated stormwater runoff to be easily transported to nearby streams. Section 305(b) of the CWA requires each State to monitor and report on surface and groundwater quality, which the EPA synthesizes into a report to Congress. The MDEQ produces a Section 305(b) Water Quality Report every two years that provides a status report on the quality of Mississippi's surface water, and the methodology of data collection for surface water. It also identifies impaired water bodies. Most recently, the MDEQ released the Mississippi 2022 Statewide 305(b) Water Quality Report, however, the 2022 Water Quality Report is currently pending release. However, MDEQ has released the Mississippi 2022 Consolidated Assessment and Listing Methodology (CALM), which provides insight on

the data requirements, assessment, and listing methodology needed to fulfill the CWA requirement for Sections 305(b) and 303(d).

Section 303(d) of the CWA requires states to identify waterbodies that are impaired or in danger of becoming impaired due to exceedances of Federally approved water quality standards. The State of Mississippi and the EPA have established surface water quality standards to assess ambient water quality conditions and to establish a priority ranking for such waters (Miss. Code Ann. §§ 49-2-1, et seq. and 49-17-1, et seq.). The MDEQ divides waterbodies into classifications for water quality assessment purposes. Four designated uses were established for surface waters in Mississippi: Fish & Wildlife, Public Water Supply, Recreation, Shellfish Harvesting, Ephemeral. After the water body is labeled within the four designated areas, the waterbody is placed into five assessment categories with a possibility of 4 sub categories: Category 1- Attaining all uses, Category 2- Attaining some uses but insufficient information for assessment of other uses, Category 3- Insufficient information to assess any use, Category 4- Not attaining a use but a TMDL is not necessary, 4A, 4B, 4C, Category 5- Not attaining a use and a TMDL is needed., 5-alt.

Water quality criteria are elements of State water quality standards that represent the quality of water that would support a particular designated use. These criteria are expressed as constituent concentrations, levels, or narrative statements. If a waterbody does not meet the water quality criteria appropriate for its designated use, then it is designated as “impaired” with respect to those constituents for which criteria are not met. The development of a total maximum daily load (TMDL) is most often the next step in the process. A TMDL is a determination of the maximum amount of a given pollutant that a waterbody can receive and not exceed the water quality standards for its designated use.

*Study Area*

Within Mississippi, there are nine drainage basins that MDEQ categorized: Big Black River, Coastal Streams, North Independent Streams, Pascagoula River, Pearl River, South Independent Streams including the Lower Mississippi River, Tennessee River, Tombigbee River, and Yazoo River including Upper Mississippi River. The study area focuses on the Pearl River drainage basin and is labeled as one 4-digit Hydrologic Unit: Pearl-0318. According to MDEQ, the pearl river basin is located within portions of Mississippi and Louisiana and is located East of the Mississippi River. This basin drains roughly 8,000 square miles from thirteen counties within Mississippi. The basin can be broken into two 8-digit Hydrologic Units; Upper Pearl-03180001 and Middle Pearl Strong- 03180002.

The Study Area consists of three counties within Mississippi: Madison County, Hinds County and Rankin County. Within these counties, there are four 12-digit Hydrologic Units; Hog Creek-Pearl River Watershed-031800020603, Town Creek-Pearl River Watershed -031800020604, Neely Creek-Conway Slough Watershed -031800020605, and Lynch Creek-Pearl River Watershed -031800020606.

The Mississippi 2022 Statewide 305 (b) Water Quality Report, MDEQ outlines one watershed that is within the study area that are found in the Mississippi 2022 §305(b) Water

Quality Assessment Report: Lynch Creek 509311. The Lynch Creek sample site is located within the Jackson City limits.

Within the Mississippi 2022 Section 303(d) List of Impaired Water Bodies, MDEQ outlines one watershed that are within the study area that is found within the Impaired Waters Listing: Lynch Creek 509311. The watershed (seen in Figure 2-13) was found to be impaired for aquatic life use support and contain a biological impairment. The Lynch Creek sample site is located within the Jackson City limits.

The water bodies in the planning area support a variety of the designated uses. Figure 2-14 depicts the classifications of streams and waterbodies within the Pearl River Drainage Basin.

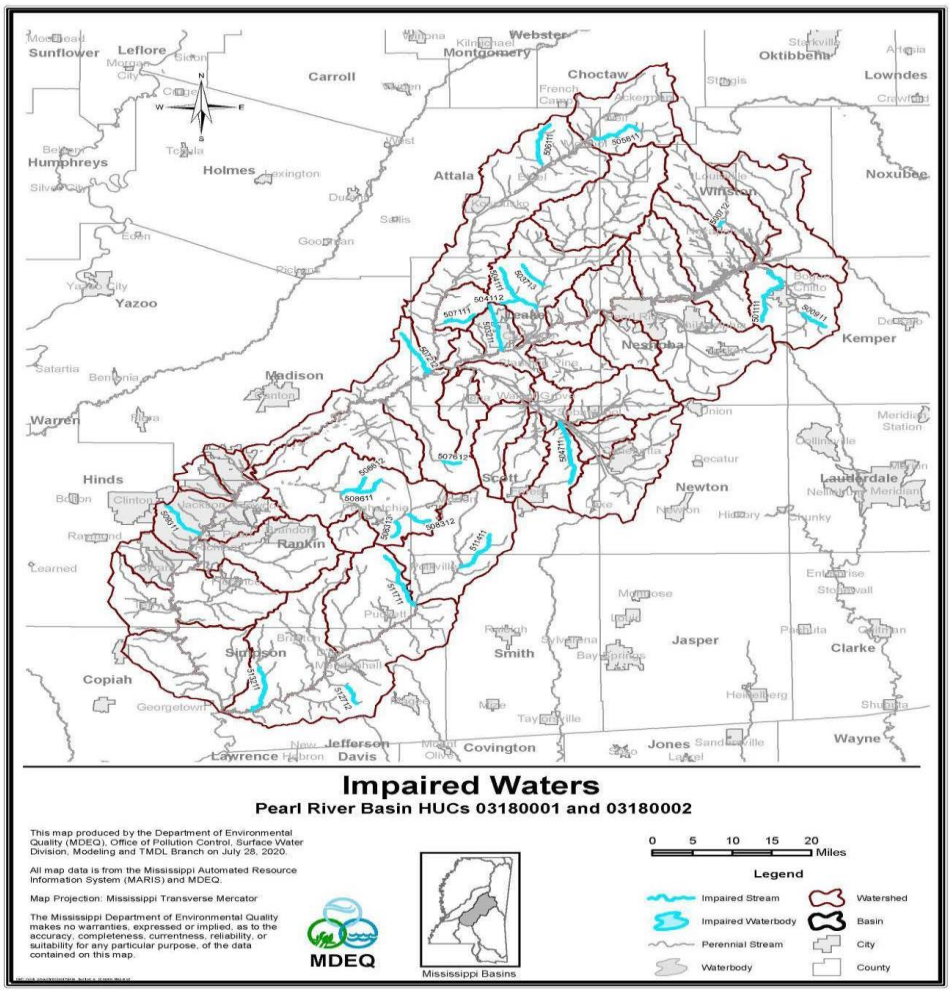


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*Figure 2-13. Impaired Waters within the Pearl River Basin, Mississippi*

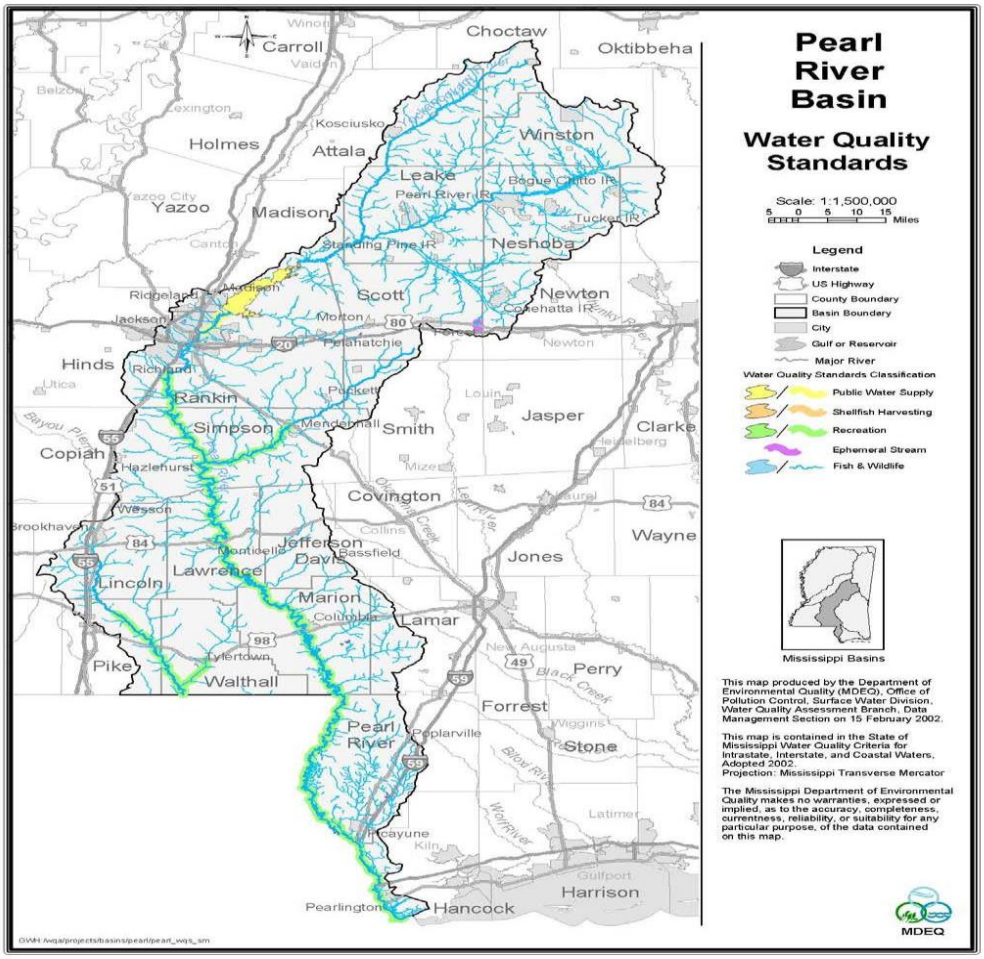



*Figure 2-14. Water Quality Standards for the Pearl River Basin, Mississippi*

## Water Supply

The Jackson MSA receives potable water from various sources. A listing of current water sources is listed below (Table 2-4). There are two plants within the Jackson MSA receiving water from the Pearl River, the O.B. Curtis and J.H. Fewell (Figure 2-15).

*Table 2-4. Water Supply Sources*

| |
|---|
| Jackson's drinking water comes from the Ross Barnett Reservoir and the Pearl River. The water is treated and provided to residents in Jackson through two facilities, O. B. Curtis and J. H. Fewell Water Treatment Plants. |
| The city of Madison's water sources come from four locations treated at local wells and distributed to residents. Bear Creek Water Association, Inc. also serves the south region of Madison County |
| The city of Brandon has 10 water wells from groundwater sources called the Sparta and Cockfield formation aquifers. |
| Ridgeland's water source is two deep-water supply wells in the Cockfield Aquifer and four deep-water supply wells in the Sparta Aquifer. |
| The water sources in Flowood come from two wells, the Cockfield Formation and Sparta Sand Aquifer. |
| The City of Clinton's water supply comes from two groundwater sources, the Sparta and Cockfield aquifers. The water is pumped from 10 deep wells, six pulling from the Sparta and four from the Cockfield aquifer. |
| Byram buys its water from the city of Jackson from Jackson's O.B. Curtis Water Plant. Byram also has six wells that pump additional water to residents |
| Canton obtains its water supply from wells in the Sparta Aquifer, as well as the Bear Creek Water Association, Inc, via a system of wells. (BCWA) |
| Flora receives water from three well pumps purified through an aquifer. |

Source: Clarion Ledger. Where do Jackson and Surrounding Cities get Their Water.

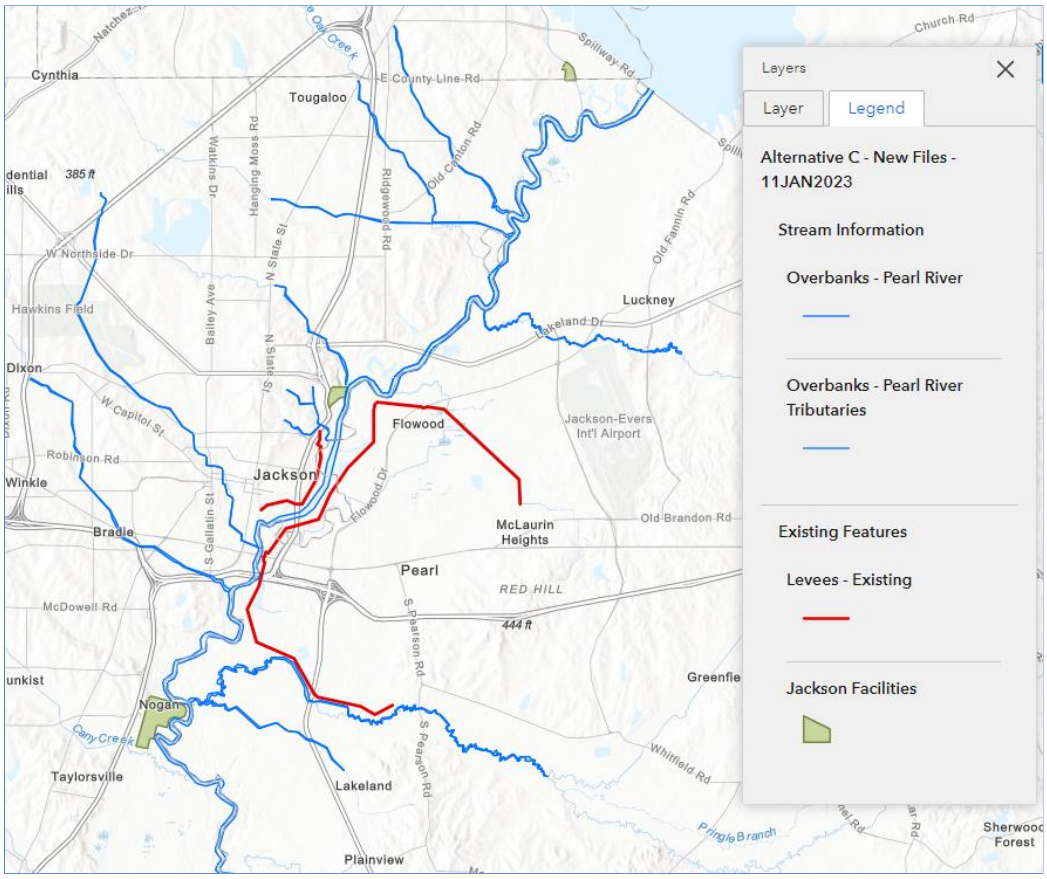



*Figure 2-15. Water Treatment Locations along the Pearl River downstream of the Ross Barnett Reservoir.* *Source: USACE Project Dashboard. 2022*

Drinking water at the City of Jackson, Mississippi's O. B. Curtis Water Treatment Plant is processed from two separate treatment systems, a conventional system built in 1993, and a membrane system built in 2007. This plant is indicated by a green outline, just south of the Ross Barnett Reservoir (Figure 2-16), from which it draws water. Each system was designed to provide 25 million gallons of water per day for a total of 50 million gallons of water to the city of Jackson. (City of Jackson, 2022, FTN Assoc, 2011, MEMA 2022)

Water is also taken from the Pearl River near the LaFleur's Bluff State Park at the J.H. Fewell Plant, which is indicated as a green outline toward the center of the above image. Built in 1914, the system was designed to provide a total of 20 million gallons per day. (City of Jackson, 2022, MEMA 2022)

Following a February 2020 inspection, the EPA declared that conditions within the city's drinking water system were in violation of standards, according to an emergency administrative order issued that month by the agency. Among its requirements, the order mandated that the city make numerous repairs or replacements at drinking water facilities and address disinfection and pH control. (EPA, 2022) Work is currently ongoing for this effort.

The city of Jackson experienced below freezing temperatures in a winter storm that began on February 14, 2021. Frozen pipes in the distribution system created a system failure that left some Jackson residents without water for weeks. (Landers, 2022).

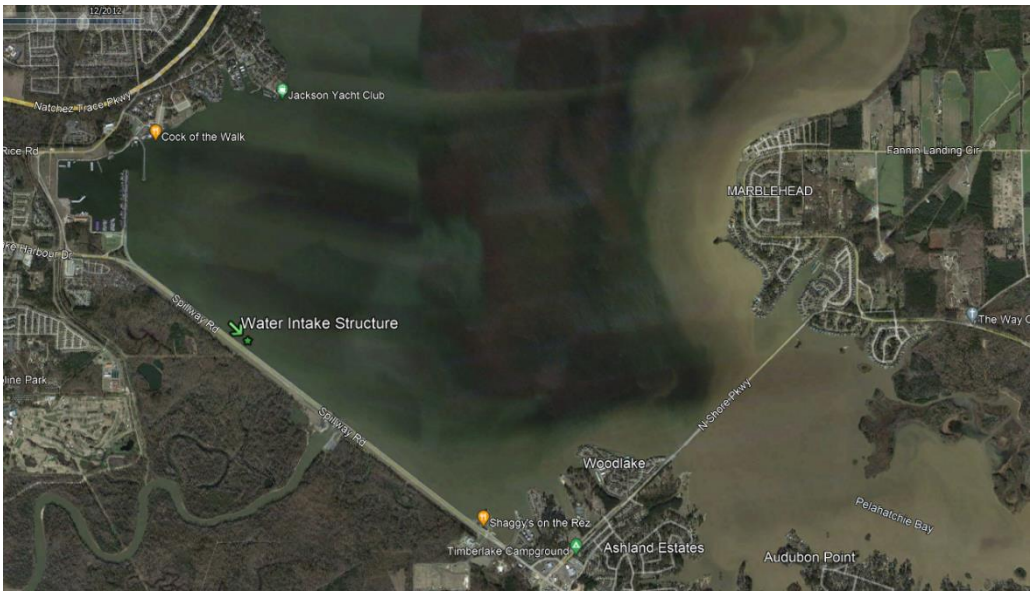



*Figure 2-16 Ross Barnett Reservoir near the O.B. Curtis Plant Intake, Feb 2020 (Source: Google Earth Areal Imagery. Dec. 2012 )*

The City of Jackson Surface Water System was impacted by recent flooding in August 2022. A previous boil-water advisory was still in effect on August 29, 2022, due to prior incidents when floodwaters on the Pearl River in the Ross Barnett Reservoir altered the chemistry of the incoming water to be treated at the Curtis facility, interrupting operations. Additional sediment, likely similar to the sediment plume shown in the image from February 2020, in combination to the critical staffing limitation, was the significant cause of this failure. Failed pumps at the facility contributed to the conditions that caused pressures to drop within the distribution system. Both the O.B. Curtis and J.H. Fewell water treatment plants had reduced water output that created pressure problems in the system. The City lacked sufficient pressures in some areas of the City to sustain adequate access to flush toilets and maintain optimal disinfection for drinking water. Both O.B. Curtis and J.H. Fewell water treatment plants lacked sufficient Class A Operators and maintenance staff. The boil water notices were lifted on September 16, 2022. (Landers, 2022; MEMA 2022)

“Returning Jackson’s drinking water system to a state of good repair would require overcoming a host of challenges, many of which have been in play for decades. At the root of the problem, Jackson’s drinking water issues are the result of “decades of disinvestment in the city's water infrastructure,” says Erik Olson, the senior strategic director for health and food at the Natural Resources Defense Council.” (Landers, 2022)

Many agencies, state, and local officials worked together to implement a “playbook” to prioritize repairs, and these repairs have now begun to increase efficiency and resilience, as well as to improve staffing shortages using contract labor. (MEMA 2022; City of Jackson, 2022)

**Tribal Resources**

USACE’s 2023 Tribal Consultation Policy requires the agency to determine if any of three categories of resources would be significantly adversely affected by the proposed action. The three (3) categories are: 1) Tribal Rights; 2) Tribal Lands; and, 3) Protected Tribal Resources (see: Section 7: *E.O. 13175* for more information on Government-to-Government Consultation between Federally-Recognized Tribes and USACE) (Table 2-5).

*Table 2-5. 2023 USACE Tribal Consultation Policy Definitions.*

| Category | Definition |
|---|---|
| Tribal rights: | Those rights legally accruing to a Federally-Recognized Tribe or tribes by virtue of inherent sovereign authority, unextinguished aboriginal title, treaties, statutes, judicial decisions, executive orders or agreement and that give rise to legally enforceable remedies. |
| Tribal lands | Any lands title to which is: either held in trust by the United States for the benefit of any Federally-Recognized Indian tribe or individual or held by any Federally-recognized Indian tribe or individual subject to restrictions by the United States against alienation. |
| Protected tribal resources | Those natural resources and properties of traditional or customary religious or cultural importance, either on or off Tribal lands, retained by, or reserved by or for, Federally-Recognized Tribes through treaties, statutes, judicial decisions or executive orders. |

*Tribal Areas of Aboriginal/Historic Interest*

USACE recognizes that Tribes may have sites of religious and cultural significance on or off Tribal Lands, as defined in 36 CFR § 800.16(x), including sites that may contain human remains and/or associated cultural items, that may be affected by this Undertaking. Each Tribe has a Tribal Historic Preservation Officer (THPO) or other designated representative who consults with Federal agencies regarding activities that may impact archaeological sites and/or Traditional Cultural Properties of aboriginal interest. Nine (9) Federally-Recognized Tribal Nations have identified aboriginal/historic Areas of Interest (AOI) in counties included within the Study Area (Figure 1-1). The Tribes are: 1) Alabama-Coushatta Tribe of Texas (ACTT); 2) Chickasaw Nation (CN); 3) Chitimacha Tribe of Louisiana (CTL); 4) Choctaw Nation of Oklahoma (CNO); 5) Jena Band of Choctaw Indians (JBCI); 6) Mississippi Band of

Choctaw Indians (MBCI); 7) Muscogee (Creek) Nation (MCN); 8) Quapaw Nation (QN); and, 9) Tunica-Biloxi Tribe of Louisiana (TBTL).

*Existing Conditions*

Tribal interest varies by geographic limits and USACE uses the most inclusive approach to consultation and coordination. As previously stated, nine (9) Federally-Recognized Tribal Nations have identified aboriginal/historic Areas of Interest (AOI) in counties included within the Study Area (Figure 1-1). According to available government records, no Federally-Recognized Tribe currently hold lands within the Study Area, nor are there specific tribal treaty rights related to access or traditional use of the natural resources in the Study Area. However, the MBCI Reservation contains more than 35,000 acres of land situated throughout Mississippi in ten (10) different counties. Most of this land is held in trust for the Tribe by the Federal Government. The Tribe has eight (8) officially recognized Choctaw Indian communities (Bogue Chitto, Bogue Homa, Conehatta, Crystal Ridge, Pearl River, Red Water, Standing Pine, and Tucker). Pearl River, located in Neshoba County, is the largest Choctaw community, and is the site of Tribal Government Headquarters.

There are protected tribal resources within the Study Area and surrounding vicinity, that include, but are not limited to, a wide variety of places and landscapes: archaeological sites, cemeteries, trails and pathways, campsites and villages, fisheries, hunting grounds, plant gathering areas, holy lands, landmarks, important places in Native American history and culture, and places of persistence and resistance. Because affected tribal members consider these places sacred, many traditional cultural sites remain unidentified including Cultural Landscapes and/or Traditional Cultural Places (TCPs). It is noteworthy to mention that Cultural Landscapes and/or TCPs may be invisible unless they are disclosed by the peoples to whom they are important. Tribal values lie embedded within Cultural Landscapes and/or TCPs and may be conveyed through means such as oral tradition. Cultural Landscapes and/or TCPs are often intertwined with the events, stories, and cultural practices of native peoples. Oral histories impart basic beliefs, teach moral values, and help explain the creation of the world, the origin of rituals and customs, the location of food, and the meaning of natural phenomena.

To augment USACE's background research into the interested Federally-Recognized Tribes and the types of tribal resources within the Study Area, USACE, consulted with Federally-Recognized Tribes on actions having the potential to significantly affect protected tribal resources, tribal rights, or Indian lands through targeted Government to Government consultation, the February 15, 2023, NHPA Section 106 consultation letter entitled: *Notice of Intent to Prepare Programmatic Agreement Regarding: "Pearl River Basin, Mississippi Federal Flood Risk Management Project, Hinds and Rankin Counties, Mississippi* (see: Appendix G)." On June 13, 2023, Participating Agency Request Letters (see: Appendix C), and subsequent stakeholder meetings and correspondence with participating Tribes. A synopsis of significant Tribal consultation, considerations, and ongoing discussions conducted to date is provided below:

On February 28, 2023, the QN submitted a written response to USACE's February 15, 2023, Section 106 NHPA letter requesting additional Government-to-Government consultation to discuss the details of the project and an explanation of the benefit to the QN. On March 22, 2023, USACE and the QN engaged in additional consultation via teleconference. USACE provided a brief overview of the project background, purpose, and objectives. The QN recommended avoiding archaeological resources to the greatest extent possible, discussed the Tribal use of eel (*Anguilla rostrata*) and requested that suitable passage be considered with any impoundment feature option to allow migration if still applicable to the Pearl River. USACE informed the QN that a fish passage was already being considered and the specific request for eel passage has been elevated to the PDT for additional consideration.

On April 26, 2023, during the first Section 106 consultation meeting with Tribal stakeholders the CNO identified that there were multiple AOIs within the Study Area including, but not limited to: Trail of Tears removal routes, the Natchez Trace (https://www.nps.gov/natr/index.htm) and areas that have Choctaw Place Names.

Early planning discussions revealed that the NFI was initially considering potential habitat mitigation sites outside of the Study Area, to the north of the Ross Barnet Reservoir, near MBCI tribal lands. On April 06, 2023, the locations of potential habitat mitigation sites were coordinated with the MBCI to identify any potential conflicts regarding Tribal rights, lands, and protected resources or other potential opportunities. The potential mitigation areas were again discussed on May 25, 2023, during the first Section 106 Consultation Meeting with Tribal stakeholders. The mitigation sites themselves were later determined to be unimplementable. However, this coordination resulted in the MBCI requesting consideration of potential Flood Risk Management (FRM) measures in the vicinity of the community of Edinburgh, Mississippi. Upon further research, it became apparent that the area requested by the MBCI to be evaluated for potential FRM measures was near, but geographically distinct from the Study Area, and therefore, the request was beyond the scope of the current project authority. These findings were communicated to MBCI during the second Section 106 consultation meeting with Tribal stakeholders on May 25, 2023. MBCI's request is documented here and is recommended for future coordination and consideration potentially under a separate authority.

On May 25, 2023, during the second Section 106 NHPA consultation meeting with Tribal stakeholders, the CNO initiated discussion about the potential to avoid and/or implement measures focused on conservation and/or ecological restoration of Cultural Keystone Species (CKS) identified by participating Tribes. A CKS can be a plant, animal, or other natural resource that has greatly shaped the cultural identity of a group of people. A CKS often has an important role in diet, materials, medicine, and/or spirituality. CKS can be integral parts of ritual, ceremony, and language, have links to kinship and oral tradition, and may be protected by a people. CKS play a role in environmental stewardship and ecosystem vitality. CKS offer indicators for ecosystem health and community resilience; protecting them ensures the survival of the communities which depend on them. Examples of CKS in the Study Area of documented significance identified by the CNO during this meeting included different species of plants, including Rivercane (*Arundinaria Gigantea*) and Switch cane

(*Arundinaria Tecta*), as well as other types of CKS resources including clay collection areas for pottery.

Discussions involving USACE, participating Tribes, the NFI, and other stakeholders regarding the potential to leverage both Traditional Indigenous Ecological Knowledge (TIEK) and scientific ecological knowledge to develop and implement sustainable practices for long-term successful CKS conservation and/or restoration and stewardship are presently ongoing. Since the initial May 25, 2023, discussion, the USACE PDT has further engaged on a Government-to-Government basis with the MBCI and CNO regarding Rivercane and the feasibility of engineering with nature opportunities for project elements, planting at habitat mitigation sites, planting as a Section 106 NHPA mitigation measure, and potential future Stewardship/Access Agreements. Further, on June 14, 2023, USACE held a follow-up meeting regarding Rivercane and Stewardship/Access Agreements for the PRBFRMP. In attendance were representatives from the CNO, USACE Tribal Center for Technical Expertise (TCTNX), the Rivercane Restoration Alliance (https://www.spa.usace.army.mil/Missions/TNTCX/Traditional-Ecological-Knowledge/Rivercane-Restoration-Alliance/), and USACE Cultural and Environmental PDT members. Discussion was focused on the feasibility of integrating Rivercane restoration into the PRBFRMP and recommendations regarding suitable (technically, ecologically, environmentally, and culturally) geographic locations for planting within the Pearl River Basin. The results of this discussion were coordinated with the MBCI on June 16, 2023, and again with participating Tribes and other potential stakeholders during the June 21, 2023, third Section 106 NHPA consultation meeting.

Restoration of Rivercane has the potential to improve riverine habit, water quality, erosion control, and cultural revitalization of practices threatened by development and agricultural pressures. Stewarding and conserving a CKS requires a holistic approach; one that accounts for the relationships between places, ecosystems, and cultures. USACE will continue to engage in consultation with Tribes during the selection of habitat mitigation sites. Efforts should be directed towards the restoration of Rivercane (*Arundinaria Gigantea*), Switch cane (*Arundinaria Tecta*), and/or other cane species of documented cultural significance and appropriateness for propagation within the Pearl River Basin. This consultation may result in Stewardship/Access Agreements between USACE, Federally-Recognized Tribes, NFI, FWS, and others, as appropriate.

On June 13, 2023, the following Federally-Recognized Tribes were also invited to participate in the planning process as Participating Agencies: ACTT, CNO, CTL, JBCI, MBCI, MCN, QN, and TBTL. (also see: Appendix A: *Scoping Report*). To date, no tribes have accepted the invitation to become Participating Agencies.

**Cultural and Historical Resources**

USACE has determined that this project is a Federal Undertaking, as defined by 54 U.S.C. § 300320 and 36 CFR § 800.16(y). Federal regulations require USACE, as an agency responsible for funds appropriated by Congress, to identify if properties are historic (listed or eligible for listing in the National Register of Historic Places (NRHP)); to assess the effects

the work would have on historic properties; to seek ways to avoid, minimize, or mitigate any adverse effects to historic properties; and, Section 106 of the National Historic Preservation Act (NHPA), as amended (54 U.S.C. § 300101 et seq.), requires Federal agencies to take into account their effects on historic properties and allow the Advisory Council on Historic Preservation (ACHP) an opportunity to comment. The implementing regulation for Section 106, 36 CFR Part 800, *Protection of Historic Properties*, lays out four (4) basic steps that must be carried out sequentially: 1) establish the undertaking identify consulting parties; 2) identify and evaluate historic properties; 3) assess effects to historic properties; and 4) resolve any adverse effects (avoid, minimize, or mitigate). An agency cannot assess the effects of the undertaking on historic properties until it has identified and evaluated historic properties within the Area of Potential Effects (APE). The agency must consult with the appropriate State Historic Preservation Officer (SHPO), Tribal Historic Preservation Officer/s (THPO) and/or tribal officials, State and local officials, non-Federal sponsors/applicants, other Consulting Parties and the public in the identification of historic properties, the assessment of adverse effects, and the resolution of adverse effects.

*Identification of Consulting Parties and Section 106 NHPA Consultation*

In partial fulfillment of USACE's Section 106 responsibilities, on February 15, 2023, USACE submitted an initial Section 106 Consultation letter entitled: "*Notice of Intent to Prepare Programmatic Agreement Regarding: "Pearl River Basin, Mississippi Federal Flood Risk Management Project, Hinds and Rankin Counties, Mississippi*" to the NFI, Mississippi State Historic Preservation Officer (SHPO) of the MDAH, and the ACHP (Appendix G). USACE also engaged in Government-to-Government consultation with Federally-Recognized Tribes via letter on February 15, 2023. Pursuant to 36 CFR § 800.2 (c)(2)(ii)(E), and in consideration of the confidentiality of information, USACE has invited the following Federally-Recognized Tribes to enter into an PA that specifies how USACE will carry out Section 106 responsibilities for this Undertaking: the ACTT, CN, CNO, CTL, JBCI, MBCI, MCN, QN, and, TBTL.

The aforementioned letters provided information regarding the study area, initial array of alternatives being considered, alternative evaluation criteria, mitigation plan formulation milestones, and USACE's proposal to develop a project-specific PA pursuant to 36 CFR § 800.14(b) to fulfill its responsibilities under Section 106 of the NHPA. Additionally, this letter invited stakeholders to provide input regarding the proposed undertaking and its potential to significantly affect historic properties and/or sites of religious and cultural significance on or off Tribal Lands [as defined in 36 CFR § 800.16(x)] and requested potential Consulting Parties' assistance with identifying other relevant entities who may have an interest in participating in the consultation.

As the proponents of the Undertaking, RHFDCD are a Signatory to the PA. On March 15, 2023, USACE received a written response from SHPO stating "The Alabama-Coushatta Tribe has expressed interest in Hinds and Rankin Counties to MDAH during calls related to NAGPRA repatriations" and "MDAH concurs with the proposal to develop a project-specific PA and looks forward to participating in the consultations and providing further comment," and are a Signatory to the PA. As a result of this consultation, SHPO also identified the City

of Jackson, Certified Local Government (CLG), as potentially having an interest in participating in this consultation. On March 28, 2023, USACE forwarded a copy of the March 15, 2023, letter provided to SHPO to the CLG and requested the CLG participate in the development of the PA for this Undertaking. At the present time, the CLG still has not confirmed if they wish to be a signatory party to the Agreement. Further, in accordance with 36 C.F.R. § 800.6(a)(1), the ACHP has been provided the required documentation and invited to participate in this PA. On March 16, 2023, the ACHP provided written notice stating that "our participation may be premature" and stating, "We request that within 180 calendar days of receiving this correspondence, you provide the ACHP with an update as to the progress of the consultation since February of 2023." On July 6, 2023, the ACHP provided written notice that it has chosen to participate in the consultation and are a Signatory to the PA. On February 23, 2023, the CN submitted a written response to USACE's letter deferring to the "First American Tribe(s) who have identified a connection to the project area." On February 28, 2023, the QN submitted a written response to USACE's February 15, 2023, requesting additional Government-to-Government consultation to discuss the details of the project. On March 22, 2023, USACE and the QN engaged in additional consultation via teleconference. During this meeting the QN confirmed that consultation to develop a PA is appropriate, the QN is only interested in portion of the project area within Hinds County on west side of Pearl River, the QN would review MDAH's finding, and that the QN will participate as a Consulting Party and are an Invited Signatory to the PA. Additional correspondence was received from the QN on March 22, 2023, stating that "We concur with their [MDAH] findings and recommendations." In addition to USACE's February 15, 2023, letter, USACE conducted additional consultation with the MBCI on February 22, 2023 (e-mail), and March 13, 2023 (telephone conference and follow-up e-mail). During the March 13, 2023, meeting the MBCI confirmed that they will participate as a Consulting Party and are a Concurring Party to the PA. On April 4, 2023, the CNO submitted a written response to USACE's letter stating "Hinds and Rankin Co.'s, MS, lie in our area of historic interest. Our office requests to be a consulting party on the PA" and are an Invited Signatory to the PA. To-date, no other Federally-Recognized Tribes have expressly declined to enter into this Agreement as a signatory party. Following USACE Public meetings regarding the PRBFRMP in late March, during which stakeholders voiced concerns about the potential of inadvertent downstream effects within Louisiana, on May 24, 2023, USACE contacted the LA SHPO's office and invited them to participate in an upcoming regularly scheduled May 25, 2023, Section 106 NHPA consultation meeting. Following the LA SHPO's participation in this meeting, USACE received notice that the LA SHPO "In the absence of any documentation of potential effects [in Louisiana], [we] see no need for our office to participate in future consultations."

On May 10, 2023, USACE posted a NHPA/NEPA Public Notice (Appendix G) on the designated project website: (http://www.mvk.usace.army.mil/Missions/Programs-and-Project-Management/Project-Management/Pearl-River/) for a (30)-day comment period requesting the public's input concerning: 1) the proposed Undertaking and its potential to significantly affect historic properties; 2) assistance in identifying any relevant parties who may have an interest in participating in this consultation, and; 3) USACE's proposal to develop a PA pursuant to 36 CFR § 800.14(b). No comments were received.

USACE is continuing to follow its Section 106 procedures described in Section 1.11.1 to develop a project-specific PA in furtherance of USACE's Section 106 responsibilities for this Undertaking. The PA would then govern USACE's subsequent NHPA compliance efforts. A schedule of past and future proposed PA development milestones is provided below:

- 1st Section 106 Consultation Meeting (Complete).
- Prepare Draft *Whereas* clauses (Complete)
- Draft Whereas submitted to consulting parties on 05/10/2023 (Complete).
- 2nd Section 106 Consultation Meeting: Discuss general comments on Draft *Whereas* clauses 05/25/2023 (Complete).
- Prepare Draft *Stipulations* (Complete).
- Draft Stipulations submitted to consulting parties by 06/07/2023 (Complete).
- 3rd Section 106 Consultation Meeting: Discuss general comments on 2nd Draft *WHEREAS* clauses and 1st Draft *Stipulations* (Complete).
- Prepare Draft Appendixes (Complete).
- Draft Appendixes submitted to consulting parties by 07/19/2023 (2-week review).
- 4th Section 106 Consultation Meeting to discuss general comments on Draft Appendixes 08/02/2023 (concurrent with end of 2-week stakeholder review).
- Address any remaining Consulting Party recommended edits and prepare complete Draft PA (2 weeks).
- Complete Draft PA submitted to consulting parties by 08/16/2023 (temporarily paused; resuming consultation concurrently with the release of this document);
- 5th Section 106 Consultation Meeting: TBD.
- USACE/Consulting Parties complete legal review: TBD.
- Begin/End signature ("Execution") process: TBD.
- Transmit Executed (signed) PA to ACHP and Consulting Parties for Implementation: TBD.

Following the execution of the PA, the ASA(CW) may proceed with issuing a ROD in compliance with Section 106 of the NHPA and NEPA. A working Draft of the PA is included in Appendix G.

*Existing Condition*

In this Section, the "Study Area" is referenced in place of a formal APE for discussion and planning purposes (Figure 1-1). The Study Area is inclusive of all "Project Areas" discussed subsequentially in this document. At the feasibility stage, the APE is conceptual; USACE acknowledges that the APE could change in PED. Therefore, USACE proposes to adopt a programmatic approach in accordance with 36 CFR § 800.14(b) to determine the final APE for the Undertaking in consultation with SHPO and participating Tribe(s) pursuant to 36 CFR § 800.16(d). The APE will incorporate direct effects (e.g., access, staging, and construction areas) including all areas of proposed ground disturbance, indirect effects (e.g., visual), and cumulative effects. Furthermore, USACE may consider information provided by other parties, such as the NFI, local governments, and the public, when establishing the APE.

The following data is not intended to be all-inclusive but is meant to provide a general understanding of the various types of historic resources that may be encountered within the Study Area that could be affected by the proposed Undertaking so that effective programmatic review measures can be developed in consultation with the appropriate stakeholders. The cultural prehistory and history of east-central and southwest Mississippi is a rich one that is shared with much of the southeast. The generalized Pre-Contact cultural chronology for the region according to Rees (2010:12) is divided into five primary archaeological components, or "periods," as follows: Paleoindian (11,500-8000 B.C.), Archaic (8000-800 B.C.), Woodland (800 B.C.-1200 A.D.), Mississippian (1200-1700 A.D.), and Historic (1700 A.D.-present). Regionally, these periods have been further divided into sub-periods based on material culture, settlement patterns, subsistence practices, and sociopolitical organization. Further, the Study Area contains archaeological sites (and above-ground resources) associated with both the prehistoric period and the historic period of significance correlating to the following MDAH Historic Themes (MDAH 2019): *Traditional Cultural Properties*; *Antebellum Mississippi*; *Civil Rights*; *Depression Era* (including New Deal projects constructed between 1933 to 1939); *Education*; *Historic Indian*; *Industrial/ Commercial*; *Landscape/Landscape Features*; *Military*; *Post Reconstruction*; *Pre-World War II Mississippi* (1900-1941); *Post World War II Mississippi* (1942-present); *Protohistoric Period*; *Reconstruction*; *Technology/Engineering*; *Transportation/Communication*; *Historic Bridges of Mississippi*; and others.

USACE has conducted a review of existing documentation: the NRHP database, the Mississippi Department of Archives and History (MDAH) *Historic Resources Inventory Database* (MDAH Website), MDAH Site Cards, historic map research, a review of cultural resources survey reports and other pertinent data and has determined that there are multiple historic properties as defined in 36 CFR 800.16(l) within the Study Area. Approximately 179 archaeological sites have been previously recorded within the Study Area that collectively span the entire spectrum of Pre-Contact and Post-Contact/historic cultural components generally recognized for the region, encompassing roughly some 10,000 years or more. Further, the Study Area contains archaeological sites (and above-ground resources) associated with both the prehistoric period and the historic period of significance spanning from the early- to mid-nineteenth century up until the mid-twentieth century. It is also important to stress that many known sites in the Study Area have cultural components encompassing more than one of these cultural/temporal periods, attesting to the long-ranging cultural importance of the region. However, the current distribution of known historic resources in the Study Area is largely indicative of project-specific Federal and State compliance activities, rather than activity specific survey for this Undertaking. Therefore, in addition to considering the documented archaeological resources within the Study Area, project areas must also be further assessed for unevaluated resources.

For example, the Study Area also falls partially within the footprint of the National Park Service (NPS) American Battlefield Protection Program (54 U.S.C. 380101-380103), Civil War Sites Advisory Commission (Public Law 101-628) "Battle of Jackson." Although it is unlikely that the landscape retains sufficient visual integrity to convey the battlefield's significance, it is possible that intact Civil War-era archaeological deposits still exist within

the Study Area, such as the likely location of the Pearl River Bridge Prisoner of War Camp and other defensive structures along the Pearl River indicated on historic maps.

USACE has also determined that the Study Area contains over 5006 inventoried built-environment resources (above-ground), 57 properties individually listed on the NRHP, four (4) National Historic Landmarks (NHL); Eudora Welty House and Garden, Mississippi State Capitol, Governor's Mansion, and the (Old) Mississippi State Capitol, and 10 primary National Register Historic Districts (NRHD), many of which have had boundary increases or amendments since their original designation, which include: Belhaven; Belhaven Heights (and Amendment); Farish Street Neighborhood (and Amendment); Poindexter Park; Smith Park Architectural (and Boundary Increase I/II/III); Spengler's Corner (and Boundary Increase); West Capitol Street; Downtown Fondren; Southwest Midtown; and Upper Midtown NRHDs.

At the state level of significance, the Study Area contains four (4) locally designated historic districts, three (3) of which correspond to, in whole or in part, with existing NRHDs which include: Belhaven Heights Historic District, Farish Street Historic District, Morris Historic District, and Belhaven Historic District. The Study Area also contains 64 Mississippi Landmarks; some of which fall within close proximity to the project footprint (e.g., Fewell Water Plant and Woodrow Wilson Bridge). The Mississippi Landmark designation is the highest form of recognition bestowed on properties by the State of Mississippi and offers the fullest protection against changes that might alter a property's historic character. Publicly owned properties that are determined to be historically or architecturally significant may be considered for designation. Significant publicly owned archaeological sites are automatically deemed Mississippi Landmarks under the Mississippi Antiquities Law. Further, no comprehensive systematic built-environment survey has been conducted throughout the entire Study Area, and project areas and their associated view-shed APE(s) must also be further assessed for unevaluated cultural resources.

**Recreational Resources**

This resource is institutionally important because of the Federal Water Project Recreation Act of 1965, as amended and the Land and Water Conservation Fund Act of 1965, as amended. Recreational resources are technically important because of the high economic value of these recreational activities and their contribution to local, state, and national economies. Recreational resources are publicly important because of the high value that the public places on outdoor recreation as sustenance to individual wellness, community health, and consumptive leisure activities like hunting and fishing. The public's recreation wants and needs are often measured and valued through Statewide Comprehensive Outdoor Recreation Plans (SCORP) which serve as a guide for all public outdoor recreation in neighborhoods, cities, and regions for a given state.

*Existing Conditions*

Public recreation in the Study Area includes numerous city and community parks consisting of playgrounds, swimming pools, golf courses, tennis courts, picnic grounds, and jogging

and walking paths. Additional public recreation areas near the Ross Barnett Reservoir are maintained by the Pearl River Valley Water Supply District (PRVWSD) and the Pearl River Basin Development District. Consumptive recreational activities in the area include fishing and, to a limited degree, hunting. Non-consumptive recreational activities include hiking, canoeing, boating, outdoor photography, biking, ATV riding, camping, and wildlife observation. The MDWFP LeFleur's Bluff State Park is also located within the study area and is sited along Pearl River.

Public access to the Pearl River itself is significantly limited due to private ownership along much of the waterfront. Public boat ramps on the Pearl River are limited to two locations, one at Lefleur's Bluff State Park and another at the Ross Barnett Reservoir Dam. The existing weir at the City of Jackson's Waterworks (RM 290.7) also limits watercraft access along much of the Pearl River in the area.

According to the United States Department of the Interior National Park Service Land & Water Conservation Fund (LWCF), 24 recreation projects have been supported since 1965 (Table 2-5). Section 6(f)(3) of the LWCF Act assures that once an area has been funded with LWCF assistance, it is continually maintained in public recreation use unless NPS approves substitution property of reasonably equivalent usefulness and location and of at least equal fair market value.

*Table 2-5. Recreation Projects Supported with LWCF Funding*

| Grant Element Title | County | Municipality | Fiscal Year | Amount |
|---|---|---|---|---|
| Flowood River Park | Rankin | Flowood | 1991 | $25,000 |
| Pearl City Park | Rankin | Pearl | 1974 | $75,000 |
| Pearl City Parks | Rankin | Pearl | 1979 | $217,000 |
| Wilton Jackson Ramp | Rankin | Pearl | 1970 | $2,700 |
| Wilton Jackson Rec Area | Rankin | Pearl | 1971 | $34,100 |
| MS Consolidated Project Phase III | Hinds | Jackson | 1979 | $17,500 |
| Airport Park | Hinds | Jackson | 1976 | $67,700 |
| Hinds County Parks | Hinds | Regional | 1981 | $157,100 |
| Jackson City Park | Hinds | Jackson | 1972 | $89,400 |
| Jackson Swimming Pool Complex | Hinds | Jackson | 1974 | $480,000 |
| Jackson Tennis Center | Hinds | Jackson | 1976 | $225,000 |
| Jackson Urban Parks | Hinds | Jackson | 1980 | $376,800 |
| Jackson Urban Playgrounds | Hinds | Jackson | 1985 | $44,800 |
| LeFleur's Bluff Nature Trail | Hinds | Regional | 2017 | $20,000 |
| LeFleur's Bluff Bank Stabilization | Hinds | Regional | 2018 | $294,000 |
| LeFleur's Bluff Gatehouse | Hinds | Regional | 2018 | $250,000 |
| LeFleur's Bluff Playground | Hinds | Regional | 2018 | $200,000 |

| | | | | |
|---|---|---|---|---|
| LeFleur's Bluff State Park | Hinds | Regional | 1984 | $100,000 |
| LeFleur's Bluff Park Expansion | Hinds | Regional | 1990 | $73,300 |
| LeFleur's Bluff State Park | Hinds | Regional | 1971 | $317,100 |
| LeFleur's Bluff State Park | Hinds | Regional | 1973 | $36,100 |
| LeFleur's Bluff State Park | Hinds | Regional | 1974 | $132,600 |
| Poindexter Park | Hinds | Jackson | 1995 | $30,000 |
| Smith Park | Hinds | Jackson | 1974 | $198,300 |
| | | | | **$3,500,000** |

Source: https://lwcf.tplgis.org/

## Aesthetics

This resource is institutionally important because of the laws and policies that affect visual resources, including but not limited to NEPA, USACE ER 1105-2-100, the Wild and Scenic Rivers Act of 1968 with amendments, and the National and Local Scenic Byway Program. Aesthetic resources are technically important because of the high value placed on the preservation of unique geological, botanical, and cultural features. Aesthetic resources are publicly important in that environmental organizations and the public support the preservation of natural pleasing vistas.

*Existing Conditions*

The study area has experienced a significant amount of development over time. Aerial imagery analysis over the last 20 years shows an increase in developed land uses and deforestation concentrated around the municipalities of Jackson, Flowood, Pearl, and Richland. Urbanization patterns within the study area have transformed visual components over time from what was once a primary bottomland hardwood riparian habitat to a mosaic of forested corridors, cropland patches, and interconnected municipal clusters which is characteristic of the Mississippi Valley Loess Plains Ecoregion. Additionally, previous flood control projects along the Pearl River floodplain and its tributaries have transformed aesthetic and visual resources within the study area. This urbanization is largely due to growth within the municipalities listed and along the transportation corridors transecting the area.

The primary source of public visual access is along major transportation routes. In the northern portion of the study area and just south of the Ross Barnett Reservoir, MS Hwy 25 (Lakeland Drive) crosses the Pearl River from east to west and connects Flowood with Jackson. In the southern portion of the study area, Interstate 20 and Hwy 80/MS Hwy 18 also cross the Pearl River from east to west and connect Pearl with Jackson. Both Interstate 55 and Hwy 51 (N. State Street) transect the study area from north to south and connect Richland with Jackson. Additionally, the Natchez Trace Parkway is located to the west of the study area. This byway is a part of the Mississippi Scenic Byways Program (MSBP) under the Mississippi Department of Transportation (MDOT) which helps to preserve, enhance, and protect the state's intrinsic resources for visitors and residents of the state.

In 1999, the Mississippi Scenic Stream Stewardship Act was created to "encourage voluntary private conservation efforts along Mississippi's unique and outstanding rivers and streams by riparian (streamside) landowners. In a non-regulatory framework, landowners would be assisted in voluntary management agreements which seek to maintain scenic values while ensuring their rights to continue customary uses along the stream." This is a non-binding agreement between the MDWFP and the landowner.

Regional tourism programs include, but are not limited to, www.visitjackson.com and www.visitmississippi.org.

**Air Quality**

The EPA, Office of Air Quality Planning and Standards has set National Ambient Air Quality Standards, (NAAQS), for six principal pollutants, called "criteria" pollutants (Table 2-6). They are carbon monoxide, nitrogen dioxide, ozone, lead, particulates of 10 microns or less in size (PM-10 and PM-2.5), and sulfur dioxide. Ozone is the only parameter not directly emitted into the air, but it forms in the atmosphere when three atoms of oxygen (Ozone 03) are combined by a chemical reaction between oxides of nitrogen and volatile organic compounds in the presence of sunlight. Motor vehicle exhaust and industrial emissions, gasoline vapors, and chemical solvents are some of the major sources of nitrogen and volatile organic compounds, also known as ozone precursors. Strong sunlight and hot weather can cause ground-level ozone to form in harmful concentrations in the air.

*Table 2-6. NAAQS Criteria Pollutants Exceedance Levels*

| Pollutant [links to historical tables of NAAQS reviews] | Primary/ Secondary | Averaging Time | Level | Form |
|---|---|---|---|---|
| Carbon Monoxide (CO) | Primary | 8 hours | 9 ppm | Not to be exceeded more than once per year |
| | | 1 hour | 35 ppm | |
| Lead (Pb) | primary and secondary | Rolling 3 month average | 0.15 µg/m$^3$ (1) | Not to be exceeded |
| Nitrogen Dioxide ($NO_2$) | Primary | 1 hour | 100 ppb | 98th percentile of 1-hour daily maximum concentrations, averaged over 3 years |
| | primary and secondary | 1 year | 53 ppb (2) | Annual Mean |
| Ozone ($O_3$) | primary and secondary | 8 hours | 0.070 ppm (3) | Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years |

| Pollutant [links to historical tables of NAAQS reviews] | | Primary/ Secondary | Averaging Time | Level | Form |
|---|---|---|---|---|---|
| Particle Pollution (PM) | $PM_{2.5}$ | primary | 1 year | 9.0 µg/$m^3$ | annual mean, averaged over 3 years |
| | | secondary | 1 year | 15.0 µg/$m^3$ | annual mean, averaged over 3 years |
| | | primary and secondary | 24 hours | 35 µg/$m^3$ | 98th percentile, averaged over 3 years |
| | $PM_{10}$ | primary and secondary | 24 hours | 150 µg/$m^3$ | Not to be exceeded more than once per year on average over 3 years |
| Sulfur Dioxide ($SO_2$) | | primary | 1 hour | 75 ppb (4) | 99th percentile of 1-hour daily maximum concentrations, averaged over 3 years |
| | | secondary | 3 hours | 0.5 ppm | Not to be exceeded more than once per year |

(1) In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 µg/m3 as a calendar quarter average) also remain in effect.

(2) The level of the annual NO2 standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.

(3) Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O3 standards are not revoked and remain in effect for designated areas. Additionally, some areas may have certain continuing implementation obligations under the prior revoked 1-hour (1979) and 8-hour (1997) O3 standards.

(4) The previous SO2 standards (0.14 ppm 24-hour and 0.03 ppm annual) would additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2) any area for which an implementation plan providing for attainment of the current (2010) standard has not been submitted and approved and which is designated nonattainment under the previous SO2 standards or is not meeting the requirements of a SIP call under the previous SO2 standards (40 CFR 50.4(3)). A SIP call is an EPA action requiring a State to resubmit all or part of its State Implementation Plan to demonstrate attainment of the required NAAQS. Table Source: https://www.epa.gov/criteria-air-pollutants/naaqs-table, 29 April 2024

The air quality within the study area, which includes Madison County, Hinds County and Rankin County, are currently in attainment status according to EPA and MDEQ. The EPA has set air quality standards for six principal pollutants: nitrogen dioxide, ozone, sulfur

dioxide, particulate matter, carbon dioxide, and lead. Currently, Mississippi meets all air quality standards.

**Noise**

Noise pollution adversely affects the lives of millions of people. Inadequately controlled noise presents a growing danger to the health and welfare of the nation's population and studies have shown that there are direct links between noise and health, particularly in urban areas. Noise Induced Hearing Loss (NIHL) is the most common and often discussed health impact, but research has shown that exposure to constant or high levels of noise can cause countless adverse health impacts, including but not limited to sleep disturbances, stress, mood changes, emotional imbalance, mental fatigue, headaches, cognitive and learning disorders, cardiovascular effects, and high blood pressure. (US EPA)

The Noise Control Act of 1972 establishes a national policy to regulate and promote an environment for all Americans free from noise that jeopardizes their health or welfare and the Occupational Safety and Health Administration Standards (29 CFR Part 1910) set standards regarding protection against the effects of noise exposure. The Act also serves to:

1. Establish a means for effective coordination of Federal research and activities in noise control.
2. Authorize the establishment of Federal noise emission standards for products distributed in commerce.
3. Provide information to the public respecting the noise emission and noise reduction characteristics of such products.

*The Science of Sound*

Sound is often generated by activities as a part of everyday life. Human response to sound varies depending on the type and characteristics of the sound, distance between the source and the receptor, sensitivity of the receptor, and the time of day the disturbance takes place. Sound becomes unwanted, referred to as noise, when it either interferes with normal activities, such as sleeping or conversation, or has a negative impact on the quality of life.

At a scientific level, sound and noise are technically the same. Both are vibrations in the air (or in water) that are picked up by the ear, converted to electrical impulses, and sent to the brain to be processed. The larger the sound waves, the stronger the vibrations, and the louder the sound. Sounds can be used to communicate, warn, navigate, and as a form of entertainment. Alternatively, noise is defined as any sound that is undesirable or disturbing because it interferes with communication, is intense enough to damage hearing, or is otherwise intrusive. So, while all noise is sound, not all sound is noise.

Sound varies by both intensity and frequency and the human ear responds differently to different frequencies. Hertz, (Hz), is the standard unit of frequency in the International System of Units (SI), and it is equal to one cycle per second. Sound intensity, described in decibels (dB), is the amount of energy in a confined space. Loudness refers to how audible sounds are perceived, but it is not directly proportional to sound intensity. How loud

something sounds differs from the actual intensity of that sound, and even if two sounds have equal intensity, it does not mean they are equally loud. A sound that seems loud in a quiet room might not be noticeable while amid heavy traffic. The risk of hearing damage increases with the intensity of the sound, not the loudness of sound.

*A-weighing*, described in *a-weighted decibels* (dBA), is a noise metric that describes steady noise levels. Since very few noises are, in fact, constant; a noise metric, A-weighted Day-night Sound Level (ADNL) was developed. Day-night Sound Level (DNL) is defined as the average sound energy in a 24-hour period with a 10-dB penalty added to the nighttime levels (10 P.M. to 7 A.M.). DNL is a useful descriptor for noise because (1) it averages ongoing yet intermittent noise, and (2) it measures total sound energy over a 24-hour period. In addition, Equivalent Sound Level (Leq) is often used to describe the overall noise environment. Leq is the average sound level in dB.

Sounds encountered in daily life and their approximate levels in dBA are provided in the following table 2-7:

*Table 2-7. Sound Level for Daily Life Activities*

| Sound Level (dBa) | Indoor | Outdoor | Human Response |
|---|---|---|---|
| 0 | The softest sound that can be heard | | Sounds at these levels typically don't cause any hearing damage. |
| 10 | Normal breathing | A leaf in the wind | |
| 20 | Ticking watch | Leaves rustling | |
| 30 | Whisper | Soft music | |
| 40 | Library | Babbling brook | |
| 50 | Refrigerator | Gentle rainfall | |
| 60 | Sewing Machine | Normal Conversation | |
| | | | |
| 70 | TV Audio | Freeway Traffic (50ft) | Some annoyance |
| 80 | Ringing Telephone | Downtown (large city) | Elevated annoyance |
| 85 | Blender | Gas lawnmower | Damage to hearing possible after 2 hours of exposure |
| 90 | Indoor concert | Motorcycle | |

Natural factors such as topography and vegetation can help reduce noise levels over long distances. When ground cover or normal unpacked earth exists between the source and

receptor, the ground becomes absorptive of noise energy. Refraction of sound waves occurs when sound passes through vegetative barriers and bends around plant structures. Leaves, twigs, and branches on trees, shrubs, and herbaceous growth absorb and deflect sound energy.

There are many different existing sources of noise throughout the project area, which is adjacent to the Jackson Metropolitan Area. As an urban area, the primary noise contributors are associated with the daily normal urban activities including operation of commercial and private vehicles (cars, trucks, trains); aircraft; operation of machinery and motors; and human industry-related noise (such as business operations). The noise levels in the affected area are typically low in subdivisions and in outlying areas and are higher in the proximity of major streets and highways.

Background noise levels are variable depending on the time of day and climatic conditions. Contributing activities include construction (road and highway), and development and industrial activities, particularly within the eastern and southern portions of the project area. Nearby developed areas, automobile and train traffic, and to a lesser extent air traffic, contribute to the background noise levels.

**Hazardous, Toxic and Radioactive Waste**

In accordance with USACE ER 1165-2-132 a NFI is responsible for providing a clean site for construction of the project, and USACE is prohibited from undertaking HTRW work on behalf of the NFI. The performance and costs of HTRW cleanup and response would not be included as part of the Federal project. A NFI for a project must perform, or ensure performance of, any investigations for HTRW that are determined necessary to identify the existence and extent of any HTRW regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. 9601-9675, and any other applicable law, that may exist in, on, or under real property interests that the Federal government determines to be necessary for construction, operation, and maintenance of the project. A NFI must also agree, as between the Federal government and the non-Federal interest, to be solely responsible for the performance and costs of cleanup and response of any HTRW regulated under applicable law that are located in, on, or under real property interest required for construction, operation, and maintenance of the project, including the costs of any studies and investigations necessary to determine an appropriate response to the contamination, without reimbursement or credit by the Federal government. Finally, the non-Federal interest must agree, as between the Federal government and the non-Federal interest, that the non-Federal interest shall be considered the owner and operator of the project for the purpose of CERCLA liability or other applicable law, and to the maximum extent practicable shall carry out its responsibilities in a manner that would not cause HTRW liability to arise under applicable law.

ER 1165-2-132, Section 8.d.1, which further details Army policy on the avoidance of HTRW Sites: “Avoidance of HTRW sites. Civil Works plan formulation and plan selection may be substantially influenced by the presence of HTRW in the project area. HTRW sites would be avoided whenever practicable. They may be a significant factor in project alternative design

even though cost may be greater than a plan that provides for HTRW response action. Consideration may be given to designating an HTRW avoidance alternative as the National Economic Development plan when costs and risks of response actions are uncertain."

A HTRW Phase I & a limited Phase II Environmental Site Assessment was conducted by the Non-Federal Interest in September 2014, and updated in August 2021. A technical memorandum was conducted by the NFI in December 2023 of the project area. Several Recognized Environmental Conditions were identified within the project area including an Unpermitted Gallatin Street Landfill Site, Unpermitted Lefleurs Landing "Jefferson Street Landfill", Gulf State Creosoting Company Site, Sonford Products Lumber Mill "Registered Superfund site", Rival Crockpot Site "Former superfund site", and three former automotive salvage yards. . Though analysis was conducted by the NFI, additional investigation and site visits are recommended.

**Socioeconomics**

*Region of Influence*

The region of influence is comprised of the following three counties in Mississippi: Hinds County, Madison County, and Rankin County.

*Population & Housing*

*Population*

Table 2-8 shows historic population from 1970 – 2020 among each of the three counties that are within the region of influence of the study area. Each of the counties experienced increases in population from 1970 until 1990. This is largely in part to the growth of the State capital of Jackson, situated in Hinds County. The growth here fueled suburbanization of the surrounding area during this time. By 2000, individuals began leaving the urban area of Jackson and relocating to other counties in the area. Economic opportunities were also beginning to decrease in Jackson during the 1990s as a result of decreasing manufacturing and textile demand during this time. These trends continued to play a large role in the decreasing population of Hinds County in addition to the relocation of individuals to other counties within the study area.

*Table 2-8. Population by County Households*

| Populations by County (000's) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **County** | **1970** | **1980** | **1990** | **2000** | **2010** | **2020** | **2030** | **2040** |
| **Hinds County (MS)** | 215 | 252 | 255 | 250 | 246 | 236 | 230 | 221 |
| **Madison County (MS)** | 30 | 42 | 54 | 75 | 96 | 105 | 124 | 136 |
| **Rankin** | 44 | 70 | 88 | 116 | 142 | 154 | 164 | 172 |

| County (MS) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Source: US Census Bureau (BOC), Moody's Analytics (ECCA) Forecast* | | | | | | | | |

Table 2-9 shows the number of households broken into counties that are within the region of influence. Similar to the trend in population, there were increasing households among all counties from 1970 – 1990. Hinds County experienced increased households by 2000, but at a much lesser rate of growth than previously experienced. After 2000, the number of households in Hinds County declined and is projected to continue declining. This is largely due economic factors that the county was experiencing, including increased suburbanization of the Jackson, MS area, the recession the United States experienced beginning in 2008, as well as inundation that was experienced in this area by the Pearl River. Frequent inundation causes damages to structures that may be unfixable, causing a steep decline in the number of households residing in the area.

*Table 2-9. Households by County*

| Number of Households by County (1970 - 2040) (000's) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **County** | **1970** | **1980** | **1990** | **2000** | **2010** | **2020** | **2030** | **2040** |
| **Hinds County (MS)** | 63 | 86 | 91 | 91 | 92 | 89 | 92 | 91 |
| **Madison County (MS)** | 8 | 13 | 19 | 27 | 36 | 40 | 50 | 56 |
| **Rankin County (MS)** | 11 | 22 | 30 | 42 | 53 | 57 | 66 | 71 |
| *Source: US Census Bureau (BOC), Moody's Analytics (ECCA) Forecast* | | | | | | | | |

*Employment, Business, and Industrial Activity*

*Employment*

Historical employment data from 1990 to 2020 is presented in Table 2-10. This decrease in employment is consistent with the economic recessions that took place in both the 1990s and the 2000s. The urban area of Jackson, MS, which resides in Hinds County, decreases in population closely mirror that of employment levels in the region of influence. Additional factors that cause a declining employment level would be the COVID-19 pandemic, which halted hiring and caused many temporary lay-offs and permanent dismissal.

*Table 2-10. Employment by County*

| Employment by County (1990 - 2040) (000's) |
|---|

| County | 1990 | 2000 | 2010 | 2020 | 2030 | 2040 |
|---|---|---|---|---|---|---|
| **Hinds County (MS)** | 121 | 117 | 103 | 99 | 96 | 96 |
| **Madison County (MS)** | 25 | 38 | 45 | 50 | 57 | 64 |
| **Rankin County (MS)** | 45 | 61 | 66 | 70 | 75 | 81 |
| *Source: Bureau of Labor Statistics (BLS), Moody's Analytics (ECCA) Forecast* | | | | | | |

*Employment by Industry*

Figure 2-17 demonstrates the aggregated industry among the region of influence from year to year starting in 2018 until 2021. This figure indicates that the largest employment industry is the trade, transportation, and utilities sector. This industry experienced a decreasing rate of growth in the year 2020. This is largely due to the COVID-19 pandemic as well as flooding that occurred in 2020. According to the Bureau of Economic Analysis, from 2019 to 2020, the aggregated number of employer establishments for the region of influence decreased by 0.5 percent. Both the State of Mississippi and the United States saw an increase in employer establishments of 0.92 percent and 2.48 percent respectively. The labor market in the region of influence is heavily influenced by community factors, including inundation of businesses causing damages and pauses in demand. In 2021, Hinds County continued to see a decrease in employer establishments of 1.76 percent.

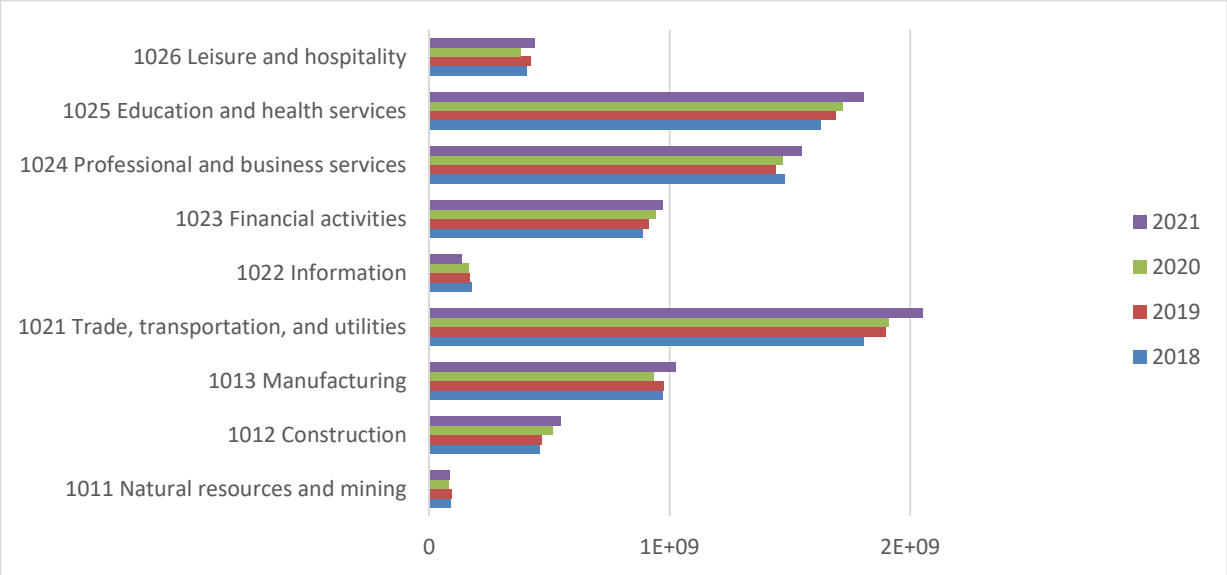



*Figure 2-17. Employment by Industry*

*Public Facilities & Services*

Table 2-11 indicates the number of critical infrastructure and the types that are within the region of influence.

*Table 2-11. Critical Infrastructure*

| Critical Infrastructure | |
|---|---|
| **Type of Infrastructure** | **Count** |
| **Fire Stations** | 10 |
| **Hospitals** | 5 |
| **Law Enforcement** | 15 |
| **Nursing Homes** | 5 |
| **Correctional Facilities** | 3 |
| **Schools** | 33 |
| **Energy Substations** | 22 |
| **Colleges & Universities** | 10 |

*Community Cohesion*

*Places of Worship*

According to the USGS's survey on Places of Worship in 2022, there are 132 places of worship within the study area. One Hundred of those places of worship are situated in the city of Jackson specifically. Places of congregation allow for an understanding and representation of themselves as both an individual and within a community.

*Community Centers*

In addition to places of worship, there are several community centers located in the study area. The Jackson, MS government has several recreation activities that it supports each year for children and adolescents that provide a sense of belonging and identity. In addition to recreation and athletic programs, the City of Jackson also supports several community centers that provide a location for a community to safely engage with other members and create relationships among each other.

**Infrastructure**

The incorporated areas within the study area are serviced by public water and wastewater facilities, gas, electricity, telecommunications, and solid waste collection. Generally, the utility providers are sufficient to supply the population with uninterrupted access to utilities. Wastewater treatment facilities currently run parallel to the Pearl River. The wastewater interceptor traverses the Pearl River floodplain before entering the Savana Street WWTP on the west bank of the Pearl River. The plant is surrounded by a levee that is not USACE-certified. Existing water infrastructure becomes stressed under flood conditions of the Pearl River. In 2022, there was unprecedented stress as an indirect effect of the Pearl River flooding, causing individuals to lose access to clean drinking water.

**Transportation**

*Roadway Networks*

The study area is comprised of several roadway classifications, including interstate highways, US highways, State highways, State routes, and local roads.

Access to transportation for both individuals using their own vehicle or using public transportation is necessary as it allows employment to be reached outside of walking distance. Residents of this area depend on transportation corridors as shown in 2. According to the Mississippi Department of Transportation, several of the site have decreased their average daily traffic use. This decrease is a direct result of the COVID-19 Pandemic that occurred in 2020, halting necessity for many individuals commuting to work. Despite this overarching decrease, the demand is still very large for these roadways, and they are necessary to access employment establishments as well as essential services, like healthcare and grocers.

*Table 2-12. Major Transportation Routes in the Region of Interest*

| Location | Site ID | 2019 ADT | 2021 ADT |
|---|---|---|---|
| Lakeland at Ridgewood | 251,050 | 47,000 | 61,000 |
| I-55 near Eastover Dr | 250,990 | 106,000 | 121,000 |
| US Hwy 80 near I-55 | 610,230 | 16,000 | 14,000 |
| I-20 near Childre Road | 610,570 | 72,000 | 75,000 |
| Lakeland at Treetops Blvd | 610,840 | 51,000 | 51,000 |
| US hwy 49 at Quinn/McBride | 610,520 | 48,000 | 51,000 |
| Old Hwy 49N at Club Oak Dr | 611,620 | 5,400 | 5,600 |
| Old Brandon Rd at I-55 | 616,004 | 5,400 | 5,900 |

*Public Transportation*

Figure 2-18 describes the CDC's Social Vulnerability Index as it relates to the Transportation and Housing theme. Within the city of Jackson, there are several census tracts that are in the 80$^{th}$ percentile or higher for having no vehicle. These tracts are particularly dependent on public transportation, including the Jackson Transit System (JTran). Access to this mode of transportation allows for individuals to gain employment opportunities outside of walking distance, access to grocery stores and other essential

services that may be required. Inundation on roadways presents an existing impact on roadways and therefore public transportation that is present in the region of interest.

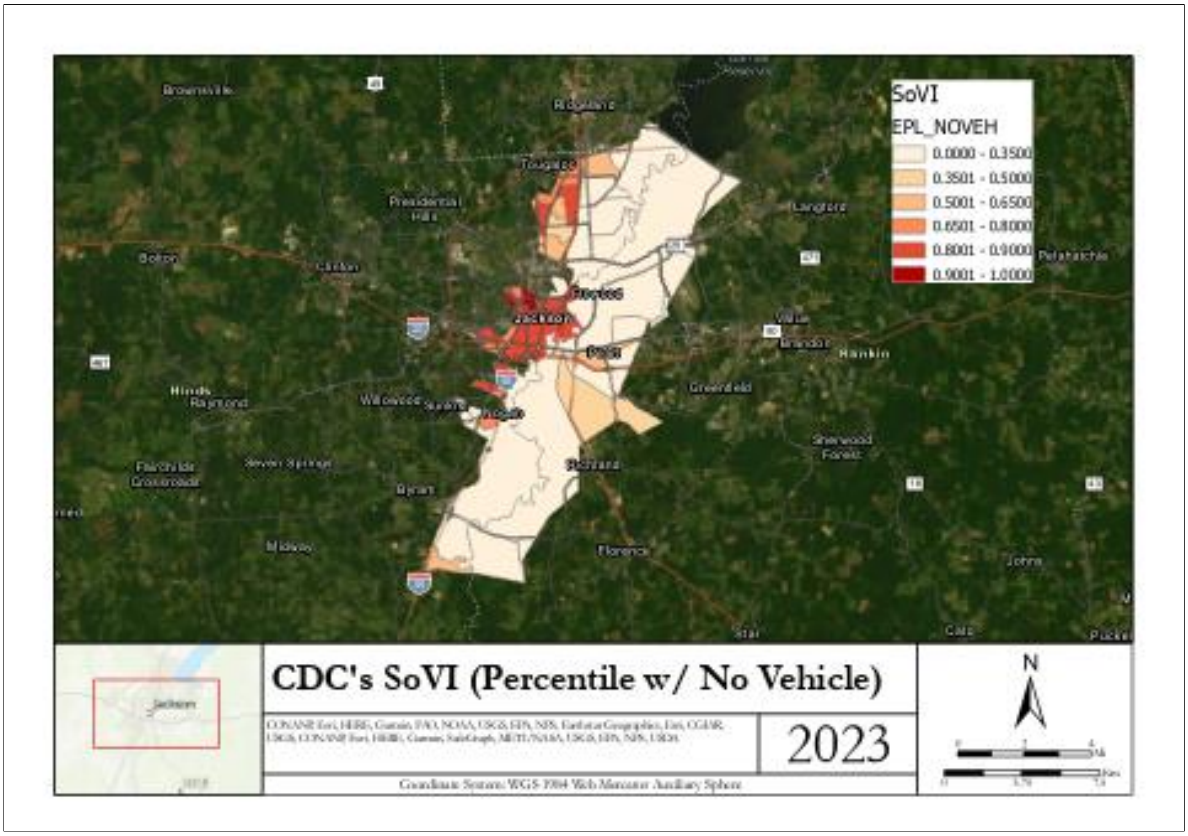



*Figure 2-18. CDC's Social Vulnerability Index*

**Environmental Justice**

USACE has conducted an EJ evaluation for the purpose of identifying the adverse and positive impacts in the study area of the Pearl River Watershed, Mississippi, in accordance with Executive Orders 12898 and 14008, and the Planning Guidance Notebook, ER-1105-2-100. This DEIS evaluation has been undertaken in accordance with the NEPA of 1969 Council on Environmental Quality, and USACE regulations for implementing NEPA.

Throughout the past forty years, the definition of "environmental justice" (EJ) has evolved along with our collective understanding of justice, equity, and equality. While different definitions continue to persist, EO 14096 defines EJ as the just treatment and meaningful involvement of all people, regardless of income, race, color, national origin, Tribal affiliation,

or disability, in agency decision-making and other Federal activities that affect human health and the environment so that people:

i. are fully protected from disproportionate and adverse human health and environmental effects (including risks) and hazards, including those related to climate change, the cumulative impacts of environmental and other burdens, and the legacy of racism or other structural or systemic barriers; and

ii. have equitable access to a healthy, sustainable, and resilient environment in which to live, play, work, learn, grow, worship, and engage in cultural and subsistence practices."

EJ is institutionally significant because of Executive Order (EO) 12898 of 1994 which is supplemented by EO 14096 of 2023, EO 14008 of 2021, , and the Department of Defense's Strategy on Environmental Justice of 1995. EO 12898 directed Federal agencies are to identify and address any disproportionately high and adverse human health or environmental effects of Federal actions to minority and/or low- income populations and to those populations challenged with environmental hazards. EO 14096 requires that environmental reviews analyze direct, indirect, and cumulative effects of Federal actions on communities with environmental justice concerns; consider best available science on disparate health effects arising from exposure to environmental hazards; and provide opportunities for early and meaningful involvement in the environmental review process by communities with environmental justice concerns potentially affected by a proposed action.

Promoting equity, equality, and supporting underserved communities through EJ has been the focus of several EO issued by President Biden since taking office in January 2021. Actions positively impacting EJ communities are of significant importance to the current Administration. For example, EO 14008, January 27, 2021, "Tackling the Climate Crisis at Home and Abroad" directs Agencies to "make achieving environmental justice part of their missions by developing programs, policies, and activities to address the disproportionately high and adverse human health, environmental, climate-related and other cumulative impacts on disadvantaged communities, as well as the accompanying economic challenges of such impacts." Also, EO 13985, January 20, 2021, "Advancing Racial Equity and Support for Underserved Communities Through the Federal Government" states the policy of the Biden Administration that the "Federal Government should pursue a comprehensive approach to advancing equity for all, including people of color and others who have been historically underserved, marginalized, and adversely affected by persistent poverty and inequality." It is important to show that any proposed project promotes racial equity and support for underserved communities through environmental justice. More recently USACE has issued an interim guidance memorandum titled "Implementation of Environmental Justice and the Justice40 Initiative", dated March 15, 2022, which outlines key areas of focus including maximizing the reach of Civil Works projects to benefit disadvantaged

communities. One of the goals of this guidance is “investing in projects which benefit disadvantaged communities.” This guidance is part of the effort announced on June 3, 2022, in the Federal Register (87 Fed. Reg. 33,756), wherein USACE requested public input in the development of regulations on EJ among other goals and methods to implement these goals as outlined in the interim guidance.

The greatest flood risk is borne by disadvantaged and minority communities in the City of Jackson, which has the second highest African American or Black population in the U.S. for all cities over 100,000 (exceeding 82 percent). According to the 2020 Census, over 25 percent of the City’s population is below the poverty level, which is an increase from 2010. During February 2020, two areas of EJ concern, Canton and the community of Duttoville, experienced the most extensive flood damage. The 2020 Census Data in Table 2-14 shows that the percentage of Black or African American population in cities and towns in the study area. In particular, the areas of EJ concern neighborhoods of Canton Club and Duttoville experienced high level flooding from both the 1979 and 2020 events and frequent flooding during smaller storm events. An article published by the Mississippi Folklife in their Winter issue 2019 states that the community of Duttoville changed after the impacts of the 1979 East Flood.

Repetitive flooding can cause permanent changes to neighborhoods. Evidence of high hazard, low-income communities becoming destabilized over time due to an inability to recover from repetitive flood events are numerous. About 50 structures in the Pearl River 10-year floodplain (backwater flooding in tributaries) in areas of Jackson are subject to this type of repetitive flooding. While making the choice to not rebuild is done at the household-level, this individual choice, institutionalized in property markets, involuntarily leads to demographic shifts in response to natural hazards. This process, while gradual, generally leads to a segregation of high- and low-income households, amplifying inequalities and placing vulnerable households further at risk.

The following are excerpts from an article published by IOP Science, Environmental Research, about repetitive flooding effects. The premise is that out-migration may increasingly gain popularity in the long run when risks become too high and incremental adaptation measures too expensive, especially to low-income homeowners. Transformational changes—such as to move away from hazard zones could become a viable option. As floods intensify, flood prone areas become gradually unattractive creating economic pressure/incentive for outmigration. Households may voluntarily choose to vacate flood-prone areas to reduce unacceptably high risk; that is people switch from repair to abandoning their homes in hazard areas. This puts high-income households in a favorable position over low-income households, who may find themselves trapped due to the lack of resources to move. It goes in line with the concept of a “trapped population” that distinguishes between individuals who decide not to relocate versus those who are forced to stay in hazard-prone areas, possibly exposing themselves to progressively severe adversities. Moreover, floods can lead to climate gentrification as high-income households push up demand and prices for lower-risk or safe locations, further forcing socio-demographic shifts in urban areas. Note that after Hurricane Katrina, in New Orleans, Louisiana the areas that did not flood (only 15 percent of the city) is now called “the sliver on

the river" and property values in these areas were less affected by the flood hazard effect and have in fact increased in value relative to more flood-prone areas. That's not to say that high-income home-owners property in less flood prone areas won't lose value, but relevant to low flood risk, this factor alone would likely raise values. While flooding has immediate economic consequences for all affected, the longer-term impacts are more detrimental for those who are economically vulnerable. The consequences of floods are therefore also characterized by environmental injustice and disproportionally undermine socio-economic resilience of low-income households. Over time, those who cannot afford to relocate to safer areas and who cannot afford homeowners insurance or repairs of flood damaged property, eventually abandon their homes. The effect of abandon homes on the community is the beginning of the process of entire areas becoming destabilized and uninhabitable.

Data for counties and cities that comprise the study area gives a broad-brush overview of the area's minority populations. The two counties in the study area as well as cities and towns with a population of 5,000 or more are shown in Table 2-14.

The largest population of the two counties in the study area is Hinds County with a 2020 population of 227,742. Jackson, MS is largest city in the study area and is home to about 67 percent of Hinds County population. The majority of Hinds County consists of Black (75 percent) with most of the minority population identifying as Black. Both Rankin and Madison Counties are majority White while cities and towns in these two counties with 5,000 or more population are also majority White and more closely match the state's racial percentages.

*Table 2-14. 2020 U. S. Census Bureau Information*

| Location | Total Population | White | Black | Native American | Asian | Native Hawaiian | Two or more Races | Minority | Hispanic |
|---|---|---|---|---|---|---|---|---|---|
| Hinds County | 227,742 | 24.7% | 73.5% | 0.1% | 0.7% | Z | 1.0% | 75.3% | 1.6% |
| Byram (city) | 12,666 | 22.3% | 75.1% | 0.2% | 0.9% | 0.0% | 1.6% | 77.7% | 1.4% |
| Clinton (city) | 26,996 | 53.6% | 40.6% | 0.0% | 3.7% | 0.0% | 1.6% | 46.4% | 2.7% |
| Jackson (city) | 153,701 | 15.0% | 82.8% | 0.2% | 0.3% | 0.0% | 1.2% | 85.0% | 1.5% |
| Rankin County | 157,031 | 74.5% | 22.5% | 0.2% | 1.4% | 0.1% | 1.3% | 21.7% | 2.7% |
| Brandon | 25,138 | 78.3% | 19.7% | 0.2% | 0.1% | 0.0% | 1.0% | 21.7% | 2.5% |
| Flowood | 10,202 | 61.2% | 28.9% | 0.7% | 6.2% | 0.0% | 1.8% | 38.8% | 3.4% |
| Pearl | 27,115 | 61.3% | 33.4% | 0.0% | 1.5% | 0.0% | 2.0% | 38.7% | 2.8% |
| Richland | 7,137 | 71.1% | 20.1% | 0.0% | 1.1% | 0.0% | 1.2% | 28.9% | 4.9% |
| Madison County | 109,145 | 57.3% | 38.5% | 0.3% | 2.8% | 0.1% | 1.0% | 42.7% | 3.2% |
| Ridgeland | 24,340 | 52.4% | 38.9% | 0.0% | 2.9% | 0.0% | 2.1% | 47.6% | 6.7% |
| State of | 2,961,279 | 58.8% | 38.0% | 0.6% | 1.1% | 0.1% | 1.4% | 41.2% | 3.5% |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Mississippi | | | | | | | | | |

Note: Includes cities and towns with population greater than 5,000. Source: U.S. Census Bureau 2020 Decennial, Quick Facts.

In the most recent reports on the effects of climate change, experts project increased flooding, among other consequences, with the most severe impacts to EJ communities and/or vulnerable groups as reported in the September 2021 report published by EPA entitled “Climate Change and Social Vulnerability in the United States – A Focus on Six Impacts”. The report analyzes six consequences of climate change (one being inland flooding) on the most vulnerable communities, including disadvantaged and minorities. With regard to inland flooding, the report identified that minority and/or low-income neighborhoods are at increased risk of exposure to flooding given their higher likelihood of living in risk-prone areas and locations with poorly maintained infrastructure. This is a precise description of the at-risk environmental justice neighborhoods in the City of Jackson as demonstrated by the February 2020 flood event. The January 31, 2022, article “Inequitable patterns of US flood risk in the Anthropocene,” published in Nature Climate Change, reports that recent developments in inundation modeling indicate flood risk in the United States will increase by 26.4 percent by 2050 due to climate change alone and that Black communities in the South will face disproportionate future increases in flood risk.

The primary focus of the study is along the Pearl River and those areas most prone to flooding in the Jackson Metropolitan area. Study area is defined as being part of the Pearl River Basin, as shown on Figure 1-6, located in the southern central portion of Mississippi and in a small part of southeastern Louisiana. The primary study area comprises the Pearl River Basin between RM 270.0 just south of Byram, Mississippi, and RM 301. 77 at the dam of Ross Barnett Reservoir. Municipalities within the study area include Jackson, Flowood, Pearl, and Richland. The study area includes parts of three counties--Madison, Hinds, and Rankin. Major tributaries of the Pearl River within the study area include Richland, Caney, Lynch, Town, and Hanging Moss Creeks. The study area extends approximately 2 miles to the west of Downtown Jackson, MS and approximately 3 miles to the east of Pearl, MS at its widest point. The study area is shown as a white-dashed line on Figure 2-19.

The EJ existing conditions analysis sets the stage for assessing if the human health, environmental or socio-economic effects associated with the Flood Control Project disproportionately affect areas of EJ concern. Areas of EJ concern are communities in the study area that are:

1) Census Tracts that meet CEQ‘s Climate & Economic Justice Screening Tool (CEJST criteria for disadvantaged communities or

2) Census block groups that have a majority minority population, according to most recent data from EJCREEN or

3) Census block groups that meet or exceed EJSCREEN’s 13 Environmental Justice Indexes of 80th percentile. An EJ index combines demographic factors with a

single environmental factor. For example, the EJ index for traffic is a combination of the following populations residing in the Census block group:

- The traffic indicator
- The low-income population
- The people of color populations

Note that the EJ index is higher in block groups with large numbers of mainly low-income and/or people of color residents with a higher environmental indicator value. The following are the 13 environmental burdens used in the EJ Index: Particulate Matter 2.5, Ozone, Diesel Particulate Matter, Air Toxics Cancer Risk, Air Toxics Respiratory Hazard Index, Toxic Releases to Air, Traffic Proximity, Lead Paint, RMP Facility Proximity, Hazardous Waste Proximity, Superfund Proximity, Underground Storage Tanks and Wastewater Discharge.

The CEJST census tracts of disadvantaged communities AND the census block groups that are majority minority AND the block groups that meet or exceed the 80$^{th}$ percentile for at least one EJ index; ALL comprise the areas of EJ concern which are the focus of the EJ impacts assessment.

The environmental justice existing conditions analysis sets the stage for assessing if the human health, environmental or socio-economic effects associated with the Flood Control Project disproportionately affect disadvantaged communities, minority populations or highly environmentally burdened areas (referred to as areas of EJ concern).

The blue areas in Figure 2-19 are majority minority census block groups, the areas in red are census tracts identified as CEJST disadvantaged communities, while purple shaded areas represent areas that are both majority minority and disadvantage communities. All three of these color shaded areas are considered an area of EJ concern which is the focus of the EJ assessment. Finally, EJSCREEN was used to include those census block groups in the study area (dark blue color in Figure 2-19) the meet or exceed the 80th percentile for EPA's Environmental Justice Indexes.

Approximately 175,700 people live in the study area. Most of the population resides in Hinds and Rankin Counties. Of the approximately 175,000 people living in the study area, approximately 135,000 reside in areas of EJ concern. About 75 percent of the population in the study area reside in an area of EJ concern.

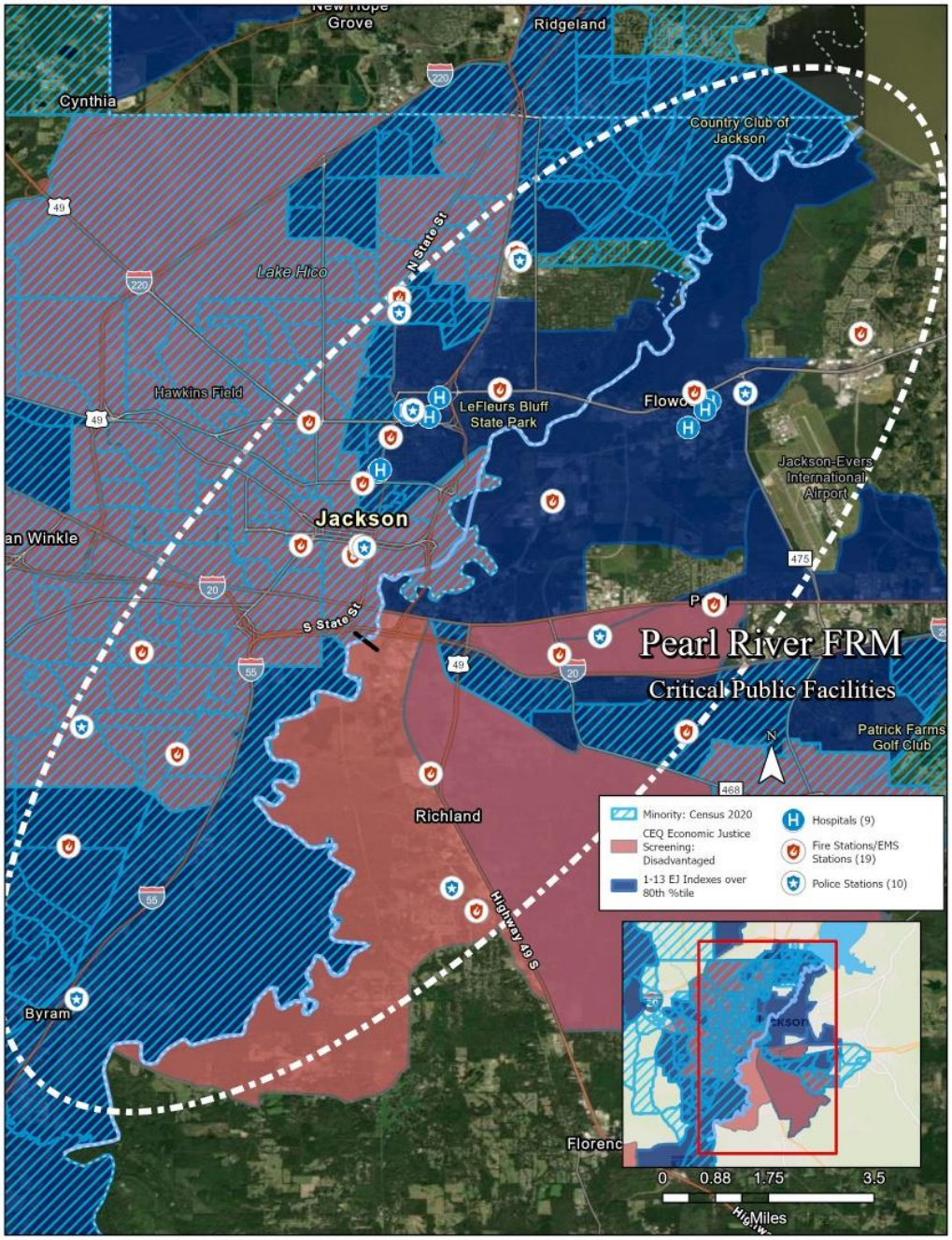



*Figure 2-19. Study Area, Critical Public Facilities and Areas of EJ Concern*

Critical public facilities (CPF), shown on the study area map, include nine hospitals, 19 fire stations/EMS, and 10 police stations. All of the CPF are located in areas of EJ concern

except one fire station/EMS. Most of the hospitals are centered around the City of Jackson and several in Flowood.

*Disadvantaged Communities and Minority Populations*

The study area is vastly comprised of populations living in areas identified as disadvantaged, majority minority neighborhoods or highly environmentally burdened communities. Most all of these areas meet at least one of EJSCREEN's EJ index ranking of the 80$^{th}$ percentile (compared to the State) and all of the areas in color on Figure 2-19 are areas of EJ concern.

A closer look at the study area reveals pockets of neighborhoods with majority minority populations in Census Block Groups within these larger communities of counties and cities. Figure 2-19 also shows larger geographic areas, U.S. Census Tracts, which are disadvantage communities in the study area as identified by CEQ through the CEJST. The areas identified as disadvantaged communities are also part of the areas of EJ concern and are a focus of the EJ assessment.

Disadvantage communities used in the EJ assessment are identified using the Climate and Economic Justice Screening Tool (CEJST), which Federal agencies are directed to use under EO14008. In January of 2021, President Biden issued Executive Order 14008. The order directed the CEQ to develop a new tool. This tool is called the Climate and Economic Justice Screening Tool. The tool has an interactive map and uses datasets that are indicators of burdens in eight categories: climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development. The tool uses this information to identify communities that are experiencing these burdens. These are the communities that are disadvantaged because they are overburdened and underserved.

Federal agencies are directed to use the tool to help identify disadvantaged communities that would benefit from programs included in the Justice40 Initiative. The tool highlights disadvantaged census tracts across all 50 states, the District of Columbia, and the U.S. territories. Communities are considered disadvantaged:

- If they are in census tracts that meet the thresholds for at least one of the tool's categories of burden, or
- If they are on land within the boundaries of Federally-Recognized Tribes

*Categories of Burdens*

The tool uses datasets as indicators of burdens. The burdens are organized into categories. justice

In addition, a census tract that is completely surrounded by disadvantaged communities and is at or above the 50th percentile for low income is also considered disadvantaged.

Census tracts are small units of geography. Census tract boundaries for statistical areas a redetermined by the U.S. Census Bureau once every 10 years. The tool utilizes the census tract boundaries from 2010. This was chosen because many of the data sources in the tool

currently use the 2010 census boundaries. For the following categories, communities are disadvantage if they are in census tracts that meet or exceed one of the following:

Climate Change**:** Are at or above the 90th percentile for expected agriculture loss rate or expected building loss rate or expected population loss rate or projected flood risk or projected wildfire risk and are at or above the 65$^{th}$ percentile for low income. and are at or above the 65$^{th}$ percentile for low income.

*Energy:* Are at or above the 90th percentile for energy cost or PM2.5 in the air and are at or above the 65$^{th}$ percentile for low income. and are at or above the 65$^{th}$ percentile for low income.

*Health:* Are at or above the 90th percentile for asthma or diabetes or heart disease or low life expectancy and are at or above the 65th percentile for low income. and are at or above the 65th percentile for low income.

*Housing:* Experienced historic underinvestment or are at or above the 90th percentile for housing cost or lack of green space or lack of indoor plumbing or lead paint and are at or above the 65th percentile for low income.

*Legacy pollution**:*** Have at least one abandoned mine land or Formerly Used Defense Sites or are at or above the 90th percentile for proximity to hazardous waste facilities or proximity to Superfund sites (National Priorities List (NPL)) or proximity to Risk Management Plan (RMP) facilities and are at or above the 65th percentile for low income.

*Transportation:* Are at or above the 90th percentile for diesel particulate matter exposure or transportation barriers or traffic proximity and volume and are at or above the 65th percentile for low income.

*Water and wastewater:* Are at or above the 90th percentile for underground storage tanks and releases or wastewater discharge and are at or above the 65th percentile for low income.

*Workforce development:* Are at or above the 90th percentile for linguistic isolation or low median income or poverty or unemployment and more than 10 percent of people ages 25 or older have a high school education (i.e. graduated with a high school diploma).

*Tribes:* Federally-Recognized Tribes, including Alaska Native Villages, are also considered disadvantaged communities. There are no resident Federally-Recognized Tribes in the study area.

# SECTION 3
# Alternatives

The USACE reviewed and analyzed the NFI final array of alternatives and two new alternatives. The NFI Section 211 Report final array of alternatives included a “nonstructural plan” (Alternative A), a “levee plan” (Alternative B) and a “channel clearing/weir/levee plan” (Alternative C). In addition, USACE in collaboration with NFI, developed two new alternatives identified as a modified nonstructural plan proposing elevating/floodproofing/acquisition (Alternative A1) and a Combination There Of (CTO) Alternative proposing a combination of features from the other alternatives (Alternative CTO). A description of the alternatives is provided below.

*NFI Final Array of Alternatives*

*Alternative A* – This alternative is a nonstructural plan that would include the acquisition (buyout) of structures and subsequent relocation or demolition of that structure. This alternative would remove structures impacted by a five-hundred-year event (0.2 percent AEP) in the floodplain and acquire the land where the structures reside. The total number of structures is estimated to be approximately 3,000 including residential, commercial, government and public buildings, schools, and hospitals. This alternative does not include the structures located behind existing levees, although flood risk in these areas may still exist.

*Alternative B* – This alternative is considered a levee plan consisting of upgrading existing levees, construction of additional earthen levee segments and/or floodwalls in unprotected areas, upgrading an existing non-Federal levee into a Federalized ring levee as well as the addition of pumps and gated structures. Additional project features would include staging areas, conveyance improvements (clearing and grubbing), fertilizing, seeding, and mulching. It is expected that heavy construction equipment such as dump trucks, excavators, and bulldozers would be used for construction.

*Alternative C* – Per the NFI Section 211 Report, Alternative C is the Locally Preferred Plan (LPP), and NFI recommended plan. The plan consists of clearing and expanding cross-sectional area of the river channel corridor to increase hydraulic conveyance, demolition of the existing weir near the J. H. Fewell WTP site, construction of a new weir with a low-flow gate structure further downstream to approximate river mile 284.3 to create a year-round recreational water body and provide an alternative raw water supply intake location should one be needed in the future, improvements to Federal levees (excavated material plan), and upgrading an existing non-Federal levee into a federalized ring levee around the Savanna Street WWTP. Alternative C includes mitigation measures and several features required to avoid and/or minimize impacts to federally listed species.

*USACE Developed Alternatives:*

*Alternative A1*- Includes elevating and floodproofing structures within the cumulative 4 percent AEP floodplain. Residential structures are to be elevated to the 1 percent AEP/ Base Flood Elevation (BFE), or higher if required by USACE or local ordinance, based on year 2082 hydrology. With a limit of up to 13 feet (NAVD88) above the ground. Nonresidential structures would be floodproofed up to 3 feet (NAVD88) above the ground. As an alternative to elevating, floodproofing of NRHP-listed or eligible residential structures would be considered on a case-by-case basis. All nonstructural components would be on a voluntary basis by the property owner. This alternative includes approximately 143 structures, 81 residential and 62 nonresidential. The option of nonstructural property acquisition (buyout) on a voluntary basis is included in the nonstructural implementation plan (Appendix N). Acquired properties would become greenspace that is publicly owned and maintained by a nonfederal sponsor (NFS).

*Alternative CTO* – The "Combination There Of," alternatives are a combination of the features associated with the presented alternatives discussed above to provide the same or better flood risk reduction as the NED Plan. Two alternatives were assessed utilizing a combination of the features listed below with (Alternative D) and without (Alternative E) the construction of a new weir.

- Alternative A1 Non-Structural Plan (further refined for CTO).
- Reduced excavation of main channel.
- Federal levee improvements.
- New weir and fish ladder.
- Utilization of existing weir.
- Non-Federal levee improvements (Savanna Street WWTP).
- Levees.
- Countermeasures for bridges.
- Mitigation features.
- Year-round recreational lake.

Implementation Under Additional Authorities or by Other Entities:

- Operational Changes at Ross Barnett Reservoir.
- Water Supply.

## 3.1 PLANNING OBJECTIVES, OPPORTUNITIES, CONSTRAINTS, AND CONSIDERATIONS

In accordance with the Water Resources Council's Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies, the Federal objective of water and related land resources planning is to contribute to NED consistent with protecting the nation's environment pursuant to national environmental statutes, applicable executive orders (EO), and other Federal planning requirements.

### 3.1.1 Objectives

As a result of the problem identification process, the objectives listed below formed the basis for the evaluation of the final array of alternative plans. These objectives are in consonance with the intent of the USACE P&G and other planning guidance:

- Reduce risk of flooding for the city of Jackson, MS and adjacent areas in Hinds and Rankin Counties, MS
- Reduce flood risk to human life and wellbeing.
- Reduce flood risk to critical infrastructure (e.g., medical centers, schools, transportation, etc.).
- Provide long-term drinking water security for the city of Jackson, MS and adjacent areas served.
- Create a self-sustaining project that allows for minimal operation and maintenance cost.
- Minimize the potentially reasonably foreseeable impacts to downstream areas, the environment, and cultural resources.

Planning Opportunities: As a result of the objectives stated above, the following opportunities could be considered:

- Consider the regional economic impacts associated with the development of recreational opportunities along the Pearl River in the project area.
- Provide recreational opportunities along the Pearl River for the city of Jackson, MS and adjacent areas in Hinds and Rankin Counties, MS.

### 3.1.2 Opportunities

Public testimony and comment from across the Pearl River watershed and within the study area reveal a multitude of concerns that may be addressed through other authorities or by other entities. No single authority can solve all the problems immediately; therefore, a systematic approach involving multiple projects from several different programs and under several different authorities would be required to effectively deal with the array of issues in the watershed. These items are not considered to be part of the subject project, but are opportunities noted that could be undertaken separately from this effort:

- Reconnecting the Community to the River. Multiple testimonies, comments from interests within the study area, and presented conceptual plans speak to improving the connection of communities to the river. Within the study area, there are few immediate access points to the river and few green spaces for the public. LeFleur’s Bluff State Park is a large public space adjacent to the river corridor; however, even its connection to the river is restricted. Entities associated with economic and

community development, colleges, the medical center, and employers are all seeking improved public spaces and greenways that can retain and attract a new generation of workforce. Furthermore, expanded public spaces and greenways serve as recreation areas where existing communities come together and connect with nature, activities with proven physical, mental, spiritual, and social benefits. Community leaders from south Jackson and other economically struggling areas, see opportunity in economic development associated with a reconnection to the river. Local entities may consider executing projects that reconnect the community to the river.

- Operation of the Ross Barnett Reservoir. The Pearl River Valley Water Supply District operates the water control features of the Ross Barnett Reservoir and in their vision for operation of the reservoir acknowledges there is a flood reduction capability associated with the reservoir. The Ross Barnett Reservoir, a non-Federal project operated by the Pearl River Valley Water Supply District, was constructed in 1962 for the purposes of water supply and recreation. Although the reservoir was not designed for flood control, the reservoir does participate and provide some flood reduction benefits. The reservoir does not have a requirement to implement flood reduction in any specific way but has been actively reducing peak flows during large inflow events since at least 1979 with an estimate that peak flows are reduced by as much as 28 percent due to these operations. Public comments across the watershed highlighted concerns with reservoir operations. State and local entities may consider operational changes at the Ross Barnett Reservoir and revising the Ross Barnett Water Control Manual to formalize continued flood reduction capacity inform future discharge operations. A sensitivity analysis shows that reducing the flows from the Ross Barnett Reservoir by 20 percent, reduces damages to the project area. The goal of this consideration is to formalize future informed releases within the reservoir limits to delay or decrease peak releases for events with a forecasted peak discharge above 35,000 cfs. Further changes to rate of change rules could further limit erosion and bank caving.

- *Water Supply and Water Quality*. The EPA and USACE are currently working with the City of Jackson to address local water and wastewater infrastructure under existing federal authorities. This work addresses the immediate and to some extent long standing problems with aging local environmental infrastructure. The J.H. Fewell Water Treatment Plant is 90 years old and remains in service, and under court order is being upgraded. The Ross Barnett Reservoir and Pearl River surface water are the two primary sources of drinking water for the surrounding communities. Flood control projects in the area must directly account for substantive work occurring and ensure alignment with such infrastructure modernization work.

- *Downstream Concerns on the Pearl River.* Public testimony and comments from communities south of the project area demonstrated current problems on the lower Pearl River. Public testimony included observations of extended periods of flooding and extended periods of low water, sand bars forming in the river threatening tributary access, low water flows impacting the Louisiana Wildlife Management Areas, and low

water flows enabling saltwater intrusion into fishing grounds and oyster beds. Concerns included the impacts of legacy federal projects (weirs, locks, and dams) on public safety, downstream water quantity and quality, and the loss of wildlife habitat. Since the deauthorization of the Pearl River as a federal navigation project, USACE executes maintenance of waterway features with funding available and as authorized by caretaker status. The following considerations have potential to improve downstream conditions and inform a strategy to restore the lower Pearl River.

- *Comprehensive Watershed Study*. A comprehensive watershed study of the Pearl River is necessary to fully understand the basin's hydrology, hydrodynamics, and ecosystem. The scope of the study should be from the headwaters to the terminus at the Gulf of Mexico. A watershed study would inform disposition of legacy federal infrastructure, opportunities for sustaining and managing flowrates through the basin, and enhancement of habitat for the basin's wildlife, flora and fauna. Authorization via a Water Resources Development Act is required.

- *Water Control Agreement and Improved Monitoring*. Since the Pearl River is not an authorized federal project, the states of Louisiana and Mississippi should consider entering into a water control agreement that sets conveyance requirements through the lower Pearl River. The agreement may set flowrate requirements at specific river miles during specified times of the year. Additional instrumentation may be required at specified river miles and with funding and authorization, USACE can support acquisition, installation, and continuous monitoring.

### 3.1.3 Planning Constraints and Considerations

A planning constraint was to avoid promoting development within the floodplain (in accordance with E.O. 11988) to the maximum extent practicable, which contributes to increased life safety risk.

Planning considerations in the plan formulation process included:

- Avoid or minimize adverse impacts to:
  - Threatened or endangered (T&E) and protected species.
  - T&E designated critical habitat.
  - Water quality.
  - Cultural, historic, and Tribal-trust resources.
  - Areas of EJ Concern.
- Avoid or minimize impacts to HTRW.
- Maintain consistency with local floodplain management plans by not inducing flooding in other areas.
- Closely coordinate with operators of Ross Barnett Reservoir on operations and maintenance of minimum flows.

## 3.2 FORMULATION AND EVALUATION OF ALTERNATIVES

Formulation of alternatives developed by the NFI is described within Appendix M: *NFI Report* and Appendix A: *Plan Formulation*. Two alternatives in the NFI Section 211 Report final array of alternatives were removed from further analysis, and USACE concurs. The two Alternatives removed are listed below:

1) Alternative A, a nonstructural plan, included the acquisition (buyout) of structures and then either relocation or demolition of that structure. The "buyout" allows for removing structures out of the 0.2 percent AEP floodplain and acquiring the land upon which the structures reside. The total number of structures to be relocated would be more than 3,000, including residential structures, commercial structures, government and public buildings, schools, and hospitals. This does not include structures behind existing levees, although there is some probability that damage and risk in these areas would still exist. It was determined by the NFI, and concurred in by USACE, that the alternative was impractical due to the logistics and costs associated with implementation. Removal of all structures from the 500-year floodplain would remove significant components of the city's economic infrastructure and was determined to be not economically justified.

2) Alternative B, the levee plan, was determined not to be the NED Plan or the LPP in the NFI Section 211 Report. USACE conducted a qualitative assessment and concluded that even with a significant design and cost reduction, the Alternative would not be Federally justified. Based on this determination, no further evaluation of Alternative B, was conducted.

The NFI's Alternative C: NFI Channel Improvement/Weir/Levee Plan, was retained for further analysis. In addition, USACE developed two new alternatives identified as "Alternative A1," a modified nonstructural plan, and "Alternative CTO," which combines various features from the other alternatives considered.

Alternative A1

A modified nonstructural plan, Alternative A1, was developed consisting of elevation, floodproofing, and voluntary property acquisition. The option of nonstructural property acquisition (buyout) on a voluntary basis is included in the nonstructural implementation plan (Appendix I). Acquired properties would become permanent/perpetual greenspace that is publicly owned and maintained by a NFS. This alternative is anticipated to have very minimal adverse impacts to the environment. This alternative would not be expected to require compensatory habitat mitigation.

CTO Alternatives D and E

As stated within the authority: "the Secretary of the Army may select a combination of any or all of the features, so long as the combined features provide the same, or better, level of flood risk reduction as the NED Plan." The USACE evaluated various combinations of the

project features listed below to determine a combination that would maximize the flood risk reduction benefits while reducing adverse impacts and costs:

- Alternative A1
- Reduced Excavation of Main Channel
- Federal levee improvements.
- New weir and fish ladder.
- Utilization of existing weir.
- Non-Federal levee improvements (Savanna Street WWTP).
- Levees.
- Countermeasures for Bridges (initial scoping with MDOT in the EIS; major evaluation will be a Pre-construction Engineering and Design (PED) effort and not part of the EIS assessment).
- Mitigation features (Impact assessment will be conducted in subsequent NEPA features (Impact assessment will be conducted in subsequent NEPA document(s)document(s).
- Year-round recreational lake.

Additional H&H analysis and evaluations of the proposed features resulted in the following features being removed from further evaluation as part of the CTO Alternative:

- Clean out and sustained maintenance of tributaries: This feature was removed from further consideration in the CTO alternative upon identifying that this work is being undertaken by the NRCS, State and other local entities through the Mississippi Watershed projects.

- Levee setbacks: This feature was determined to provide limited flood risk reduction benefits and therefore was removed from further consideration.

- Demolition of the existing weir: Demolition of the existing weir is not needed as the existing weir is submerged and does not impede water flow. The existing weir would also be necessary to maintain adequate water supply should a new weir not be constructed.

Based on the results of the USACE's analysis, H&H modeling and agency coordination, the CTO Alternative could be comprised of any, or all, of the remaining features as described in Section 3.4 and Appendix I: *Project Descriptions*. Should the ASA select a different combination of features, or all of the features, as the CTO, additional analysis, modeling, and supplemental NEPA analysis would be required.

## 3.3 EVALUATION TOOLS/MODELING

Described below are the tools USACE utilized for hydraulic, hydrologic, and economic analysis of the Alternative A1, Alternative C, and Alternative CTO.

### 3.3.1 Hydrology & Hydraulics Evaluation Tools and Modeling

The *Hydrology & Hydraulics* (H&H) Appendix E provides the hydrologic, hydraulic, and statistical analysis that was conducted by USACE. For hydraulics and hydrology, a HEC-RAS 6.3.1 unsteady state hydraulic modeling with a combination of one-and two-dimensional elements is used throughout the analysis. A HEC- Hydrologic Modeling System HMS version 4.10 (HEC, July 2022) model was developed to model the incremental local flows downstream of the Ross Barnett dam. The Hydrologic Engineering Center Statistical Software Package (HEC-SSP) version 2.3 was used to update the flow frequencies at key gaged locations within the Basin. To confirm dam safety hazard classification to inform life safety and design, four breach scenarios were completed with Alternative C project conditions (i.e., new weir), to confirm the dam safety hazard classification.

### 3.3.2 Economics Evaluation Tools and Modeling

The structure inventory used for alternative assessments uses the National Structure Inventory 2022 as a base for structure points, occupancy types, population information, and square footage. The foundation heights and structure values were assigned based on statistics gathered via Google Street View surveys. These surveys involved observing random samples by reach and occupancy type to gather information, such as foundation height, foundation type, effective age, and condition. This was used to inform both the values and the first-floor elevations and depreciation factors. The RS Means Square Foot Costs 2023 catalog was used to calculate structure values incorporating locality adjustments.

To estimate damages, HEC-FDA model version 1.4.3 was used. It uses a point-based structure inventory. Hydraulic stage data from H&H model outputs were used to determine the flood depths at each structure, and structure depth; damage curves are used to estimate damages. For the purposes of this analysis, only the traditional damage categories of structures, contents, vehicles, and debris removal are included in the economic analysis. Nontraditional benefit categories, such as reoccupation costs, emergency response costs, road detour costs, and agriculture damages prevented are not included.

Expected annual damages were calculated for the without-project condition and the with-project condition. Annualized costs and benefits over a 50-year period of analysis will be compared to determine the net benefits and the benefit-cost ratio (BCR) for each alternative. These benefits will be summarized, along with other comprehensive benefits, and presented to USACE decision makers.

#### 3.3.2.1 Development of Nonstructural Costs

**3.3.2.1.1** Alternative A1 Nonstructural Costs: Residential Structures

Elevation costs were based on the difference in the number of feet between the original first floor elevation and the target elevation (the 1% AEP/ BFE, plus one foot) for each structure. Elevation costs by structure were summed to yield an estimate of total structure elevation costs. For screening to the final number of structures included in the nonstructural plan, the

cost per square foot for raising a structure was based on data obtained during interviews with representatives of three major metropolitan New Orleans area firms that specialize in the structure elevation (Table 3-1). Composite costs were derived for residential structures by type: slab and pier foundation, one story and two-story configuration, and for manufactured, modular, and mobile homes. These composite unit costs also vary by the number of feet that structures may be elevated. The cost per square foot to raise an individual structure to the target height was multiplied by the footprint square footage of each structure to compute the costs to elevate the structure. Using previous USACE nonstructural study costs, preconstruction, engineering, and design (PED) and construction management were accounted for by taking 14% and 8% of the construction costs respectively. Also, a contingency of 43% was added to the cost of implementation. This contingency was selected for use from another recent Feasibility Study consisting of nonstructural features with certified costs. Table 3-1 shows the cost per square foot of structure raising by occupancy type and height raised.

**3.3.2.1.2** Alternative A1 Nonstructural Costs: Non-Residential Structures

The dry flood proofing feature was applied to all non-residential structures. Separate cost estimates were developed to flood proof these structures based on their relative square footage. If the square footage was between 0 and 20,000, then the total cost equaled $153,000; between 20,000 and 100,000 square feet equaled $473,000; and greater than 100,000 square feet equaled $1,190,000. These costs were developed by contacting local contractors and were escalated to FY 2024 prices. PED and construction management were accounted for by taking 14% and 8% of the construction costs respectively. Also, a contingency of 43% was added to the cost of implementation.

**3.3.2.1.3** Operations, Maintenance, Relocations, Rehabilitation, and Repair

The elevation features are anticipated to operate as intended and as such, there are no further resources necessary to ensure that the engineered activity operates as intended. Periodic inspection of the of the floodproofing efforts, if required, are expected to not be significant (approximately $500 per structure over several years). The inspection costs are an extremely small percentage of the overall cost of implementation and can be considered capitalized in the initial cost of implementation. Section 10 of Appendix N-Nonstructural Implementation Plan provides additional information regarding periodic inspections.

*Table 3-1. Cost per Square Foot of Structure Raising by Occupancy Type and Number of Feet raised, FY 2024 Price Level*

| Ft. Elevated | 1STY-SLAB | 2STY-SLAB | 1STY-PIER | 2STY-PIER | MOBILE HOME |
|---|---|---|---|---|---|
| 1 | 116 | 128 | 103 | 114 | 57 |
| 2 | 116 | 128 | 103 | 114 | 57 |
| 3 | 119 | 130 | 107 | 118 | 57 |
| 4 | 123 | 140 | 107 | 118 | 57 |

| | | | | | |
|---|---|---|---|---|---|
| 5 | 123 | 140 | 107 | 118 | 70 |
| 6 | 125 | 142 | 110 | 120 | 70 |
| 7 | 125 | 142 | 110 | 120 | 70 |
| 8 | 129 | 147 | 113 | 123 | 70 |
| 9 | 129 | 147 | 113 | 123 | 70 |
| 10 | 129 | 147 | 113 | 123 | 70 |
| 11 | 129 | 147 | 113 | 123 | 70 |
| 12 | 129 | 147 | 113 | 123 | 70 |
| 13 | 134 | 154 | 114 | 125 | 70 |

#### 3.3.2.2 Development of Costs

Costs were developed utilizing the Micro-Computer Aided Cost Engineering System (MCACES) MII Costs for Alternative C were updated utilizing the NFI cost estimates and the unit costs provided in the MII file as a basis. Use of this system allowed for revisions to the alternative costs based on USACE-identified quantity changes as presented in Table 3-4. However, this updating of costs does not constitute endorsement of the construction means and methods or underlying assumptions used in the development of the NFI provided costs.

**3.3.2.2.1** Real Estate Costs

No further real estate analysis was conducted beyond what was provided in the NFI Section 211 Report.

For Alternative C, the per acre cost for lands to be acquired in fee title calculated in the brief gross appraisal seems reasonable and concurred with. It is uncertain if all incidental and administrative Federal cost (i.e., real estate acquisition management, oversight, review, crediting, etc.) and non-Federal (i.e., surveying, mapping, tract description preparation, title cost & procurement, tract acquisition negotiations & final closings, attorneys' compensability opinions, utility relocations contracts, etc.) were considered or captured in the cost estimates provided.

## 3.4 PROJECT DESCRIPTION OF ALTERNATIVES

The project description for the alternatives evaluated include the NFI Alternative C: channel improvement/weir/levee plan and two USACE alternatives. The USACE alternatives are Alternative A1 a modified nonstructural plan and a CTO Alternative. The CTO Alternative may be comprised of a Nonstructural component and flood damage risk reduction structural features.

### 3.4.1 Alternative A1: USACE Nonstructural Plan

The nonstructural analysis was based on an inventory of residential and non-residential structures that was developed by USACE in 2023 using the National Structural Inventory version 2.0. An assessment of structures located in the 10 percent, 4 percent, 2 percent, and

1% AEP floodplains was performed for the portions of the study are subject to flooding from the main stem of the Pearl River and backwater flooding on the tributaries (Figures 3-1a through 3-1d and Table 3-2). Elevation and floodproofing was considered to determine the effectiveness of a nonstructural alternative. For the analysis, residential structures were to be elevated to the 1% AEP/BFE plus one foot, up to 13 feet above the ground, and nonresidential structures were to be floodproofed up to 3 feet above the ground. All nonstructural components would be implemented on a voluntary basis in cooperation with the property owner. The assumption is that there would be 100 percent participation rate; however, for socially vulnerable areas the participation rate based on similar USACE projects, such as Huntington District Section 202 program is that approximately a 50 percent participation rate is typically realized.

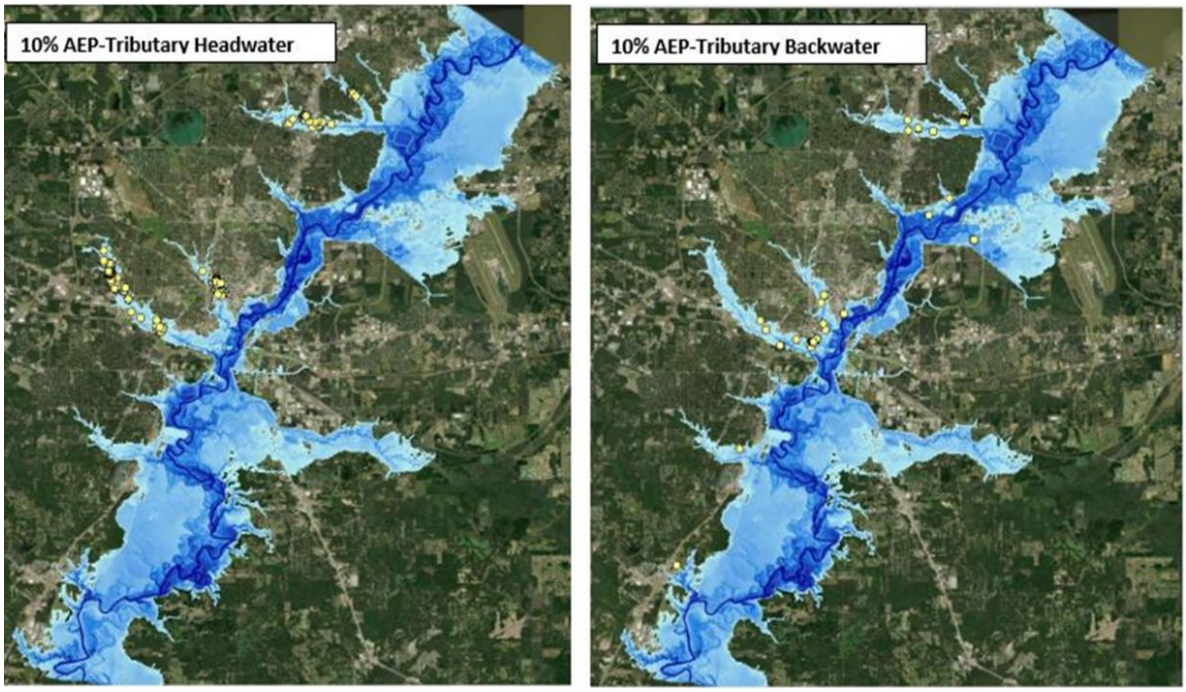



*Figure 3-1a. Structures inundated from a Cumulative 10% AEP Event separated by Headwater and Backwater Flooding*

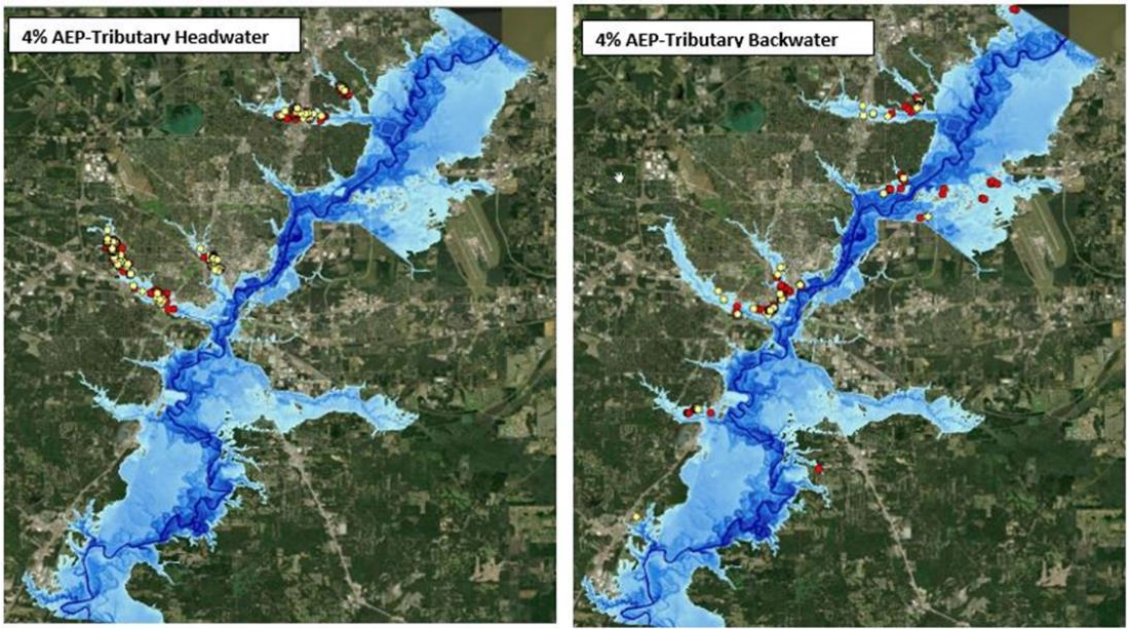



*Figure 3-1b. Structures Inundated from a Cumulative 4% AEP Event Separated by Headwater and Backwater Flooding*

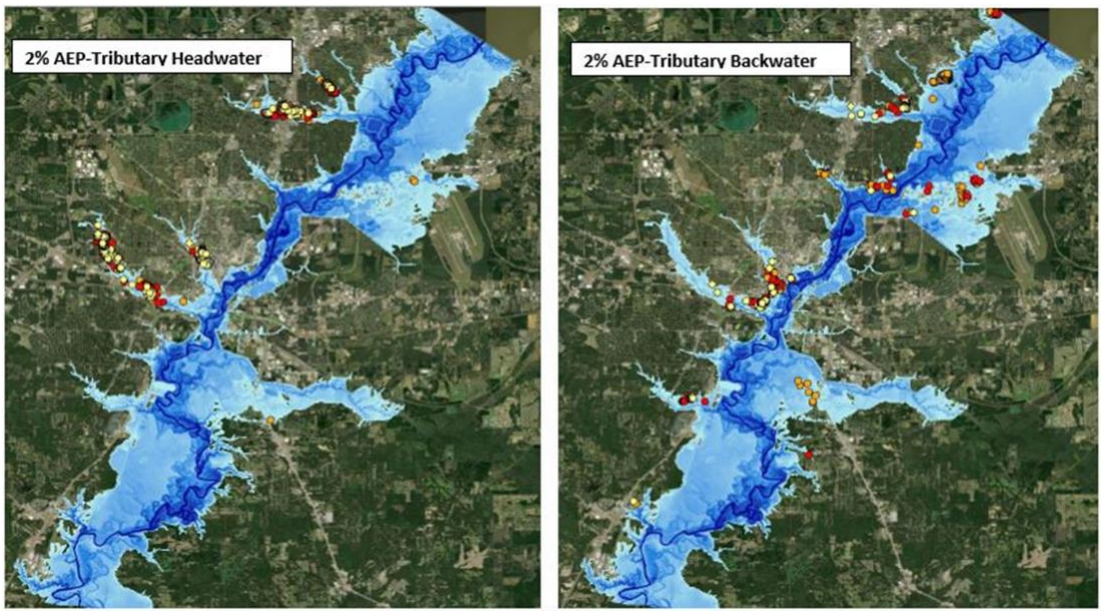



*Figure 3-1c. Structures Inundated from a Cumulative 2% AEP Event Separated by Headwater and Backwater Flooding*

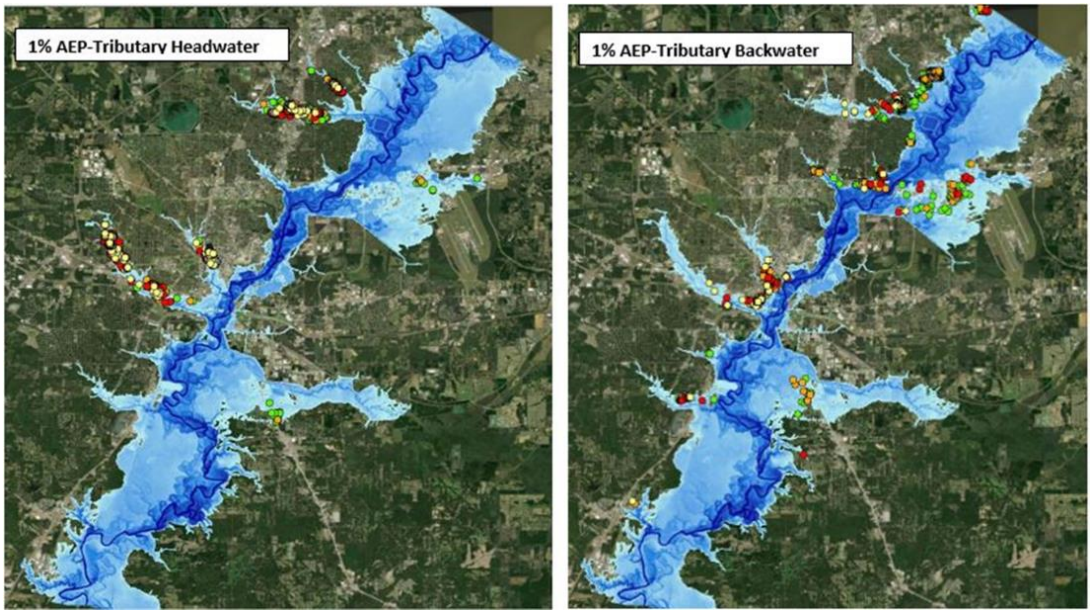



*Figure 3-1d. Structures Inundated from a Cumulative 1% AEP Event Separated by Headwater and Backwater Flooding (Colored dots represent structures in the following AEP floodplains: green dots are 1% (100 year), orange dots are in the 2% (50 year), red dots are within the 4% (25 year) and yellow dots are within the 10% (10 year).*

*Table 3-2. Noncumulative Nonstructural Benefits for Study Area for Elevating and Floodproofing, FY24 Price Level and Discount Rate*

| | (10% AEP) | (4% AEP) | (2% AEP) | (1% AEP) |
|---|---|---|---|---|
| Project First Cost | $18,968,000 | $31,105,000 | $76,799,000 | $154,077,000 |
| Interest During Construction | $64,000 | $106,000 | $260,000 | $523,000 |
| Total Investment Cost | $19,032,000 | $31,211,000 | $77,060,000 | $154,600,000 |
| AA Investment Cost | $705,000 | $1,156,000 | $2,854,000 | $5,727,000 |
| Benefits EAD Reduced | $2,259,000 | $1,751,000 | $1,793,000 | $1,466,000 |
| Net Benefits | $1,554,000 | $595,000 | ($1,061,000) | ($4,261,000) |
| B/C Ratio | 3.2 | 1.5 | 0.6 | 0.3 |

Based on an incremental floodplain analysis, the 10 percent and 4 percent incremental AEP floodplains were both economically justified. Approximately 143 structures, 81 residential and 62 nonresidential, are included in this cumulative 4 percent AEP floodplain. The

cumulative results of the 4 percent AEP floodplain are displayed in Table 3-3. This nonstructural plan is referred to as Alternative A1.

*Table 3-3. Summary of Results for Alternative A1, the USACE modified Nonstructural Plan, FY24 Price Level and Discount Rate*

| | |
|---|---|
| Project First Cost | $50,072,903 |
| Interest During Construction | $170,090 |
| Total Investment Cost | $50,242,993 |
| AA Investment Cost | $1,861,000 |
| Total AA Cost | $1,861,000 |
| Benefits EAD Reduced | $4,010,090 |
| Net Benefits | $2,149,090 |
| B/C Ratio | 2.2 |

These structures have been identified to be preliminarily eligible for the nonstructural alternative. Due to feedback from public meetings in May and June 2023 requesting the option to have properties acquired, the option of nonstructural property acquisition (buyout) on a voluntary basis is included in the nonstructural implementation plan (Appendix K). In addition, 10 of the 600 structures are located within the FEMA Regulated Floodway and would only be eligible for demolition or relocation. Structures located within the FEMA Regulated Floodway, based on preliminary analysis, have relatively similar flood risk in comparison to structures located outside of the FEMA Regulated Floodway.

*Table 3-4. Nonstructural Plan A1 Structure Type Eligibility*

| Structure Type | Public | Private-Non-Profit | Residential-Non-Historic | Residential-Historic | Nonresidential |
|---|---|---|---|---|---|
| Property Acquisition & Structure Demolition | x | x | x | x | x |
| Property Acquisition & Structure Relocation | x | x | x | x | x |
| Structure Elevation | | | x | x | x |
| Structure Dry floodproofing | | | | x | x |
| Structure Wet floodproofing | | | x | x | x |

| | | | | | |
|---|---|---|---|---|---|
| Retrofitting of Existing Buildings | | | x | x | x |

### 3.4.1.1 Non-structural Implementation Approaches

#### 3.4.1.1.1 Property Acquisition and Structure Demolition

Property acquisition and structure demolition consists of the acquiring the existing at-risk structure and, typically, the underlying land, and conversion of the land to open space through the demolition of the structure. The property must be deed-restricted in perpetuity to open space uses to restore and/or conserve the natural floodplain functions.

#### 3.4.1.1.2 Property Acquisition and Structure Relocation

Property acquisition and structure relocation consists of the physical relocation of an existing structure to an area outside of a hazard-prone area and, typically, the acquisition of the underlying land. Relocation must conform to all applicable State and local regulations. The property must be deed-restricted in perpetuity to open space uses to restore and/or conserve the natural floodplain functions.

#### 3.4.1.1.3 Elevation

Elevation is physically raising an existing structure to an elevation to the 1 percent AEP BFE based on year 2082 hydrology or higher if required by USACE or local ordinance. Foundations must be designed to properly address all loads and effects, be appropriately connected to the floor structure above, and utilities must be properly elevated.

#### 3.4.1.1.4 Dry Floodproofing

Dry floodproofing is using techniques applied to keep non-residential structures dry by sealing the structure to keep floodwaters out. Dry floodproofing would be completed on eligible structures at or below 3 feet (0.9m) depth.

#### 3.4.1.1.5 Wet Floodproofing

Techniques designed to permit floodwaters to enter a structure to prevent or provide resistance to damage from flooding. Wet floodproofing of a structure interior is intended to counteract hydrostatic pressure on the walls, surface, and support systems of the structure by equalizing interior and exterior water levels during a flood.

#### 3.4.1.1.6 Retrofitting of Existing Buildings

Modifications to the structural elements of a building to reduce or eliminate the risk of future flood damage and to protect inhabitants. The structural elements of a building that are essential to protect to prevent damage include foundations, load-bearing walls, beams, columns, structural floors and roofs, and the connections between these elements. Retrofitting also includes modifications to the nonstructural elements of a building or facility

to reduce or eliminate the risk of future damage and to protect inhabitants. Retrofits are primarily defined as modifications to the elements of a building to reduce or eliminate the risk of future damage. Structural retrofits are designed to protect elements such as foundations, load-bearing walls, beams, columns, building envelopes, windows, structural floors, roofs, and the connections between these elements. Nonstructural retrofitting involves the modification of a building or facility's nonstructural elements and may include elevation of heating and ventilation systems to minimize or prevent flood damage.

### 3.4.2 Alternative C: NFI Channel Improvement/Weir/Levee Plan

Flood risk management benefits are realized by removing areas that constrict the floodplain by deepening the channel and floodplain. By doing this, conveyance of water downstream is improved through the project area. The water surface elevation of the river would be lowered in some places by as much as 8 feet (2.4 m) within the project area. Normal river stages would be permanently elevated. Flood elevations would be reduced within the reach of excavation and upstream of the excavation. Alternative C (Figure 3-2 and Table 3-4) consists of the construction of channel improvements, demolition of the existing weir near the J. H. Fewell WTP site and construction of a new weir with a low-flow gate structure further downstream for water supply to be continued while simultaneously creating an area of surface water for recreational opportunities, Federal levee improvements (excavated material plan), and upgrading an existing non-Federal ring levee with slurry wall around the Savanna Street WWTP.

Construction of the project would require relocations and/or improvements to various public and private utilities and infrastructure, (Table 3-5), avoidance and minimization features required under the ESA, and the creation of new habitat mitigation areas to offset losses within the project's construction footprint areas.

There are 9 transmission lines within the project area. All efforts would be made to avoid, monitor, maintain clearance requirements, and protect these structures. If avoidance is not possible, then utility relocation or raising of lines/protection of structures would be necessary. It is estimated that 5 to 6 of these lines will require additional utility relocation costs. Coordination with the operating entity to determine specific requirements of each transmission line will be conducted during PED.

USACE modeling of Alternative C considered a variety of upgrades to the NFI routing. These included calibration to the recent 2020 flood event, which had not occurred at the time of NFI modeling, incorporating more recent flow record data (1980s to 2022), updating all runs to unsteady state routing, inclusion of tributary coincident flow, and the inclusion of lateral structures to represent the levees (Figure 3-3). Updated calibration has shown that the system response has changed since the 1979 event to be more efficient. as illustrated by the comparable events from 1983 and 2020. The two events had similar flows at Pearl River gage in Jackson, but the stage was reduced by approximately 2.9 ft for the 2020 event.

*Table 3-5. Alternative C Project Key Features*

| Feature | ALT C | | Units |
|---|---|---|---|
| | Quantity NFI (211 report) | Quantity USACE | |
| **NON-STRUCTURAL** | | | |
| Non-structural plan | acquisition | | structures |
| **STRUCTURAL** | | | |
| Lake Surface Water Area | 1700 | 2562.25 | acres |
| Clearing and Grubbing | 2,600 | 2301.39 | acres |
| Channel Improvements Excavation | 1400 | 1443.25 | acres (mcy) |
| Fill Area | 870 | 858.14 | acres (mcy) |
| Stabilization or armoring for bridge abutments | 10 | 7 | bridges |
| Hard Point in tributary channels to prevent incision/sediment into newly constructed lake | | 850 | Feet (crossing river) |
| Newly Federalized Levee (inc. slurry wall | 1.7 | 1.7 | miles |
| Slurry Wall Savanna Street WWTP | 1.7 | 1.7 | miles |
| New Slurry wall for seepage of existing features | n/a | 1,460 ft | miles |
| Weir and new gate | 1 | 1 | each |
| Pumps to address interior drainage Impacts | 0 | 2 | each |
| Fish Passage | 7000 | 7000 | feet |
| Canton Club Levee | n/a | n/a | miles |
| **OPERATIONS AND MAINTENANCE** | | | |
| Weir | Unknown | | each |
| Fish Passage | | | each |
| Terrestrial Habitat Mitigation | | | events |
| Riverine Habitat Mitigation | | | events |
| Lake | | | each |
| Pump Station | | | each |
| Levees | | | each |
| **MITIGATION** | | | |
| Sandbars (material from excavation) | 31 | NA | acres |
| Reforest top bank of fish passage | ? | ? | acres |
| Riverbank preservation | 10 | NA | miles |
| Removal of obsolete aquatic barriers | 0 | 1 | structure |

| | | | |
|---|---|---|---|
| connect occupied and suitable unoccupied riverine habitat | 0 | NA | acres |
| Open historically lost riverine habitat | 0 | NA | acres |
| Terrestrial Habitat Mitigation | 5,000 | 24,760 | acres |

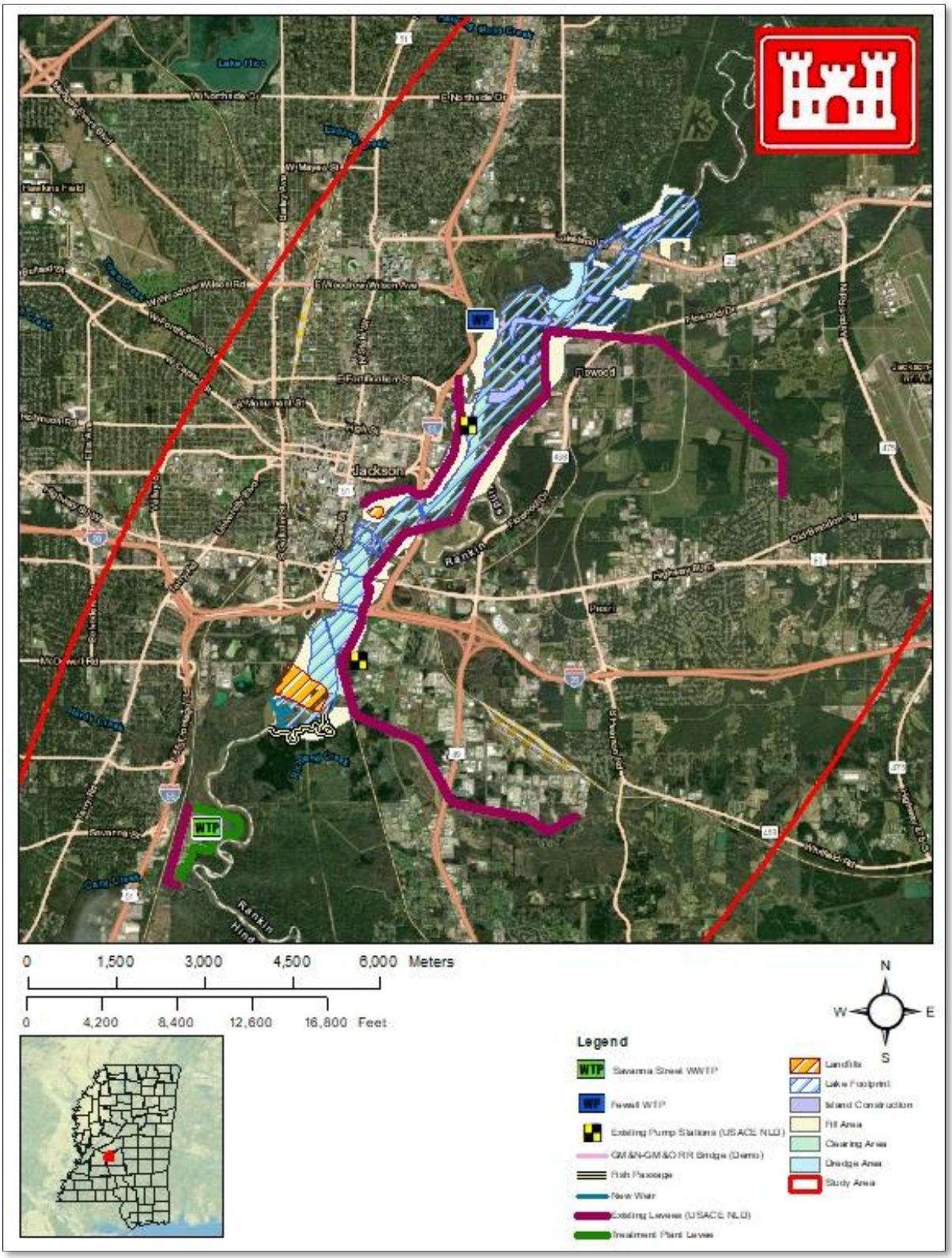



*Figure 3-2. Alternative C Key Features*

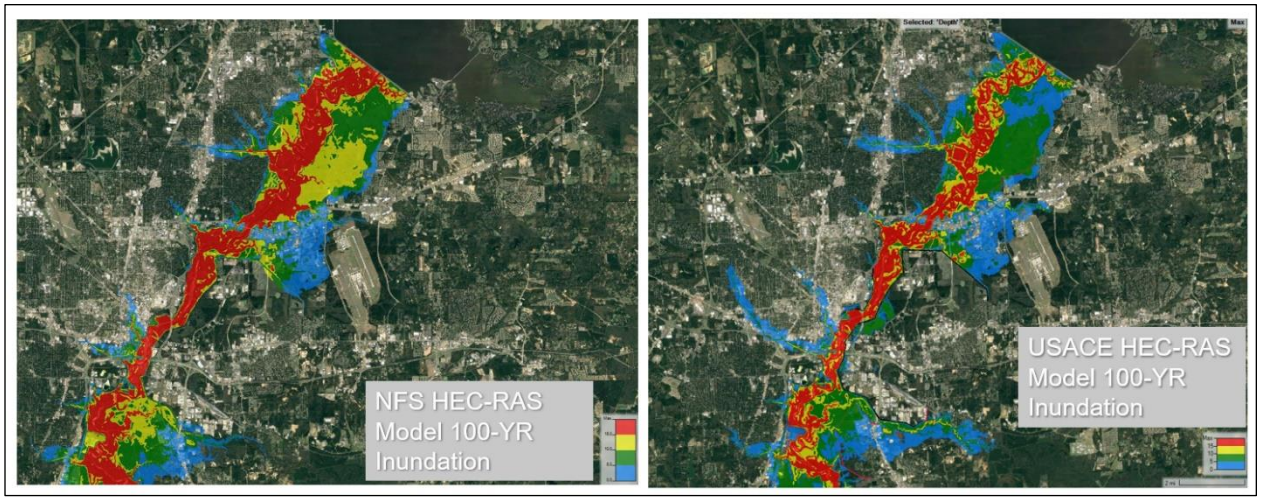



*Figure 3-3. NFI versus USACE modeling Results for the 1% AEP (100-year) Without Project Routing Scenario*

### 3.4.2.1 Channel Improvements

Channel improvements (Figure 3-4) consist of excavating areas along the Pearl River to improve conveyance from RM 284 to 294. The channel improvement footprint includes approximately 2,557 acres (1034.7 hectares (ha)) in which disturbance would occur. The excavation would be of various widths ranging from 400 to 2,000 feet (121.9-609.6 m) to be determined during the PED phase. Excavation depths would vary between 5-20 feet to meet the proposed bottom elevation of 248.0 NGVD. This total includes 1,692 acres (684.7 ha) in which excavation would occur to deepen the channel overbanks and 865 acres (350.0 ha) that would be used for placement of the excavated fill material. Approximately 20 million cubic yards (19.1 million $m^3$) of material would be excavated from the floodplain and channel overbanks. The existing river channel would not be widened, instead excavation of the overbank areas would occur.

The preliminary project layout also includes islands within the channel improvement excavation area that would be maintained and/or expanded upon from RM 289.5 to RM 292.0. Further, sand bars would be constructed inside the floodplain and along the existing islands to compensate for the loss of sand bar habitat.

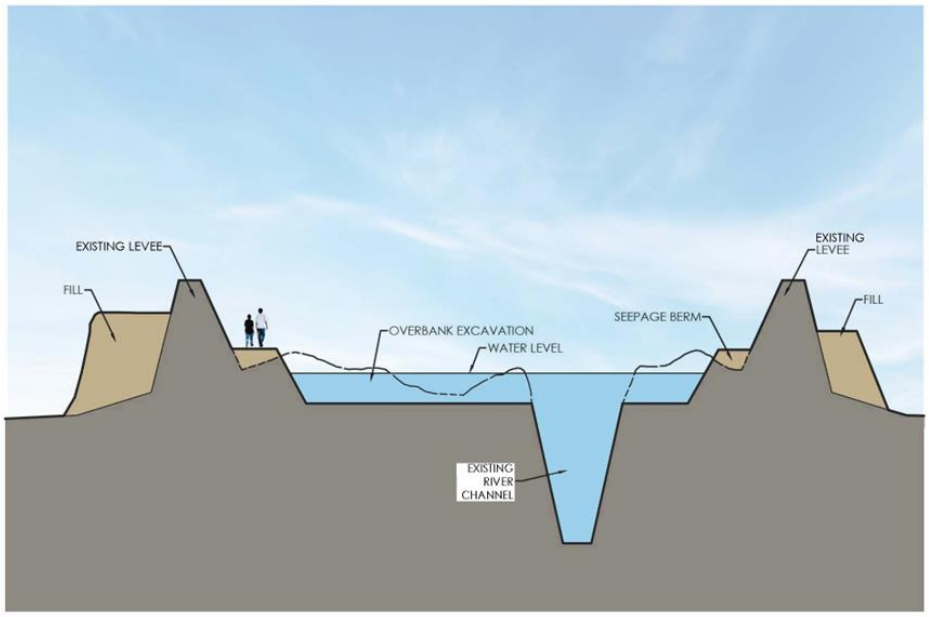



*Figure 3-4. Channel Improvements with a Relocated Weir*

### 3.4.2.2 Overbank Modifications

The existing overbank areas of the Pearl River channel would be lowered to increase conveyance of flood flows. Existing levees would remain in place and would be maintained for flood control and to aid in haul access. The excavation limits near the existing levees would be determined during final design.

The progression upstream would naturally allow for positive and continued dewatering of flooded areas ahead of moving into the next section. The three segments and their main areas of activity are further described in these stationed reaches listed below.

1. Station 10+00 through 140+00. Specific items included in this reach are the I-20 Interstate bridges (Sta. 95+00±) as well as the U.S. Highway 80 (Sta. 110+00), Old Brandon Road (Sta. 135+00±), and railroad bridges (Sta. 70+00±, Sta. 130+00±). Two high-pressure gas lines run through this reach and would have to be carefully monitored as excavation and grading activities progress. Multiple access points on both sides of the river would have to be maintained and monitored from a perspective of public safety and construction use. Projected quantities for earthwork are approximately 6 million cubic yards ($yd^3$).

2. Station 140+00 through 290+00. This reach contains the eastward expansion of the east side levees and the construction of islands in the deepened overbank. Islands would be formed as part of the excavation activities. As with the previous reach segment, numerous access points would require management and maintenance for use and safety. A creosote slough area (Sta. 240+00±) would be avoided, when possible, to not disturb or cause any objectionable material to be exposed or mixed with other excavated material. In the event avoidance is not possible, the slough area may be excavated and hauled to a separate disposal site, and the remaining exposed surface capped prior to final grading. Projected excavation quantities are 6 million $yd^3$.

3. Station 290+00 through 400+00. As with the previous downstream reaches, there are bridges to work around (Highway 25 near Sta. 360+00), and gas lines and transmission lines that must be monitored during earthmoving operations. Depending on the final design, Mayes Lake (Sta. 310+00±) may need tie-in work to maintain its current level. A determination about the tie-in work would be made during the PED phase. An existing abandoned railroad embankment of the Gulf, Mobile & Northern/Gulf Mobile and Ohio (GM&N/GM&O) Railroad Bridge could also be affected and was removed in H&H modeling. Some island forming work would be required in this reach. The existing weir at the water works bend near Station 290+00 would remain undisturbed until completion of the new weir at the downstream terminus as to maintain water supply for the treatment plant. Projected excavation quantities in this reach are approximately 8 million cubic yards.

#### 3.4.1.3 Hardpoints at Base of Tributaries

Multiple tributary inflow points exist within this reach and Alternative C would add a hardpoint, via a riprap chute to prevent backward erosion at each tributary inflow where the excavation of overbanks decreased the tributary channel bottom elevation at or near the confluence of those tributaries with the Pearl River.

#### 3.4.1.4 Maintenance and Reinforcement of Bridge Abutments of Bridges (if required)

Stabilization or armoring, such as riprap, slope paving, slide repairs, etc., is required to ensure structural of integrity of various bridge structures due to changed conditions with this alternative. This work will be carried out prior to clearing and any major channel work. Following its own analysis, the Mississippi Department of Transportation (MDOT) has informed the Rankin-Hinds Flood Control District (the Flood Control District), MDOT agrees to collaborate with the Flood Control District in “the advancement of this project and to ensure countermeasures are included, if determined necessary during the future design process.” (letter to G. Rhoads, dated February 26, 2024) To this end, the Flood Control District developed a range of cost estimates for potential structural and hydraulic countermeasures that could be recommended if countermeasures are determined necessary. The array of countermeasure features analyzed will mitigate potential impacts to MDOT bridges that will be identified during the PED phase. The estimated cost for these features is based upon known costs for the construction of hydraulic and structural

countermeasures on another MDOT project at downstream hydraulic crossings of the Pearl River. When additional information becomes available during PED, adjustments to the design can and will be made to reduce potential impacts. Any proposed countermeasure design and implementation will be conducted with MDOT's concurrence, review, and approval.

Rough estimations of the level of effort required to mitigate for bridge impacts include improvements for approximately 36 bents, 12 piers, abutment scour, as well as funding to conduct monitoring surveys. A pile is a concrete post that is driven into the ground to act as a leg or support for a bridge. A bent is a combination of the cap and the pile. Together, with other bents, act as supports for the entire bridge.

There are a total of 2 active railroad bridges within the project area. All efforts would be made to avoid, monitor, and protect these structures. Additional modeling is required to validate these assumptions during PED. If avoidance is not possible, then coordination with the operating entity to determine specific requirements of each railway bridge will be conducted during PED. All alterations of railroad bridges would be in accordance with Section 3 of the 1946 Flood Control Act (22 USC 701p).

Description of work is consistent for both Alternative C and CTO. The difference is that the extent of improvements for the selected structures would be expected to be larger for the Alternative C.

#### 3.4.1.5 Excavated Material Plan

Federal levees exist within much of this reach and Alternative C would use the existing levees, upgraded with excess excavation placed behind them. Excavated fill would be placed in designated disposal areas on the protected side of existing levees. These areas would be graded to be at the same elevation or lower than existing levees and grassed to establish long-term erosion control. Additional riprap or other armoring would be placed as required during the final grading operations.

The excavated material disposal fill areas placed on the protected side of levees would impact approximately 465.6 acres (188.4 ha) (Figure 3-5). Clearing of wooded areas to the east of the proposed new banks (small areas on the west side) would be cleared and grubbed ahead of receiving excavated material from the channel overbank excavation. The excavated material would be used to create a substantial new land mass within the Jackson MSA. The new land mass created behind the levees would range from 200 to over 1,000 feet (121.9-304.8 m) in width. The newly created riverfront area would allow for expanded riverfront access, natural areas, and commercial development, along with recreational opportunities.

If any structures are to be built on top of any portion of the maintenance berm designed or used a seepage control, the berms would be overbuilt and utilities or any other structure or penetrations would be limited to within the overbuilt section. Penetrations trough the berm

could become seepage exit points, and this is specified to limit fracture through the main berm.

Where water would be permanently ponded against the riverside slope, these areas would require a 40-foot-wide semi-compacted impervious riverside maintenance berm to limit seepage through the levee. The typical details include a detail of the berm assumed to extend the entire length of any levee section where water is pooled. The berm would have a crown elevation 3 feet above normal pool, a 1V on 40H top slope and a 1V on 3H toe slope. No removal of the riverside blanket near the existing levees is anticipated.


*Figure 3-5. Plan View of Proposed Channel Improvements Excavated Material Plan, and Weir with Gate*

### 3.4.1.6 Structure Demolition

The existing weir located at RM 291 near the J. H. Fewell WTP site would be demolished and replaced with a new weir further downstream near RM 284.3 at the south end of the channel improvements area. In the area surrounding the J. H. Fewell WTP, Plan C calls for the demolition of the J.H. Fewell Weir located at RM 291, which is currently set to approximately elevation 250 feet. Dredging would be conducted to elevation 248 feet. It is

undetermined if the water intake structures and access way of the J. H. Fewell WTP would need further modification. Demolition may also be required at all or part of the abandoned GM&N/GM&O Railroad Bridge since it was removed in H&H modeling. Figure 3-6 shows the excavation extent provided in the black polygon with the WTP, weir and intake structures. The length of area (including the island) directly along the railroad bridge is approximately 3,600 feet.

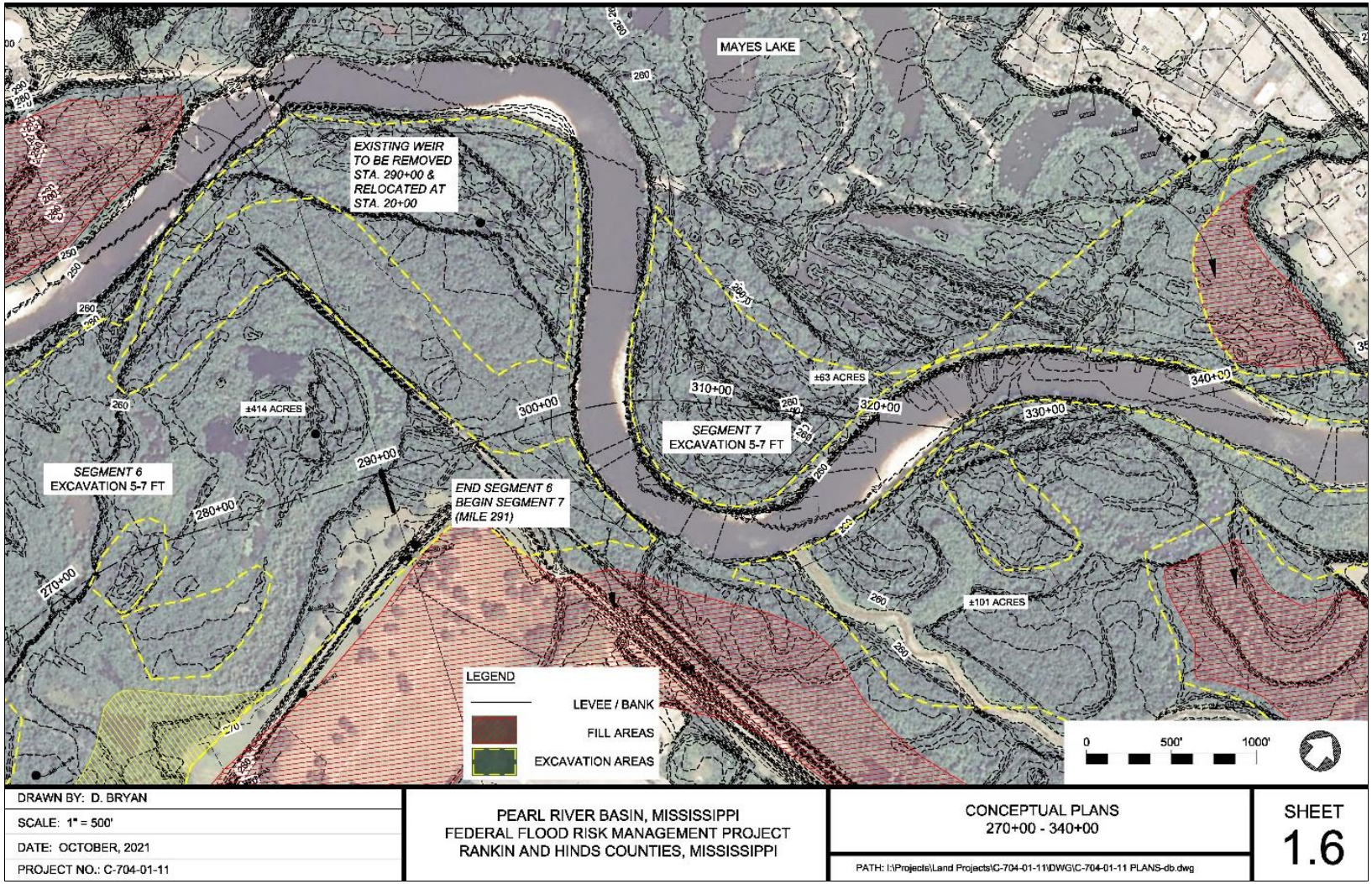



*Figure 3-6. Proposed Excavation Extent for Demolition of the J.H. Fewell Weir*

### 3.4.1.7 Construction of New Weir and Gate with Fish Ladder

The demolished weir would be replaced with a new weir constructed downstream near RM 284.3 at the south end of the channel improvements area. The purpose of the new weir would be to maintain the baseline low-water level for water supply at the J. H. Fewell WTP within the channel improvements area. The new weir would provide for a significantly larger body of water within the Pearl River channel to the north of the weir. Downstream low-water hydrologic flows (extreme drought condition minimum flows) within the Pearl River channel would be maintained by means of a 12 x 12-foot low-flow gate. The gate is also required for any future maintenance which requires drawdown of the lake. Portions of weir would be submerged during flood events thereby allowing excess water to pass downstream. Water would pass over the weir with inflow into the lake approximately equaling outflow at any given time (with the exception of the extreme drought, which has a minimum release and outflow could be greater than inflow. However, this is expected to rarely occur, as the Ross Barnett Reservoir also has a minimum release requirement that would pass through the system). As opposed to the existing weir, the replacement weir would be constructed to a higher elevation of 258 NGVD vs. the current of 250 NGVD, and a larger width of 1,500 feet along an approximately 1 mile (1.6 km) stretch on the southern end of the proposed channel improvements area. This weir would impound an area of approximately 2600 acres. Baffle blocks to help prevent floating solids from flowing over the weir are part of the conceptual designs. Further, additional excavation for the fish ladder would occur along the left descending bank of the relocated weir in the project area. The fish ladder has been conceptually designed to be approximately 7,300 feet (2,225.0 m) in length. The fish passage design will be coordinated with The Service and state agencies during the PED phase.

The proposed weir meets USACE and State criteria to be defined as a dam based on the height of the structure and water storage. Additional costs were added to the NFI project cost to account for a redesign and constructing the weir to higher USACE and State criteria for a dam. Rough cost estimates were derived using some unit costs from the NFI. A more refined cost estimate would be done once the dam is redesigned to meet USACE and State criteria.

The proposed weir does not provide any flood control benefits, and construction of the weir necessitates additional pumping needs at existing levees as well as seepage protection in the form of berms and slurry walls on existing levee features upstream of the weir. However, the weir provides a lake surface for future water supply concerns, as well as adding attractive locations for recreation and future economic development. Public recreation facilities within the floodplain (i.e., boat ramps and landings, pedestrian access points, public and RV parks, natural areas, and trails) are not part of Alternative C; however, at a later time, those features may be added by other entities as a result of the weir's new expanded year-round recreational water body.

### 3.4.1.8 Additional Pumping Needs at Existing Levees

The existing levees contain drainage structures that allow water to drain from the interior of the leveed area when the Pearl River is low. When the Pearl River water level is high, the drainage structures are closed, and pump stations are used to pump water out of the leveed area. The original design (original levee construction) of these features called for the drainage structure to handle a 1 percent AEP interior drainage flow and the pumps were originally designed for a smaller event. Later additional pump capacity was added without additional study (see: 2007 Report for details). The proposed new weir would maintain a minimum pool at elevation 258.0 ft. Due to the new pool elevation, the drainage structures would have at least 9 ft of water covering the structures at all times and would no longer be able to operate and prevent the new reservoir from flooding the interior leveed areas. Additional pumping capacity would be installed to mitigate for the loss of capacity of the drainage structures. In addition, some of the proposed fill areas in the NFI plan would fill in part of the sump that is presently used to store water for pumping. The NFI did not perform an interior flooding analysis to determine mitigation features for the loss of the use of the drainage structures. This analysis would need to be completed if Alternative C is selected for construction. Additionally, the Operation and Maintenance (O&M) of the additional pumping would need to be substantially updated from the existing O&M plan for the pumping ability and constant operations prior to construction. Costs for this effort are estimated to range from $100 million to $200 million depending on the size of the pump stations needed. Cost estimates (adjusted for inflation) were based off recent experience with pump cost estimation from studies or actual construction, such as the proposed pump station for the *Raritan Bay and Sandy Hook Bay Hurricane Sandy Limited Reevaluation Report*, dated September 2016, and pump station construction in the Trinity River Corridor were also used to verify cost ranges.

#### 3.4.1.9 Newly Federalized Levee

An existing non-Federal levee protects the Savanna Street WWTP near RM 282. As part of Alternative C, the levee would undergo maintenance and additional upgrades, so the levee meets the freeboard needed for certification for a 1 percent AEP flood event in advance of the main construction phases (Figure 3-7). The levee section proposed for the new Federalized levee around the WWTP consists of a 10-foot crown width with 1V on 3H landside and riverside slopes. If needed, a slurry wall for seepage mitigation would be added. At this location, additional pumps would not be needed to provide protection behind levees since the existing pumps are already in progress of being replaced as part of the Section 219 Environmental Infrastructure Program as discussed in Section 1.5.2 of this report.

Principal features of the work include mobilizing and demobilizing, clearing, and grubbing, removing and stockpiling any existing crushed stone surface, semi-compacted levee embankment, traverses, adding new crushed stone surfacing, mowing, turfing, erosion control matting, preventing storm water pollution, and providing environmental protection. Additional work could include trenching and the creation and backfill of a concrete slurry wall within the levee footprint.

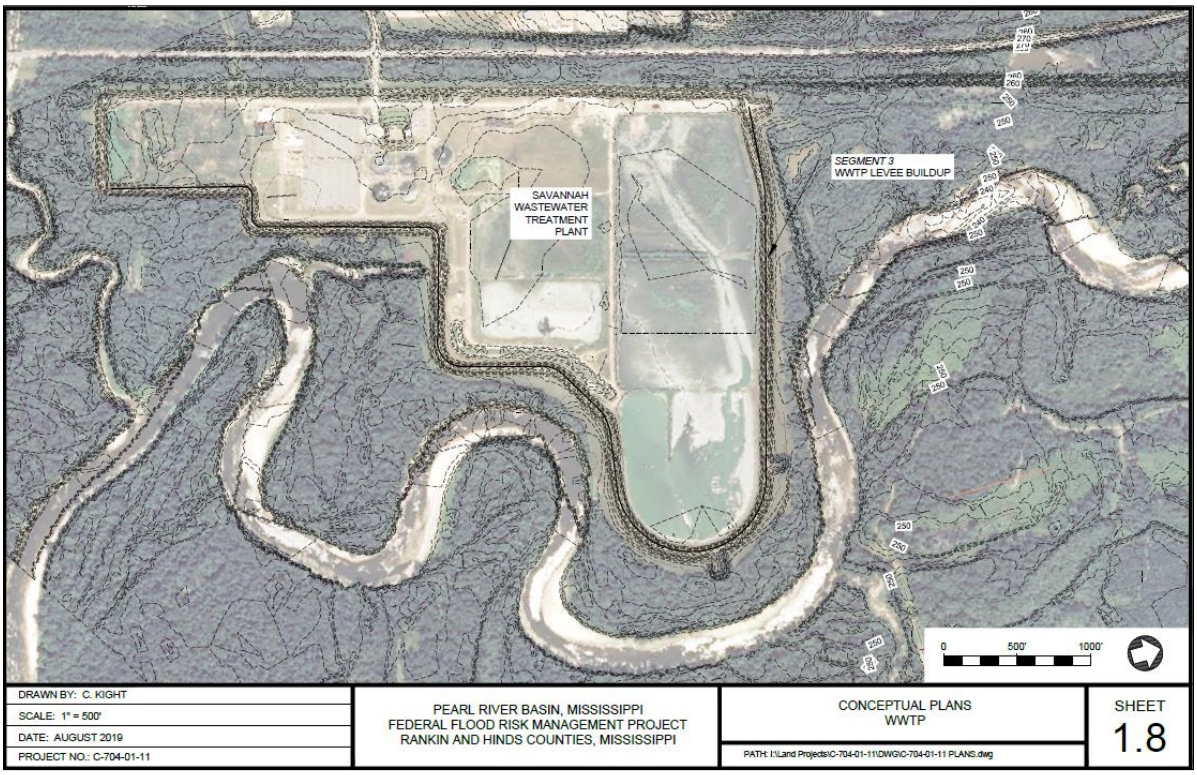



*Figure 3-7. Proposed Federalized Levee at WWTP*

### 3.4.2.1.1 Borrow Plan

A borrow plan has not been developed at this stage of the analysis. It is conceivable that there is enough borrow material from the material excavated from within the channel but it is unknown at this time if the material is suitable for constructing levees. Should the excavated material within the channel be determined to be unsuitable, borrow material would need to be obtained from another source for construction of any levees. There are potential borrow sources identified within close proximity of the project area (10-mile radius). Reference Figure 3-8 for a potential source. Borrow opportunities would be further investigated during PED and a supplemental NEPA document would be prepared at that time.

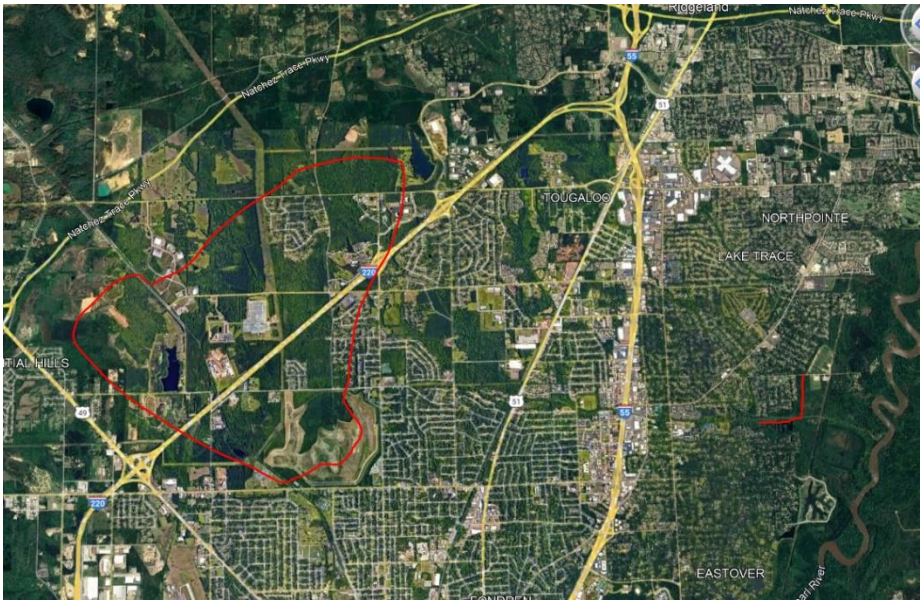



*Figure 3-8 Potential Borrow Sources*

### 3.4.2.10 Property Relocations

Alternate C includes removing the abandoned GM&N/GM&O Railroad Bridge and embankment, relocating or reconstructing property of others, bridge counter measures, utilities and lands or interests purchased for such relocations and conveyed to others. All alterations of railroad bridges would be in accordance with Section 3 of the 1946 Flood Control Act (22 USC 701p). Of the 2,750 acres needed for the implementation of Alternative C, the NFI owns the real estate for approximately 1,120 acres.

Relocations also include the removal of existing historical unpermitted solid waste units in the floodplain, removal and capping of an existing potential HTRW site, and remediating as necessary at full NFI responsibility, including (Figure 3-9):

- An existing automotive salvage yard.
- Mitigation features may be required for Gulf States Creosote Company Site.
- Additional capping and bank stabilization features would be required for unpermitted LeFleur's Landing Site (Jefferson Street Landfill).
- Excavation and removal of approximately half of the closed and sealed Gallatin Street Landfill Site of proposed channel improvements.

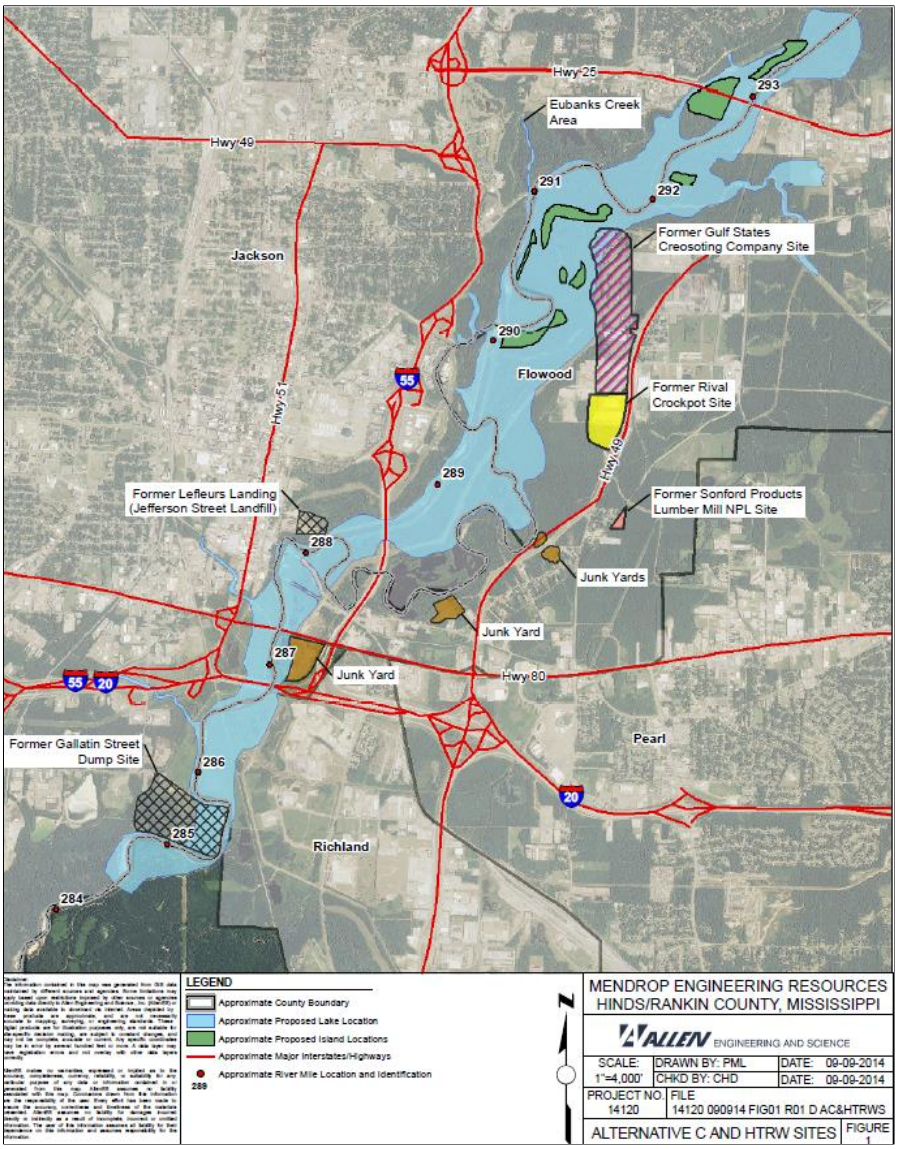



*Figure 3-9. Known and Potential HTRW Sites within Project Area*

The Gulf States Creosote Company Site is located within the project area. The site, or portions thereof, may require avoidance, remediation, or some other mitigating features. The unpermitted LeFleur's Landing Site is also located along the edge of the proposed channel improvement excavation area. It would require additional capping and bank stabilization features due to potential leaching of landfill waste and groundwater movement in the area. Remediation design and coordination with appropriate local, State, and Federal agencies would determine site actions to eliminate potential leaching of landfill waste to the groundwater and movement of groundwater into the proposed channel improvement.

Groundwater controls and a slurry wall may be appropriate remedial actions in this event. The proposed channel improvement excavation area would also bisect the unpermitted Gallatin Street Landfill Site; therefore, excavation and removal of approximately half of the

landfill site would be required to construct the proposed channel improvement. This excavated material would then be incorporated into the current remaining landfill area to further elevate the area, cap the area, and provide bank stabilization. Final remedial designs would be coordinated with appropriate Federal and State agencies to determine necessary actions to prevent and/or eliminate potential leaching of landfill waste chemicals to the groundwater and movement of groundwater into the proposed channel improvement area prior to the initiation of excavation activities at this location. Again, groundwater controls and a slurry wall may be appropriate remedial actions.

#### 3.4.2.11 Operations and Maintenance (Channel, Weir, Seepage Berms, Fish Passage, Levee updates)

Operations and Maintenance is ongoing for existing features within the Rankin-Hinds AOR, additional Operations and Maintenance will be implemented for each constructed feature to USACE Standards. Existing Levee and Pumping Plant manuals will be updated. New features, such as the new weir and lake will require development of new O&M manuals. The district commander is responsible for developing an OMRR&R manual for each project and separable element constructed under a separate project cooperation agreement (PCA), or functional portion of a project or separable element, reporting the status of the manual through the project management system as required by ER 5-7-1(FR). Normally, the Engineering Division will be assigned the overall responsibility for preparing a draft OMRR&R manual with appropriate inputs from other disciplines and, in consultation with the project sponsor, furnishing the draft manual to the project manager for coordination with the project sponsor, and preparing the final OMRR&R manual for approval. For a functional portion, the OMRR&R manual is an interim manual pending completion of the entire project or separable element. The major subordinate commander is responsible for review and approval of the manual. The project sponsor, normally through a permanent committee consisting of our headed by an official usually called the "superintendent" is responsible for carrying out the provisions of the OMRR&R manual. The OMRR&R manual will include coverage of all OMRR&R subjects required by the PCA and existing regulations, in detail sufficient to ensure proper OMRR&R accomplishment by the project sponsor. Project sponsors, subject to review and approval of the district commander, may prepare supplements to the manual.

### 3.4.3 Alternative Combination Thereof Plan

The USACE evaluated various combinations of the project features to determine a combination that would maximize the flood risk reduction benefits while reducing adverse impacts and costs. Based on H&H modeling and agency coordination, the CTO Alternative could be comprised of the following features with or without a weir (Alternative D and Alternative E, respectively):

- Alternative A1

- Reduced Excavation of Main Channel
- Federal levee improvements.
- New weir and fish ladder.
- Utilization of existing weir.
- Non-Federal levee improvements (Savanna Street WWTP).
- Levees.
- Countermeasures for Bridges.
- Mitigation features.
- Year-round recreational lake.

### 3.4.3.1 CTO Feature Summary

Table 3-6 Provides a listing of the project features of the CTO alternative with (Alternative D) and without (Alternative E) a weir for comparative purposes. Based on H&H modeling, the weir would be located in a different location from the new weir as identified in Alternative C. Figure 3-9 shows the location of the proposed weir.

*Table 3-6. Alternatives CTO Comparison With and Without Weir*

| Alternative CTO | With Weir (Alternative D) | Without Weir (Alternative E) | Units |
|---|---|---|---|
| | Quantity | Quantity | |
| **NON-STRUCTURAL** | | | |
| Non-structural plan | 60<br>43 residential<br>17 nonresidential | 60<br>43 residential<br>17 nonresidential | structures |
| **STRUCTURAL** | | | |
| Lake Surface Water Area | 1706 | 0 | acres |
| Clearing and Grubbing * | 1,501 | 1,501 | acres |
| Channel Improvements Excavation * | 1016 (11.3-14.1) | 1016 (11.3-14.1) | acres (mcy) |
| Fill Area (NFI 1.3 bulk factor) * | 585 (14.66-18.36) | 585 (14.66-18.36) ) | acres (mcy) |
| Stabilization or armoring for bridge abutments * | 7 | 7 | bridges |
| Hard Point in tributary channels to prevent incision/sediment into newly constructed lake * | 750 | 750 | Feet (crossing river) |
| Newly Federalized Levee (inc. slurry wall* | 1.7 | 1.7 | miles |
| Slurry Wall Savanna Street WWTP* | 1.7 | 1.7 | miles |
| New Slurry wall for seepage of existing features** | Up to 1.3 | 0 | miles |
| Weir and new gate ** | 1 | 0 | each |
| Pumps to address interior drainage Impacts ** | 1 | 0 | each |

| | | | |
|---|---|---|---|
| Fish Ladder ** | 5,000-6,000 | 0 | feet |
| Canton Club Levee*** | 1.4 | 1.4 | miles |
| RV, Tent, Cabin Camping | 150 | 0 | each |
| Fishing Piers | 6 | 0 | each |
| Trails | 79,000 | 0 | linear feet |
| Wildlife Viewing | 4,500 | 0 | square feet |
| **OPERATIONS AND MAINTENANCE** | | | |
| Weir | 1 | 0 | each |
| Fish Ladder | ? | 0 | each |
| Terrestrial Habitat Mitigation | 11 | 11 | events |
| Riverine Habitat Mitigation | ? | 0 | events |
| Lake | 1 | 1 | each |
| Pump Station | 1 | 0 | each |
| Levees | 2 | 2 | each |
| **MITIGATION** | | | |
| Sandbars (material from excavation) | 31 | 0 | acres |
| Reforest top bank of fish ladder | ? | 0 | acres |
| Riverbank preservation | 10 | 10 | miles |
| Removal of obsolete aquatic barriers | 1 | 0 | structure |
| connect occupied and suitable unoccupied riverine habitat | ? | 0 | acres |
| Open historically lost riverine habitat | ? | 0 | acres |
| Terrestrial Habitat Mitigation | 10,762 | 10,762 | acres |

* Components of Alt C Excavation
** Components of Alt C Weir
***Feature from Alternative B

## Nonstructural Component

The nonstructural analysis was conducted based on a residential and non-residential structure inventory developed by USACE in 2023 using the National Structural Inventory database of structures, version 2.0. An assessment of structures located in the 10 percent, 4 percent, 2 percent, and 1 percent AEP floodplains in the Post Project Construction was performed (reference Appendix N for more details). The NS features Elevation and floodproofing of structures were used to determine the effectiveness of a nonstructural alternative. For the analysis, residential structures would be elevated to the 1 percent AEP BFE based on year 2082 hydrology up to 13 feet above the ground and nonresidential

structures to be floodproofed up to 3 feet above the ground. Participation in the nonstructural plan would on a voluntary basis by the property owner.

As a result of feedback from the public meetings held in May and June 2023, the option to include property acquisition (buyout) on a voluntary basis is included in the nonstructural implementation plan. Full details regarding the Non-structural Implementation Plan are included in Appendix N.

### NFI Channel Improvement/Weir/Levee Plan Components

Both of the Alternatives CTO (Alternative D and E) provides similar flood risk reduction as the NFI Alternative C with a smaller footprint. Alternative CTO consists of the construction of channel improvements, a new weir (Alternative D) with a low-flow gate structure downstream for future potential water supply while simultaneously creating a lake area for recreational opportunities (Figure 3-10). Federal levee improvements (excavated material plan) and raising an existing non-Federal ring levee (the Savanna Street WWTP Levee).

Modifications include constructing a weir upstream of the location identified for Alternative C, reducing excavation limits which reduces fill areas and thus reducing environmental impacts throughout the project footprint. The new weir would have a lower elevation than proposed for alternative C as well as a reduction in the overbank excavation limits. These changes could reduce environmental impacts especially to HTRW sites within the project footprint.

The Alternative CTO seeks to realize flood risk management through a reduced scope of measures that provide similar levels of flood risk reduction as Alternative C. Flood risk management is realized through lowering of the channel overbanks within the project footprint, thereby improving conveyance of water through the project area and lowering the water surface elevation of the river in some places within the project area over 4 feet (1.2 m). Water surface elevation reductions due to this excavation would provide reduction of flood elevations not only within the reach of excavation, but additional elevation reductions upstream for over 8 miles upstream of the excavation limits.

Construction of the project would require relocations and/or improvements to various public and private utilities and infrastructure, mitigating potential HTRW and other hazardous waste sites within the floodplain, avoidance and minimization features required under the Endangered Species Act, and the creation of new habitat mitigation areas to offset losses within the project’s construction footprint areas.

There are a total of 9 transmission lines within the project area. All efforts would be made to avoid, monitor, maintain required clearance, and protect these structures. If avoidance is not possible, then utility relocation or raising of lines/protection of structures would be necessary. It is estimated that 4 to 5 of these lines will require additional utility relocation costs. Coordination with the operating entity to determine specific requirements of each transmission line will be conducted during PED.

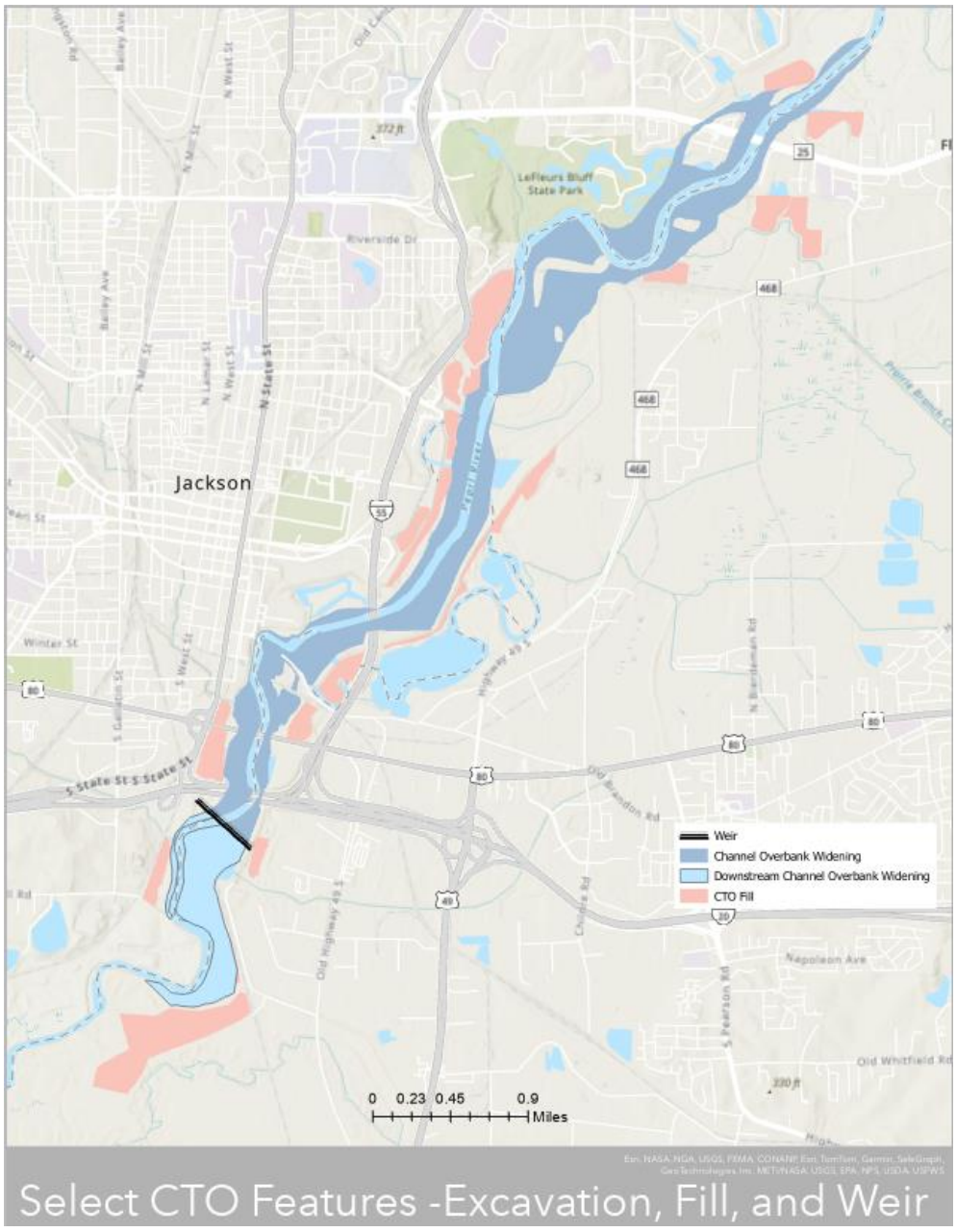



*Figure 3-10. Select CTO Features – Excavation, Fill, and Weir*

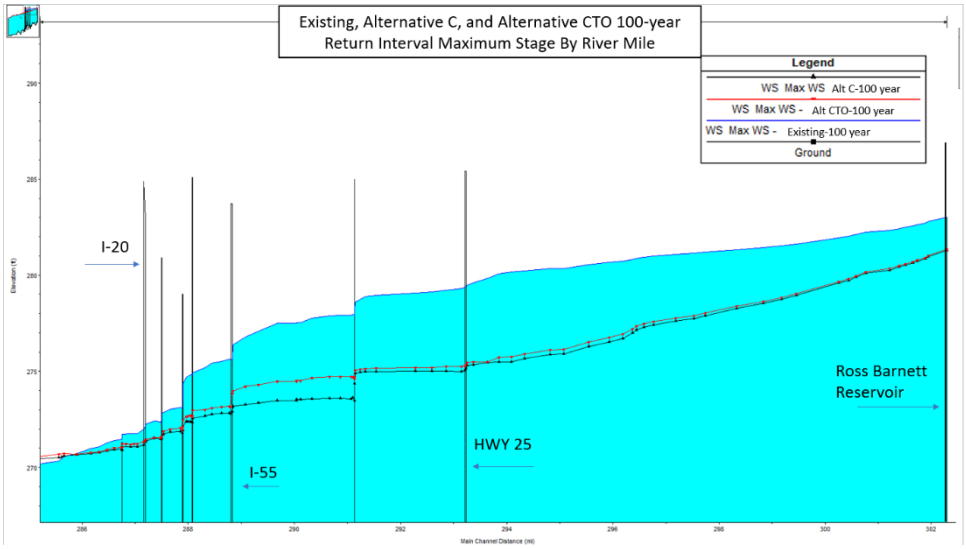



*Figure 3-11. USACE modeling Results for the 1% AEP (100-year) With and Without Project Routing Scenario*

**Channel Improvements**

Channel improvements (Figure 3-12) consist of excavating areas along the Pearl River to improve conveyance from RM 285 to 294, which included river reaches previously channelized during the existing levee construction. The channel improvement footprint includes excavation of up to 1,016 acres. Of the total 1,016 acres, approximately 853 acres are located above the proposed weir, and approximately 163 acres are located below the proposed weir. The width of excavation would vary ranging from 500 to 2,600 feet (152-793 m) including the river width. The actual widths would be determined during the PED phase. The depth of excavation would vary between 0 -15 feet to meet the proposed bottom elevation of 250.0 feet NGVD. The quantity of material excavated from the floodplain and channel overbanks would range from 11.3 to 14.1 million cubic yards (8.6-10.7 million $m^3$) of material. The existing river channel would not be widened, instead excavation of the overbank areas would occur.

The preliminary project layout includes islands within the channel improvement excavation area that would be maintained and/or expanded upon from RM 288.0 to RM 292.0. Further, sand bars could be constructed inside the floodplain and along the existing islands to compensate for the loss of sand bar habitat.

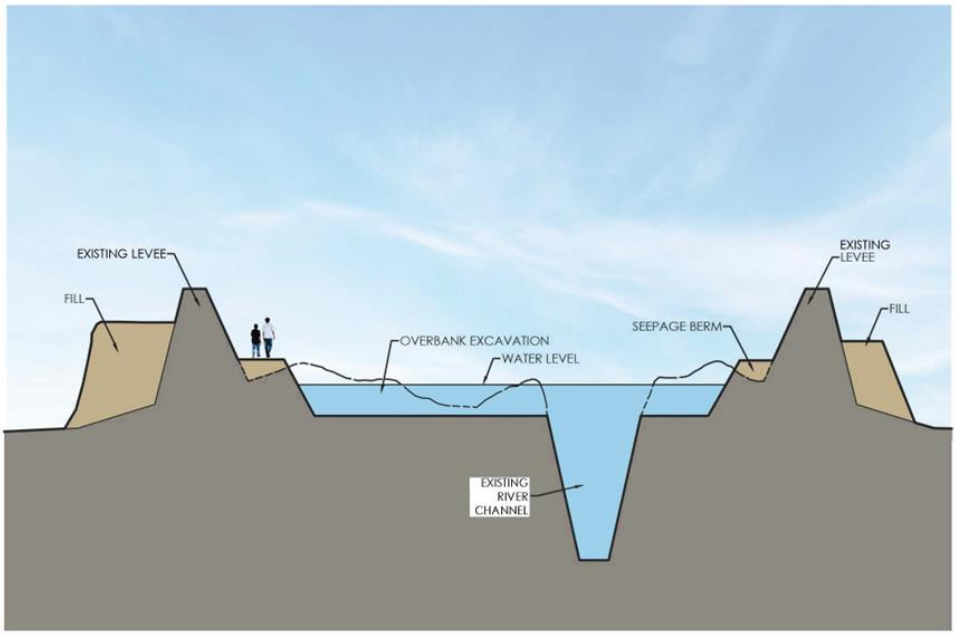



*Figure 3-12. Channel Improvements with a Relocated Weir*

**Overbank Modifications**

The existing overbank areas of the Pearl River channel would be lowered to increase conveyance of flood flows. Existing levees would remain in place and would be maintained to increase this control and to aid in haul access. Excavation limits near the existing levees would be determined during final design.

Station 10+00 through 140+00. Specific items included in this reach are the I-20 Interstate bridges (Sta. 95+00±) as well as the U.S. Highway 80 (Sta. 110+00), Old Brandon Road (Sta. 135+00±), and railroad bridges (Sta. 70+00±, Sta. 130+00±). Two high-pressure gas lines run through this reach and will would have to be carefully monitored as excavation and grading activities progress. Multiple access points on both sides of the river would have to be maintained and monitored from a perspective of public safety and construction use.

Station 140+00 through 290+00. This reach contains excavating the overbank areas around high points such that high points would appear as islands. As with the previous reach segment, numerous access points would require management and maintenance for use and safety. A creosote slough area (Sta. 240+00±) will be avoided during construction, to not disturb or cause any objectionable material to be exposed or mixed with other excavated material.

Station 290+00 through 400+00. As with the previous downstream reaches, there are bridges to work around (Highway 25 near Sta. 360+00), and gas lines and transmission lines that must be monitored during earthmoving operations. Depending on the final design, Mayes Lake (Sta. 310+00±) may need tie-in work to maintain its current level. A determination about the tie-in work would be made during the PED phase. An existing abandoned railroad embankment of the Gulf, Mobile & Northern/Gulf Mobile and Ohio (GM&N/GM&O) Railroad Bridge could also be affected and was removed in H&H modeling. Some excavation would be required in this reach such that high points would appear as islands. The existing weir at the water works bend near Station 290+00 would remain undisturbed.

**Excavated Material Plan (Fill material)**

Alternative CTO would upgrade the existing federal levees by placing excavated material on the protected side of the levees. Excavated fill material would also be placed in designated disposal areas in other locations within the flood plain. The disposal fill areas would impact approximately 485 acres (151 ha) (Figure 3-10).

Clearing and grubbing of approximately 1501 acres would occur prior to placement of the excavated fill material from the channel lowering. The excavated fill material would be used to create land areas ranging from 6.5 to 88 acres (2.6 – 21 hectares) within the Jackson MSA. The newly created areas could allow for expanded riverfront access, natural areas, and commercial development, along with recreational opportunities. The Jackson MSA has significant historical and cultural site presence, final site locations would be adjusted during PED following completion of cultural resource surveys.

Fill material placed behind levees would be graded to the same elevation or lower than existing levees, compacted for suitably for future land development. However, if any structures are built on top of any portion of the maintenance berm designed or used as a seepage control, the berms would need to be overbuilt and utilities or any other structure or penetrations would be limited to within the overbuilt section.

Where water would be permanently ponded against the riverside slope, these areas will require a 40-foot-wide semi-compacted impervious riverside maintenance berm to limit seepage through the levee. The berm assumed to extend the entire length of any levee section where water is pooled. No removal of the riverside blanket near the existing levees is anticipated. A riverside blanket refers to a top layer of clay and/or silt soil with low permeability constructed on the riverside of a levee to reduce the movement of water underneath the levee.

If any structures are to be built on top of any portion of the maintenance berm designed or used a seepage control, the berms would be overbuilt and utilities or any other structure or penetrations would be limited to within the overbuilt section. Penetrations trough the berm could become seepage exit points, and this is specified to limit fracture through the main berm.

**Material Provided to NFI**

Up to 1,660,000 cy (1,269,000 3) of fill material (estimated as 100 acres (40.5 hectares) of fill 10 feet high) would be provided to the NFI for additional usage within the project footprint. This material would either hauled directly from the excavation site or moved to a staging area for removal by the NFI. Existing fill areas would be used as staging areas after clearing and grubbing but prior to fill activities.

**Hardpoints at Base of Tributaries**
Multiple tributary inflow points exist within this reach and Alternative CTO will add a hardpoint, via a rock chute to prevent backward erosion at each tributary inflow where the excavation of overbanks decreased the tributary channel bottom elevation at or near the confluence of those tributaries with the Pearl River.

**Reinforcement of Bridge Abutments or Replacement of Bridges (if required)**
If any stabilization or armoring, such as riprap, slope paving, slide repairs, etc., is required, it will be carried out prior to clearing and any major channel work. Following its own analysis, the MDOT has informed the Rankin-Hinds Flood Control District (the Flood Control District), that MDOT agrees to collaborate with the Flood Control District in “the advancement of this project and to ensure countermeasures are included, if determined necessary during the future design process.” (Letter to G. Rhoads, dated February 26, 2024) To this end, the Flood Control District developed a range of cost estimates for potential structural and hydraulic countermeasures that could be recommended if countermeasures are determined necessary. The array of countermeasure features analyzed will mitigate potential impacts to MDOT bridges that will be identified during the PED phase. The estimated cost for these features is based upon known costs for the construction of hydraulic and structural countermeasures on another MDOT project at downstream hydraulic crossings of the Pearl River. When additional information becomes available during PED, adjustments to the design can and will be made to reduce potential impacts. Any proposed countermeasure design and implementation will be conducted with MDOT’s concurrence, review, and approval.

Rough estimations of the level of effort required to mitigate for bridge impacts include improvements for approximately 36 bents, 12 piers, abutment scour, as well as funding to conduct monitoring surveys. A pile is a concrete post that is driven into the ground to act as a leg or support for a bridge. A bent is a combination of the cap and the pile. Together, with other bents, act as supports for the entire bridge.

There are a total of 2 active railroad bridges within the project area. All efforts would be made to avoid, monitor, and protect these structures. Additional modeling is required to validate these assumptions during PED. If avoidance is not possible, then coordination with the operating entity to determine specific requirements of each railway bridge will be conducted during PED. All alterations of railroad bridges would be in accordance with Section 3 of the 1946 Flood Control Act (22 USC 701p).

**Construction of New Weir and Gate with Fish Ladder**
Alternative CTO may include a new weir to be constructed near RM 286.5 at the southern end of the channel improvements area. It should be noted that the CTO alternative does not

include any modifications to the existing J. H. Fewell weir. This new weir would provide for a larger body of water within the Pearl River channel to the north of the weir and fish ladder. Downstream low-water hydrologic flows (extreme drought condition minimum flows) within the Pearl River channel would be maintained by means of a 12 x 12-foot low-flow gate. Also note that the gate is required for any future maintenance which requires drawdown of the lake. Portions of the weir would be submerged during normal flow allowing excess water to pass downstream. Water would pass over the weir with inflow into the lake approximately equaling outflow at any given time (with the exception of the extreme drought, which has a minimum release and outflow could be greater than inflow. However, this is expected to occur very rarely, as the Ross Barnett Reservoir also has a minimum release requirement that would pass through the system). As opposed to the existing weir, the new weir would be constructed to a higher elevation of approximately 256 feet. NAVD 88 with a length of up to 1,700 feet with a fish ladder located on the southern end of the proposed channel improvements area. The weir would impound approximately 6 feet of water along the excavated overbanks (about 1350 ft) and up to 22 feet in the approximately 350 feet across the main channel. This would impound an area of approximately 1706 acres, of this area approximately 637 acres are upstream of the Fewell Water Treatment Plant Weir. Downstream erosion protection from flow over the weir are part of the conceptual designs.

A fish ladder (Figure 3-13) would be excavated around the relocated weir within the project area. The fish ladder is conceptually designed to be approximately between 5,000 - 6,000 feet (1524-1829 m) in length. The fish ladder would be constructed at an approximate 0.004 ft/ft slope and tie into the Conway Slough which connects to the Pearl River 0.8 miles downstream of the CN Railroad Bridge. The fish ladder design would be coordinated with US Fish and Wildlife, state agencies and Tribes during the PED phase.

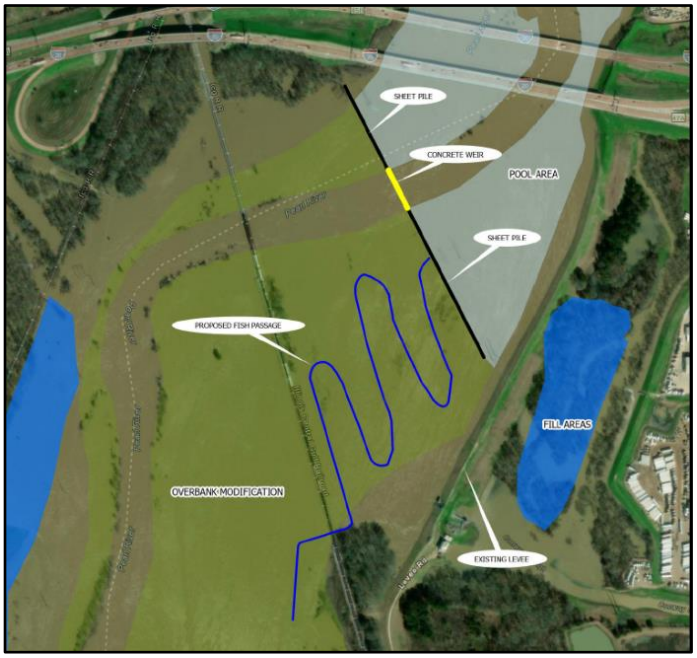



*Figure 3-13. Proposed Weir (Black) and Fish Ladder (Blue) Exact Dam Design to be*

*determined in PED.*

The proposed weir meets USACE and State criteria to be defined as a dam based on the height of the structure and water storage. As a result, the dam would be designed and constructed to meet USACE and State criteria for a dam.

The construction of a weir without excavation of the overbanks has not been sufficiently investigated to ensure that inducements do not occur. Construction of the weir without channel conveyance improvement was not analyzed and would require additional study if selected.

The proposed weir does not provide any flood control benefits, and construction of the weir necessitates additional pumping needs at existing levees as well as seepage protection in the form of berms and slurry walls on existing levee features upstream of the weir. However, the weir provides a lake surface for future water supply concerns, as well as adding attractive locations for recreation and future economic development. The proposed weir would result in an expanded, year-round recreational water body capable of supporting recreational facilities. Potential recreation sites would be limited to areas disturbed by construction and design of these facilities would be coordinated during PED (Figure 3-14). The potential recreational opportunities could include boat ramps, camping areas, fishing piers, trails, or wildlife viewing areas.

Implementation of this alternative would be subject to the non-Federal sponsor agreeing to comply with the applicable federal laws and policies prescribed in the model Partnership Agreement for Authorized Structural Flood Risk Management Projects. The Flood Control District, the non-Federal sponsor, anticipates recreation operations will be solely its responsibility. As such, recreation design and construction would be cost shared.

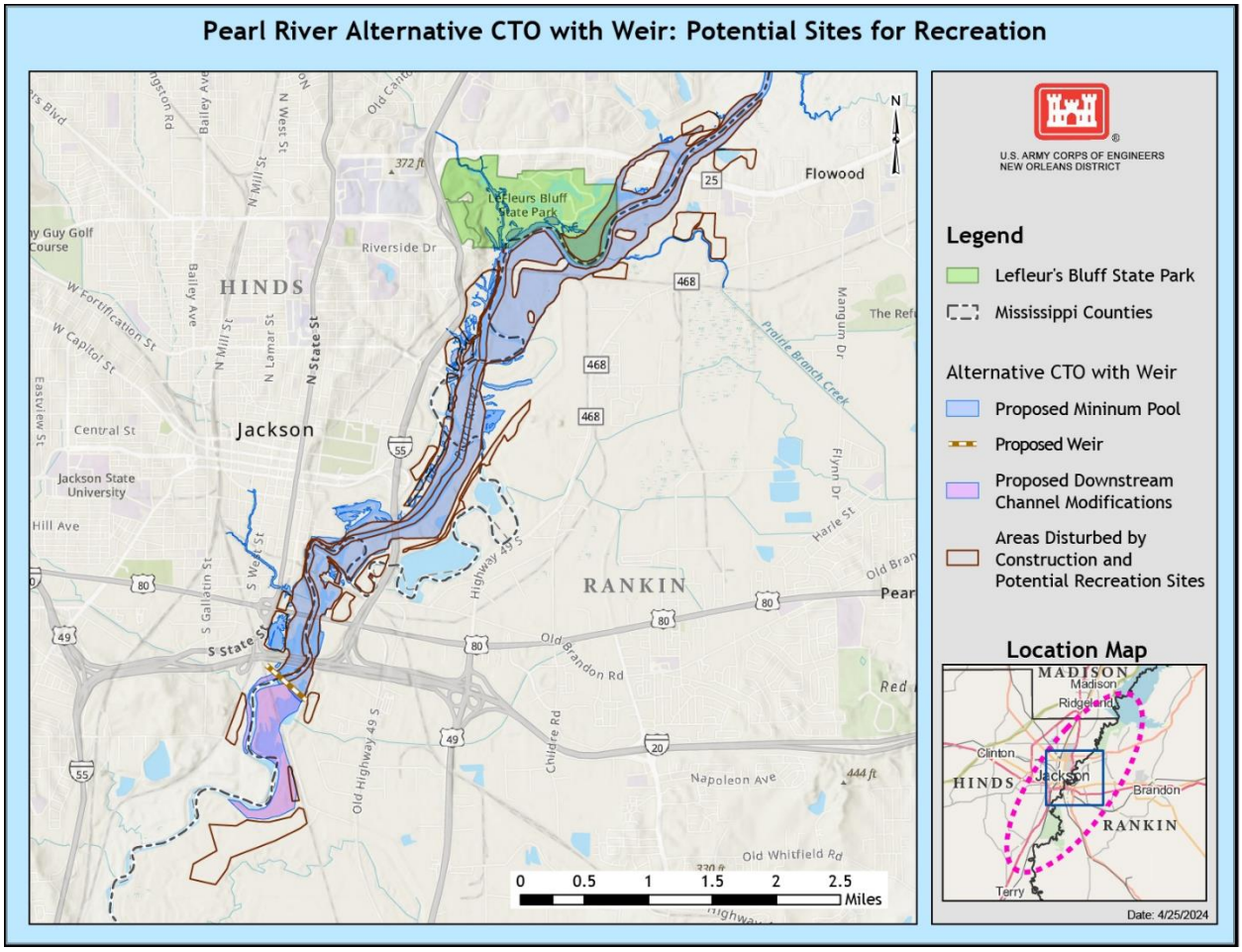



*Figure 3-14. Potential Sites for Recreational Features*

**Pumping Needs at Existing Levees**

The existing levees contain drainage structures that allow water to drain from the interior of the leveed area when the Pearl River is low. When the Pearl River water level is high, the drainage structures are closed, and pump stations are used to pump water out of the leveed area. The original design of these features called for the drainage structure to handle a 1 percent AEP interior drainage flow and the pumps were originally designed for a smaller event.

Alternative CTO calls for the construction of a new weir with a minimum pool at elevation 256.0 ft. As a result, the drainage for the Jackson Fairgrounds Levee would always impound at least multiple feet of water on the structure and would no longer be able to operate via gravity flow in order to prevent the new lake from flooding the interior leveed areas.

The proposed new weir was placed upstream of the East Jackson Levee drainage structure, so the pool should not impact the operation of the drainage structure. Additional pumping

capacity would be needed to mitigate for the loss of capacity of the gravity flow drainage at the Jackson Fairgrounds Levee. Additionally, the Operation and Maintenance of the additional pumps would need to be substantially updated from the existing O&M plan for the pumping capacity and constant operations.

**Savanna Street WWTP Levee**

This is an existing non-Federal levee that provides flood risk reduction to the Savanna Street WWTP near RM 282 (Jackson-East Jackson Flood Control Project NLDID: 14050000124). The levee would undergo maintenance and additional upgrades to meet the freeboard necessary to meet a 1 percent AEP flood event in advance of the main construction phases (Figure 3-15). The new Federalized levee around the WWTP consists of a 10-foot crown width with 1V on 3H landside and riverside slopes. If needed, a slurry wall for seepage mitigation would be added. Additional pumps would not be needed since the existing pumps are being replaced as part of the Section 219 Environmental Infrastructure Program discussed in Section 1.5.2 of this report.

Principal features of the work include mobilizing and demobilizing, clearing and grubbing, removing and stockpiling any existing crushed stone surface, semi compacted levee embankment, traverses, adding new crushed stone surfacing, mowing, turfing, erosion control matting, preventing storm water pollution, and providing environmental protection. Additional work could include trenching and the creation and backfill of a concrete slurry wall within the levee footprint.


*Figure 3-15. Proposed Federalized Levee at Savanna WWTP*

**Operations and Maintenance (Channel, Weir, Seepage Berms, Fish Ladder, Levee updates)**

Operations and Maintenance is ongoing for existing features within the Rankin-Hinds AOR, additional Operations and Maintenance will be implemented for each constructed feature to USACE Standards. Existing Levee and Pumping Plant manuals will be updated. New features, such as the Canton Club Levee and the new weir and lake will require development of new O&M manuals. The district commander is responsible for developing an OMRR&R manual for each project and separable element constructed under a separate project cooperation agreement (PCA), or functional portion of a project or separable element, reporting the status of the manual through the project management system as required by ER 5-7-1(FR). Normally, the Engineering Division will be assigned the overall responsibility for preparing a draft OMRR&R manual with appropriate inputs from other disciplines and, in consultation with the project sponsor, furnishing the draft manual to the project manager for coordination with the project sponsor, and preparing the final OMRR&R manual for approval. For a functional portion, the OMRR&R manual is an interim manual pending completion of the entire project or separable element. The major subordinate commander is responsible for review and approval of the manual. The project sponsor, normally through a permanent committee consisting of our headed by an official usually called the "superintendent" is responsible for carrying out the provisions of the OMRR&R manual. The OMRR&R manual will include coverage of all OMRR&R subjects required by the PCA and existing regulations, in detail sufficient to ensure proper OMRR&R accomplishment by the project sponsor. Project sponsors, subject to review and approval of the district commander, may prepare supplements to the manual.

## Levees Plan

**Canton Club Levee**

A levee segment of approximately 1.5 miles is proposed on the west bank of the Pearl River in northeast Jackson (Figure 3-16). This levee would provide additional flood risk reduction for approximately 100 acres of high density developed neighborhoods. This area is bounded on the north by the North Canton Club Circle and Beechcrest Drive on the South. It is estimated this would reduce flood risk for over 250 homes.


*Figure 3-16. Proposed Canton Club Levee (orange line)*

Principal features of the work include mobilizing and demobilizing equipment, clearing and grubbing, removing and stockpiling any existing crushed stone surface, semi compacted levee embankment, traverses, adding new crushed stone surfacing, mowing, turfing, erosion control matting, preventing storm water pollution, and providing environmental protection.

If additional borrow is necessary, the borrow areas would be acquired by the NFI and furnished by the Government to the contractor (government furnished borrow). Some small areas could be more appropriate for the construction of a short floodwall, typically an I or T wall, could be more appropriate for some small areas due to space constraints, though further analysis would be required. Constructing a less designed berm could be more appropriate where smaller loadings would occur.

Construction of the project will require relocations and/or improvements to various public and private utilities and infrastructure, avoidance and minimization features required under the ESA, and the creation of new habitat mitigation areas to offset losses within the project's construction footprint areas.

**Borrow Plan**

A borrow plan has not been developed at this stage of the analysis. It is conceivable that there is enough borrow material from the material excavated but it is unknown at this time if the material is suitable for constructing levees. Should the excavated material be determined to be unsuitable, borrow material would need to be identified for construction of

any levees. There are potential borrow sources within close proximity of the project area (10-mile radius). Reference Figure 3-8 for potential source. Borrow opportunities would be further investigated during PED and a supplemental NEPA document would be prepared at that time.

**Operations and Maintenance (Canton Club Levee)**

Operations and Maintenance will be implemented for each constructed feature to USACE Standards. The district commander is responsible for developing an OMRR&R manual for each project and separable element constructed under a separate project cooperation agreement (PCA), or functional portion of a project or separable element, reporting the status of the manual through the project management system as required by ER 5-7-1(FR). Normally, the Engineering Division will be assigned the overall responsibility for preparing a draft OMRR&R manual with appropriate inputs from other disciplines and, in consultation with the project sponsor, furnishing the draft manual to the project manager for coordination with the project sponsor, and preparing the final OMRR&R manual for approval. For a functional portion, the OMRR&R manual is an interim manual pending completion of the entire project or separable element. The major subordinate commander is responsible for review and approval of the manual. The project sponsor, normally through a permanent committee consisting of our headed by an official usually called the "superintendent" is responsible for carrying out the provisions of the OMRR&R manual. The OMRR&R manual will include coverage of all OMRR&R subjects required by the PCA and existing regulations, in detail sufficient to ensure proper OMRR&R accomplishment by the project sponsor. Project sponsors, subject to review and approval of the district commander, may prepare supplements to the manual.

**Mitigation Component**

Habitat Mitigation would be achieved by implementing Corps constructed mitigation projects and/or purchasing of mitigation bank credits. Further planning and analysis would be completed during PED to determine which strategies, stand alone or combined, would fully compensate for habitat impacts.

Mitigation features may be required for Gulf States Creosote Company Site. The Creosote Slough is located within the project area. The site, or portions thereof, may require avoidance, remediation, or some other mitigating features. Groundwater controls and a slurry wall may be appropriate remedial actions in this event. Final remedial designs would be coordinated with appropriate Federal and State agencies to determine necessary actions to prevent and/or eliminate potential leaching of chemicals to the groundwater and movement of groundwater into the proposed channel improvement area prior to the initiation of excavation activities at this location.

Coordination with appropriate local, State, and Federal agencies would determine site actions to eliminate potential leaching of landfill waste to the groundwater and movement of groundwater into the proposed channel improvement.

## 3.5 COMPARISON OF LEVEL OF FLOOD RISK REDUCTION

Alternative A1 would accrue flood annual damage reductions of $18,713,300, approximately 45 percent of the without-project damages. Alternative C would accrue expected annual damage (EAD) reductions of $8,573,000, approximately 20 percent of the without-project EAD of $42,330,000. Although more limited in scope, Alternative A1 would reduce an additional 25 percent of damages in the study area compared to Alternative C. Furthermore, Alternative A1 would not induce any flooding upon implementation, while Alternative C would induce flooding on approximately 220 structures within the study area and potentially more structures south of the study area.

The CTO alternatives would further reduce the residual damages that would remain with the Alternative A1 in place.

USACE also qualitatively evaluated the removal of the non-flood risk reduction features from Alternative C that would reduce the quantities presented in Table 3-7 and total project costs. Not only would removal of the weir reduce construction costs, but also mitigation for implementation of the project. It is assumed that the removal of the weir would substantially reduce the terrestrial habitat impacts that were due to inundation, and the post construction long-term water velocity and water quality monitoring would no longer be required. With the reduction of quantities and total project costs described in Section 3.4.4., a revised Alternative C to only include flood risk reduction project features would not be considered the NED Plan.

*Table 3-7. Comparison of Level of Flood Protection for Alternatives A1 and C at FY23 Price Level and Discount Rate*

| | A1 | C-Low Cost | C-High Cost |
|---|---|---|---|
| Project First Cost | $198,520,000 | $1,046,068,000 | $2,122,260,000 |
| Interest During Construction | $614,000 | $67,289,000 | $136,515,000 |
| Total Investment Cost | $199,134,000 | $1,113,357,000 | $2,258,775,000 |
| Average Annual Investment Cost | $7,021,100 | $39,255,000 | $79,640,000 |
| Average Annual O&M Cost | $0 | $940,000 | $940,000 |
| Total Average Annual Cost | $7,021,100 | $40,195,000 | $80,580,000 |
| Benefits EAD Reduced | $18,712,700 | $14,279,200 | $14,279,200 |

| | | | |
|---|---|---|---|
| Net Benefits | $11,691,600 | -$25,915,800 | -$66,300,800 |
| B/C Ratio | 2.7 | 0.4 | 0.2 |

### 3.5.1 National Economic Development Plan

The objective of National Economic Development (NED) is to maximize increases in the net value of goods and services. Within USACE, this is achieved by comparing the difference in the value (benefits) produced by the project to the value of the resources (costs) required to produce those goods and services or construct the project, or Net Benefits. In order to produce Net Benefits a particular plan must manifest a benefit to cost ratio (BCR) greater than 1.0. Table 3-8 below provides an economic analysis summary utilized to determine the likely the NED Plan.

*Table 3-8. Summary of Economic Assessment at FY24 Price Level and Discount Rate*

| | **CTO** | | **CTO Without Weir** | | **A1-NS Only** | **A1 with Canton Levee** |
|---|---|---|---|---|---|---|
| | **Low** | **High** | **Low** | **High** | | |
| **Project First Cost** | $487,328,569 | $655,391,345 | $399,498,775 | $508,474,363 | $50,072,903 | $60,072,903 |
| **IDC** | $18,613,297 | $25,161,141 | $15,305,461 | $19,748,644 | $170,090 | $306,657 |
| **Total Investment Cost** | $505,941,865 | $680,552,487 | $414,804,236 | $528,223,006 | $50,242,993 | $60,379,561 |
| **Benefits** | $27,718,600 | $27,718,600 | $22,409,565 | $22,409,565 | $4,010,090 | $4,828,250 |
| **AA Investment Cost** | $18,740,500 | $25,208,300 | $15,403,200 | $19,738,400 | $1,861,000 | $2,236,500 |
| **AA O&M Cost** | $729,936 | $891,122 | $196,976 | $421,372 | $0 | $20,340 |
| **Total AA Cost** | $19,470,436 | $26,099,422 | $15,600,176 | $20,159,772 | $1,861,000 | $2,256,840 |
| **Net Benefits** | $8,248,164 | $1,619,178 | $6,809,389 | $2,249,793 | $2,149,090 | $2,571,410 |
| **BCR** | 1.4 | 1.1 | 1.4 | 1.1 | 2.2 | 2.1 |

#### 3.5.1.1 Alternative A1

Preliminary economic analysis identified Alternative A1 as the potential NED Plan. However, once controlling for the effects of the headwater flooding on the tributaries, the net benefits of the non-structural plan dropped to $2.15m with a BCR of 2.2. As a result, Alternative A1 was no longer the clear NED plan, but was still in contention. However,

significant implementation risks associated with Alternative A1 are described below which may prohibit selection of Alternative A1 as the NED plan.

#### 3.5.1.1.1 Assumed Participation Rate

Participation rates for eligible property owners in structure elevation programs have been shown to vary considerably. The ongoing structure elevation program associated with the Southwest Coastal study in southwest Louisiana is currently tracking at approximately 80%. However, pilot programs across a thirty-year period in the Cumberland Basin in Tennessee have stayed at a consistent 50%. The table below (Table 3-9) displays the potential net benefits of the stand-alone non-structural plan and the combination non-structural plan with the Canton Club levee through a range of participation rates.

*Table 3-9. Nets Benefits of Non-structural Alternatives at Varying Participation Rates*

| Participation Rate | Net Benefits | | |
|---|---|---|---|
| | NS Only | NS with Canton Levee-High Cost | NS with Canton Levee-Low Cost |
| 100% | 2,149,090 | 2,571,410 | 2,593,940 |
| 90% | 1,934,181 | 2,356,501 | 2,379,031 |
| 80% | 1,719,272 | 2,141,592 | 2,164,122 |
| 70% | 1,504,363 | 1,926,683 | 1,949,213 |
| 60% | 1,289,454 | 1,711,774 | 1,734,304 |
| 50% | 1,074,545 | 1,496,865 | 1,519,395 |
| 40% | 859,636 | 1,281,956 | 1,304,486 |

For comparison, the table below (Table 3-10) displays the net benefits of the CTO with and without weir at both the high and low range of cost points.

*Table 3-10. Nets Benefits of CTO Alternatives*

| Net Benefits | | | |
|---|---|---|---|
| CTO with Weir | | CTO without Weir | |
| Low Cost | High Cost | Low Cost | High Cost |
| 8,248,164 | 1,619,178 | 6,847,889 | 2,429,293 |

A comparison was made between the potential Net benefit performance of Non-structural plan options relative to the High Cost CTO plan options. With a participation rate of 70% or less, the stand-alone non-structural plan would fall out of contention for selection as the NED

plan. With a participation rate of 50% or less, the non-structural plan in conjunction with the Canton Club levee would fall out of contention for selection as the NED plan.

#### 3.5.1.1.2 Ineligible Costs

Not all implementation costs will be borne by the Federal Government and/or Non-federal Interest. The required non-structural alternative implementation agreement will obligate structure owners to expend any and all costs that may be necessary in connection with the elevation of the structure which are not deemed "eligible costs". Ineligible project costs include:

- Any structural and system repair due to existing deficiencies.
- Modifications or improvements to a septic system except for extension of lines from the raised structure.
- Cost for elevation above the identified target design elevation.
- Modifications to structures that are NOT attached to the eligible residential or commercial structure.
- Modifications to tubs, pools, spas, hot tubs, and related structures or accessories
- Modifications to decks and patios not connected to or immediately adjacent to the structure except for modifications that are expressly required by building codes.
- Proper remediation, removal and disposal or environmental contaminants including but not limited to HTRW, asbestos, and asbestos-containing materials in damaged for friable form.
- Costs associated with bringing a non-conforming structure into compliance with current building code, housing code, and/or other applicable codes.
- Costs associated with special access improvements, aside from those covered by the Americans with Disabilities Act (ADA), that are not deemed eligible; and
- Improvements to structures not considered the primary residence.

Significant portions of the study area have been identified as low-income communities; therefore, it is likely that some structure owners may not have the financial ability to address any potential additional, ineligible project costs. Preliminary visual assessment of the residences within the project area has indicated that many of these structures may require rehabilitation to be eligible to participate in the non-structural alternative. The potential owner-borne costs may prevent structure owners from participating thereby reducing the effectiveness provided by the non-structural plan.

### 3.5.1.2 CTO Alternatives

#### 3.5.1.2.1 Economic Comparison

Of the remaining implementable alternatives assessed (i.e., CTO without weir and CTO with weir), the economic summary contained within Table 3-8 indicates that the CTO without Weir Alternative provides the highest net benefits when assuming high costs, and therefore could be considered as the NED plan. However, the anticipated costs of the alternatives are

provided as an estimated range of low to high costs due to limited design maturity and the inability to sufficiently refine alternative costs. Should the high costs be reduced by as little as 15% for both CTO alternatives, a small reduction considering the wide range of cost and conservative nature of these anticipated costs, the CTO with Weir would provide the highest net benefits of the two CTO alternatives as indicated in Table 3-11 below. It is also useful to note that the in the event of equivalent Net Benefits, the CTO with Wier provides measurably greater total benefits, or damage reduction.

*Table 3-11. Summary of Economic Assessment of CTO Alternatives at 85% of High Cost*

| | 85% of High Cost | |
|---|---|---|
| | **CTO with Weir** | **CTO without Weir** |
| **Project First Cost** | $560,346,178 | $435,466,743 |
| **IDC** | 21,398,056 | 16,638,868 |
| **Total Investment Cost** | $581,744,233 | $452,105,611 |
| **Benefits** | 27,718,600 | $22,409,565 |
| **AA Investment Cost** | 21,548,300 | 16,746,400 |
| **AA O&M Cost** | 757,454 | 358,166 |
| **Total AA Cost** | 22,305,754 | 17,104,566 |
| **Net Benefits** | 5,412,847 | 5,304,999 |
| **BCR** | 1.2 | 1.3 |

#### 3.5.1.2.2 Ancillary Benefits

The CTO with Weir Alternative would also produce additional ancillary recreational benefits which would further meet the National Economic Development objective and support the CTO with Weir as the likely NED plan. The proposed weir would result in expanded, year-round recreational water body capable of supporting incidental recreational facilities and recreational opportunities to include boat ramps, boating, camping, fishing piers, nature/hiking trails, and/or wildlife viewing (Figure 3-9). These recreational benefits would not be achieved with the implementation of the CTO without Weir Alternative.

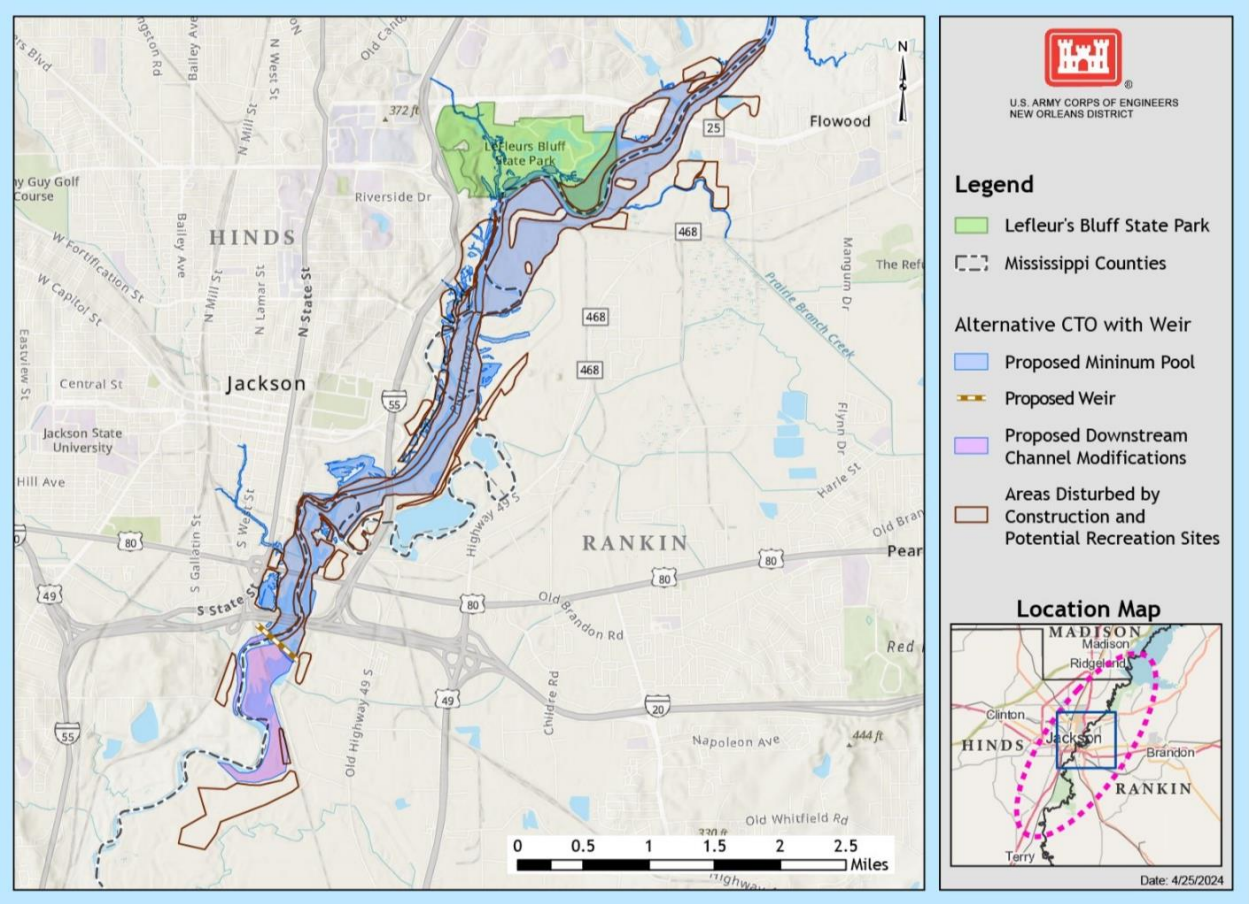



*Figure 3-9. CTO with Weir Potential Sites for Recreational Opportunities*

### 3.5.1.3 Additional Considerations

#### 3.5.1.3.1 Flood Event Impacts to Roadways and Accessibility

Non-structural features will not be applied to transportation infrastructure and Structural features will partially address impacts to roadways and associated accessibility. The City of Jackson has identified over 50 streets within the city impacted by various flood events associated with the Pearl River. Should a non-structural plan be implemented, eligible and participating structures would be protected from impacts. A structural plan will eliminate or reduce flooding on some currently impacted streets. However, the potential for residents being unable to return due to impassable roadways during and post event, preventing them from accessing properties for the extent of the flood event, will remain to varying degrees. Certain roadways impacted by flood events may also render emergency facilities inaccessible and inhibit emergency services from accessing structure owners or residents who attempt to return to or choose to remain in their residence. Alternative C or the CTO could improve these issues in areas that benefit from flood reduction.

#### 3.5.1.3.2 Flood Event Impacts to Water Supply

The City of Jackson has experienced numerous water-related crises associated with flood events including water treatment plant failures, and the inability to provide safe drinking water for residents for extended periods of time post-event. A recent event in 2022 resulted in state of emergency and federal disaster declarations, and approximately 160,000 residents were impacted by water supply disruption. (This event was triggered due to sedimentation issues outside of the project area.) Non-structural elevation of structures would protect participating structures with implementation of the non-structural plan. However, the non-structural plan would not reduce topographic flooding in the city of Jackson. Non-structural features will not be applied to service infrastructure. Structural plans would also not eliminate certain operational flood risks previously experienced by the existing water supply infrastructure. As a result, residents may still be unable to return to or utilize their residences due to the lack of adequate drinking water should the water supply continue to be impacted. Further water quality and sedimentation studies will need to be performed to determine the potential for impacts from sewer overflows, storm sewer drainage, contamination during high floods, and sedimentation related to water treatment and supply for any identified plan.

#### 3.5.1.3.3 Flood Event Impacts to Sewage System

The sewage system of the City of Jackson is also impacted by flood events. There are documented, repeated overloading of the sewage system, which have resulted in sewage overflows through open culverts into the Pearl River and adjacent waterways. Both the non-structural and structural plan provide some limited reduction in exposure to sewage overflows. Non-structural by lifting participating structures above water levels, and structural by reducing the footprint of flood inundation. However, residents participating in the non-structural plan may be unable to return to or utilize their residences, regardless of reduced exposure, due to the lack of functioning sewage systems, and/or the health hazards associated with potential exposure to raw sewage from flood related overflows in the vicinity of their properties. The C or CTO alternatives could improve these issues in areas that benefit from flood reduction.

### 3.5.1.4 NED

While total potential benefits based on 100 percent participation are used to assess potential non-structural plan viability, the actual average participation in non-structural flood risk reduction plans varies. A reasonable expectation for homeowner participation in a non-structural plan is 50 percent. Realization of this participation would mean that the Non-structural and Non-structural/Levee (assuming median cost) plans would be expected to produce approximately $1.075 and $1.508 million in Net Benefits respectively. By comparison the Structural plans, CTO wo/weir and CTO w/ weir, assuming 85 percent of the high estimated costs, would produce approximately $5.152 and $5.413 million in Net Benefits respectively. The structural plans both also contain a non-structural sub element that has a set cost.

Comparing the potential of the expected and variable outputs for all plans it appears that the plans likely to best meet the NED requirement would be one of the CTO structural plans, either without or with a weir. The possible difference in Net Benefits between the CTO w/weir and CTO plans could range between $0.63 and $1.4 million. However, the difference between the total benefits between the CTO w/weir and CTO plans is approximately $27.7 versus $22.4 million. An approximate difference of $5.3 million. The structural plans also provide approximately 4 to 5 times the total damage reduction provided by the Non-structural plans.

As a result, it can be reasonably expected that one of the CTO plans, likely the CTO w/weir, would be the NED plan.

# SECTION 4
# Environmental Consequences

In accordance with NEPA, this section includes the scientific and analytic basis for comparison of the alternatives A1, C, CTO, and the "No-Action" Alternative. The alternatives are assessed for their potential impacts on the relevant resources discussed in Section 2.

The discussion includes an analysis of potential beneficial and adverse effects on the resources, including a discussion of direct, indirect, and cumulative impacts, the relationship between short-term uses and long-term productivity, and any irreversible or irretrievable commitments of resources.

The alternatives assessed include those alternatives that were carried forward following the evaluation of the NFI final alternatives in their draft Final Section 211 Report and the USACE developed alternatives discussed in Section 3.

1) No Action Alternative

2) Alternative A1: USACE Developed Nonstructural Plan
   - 4% AEP
   - 10% AEP

3) Alternative C: NFI Channel Improvement/Weir/Levee (LPP)
   - Channel Improvements
   - Demolishing existing weir near J.H. Fewell WWTP
   - Construction of a new weir downstream for water supply
   - Creation of water area (lake) for recreational opportunities
   - Federal Levee Improvements
   - Upgrading an existing Federal Ring Levee around Savanna Street WWTP

4) Alternative CTO: Combination of the following features (preliminary NED plan):
   - Alternative A1
   - Reduced Excavation of Main Channel
   - Federal levee improvements.
   - New weir and fish ladder.
   - Utilization of existing weir.
   - Non-Federal levee improvements (Savanna Street WWTP).
   - Levees.
   - Countermeasures for Bridges.
   - Mitigation features.
   - Year-round recreational lake.

The CTO alternative as described in Section 3.4.3 was used to assess potential resource impacts that could occur if this combination of features were selected. At this phase of the study, the analysis of the CTO plan is preliminary and based off the information currently on hand. Further analysis and a supplemental NEPA document would be necessary to fully assess the alternative including any potential compensatory mitigation in the next phase of the study. The CTO alternative is assessed for potential impacts with a new weir and without a weir since construction of the weir does not provide any flood risk reduction benefits but does provide opportunity for recreational benefits if constructed. The level of analysis is commensurate with the level of data and information available at this time.

*Table 4-1 provides a comparison of the final array of alternatives.*

| Feature | ALT A1 Non-Structural Plan | ALT C | | ALT D CTO W/WEIR | ALT E CTO WO/WEIR | Units |
|---|---|---|---|---|---|---|
| | Quantity | Quantity NFI (211 report) | Quantity USACE | Quantity | Quantity | |
| **NON-STRUCTURAL** | | | | | | |
| Non-structural plan | 143<br>81 residential<br>62 nonresidential | acquisition | | 60<br>43 residential<br>17 nonresidential | 60<br>43 residential<br>17 nonresidential | structures |
| **STRUCTURAL** | | | | | | |
| Lake Surface Water Area | NA | 1700 | 2562.25 | 1706 | 0 | acres |
| Clearing and Grubbing | | 2,600 | 2301.39 | 1,501 | 1,501 | acres |
| Channel Improvements Excavation | | 1400 | 1443.25 | 1016 (11.3-14.1) | 1016 (11.3-14.1) | acres (mcy) |
| Fill Area | | 870 | 858.14 | 485 (12.5-16.2) | 485 (12.5-16.2) | acres (mcy) |
| Fill- Sponsor Responsibility (1.3 Bulk Factor) | | volume not listed | | 100 (2.16) | 100 (2.16) | acres (mcy) |
| Stabilization or armoring for bridge abutments | | 10 | 7 | 7 | 7 | bridges |
| Hard Point in tributary channels to prevent incision/sediment into newly constructed lake | | | 850 | 750 | 750 | Feet (crossing river) |
| Newly Federalized Levee (inc. slurry wall | | 1.7 | 1.7 | 1.7 | 1.7 | miles |
| Slurry Wall Savanna Street WWTP | | 1.7 | 1.7 | 1.7 | 1.7 | miles |
| New Slurry wall for seepage of existing features | | n/a | 1,460 ft | Up to 1.3 | 0 | miles |
| Weir and new gate | | 1 | 1 | 1 | 0 | each |
| Pumps to address interior drainage Impacts | | 0 | 2 | 1 | 0 | each |

| | | | | | | |
|---|---|---|---|---|---|---|
| Fish Ladder | | 7000 | 7000 | 5,000-6,000 | 0 | feet |
| Canton Club Levee | | n/a | n/a | 1.4 | 1.4 | miles |
| **OPERATIONS AND MAINTENANCE** | | | | | | |
| Weir | **NA** | Unknown | | 1 | 0 | each |
| Fish Ladder | | | | ? | 0 | each |
| Terrestrial Habitat Mitigation | | | | 11 | 11 | events |
| Riverine Habitat Mitigation | | | | ? | 0 | events |
| Lake | | | | 1 | 1 | each |
| Pump Station | | | | 1 | 0 | each |
| Levees | | | | 2 | 2 | each |
| **MITIGATION** | | | | | | |
| Sandbars (material from excavation) | **NA** | 31 | NA | 31 | 0 | acres |
| Reforest top bank of fish ladder | | ? | ? | ? | 0 | acres |
| Riverbank preservation | | 10 | NA | 10 | 10 | miles |
| Removal of obsolete aquatic barriers | | 0 | 1 | 1 | 0 | structure |
| connect occupied and suitable unoccupied riverine habitat | | 0 | NA | ? | 0 | acres |
| Open historically lost riverine habitat | | 0 | NA | ? | 0 | acres |
| Terrestrial Habitat Mitigation | | 5,000 | 24,760 | 10,762 | 10,762 | acres |

## 4.1 SUMMARY OF ENVIRONMENTAL CONSEQUENCES TABLE

Table 4-2 is a summary table of the potential environmental consequences by resource for each alternative considered. The No Action plan alternative would result in a continuation of existing trends and is not included in the table. However, it is included in the assessment of impacts throughout this section for a comparative analysis.

*Table 4-2. Summary of Potential Environmental Consequences by Resource*

| **Resources** | **Alt A1: USACE Nonstructural Plan** | **Alt C: LPP, Channel Improvement/ Weir/Levee** | **Alt CTO with weir:** | **Alt CTO with without weir:** |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| Wetland | D/I/C = (0/0/0) | D/I/C= (-/-/-) | D/I/C = (-/-/-) | D/I/C = (-/-/-) |
| Forested Uplands | D/I/C = (0/0/0) | D/I/C= (-/-/-) | D/I/C = (-/0/-) | D/I/C = (-/0/-) |
| Aquatic and Fisheries | D/I/C = (0/0/0) | D/I/C= (-/-/-) | D/I/C = (-/-/-) | D/I/C = (-/-/-) |
| Wildlife Resources | D/I/C = (0/0/0) | D/I/C= (-/-/-) | D/I/C = (-/-/-) | D/I/C = (-/-/-) |
| T&E; Protected Species | D/I/C = (0/0/0) | D/I/C= (-/--/-) | D/I/C = (-/--/-) | D/I/C = (-/-/-) |
| Soils; P&U Farmlands | D/I/C = (0/0/0) | D/I/C = (0/0/0) | D/I/C = (0/0/0) | D/I/C = (0/0/0) |
| Cultural Resources | Incomplete information to assess, could be D/I/C = – or + | Incomplete information to assess, could be D/I/C = – or + | Incomplete information to assess, could be D/I/C = – or + | Incomplete information to assess, could be D/I/C = – or + |
| Recreation | D/I/C = (0/0/0) | D/I/C = (-/+/+) | D/I/C = (-/+/+) | D/I/C = (-/0/0) |
| Aesthetics | VRAP not completed; could be – or + | VRAP not completed; could be – or + | VRAP not completed; could be – or + | VRAP not completed; could be – or + |
| Air Quality | D/I/C= (0/0/0) | D/I/C = (-/0/0) | D/I/C = (-/0/0) | D/I/C = (-/0/0) |
| Noise Quality | D/I/C= (-/-/-) | D/I/C= (-/-/-) | D/I/C = (-/-/-) | D/I/C = (-/-/-) |
| H&H Resources | D/I/C = (0/0/0) | Sediment study not completed; could be -- | Sediment study not completed; could be – with weir/impoundment | without weir could be (+/0/-) |
| Water Quality | D/I/C = (0/0/0) | Incomplete; could be -- | Depending on ASA's Selection of Features. Water Quality analysis is not complete, could be – or + | Water Quality analysis is not complete, could be – or + |
| Water Supply | D/I/C = (0/0/0) | Availability: +++; quality needed to be able to use for water supply -- | Availability: +++; quality needed to be able to use for water supply -- | D/I/C = (0/0/0) |
| Socioeconomics | Not complete; could be D/I/C = (0/0/0) | Incomplete; could be D/I/C = (+/+/0) | Incomplete information to assess; could be D/I/C = (+/+0/0) | Incomplete information to assess; could be D/I/C = (+/+0/0) |
| Environmental Justice | D/I/C= (0/0/0) | D/I/C= (+/+/0) | D/I/C = (+/+/0) | D/I/C = (+/+/0) |
| HTRW | D/I/C= (+-/0/0) | D/I/C= (---) | Incomplete information to assess, could be D/I/C = could be – or +. HTRW Phase I was not conducted; | Incomplete information to assess, could be D/I/C = could be – or +. HTRW Phase I was not conducted; |
| Greenhouse Gas | Incomplete, could be – or + | Incomplete information to assess, could be D/I/C = – or + | Incomplete information to assess, could be D/I/C = – or + | Incomplete information to assess, could be D/I/C = – or + |

D/I/C = Direct, Indirect, Cumulative Impacts
Positive Impacts are denoted by +
Negative impacts are denoted by –

No impacts are denoted by 0

## 4.2 RELEVANT RESOURCES

### 4.2.1 Natural Environment

### Wetland Resources

#### 4.2.1.1.1 No Action Alternative – Future without Project Condition

Significant impacts to wetland habitats have occurred over time due to ongoing development activities in and around the Project Area, and these trends are likely to continue. Without action, wetlands within the Project Area (including the historically predominant bottomland hardwood habitat) would likely continue to decline as result of ongoing urbanization and changing river conditions. Impacts to the Pearl River channel itself have also occurred in connection with past flood control projects and ongoing maintenance associated with flood control. For example, the river appears to be moving more water at lower stages in recent years compared to historic trends and the area between the levees has been clear cut and mowed, reducing friction during flood events and also impacting available habitat (see H&H report). Without changes in flood control management, these impacts would be expected into the future.

#### 4.2.1.1.2 Alternative A1 – USACE Developed Nonstructural Plan

Given that this alternative consists of nonstructural features to address residual damages for existing structures, neither direct, indirect, nor cumulative impacts to wetlands are expected from such activities. However, the trends discussed in the No Action Alternative are likely to persist.

#### 4.2.1.1.3 Alternative C – NFI Channel Improvement/Weir/Levee Plan (LPP)

This alternative consists of channel improvements, demolishing an existing weir, and constructing a new weir further downstream to enlarge the existing river channel, Federal levee improvements, and upgrading an existing non-Federal levee. The alternative is anticipated to have significant impacts to wetlands within the Project Area.

Direct, adverse impacts associated with construction and implementation of this alternative within the Project Area would be major in intensity and potentially long-term in duration. Construction, particularly excavation and fill, would directly impact ~315 acres of emergent wetlands, ~909 acres of BLH/scrub-shrub wetland habitat, and ~150 acres of swamp habitat. Construction of Alternative C would transition these wetland habitats to open water (lacustrine) habitat and uplands that would not be revegetated. Indirect impacts to wetlands in the Project Area would be due to fill areas potentially disconnecting adjacent wetlands from hydrologic connectivity. The direct and indirect adverse impacts are considered significant. However, mitigation actions would be developed in coordination with the

resource agencies and the NFI, to fully compensate for these impacts and therefore the significance of the impacts would be offset.

Cumulative impacts, including both direct and indirect impacts of the alternative along with additional impacts from other, previous projects in the area are anticipated to be major in intensity and long-term in duration. Impacts to wetlands from Alternative C would add to the impacts that have occurred over time and are expected to continue due to ongoing development and activities in and around the Project Area. As stated above, mitigation actions would be developed in coordination with the resource agencies and the NFI to fully compensate for the impacts from Alternative C. With Alternative C, wetlands within the Project Area (including the historically predominant bottomland hardwood habitat) would likely continue to decline as result of ongoing urbanization, changing river conditions, and continued maintenance associated with flood control.

#### 4.2.1.1.4 Alternative CTO

##### 4.2.1.1.4.1 Alternative CTO without Weir (Alt E)

Direct, indirect, and cumulative impacts to wetlands due to implementation of the CTO without the weir would be the same as discussed with a weir as excavation and fill activities would still take place.

##### 4.2.1.1.4.2 Alternative CTO with Weir (Alt D, Preliminary NED Plan)

Direct, adverse impacts associated with construction and implementation of this alternative within the Project Area would be major in intensity and potentially long-term in duration. Construction, particularly excavation and fill, would directly impact ~34 acres of emergent wetlands, ~499 acres of BLH/scrub-shrub wetland habitat, and ~55acres of swamp habitat. Construction of Alternative CTO would transition these acres to open water (lacustrine) habitat and uplands that would not be revegetated. Indirect impacts to wetlands in the Project Area would be due to fill areas potentially disconnecting adjacent wetlands.

Cumulative impacts, including both direct and indirect impacts of the alternative along with additional impacts from other, previous projects in the area, are anticipated to be major in intensity and long-term in duration. Impacts to wetlands from Alternative CTO would add to the impacts that have occurred over time and are expected to continue due to ongoing development and activities in and around the Project Area. With Alternative CTO, wetlands within the Project Area (including the historically predominant bottomland hardwood habitat) would likely continue to decline as result of ongoing urbanization, changing river conditions, and continued maintenance associated with flood control.

The direct and indirect adverse impacts are considered significant. However, mitigation actions would fully compensate for these impacts; therefore, these impacts would be offset.

**Forested Uplands**

#### 4.2.1.1.5 No Action Alternative – Future without Project Condition

With the No Action Alternative, no action would be taken to lessen or worsen the current trend of impacts discussed in section 3.2.1.3 and therefore that current trend would likely continue and so would the destruction of this habitat.

#### 4.2.1.1.6 Alternative A1 – USACE Developed Nonstructural Plan

Because Alternative A1 involves flood proofing or raising structures, no direct, indirect, or cumulative impacts to forested uplands are anticipated. However, the trends discussed in the no action alternative are likely to persist.

#### 4.2.1.1.7 Alternative C –NFI Channel Improvement/Weir/Levee Plan (LPP)

Approximately 696 acres of forested uplands are anticipated to be directly impacted due to excavation (clearing) and fill activities. There are no indirect impacts to forested uplands associated with Alternative C. Cumulative impacts, including direct impacts of the alternative along with additional impacts from other, previous projects in the area are anticipated to be major in intensity and long-term in duration. Impacts to uplands from Alternative C would add to the impacts that have occurred over time and are expected to continue due to ongoing development and activities in and around the Project Area. With Alternative C, uplands within the Project Area would likely continue to decline as result of ongoing urbanization, changing river conditions, and continued maintenance associated with flood control.

The direct adverse impacts are considered significant. However, mitigation actions would fully compensate for these impacts and therefore the significance of the impacts would be offset.

#### 4.2.1.1.8 Alternative CTO

##### 4.2.1.1.8.1 Alternative CTO without Weir (Alt E)

Impacts to forested uplands due to implementation of the CTO without the weir would be the same as discussed with a weir as excavation and fill activities would still take place.

##### 4.2.1.1.8.2 Alternative CTO with Weir (Alt D, Preliminary NED Plan)

Approximately 223 acres of forested uplands are anticipated to be directly impacted due to excavation (clearing) and fill activities. There are no indirect impacts to forested uplands associated with Alternative CTO. Cumulative impacts, including direct impacts of the alternative along with additional impacts from other, previous projects in the area are anticipated to be major in intensity and long-term in duration. Impacts to uplands from Alternative CTO would add to the impacts that have occurred over time and are expected to continue due to ongoing development and activities in and around the Project Area. With Alternative CTO, uplands within the Project Area would likely continue to decline as result of ongoing urbanization, changing river conditions, and continued maintenance associated with flood control.

The direct adverse impacts are considered significant. However, mitigation actions would fully compensate for these impacts and therefore the significance of the impacts would be offset.

**Aquatic and Fisheries Resources and Water Bottoms**

#### 4.2.1.1.9 No Action Alternative – Future without Project Condition

The no action alternative would likely not have a large impact on aquatic resources or water bottoms. The current trend of urbanization in the area could lead to increased nutrients from runoff, leading to decreased water quality. Additionally, it is not likely urban sprawl would impact available aquatic habitat, due to the frequent flooding that occurs in the area. Based on historical imagery, the riverbanks and rate of meander migration in the study area appear to be relatively stable. Therefore, it is not expected that the river and subsequent water bottoms would change dramatically over time. The current available habitat would likely remain unchanged and support the present aquatic species.

#### 4.2.1.1.10 Alternative A1 – USACE Developed Nonstructural Plan

This alternative would entail the elevation, buyout, relocation, and floodproofing of existing potentially affected structures within the Study Area. Since this alternative is nonstructural, no direct impacts to aquatic and fisheries resources are anticipated. Given the nature of the proposed action for this alternative, no indirect impacts are anticipated from this nonstructural alternative. Given the determination that no direct or indirect impacts to aquatic and fisheries resources would be associated with the implementation of Alternative A1, no cumulative impacts are anticipated.

#### 4.2.1.1.11 Alternative C –NFI Channel Improvement/Weir/Levee Plan (LPP)

*Direct Impacts*: Alternative C consists of the constructing channel improvements, demolishing the existing weir near the J. H. Fewell WTP site, and constructing a new weir with a low-flow gate structure further downstream to enlarge the existing river channel, Federal levee improvements (excavated material plan), and upgrading an existing non-Federal levee into a Federalized ring levee around the Savanna Street WWTP. Excavation for channel improvements would cause the permanent conversion of all of marsh and swamp habitat within the area of excavation to be converted to open water (lacustrine) habitat. Additionally, the 287 acres of riverine habitat adjacent to the areas of excavation would also be converted to open water (lacustrine) habitat due to loss of habitat function.

During construction fish and aquatic organisms would be directly displaced by dredging and filling activities. Mobile organisms would be able to relocate, while non-mobile species would likely experience mortality. Direct negative impacts to fish and aquatic resources during construction is expected to be temporary and moderate. Additionally, sedimentation from construction activities would temporarily cause negative effects on water quality and food source availability for some aquatic species.

Implementing Alternative C would cause a shift in habitat from primarily riverine to open water (lacustrine). This would likely have a negative effect on the riverine guilds of fish and aquatic resources in the study area. Conversely, this shift and addition of open water habitat would result in a positive affect for generalists and lacustrine species. It is expected that aquatic organisms in the riverine guild would not be able to adapt to the new habitat created

by implementing Alternative C and this impact would be severe and long term in the study area.

Alternative C also includes the relocation of the weir at RM 290.7 to approximately RM 284, at the south end of the channel improvements area. The weir would be utilized to maintain the baseline water level within the channel improvements area and to maintain the existing hydrologic flows within the Pearl River channel. The relocated weir would include a low-flow gate to maintain flows during low flow periods.

Historically, low-head dams, weirs, and impoundments have been understood to be obstructions to migratory aquatic species. The existing weir at the J.H. Fewell Water Treatment Plant (RM 290.7) was constructed to maintain water levels in the Pearl River to ensure that drinking water supply is maintained for the City of Jackson. This weir created an impediment to migratory patterns of aquatic species as do the multiple low-head dams/sills downstream of the Project Area. A fish ladder would be created around the relocated weir in the project area. The fish ladder has been conceptually designed to be approximately 7,300 feet in length and designed so that velocities would not exceed the sturgeon's swim speed. Including the fish ladder would increase the possibility for migrating aquatic species to utilize the Project Area.

*Indirect Impacts:* There could be negative indirect impacts associated with Alternative C due to possible sediment transport changes. Siltation would likely occur at the proposed weir, . These impacts are expected to be minor to moderate and long term in duration. Additionally, indirect impacts from the proposed weir may cause limits on upstream migration of aquatic and fisheries resources. However, the proposed fish ladder would likely mitigate for those affects. Further information related to indirect impacts to aquatic resources may come to light as designs progress.

*Cumulative Impacts:* Previous flood risk management activities in the study area have altered historical habitats and the natural flow of the river. The loss of 287 acres of riverine habitat in the study area would continue to contribute to the overall degradation of habitat in the area. This loss would lead to a reduction in habitat complexity found within the study area and over time, would likely have negative effects on the fish and aquatic resources as the habitat quality continues to decline.

Given the direct and indirect impacts, cumulative adverse impacts on aquatic and fisheries resources would be anticipated to be moderate in intensity and long term in duration within the Project Area. Cumulative impacts relative to the downstream affects in the Pearl River Watershed are currently not well understood. Further information related to cumulative impacts to aquatic resources may come to light as designs progress or additional analysis is completed.

#### 4.2.1.1.12 Alternative CTO

#### 4.2.1.1.12.1 Alternative CTO without Weir (Alt E)

Direct and indirect impacts to fish and aquatic species from this alternative are anticipated to be moderate in intensity and potentially long-term in duration. Without the weir, riverine habitat would be conserved, except for during highwater events. Excavation associated with construction for channel improvements could cause temporary disturbances, such as increased turbidity, to fish and aquatic species but will likely provide additional open water habitat during highwater events that would benefit some aquatic species.

Cumulative impacts, including both direct and indirect impacts of the alternative along with additional impacts from other, previous projects in the area are anticipated to be moderate in intensity and long-term in duration. Impacts to fish and aquatic species from Alternative CTO without weir would add to the impacts that have occurred over time and are expected to continue due to ongoing development and activities in and around the Project Area. With Alternative CTO, fisheries habitat within the Project Area would likely continue to decline as result of ongoing urbanization, changing river conditions, and continued maintenance associated with flood control.

#### 4.2.1.1.12.2 Alternative CTO with Weir (Alt D, Preliminary NED)

Direct, adverse impacts associated with construction and implementation of this alternative within the Project Area would be major in intensity and potentially long-term in duration. Construction associated with excavation would convert wetland and swamp habitat to open water habitat. Additionally, all the riverine habitat above the weir would be converted to open water habitat. The impacts to fish and aquatic species are similar to those from Alternative C but are less due to the smaller area of impact from the Alternative CTO with weir.

**Wildlife**

### 4.2.1.1.13 No Action Alternative – Future without Project Condition

Several wildlife species would likely be impacted by continued degradation of ecosystem structure and function due to ongoing urban growth and development adjacent to the Project Area. As urban growth continues, overall suitable wildlife habitat and the quality of that habitat within the Project Area would likely be further reduced following recent trends. Ongoing maintenance within the Project Area associated with flood control would also continue to impact wildlife habitat quality and availability. Feral hogs are expected to spread throughout the Project Area in coming years and could further damage habitat quality and compete with other native wildlife species for available habitat and other resources.

### 4.2.1.1.14 Alternative A1 – USACE Developed Nonstructural Plan

This alternative consists of nonstructural features to address residual damages for existing structures. Given that, any direct adverse impacts to wildlife resources would be minor and short-term in duration, and no indirect impacts would be anticipated. Conversely, there would be potential for restoration of existing urban habitat to historic habitat types that could provide positive impacts to wildlife resources. Similar impacts to those discussed in the no

action alternative would likely occur under this alternative as well. Potential adverse cumulative impacts are anticipated be minor in intensity and long-term in nature with negligible significance.

#### 4.2.1.1.15 Alternative C – NFI Channel Improvement/Weir/Levee Plan (LPP)

Alternative C consists of the construction of channel improvements, demolition of an existing weir and construction of a new weir further downstream to enlarge the existing river channel, Federal levee improvements, and upgrading an existing non-Federal levee. This alternative is anticipated to impact wildlife supported by floodplain areas in the Project Area through reduction in available habitat and habitat quality.

Direct and indirect impacts to wildlife from this alternative are anticipated to be minor to moderate in intensity and potentially long-term in duration. Excavation for channel improvements and the use of fill areas for dredge disposal would result in permanent loss of habitat and associated resources that would be long term as the excavated areas would convert to open water and the fill areas would not be revegetated. Aquatic habitats of the Pearl River channel and other major water bodies would also be directly impacted by construction. Approximately 287 acres of riverine habitat would be converted to lacustrine habitat. Wildlife dependent on riverine system ecology would suffer with this conversion. Access to wildlife habitat within the Project Area would not be significantly impacted for wildlife species that are terrestrial, highly mobile, and could migrate into the adjoining habitats not directly impacted by project implementation. The conversion of existing wildlife habitats within the Project Area would result in cumulative, adverse impacts that would be moderate in intensity and long-term in duration. These impacts could be more severe where implementation of the alternative results in further urban and recreational development along the riverfront, reducing available habitat adjacent to the Project Area. Impacts to wildlife from Alternative C would add to continued degradation of ecosystem structure and function expected from ongoing urban growth and development adjacent to the Project Area. Ongoing maintenance within the Project Area associated with flood control would also continue to impact wildlife habitat quality and availability, including contributing to increases in invasive species such as feral hogs.

#### 4.2.1.1.16 Alternative CTO

##### 4.2.1.1.16.1 Alternative CTO without Weir (Alt E)

Direct and indirect impacts to wildlife from this alternative are anticipated to be minor to moderate in intensity and potentially long-term in duration. Excavation for channel improvements and the use of fill areas for dredge disposal would result in permanent loss of habitat and associated resources that would be long term as the excavated and fill areas would not be revegetated. The wildlife dependent on riverine system ecology would not be impacted as the Pearl River would continue to function as a riverine system except in high water events. This would not be much different from the current conditions during high water events and the impacts would be temporary and to a much lesser extent than with a weir. Access to wildlife habitat within the Project Area would not be significantly impacted as most

species are highly mobile and could migrate into the adjoining habitats not directly impacted by project implementation.

The conversion of existing wildlife habitats within the Project Area would result in cumulative, adverse impacts that would be moderate in intensity and long-term in duration. These impacts could be more severe where implementation of the alternative results in further urban development along the riverfront, reducing available habitat adjacent to the Project Area. Impacts to wildlife from Alternative CTO without a weir would add to continued degradation of ecosystem structure and function expected from ongoing urban growth and development adjacent to the Project Area. Ongoing maintenance within the Project Area associated with flood control would also continue to impact wildlife habitat quality and availability, including contributing to increases in invasive species such as feral hogs.

#### 4.2.1.1.16.2 Alternative CTO with Weir (Alt D, Preliminary NED Plan)

It is assumed that, like Alternative C, construction of the CTO with weir would likely eliminate riverine habitat that many aquatic species depend on. For this draft, a conservative approach is being taken and therefore this alternative is expected to have the same direct, indirect and cumulative impacts as Alternative C. However, these impacts would be to a lesser degree as approximately 232 acres of riverine habitat would be converted to lacustrine habitat. Wildlife dependent on riverine system ecology would suffer with this conversion. Velocity analysis, like that conducted for Alternative C, is being conducted to better understand the potential impact of the CTO on the riverine system. This data will be included in the final EIS.

**Threatened, Endangered and Protected Species**

### 4.2.1.1.17 Gulf sturgeon

#### 4.2.1.1.17.1 No Action Alternative

With the No Action Alternative, no action would be taken address the stressors causing the current trend discussed in section 3.2.1.8 and therefore the decline of Gulf sturgeon numbers would likely continue.

#### 4.2.1.1.17.2 Alternative A1 USACE Developed Nonstructural Plan

USACE Developed Nonstructural Plan There are no direct, indirect, or cumulative impacts or benefits to Gulf sturgeon associated with Alternative A1 and, therefore, the decline of the Gulf sturgeon numbers would likely continue.

#### 4.2.1.1.17.3 Alternative C – NFI Channel Improvement/Weir/Levee Plan (LPP)

Direct impacts during construction are expected due to potential sedimentation and increased turbidity. The disturbance to the sediment would increase the turbidity in the river. Increased sediment and turbidity can result in decreased light penetration and decreased photosynthesis. High levels of sediment can settle on fish spawning areas and smother fish eggs and larvae. Sediments can settle on respiratory surfaces of fish and aquatic organisms

and interfere with respiration. The potential increase in sedimentation and turbidity in the river from the channel excavation and levee relocation would have impacts on the macroinvertebrate prey for any juvenile GS that would be temporarily feeding in the area.

Indirect impacts are also expected due to potential sedimentation and increased turbidity but also due to migratory blockage. Until a vegetative cover is established along the excavated areas, all disturbed areas would be subject to erosion. This could potentially cause excess sediment to flow downstream of the construction area, and erosion could be exacerbated in that area until the riverbank has stabilized. The turbidity would be additive to any downstream riverbank erosion resulting from sediments being trapped behind the weir after its construction. Increased sediment and turbidity can result in decreased light penetration and decreased photosynthesis. Production of benthic organisms also can be reduced by high levels of sediment.

The migratory blockage caused by the weir structure could impact the sturgeon's ability to swim north of the structure unless there are high water events; however, a fish ladder channel has been included as part of the project design to minimize the impacts on aquatic species migration. Flow conditions would need to meet the needs of the species to allow for navigation of the ladder. These conditions include water velocity that does not exceed the sturgeon's swim speed and enough water flow levels for the species to be able to swim through it. At this time, there is only a conceptual model of the fish ladder channel, approximately 1.4 miles long of a curving channel, with the possible velocities ranging anywhere from 1 to 7 fps. The optimal velocities of 2 to 4 fps need be considered during detail design of the fish ladder.

Cumulative impacts, including both direct and indirect impacts of the alternative along with additional impacts from other, previous projects in the area are anticipated to be major in intensity and long-term in duration. Impacts to GS from Alternative C would add to the impacts that have occurred over time and are expected to continue due to ongoing development and activities in and around the Project Area.

The direct and indirect impacts are considered significant. However, with the inclusion of minimization features and reasonable and prudent features anticipated from the Service, the significance would be offset.

Based upon literature review, available survey data, the current status of the species, the environmental baseline for the action area, and the effects of the action, USACE has determined that implementation of Alternative C is likely to adversely affect but is not likely to jeopardize the continued existence of, the Gulf sturgeon.

The PBFs of flow regime, sediment quality, and migratory pathways would not be impacted by the construction of the Channel Improvement Project; therefore, only the effects on the PBFs of food and water quality would be discussed.

Potential Increase in sedimentation and turbidity would lead to impacts on water quality, which then leads to impacts on the prey base for juvenile sturgeon. These impacts on water quality would be temporary and would be reduced through erosion control features.

Changes to water velocity, water surface elevation and water quality in the area would be anticipated. DO and temperature are important water quality factors for sturgeon. As temperature increases, DO levels decrease, which can affect the growth and respiration rates of juvenile sturgeon. Water quality modeling conducted for temperature and DO indicate post-project levels would have a slight but not significant difference from the pre-project levels. The impacts to critical habitat discussed above are considered insignificant. Based upon the assessment completed, it was determined that implementation of Alternative C would not result in an adverse modification to Gulf sturgeon critical habitat.

#### 4.2.1.1.17.4 Alternative CTO

##### 4.2.1.1.17.4.1 Alternative CTO without Weir (Alt E)

If a weir is not included long term changes to water velocity, water surface elevation, and water quality during high water events. This would not be much different from the current conditions during high water events and the impacts would be temporary during each event and to a much lesser extent than with a weir. These impacts are considered insignificant.

Based upon literature review, available survey data, the current status of the species, the environmental baseline for the action area, and the effects of the action, USACE has determined that implementation of Alternative CTO without a weir may affect but is not likely to adversely affect the GS or GS critical habitat.

##### 4.2.1.1.17.4.2 Alternative CTO with Weir (Alt D, Preliminary NED Plan)

It is assumed that, like Alternative C, construction of the CTO with weir would likely eliminate riverine habitat that the GS depends on. For this draft a conservative approach is being taken and therefore this alternative would have the same direct, indirect, and cumulative impacts as well as determination as Alternative C if a weir is included. Velocity analysis, like that conducted for Alternative C, is being conducted to better understand the potential impact of the CTO on the riverine system. This data will be included in the final EIS

#### 4.2.1.1.18 Ringed Sawback (ringed map) Turtle

#### 4.2.1.1.18.1 No Action Alternative

With the No Action Alternative, no action would be taken address the stressors causing the current trend discussed in section 3.2.1.8 and therefore the decline of ringed map turtle populations would likely continue.

#### 4.2.1.1.18.2 Alternative A1 – USACE Developed Nonstructural Plan

There are no direct, indirect, or cumulative impacts nor any actions to address the stressors to the ringed map turtle associated with Alternative A1. Therefore, the decline of ringed map turtle populations would likely continue.

#### 4.2.1.1.18.3 Alternative C –NFI Channel Improvement/Weir/Levee Plan (LPP)

Direct impacts by way of death and avoidance of the area are anticipated due to implementation of Alternative C. Disturbance from excavation of material from within and adjacent to the river over approximately two years could result in death of individuals if they are unable to escape the construction work area. Ringed map turtles currently found in this area of the river would likely move away from the area to avoid construction activities. Ringed map turtles in the construction area are expected to be disturbed in some form of alteration of normal feeding, basking, and nesting activities while channel excavation activities are taking place.

Indirect impacts due to changes in the velocity and water surface elevation are anticipated. The current lotic habitat would be replaced with a lentic habitat which has been proven by the Ross Barnett Reservoir to not support the persistence of the ringed map turtle. The riparian zone would be almost eliminated, which would eliminate available habitat. There would be potential for existing nests to be flooded during filling of the area behind the weir if this occurs from May to October. Details of how the filling would be undertaken have not been finalized but would be coordinated with the Service.

Ringed map turtles downstream of the proposed weir are likely to experience short-term impacts associated with increased sediment/siltation on sandbars and basking material during construction. However, once sediment runoff issues have dissipated due to high streamflow events, it is expected that the habitat immediately downstream of the weir would remain suitable for the ringed map turtle.

It is anticipated that downstream of the weir would experience some degree of instability that would occur over several years with the capture of small amounts of sediment. Impacts from this would result primarily from an increase in turbidity decreasing potential food sources.

Cumulative impacts, including both direct and indirect impacts of the alternative along with additional impacts from other, previous projects in the area are anticipated to be major in intensity and long-term in duration. Impacts to the ringed map turtle from Alternative C would add to the impacts that have occurred over time and are expected to continue due to ongoing development and activities in and around the Project Area.

The direct and indirect impacts are considered significant. However, with the inclusion of minimization features and reasonable and prudent features anticipated from the Service, the significance would be offset.

Based upon literature review and available survey data, and the effects of the action, the USACE has determined that implementation of Alternative C is likely to adversely affect but is not likely to jeopardize the continued existence of the ringed map turtle.

#### 4.2.1.1.18.4 Alternative CTO

##### 4.2.1.1.18.4.1 Alternative CTO without Weir (Alt E)

If a weir is not included, direct impacts are expected by the way of the species avoiding the area during construction activities. Additionally, there is the potential for some individuals being directly killed during overbank excavation activities. This would be mitigated by surveying the area during construction activities and relocating individuals and nests if found. There would be temporary impacts due to decreased water quality during construction activities. Indirect impacts in the way of changes to water velocity, water surface elevation, and water quality may occur during high water events. This would not be much different from the current conditions during high water events and the impacts would be temporary and to a much lesser extent than with a weir. Impacts to the riparian zone would remain as excavation activities would still take place. Cumulative impacts, including both direct and indirect impacts of the alternative without the weir, along with additional impacts from other previous projects in the area are anticipated to be minor in intensity and short-term in duration. These impacts are considered insignificant when mitigation measures are considered.

Based upon literature review and available survey data, and the effects of the action, although substantially less than that with a weir, the USACE has determined that implementation of Alternative CTO without a weir is likely to adversely affect but is not likely to jeopardize the continued existence of the ringed map turtle. This determination is due to the overbank excavation and the need to capture and relocate ringed map turtles.

##### 4.2.1.1.18.4.2 Alternative CTO with Weir (Alt D, Preliminary NED Plan)

It is assumed that, like Alternative C, construction of the CTO with weir would likely eliminate riverine habitat that the ringed map turtle depends on. For this draft a conservative approach is being taken and therefore this alternative would have the same direct, indirect, and cumulative impacts as well as determination as Alternative C if a weir is included. Velocity analysis, like that conducted for Alternative C, is being conducted to better understand the potential impact of the CTO on the riverine system. This data will be included in the final EIS.

#### 4.2.1.1.19 Northern Long-eared Bat (NLEB)

#### 4.2.1.1.19.1 No Action Alternative

With the No Action Alternative, no action would be taken address the stressors causing the current trend discussed in section 3.2.1.8, and, therefore, the decline of the species would likely continue.

#### 4.2.1.1.19.2 Alternative A1 – USACE Developed Nonstructural Plan

There are no direct, indirect, or cumulative impacts to the NLEB associated with Alternative A1, but no action would be taken to address the stressors either.

#### 4.2.1.1.19.3 Alternative C – NFI Channel Improvement/Weir/Levee Plan (LPP)

No direct interactions are anticipated as no existing data is available that would indicate that the NLEB currently utilizes the project area. However, if surveys are conducted and females are found using the area during maternity pup season (May 1 – July 31), any tree removal activities would be required to take place in the non-maternity season (August 1 – April 30). Indirect impacts would be due to the removal of potential roosting and foraging habitat (forests and structures such as abandoned bridges) and could result in potential adverse effects. Cumulative impacts, including both direct and indirect impacts of the alternative along with additional impacts from other, previous projects in the area are anticipated to be minor in intensity and long-term in duration. Impacts to the NLEB from Alternative C would add to the impacts that have occurred over time and are expected to continue due to ongoing development and activities in and around the Project Area. The impacts discussed above are considered insignificant.

Based upon literature review, the lack of available survey data, and the effects of the action, the USACE has determined that implementation of Alternative C may affect but is not likely to adversely affect the NLEB.

#### 4.2.1.1.19.4 Alternative CTO

##### 4.2.1.1.19.4.1 Alternative CTO without Weir (Alt D)

Alternative CTO without a weir same direct, indirect, and cumulative impacts as well as determination as Alternative C as excavation and fill would still take place. However, the impacts would be to a lesser degree.

##### 4.2.1.1.19.4.2 Alternative CTO with Weir (Alt E, Preliminary NED Plan)

This alternative would have the same direct, indirect, and cumulative impacts as well as determination as Alternative C as excavation and fill would still take place. However, the impacts would be to a lesser degree.

### 4.2.1.1.20 Pearl River Map Turtle (PRMT)

#### 4.2.1.1.20.1 No Action Alternative

With the No Action Alternative, no action would be taken address the stressors causing the current trend discussed in section 3.2.1.8, and, therefore, the current trend of impacts to the persistence of the species would likely continue.

#### 4.2.1.1.20.2 Alternative A1 – USACE Developed Nonstructural Plan

There are no direct, indirect, or cumulative impacts to the PRMT associated with Alternative A1 nor are there any actions to address the stressors.

#### 4.2.1.1.20.3 Alternative C – NFI Channel Improvement/Weir/Levee Plan (LPP)

Direct impacts by way of death and avoidance of the area are anticipated due to implementation of Alternative C. Disturbance from excavation of material from within and adjacent to the river over approximately two years could result in death of individuals if they are unable to escape the construction work area. PRMTs currently found in this area of the river would likely move away from construction activities. PRMTs in the construction area are expected to be disturbed in some form of alteration of normal feeding, basking, and nesting activities while channel excavation activities are taking place.

Indirect impacts due to changes in the velocity and water surface elevation are anticipated. The current lotic habitat would be replaced with a lentic habitat which has been proven by the Ross Barnett Reservoir to not support the persistence of the PRMT. The riparian zone would be almost eliminated which would eliminate available habitat. There would be potential for existing nests to be flooded during filling of the area behind the weir if this occurs from May to October. Details of how the filling would be undertaken have not been finalized but would be coordinated with the Service.

PRMTs downstream of the proposed weir are likely to experience short-term impacts associated with increased sediment/siltation on sandbars and basking material during construction. However, once sediment runoff issues have dissipated due to high streamflow events, it is expected that the habitat immediately downstream of the weir would remain suitable for the PRMT.

It is anticipated that downstream of the weir would experience some degree of instability that would occur over several years with the capture of small amounts of sediment. Impacts from this would result primarily from an increase in turbidity decreasing potential food sources.

Cumulative impacts, including both direct and indirect impacts of the alternative along with additional impacts from other, previous projects in the area are anticipated to be major in intensity and long-term in duration. Impacts to the PRMT from Alternative C would add to the impacts that have occurred over time and are expected to continue due to ongoing development and activities in and around the Project Area.

The impacts discussed above are considered significant. However, with the inclusion of minimization features and reasonable and prudent features anticipated from the Service, the significance would be offset.

Based upon literature review and available survey data, and the effects of the action, the USACE has determined that implementation of Alternative C is likely to adversely affect but is not likely to jeopardize the continued existence of the PRMT. OBJ

#### 4.2.1.1.20.4 Alternative CTO

#### 4.2.1.1.20.5 Alternative CTO without Weir (Alt D)

If a weir is not included, direct impacts are expected by the way of the species avoiding the area during construction activities. Additionally, there is the potential for some individuals being directly killed during overbank excavation activities. There would be temporary impacts due to decreased water quality during construction activities. Indirect impacts in the way of changes to water velocity, water surface elevation, and water quality may occur during high water events. This would not be much different from the current conditions during high water events and the impacts would be temporary and to a much lesser extent than with a weir. Impacts to the riparian zone would remain as excavation activities would still take place. Cumulative impacts, including both direct and indirect impacts of the alternative without the weir, along with additional impacts from other previous projects in the area are anticipated to be minor in intensity and short-term in duration.

Based upon literature review and available survey data, and the effects of the action, although tremendously less than that with a weir, the USACE has determined that implementation of Alternative CTO without a weir is likely to adversely affect but is not likely to jeopardize the continued existence of the PRMT. This determination is due to the overbank excavation and the need to capture and relocate PRMTs.

**Alternative CTO with Weir (Alt E, Preliminary NED Plan)**

It is assumed that, like Alternative C, construction of the CTO with weir would likely eliminate riverine habitat that the PRMT depends on. For this draft a conservative approach is being taken and therefore this alternative would have the same direct, indirect, and cumulative impacts as well as determination as Alternative C if a weir is included. Velocity analysis, like that conducted for Alternative C, is being conducted to better understand the potential impact of the CTO on the riverine system. This data will be included in the final EIS.

#### 4.2.1.1.21 Alligator Snapping Turtle

#### 4.2.1.1.21.1 No Action Alternative

With the No Action Alternative, no action would be taken address the stressors causing the current trend discussed in section 3.2.1.8 and therefore the current trend of impacts to the existence of the species would likely continue.

#### 4.2.1.1.21.2 Alternative A1 – USACE Developed Nonstructural Plan

There are no direct, indirect, or cumulative impacts to the AST associated with Alternative A1 nor would any action be taken to address the stressors.

#### 4.2.1.1.21.3 Alternative C – NFI Channel Improvement/Weir/Levee Plan (LPP)

Direct impacts by way of disturbance from excavating material within and adjacent to the river over approximately two years could result in death of individuals if they are unable to

escape the construction work area. Aquatic turtle research that focused on disturbances associated with construction found that aquatic turtles within a construction area would move up or downstream from the construction activity (Chen and Leu 2009; Plummer and Mills 2008). Therefore, it is reasonable to assume that many ASTs currently found in the proposed impounded area would slowly move away from construction activities. ASTs in the construction area are expected to be disturbed in some form of alteration of normal feeding, basking, and nesting activities while channel excavation activities are taking place. The construction of the flood control project and associated infrastructure could temporarily alter habitat conditions, leading to a decline in the Alligator Snapping turtle population. In addition, the project could also potentially impact the Alligator Snapping turtle through temporary changes in water quality. Impacts include removal of natural buffers that would impact water quality, and a slight decrease and less variation of dissolved oxygen concentrations.

Indirect impacts associated with the project would include the potential impacts of the project on other species that rely on the same habitat as the AST. For example, the project and associated infrastructure could temporarily impact local fish populations, which in turn may impact the local turtle population as these fish populations are a primary food source for the AST.

Potential indirect benefits of the project for the AST include the creation of a new, more suitable, and desirable habitat when compared to existing conditions. The construction of the project and associated infrastructure could provide new areas of deep, permanent water with a soft substrate for nesting. However, the recreational benefits that are anticipated to be implemented by the NFI could have adverse impacts by the way of increase in fishing bycatch on trotlines, limblines, and rod/reel. Implementing fishing regulations (i.e., no set lines or commercial nets) would reduce AST mortality due to these actions.

Cumulative impacts, including both direct and indirect impacts of the alternative along with additional impacts from other previous projects in the area are not anticipated to be major in intensity but could be long-term in duration. Impacts to the AST from Alternative C would add to the impacts that have occurred over time and are expected to continue due to ongoing development and activities in and around the Project Area.

The impacts discussed above are considered significant. However, with the inclusion of minimization features and reasonable and prudent features anticipated from the Service, the significance would be offset.

Based upon literature review and available survey data, and the effects of the action (both detrimental and beneficial activities proposed), the USACE has determined that implementation of Alternative C is likely to adversely affect but not likely to jeopardize the continuing existence of the AST.

#### 4.2.1.1.21.4 Alternative CTO

#### 4.2.1.1.21.5 Alternative CTO without Weir (Alt E)

If a weir is not included, direct impacts are expected by the way of the species avoiding the area during construction activities. Additionally, there is the potential for some individuals being directly killed during excavation activities. Temporary indirect impacts in the way of changes to water quality during construction and removal of natural buffers may occur. The potential benefits associated with a weir would not be realized with no weir.

Cumulative impacts, including both direct and indirect impacts of the alternative along with additional impacts from other previous projects in the area are not anticipated to be major in intensity or long-term in duration. Impacts to the AST from Alternative CTO with no weir would add to the impacts that have occurred over time and are expected to continue due to ongoing development and activities in and around the Project Area.

The impacts discussed above are considered insignificant and with the inclusion of minimization features and reasonable and prudent features anticipated from the Service, the impacts would be offset.

Based upon literature review and available survey data, and the effects of the action, although substantially less than that with a weir, USACE has determined that implementation of Alternative CTO without a weir is likely to adversely affect but not likely to jeopardize the continuing existence of the AST. This determination is due to the fact that some individuals could be killed during overbank excavation activities.

#### 4.2.1.1.21.6 Alternative CTO with Weir (Alt D, Preliminary NED Plan)

It is assumed that, like Alternative C, construction of the CTO with weir would likely eliminate riverine habitat that the AST depends on. For this draft a conservative approach is being taken and therefore this alternative would have the same direct, indirect, and cumulative impacts as well as determination as Alternative C if a weir is included. Velocity analysis, like that conducted for Alternative C, is being conducted to better understand the potential impact of the CTO on the riverine system. This data will be included in the final EIS.

### 4.2.1.1.22 Louisiana Pigtoe

#### 4.2.1.1.22.1 No Action Alternative

With the No Action Alternative, no action would be taken address the stressors causing the current trend discussed in section 3.2.1.8 and therefore the current trend of impacts to the existence of the species would likely continue.

#### 4.2.1.1.22.2 Alternative A1 – USACE Developed Nonstructural Plan

There are no direct, indirect, or cumulative impacts to the LA pigtoe associated with Alternative A1 nor would any actions be taken to address the stressors.

#### 4.2.1.1.22.3 Alternative C – NFI Channel Improvement/Weir/Levee Plan (LPP)

Direct impacts by way of death are anticipated due to implementation of Alternative C. Excavation of material from within the river over approximately two years would result in death of individuals as well as displacement of host fishes.

Indirect impacts due to changes in the velocity and water surface elevation are anticipated. The current lotic habitat would be replaced with a lentic habitat which would eliminate available habitat and host fishes. LA pigtoes downstream of the proposed weir are likely to experience short-term impacts associated with increased sediment/siltation associated with construction activities which may cause extirpation. However, once sediment runoff issues have dissipated due to high streamflow events, it is expected that the habitat immediately downstream of the weir would remain suitable for the LA pigtoe. It is anticipated that downstream of the weir would experience some degree of instability that would occur over several years with the capture of small amounts of sediment. Impacts from this would result in a river bottom shift and would bury mussel beds which would then result in suffocation of individuals. The increase in turbidity and decreasing water quality would also impact potential host fishes.

Cumulative impacts, including both direct and indirect impacts of the alternative along with additional impacts from other, previous projects in the area are anticipated to be major in intensity and long-term in duration. Impacts to the LA pigtoe from Alternative C would add to the impacts that have occurred over time and are expected to continue due to ongoing development and activities in and around the Project Area.

The direct and indirect impacts are considered significant. However, with the inclusion of minimization features and reasonable and prudent features anticipated from the Service, the significance would be offset.

Based upon literature review and available survey data, and the effects of the action, the USACE has determined that implementation of Alternative C is likely to adversely affect but is not likely to jeopardize the continued existence of the Louisiana pigtoe.

#### 4.2.1.1.22.4 Alternative CTO

#### 4.2.1.1.22.5 Alternative CTO without Weir (Alt E)

If a weir is not included, there could be no direct impacts due to a temporary increase in sedimentation and decrease in water quality during construction activities. Indirect impacts would be changes to water velocity, water surface elevation, and water quality during high water events. This would not be much different from the current conditions during high water events and the impacts would be temporary and to a much lesser extent than with a weir. These impacts are considered insignificant.

Based upon literature review, available survey data, the current status of the species, the environmental baseline for the action area, and the effects of the action, USACE has

determined that implementation of Alternative CTO without a weir may affect but is not likely to adversely affect the Louisiana pigtoe.

#### 4.2.1.1.22.6 Alternative CTO with Weir (Alt D, Preliminary NED Plan)

It is assumed that, like Alternative C, construction of the CTO with weir would likely eliminate riverine habitat that the Louisiana pigtoe depends on. For this draft a conservative approach is being taken and therefore this alternative would have the same direct, indirect, and cumulative impacts as well as determination as Alternative C if a weir is included. Velocity analysis, like that conducted for Alternative C, is being conducted to better understand the potential impact of the CTO on the riverine system. This data will be included in the final EIS.

It is assumed that, like Alternative C, construction of the CTO with weir would likely eliminate riverine habitat that the Louisiana pigtoe depends on. For this draft, a conservative approach is being taken when assessing impacts due to CTO with a weir. That being said, this alternative would have the same direct, indirect, and cumulative impacts as well as determination as Alternative C if a weir is included. Velocity analysis, like that conducted for Alternative C, is being conducted to better understand the potential impact of the CTO on the riverine system. This data will be included in the final EIS.

### 4.2.1.1.23 Tricolored Bat (TCB)

#### 4.2.1.1.23.1 No Action Alternative

With the No Action Alternative, no action would be taken address the stressors causing the current trend discussed in section 3.2.1.8, and, therefore, the current trend of TCB population decline would likely continue.

#### 4.2.1.1.23.2 Alternative A1 – USACE Developed Nonstructural Plan

There are no direct, indirect, or cumulative impacts to the TCB associated with Alternative A1 nor would any stressors be addressed.

#### 4.2.1.1.23.3 Alternative C – NFI Channel Improvement/Weir/Levee Plan (LPP)

Since the TCB is widespread throughout MS, there are no existing survey data specifically for the project area, however, they can be found in many different habitat types throughout the year. As such, it is difficult to determine the direct impacts to the species at this time. If surveys are conducted and TCB are found using the area, then tree removal activities for the project would not take place during the pup season (May 1 – July 31) or during the torpor season (December 15 - February 15).It can be assumed that indirect impacts would be due to the removal of potential roosting and foraging habitat (forests and structures such as abandoned bridges) and could result in potential adverse effects. Cumulative impacts, again hard to determine at this time, but including impacts of the alternative along with additional impacts from other, previous projects in the area are anticipated to be minor in intensity but long-term in duration. Impacts to the TCB from Alternative C would add to the impacts that

have occurred over time and are expected to continue due to ongoing development and activities in and around the Project Area.

The impacts discussed above could potentially be considered significant if future survey data show that the TCB is in fact occupying the area. However, with the inclusion of minimization features and reasonable and prudent features anticipated from the Service, the significance would be offset.

USACE has conducted literature reviews and is in coordination with the Service. Due to the lack of available survey data, and the fact that the TCB is widespread in Mississippi, the USACE will be conservative and assume that TCBs are utilizing the area.

If TCBs are utilizing the area, particularly for hibernation, Alternative C would not only remove roosting and foraging habitat but could also disturb hibernating bats potentially resulting in death of individuals. However, with the implementation of tree clearing restrictions, these impacts would be minimized or avoided. Based upon literature review and the effects of the action, the USACE has determined that implementation of Alternative C may affect but is not likely to adversely affect the TCB.

#### 4.2.1.1.23.4 Alternative CTO

#### 4.2.1.1.23.5 Alternative CTO without Weir (Alt E)

This alternative would have the same direct, indirect, and cumulative impacts as well as determination as Alternative C as excavation and fill would still take place. However, the impacts would be to a lesser degree.

#### 4.2.1.1.23.6 Alternative CTO with Weir (Alt D, Preliminary NED Plan)

This alternative would have the same direct, indirect, and cumulative impacts as well as determination as Alternative C as excavation and fill would still take place. However, the impacts would be to a lesser degree.

### 4.2.1.1.24 Monarch Butterfly

#### 4.2.1.1.24.1 No Action Alternative

With the No Action Alternative, no action would be taken address the stressors causing the current trend discussed in section 3.2.1.8 and therefore the current trend of monarch population decline would likely continue.

#### 4.2.1.1.24.2 Alternative A1 – USACE Developed Nonstructural Plan

Direct impacts to the Monarch butterfly associated with Alternative A1 would be the potential for collision with construction equipment during raising of structures. Although collision with vehicles on nearby roadways is a regular occurrence, the construction activities could increase the number of individuals impacted. However, the species is highly mobile, and the equipment is rather slow moving, so it is expected that any individuals present could escape

the impact. Indirect benefits could be assumed if structures are relocated, and the area is allowed to self-vegetate into greenspace. Cumulative impacts would be the potential adverse impacts and benefits due to this alternative plus any benefits or adverse impacts attributable to other previous, existing, and reasonably foreseeable projects within the study area.

#### 4.2.1.1.24.3 Alternative C – NFI Channel Improvement/Weir/Levee Plan (LPP)

Direct impacts could be expected by way of collision with construction equipment. Although collision with vehicles on nearby roadways is a regular occurrence, the construction activities could increase the number of individuals impacted. Indirect impacts could be expected due to the conversion of desired habitat to open water and elimination of food source. Cumulative impacts, including both direct and indirect impacts of the alternative along with additional impacts from other, previous projects in the area are anticipated to be minor in intensity and long-term in duration.

The impacts discussed above could potentially be considered significant. However, with the inclusion of minimization features and reasonable and prudent features anticipated from the Service, the significance would be offset.

Based upon literature review and available survey data, and the effects of the action, the USACE has determined that implementation of Alternative C is likely to adversely affect but is not likely to jeopardize the continued existence of the monarch butterfly.

#### 4.2.1.1.24.4 Alternative CTO

#### 4.2.1.1.24.5 Alternative CTO without Weir (Alt E)

Alternative CTO without a weir would incur the same direct impacts as CTO with a weir. Indirect impacts would be the potential benefit of providing suitable habitat for the monarch butterfly if the excavated areas are allowed to self-vegetate with wildflowers which would provide suitable habitat and a food source. If the excavated areas are mowed regularly and only allowed to self-vegetate with grass the indirect impact would be the conversion of desired habitat to grassy uplands and elimination of food source. Cumulative impacts, including both direct and indirect impacts of the alternative along with additional impacts from other, previous projects in the area are anticipated to be minor in intensity and long-term in duration.

Based upon literature review and available survey data, and the effects of the action, the USACE has determined that implementation of CTO without a weir is not likely to adversely affect the monarch butterfly.

#### 4.2.1.1.24.6 Alternative CTO with Weir (Alt D, Preliminary NED Plan)

This alternative would have the same direct, indirect, and cumulative impacts as well as determination as Alternative C as excavation and fill would still take place. However, the impacts would be to a lesser degree.

### 4.2.1.1.25 Other Protected Species

#### 4.2.1.1.25.1 No Action Alternative

With the No Action Alternative, no action would be taken to address the stressors causing the current trend discussed in section 3.2.1.8, and, therefore, the current trend of migratory bird population decline would likely continue and there would be no impacts to the bald eagle.

#### 4.2.1.1.25.2 Alternative A1 – USACE Developed Nonstructural Plan

There are no direct, indirect, or cumulative impacts to bald eagles associated with Alternative A1. A qualified biologist would survey the area prior to construction to determine if any migratory birds are nesting within structures to be removed. There could be direct impacts to migratory birds if any are found nesting in any of the structures to be removed. Coordination with The Service and MDWFP would determine what actions should be taken depending on the species present. Indirect benefits could be assumed for some species of migratory birds if structures are relocated, and the area is allowed to self-vegetate into greenspace. Cumulative impacts would be the potential benefits or impacts due to this alternative plus any benefits or adverse impacts attributable to other previous, existing, and reasonably foreseeable projects within the study area. The impacts discussed above are considered insignificant.

#### 4.2.1.1.25.3 Alternative C – NFI Channel Improvement/Weir/Levee Plan

Direct impacts would be attributed to avoidance of the area during construction. Indirect impacts would be the elimination of potential roosting, foraging, and nesting habitat. Cumulative impacts, including both direct and indirect impacts of the alternative along with additional impacts from other, previous projects in the area are anticipated to be minor in intensity but long-term in duration. Impacts to the bald eagle and migratory birds from Alternative C would add to the impacts that have occurred over time and are expected to continue due to ongoing development and activities in and around the Project Area. A qualified biologist would survey the area prior to construction to determine the presence of nesting birds. If eagle nests are found in the project area, the USACE MVK would apply for an incidental eagle take permit and would implement avoidance and minimization features described in the National Bald Eagle Management Guidelines until a permit with applicable requirements is received. Coordination with The Service and MDWFP would establish buffer zones and other guidelines to be implemented for nesting migratory birds depending on the species present. The impacts discussed above are considered insignificant.

#### 4.2.1.1.25.4 Alternative CTO

#### 4.2.1.1.25.5 Alternative CTO without Weir (Alt E)

Alternative CTO without a weir would have the same impacts as that with a weir.

#### 4.2.1.1.25.6 Alternative CTO with Weir (Alt D, Preliminary NED Plan)

This alternative would have the same direct, indirect, and cumulative impacts as well as determination as Alternative C as excavation and fill would still take place. However, the impacts would be to a lesser degree.

**Soils and Prime and Unique Farmlands**

#### 4.2.1.1.26 No Action Alternative – Future without Project Condition

Without implementation of the proposed project, no action would be taken to lessen or worsen the current trend of anthropogenic and natural impacts to soils and prime and unique farmland in the project area, therefore, existing trends would likely continue.

#### 4.2.1.1.27 Alternative A1 – USACE Developed Nonstructural Plan

No direct, indirect, or cumulative impacts to soils and prime and unique farmlands are anticipated due to implementation of Alternative A1 and no action would be taken to lessen the current trend.

#### 4.2.1.1.28 Alternative C – NFI Channel Improvement/Weir/Levee Plan (LPP)

This alternative would not have an adverse effect on soils and prime and unique farmlands. There would be no indirect impacts anticipated to soils and prime and unique farmlands associated with Alternative C. Cumulatively, there would not be the incremental direct and indirect impacts of implementing and operating Alternative C on soils and prime and unique farmlands plus the direct and indirect impacts attributable to other previous, existing, and reasonably foreseeable projects within the study area.

#### 4.2.1.1.29 Alternative CTO Plan

#### 4.2.1.1.29.1 Alternative CTO without Weir (Alt E)

No direct, indirect, or cumulative impacts to soils and prime and unique farmlands are anticipated due to implementation of Alternative CTO without Weir and no action would be taken to lessen the current trend.

#### 4.2.1.1.29.2 Alternative CTO with Weir (Alt D, Preliminary NED Plan)

The impacts resulting from implementation of this alternative would be anticipated to be similar to Alternative C.

**Hydrology & Hydraulics**

#### 4.2.1.1.30 No Action Alternative – Future without Project Condition

The Pearl River study area has experienced historic flooding, 1979, 1983, and 2020 that has caused damages to the City of Jackson MSA. Main channel flooding is a result of the intense flood season within the study area between December through April (Tennessee

Valley Authority, 2004). In addition to the flood season, summer storms have been documented to be intense causing localized flooding within the tributaries (Tennessee Valley Authority, 2004). When the Pearl River reaches a certain stage, near 28 feet, riverine flooding begins within the study area, causing a backwater influence on the tributaries within the Jackson area (US Department of Commerce, NOAA, National Weather Service). It is noted that there have been over 51 crests that have reached a moderate flood stage of 33 feet and 41 crests that have reached a major flood stage of 36 or more since 1874 (US Department of Commerce, NOAA, National Weather Service, Historical Crests n.d.). Within the past 5 years, there have been a reported 8 flood events that have reached at or above flood stage (US Department of Commerce, NOAA, National Weather Service, Recent crests). These flood events can lead to direct, indirect, and cumulative impacts to the main channel as well as the surrounding tributaries.

As described in section 2.1.4.6, there are many road crossings through the project reach, many of which were constructed in the 1960s. Figure 4-1 plots the profile of the peak of the 2020 flood event in blue (stage is on the vertical axis) and the location of bridges (vertical lines). This plot shows approximated water surface increases occurring due to the bridge constrictions at each crossing with the bumps in stage at the vertical lines.

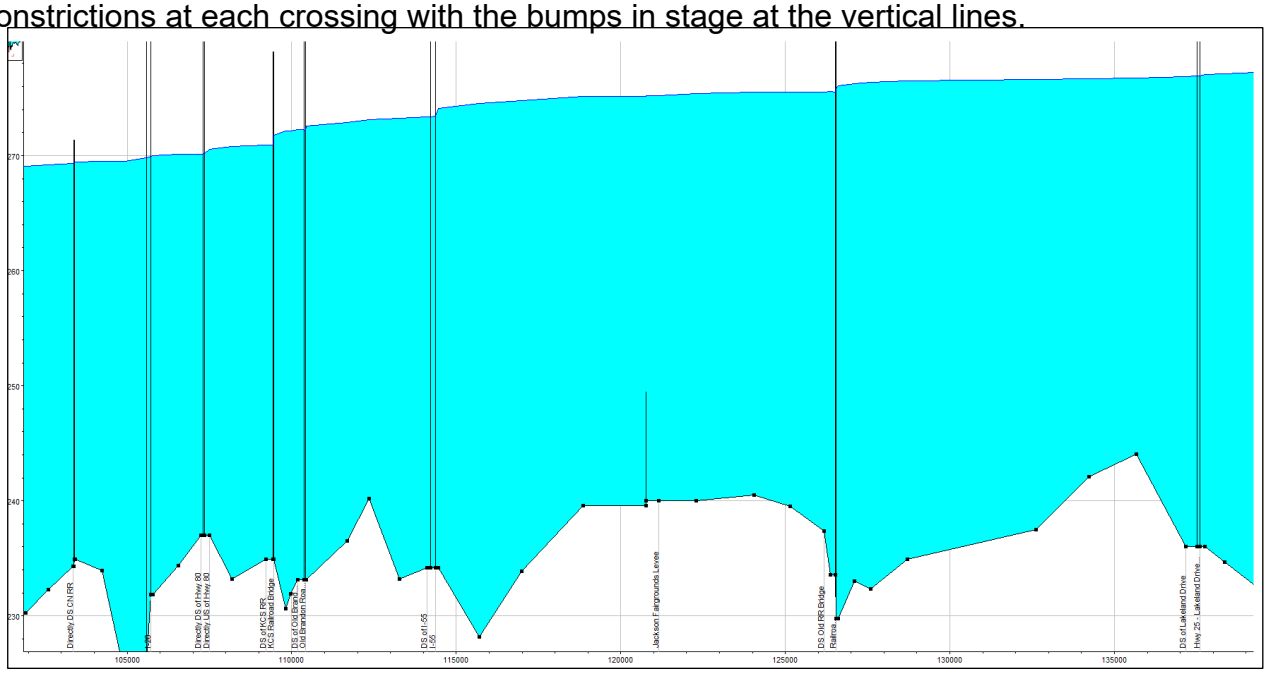



*Figure. 4-1. 2020 Profile of the Peak of the Flood Event*

The direct and indirect impacts from flooding include increased erosion rates, increased sediment load, a decrease in water quality, and water supply issues (In 2022 floodwater impacts to water quality within the upstream Ross Barnett Reservoir led to the loss of water

supply for the City of Jackson). Without the implementation of a plan that would address the flooding within the study area, there would continue to be negative impacts.

#### 4.2.1.1.31 Alternative A1 – USACE Developed Nonstructural Plan

Because Alternative A1 only addresses flood proofing or raising currently existing structures, there would be no foreseeable changes to the current hydraulics and hydrology due to the implementation of this alternative.

#### 4.2.1.1.32 Alternative C – Channel Improvement/Weir/Levee Plan (LPP)

Alternative C was designed to reduce flooding by removing areas that constrict the floodplain along with deepening of the channel overbanks within the project footprint; thereby improving downstream conveyance of water through the project area and lowering the water surface elevation of the river. Water surface elevation reductions due to this excavation would provide reduction of flood elevations not only within the reach of excavation, but additional elevation reductions upstream of the excavation. Alternative C also consists of changing the design of the current weir and additional features as described in Section 3. The largest change hydraulically from this alternative is the creation of an impoundment behind the weir which converts the area from riverine flow to a slow flow across a larger area. Currently, during flood events (even smaller ones) in the current state, overflow into riparian and/or wetland areas along the banks of the river would occur to varying extents. Under Alternative C, many of these areas would be deepened and consistently contain open water.

A detailed description of the hydraulic and hydrologic analysis regarding Alternative C is located in Hydraulic and Hydrologic Appendix E *H&H Report*. Key points are summarized below.

The Hydrologic Engineering Center Statistical Software Package (HEC-SSP) version 2.3 was used to model Alternative A1 and Alternative C, with the USACE team ensuring the full period of record from the outflow at the Ross Barnett Reservoir was included. This period of record was supplemented with data from the downstream Jackson gage (from 1874 to 2022) and the latest information from United States Geological Survey. In addition, the local drainage, bridge constrictions and other constraints that are present in the system were added to the model. The model treated flows from the Ross Barnett reservoir generally as run-of-river even though it can somewhat limit peak flows. This is consistent with current and likely future Ross Barnett operations. The USACE team calibrated this model to the 2020 flood event.

The modeling that USACE did showed a reduction in flooding, but not to the extent that previous modeling had indicated. Figure 4-2 and 4-3 shows the current extent of flooding versus the flooding extent with Alternative C – with yellow and orange showing areas with flood reduction and blues showing areas that would still be inundated. While this graphic does not show the whole area, a comparison to Figure 4-10 (EJ section) later in this document would show that areas with low income and/or minority population are still experiencing flooding.

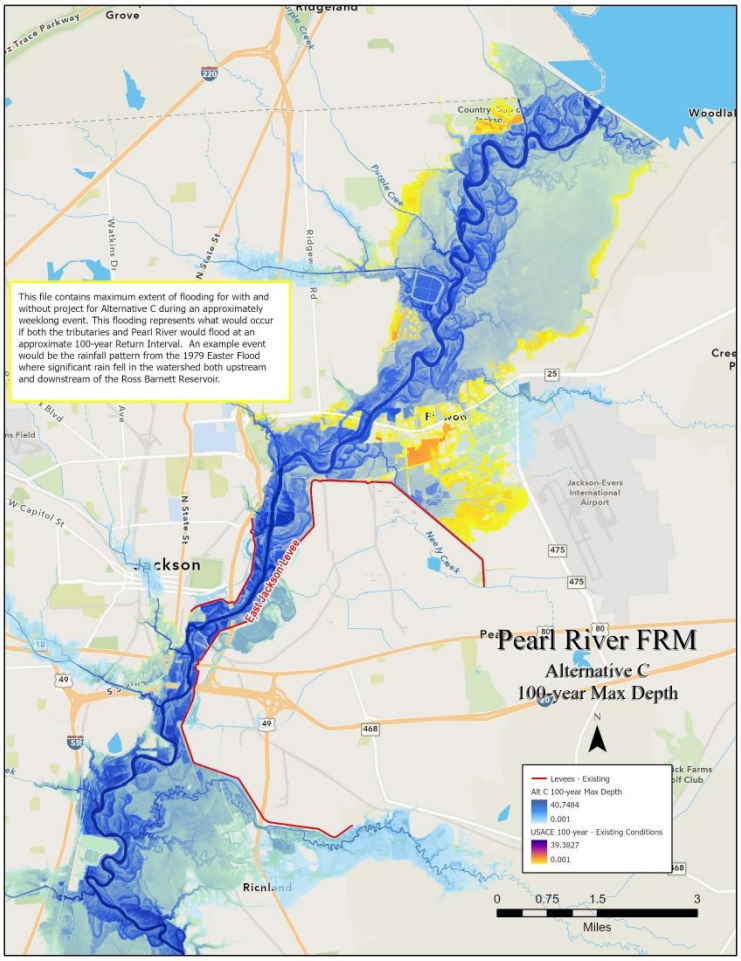



*Figure 4-2. Alternative C 100-year Flood Extent Reduction (Tributary and Pearl River Impacts)*

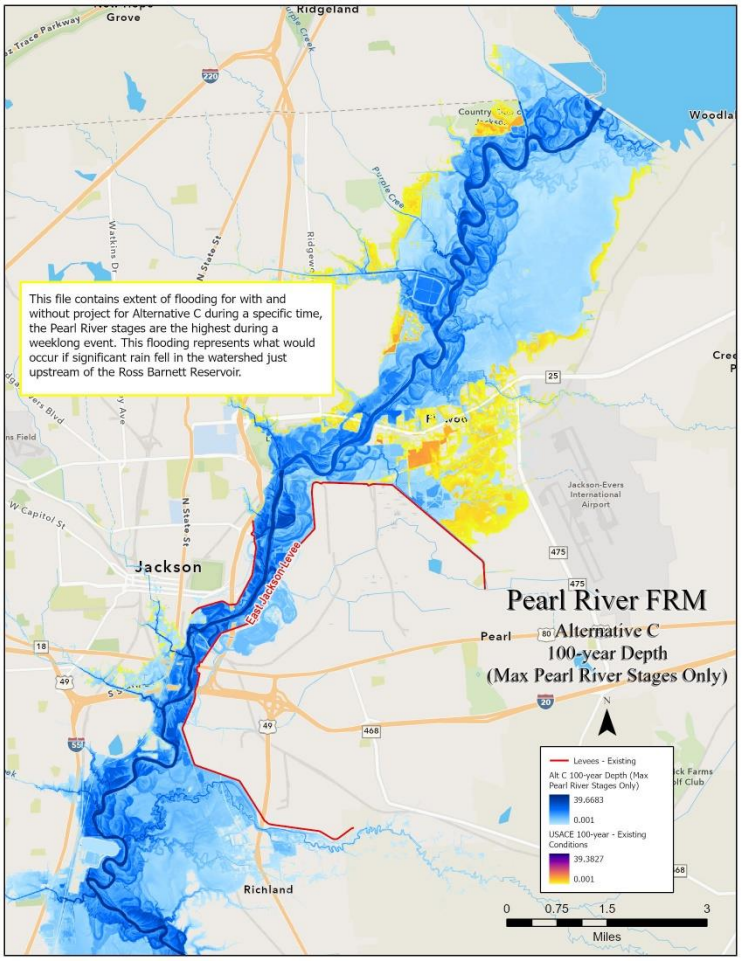



*Figure 4-3. Alternative C 100-year Flood Extent Reduction (Pearl River Impacts Only)*

The model was extended further downstream. The model showed additional flooding downstream for Alternative C, caused by an increase in stage to areas that were not flooded in the without project condition at both the 20 percent and 1 percent AEP. These inducements for the 20 percent AEP event appear to resolve just prior to the Copiah Creek confluence, approximately 32 miles downstream of the project. Table 4-3 shows the difference in acreage between the current conditions and Alternative C.

*Table 4-3. Acres of Inducement for the 1 and 20 % AEP events from Project Location to Copiah Creek*

| **Total Acres Included by Increment of Inducement (Feet) – to Confluence with Copiah Creek** | 1 **% AEP- Acres** | **20% AEP Acres** |
|---|---|---|
| 0 - 0.25 Feet | Up to 16,200 | Up to 33,200 |
| 0.25 - 0.5 Feet | 38,800 | 2,330 |

The table above show estimated acres impacted due to construction of Alternative C or CTO for both the 5- and 100-year events. These were classified as either expected inducements or unlikely inducements. Modeled areas with an additional 0.25 feet or more of inundation are considered to be a measurable inducement. (Approximately 38,800 acres at the 100-year Frequency, and 2,330 acres at the 5-year frequency) Impacted areas in the 0.25 feet or less range are considered not likely to have any measurable negative impacts. These areas, however, will require further modeling in PED to confirm this initial assessment.

#### 4.2.1.1.33 Alternative CTO

##### 4.2.1.1.33.1 Alternative CTO without Weir (Alt E)

Alternative CTO without Weir as described in section 3 was designed to reduce flooding by removing areas that constrict the floodplain along with deepening of the channel and floodplain within the project footprint; thereby improving downstream conveyance of water through the project area and lowering the water surface elevation of the river. Water surface elevation reductions due to this excavation would provide reduction of flood elevations not only within the reach of excavation, but additional elevation reductions upstream of the excavation.

Key differences between the CTO with Weir and CTO without weir lie at low flows, where there will be no added permanent impoundment for recreation and possible future water supply access. This reduces cost, by reducing the need for pumping capacity at the Jackson Fairgrounds Levee, fish passage, some riverine mitigation impacts, and the need for additional seepage protection at the Existing Federal Levees.

At high flows (estimated to be about the 5-year return interval and above) the water levels for CTO with or without weir are assumed to be the same, and benefits can be taken directly from the CTO with Weir analysis.

##### 4.2.1.1.33.2 Alternative CTO with Weir (Alt D, Preliminary NED Plan)

Alternative CTO as described in section 3 was designed to reduce flooding by removing areas that constrict the floodplain along with deepening of the channel and floodplain within the project footprint; thereby improving downstream conveyance of water through the project area and lowering the water surface elevation of the river. Water surface elevation reductions due to this excavation would provide reduction of flood elevations not only within the reach of excavation, but additional elevation reductions upstream of the excavation.

Alternative CTO also consists of changing the location and design of the current weir and additional features as described in Section 3. The largest change hydraulically from this alternative is the creation of an impoundment behind the weir which converts the area from riverine flow to a slow flow across a larger area. Currently, during flood events (even smaller

ones) in the current state, overflow into riparian and/or wetland areas along the banks of the river would occur to varying extents. Under Alternative CTO as described in the Section 3, many of these areas would be deepened and consistently contain open water. Note that CTO as defined is a feature-by-feature selection at the ASA discretion. Any change to the selection of features, would impact hydraulic results.

A detailed description of the hydraulic and hydrologic analysis regarding Alternative CTO is located in Hydraulic and Hydrologic Appendix E *H&H Report*. Key points are summarized below.

The Hydrologic Engineering Center Statistical Software Package (HEC-SSP) version 2.3 was used to model inflow data, with the USACE team ensuring the full period of record from the outflow at the Ross Barnett Reservoir was included. This period of record was supplemented with data from the downstream Jackson gage (from 1874 to 2022) and the latest information from United States Geological Survey. In addition, the local drainage, bridge constrictions and other constraints that are present in the system were added to the model. The model treated flows from the Ross Barnett reservoir generally as run-of-river even though it can somewhat limit peak flows. This is consistent with current and likely future Ross Barnett operations. The USACE team calibrated this model to the 2020 flood event.

The modeling that USACE did showed a reduction in flooding, consistent with Alternative C. Figure 4-4 and 4-5 shows the current extent of flooding versus the flooding extent with Alternative CTO – with yellow and orange showing areas with flood reduction and blues showing areas that would still be inundated. While this graphic does not show the whole area, a comparison to Figure 4-11 later in this document would show that areas with low income and/or minority population are still experiencing flooding. However, these flooding areas are reduced in comparison to Alternative C.

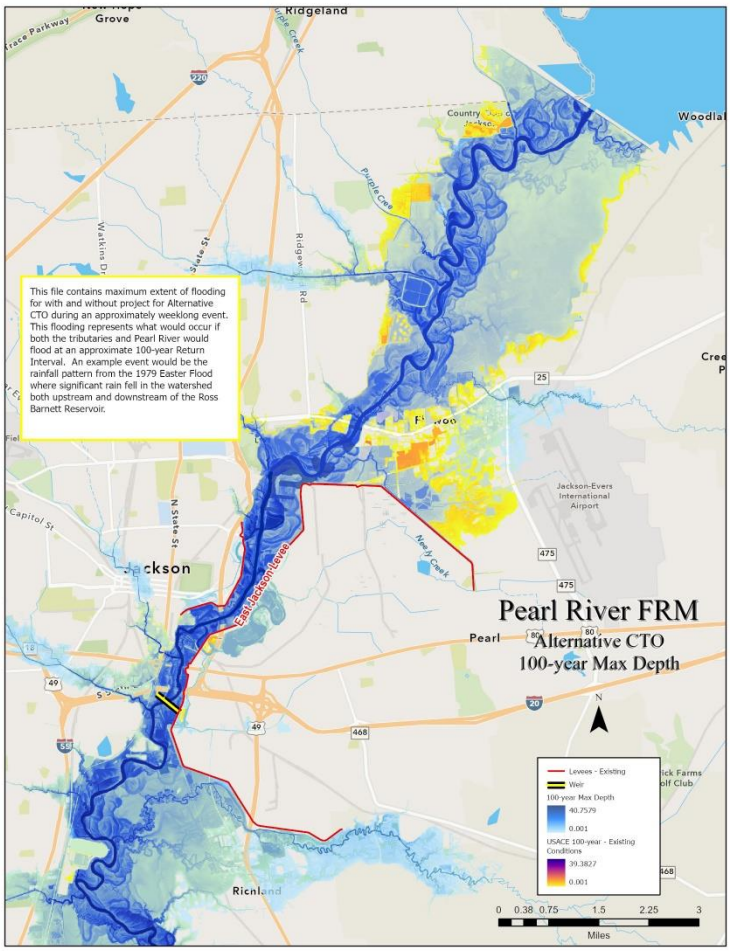



*Figure 4-2. Alternative CTO 100-year Flood Extent Reduction (Tributary and Pearl River Impacts)*

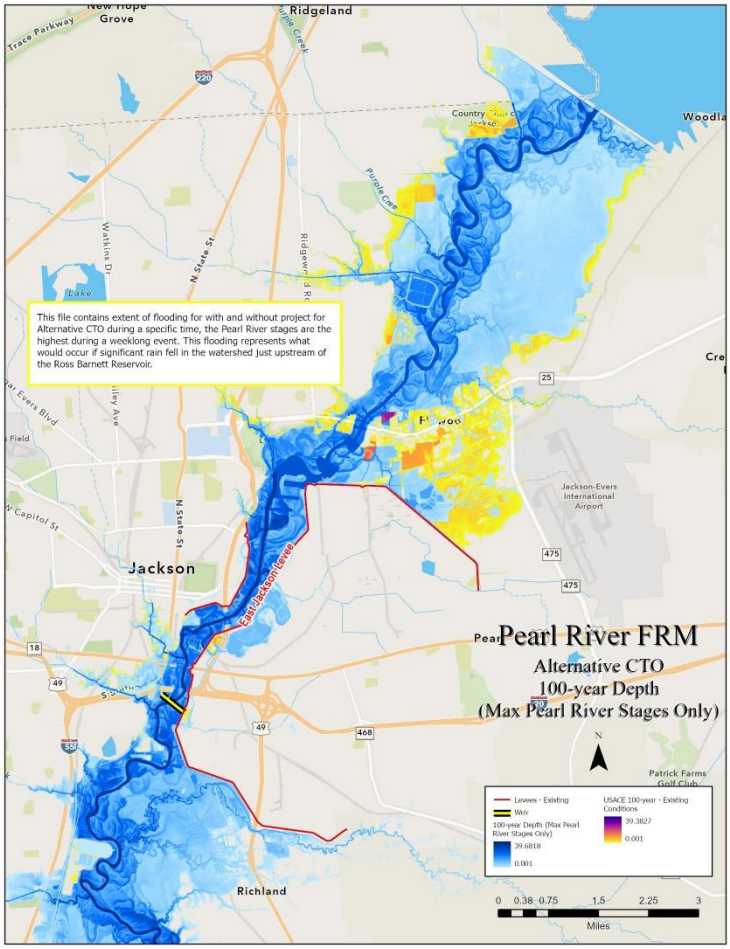



*Figure 4-3. Alternative CTO 100-year Flood Extent Reduction (Pearl River Impacts Only)*

The downstream inducements are considered to be the same as alternative C, given the similarity of the results just downstream of the project area. The Alternative C model was extended further downstream. The model showed additional flooding downstream for Alternative C caused by an increase in stage to areas that were not flooded in the without project condition at both the 20 percent and 1 percent AEP. These inducements for the 20 percent AEP event appear to resolve just prior to the Copiah Creek confluence, approximately 32 miles downstream of the project area. Table 4-3 shows the difference in acreage between the current conditions and Alternative C.

*Table 4-3. Acres of Inducement for the 1 and 20 % AEP events from Project Location to Copiah Creek for CTO*

| Total Acres Included by Increment **of Inducement (Feet) – to Confluence with Copiah Creek** | 1 **% AEP- Acres** | **20% AEP Acres** |
|---|---|---|

| | | |
|---|---|---|
| 0 - 0.25 Feet | Up to 16,200 | Up to 33,200 |
| 0.25 - 0.5 Feet | 38,800 | 2,330 |

The table above show estimated acres impacted due to construction of Alternative C or CTO for **both the 5- and 100-year events.** These were classified as either expected inducements or unlikely inducements. Modeled areas with an additional 0.25 feet or more of inundation are considered to be a measurable inducement. (Approximately 38,800 acres at the 100-year Frequency, and 2,330 acres at the 5-year frequency) Impacted areas in the 0.25 feet or less range are considered not likely to have any measurable negative impacts. These areas, however, will require further modeling in PED to confirm this initial assessment.

**Water Quality**

#### 4.2.1.1.34 No Action Alternative – Future without Project Condition

Impacts from a flood event may include an increase in erosion that would cause an increase the level of turbidity. The increase in turbidity would temporarily increase the water temperature due to suspended solids within the water column (Paaijmans, K P et al., 2008). This increase in water temperature would result in the decrease of dissolved oxygen within the impacted area (Dissolved Oxygen and Water | U.S. Geological Survey, 2019). Without the implementation of a plan that would address the flooding within the study area, there is a possibility that the water quality within the study area would either remain the same or decline.

#### 4.2.1.1.35 Alternative A1 – USACE Developed Nonstructural Plan

For Alternative A1, the impacts would be similar to the no action as there would be no foreseeable changes for water quality due to implementation of this alternative.

#### 4.2.1.1.36 Alternative C – NFI Plan, Channel Improvement/Weir/Levee Plan (LPP)

This plan could potentially result in direct, indirect, and cumulative impacts to water quality. Potential direct impacts from the construction and existence of channel improvements, overbank modifications, maintenance berms, demolition of existent weir and construction of a weir and gate with fish ladder, and improved levee segments would include temporary increases in turbidity and suspended solids in adjacent water bodies – the Pearl River and tributaries. Erosion control feature could decrease the amount of sedimentation, but the sheer volume of material to be moved makes turbidity in the system likely. The impacts to water quality due to the proposed project are inconclusive due to the lack of data, modeling inaccuracies, and the usage of outdated modeling methodologies of the project area. In order to determine if this project is viable additional analysis is required. Please reference appendix E, Hydrologic and Hydraulic Analysis for a more detailed water quality assessment.

Coordination with MDEQ is currently on-going. A stormwater pollution prevention plan would be developed to minimize any potential effects to water quality during construction. A section

404 (b) (1) evaluation would be conducted during PED. A section 401 pre-filing meeting request was submitted to MDEQ on July 11, 2023, and was reissued on April 26, 2024 due to the inclusion of Alternative CTO. Finalization of the 404 (b) (1)

#### 4.2.1.1.37 Alternative CTO

##### 4.2.1.1.37.1 Alternative CTO without Weir (Alt E)

This plan could potentially result in direct, indirect, and cumulative impacts to water quality. Potential direct impacts from the construction and existence of channel improvements, overbank modifications, maintenance berms, and improved levee segments would include temporary increases in turbidity and suspended solids in adjacent water bodies – the Pearl River and tributaries. Erosion control feature could decrease the amount of sedimentation, but the sheer volume of material to be moved makes turbidity in the system likely. The impacts to water quality due to the proposed project are inconclusive due to the lack of data, modeling inaccuracies, and the usage of outdated modeling methodologies of the project area. In order to determine if this project is viable additional analysis is required. Please reference appendix E, Hydrologic and Hydraulic Analysis for a more detailed water quality assessment.

Coordination with MDEQ is currently on-going. A stormwater pollution prevention plan would be developed to minimize any potential effects to water quality during construction. A section 404 (b) (1) evaluation would be conducted during PED. A section 401 pre-filing meeting request was submitted to MDEQ on July 11, 2023, and was reissued on April 26, 2024 due to the inclusion of Alternative CTO. Finalization of the 404 (b) (1).

##### 4.2.1.1.37.2 Alternative CTO with Weir (Alt D, Preliminary NED Plan)

This plan could potentially result in direct, indirect, and cumulative impacts to water quality. Potential direct impacts from the construction and existence of channel improvements, overbank modifications, maintenance berms, construction of a weir and gate with fish ladder, and improved levee segments would include temporary increases in turbidity and suspended solids in adjacent water bodies – the Pearl River and tributaries. Erosion control feature could decrease the amount of sedimentation, but the sheer volume of material to be moved makes turbidity in the system likely. The impacts to water quality due to the proposed project are inconclusive due to the lack of data, modeling inaccuracies, and the usage of outdated modeling methodologies of the project area. In order to determine if this project is viable additional analysis is required. Please reference appendix E, Hydrologic and Hydraulic Analysis for a more detailed water quality assessment.

Coordination with MDEQ is currently on-going. A stormwater pollution prevention plan would be developed to minimize any potential effects to water quality during construction. A section 404 (b) (1) evaluation would be conducted after further data is provided. A section 401 pre-filing meeting request was submitted to MDEQ on July 11, 2023, and was reissued on April 26, 2024 due to the inclusion of Alternative CTO.

**Water Supply**

#### 4.2.1.1.38 No Action Alternative – Future without Project Condition

While there are current and ongoing negative impacts to the watershed, there are no foreseeable negative changes for water supply by USACE for a future without project scenario. Local officials have continued major repair efforts of local water supply facilities within the city of Jackson, and therefore, short-term improvements to the water supply system are expected to occur.

#### 4.2.1.1.39 Alternative A1 – USACE Developed Nonstructural Plan

While there are current and ongoing negative impacts to the watershed, there are no foreseeable negative changes for water supply by USACE for Alternative A1 scenario. Local officials have continued major repair efforts of local water supply facilities within the city of Jackson, and therefore short-term improvements to the water supply system are expected to occur.

#### 4.2.1.1.40 Alternative C – NFI Plan, Channel Improvement/Weir/Levee Plan (LPP)

There are potential positive and negative impacts to the water supply due to the implementation of Alternative C.

Potential direct impacts to water supply due to the deterioration of water quality from the construction of channel improvements, overbank modifications, maintenance berms, demolition of existent weir and construction of a weir and gate with fish ladder, and improved levee segments would include temporary increases in turbidity and suspended solids in adjacent water bodies. Additional assessment would be required to allow for planned construction of the project in a manner to limit impacts to potable water.

Potential direct impacts to water supply due to the deterioration of water quality from the existence of the proposed weir could impact sediment load within the newly formed reservoir due to reduced velocities and entrainment potential. During design, additional study and verification would be needed to confirm that adding a large weir would not induce sediment loads to alter the incoming chemistry in such a way to induce failure at the existing J.H. Fewell Plant or any other proposed structure along the newly ponded area. A sedimentation study has been proposed to be completed during the PED phase of this study.

Potential direct impacts to water supply due to the coexistence of known HTRW sites and probable exposure to contaminants within the ponded area created by the proposed weir. During the preliminary assessments, the NFI identified several recognized environmental conditions (RECs) within the project area. Within the Unpermitted Gallatin Street Landfill Site, the proposed construction details excavating roughly 40 acres of material and relocating the material to the western portion of the Gallatin Street Landfill. Within the NFI sponsor’s consultant report, it was found that soil borings discovered garbage roughly 3 to 34 feet deep. Water samples from monitoring wells within this landfill resulted in concentrations of cadmium, lead, and nickel above the maximum contaminant levels for the Safe Drinking Water Act. The consultant who sampled this landfill stated there is a clay layer possibly holding the potential leachate material from entering the nearby groundwater. For

the Unpermitted LeFleur's Landing "Jefferson Street Landfill", benzene was found within soil and water samples to be three times the regulated limit. Reconnaissance from the consultant showed that the landfill had evidence of waste/debris exposed due to possible erosion. It was also found that the landfill had no signs of a constructed cap or liner to prevent possible leachate from the landfill to nearby groundwater. In addition to the two landfills mentioned above, there is additional potential proposed work if a site is unable to be avoided due to construction: Gulf States Creosoting Company Site. EPA conducted an onsite soil sampling analysis in December 2003 and discovered chemicals such as barium, cobalt, manganese, zinc, and creosote residuals including a variety of semi-volatile polynuclear aromatic hydrocarbons. Though this site was not placed on the EPA's Superfund list, elevated levels of organic and inorganic chemicals remain onsite and are possibly being released into the oxbow lake water and into the Pearl River during high flows/flood events. Due to this risk, if dredging, bank stabilization, or any form of construction is done near the Gulf States Creosoting Company Site, there is a risk that the known chemicals discovered onsite could either leach into the Pearl River or to nearby groundwater.

Potential positive opportunities for impact to water supply would be the creation of the ponded area behind the proposed weir. This would allow the City of Jackson, or other municipalities adjacent to the proposed ponded surface, a larger area with readily available water, with which to site potential future water treatment facilities.

#### 4.2.1.1.41 Alternative CTO

##### *4.2.1.1.41.1* Alternative CTO without Weir (Alt E)

This alternative without weir could have limited impacts to existing water quality and thus existing water supply. However, without a new weir, the benefit to the City of Jackson for a larger area for future water supply does not happen.

##### 4.2.1.1.41.2 Alternative CTO with Weir (Alt D, Preliminary NED Plan)

This alternative could have similar impacts in the long-term compared to Alternative C if a new weir is constructed. Depending on the method and means of selected features additional study could be needed to determine the best methods of design and construction to limit the impact to potable water throughout the system in respect to contaminant retention due to pooling and sediment loading prior to treatment.

**Cultural and Historical Resources**

#### 4.2.1.1.42 No Action Alternative – Future without Project Condition

Impacts to cultural and historic resources within the study area have resulted from both natural processes, (e.g., flooding and erosion) and human activities (e.g., development, flood control features, recreational use, and vandalism). Riverine environments are dynamic and impacts to cultural and historic resources would continue at the current trend because of natural processes and anthropogenic modifications to the landscape. The No-Action

Alternative would have no immediate impact on archaeological resources. Artificial and natural processes would likely continue to erode and deteriorate known archaeological resources, while exposing previously undocumented sites and/or artifacts. The No-Action Alternative would also have no immediate impact on historic buildings, structures, and other infrastructure. However, the built-environment would not remain static over time and would continue to evolve. Adverse impacts that are expected to occur to some built-environment resources include non-compatible modifications, deterioration due to neglect and abandonment, and damage from flooding or other natural disasters. Other historic buildings, structures, and infrastructure would likely be maintained and/or restored in manners consistent with the Secretary of the Interior's (SOI) *Standards for the Treatment of Historic Properties* (48 FR 44716-42, September 29, 1983). Further, the number of NRHP-eligible built-environment properties would increase over time as resources continue to age and gather historical significance. No change would occur in the management condition of cultural and historic resources; Federal actions or undertakings would continue to be reviewed in accordance with Section 106 of the NHPA.

#### 4.2.1.1.43 Alternative A1 – USACE Developed Nonstructural Plan

Direct Impacts. A review of Alternative A1 indicates that the considered action includes ground disturbing activities (e.g., access, staging, foundation work and hardening, demolition, site cleanup, and other associated site work) within the project footprint that may directly affect primarily undocumented archeological resources in a manner that may diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Alternative A1 also has potential for significant direct impacts to historic built-environment resources (e.g., residential, commercial, and public structures). These structures have unique architectural and design characteristics that many property-owners strive to maintain and enhance. The considered action includes direct modifications (i.e., elevation, flood proofing, retrofit, and/or demolition) to built-environment historic properties that are most likely to diminish the integrity of the property's design, materials, and/or workmanship, but also have potential to cause other types of direct effects to the integrity of the property's location, setting, feeling, or association.

USACE anticipates that many of the potential direct adverse effects to archaeological resources can be avoided or minimized by confining nonstructural work to substantially within the existing building/structure footprint and adherence to "Lower-Impact Demolition Stipulations" (LIDS; i.e., work restrictions; see: Appendix N) designed to avoid impacts to archaeological resources developed in consultation with SHPO, Federally-Recognized Tribes, and other Consulting Parties that would be incorporated into the PA and implemented during design and construction. USACE also anticipates that many of the potential direct adverse effects to built-environment resources would be avoided or minimized through the "design review" process in which USACE would seek ways to revise the scope of the project to substantially conform to the SOI *Standards*, and/or avoid or minimize adverse effects for NRHP-listed or eligible historic properties and/or properties of religious or cultural significance to Federally-Recognized Tribes, or TCP(s), that would be included within the PA. The nonstructural treatment selected should, whenever possible, utilize design principles and practices that retain or minimize changes to the building's

historic features, integrity, and character. Should the proposal have a direct adverse effect on a historic property that cannot be avoided or minimized, USACE would work toward a resolution of adverse effects with SHPO, Federally-Recognized Tribes, and other Consulting Parties following the procedures negotiated in the PA. Any additional conditions or requirements would be documented at that time.

Indirect. In addition to individual historic properties where nonstructural features are implemented, Alternative A1 also has the potential for indirect impacts to known and undocumented built-environment resources in the larger context of the surrounding viewshed that the building(s) occupy, or are adjacent to, through the successive introduction of new visual elements and/or modifications to the viewshed and overall visual landscape of known and previously undocumented (e.g., individual/contributing NRHP-eligible structures, local and NRHP-listed or eligible NRHDs, and Mississippi/National Historic Landmarks), that may diminish the integrity of these property's location, setting, and feeling. The arrangement of structures within their community represents a distinct pattern of cultural development that should be valued and preserved. The type, scale, location, and pattern of historic properties define the overall character of a neighborhood. A nonstructural design proposal for a single property, regardless of if the individual structure is historic or not, must also consider its relationship to historic properties within the neighborhood and/or historic district in which it is located. The treatment of an individual property's site features, design, materials, and/or workmanship, can play a critical role in avoiding or minimizing the potentially disruptive indirect visual impacts that nonstructural features can have on a surrounding neighborhood, historic district, or other types of built-environment resources.

Although Alternative A1 has the potential to indirectly impact multiple historic properties, one of the most significant outcomes of this effort would be to reduce risk to historic structures from future flood events so they maintain their character in relation to other historic buildings within each neighborhood or historic district, thus, protecting the architectural qualities of each neighborhood or historic district as a whole. Therefore, Alternative A1 may have positive indirect impacts towards preserving at-risk unique architectural and design characteristics that the communities and historic districts in the Study Area strive to maintain and enhance.

USACE anticipates that many of the potential indirect adverse effects to built-environment resources would be localized and could be avoided or minimized through the design review process that would be included within the PA (see above). The nonstructural features represent a framework in which a range of potential flood risk reduction actions are required to be considered, each with a unique range of planning considerations and constraints, including neighborhood context. Where possible, by integrating both traditional and innovative nonstructural design approaches, it is still possible to reinforce a historic building's physical relationship to its site, neighboring buildings, the street on which it is located, as well as the neighborhood or historic district it may be located within or adjacent to, in a sensitive manner, to produce the best individualized approach for a given historic building, neighborhood, and/or historic district. These approaches can reduce the damaging visual effects of altering historic properties in a manner that maintains or complements their individual character and setting. Appropriate techniques to avoid or minimize potential

indirect negative visual effects could include considering ways to revise the scope of the project to substantially conform to the SOI *Standards*; limiting elevation heights; floodproofing historic structures as opposed to elevation; shifting specific project elements away from the historic property to lessen the adverse effect (e.g., buffering); aesthetic camouflaging treatments; and/or use of sympathetic infill panels and landscaping features to visually shield project elements from historic properties within the surrounding viewshed. Potential adverse impacts to NRHP-eligible historic buildings, structures, NRHD(s), or other built environment resources that cannot be avoided or minimized would be mitigated as appropriate following the procedures negotiated in the PA in consultation with SHPO, Federally-Recognized Tribes, and other Consulting Parties, as appropriate. Any additional conditions or requirements would be documented at that time.

Cumulative. Cumulative impacts to cultural resources would be the additive combination of the direct and indirect impacts of Alternative A1 and other Federal, state, local, and private, flood risk projects existing and/or authorized for construction along the Pearl River Basin (reference Table 1-2). Activities associated with these projects have the potential to directly and/or indirectly effect existing and previously undocumented cultural resources within the project footprints, surrounding viewsheds, and communities they occur.

Potential negative impacts of Alternative A1 may include direct, indirect, and cumulative effects to properties included in or eligible for inclusion in the NRHP and cultural resources significant at the state, local, and national level and/or of significance to Federally-Recognized Tribes that may be listed or eligible for the NRHP, including archaeological sites, historic structures, local and NRHDs, and other built-environment resources. Conversely, the Alternative A1 may have long-term positive net impacts to cultural resources within communities in the Study Area. USACE acknowledges that the Alternative A1 may result in modifications to historic buildings or other built-environment resources potentially not meeting the SOI *Standards*. However, the overarching goal of this effort is to reduce risk from future flood events within the Jackson MSA, thus; potentially protecting the architectural qualities of the community as a whole. Therefore, Alternative A1 may also have positive cumulative impacts towards preserving nonrenewable, at-risk, unique architectural and design characteristics that the communities and historic districts strive to maintain and enhance. Otherwise, damage to, or widespread loss of, cultural resources could lead to the loss of connection to place, causing a net loss of cultural diversity within the Study Area and its surrounding communities. This is important because the cultural resources within many portions of the Study Area are understudied and/or not duplicated or replaced at other locations. Because most cultural resources are nonrenewable this would constitute a significant direct and cumulative impact.

The assessment of direct, indirect, and cumulative impacts for Alternative A1 may require a comprehensive inventory and NRHP evaluation of built-environment resources at each site where nonstructural features are proposed in addition to the larger surrounding viewshed and would need to be completed in PED; it is recommended that inventory work for each site should be conducted no more than five (5) years in advance of construction. Potential adverse impacts to archaeological sites, historic buildings, structures, NRHD(s), or other built-environment resources listed or eligible for the NRHP that cannot be avoided or

minimized would be mitigated as appropriate following the procedures negotiated in the PA in consultation with SHPO, Federally-Recognized Tribes, and other Consulting Parties, as appropriate. Any additional conditions or requirements would be documented at that time.

#### 4.2.1.1.44 Alternative C – NFI Plan, Channel Improvement/Weir/Levee Plan (LPP)

Direct. A review of Alternative C indicates that the considered action includes wide-spread ground disturbing activities including, but not limited to, staging; creating new or upgraded access and haul roads; storage; new stockpile, berm, borrow, disposal, and waste areas; channel improvements by means of removing areas that constrict the floodplain along with deepening of the channel overbank and floodplain within the project footprint through excavation; creation of newly inundated areas; Federal levee improvements (i.e., excavated material plan); adding additional pumping capacity would be needed to mitigate for the loss of capacity of the drainage structures Jackson East and Fairgrounds Levees; relocations and/or improvements to various public and private utilities and infrastructure including bridge counter features (stabilization or armoring such as riprap, slope paving, and slide repairs) for most major crossings of the Pearl River within the project area (details to be determined in consultation with MDOT during PED); potential mitigation of HTRW and other hazardous waste sites within the floodplain; demolition of infrastructure including the exiting weir near the J. H. WTP site and an existing abandoned railroad bridge and embankment of the Gulf, Mobile & Northern/Gulf Mobile and Ohio (GM&N/GM&O) Railroad; expansion of existing, and creation of new, island formations within the Pearl River; construction of a new weir with an armored low-flow gate structure; creation of a new year-round waterbody; excavation of off-site suitable borrow materials and upgrading an existing non-Federal levee around the Savanna Street WWTP; creation of a fish ladder and compensatory habitat mitigation areas to offset losses within the project's construction footprint areas; construction of new recreation areas; and, site cleanup. The Alternative C project area presents a moderate to high potential for both known and undocumented Pre-Contact and Post-Contact/historic archaeological resources to exist, spanning from the early- to mid-nineteenth century up until the mid-twentieth century. These actions have the potential to directly impact both known and undocumented prehistoric and historic cultural resources including but not limited to: archeological sites; including sites that may contain human remains (e.g., Native American mound sites), funerary objects, sacred objects, or objects of cultural patrimony, and/or Traditional Cultural Properties (TCPs) that exist both within the project footprint and associated areas in a way that may diminish and, or, eliminate the integrity, of these non-renewable properties' location, design, setting, contexts, materials, workmanship, feeling, or association.

Further, Alternate C has the potential to directly affect built-environment resources of undetermined eligibility or eligible for Mississippi Historic Landmark status and/or listing on the NRHP (e.g., bridge abutments, WTP, WWTP) in a way that may diminish the integrity, of these property's location, design, setting, materials, workmanship, feeling, or association.

Should Alternative C have a direct adverse effect on a NRHP-eligible cultural resource that cannot be avoided or minimized, USACE would work toward a resolution of adverse effects with SHPO, Federally-Recognized Tribes, and other Consulting Parties following the

procedures negotiated in the PA. Any additional conditions or requirements would be documented at that time.

Indirect. A review of Alternative C indicates that the considered action includes the introduction of new or modified visual elements (e.g., flood control structures, newly created land, inundated areas, and recreational features, expanded levee footprints, relocated utilities and infrastructure) to known and previously undocumented built-environment resources that exist within the project area's viewshed (e.g., historic buildings, structures, bridges, local and NRHDs, Mississippi and NHLs, other private, public, industrial, and waterfront-related resources, and TCPs) in a way that may indirectly diminish the integrity of these property's setting, feeling, or association. Work on waterways such as channel improvements, creation of newly inundated areas, and/or bank stabilizations can also indirectly increase erosion in other areas adjacent to project areas and outside of the immediate footprint and changes in downstream water velocity, water surface elevation, and directed stormwater flowage could indirectly accelerate the erosion and deterioration of known archaeological resources, while exposing previously undocumented sites and/or artifacts; resulting in loss of site integrity, context, and scientific research value. Furthermore, changes in land use within the project area as a result of the creation of the new year-round waterbody and recreational features (i.e., conversion of private to public land) may have additional indirect impacts to archaeological resources. For instance, potential negative impacts might include damage to archaeological sites resulting from increased pedestrian and recreational vehicle traffic or be exposed for incidental collecting. Positive impacts may include increased public accessibility and interpretation value.

Should Alternative C have an indirect adverse effect on a NRHP-eligible cultural resource that cannot be avoided or minimized, USACE would work toward a resolution of adverse effects with SHPO, Federally-Recognized Tribes, and other Consulting Parties following the procedures negotiated in the PA. Any additional conditions or requirements would be documented at that time.

Cumulative. Cumulative impacts to cultural resources would be the additive combination of the direct and indirect impacts of Alternative C, other reasonably foreseeable impacts beyond the Federal interest in the project (see below), and other Federal, State, local, and private, flood risk management projects existing and/or authorized for construction along the Pearl River Basin (Table 1-2). Activities associated with these projects as a whole have the potential to incrementally impact existing and previously undocumented and non-renewable cultural resources within the project footprints, surrounding viewsheds, and communities they occur in.

At the present time, portions of the Alternate C project footprint remain undefined and/or un-surveyed for archaeological resources. Further, correspondence indicates that not all previous surveys within the project footprint meet current MDAH archaeological Survey Standards (see letter from MDAH to Headwaters Consulting dated April 11, 2018; Appendix G) and many of these sites have not been subject to thorough documentation and present an unknown amount of research potential. Cumulative negative impacts may include upstream and downstream impacts to archaeological resources caused by the repeated

wetting and drying of sites due to impoundment and release of water that may cause artifacts from sites to erode from their original contexts, lose scientific value, or be exposed for incidental collecting by visitors. Also, there is potential for significant loss of prehistoric and historic information about Pearl River Basin. The archaeological sites within the project footprint are cultural resources that are non-renewable and the potential impacts to sites would be an irreversible commitment of these resources. Mitigation features for these impacts would be assessed on a site-specific basis and may include archaeological data recovery. However, the loss of valuable cultural resources associated with archaeological sites cannot be entirely mitigated. If such cultural resources are encountered at multiple sites, this would constitute a significant cumulative adverse impact. However, comprehensive data recovery and analysis from these sites may add to a better regional understanding of prehistory and history within the Pearl River Basin.

Other reasonably foreseeable cumulative impacts to built-environment resources may result from the future planned development of areas recently removed from the floodplain following the period of Federal interest in the project that have the potential to indirectly effect known and previously undocumented built-environment resources (e.g., individual/contributing NRHP-eligible structures, local and NRHP-listed or eligible NRHDs, and Mississippi/NHL(s) in a way that may diminish the integrity, of these properties' setting, contexts, feeling, or association. Such damage to, or widespread loss of, cultural resources could lead to the loss of connection to place, causing a net wholesale loss of cultural diversity within the Study Area and its surrounding communities. This is important because the cultural resources within many portions of the Study Area are understudied and/or not duplicated or replaced at other locations. Because most cultural resources are nonrenewable, this would constitute a significant cumulative impact. However, a reduction in the frequency of downstream flooding may have a long-term positive impact to as yet unidentified or buried resources beyond the proposed project area footprint; potentially including resources at all levels of significance (state, local, national, Tribal).

A review of current existing documentation and/or comprehensive inventory and National Register evaluation of all built-environment, archaeological resources, and/or TCPs would need to be completed within the APE for each construction item in PED; inventory work for each APE should be conducted no more than 5 years in advance of construction. Potential adverse impacts to archaeological sites, historic buildings, structures, local/NRHD(s), Mississippi/NHL(s), TCPs, or other built-environment resources listed or eligible for the NRHP that cannot be avoided or minimized would be mitigated as appropriate following the procedures negotiated in the PA in consultation with SHPO, Federally-Recognized Tribes, and other Consulting Parties, as appropriate. Any additional conditions or requirements would be documented at that time.

#### 4.2.1.1.45 Alternative CTO

This alternative could have additive incremental direct, indirect, and cumulative impacts similar as described for Alternatives A1 and C. The CTO alternative has potential to impact archaeological sites, historic buildings (e.g., residential, commercial, public), structures and/or infrastructure (e.g., bridges and railroads), existing local/NRHD(s) and other historical

communities that are yet to be evaluated for NR eligibility (e.g., Duttosville), Mississippi/ NHLs, TCPs, or other built-environment resources listed or eligible for the NRHP, especially in areas where levees or channel improvements are recommended. A review of current existing documentation and/or comprehensive inventory and National Register evaluation of all built-environment, archaeological resources, and/or TCPs would need to be completed within the APE for each construction item during PED; inventory work for each APE should be conducted no more than five years in advance of construction. Potential adverse impacts to archaeological sites, historic buildings, structures, local/NRHD(s), Mississippi/NHL(s), TCPs, or other built-environment resources listed or eligible for the NRHP that cannot be avoided or minimized would be mitigated as appropriate following the procedures negotiated in the PA in consultation with SHPO, Federally-Recognized Tribes, and other Consulting Parties, as appropriate. Any additional conditions or requirements would be documented at that time. However, the CTO differs from Alternative C in some notable ways:

1. The CTO does not require the demolition of the exiting weir near the J. H. Fewell WTP; rather the weir would be permanently inundated if a new weir was constructed downstream. If a new weir is not constructed downstream, then no change to water heights at the location of the J. H. Fewell WTP weir would occur. Portions of the J. H. Fewell WTP (Filter Building and Pump #1) were designated a Mississippi Landmark on October 30, 1991. The weir's status as an individually-eligible/contributing feature would require additional assessment. If the weir was determined to be individually-eligible or a contributing feature of the J. H. Fewell WTP, submersion of the weir could result in a finding of indirect Adverse Effects (viewshed). Any such effects would be addressed in accordance with the procedures negotiated in the PA.

2. The CTO does not require adding additional pumping capacity to mitigate for the loss of capacity at the Jackson East Levee; this would only be required for the Jackson Fairgrounds Levee (see below for additional information). Because this action does not include the introduction of any new project features, conditions would not change and would remain the same as described in the No Action Alternative.

3. The CTO may include the construction of the proposed Canton Club Levee. The area surrounding the proposed levee largely has not been previously surveyed for archaeological and above-ground resources but based on the proximity of the proposed levee footprint in relation to the locations of other previously recorded archaeological sites, this location possesses a high potential to contain yet unrecorded archaeological resources. Additionally, the construction of the Canton Club Levee would require obtaining borrow material for construction from an off-site location (10-mile radius assumed). Presently the borrow material source location is unknown. Therefore, both the construction of the Canton Club Levee, the borrow location, and any associated staging areas would require review in accordance with the procedures negotiated in the PA.

4. The CTO includes a reduction in both volume and acreages of both excavation and fill as compared to the Alternative C, with comparable flood reduction results. While both the CTO and Alternative C have the potential to effect both known and yet unidentified historic resources, it can be reasonably assumed that the CTO's reduced footprint would

result in fewer potential direct adverse effects to historic properties; while at the same time still providing approximately yet same level of flood-risk protection which may have positive indirect impacts towards preserving at-risk unique architectural and design characteristics that the communities and historic districts in the Study Area strive to maintain and enhance.

5. The CTO, in comparison to Alternatives A1 or C alone, and assuming all components of the CTO are selected by the ASA, would through the combination of benefits resulting from the Alternative A1 (NS plan), the conveyance channel improvements, and the Canton Club levee, provide benefits to approximately 500 structures in areas of EJ concern by removing them from the 100-year floodplain (no longer flooding at first floor). As mentioned above, although this action has the potential to impact historic properties directly, indirectly, and cumulatively, one of the most significant outcomes of this effort would be to reduce risk to historic structures from future flood events so they maintain their character in relation to other historic buildings within each neighborhood or historic district, thus, protecting the architectural qualities of each neighborhood or historic district as a whole. Therefore, the CTO may have positive indirect and cumulative impacts towards preserving archaeological sites and at-risk unique architectural and design characteristics that the communities and historic districts in the Study Area strive to maintain and enhance.

6. The CTO includes the excavation of material near the Gulf States Creosoting Company contaminated slough HTRW site. During PED, avoidance measures will be further evaluated to avoid potential impacts to the contaminated area as is feasible. Comparatively, Alternative C proposes excavation and placement of material on two HTRW sites within the project footprint (i.e., the Gulf States Creosoting Company contaminated slough site and the unpermitted Gallatin Street Landfill). At the most basic level, the CTO's reduced excavation footprint would be anticipated to have less potential to affect any historic properties present within either HTRW location.

7. The CTO analyzes scenarios including both future "without" or "with" the construction of a new weir with an armored low-flow gate structure and fish ladder for the purpose of creating of a new year-round waterbody. In the case of the "with" new weir, gate, and fish ladder scenario, the proposed weir would be located slightly further upstream of the proposed location of the Alternative C weir and fish ladder. In the case of the "without" new weir, gate, and fish ladder scenario, additional improvements to existing Federal levees (i.e., excavated material plan), additional pumping capacity at the Jackson Fairground Levee, recreation features, and some riverine habitat mitigation is removed from the project. The CTO "without" and "with" weir is evaluated below:

#### 4.2.1.1.45.1 Alternative CTO without Weir (Alt E)

The CTO without weir could have additive incremental direct, indirect, and cumulative impacts similar to Alternatives A1 and C and as described above in Section 4.2.1.1.49. However, due to the reduction of individual work items and reduced footprint is assumed to generally have less potential to directly, indirectly, and cumulatively effect historic properties

than that of the “with” weir scenario evaluated below; but at the same time still would provide a similar level of protection as that of Alternate C towards preserving archaeological sites and at-risk unique architectural and design characteristics that the communities and historic districts in the Study Area strive to maintain and enhance.

#### 4.2.1.1.45.2 Alternative CTO with Weir (Alt D, Preliminary NED Plan)

The CTO with weir could have additive incremental direct, indirect, and cumulative impacts similar to Alternatives A1 and C and as described above in Section 4.2.1.1.49; though greater in magnitude than the CTO “without” weir scenario described above; but at the same time still would provide a similar level of protection as that of Alternate C towards preserving archaeological sites and at-risk unique architectural and design characteristics that the communities and historic districts in the Study Area strive to maintain and enhance.

### 4.2.1.1.46 Next Steps

No determination of effect under the NHPA pursuant to 36 CFR 800.4(d) is being made at this time. As an alternate to the “Standard Section 106” process described above, in partial fulfillment of its Section 106 responsibilities, USACE has initiated consultation to negotiate a Section 106 PA that sets out the features the USACE will implement to resolve adverse effects through avoidance, minimization, and/or mitigation (36 CFR § 800.14(b). A PA is appropriate when the undertaking is complex; the undertaking would adversely affect a significant historic property; the extent of effects is unknown; there is public controversy; and/or the parties involved overwhelmingly prefer it. The goal of this Section 106 consultation is to provide a framework for addressing this Undertaking and establish protocols for continuing consultation with the MS SHPO, Federally Recognized Tribal governments, and other stakeholders. The PA would identify Consulting Parties, define applicability, establish review timeframes, stipulate roles and responsibilities of stakeholders, include procedures for consultation with Federally-Recognized Tribes, consider the views of the SHPO/THPO(s) and any other Consulting Parties, afford for public participation, develop programmatic allowances to exempt certain actions from Section 106 review, outline a standard review process, determine an appropriate level of field investigation to identify and evaluate historic properties and determine the potential to affect historic properties and/or sites of religious and cultural significance, streamline the assessment and resolution of adverse effects to historic properties through avoidance, minimization, and programmatic treatment approaches for mitigation, establish reporting frequency and schedule, provide provisions for post-review unexpected discoveries and unmarked burials, and incorporate the procedures for amendments, duration, termination, dispute resolution, and implementation. The PA would then govern USACE’s subsequent NHPA compliance efforts. The PA will be executed before a ROD is issued, ideally before the final EIS.

**Recreational Resources**

### 4.2.1.1.47 No Action Alternative – Future without Project Condition

With the no action alternative, recreational resources would continue to be influenced by land use trends and natural processes over the course of time. Public access to recreational

resources in the study area would continue to be in demand. Demand for and access to recreational resources would be subject to ongoing operation and maintenance activities associated with existing flood control projects and the management of future development and growth in and around Jackson and Central Mississippi.

#### 4.2.1.1.48 Alternative A1 – USACE Developed Nonstructural Plan

The nonstructural alternative includes the elevation, floodproofing, buyout, and/or relocation of existing potentially affected structures within the study area. Any site disturbance associated with the nonstructural alternative would not directly impact recreational activities that take place within the study area. The potential for indirect, adverse impacts associated with the nonstructural alternative would be minor in intensity and short in duration. There is the small chance that the process of working on some structures may temporarily interfere with some existing recreational sites' access. An indirect impact of elevating structures is that building costs of future recreational buildings may limit the number of facilities being constructed. Sites that would no longer have structures could have incidental recreation potential with opportunities for greenspace and wildlife viewing depending on location. Cumulative impacts would be the progressive direct and indirect impacts of implementing and operating the nonstructural alternative, as well as the direct and indirect impacts due to other previous, existing, and authorized projects within the Pearl River Watershed. Any anticipated cumulative adverse impacts would be minor in intensity and short in duration.

#### 4.2.1.1.49 Alternative C – NFI Plan, Channel Improvement/Weir/Levee Plan (LPP)

This alternative includes the construction of channel improvements, associated weir structure, and improved levee segments. The implementation of this alternative would result in a significant shift from terrestrial to water-dependent recreational activities for areas in proximity to the Pearl River waterfront. Potential direct and indirect, adverse impacts to the LeFleur's Bluff State Park and associated recreational activities (Figure 4-3), including access to and use of the site, would be avoided, minimized, or mitigated through the continued coordination with the Mississippi Department of Wildlife, Fisheries and Parks (MDWFP). There would be temporary limitations on all recreational activities adjacent to and within the Pearl River during construction.

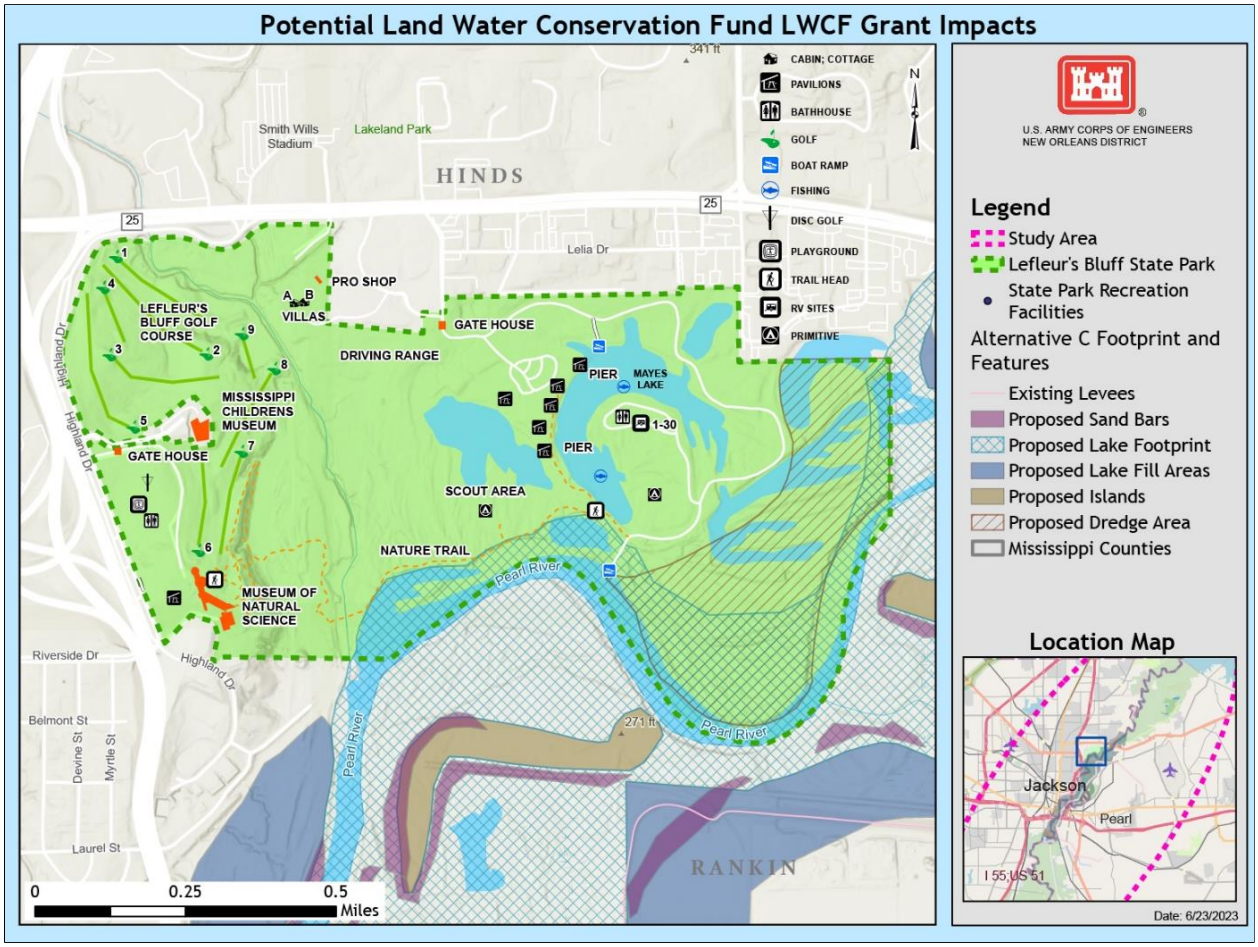



*Figure 4-3 Alternative C Potential Land Water Conservation Fund Grant Impacts*

As opposed to the existing weir, the replacement weir would be constructed to a higher elevation of 256 NGVD vs. the current of 250 NGVD. The proposed weir would result in an expanded, year-round recreational water body capable of supporting incidental recreational facilities. Potential recreation sites would be limited to areas disturbed by construction and design of these facilities would be coordinated during PED (Figure 4-4). The potential recreational opportunities could include boat ramps, boating, camping, fishing piers, nature/hiking trails, and/or wildlife viewing. Recreational watercraft would not be impeded by the replacement weir with the exception of low water conditions due to drought conditions.

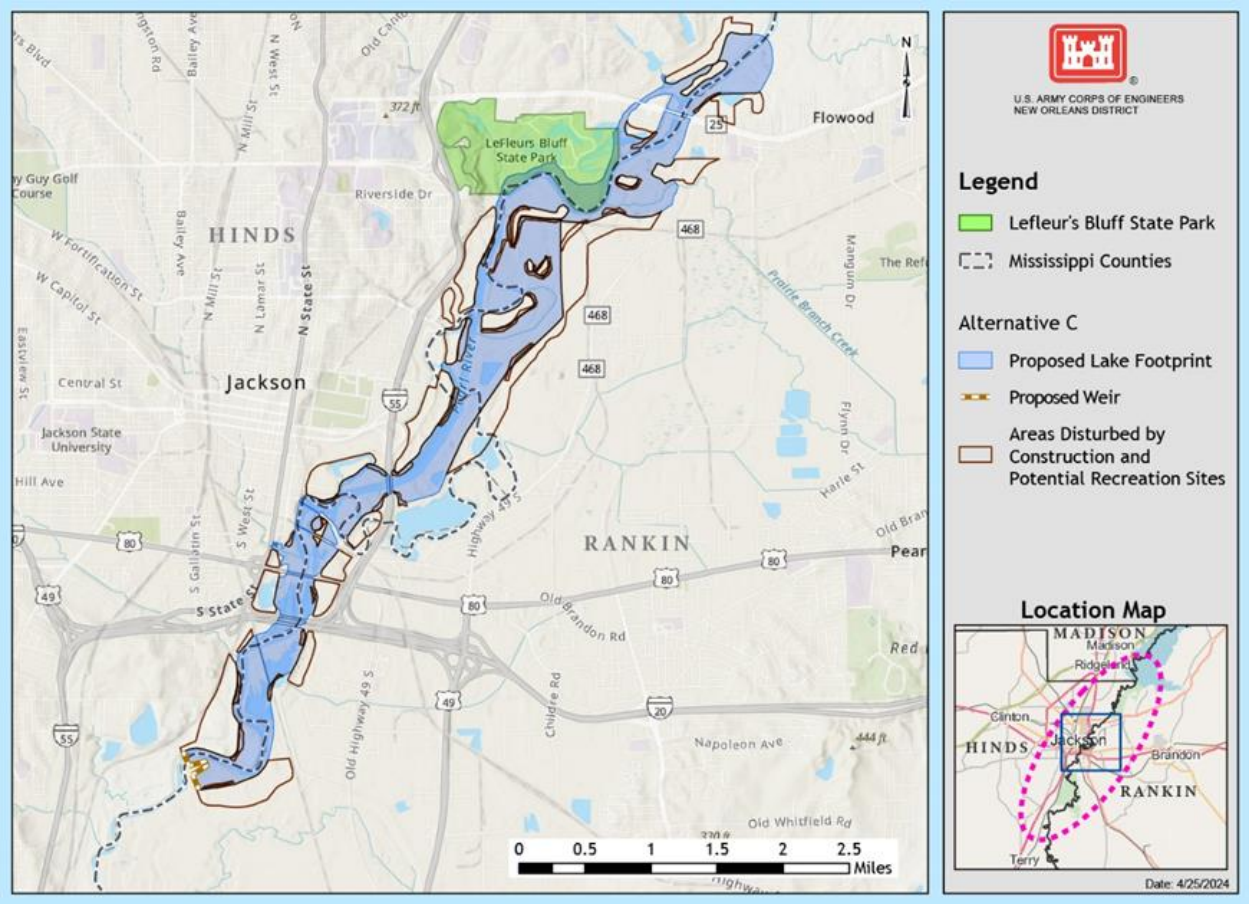



*Figure 4-4. Alternative C Potential Sites for Recreation*

Cumulative impacts would be the progressive direct and indirect impacts of implementing this alternative plus the direct and indirect impacts to recreation resources by other previous, existing, and authorized projects within the Pearl River Watershed. There would be a shift in the types of recreational opportunities that are available post-construction correlating with the significant shift in habitat anticipated with this alternative. This increased potential for new water-based recreational opportunities in the area would continue to depend on the public's ability to access and use the proposed water body and waterfront features.

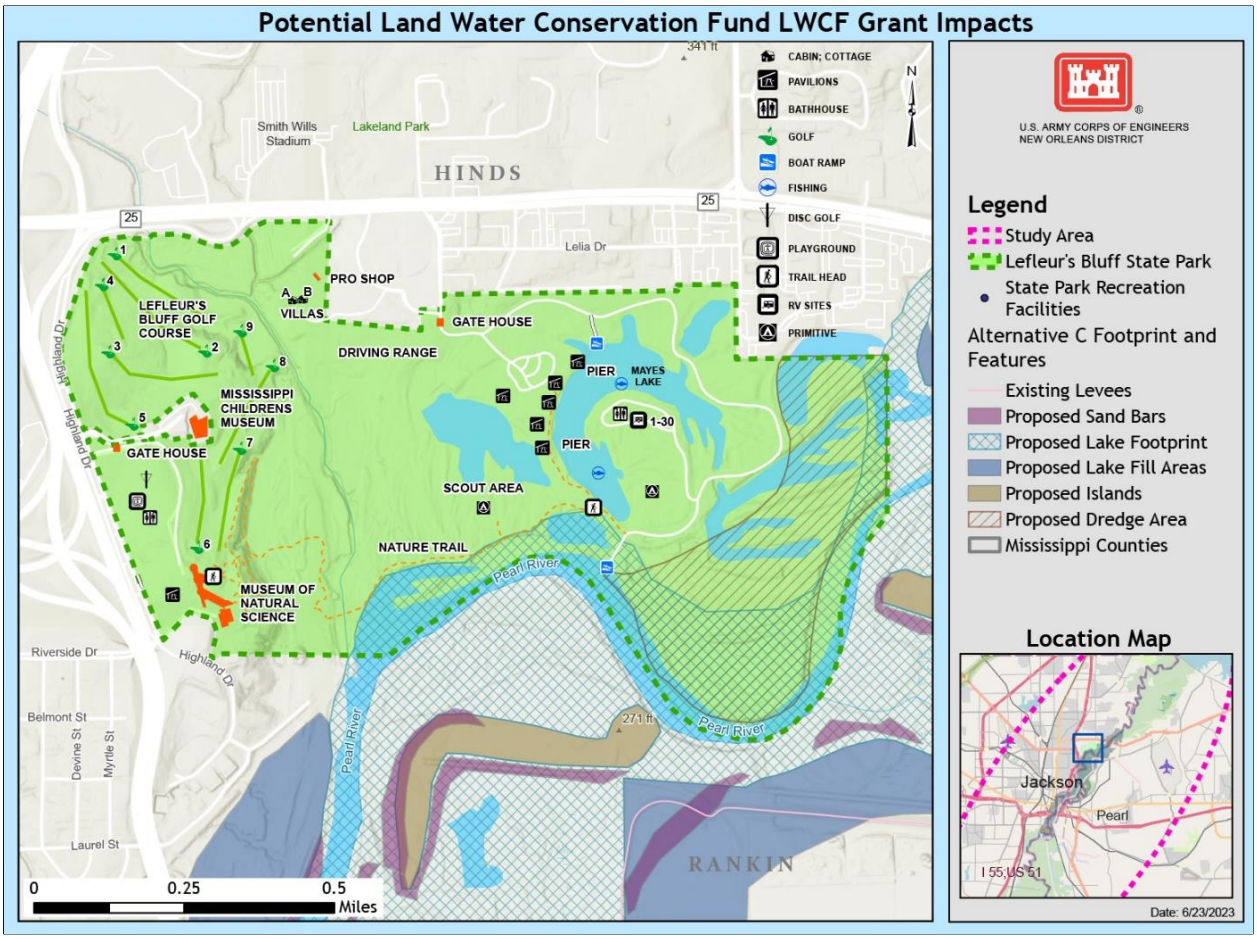



*Figure 4-5. Potential Land Water Conservation Fund LWCR Grant Impacts*

#### 4.2.1.1.50 Alternative CTO

##### 4.2.1.1.50.1 Alternative CTO without Weir (Alt E)

This alternative would have similar impacts to Alternative A1, and without a weir, there would be temporary limitations on recreational activities adjacent to and within the levee and channel improvements construction areas during construction. Without a weir, recreation would stay terrestrial focused.

##### 4.2.1.1.50.2 Alternative CTO with Weir (Alt D, Preliminary NED Plan)

This alternative would have similar impacts to Alternative A1, and if a weir is included, additional impacts as described for Alternative C, but to a lesser degree with regards to the proposed minimum pool elevation. The implementation of this alternative would result in a

significant shift from terrestrial to water-dependent recreational activities for areas in proximity to the Pearl River waterfront. Potential direct and indirect, adverse impacts to the LeFleur's Bluff State Park and associated recreational activities (Figure 4-6), including access to and use of the site, would be avoided, minimized, or mitigated through the continued coordination with the Mississippi Department of Wildlife, Fisheries and Parks (MDWFP). There would be temporary limitations on all recreational activities adjacent to and within the Pearl River during construction.

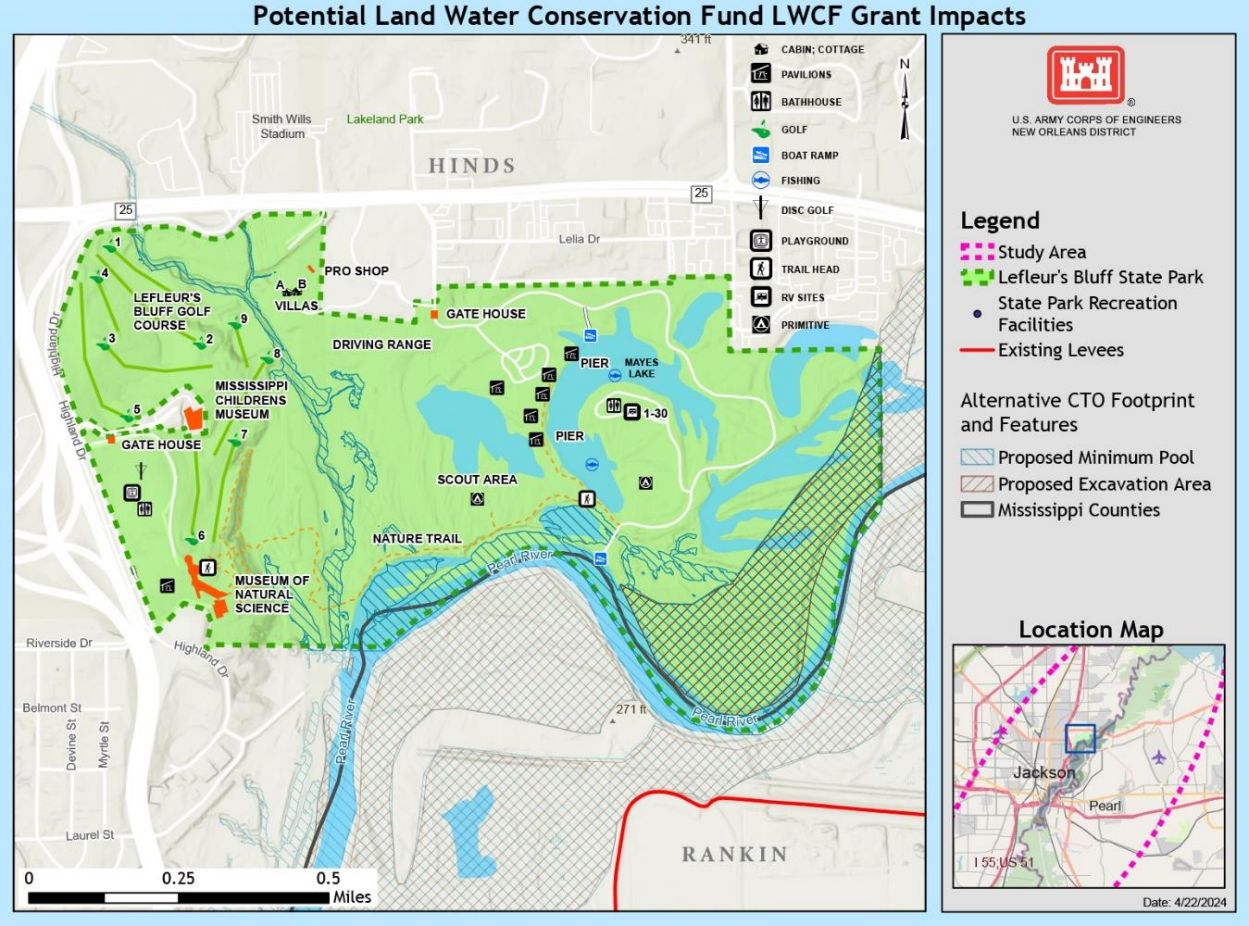



*Figure 4-6 CTO with Weir Potential Land Water Conservation Fund Grant Impacts*

As opposed to the existing weir, the new weir would be constructed to a higher elevation of 256 NGVD vs. the current of 250 NGVD. The proposed weir would result in an expanded, year-round recreational water body capable of supporting incidental recreational facilities. Potential recreation sites would be limited to areas disturbed by construction and design of these facilities would be coordinated during PED (Figure 4-7). The potential recreational

opportunities could include boat ramps, boating, camping, fishing piers, nature/hiking trails, and/or wildlife viewing. Recreational watercraft would not be impeded by the replacement weir with the exception of low water conditions due to drought conditions.

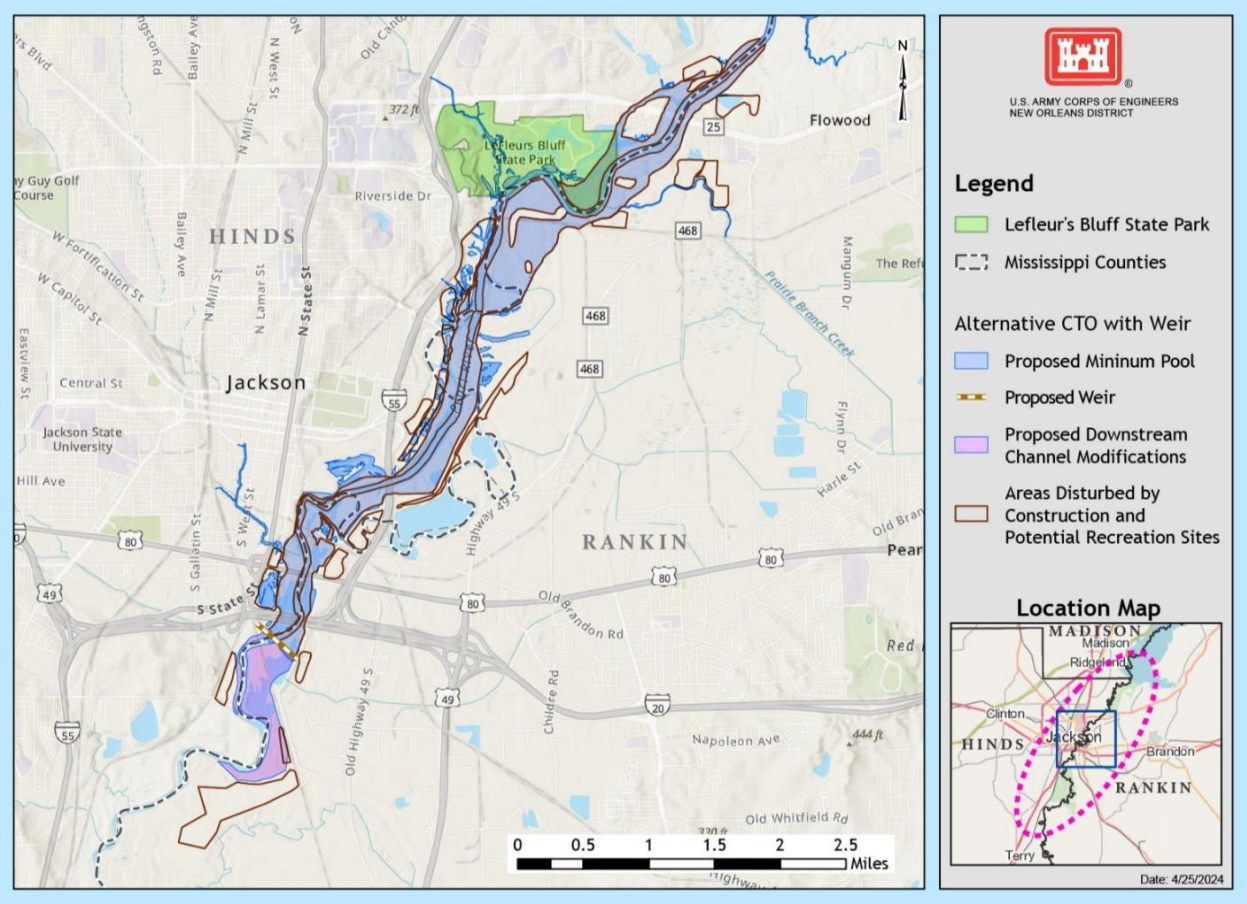



*Figure 4-7. CTO with weir Potential Sites for Recreational Features*

## Aesthetics

### 4.2.1.1.51 No Action Alternative – Future without Project Condition

With the no action alternative, aesthetics and visual resources would closely correspond with future land use trends regarding development and growth in and around Jackson and Central Mississippi. Ongoing operation and maintenance activities associated with existing flood control projects would continue to impact aesthetic and visual resources in the study area depending on the individual project's location and scope.

### 4.2.1.1.52 Alternative A1 – USACE Developed Nonstructural Plan

The nonstructural alternative includes the elevation, floodproofing, buyout, and/or relocation of existing potentially affected structures within the study area. Elevating existing structures would not cause adverse impacts to visual resources. Structures being raised are currently present, their elevation would change, but the site is still occupied either way. Direct and indirect impacts to visual resources would occur when a structure is demolished by eliminating that view from that site. When a structure is removed and open land is created, this may be perceived as naturalistic or a void within an established community depending on aesthetic response. During construction, adverse impacts would be minor in intensity and short in duration. For further information regarding impacts to the historical viewshed, refer to Cultural and Historic Resources Section in this document. USACE anticipates that potential indirect adverse effects to visual resources would be localized and could be avoided or minimized through the design review process that would be included within the PA appendix, Memorandum of Understanding (MOU) Regarding the Assessment of Aesthetic Resources.

Cumulative impacts would be the progressive direct and indirect impacts of implementing and operating the nonstructural alternative, as well as the direct and indirect impacts due to other previous, existing, and authorized projects within the Pearl River Watershed. Any anticipated cumulative impacts would be minor in intensity and short in duration. For further information regarding approaches that can reduce the damaging visual effects of altering historic properties to the historical viewshed, refer to Cultural and Historic Resources Section in this document.

#### 4.2.1.1.53 Alternative C – NFI Plan, Channel Improvement/Weir/Levee Plan (LPP)

This alternative includes the construction of channel improvements, associated weir structure, and improved levee segments. Activities associated with the construction of this alternative would have direct, adverse impacts to visual resources within the construction footprint. The introduction of new or modified visual elements (e.g., flood control structures, newly created land, inundated areas, expanded levee footprints) would alter existing landform, water, vegetation, land use and user activity in the area. Forested areas would be cleared of existing vegetation and newly created land and would take many years to revegetate if not further developed in the future or converted to open water. As a result, existing forestland would shift to open water for areas in proximity to the Pearl River waterfront. Visual elements that are not located within the project footprint would be further preserved and benefit from these flood risk reduction efforts. A review of current existing inventory and evaluation of all aesthetic resources, or Visual Resources Assessment Procedure (VRAP), would need to be completed for the area per ER 1105-2-100 Appendix C Environmental Evaluation & Compliance, section C-5 “Aesthetic Resources.” Significant and adverse impacts to visual resources will continue to be assessed and mitigated during the PED phase.

Cumulative impacts would be the overall shift in viewsheds as is characteristic of ongoing development in the area and like the Ross Barnett Reservoir immediately north of the study area. The cumulative impacts on aesthetic and visual resources associated with the implementation of this alternative would be considered moderate in intensity and long in

duration. For further information regarding approaches that can reduce the damaging visual effects of altering historic properties to the historical viewshed, refer to Cultural and Historic Resources Section in this document. USACE anticipates that potential indirect adverse effects to visual resources would be localized and could be avoided or minimized through the design review process that would be included within the PA appendix, Memorandum of Understanding (MOU) Regarding the Assessment of Aesthetic Resources.

#### 4.2.1.1.54 Alternative CTO

##### 4.2.1.1.54.1 Alternative CTO without Weir (Alt E)

While the aesthetic impacts of this alternative would be similar to those in Alternative A1 and C, they are anticipated to be reduced in scale and contrast due to a reduction in scope of the structural work items. Due to the proposed overbank modifications and resulting inundated area being significantly smaller than those of Alternative C and Alternative CTO with weir, existing landform, water, vegetation, land use and user activity would be smaller. Visual elements that are not located within the project footprint would be further preserved and benefit from these flood risk reduction efforts.

##### 4.2.1.1.54.2 Alternative CTO with Weir (Alt D, Preliminary NED Plan)

This alternative is expected to have similar direct, indirect, and cumulative aesthetic impacts to those in Alternatives A1 and C. For further information regarding approaches that can reduce the damaging visual effects of altering historic properties to the historical viewshed, refer to Cultural and Historic Resources Section in this document. USACE anticipates that potential indirect adverse effects to visual resources would be localized and could be avoided or minimized through the design review process that would be included within the PA appendix, Memorandum of Understanding (MOU) Regarding the Assessment of Aesthetic Resources.

**Air Quality**

#### 4.2.1.1.55 No Action Alternative – Future without Project Condition

Without implementation of the Proposed Alternatives, no direct, indirect, or cumulative impacts to air quality would occur.

#### 4.2.1.1.56 Alternative A1 – USACE Developed Nonstructural Plan

There are no foreseeable changes for Air Quality with this proposed plan.

#### 4.2.1.1.57 Alternative C – NFI Plan, Channel Improvement/Weir/Levee Plan (LPP)

During construction of this project, there is a probability of an increase in air emissions from the usage of internal combustion engines (Gasoline and Diesel), creation of particulate emissions during project construction, and increase in dust due to vehicular traffic. The potential emissions would include 1) exhaust emissions from operations of various types of non-road construction equipment and 2) fugitive dust due to earth disturbance. The emissions from supply trucks and workers commuting to work would temporarily impact air quality in the vicinity of the project area. Operation of construction equipment and support vehicles would also generate Volatile Organic Compounds (VOCs), Particulate Matter (PM)10, PM2.5, Nitrogen Oxides (NOx), Carbon Monoxide (CO), Ozone (O3) and Sulfur Oxides (SOX) emissions from diesel engine combustion. During the construction of the proposed action, proper and routine maintenance of all vehicles and other construction equipment would be implemented to ensure that emissions are within the design standards of all construction equipment.

Currently Madison County, Hinds County and Rankin County, are in attainment status of all NAAQS according to EPA and MDEQ. If the construction duration is projected to be short term, any increases or impacts on ambient air quality would be expected to be short-term and minor and would not be expected to cause or contribute to a violation of Federal or State ambient air quality standards. If the construction duration is projected to be long term, there is a possibility that air quality may be impacted, and further analysis would be needed.

There would be no adverse indirect impacts to air quality in the counties with construction from the proposed action.

Significant cumulative adverse impacts are not anticipated from activities associated with the projected alternatives when considered with past, present, or reasonably foreseeable future actions.

#### 4.2.1.1.57.1 Alternative CTO

#### 4.2.1.1.57.2 Alternative CTO without Weir (Alt E)

During construction of this project, there is a probability of an increase in air emissions from the usage of internal combustion engines (Gasoline and Diesel), creation of particulate emissions during project construction, and increase in dust due to vehicular traffic. The potential emissions would include 1) exhaust emissions from operations of various types of non-road construction equipment and 2) fugitive dust due to earth disturbance. The emissions from supply trucks and workers commuting to work would temporarily impact air quality in the vicinity of the project area. Operation of construction equipment and support vehicles would also generate Volatile Organic Compounds (VOCs), Particulate Matter (PM)10, PM2.5, Nitrogen Oxides (NOx), Carbon Monoxide (CO), Ozone (O3) and Sulfur Oxides (SOX) emissions from diesel engine combustion. During the construction of the proposed action, proper and routine maintenance of all vehicles and other construction equipment would be implemented to ensure that emissions are within the design standards of all construction equipment.

Currently Madison County, Hinds County and Rankin County, are in attainment status of all NAAQS according to EPA and MDEQ. If the construction duration is projected to be short term, any increases or impacts on ambient air quality would be expected to be short-term and minor and would not be expected to cause or contribute to a violation of Federal or State ambient air quality standards. If the construction duration is projected to be long term, there is a possibility that air quality may be impacted, and further analysis would be needed.

There would be no adverse indirect impacts to air quality in the counties with construction from the proposed action.

Significant cumulative adverse impacts are not anticipated from activities associated with the projected alternatives when considered with past, present, or reasonably foreseeable future actions.

#### 4.2.1.1.57.3 Alternative CTO with Weir (Alt D, Preliminary NED Plan)

During construction of this project, there is a probability of an increase in air emissions from the usage of internal combustion engines (Gasoline and Diesel), creation of particulate emissions during project construction, and increase in dust due to vehicular traffic. The potential emissions would include 1) exhaust emissions from operations of various types of non-road construction equipment and 2) fugitive dust due to earth disturbance. The emissions from supply trucks and workers commuting to work would temporarily impact air quality in the vicinity of the project area. Operation of construction equipment and support vehicles would also generate Volatile Organic Compounds (VOCs), Particulate Matter (PM)10, PM2.5, Nitrogen Oxides (NOx), Carbon Monoxide (CO), Ozone (O3) and Sulfur Oxides (SOX) emissions from diesel engine combustion. During the construction of the proposed action, proper and routine maintenance of all vehicles and other construction equipment would be implemented to ensure that emissions are within the design standards of all construction equipment.

Currently Madison County, Hinds County and Rankin County, are in attainment status of all NAAQS according to EPA and MDEQ. If the construction duration is projected to be short term, any increases or impacts on ambient air quality would be expected to be short-term and minor and would not be expected to cause or contribute to a violation of Federal or State ambient air quality standards. If the construction duration is projected to be long term, there is a possibility that air quality may be impacted, and further analysis would be needed.

There would be no adverse indirect impacts to air quality in the counties with construction from the proposed action.

Significant cumulative adverse impacts are not anticipated from activities associated with the projected alternatives when considered with past, present, or reasonably foreseeable future actions.

**Noise**

#### 4.2.1.1.58 No Action Alternative – Future without Project Condition

Noise impacts would most likely be similar to those under existing conditions. There would be no direct, indirect, or cumulative impacts since the proposed action would not be implemented. Future noise levels would likely continue to be dictated by normal daily activities in the area.

#### 4.2.1.1.59 Alternative A1 – USACE Developed Nonstructural Plan

Stationary equipment consists of equipment that generates noise from one general area and includes items such as pumps, generators, compressors, etc. This type of equipment operates at a constant noise level under normal operation and is classified as non-impact equipment. Other types of stationary equipment such as pile drivers, jackhammers, pavement breakers, blasting operations, etc., produce variable and sporadic noise levels and often produce impact-type noises. Impact equipment is equipment that generates impulsive noise, where impulsive noise is defined as noise of short duration (generally less than one second), high intensity, abrupt onset, rapid decay, and often rapidly changing spectral composition. For impact equipment, the noise is produced by the impact of a mass on a surface, typically repeating over time.

Mobile equipment, including but not limited to dozers, scrapers, and graders, may operate in a cyclic fashion in which a period of full power is followed by a period of reduced power. Other equipment such as compressors, although generally considered to be stationary when operating, can be readily relocated to another location for the next operation.

*Direct Impacts:* The direct impacts resulting from Alternative A1 would be caused by activities associated with elevation and/or destruction (in the case of buyout) of selected structures. Noise would be generated from the use of heavy mobile construction equipment including, but not limited to backhoes, bulldozers, excavators, and haul trucks. Noise would be of varying levels, ranging anywhere from 80dB (backhoe), up to 130dB (jackhammer). Impacts are expected to be short term in nature, however there is the possibility of noise lasting longer than expected from the use of stationary equipment. Since the project area is developed, project noises would likely be heard by a large number of individuals both in commercial and residential areas, however the increased noise levels would only be present during daylight hours during construction. While noise impacts may cause a temporary inconvenience to residents and facilities in the immediate area, noise levels associated with construction activities would be temporary and monitored to ensure acceptable standards are maintained. Given this, the intensity of the direct impacts to noise levels within the Project Area would not be considered significant.

*Indirect Impacts:* The same conditions can be stated for the indirect impacts from the implementation of Alternative A1. The indirect impacts to the adjoining areas would be associated with the short-term increase in noise levels during the construction period, with the potential for slightly longer durations from stationary equipment, depending on the recipient's proximity to the source.

*Cumulative Impacts:* Cumulative impacts would be the incremental direct and indirect impacts of implementing and operating Alternative A1, as well as the direct and indirect

impacts attributable to other previous, existing and authorized projects within the Pearl River Watershed. Given the determination that direct or indirect impacts to the noise levels within the Project Area or adjacent areas beyond the construction period would not be likely with the Alternative A1 implementation, potential cumulative adverse impacts would likewise be considered as minor and short-term in duration.

#### 4.2.1.1.60 Alternative C – NFI Plan, Channel Improvement/Weir/Levee Plan (LPP)

*Direct Impacts:* While the types of direct impacts from noise for Alternative C would be similar to those described in Alternative A1, it is expected that due to significantly more actions and activities, such as levee maintenance and removal of the CM&N/CM&O Railroad Bridge and embankment, the construction noise would occur over a longer period of time. Noise generated from construction equipment used to demolish and rebuild the weir, construction of the maintenance berms and maintenance and reinforcement of the bridge abutments the use of heavy mobile construction equipment and be of varying levels, ranging anywhere from 80dB, up to 130dB.

Excavation and deepening activities associated with the channel overbank improvements are expected to cause noise levels to temporarily increase in various locations along the Pearl River, due to the operation of equipment and vehicles used during construction. While the equipment that would be working may produce sound levels of between approximately 80dB and 86dB, buildings and trees in the project areas tend to restrict the effects of sound; therefore, construction noise may be muffled in some areas.

Overall, the direct impacts to noise levels with the implementation of Alternative C would be short-term, minor, adverse conditions during the construction period. Based upon the project design, no long-term direct impacts to noise levels within the Project Area would be anticipated. Additionally, no changes in the current roadways or traffic patterns would be anticipated with the implementation of this alternative since the project footprint is located along corridors that are already major transportation routes. Given this, the anticipated direct, adverse impacts to noise levels associated with the implementation of Alternative C would be minor in intensity and short-term in duration.

*Indirect Impacts:* The same can be stated for the indirect impacts to noise levels within the adjacent areas. The potential increase in noise levels to the adjacent areas would be minor, short-term, and limited to the construction period. With much of the area adjacent to the project already developed and with the presence of the Interstate 20 and Interstate 55 transportation corridors within the southern portion of the Project Area, there is a considerable level of noise currently present. Any increases in noise levels, even during construction, would not be significant. As a result, the potential indirect, adverse impacts to noise levels would also be considered as minor in intensity and short-term in duration.

*Cumulative Impacts:* Cumulative impacts would be the incremental direct and indirect impacts of implementing and operating Alternative C plus the direct and indirect impacts attributable to other previous, existing, and authorized projects within the Pearl River Watershed. Given the determination that direct or indirect impacts to the noise levels within

the Project Area or adjacent areas beyond the construction period would not be likely with the Alternative C implementation, the potential cumulative impacts due to the implementation of this alternative would be minor and short-term in duration as it regards noise levels.

#### 4.2.1.1.61 Alternative CTO

##### 4.2.1.1.61.1 Alternative CTO without Weir (Alt D)

*Direct Impacts*: Due to the equipment that would be used, direct impacts from noise for Alternative CTO would be similar to those impacts described in Alternative A1 and Alternative C. Noise generated from construction equipment used would be of varying levels, ranging anywhere from 80dB, up to 130dB. While the equipment that would be working may produce sound levels of between approximately 80dB and 86dB, buildings and trees in the project areas tend to restrict the effects of sound; therefore, construction noise may be muffled in some areas.

Overall, the direct impacts to noise levels with the implementation of Alternative CTO would be short-term, minor, adverse conditions during the construction period.

*Indirect Impacts*: Indirect impacts to noise levels would be somewhat higher than those identified in Alternative A1 and Alternative C. With much of the area adjacent to the project already developed, there is a considerable level of noise currently present. Therefore, any increases in noise levels, would not be significant. As a result, the potential indirect, adverse impacts to noise levels would also be considered as minor in intensity when compared with the overall existing noise levels already in the area.

*Cumulative Impacts*: Cumulative impacts would be the incremental direct and indirect impacts of implementing and operating Alternative CTO plus the direct and indirect impacts attributable to other previous, existing, and authorized projects within the Pearl River Watershed.

Given the determination that direct or indirect impacts to the noise levels within the Project Area or adjacent areas beyond the construction period would likely be increased with the Alternative CTO implementation, the potential cumulative impacts from this alternative would be permanent, yet insignificant as it pertains to overall noise levels in the area.

##### 4.2.1.1.61.2 Alternative CTO with Weir (Alt E, Preliminary NED Plan)

*Direct Impacts*: With the construction of the weir, direct impacts from noise would be similar to those impacts described in Alternative A1 and Alternative C, ranging anywhere from 80dB, up to 130dB. The sound of the equipment could potentially be muffled by the buildings and trees in the project areas. Overall, the direct impacts to noise levels with the implementation of Alternative CTO would be short-term, minor, adverse conditions during the construction period.

*Indirect Impacts*: Indirect impacts to noise levels would be somewhat higher and for a longer duration than those identified in Alternative A1 and Alternative C. Additionally, due to

construction of the weir resulting in an expanded water body capable of supporting recreational activities, the additional sound of activities associated with camping, boating, fishing, and other recreational activities would result in a permanent increase in the level of noise already within the area.

*Cumulative Impacts:* Cumulative impacts would be the incremental direct and indirect impacts of implementing and operating Alternative CTO plus the direct and indirect impacts attributable to other previous, existing, and authorized projects within the Pearl River Watershed.

Given the determination that direct or indirect impacts to the noise levels within the Project Area or adjacent areas beyond the construction period would likely be increased with the Alternative CTO implementation, the potential cumulative impacts from this alternative would be permanent, yet insignificant as it pertains to overall noise levels in the area.

**HTRW**

#### 4.2.1.1.62 No Action Alternative – Future without Project Condition

Without implementation of the Proposed Alternatives, no direct, indirect, or cumulative impacts to HTRW would occur.

#### 4.2.1.1.63 Alternative A1 – USACE Developed Nonstructural Plan

The NFI would conduct a Phase 1 Environmental Site Assessment for each structure subject to modification and acceptance into the project. Compliance with applicable hazardous waste management laws and regulations (e.g., RCRA, CERCLA) would be achieved prior to construction. If any substances regulated under these laws were discovered, the NFI would comply with all applicable requirements. Since compliance with hazardous waste management laws and regulations is an eligibility criterion prior to construction, no impacts arising from any HTRW issues are anticipated with implementation of the project.

#### 4.2.1.1.64 Alternative C – NFI Plan, Channel Improvement/Weir/Levee Plan (LPP)

A HTRW Phase I & II Environmental Site Assessment was conducted by the NFI September 2014 and updated by the NFI in August 2021 of the project area. A technical memorandum was conducted by the NFI in December 2023 of the project area. During the preliminary assessments, the NFI identified several RECs within the project area. Of the RECs that were identified, soil and/or water sampling was accomplished at two sites within the study area by the NFI: Unpermitted Gallatin Street Landfill Site and Unpermitted Lefleurs Landing "Jefferson Street Landfill."

Within the Unpermitted Gallatin Street Landfill Site, the proposed construction details excavating roughly 40 acres of material to depths between 5' to 20' of the landfill and relocating the material to the western portion of the Gallatin Street Landfill. Within the NFI consultant report, appendix H titled "Environmental Evaluation of Hazardous, Toxic, and Radiological Waste (HTRW) Sites, it was found that soil borings discovered garbage roughly

3’ to 34’ deep. Due to this discovery, the depth of how much material would have to be excavated would possibly change. Water samples from monitoring wells within this landfill resulted in concentrations of cadmium, lead, and nickel above the maximum contaminant levels for the Safe Drinking Water Act. According to Aquaterra, the consultant who sampled this landfill, there is a clay layer possibly holding the potential leachate material from entering the nearby groundwater.

For the Unpermitted Lefleurs Landing “Jefferson Street Landfill” benzene was found within soil and water samples to be three times the regulated limit. Reconnaissance from the consultant showed that the landfill had evidence of waste/debris exposed along the waters edge due to possible erosion. It was also found that the landfill had no signs of a constructed cap or liner to prevent possible leachate from the landfill to nearby groundwater.

In addition to the two landfills mentioned above, there is potential proposed work if a site is unable to be avoided due to construction: Gulf States Creosoting Company Site. The proposed work for this site includes the excavation of the slough area and offsite disposal of the excavated material, and the remaining exposed surface area to be capped prior to final grading. It is noted within Appendix O of the NFI’s Integrated Final Feasibility Study& Environmental Impact Statement titled, “Construction Methods and Geotechnical Analysis”, if the site is unavoidable then the excavation of the slough area and capping of the remaining surface area could occur. There is no proposed depth and area of how much material would be excavated if needed. EPA conducted an onsite soil sampling analysis in December 2003 and discovered chemicals such as barium, cobalt, manganese, zinc, and creosote residuals including a variety of semi-volatile polynuclear aromatic hydrocarbons. The sampling was done to determine if the property would qualify as a National Priority List Site under the Federal Superfund Program. According to the on-site assessment by EPA, this site would not rank high enough to be labeled as a Superfund site because the surrounding town, Flowood, MS, receives its water supply from wells beneath a substantial confining layer possibly avoiding any contamination that is found on the creosote site. Though this site was not placed on the EPA’s Superfund list, elevated levels of organic and inorganic chemicals remain onsite and are possibly being released into the oxbow lake water and into the Pearl River during high flows/flood events. Due to this risk, if dredging, bank stabilization, or any form of construction is done near the Gulf States Creosoting Company Site, there is a risk that the known chemicals discovered onsite could either leach into the Pearl River or to nearby groundwater. For additional information regarding the RECs that were found within the study area, please see Appendix E.

Due to the discovery of the RECs within the project area, there is a high probability of encountering HTRW during the construction of the project. If this project is approved and funded, a full Phase 1 and Phase 2 Environmental Site Assessment would need to be conducted prior to any reconnaissance, acquisition, and construction. Appropriate regulations such as ER 1165-2-132 paragraph 12(b) are to be followed before, during, and after construction. During construction of each site, ongoing sampling would have to be done to ensure that all contaminated material would be removed from the site before finalizing the project. Coordination with EPA and Local regulating agencies would have to be done to ensure regulations are followed.

For the removal of material from the Unpermitted Gallatin Street Landfill, soil sampling & analysis, ground water sampling & analysis, air quality monitoring, characterization of the excavated material and additional sampling would have to be done. For the Gulf States Creosoting Company Site, the same guidelines would have to be followed as the Gallatin Street Landfill if excavation is done. For the unpermitted Lefleurs Landing “Jefferson Street Landfill,” guidelines would be similar to Gallatin Street landfill for identifying what is onsite. The data collected and the sampling of each site will help determine what type of remediation would be needed: how much material would have to be excavated, what type of cap would be placed, placement of bank stabilization, and other remediation features. For the study area, if ER 1165-2-132, Federal, state, and local regulations are not followed during the construction of this project, there is a potential for long term direct, indirect, and cumulative impacts to the study area and potentially downstream of the project area.

#### 4.2.1.1.65 Alternative CTO

##### 4.2.1.1.65.1 Alternative CTO without Weir (Alt E)

A Phase I Environmental Site Assessment was not conducted for the CTO without Weir and would need to be done prior to construction to identify any recognized environmental conditions within the proposed project area. Since a Phase I Environmental Site Assessment was not done, there are levels of uncertainty for portions of the CTO that was not evaluated within the NFI Phase I. If the CTO does not include the construction of the new weir, there is a potential that the impacts to the recognized environmental conditions, as stated within Alternative C, could be lower depending on the details of the CTO.

##### 4.2.1.1.65.2 Alternative CTO with Weir (Alt D, Preliminary NED Plan)

A Phase I Environmental Site Assessment has not been conducted and would need to be done prior to construction to identify any recognized environmental conditions within the proposed project area. A technical memorandum was conducted by the NFI in December 2023 of the project area. Since a Phase I Environmental Site Assessment was not done, there are levels of uncertainty for portions of the CTO that was not evaluated within the NFI Phase I. If the CTO were to include the construction of the new weir, the impacts to HTRW could be similar to the impacts stated within alternative C. A partial site visit of the Lefleurs Landing “Jefferson Street Landfill” and the Gulf States Creosoting Company Site was conducted on April 16, 2024. It was found that both sites exhibited the same RECs as identified within the NFI Phase I 2016 assessment. The Gallatin Street Landfill was not visited on this site visit. Due to the limited access during the site visits and the conditions they were in, it is recommended that further analysis, Phase I and/or Phase II, would be needed of all sites within the project area to ensure HTRW is not present during any form of construction or fill placement by the NFI.

**Socio Economics**

#### 4.2.1.1.65.3 Population and Housing

#### 4.2.1.1.65.4 No Action Alternative – Future without Project Condition

The no action alternative presents no direct or indirect impacts in relation to population and housing. Additionally, Moody's analytics (ECCA) forecast presents a decline in the population, and therefore households, for Hinds County and growth in Madison and Rankin Counties. These trends would be expected to continue as flooding continues to occur.

#### 4.2.1.1.65.5 Alternative A1 – USACE Developed Nonstructural Plan

Alternative A1 presents a direct beneficial impact on population and housing because of elevating residential structures and flood proofing nonresidential structures within the study area. Indirect impacts could include a slower, yet still declining rate of population due to an increased number of elevated homes. Frequent flooding of communities can have a detrimental impact on population due to residents ultimately relocating instead of repeatedly bearing the direct and indirect cost of repair and temporary displacement. A1 provides flood risk reduction for the residents at most risk of bearing the effects of high frequency flooding.

#### 4.2.1.1.65.6 Alternative C – NFI Plan, Channel Improvement/Weir/Levee Plan (LPP)

Alternative C presents no direct impacts to population and housing. Positive indirect impacts would include an increase in population and housing as a result of stage reduction in the ROI for residential and commercial structures.

#### 4.2.1.1.65.7 CTO

##### 4.2.1.1.65.7.1.1 Alternative CTO without Weir (Alt E)

This alternative could have similar impacts to Alternative A1 with the possibility of increase in population and housing as a result of stage reduction in the ROI for residential and commercial structures.

##### 4.2.1.1.65.7.1.2 Alternative CTO with Weir (Alt D, Preliminary NED Plan)

This alternative could have similar impacts in the long-term compared to Alternative C if a new weir is constructed and impacts similar to Alternative A1 if a new weir is not constructed.

#### 4.2.1.1.65.8 Employment, Business, and Industrial Activity

##### 4.2.1.1.65.8.1 No Action Alternative – Future without Project Condition

The no action alternative does not present any direct or indirect impacts to employment and business activity in the ROI. There would be a continued downward trend in employment as

indicated by Moody's Analytics ECCA forecast for Hinds County and increase employment in Rankin and Madison Counties as establishments move outward from the affected area.

#### 4.2.1.1.65.8.2 Alternative A1 – USACE Developed Nonstructural Plan

Alternative A1 presents positive direct impacts on employment via opportunities created during construction of the project. Adverse indirect impacts would be experienced in the ROI as the inundation would still be present on roadways affecting sectors heavily reliant on transportation corridors.

#### 4.2.1.1.65.8.3 Alternative C – NFI Plan, Channel Improvement/Weir/Levee Plan (LPP)

Alternative C presents positive direct impacts to employment and business activity through construction investment during implementation. It would also have positive indirect impacts on employment as transportation corridors would be better accessed and allow for businesses to operate at full capacity. It could forestall the loss of some business and employment in the study area to the extent that such attrition would be due to limited accessibility from flooded roadways. Furthermore, since the creation of the lake could lead to additional opportunities for recreation, there is potential for employment to increase in the dining and entertainment sectors.

#### 4.2.1.1.65.8.4 Alternative CTO

#### 4.2.1.1.65.8.4.1 Alternative CTO without Weir (Alt E)

This alternative could have similar impacts to Alternative A1 with the possibility of indirect impacts would be experienced in the ROI as the inundation would still be present on roadways affecting sectors heavily reliant on transportation corridors.

#### 4.2.1.1.65.8.4.2 Alternative CTO with Weir (Alt D, Preliminary NED Plan)

This alternative could have similar impacts in the long-term compared to Alternative C if a new weir is constructed, but fewer positive impacts than Alternative A if a new weir is not constructed.

### 4.2.1.1.65.9 Public Facilities and Services

#### 4.2.1.1.65.9.1 No Action Alternative – Future without Project Condition

The no action alternative does not present any direct or indirect impacts to the existing public facilities and services in the ROI. These facilities would continue to have service interruptions during an inundation event and would remain in place.

#### 4.2.1.1.65.9.2 Alternative A1 – USACE Developed Nonstructural Plan

Alternative A1 does not present any direct or indirect impacts to the existing public facilities and services in the ROI as inundation on roadways would continue to inhibit the capabilities

of emergency services. These facilities would continue to have service interruptions during an inundation event and would remain in place.

#### 4.2.1.1.65.9.3 Alternative C – NFI Plan, Channel Improvement/Weir/Levee Plan (LPP)

Alternative C does not present any direct impacts on the public facilities and services in the ROI. Positive indirect impacts would be experienced as a result of decreased flooding on roadways and facilities within the ROI.

#### 4.2.1.1.65.9.4 Alternative CTO

#### 4.2.1.1.65.9.4.1 Alternative CTO without Weir (Alt E)

This alternative could have similar impacts to Alternative A1 and could have no direct or indirect impacts to the existing public facilities and services in the ROI.

#### 4.2.1.1.65.9.4.2 Alternative CTO with Weir (Alt D, Preliminary NED Plan)

This alternative could have similar impacts in the long-term compared to Alternative C if a new weir is constructed, but fewer positive impacts than Alternative C if a new weir is not constructed.

### 4.2.1.1.65.10 Tax Revenues and Property Values

#### 4.2.1.1.65.10.1 No Action Alternative – Future without Project Condition

Tax revenues and property values would possibly decrease somewhat due to projected population decreases under the future without project condition.

#### 4.2.1.1.65.10.2 Alternative A1 – USACE Developed Nonstructural Plan

Property values could increase for structures included in the nonstructural plan. The implementation of Alternative A1 could lead to a temporary increase in sales tax revenue due to workers making purchases in the study area.

#### 4.2.1.1.65.10.3 Alternative C – NFI Plan, Channel Improvement/Weir/Levee Plan (LPP)

Property values could increase for structures benefiting from the implementation of Alternative C. The implementation of Alternative C could lead to a temporary increase in sales tax revenue due to workers making purchases in the study area. Long-term increases in sales tax revenue could occur due to out-of-state visitors taking advantage of recreational opportunities created by Alternative C.

#### 4.2.1.1.65.10.4 Alternative CTO

##### 4.2.1.1.65.10.4.1 Alternative CTO without Weir (Alt E)

This alternative could have similar impacts to Alternative A1 and could lead to a temporary increase in sales tax revenue due to workers making purchases in the study area.

##### 4.2.1.1.65.10.4.2 Alternative CTO with Weir (Alt D, Preliminary NED Plan)

This alternative could have similar impacts in the long-term compared to Alternative C if a new weir is constructed, but fewer impacts than Alternative C if a new weir is not constructed.

### 4.2.1.1.65.11 Community Cohesion

#### 4.2.1.1.65.11.1 No Action Alternative – Future without Project Condition

The no action alternative does not have any direct or indirect impacts to community cohesion in the ROI. Community centers and places of worship would continue to experience inundation at the structure and on roadways in this alternative.

#### 4.2.1.1.65.11.2 Alternative A1 – USACE Developed Nonstructural Plan

Alternative A1 presents adverse direct impacts on community cohesion via the separation of neighbors during elevation of residential homes. There would also be adverse indirect impacts on community cohesion as there would be a large portion of individuals who are not mitigated for under this alternative. Additionally, community center and places of worship would still remain inaccessible during inundation events due to flooding on roadways.

#### 4.2.1.1.65.11.3 Alternative C – NFI Plan, Channel Improvement/Weir/Levee Plan (LPP)

Alternative C presents no direct impacts to community cohesion. Indirect positive impacts to community cohesion include increased accessibility on roadways, as well as a reduction in damages to structures for community facilities. In addition, community cohesion would be positively impacted as more structures in the community would be mitigated.

#### 4.2.1.1.65.11.4 Alternative CTO

##### 4.2.1.1.65.11.4.1 Alternative CTO without Weir (Alt E)

This alternative could have similar impacts to Alternative A1 and could result in direct impacts on community cohesion via the separation of neighbors during elevation of residential homes. There would also be adverse indirect impacts on community cohesion as there would be a large portion of individuals who are not mitigated for under this alternative.

#### 4.2.1.1.65.11.4.2 Alternative CTO with Weir (Alt D, Preliminary NED Plan)

This alternative could have similar impacts in the long-term compared to Alternative A1, though with a new weir those impacts may be lessened.

### 4.2.1.1.65.12 Infrastructure

#### 4.2.1.1.65.12.1 No Action Alternative – Future without Project Condition

The no action alternative would have no direct or indirect impact on the existing infrastructure. These facilities would continue to be stressed during an inundation event.

#### 4.2.1.1.65.12.2 Alternative A1 – USACE Developed Nonstructural Plan

Alternative A1 would have no direct or indirect impacts to existing infrastructure. Under this alternative, there would be continued stress on the facilities during inundation events.

#### 4.2.1.1.65.12.3 Alternative C – NFI Plan, Channel Improvement/Weir/Levee Plan (LPP)

Alternative C presents no direct impacts to infrastructure. There is a positive indirect impact to infrastructure as there would be opportunity for investment and expansion for the existing facilities.

#### 4.2.1.1.65.12.4 Alternative CTO

##### 4.2.1.1.65.12.4.1 Alternative CTO without Weir (Alt E)

This alternative could have similar impacts to Alternative A1 and could have no direct or indirect impacts to existing infrastructure. Under this alternative, there would be continued stress on the facilities during inundation events.

##### 4.2.1.1.65.12.4.2 Alternative CTO with Weir (Alt D, Preliminary NED Plan)

This alternative could have similar impacts in the long-term compared to Alternative A1, though with a new weir those impacts may be lessened.

### 4.2.1.1.65.13 Transportation

#### 4.2.1.1.65.13.1 No Action Alternative – Future without Project Condition

The no action alternative does not present any direct or indirect impacts on transportation in the ROI. Suburbanization would continue in the city of Jackson, increasing the reliance on transportation corridors.

#### 4.2.1.1.65.13.2 Alternative A1 – USACE Developed Nonstructural Plan

Alternative A1 does not present any direct or indirect impacts to the ROI in relation to transportation. These transportation corridors would continue to be inundated and cause transportation issues.

#### 4.2.1.1.65.13.3 Alternative C – NFI Plan, Channel Improvement/Weir/Levee Plan (LPP)

Alternative C presents no significant direct impacts to transportation. Positive indirect impact would result as transportation corridors would have a reduction of stages during inundation events.

#### 4.2.1.1.65.13.4 Alternative CTO

##### 4.2.1.1.65.13.4.1 Alternative CTO without Weir (Alt E)

This alternative could have similar impacts to Alternative C and could present no direct or indirect impacts to the ROI in relation to transportation.

##### 4.2.1.1.65.13.4.2 Alternative CTO with Weir (Alt D, Preliminary NED Plan)

This alternative could have similar impacts in the long-term compared to Alternative A1, though with a new weir the benefits of Alternative C might be realized.

### 4.2.1.1.65.14 Environmental Justice

An EJ assessment in Section 2.3.3 defines and identifies areas of EJ concern. The following section of the report assesses impacts to areas of EJ concern under the future without-project condition and for the action alternatives, Alternatives A1, C and CTO, and mitigation strategies that avoid, reduce, and minimize direct, indirect and cumulative impacts.

Areas of EJ concern are identified in the Existing Conditions Section 2.2, and include communities in the study area:

1) that meet CEQ CEJST criteria for disadvantaged communities or
2) are block groups that have a majority minority population, according to most recent data from the U.S. Census Bureau; or
3) that meet at least one of the 13 EPA EJSCREEN environmental justice indexes above the 80th percentile.
4) The CEJST census tracts of disadvantaged communities AND the census block groups that are majority minority AND the EJSCREEN tracts that meet the EJ index criteria comprise the areas of EJ concern which is the focus of the EJ impacts assessment.

In addition to the EJ assessment evaluating Alternative Plan flood risk management effectiveness for the areas of EJ concern in the study area, two neighborhoods in particular are identified for specific flood risk management measures because of frequent high-level flooding and include the Canton Club subdivision and the Duttoville neighborhood which is often the first area to flood. Both are considered for features that could reduce flood threat of the 100-year event and include a levee for the Canton Club area and FRM measures for the Duttoville neighborhood. Ongoing work consists of further refinement of other possible structural components (levees, gates, or other drainage control features) for certain neighborhoods impacted by early and frequent backwater flood from the Pearl River. These

neighborhoods including but not limited to the neighborhoods south of downtown, south of Highway 80/north of I-20 offramps to South State Street, and in the vicinity of Westbrook Road in Jackson. Depending upon final design, Operations and Maintenance will be implemented for each constructed feature, following the same procedures discussed above.
“

The Duttoville community is of historical local significance as a community of color extending back to the late 1800’s, according to an article published by Mississippi Folklife in their Winter issue 2019 and is just one area among many in the study area identified as an area of EJ concern. Duttoville was named for the esteemed priest, Luigi Dutto, who parceled out the land to poor immigrants in the late 1800’s.

After areas of EJ concern are identified, the second step is to identify impacts (beneficial and adverse) of the federal action, in this case, the impacts of constructing a flood risk reduction system which includes three alternatives, Alternative A1 Non Structural Plan (elevations/floodproofing or voluntary buyouts), Alternative C (a structural plan including three measures, channel improvements, new weir and bringing the water treatment plant levee up to federal standard) and Alternative CTO (NS component, channel improvements, Canton Club levee, Water Treatment Plant levee, and new weir), and CTO without new weir.

The third step is to determine if the impacts to areas of EJ concern are high, adverse disproportionate impacts. If they are, a mitigation plan is required and developed through EJ outreach and engagement with residents of Areas of EJ Concern to develop features that would avoid, minimize and reduce the impacts. Regardless, if adverse impacts are disproportionate or not, this EJ assessment provides mitigation features for the potential adverse impacts.

Finally, Justice40 project benefits accruing to disadvantaged communities, as per EO 14008, is described at the end of this EJ assessment.

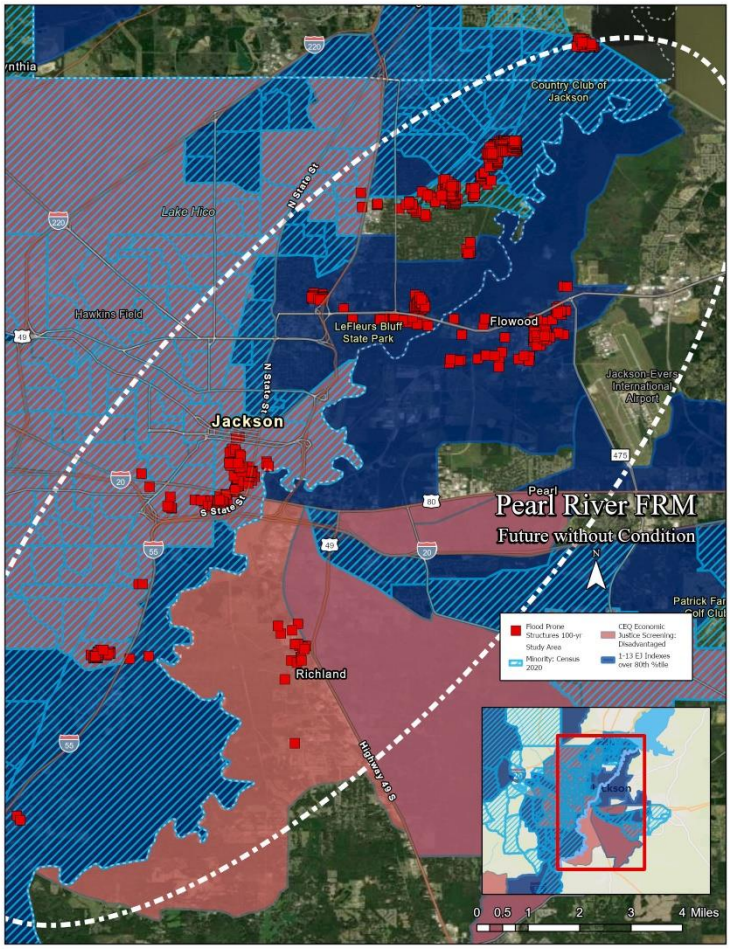
#### 4.2.1.1.65.14.1 No Action Alternative – Future without Project Condition

Under the FWOP conditions, the study area would continue to experience damages from rainfall events and housing and roads would continue to experience flooding during high water events. There would be no direct impact to areas of EJ concern under this alternative. However, because the alternative fails to provide flood risk reduction, the actual and perceived risks to residents in areas of EJ concern under this alternative would be higher than under the alternatives. Areas of EJ concern would continue to be affected by and potentially adapt to changes in environmental conditions under the No Action Alternative in the short-term. Continued risk of flooding to areas of EJ concern in the study area could result in these communities suffering economic losses, loss of agricultural lands, impacts to urban structures and property, loss of crops, or damage to property, and reduction in land values.

Indirect impacts under the No Action Alternative would include a higher potential for permanent displacement of disadvantage community and minority residents compared to the with-project alternatives, as residents relocate to areas with higher levels of flood protection.

Cumulative impacts under the No Action Alternative would include the potential for a steady decline in minority and/or low-income population groups and other groups as residents move to areas with lower flood risks as well as continued financial and emotional strain placed on these groups as they prepare for and recover from flood events.

Figure 4-8 shows the structures in the study area under the future without-project condition that flood at the first floor, for the cumulative 100-yr floodplain. Residents are impacted by the inability to travel on roadways during events and possible automobile flooding, or worse, home flooding. About 773 structures in the study area are part of the approximate 1.0 percent AEP floodplain (100-year event). All 773 structures are located in areas of EJ concern. Colored polygons represent areas of EJ Concern, either an area identified as a disadvantage community (red) or is a majority minority area (blue hashed polygons) or both (purple) or is an area meeting the EJSCREEN EJ indexes percentile criteria (dark blue area) and the red squares represent structures flooding, according to H&H and Economics modeling.



Note: Polygon minority data (blue hashed lines) are from Steven Manson, Jonathan **Schroeder, David Van Riper, Tracy Kugler, and Steven Ruggles. IPUMS National Historical Geographic Information System: Version 16.0 [dataset]. Minneapolis, MN: IPUMS. 2021.** http://doi.org/10.18128/D050.V16.0. Red and purple polygon data is from CEQ's Climate and Economic Justice Screening Tool (CEJST) and dark blue represents EJSCREEN EJ index criteria being met or exceeded

*Figure 4-8. Future Without-Project Condition, Structures in 100-year floodplain and Areas of EJ Concern*

#### 4.2.1.1.65.14.2 Alternative A1 – USACE Developed Nonstructural Plan

Potential Beneficial Direct Impacts to Areas of EJ Concern. Of the 143 structures that are part of the nonstructural plan, a vast majority (139) are in areas of EJ concern. These structures and their owners who live in areas of EJ concern, should they decide to participate in the NS plan and meet the eligibility criteria, would receive flood risk reduction benefits. For example, approximately 34 structures in the 25-year floodplain in Duttoville are potentially eligible for the NS plan and include 24 residential and 10 commercial structures. Homeowners of eligible residential properties can volunteer to have their home elevated, but also have the choice to participate in the voluntary buyout program. Owners of non-residential structures could be eligible for floodproofing of their structure.

About 143 structures (81 are residential) out of the approximately 773 structures in the cumulative 1 percent AEP floodplain are part of the NS plan and are shown on Figure 4-9. The nonstructural plan is economically justified based upon structures within the cumulative 4 percent AEP floodplain.

The nonstructural analysis was based on an inventory of residential and non-residential structures that was developed by USACE in 2023 using the National Structural Inventory version 2.0. An assessment of all structures located in the 10 percent, 4 percent, 2 percent, and 1 percent AEP floodplains were performed. Approximately 143 structures within the 20 percent to 4 percent AEP floodplain (also referred to as cumulative 4 percent AEP floodplain) are included in Alternative A1 and were identified as being economically justified. Elevation and floodproofing was used to determine the effectiveness of a nonstructural alternative. For the analysis, residential structures were to be elevated to the 1 percent AEP BFE based on year 2082 hydrology up to 13 feet above the ground and nonresidential structures to be floodproofed up to 3 feet above the ground. All nonstructural components would be on a voluntary basis by the property owner. This summary of A1 assumes a 100% participation rate, which is needed for estimating the cost of implementation. Based on other studies in the region, the actual participation rate would likely be lower. Table 3-9 displays the results of implementation over a range of potential participation rates. Voluntary buyouts, elevating or floodproofing structures offers the chance for property owners to reduce their flood risk from rainfall events. Overall, the nonstructural plan would offer the opportunity to elevate, floodproof or for voluntarily buyouts about 143 structures out of the 773 structures identified in the future without-project condition 1 percent AEP floodplain.

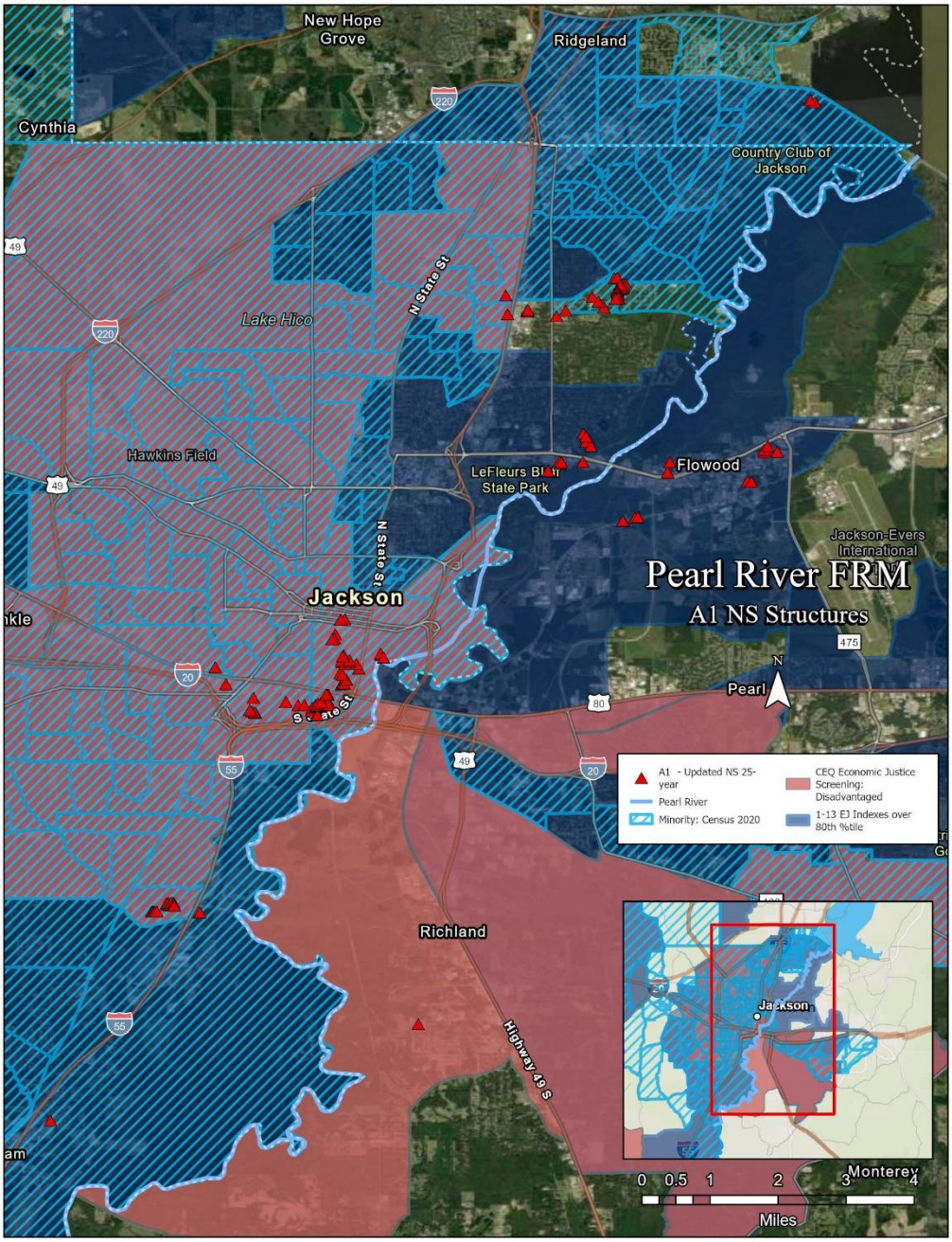



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*Figure 4-9. Non Structural*

Only residential structures in the cumulative 4 percent AEP floodplain would be eligible to be elevated. An eligible structure is, among several criteria, one that is structurally sound and capable of being elevated. Additionally, while the eligible structure is being elevated, residents of that structure are required to relocate to temporary quarters. Homeowners would be responsible for the costs to have their structure repaired so it can be elevated, and for any relocation housing costs during the elevation. If a tenant resides in the structure, financial assistance would be provided under the Uniform Relocation Act (URA) for temporary relocation during elevation.

Potential Adverse Direct Impacts to Areas of EJ Concern. Low-income homeowners may not have sufficient resources to bear these costs of participating in the home elevation program. Homeowners of residential structures that do not meet the house soundness criteria and who cannot afford the repairs or HTRW remediation costs (asbestos removal) and those who cannot afford to relocate during elevation would be unable to participate in the program. Their residences, without another option, would remain at existing grade and would be exposed to higher risk for flooding than the homeowners who participate in the program. Although homeowners would be responsible for costs associated with repairs to ensure a structurally-sound home prior to elevation and would be responsible for temporary relocation costs during elevation, all other eligible costs of elevating structures, including the cost to elevate the structure, would not be borne by any single individual or the community; rather, these costs would be part of the proposed project costs. Minority and low-income tenants living in rental properties may experience benefits if the property owner chooses to participate in the plan. Under those circumstances, renters would not be responsible for temporary relocation costs.

The implementation plan for the nonstructural alternative may cause high, adverse disproportionate impacts to low-income residents who cannot afford the costs associated with elevation. A more refined assessment to identify high, adverse disproportionate impacts would be completed during PED when housing that is not engineeringly-sound would be identified. If necessary, a mitigation plan to address high and adverse impacts would be developed through public outreach to EJ areas of concern and public meetings. A whole-of-government approach may be applied to help resolve any disproportionate impacts to EJ areas of concern identified during PED. Whole-of-Government approach involves identifying other entities (such as other local, state, and Federal governments) that may be able to provide financial assistance that bridges the financial gap of low-income owners to become eligible for structure elevation. Another option may be available which involves offering voluntary buyouts to homeowners unable to participate in the elevation program due to high financial burdens.

#### 4.2.1.1.65.14.3 Alternative C – NFI Plan, Channel Improvement/Weir/Levee Plan (LPP)

Alternative C measures include removing areas that constrict the floodplain along with deepening of the channel overbank and floodplain within the project footprint; thereby improving downstream conveyance of water through the project area and lowering the water surface elevation of the river in some places within the project area by as much as 8 feet

(2.4 m). Alternative C involves at least three major features, channel improvements, constructing a new weir in a new location and a levee upgrade around the Water Treatment Facility.

Beneficial Direct Impacts to Areas of EJ Concern

This section presents a comprehensive benefits analysis of impacts to areas of EJ concern by identifying positive (beneficial) flood risk reduction effects, including a lowering of flood stage (structures still are flooding but less) or structures that would no longer flood in the 100-year floodplain with Alternative C constructed. In areas where Alternative C would reduce the adverse impacts to EJ communities experienced under the future without-project condition - flood damages, loss of life, reduced economic activity, and potential out-migration - these positive impacts would be long term and would be likely to sustain the socioeconomic vitality of the area, positively impacting EJ communities. Positive economic dollar benefits accrue to those in areas of EJ concern. However, Alternative C was determined not to be economically justified. For more information on the economics of Alternative C, see the Economics section.

Construction of Alternative C could benefit 709 structures out of 773 that are part of the 100-year cumulative floodplain. A benefiting structure under Alternative C is one that could have a lowering of its flood stage or a structure no longer flooding at its first floor elevation Figure 4-10 shows the location of the structures that could benefit from Alternative C. A majority of structures would no longer flood (yellow squares) while about 30 percent could still see flooding in the house but less (red squares), compared to the no action condition. Approximately 207 residential structures (includes mobile homes) in areas of EJ concern could experience less flooding (due to a lower flood stage) and 486 structures in areas of EJ concern could no longer flood. Overall, about 92 percent (709 out of 773) of structures in the 100-year floodplain could see less flooding or no longer flood with Alt C constructed and a vast majority are in areas of EJ concern.

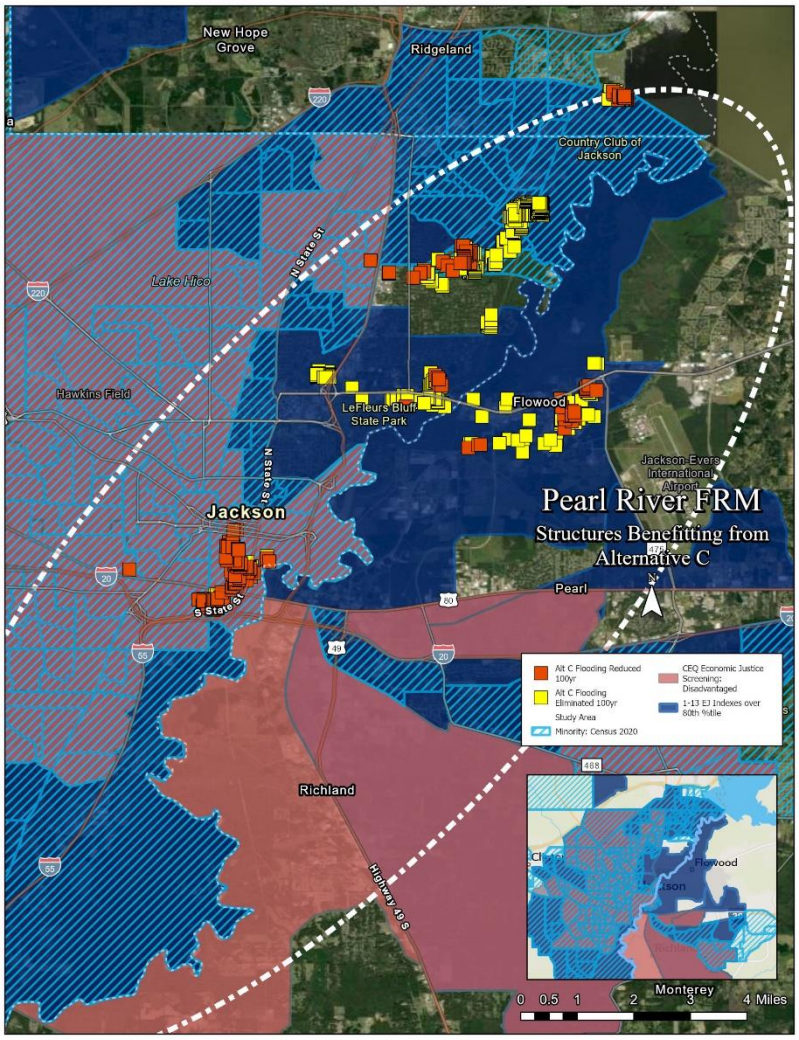


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*Figure 4-10. Structures Benefiting from Alternative C and Areas of EJ Concern*

The Duttoville community residents could also see lower flood risk compared to the no action scenario. About 47 structures in Duttoville could see a lowering of flood stage or no longer flood if Alternative C is constructed and 29 are residential.

*Savanna Street WWTP (Treatment Plant)*

As part of Alternative C, an existing non-Federal levee that protects the Savanna Street Water Treatment Plant near RM 282.would undergo maintenance and additional upgrades, so the levee meets the freeboard needed for certification for a 1 percent AEP flood event.

Benefits to the treatment facility include reduced risk of inundation of the facility and therefore the ability to remain operational during floods and provide a water source to those who rely on the Savanna Street plant for water treatment.

*Critical Public Facilities*

Critical public facilities (CPF) in the study area include nine hospitals, 19 fire stations/EMS, and 10 police stations. All of the CPF are located in areas of EJ concern except one fire station/EMS. Most of the hospitals are centered around the City of Jackson and a few in Flowood. All of the CPF would receive some level of flood reduction benefits from Alternative C, either a lowering of flood stage or no longer flooding. Further analysis of CPF and alternative flood risk reduction benefits will be provided in the final report.

#### 4.2.1.1.65.14.4 Alternative CTO

#### 4.2.1.1.65.14.4.1 Alternative CTO without Weir (Alt E)

Beneficial and Adverse Impacts to Structures: Impacts to areas of EJ concern from Alternative CTO without Weir are expected to be similar to the impacts described for Alternative CTO with Weir.

#### 4.2.1.1.65.14.4.2 Alternative CTO with Weir (Alt D, Preliminary NED Plan)

Benefits to Structures

*Canton Club Levee Benefits:*

The Canton Levee measure could benefit 165 structures, and all are residential and located immediately behind the proposed levee. Additionally, all of the 165 structures are in an area of EJ concern because the area is a majority minority neighborhood and meets the EJSCREEN EJ Index criteria. Figure 4-11 shows the location of the structures that could benefit from the CTO measures, including the Canton Club levee which are shown as pink squares in the northern part of the study area, most of which overlap each other due to the scale of the map. All of the structures in this subdivision would no longer flood from a cumulative 100-year event. If a structure is no longer flooding, then that structure would not flood inside the house. Table 4-4 provides the breakdown of Canton Club levee FRM beneficial impacts to areas of EJ concern.

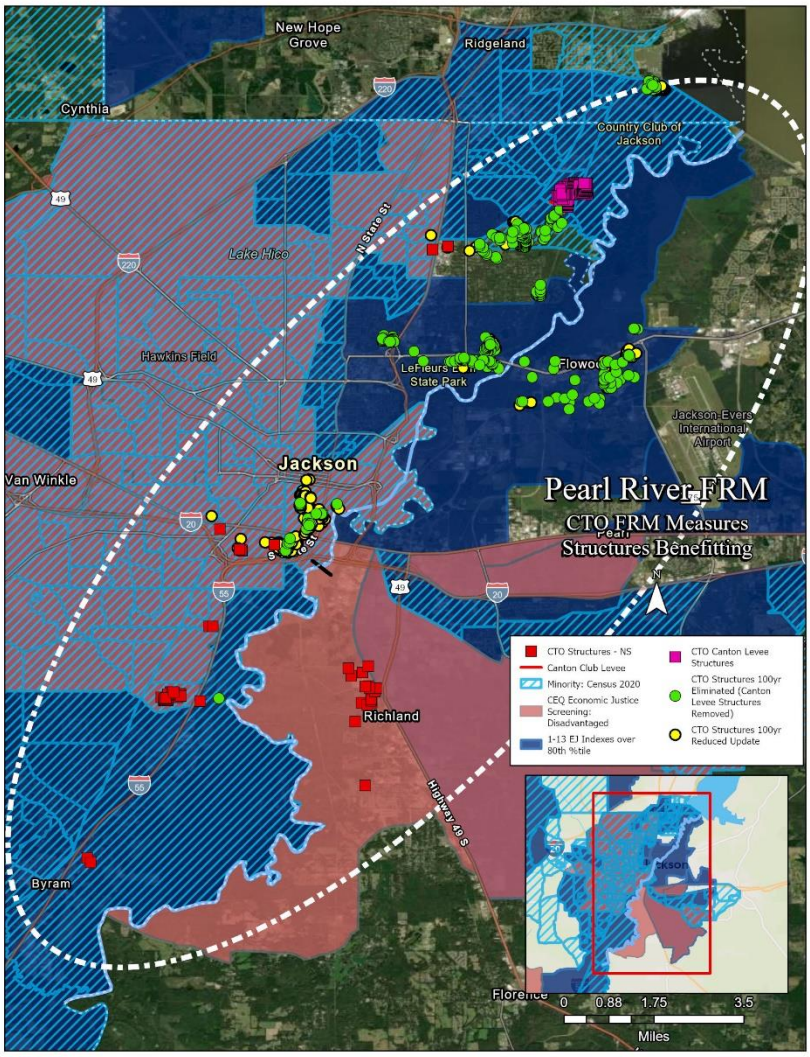


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*Figure 4-11: Structures Benefiting from Alternative CTO and Areas of EJ Concern*

*CTO Channel Improvement FRM Benefits to Areas of EJ Concern:*

Construction of channel improvements could benefit 548 structures in the 100-year floodplain. Figure 4-11 shows the location of the structures that could benefit from channel improvements, either by flooding less (yellow circles) or no longer flooding at all (green circles). Of the 548 structures benefiting from the FRM channel improvement, a majority 316 structures are no longer flooding from a 100-year event. The vast majority of these structures are residential and are located in areas of EJ concern.

Another 232 structures would benefit from a lowering of the flood stage and would continue to flood but less with the channel improvement constructed. About 229 are in areas of EJ concern and 106 are residential. Table 4-4 provides the breakdown of FRM beneficial impacts to areas of EJ concern.

Duttoville beneficial impacts to structures from the CTO channel improvement include about 43 structures (26 residential) with a reduced flood stage and four (three residential) that could be removed from the 100-year floodplain.

*CTO NS Plan*

Fifty-nine of the sixty structures that are part of the CTO NS plan are in areas of EJ concern. Forty-three structures are residential and 42 are in areas of EJ concern. The NS plan is economically justified based upon structures within the cumulative 25-year floodplain. The structures that are included in the CTO NS plan include 52 structures that are being induced (discussed below) with first floor flooding of 5" or greater. The other 8 structures in the NS plan are included because these structures are not receiving any benefit from the channel improvement FRM measures. Structures that may see a lowering of the flood stage due to the channel improvement flood risk measure are NOT included in the NS plan. Table 4-4 provides the breakdown of NS Plan beneficial impacts to areas of EJ concern while Figure 4-11 shows the location of the structures in the CTO NS plan.

The nonstructural analysis was based on an inventory of residential and non-residential structures that was developed by USACE in 2023 using the NSI version 2.0. An assessment of all structures located in the 10, 25, 50, and 100-year (10 percent, 4 percent, 2 percent, and 1 percent AEP) floodplains were performed. Approximately 60 structures within the 5- to 25-year floodplain (also referred to as cumulative 25-year floodplain) are included in the NS Plan and were identified as being economically justified. Elevation/floodproofing or voluntary buyout was used to determine the effectiveness of a nonstructural alternative. For the analysis, residential structures were to be elevated to the future 100-year stage up to 13 feet above the ground and nonresidential structures to be floodproofed up to 3 feet above the ground. All nonstructural components would be on a voluntary basis by the property owner. Elevating or floodproofing structures offers the chance for property owners to reduce their flood risk from rainfall events. The option of nonstructural property acquisition (buyout) on a voluntary basis is included in the nonstructural implementation plan.

Figure 4-11 shows the location of the 60 structures (residential and non-residential) in the study area that are included in the NS Plan and are part of the economically justified cumulative 25-year floodplain.

The implementation plan for the nonstructural alternative may cause high, adverse disproportionate impacts to low-income residents who cannot afford the costs associated with elevation. A more refined assessment to identify high, adverse disproportionate impacts would be completed during PED when housing that is not engineeringly-sound would be identified. If necessary, a mitigation plan to address high and adverse impacts would be developed through public outreach to EJ areas of concern and public meetings. A whole-of-

government approach may be applied to help resolve any disproportionate impacts to EJ areas of concern identified during PED. Whole-of-Government approach involves identifying other entities (such as other local, state, and federal governments) that may be able to provide financial assistance that bridges the financial gap of low-income owners to become eligible for structure elevation. Another option may be available which involves offering voluntary buyouts to homeowners unable to participate in the elevation program due to high financial burdens.

*CTO Water Treatment Plant At Savanna Street*

Beneficial impacts to areas of EJ concern for the CTO WWTP measure would be the same as described for the WWTP under Alternative C**.**

*Critical Public Facilities*

Beneficial impacts to CPF in areas of EJ concern for the CTO would be similar as described for the CPF under Alternative C**.**

*Table 4-4: Summary of CTO FRM Measure Benefits to Structures*

| Measure | In Study Area | Structures Benefiting in 100-yr floodplain with Lower Flood Risk* Not in EJ area/In EJ area*** | Structures Benefiting in 100-yr floodplain No longer flooding** Not in EJ area/In EJ area*** |
|---|---|---|---|
| Canton Levee | 165 | 0/0 | 0/165 |
| Channel Improvements | 548 | 3/229 | 12/304 |
| NS Plan | 60 | 0/0 | 1/59 |

* Structures having a lower flood risk are expected to continue to flood but have a lower flood stage with measure constructed.
** Structures identified as no longer flooding are part of the 100-year floodplain and are not expected to have first floor flooding.
*** EJ areas are those areas identified as either census block groups that are a majority minority or meet the EJSCREEN EJI criteria or census tracts that are disadvantaged per CEJST.

*Table 4-5: Summary of Pearl River FRM Alternative Benefits to Structures*

| **Structures Benefiting in 100-yr floodplain.** | | | |
|---|---|---|---|
| | | **Lower Flood Risk*** | **No longer flooding**** |
| **Alternative** | **In Study Area** | **Not in EJ area/In EJ area***** | **Not in EJ area/In EJ area***** |
| No Action**** | 773 | N/A | N/A |
| A1 | 143 | 0/0 | 27/116 |
| C | 709 | 4/207 | 12/486 |
| CTO | 773 | 3/229 | 13/528 |

* Structures having a lower flood risk are expected to continue to flood but have a lower flood stage with measure constructed.

** Structures identified as no longer flooding are part of the 100-year floodplain and are not expected to have first floor flooding.

*** EJ areas are those areas identified as either census block groups that are a majority minority or meet the EJSCREEN EJI criteria or census tracts that are disadvantaged per CEJST.

****All of the structures in the 100-yr floodplain are in areas of EJ concern.

## Adverse Direct Impacts of Alternatives C, CTO w/weir and without weir

Alternatives have adverse direct impacts to areas of EJ concern and those impacts relate to the project features potentially causing flooding inducements. Both Alternatives C and CTO could cause flooding inducements to residents and businesses located in communities of EJ concern.

### *Alt C: Adverse Direct Impacts (Flooding Inducements) to Areas of EJ Concern*

Direct, adverse impacts from construction of Alternative C include potential induced flooding from the 100-year storm event to approximately 83 structures in the study area. Figure 4-12 shows the location of structures that could have induced flooding from Alternative C. These structures could experience more flooding if Alternative C is constructed than they would experience if Alternative C was not constructed. Of the 83 structures that could see flood inducements, 40 could see less than one foot (green dots) while 43 structures could see one foot or more of flood inducements (pink dots) from the 100-year flood event. All of the structures, with induced flooding from Alternative C, are in areas of EJ concern. Mitigation of all flood inducements is required and includes eligibility in the NS plan.

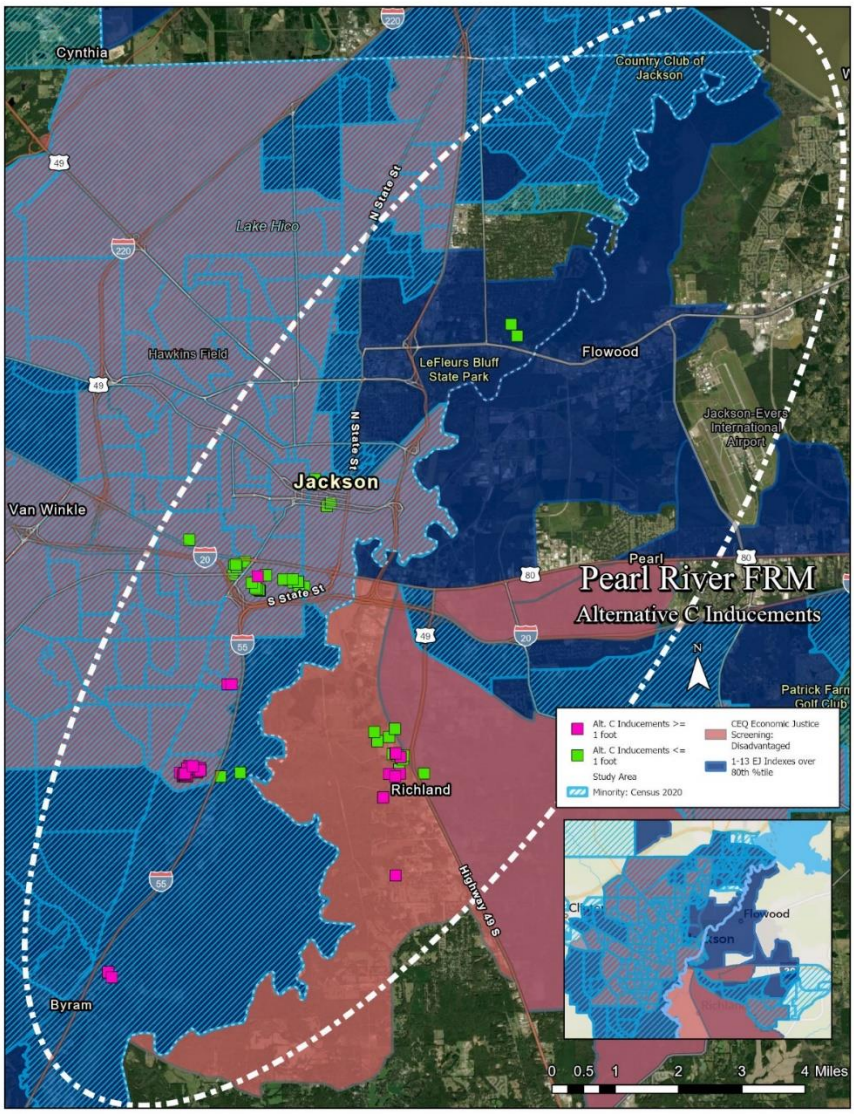


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*Figure 4-12. Alt C Potential Induced Flooding of Structures and Areas of EJ Concern*

#### 4.2.1.1.65.14.5 Alternative CTO

Adverse Direct Impacts (Flooding Inducements) to Areas of EJ Concern

Direct, adverse impacts from construction of Alternative CTO include potential induced flooding from the 100-year storm event to approximately 52 structures in the study area. Figure 4-13 shows the location of 52 structures (purple squares) that could have induced flooding from Alternative CTO. These structures could experience more flooding if

Alternative CTO is constructed than they would experience if Alternative CTO was not constructed. The structures shown as the color pink squares are those that the CTO alternative does not provide any FRM benefit (either a lowering of flood stage or no longer flooding). All of the 60 structures are in areas of EJ concern. Mitigation of the structural inducements and of the 8 structures not benefiting from the CTO plan includes elevation of the structure if residential, floodproofing if commercial and voluntary buyout.

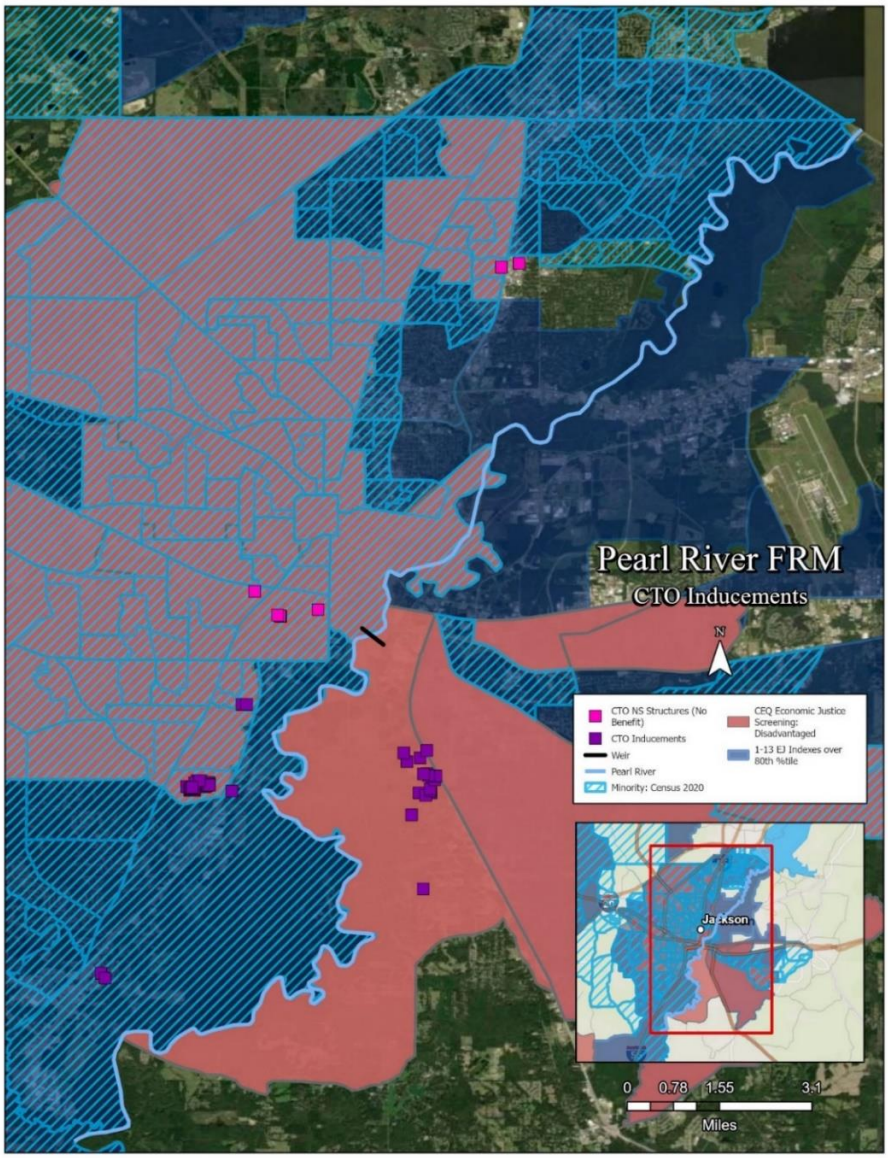


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*Figure 4-13: Structures impacted by CTO Flooding Inducements*

#### 4.2.1.1.65.14.6 Alternative A1, C and CTO:

Indirect Beneficial and Adverse Impacts to Areas of EJ Concern

The indirect beneficial impacts from all of the alternatives include socio-economic benefits which are described in Section 4.2.1.1.65.3 and include positive benefits to housing, businesses, employment opportunities and property values.

The indirect adverse impacts from the Alternative A1, Alternative C, and Alternative CTO are not expected to be high adverse impacts, would be temporary, and related to construction activities. Indirect adverse impacts due to the nonstructural plan and elevating of structures also are related to construction activities associated with the elevation of the structure. Indirect impacts are other types of impacts besides direct impacts which are described in the above sections.

Adverse, indirect impacts of construction of the structural features of all of the alternatives may include the following: transportation and traffic delays, noise, and dust and minor air quality impacts.

The Nonstructural Plan may cause temporary impacts to housing, both within EJ and non-EJ areas of concern while eligible residential structures are being elevated. How the implementation of the Nonstructural Plan might impact low-income communities is not yet known at this point in the planning process. Homeowners in low-income communities may have more of an inability to prepare their home for elevation or to afford the cost of temporary relocation during the houses elevation and may not be able to participate in the elevation plan. Further evaluation of the impact to homeowners in areas of environmental justice concern would be assessed at the time of plan implementation, during pre-construction engineering and design.

Adverse indirect impact of structure elevations may include the temporary relocation of the household members while the structure is being elevated. However, these indirect impacts would not be considered high, adverse, or disproportionate, are temporary in nature and would be felt by those in EJ and non-EJ communities.

In general, the construction, operation, and maintenance of Alternative C and CTO may cause adverse temporary impacts on the road network near the proposed upgraded Water Treatment Levee due to increased congestion, accelerated roadway wear-and-tear, and traffic delays resulting from re-routing major and local access roads. Temporary impacts on transportation due to increased congestion may occur and is dependent on road closures required to construct the levee improvement. Road closures may not occur every day, and if closures are required, they would be for the short-term. On those segments of roads where traffic is re-routed, minor to moderate delays, particularly during peak hours, may occur especially in more congested areas.

Noise near housing being elevated and along and adjacent to the levee construction would increase due to the temporary operation of equipment and vehicles used during construction. While noise impacts may cause a temporary inconvenience to residents and

facilities in the immediate area, noise levels associated with construction activities would be temporary and monitored to ensure acceptable standards are maintained. No permanent noise impacts are anticipated, and all noise emissions are expected to be short-term, lasting only as long as construction activities.

Dust and air quality impacts to EJ areas of concern are expected to be minor and short term. Refer to Air Quality Section 4.2.1.1.53 for more information on alternative impacts. Temporary increases in air pollution could occur from the use of construction equipment (combustible emissions). Combustible emission calculations were made for standard construction equipment, such as bulldozers, excavators, dredgers, pumps, front end loaders, backhoes, cranes, and dump trucks.

#### 4.2.1.1.65.14.7 Mitigation of Impacts to Areas of EJ Concern

Direct Impacts

*Uniform Relocation Act (URA) Benefits for those impacted under the Nonstructural Plan:* Allowable relocation assistance funds for displaced tenants are allocated in accordance with the Uniform Relocation Assistance (URA) and Real Property Acquisition Policies for Federal and Federally Assisted Programs of 1970, Public Law 91-646, 84 Stat. 1984 (42 U.S.C. 4601), as amended by the Surface Transportation and Uniform Relocation Assistance Act of 1987, Title IV of Public Law 100-17, 101 Stat. 246-256. Relocation assistance for tenants may include, among other things, advisory services, eligible reasonable out-of-pocket expenses incurred during temporary displacement (e.g., moving and storage of household goods required to be removed during construction, temporary quarters, meals, etc.). Landowners whose properties are voluntarily elevated would not be eligible for benefits in accordance with URA; however, tenants of these structures may be eligible for these benefits.

*Uniform Relocation Act (URA) Benefits for those impacted by Acquisition:* Homeowners who are impacted by acquisition would also qualify for URA benefits, which are described in more detail in Appendix N.

*Mitigation of Alternative C and CTO Induced Flooding and Structures not Benefiting:* Structures that could be impacted by induced flooding or those structures not receiving flood reduction benefits would be eligible for participation in the NS Plan which includes voluntary buyouts or elevation or floodproofing and would be eligible for URA benefits.

*Mitigation of Indirect Construction-Related Impacts:* Best Management Practices include several impact avoidance features which are included as integral components of the proposed action to minimize impacts to vehicular transportation. USACE contracts would designate specific routes for construction-related traffic to avoid residential areas, to the maximum extent practicable, and staging areas for construction equipment and personnel would be located away from heavily populated areas. Streets that would serve construction-related traffic would be resurfaced, if needed and as appropriate, prior to initiation of construction activities, and maintenance of those streets would be provided during the construction period. Appropriate detour signage would be placed to preserve access to local

streets during construction activities. Off-street parking would be provided for construction workers, and shuttle vans would be used to transport construction workers to the work sites, if necessary. Streets that are damaged by any and all construction activities would be repaired.

Noise along all segments of levee construction would increase due to the temporary operation of equipment and vehicles used in the construction of the Water Treatment Plant levee. Short-term noise impacts would be avoided, minimized, or mitigated by use of the following best management practices:

- The contractor, as a best management practice and as practicable, would restrict work to regular business hours (approximately 0700-1900) on weekdays to reduce potential effects from noise and increased truck traffic to the identified existing EJ community and general public**.**
- Placement of temporary noise barriers adjacent to construction activities.
- If machinery causing vibrations is used, the following noise and vibration monitoring language would be included in the contract specifications for specific work items:
- Monitoring of noise levels to verify adherence to contract specifications.
- Limit any pile driving activities associated with pile founded T-walls (used for levee construction) to daylight hours.
- Use vibration monitoring equipment that features surface velocity waves caused by equipment and monitor vibration up to a threshold value established and approved in writing by USACE. Such measurements would only be taken near residences and occupied buildings that could be adversely affected by excessive ground vibrations.
- Construction equipment noise would be minimized during construction by muffling and shielding intakes and exhaust on construction equipment (per the manufacturer's specifications), and by shrouding or shielding impact tools.

All equipment, haul trucks, and worker vehicles would be turned off when not in use for more than 30 minutes.

Equipment warm-up areas, water tanks, equipment storage areas, and staging areas would be located as far from existing residences as is feasible.

Justice40 Initiative

To assist the Administration in achieving the Justice40 Initiative goals, USACE must use investments as the metric to measure benefits, essentially providing that 40 percent of USACE investments in climate and critical clean water and waste infrastructure would benefit disadvantaged communities. USACE will strive to achieve the 40 percent goal under Justice40 Initiative. In the Interim Implementation Guidance for the Justice40 Initiative, dated 20 July, 2021; and MEMORANDUM FOR COMMANDING GENERAL, U.S. ARMY CORPS OF ENGINEERS SUBJECT: Implementation of Environmental Justice and the Justice40 Initiative (Justice40 Interim Guidance) dated 15 March 2022, the federal government established the goal that 40 percent of the overall benefits of certain Federal

investments, flow to disadvantaged communities that are marginalized, underserved, and overburdened by pollution.

The CEQ's CEJST was used to identify disadvantaged communities in the study area. Note that the CEJST disadvantaged community metric is different from the metrics used to identify areas of EJ concern, the latter also including EJSCREEN data on minority populations and communities with high environmental burdens. In the CEJST database, the CEQ identifies Census Tracts throughout the nation that meet its definition of a disadvantaged community. The purpose of the tool is to help Federal agencies identify disadvantaged communities that are marginalized, underserved, and overburdened by pollution. The current version of the CEJST provides socioeconomic, environmental, and climate information to identify and inform decisions that may affect these communities. The CEJST identifies disadvantaged communities through publicly available, nationally consistent datasets.

Based on the CEJST data for the study area, approximately 60% of the benefits of A1 would be captured in Justice 40 disadvantaged communities, while approximately 20% of the benefits of the CTO would be captured in Justice 40 disadvantaged communities.

# SECTION 5
# Mitigation Requirements

## 5.1 HABITAT MITIGATION

This section outlines the unavoidable habitat impacts and terrestrial mitigation requirements associated with the Pearl River Flood Risk Management (PR FRM) Project. A project specific mitigation plan would be developed during PED and included in a subsequent NEPA document(s). The Interagency Mitigation Team (IMT), which includes the Service, MVK, Rankin and Hinds (NFI) and MDWFP, will work closely to complete a detailed mitigation plan during PED. This mitigation plan will include all of the components set forth in applicable federal and USACE laws, guidance, policy, and regulations. These components include an inventory and categorization of ecological resources, significant net losses, mitigation planning objectives, land considerations, potential mitigation strategies, alternative mitigation plans, costs of mitigation plan increments and alternatives, incremental costs, plan selection considerations, a recommended compensatory mitigation plan, implementation risks, criteria for determining ecological success, and a monitoring and adaptive management plan. No construction activities would begin prior to completion and approval of a mitigation plan as habitat mitigation is to occur prior to or concurrent with project construction.

The IMT determined that the nonstructural plan would not incur any impacts that would require habitat mitigation.

Fish and wildlife habitat within the study area includes the Pearl River main stem and tributaries, the Ross Barnett Reservoir, a number of oxbow lakes and channel cutoffs, and several other smaller lakes or ponds. Many of the oxbow lakes and sloughs are associated with forested wetland ecosystems dominated by hardwoods interspersed with cypress-tupelo brakes. In addition, upland habitats are present on the higher elevations that contain both pine and mixed pine and hardwood timber stands. There are several areas located throughout the study area that have been converted to more early successional scrub-shrub habitat types as a result of timber harvesting activities and floodway management. This forested wetland complex, in association with the river and its other aquatic habitats, provides habitat for many fish and wildlife species, resulting in a high species diversity.

The IMT relied heavily on previous reports and documents for existing conditions and habitat resources found in the project area. Sources of habitat data include information from resource agencies, published reports, and agency records.

The Project area includes mixed forested wetlands, emergent wetlands, mixed scrub-shrub wetlands, mixed upland forests, upland scrub-shrub, grassland, evergreen forest, and riverine habitat. The interagency team determined that using the 2014 HEP analysis results (Appendix F) would be acceptable on an interim basis for identifying impacts on selected fish and wildlife habitats. Natural succession and landscape changes have occurred since the 2014 HEP analysis. Additionally, since the 2014 analysis, the Alt C footprint has been

reduced resulting in a reduction of forested uplands impacts by approximately 50 acres. Therefore, the 2014 HEP acreages aren't consistent with the existing habitat acreages. Table 3 displays a comparison of the 2014 HEP analysis habitat acres to the existing habitat acres.

*Table 5-1 Habitat Impact Changes from 2014 to Current*

| Habitat Type | Acres of Impact 2014 HEP | Description of Habitat Change | Current Acres of Impact |
|---|---|---|---|
| Emergent Wetlands | 59 | | 315 |
| Lacustrine/Open Water | 200 | | 200 |
| BLH wet | 911 | | 762 |
| Swamp | | | 150 |
| Scrub-shrub wetlands | 256 | Converted to Emergent for conveyance improvement | 147 |
| Riverine | 287 | | 287 |
| Forested Uplands | 536 | Reduction in project footprint reduced acres of impact | 696 |
| palustrine | 147 | Palustrine acres re-categorized to scrub shrub wetlands | 0 |
| upland evergreen | 14 | | 14 |
| upland grassland | 152 | | 152 |
| upland pasture | 54 | | 54 |
| upland shrub | 209 | Natural succession to forested uplands | 0 |

Numbers are approximated and have been rounded for simplicity.

The IMT met on several occasions to discuss habitat impacts and assumptions to apply to mitigation. The following assumptions were agreed upon by the IMT.

- Upland grassland and pasture would not be mitigated.
- Lacustrine habitat would be self-mitigating by both Alt C and Alt CTO with a weir.
- Scrub-Shrub wetlands would be mitigated with BLH.
- Upland evergreen would be mitigated with forested uplands.

- Emergent wetlands are not a habitat that naturally exists in this area. The emergent wetlands that currently exist are due to maintenance activities (such as mowing and herbicide treatment) within the area. Therefore, emergent wetland impacts would be mitigated with BLH.
- Acres of impact due to CTO would be determined by overlaying the CTO footprint, which falls within the Alt C footprint except for the Canton Club levee, with the habitat map and adding the 13 acres of BLH impacts due to the Canton Club levee.
- AAHUs of impact due to CTO would be calculated by applying the percent acres decrease from Alt C to CTO to the AAHUs of Alt C (see Table 4)
- Riverine impacts would be displayed as acres until PED when appropriate obligate riverine species would be used to determine units of impact.
- It is assumed that any recreational features implemented by the NFI would fall within the already impacted footprint (i.e., fill areas) and would not impact any of the mitigation features required for threatened and endangered species under the Endangered Species Act.

Table 5-2 shows the impacts to be mitigated per habitat type based on the IMT assumptions. It should be noted that the AAHUs of riverine impacts have not been adequately determined at this time and are therefore displayed in acres impacted. During PED, HEP models would be conducted using appropriate obligate riverine species to determine the habitat units of riverine habitat impacted and required for mitigation.

*Table 5-2 Impacts to be Mitigated Based on IMT Assumptions*

| Habitat | Alt C Acres of Impact | CTO Acres of Impact | % decrease | Alt C AAHUs | CTO AAHUs |
|---|---|---|---|---|---|
| Lacustrine/Open Water | 200 | 81 | 60% | 1,232 | 497 |
| BLH wet | 1,224 | 689 | 44% | 3,011 | 1,695 |
| Swamp | 150 | 55 | 63% | 368 | 135 |
| Forested Uplands | 710 | 223 | 69% | 2,733 | 859 |
| Riverine* | 287 | 232 | | TBD | TBD |

*Riverine impacts are not finalized at this time as the number of AAHUs impacted has not been adequately quantified.

If the CTO without a weir were to be implemented, the riverine impacts of approximately 232 acres would no longer be incurred and so riverine mitigation would not be necessary. The terrestrial impacts would still be realized and so BLH, swamp, and forested uplands mitigation would still be required. Additionally, approximately 497 AAHUs of lacustrine habitat would require mitigation as there would be no weir to create a lake and therefore would not be self-mitigating.

The number of AAHUs impacted per habitat type is equivalent to the number of AAHUs required for mitigation. The acres, however, are not a one-to-one equivalency and are based on the habitat quality of the mitigation site and the mitigation strategy to be implemented. The NFI has identified lands that could be used to satisfy all, or a portion of, the terrestrial mitigation needs. These lands are within the PR basin and are available for acquisition. The IMT continues to assess the lands identified to determine what mitigation strategies could be implemented and how much of the mitigation need would be satisfied. The IMT has identified some preliminary mitigation strategies that could be considered and assessed during PED and mitigation plan development. See Appendix F for further details. The mitigation strategies and locations of riverine mitigation have not yet been identified. During PED, modeling would be conducted using appropriate obligate riverine species to determine units of riverine impact and mitigation planning would identify mitigation strategies and locations.

A detailed mitigation plan would be developed during PED and in subsequent supplemental NEPA document(s), The goal of this mitigation plan would be to fully compensate, in kind, for the unavoidable impacts to significant fish and wildlife habitat resources that would occur due to implementation of the pearl river flood risk management project.

# SECTION 6
# Implementation of Alternatives

Section 3104 of WRDA 2007 authorizes a flood damage reduction project at a total cost of $205,800,000 based on 2007 dollars. The flood damage reduction project will be determined by the ASA-CW decision on which alternative to implement. Recalculated for fiscal year (FY) 2023 using the Civil Works Construction Cost Index System (CWCCIS), which includes in its factors FY2022 inflation, the total authorized project cost is $367.5M. The USACE Section 902 Cost Limit recalculated for FY 2023 as the maximum cost is $408,687,000.

## 6.1 ALTERNATIVE A1: NONSTRUCTURAL

The Implementation plan for the Nonstructural plan A1 is located in Appendix N for reference. Based on current cost estimates, Alternative A1 could be implemented in its entirety and would require minimal additional analysis during the PED phase.

## 6.2 ALTERNATIVE C: CHANNEL IMPROVEMENT/WEIR/ LEVEE PLAN PROJECT

Preliminary analysis of Alternative C identifies downstream impacts requiring analysis prior to implementation. Alternative C implementation costs exceed the authorized costs, as well as funds allocated under the Bipartisan Infrastructure Law. As a result, additional authorization and appropriations are required for full implementation. However, separable elements of the Alternative C that can be executed within existing authorization can still be considered.

## 6.3 ALTERNATIVE CTO

Implementation of a combination of the flood risk reduction features presented for consideration for the CTO alternative may be implemented under Section 3104, subject to the maximum project cost limit imposed by Section 902 of WRDA 1986, as amended. To implement multiple flood risk management features and a more comprehensive solution, additional authority is required either an increase in the total authorized project cost under Section 3104 or a programmatic authority to implement flood risk management features in the Pearl River Basin similar to CAP Section 205 projects. Additional analysis and design, feasibility level decision documents, and supplemental NEPA documentation would be required during the PED phase if such solutions are recommended.

## 6.4 ADDITIONAL AUTHORITIES OR BY OTHER ENTITIES

Public testimony and comment from across the Pearl River watershed and within the study area reveal a multitude of concerns that may be addressed through other authorities or by other entities. No one authority can solve all the problems immediately; therefore, a systematic approach involving multiple projects from several different programs and under several different authorities would be required to effectively deal with the array of issues in the watershed.

The Pearl River Valley Water Supply District could consider operational changes at the Ross Barnett Reservoir and revising the Ross Barnett Water Control Manual to formalize continued flood reduction capacity though future informed operations.

EPA could use existing authorities to provide water supply in addition to local water infrastructure improvements currently being implemented in the City of Jackson under the USEPA authorities and the USACE Environmental Infrastructure Program (Section 219) project. Furthermore, the City of Jackson Water/Sewer Utilities Division could make local water infrastructure improvements.

A NFI could excavate the channel for recreational and economic development.

Since the Pearl River is not an authorized federal project, the states of Louisiana and Mississippi should consider entering into a water control agreement that sets conveyance requirements through the lower Pearl River. The agreement may set flowrate requirements at specific river miles during specified times of the year. Additional instrumentation may be required at specified river miles and with funding and authorization, USACE can support acquisition, installation, and continuous monitoring. A comprehensive watershed study of the Pearl River is necessary to fully understand the basin's hydrology, hydrodynamics, and ecosystem. The scope of the study should be from the headwaters to the terminus at the Gulf of Mexico. A watershed study would inform disposition of legacy federal infrastructure, opportunities for sustaining and managing flowrates through the basin, and enhancement of habitat for the basin's wildlife, flora and fauna. Authorization via a Water Resources Development Act would be required. Since the Pearl River is not an authorized federal project, the states of Louisiana and Mississippi should consider entering into a water control agreement that sets conveyance requirements through the lower Pearl River, should further structures that alter flow rates within the lower Pearl River basin be proposed and constructed. The agreement may set flowrate requirements at specific river miles during specified times of the year. Additional instrumentation may be required at specified river miles and with funding and authorization, USACE can support acquisition, installation, and continuous monitoring.

## 6.5 DOWNSTREAM IMPACTS

Alternative A1 Nonstructural Plan would not change the hydrology; therefore, no downstream impacts would occur.

Alternative C: channel improvement/weir/levee plan would have downstream impacts based on USACE assessments which are described in general below and in further detail in the H&H Appendix E of this report.

### 6.5.1 Flow and Stage Downstream with Alternative C and CTO

The assessment was completed for Alternative C for the 20% AEP and 1% AEP frequencies, to represent a relatively frequent event as well as a more extreme scenario. There were flow and stage inducements identified for both frequency events (Table 6-1). The inducements due to the 20 percent AEP event appear to resolve just prior to the Copiah

Creek confluence, approximately 32 miles downstream of the project. Alternative CTO had similar but slightly reduced impacts.

*Table 6-1. Impacted Areas from Project Area to Confluence with Copiah Creek*

| Total Acres Included by Increment of Inducement (Feet) – to Confluence with Copiah Creek | 1 % AEP- Acres | 20% AEP Acres |
|---|---|---|
| 0 - 0.25 Feet | Up to 16,200 | Up to 33,200 |
| 0.25 - 0.5 Feet | 38,800 | 2,330 |

Table 6-1 above show estimated acres impacted due to construction of Alternative C or CTO for both the 5- and 100-year events. These were classified as either expected inducements or unlikely inducements. Modeled areas with an additional 0.25 feet or more of inundation are considered to be a measurable inducement. (Approximately 38,800 acres at the 100-year Frequency, and 2,330 acres at the 5-year frequency) Impacted areas in the 0.25 feet or less range are considered not likely to have any measurable negative impacts. These areas, however, will require further modeling in PED to confirm this initial assessment.

Additional assessment of the changes to downstream boundary was conducted for the 1% AEP event in which impacts extending to the Mississippi Gulf Coast could not be ruled out until final feature design. Further analysis would be needed to validate the total impacts, However, major impacts to the downstream watershed beyond the RM 200 (approximately 5 miles north of Monticello, MS) are highly unlikely.

#### 6.5.1.1 Sediment Analysis and Management Downstream with Alternative C and CTO

Potential direct impacts to water supply and flood conveyance due to the deterioration of water quality or quantity from the existence of the proposed weir that could impact sediment load within the newly formed reservoir due to reduced velocities and entrainment potential. A sedimentation study would be necessary to assess the viability of project features. The impacts to water quality and conveyance to the proposed project are inconclusive due to the lack of data, and modeling efforts within the project area. No sediment samples have been provided or analyzed from the Ross Barnett Reservoir or downstream project area either on the main Pearl River channel or tributaries for use in this study.

To determine if impacts are acceptable, additional analysis is needed. Verification would be needed to demonstrate that adding a large weir would not induce sediment loads to alter the incoming chemistry in such a way to induce failure at the existing J.H. Fewell Plant or any other proposed structure along the newly ponded area. Determination of Sediment Oxygen Demand (SOD) for Pearl River sediments that would lie under Preferred Project Lake. Impoundment would increase the depth over the sediments potentially decreasing DO in water column immediately adjacent to sediments. Deeper waters when combined with SOD could possibly result in bottom water hypoxia and anoxia.

Verification also would be needed to verify that sedimentation passed from the Ross Barnett Reservoir within a proposed ponded feature would not impact storage or conveyance of flood waters. Assessment of the tributaries for sediment load as well as the requirement of Hard Points in tributary channels to prevent incision and additional sediment into newly constructed lake would be needed.

#### 6.5.1.2 Water Quality Downstream with Alternative C and CTO

The NFI provided two distinct modeling studies, which used available data to evaluate water quality impacts the of construction of a new lake (Alternative C) on the Pearl River below Ross Barnett Reservoir. USACE reviewed the NFI's work and recommendations for any future efforts. Modeled impacts predicted were of short duration and limited reach. A major premise of the efforts is that the waters filling the new lake are essentially those of Ross Barnett, so no significant water quality issues are expected. The studies concluded that below the proposed lake, water quality impacts in the Pearl River due to any flow alterations are muted and not substantial.

A key aspect of these studies is that the waters of the proposed lake are essentially those released from Ross Barnett and that they receive no loadings while in the proposed lake which may degrade water quality conditions. The study concluded that the three existing point sources that contribute to the project area are either not significant enough or don't directly contribute to the proposed lake waterbody, so as to not degrade the new lake water quality. However, the impact of stormwater loads upon the receiving waters of the proposed lake is poorly understood and characterized. Compounding this issue are the condition of the Jackson sewer system and the reported number of overflows and leaks. A common assumption is that sanitary sewer leaks potentially reach receiving waters via the stormwater drainage system. The degree to which the watershed of the proposed lake is susceptible to receiving sanitary sewage overflows via the stormwater collection system and ongoing and future efforts to address these issues is unknown at this time.

### 6.5.2 Life Safety Analyses- Dam and Levee for Alternative C and CTO

**Life Safety – Dam Breach C and CTO**

Four pool loadings were modeled with a breach / non-breach pair using the loading and parameters listed below. A proxy ½ PMF (2022) provided by the Ross Barnett Reservoir Staff was routed downstream to mimic a design storm that would be calculated at the proposed dam location. Note that this analysis was only completed for the Alternative C geometry due to the time constraints associated with the addition of Alternative CTO modeling. It is reasonable to assumed that the Alternative CTO has less impact due to a breach of a structure, given the smaller dam size, and smaller impounded water volume. It is probable but not proven that the Alternative CTO proposed weir may be considered a low hazard dam.

*Table 6-2. Hydraulic Loadings for Breach Testing (Alternative C)*

| Pool Loading (ft) | Flow Ratio | Breach Bottom Elevation (ft) | Breach Width (ft) | Breach Formation Time (hr) |
|---|---|---|---|---|
| 260.1 (approximate top of dam) | 0.01% AEP x 0.15 | 248 | 1900 | 0.1 |
| 260.3 | 0.01% AEP x 0.2 | 248 | 1900 | 0.1 |
| 260.8 | 0.01% AEP x 0.3 | 248 | 1900 | 0.1 |
| 275.2 | ½ PMF* | 248 | 1900 | 0.1 |

The breach at a pool of 260.1ft showed additional flooding focused within the downstream area. The identified structures appear to be hunting cabins or temporary raised structures. The breach at a pool of 260.8ft (0.01% AEP x 0.3) showed a minimal incremental difference in the breach and non-breach pair. No structures are impacted by the 260.8 ft breach scenario. The breach at 275.2 ft (1/2 PMF) showed no incremental difference in the breach and non-breach pair.

**Weir Design Requirement Estimation – Alternative C and CTO**

Four breach scenarios were completed with the Alternative C model, to confirm dam safety hazard classification. Per FEMA's dam safety report 333, there are three hazard classifications as shown below in Figure 6-1, ranging from high to low. Per USACE guidelines 1110-8-2(FR) there are 4 classifications (Table 6-3), 1-4. Given that the proposed weir retains a large volume of water, a high hazard dam would automatically be a standard 1, a significant hazard dam would be either a Standard 1 or 3 depending on amount of property impacts, and low hazard dam would be a standard 2.

| Hazard Potential Classification | Loss of Human Life | Economic, Environmental, Lifeline Losses |
|---|---|---|
| Low | None expected | Low and generally limited to owner |
| Significant | None expected | Yes |
| High | Probable. One or more expected | Yes (but not necessary for this classification) |

*Figure 5-1. Hazard Potential Classifications*

*Table 6-3. USACE Design Standards for Dams*

| Standard | Description | Inflow Design Flood |
|---|---|---|
| 1 | Risk to life and property | Probable Maximum Flood (PMF) |
| 2 | Run of river projects (e.g., Navigation) | Standard Project Flood (SPF) |

| | | |
|---|---|---|
| 3 | Negligible incremental impacts due to failure | Base Safety Condition ***<br>(Minimum ½ PMF) |
| 4 | Small dams | 1% Annual Exceedance |

Two structures that are not listed within the study structure inventory were incrementally damaged by this event for Alternative CTO. Therefore, there would be no life loss associated with these structures. They appear to be tractor sheds or deer camps that would not be significantly impacted by the additional water when shallow, and at higher flow/elevation breaches, there are no structures that are incrementally damaged. Therefore, for current study purposes the proposed weir for Alternative C will be considered to a significant hazard, standard 3 dam, which requires a ½ PMF design storm.

It is reasonable to assumed that the Alternative CTO has less impact due to a breach of a structure, given the smaller dam size, and smaller impounded water volume. It is probable but not proven that the Alternative CTO proposed weir may be considered a low hazard dam. A more formal legal review of terms and damages incurred will be needed to confirm this determination and for any other alternative including a dam moved forward to further study.

**Breaching Analysis of Existing Analysis for Alternative C and CTO**

No formal breaching analysis occurred after a review of elevation profiles along the river and existing leveed areas. As the flows increase in the river, risk would be attributed to a riverine flow regime, rather than a ponded body of water. The images below (6-2) show elevations ranges within the existing levees and demonstrate that there would be very little structure impact and reasonably no life loss if a structure were to breach due to the low flow ponded surface. (above which risk is not attributed to the weir, but instead to a riverine flooding aspect.)

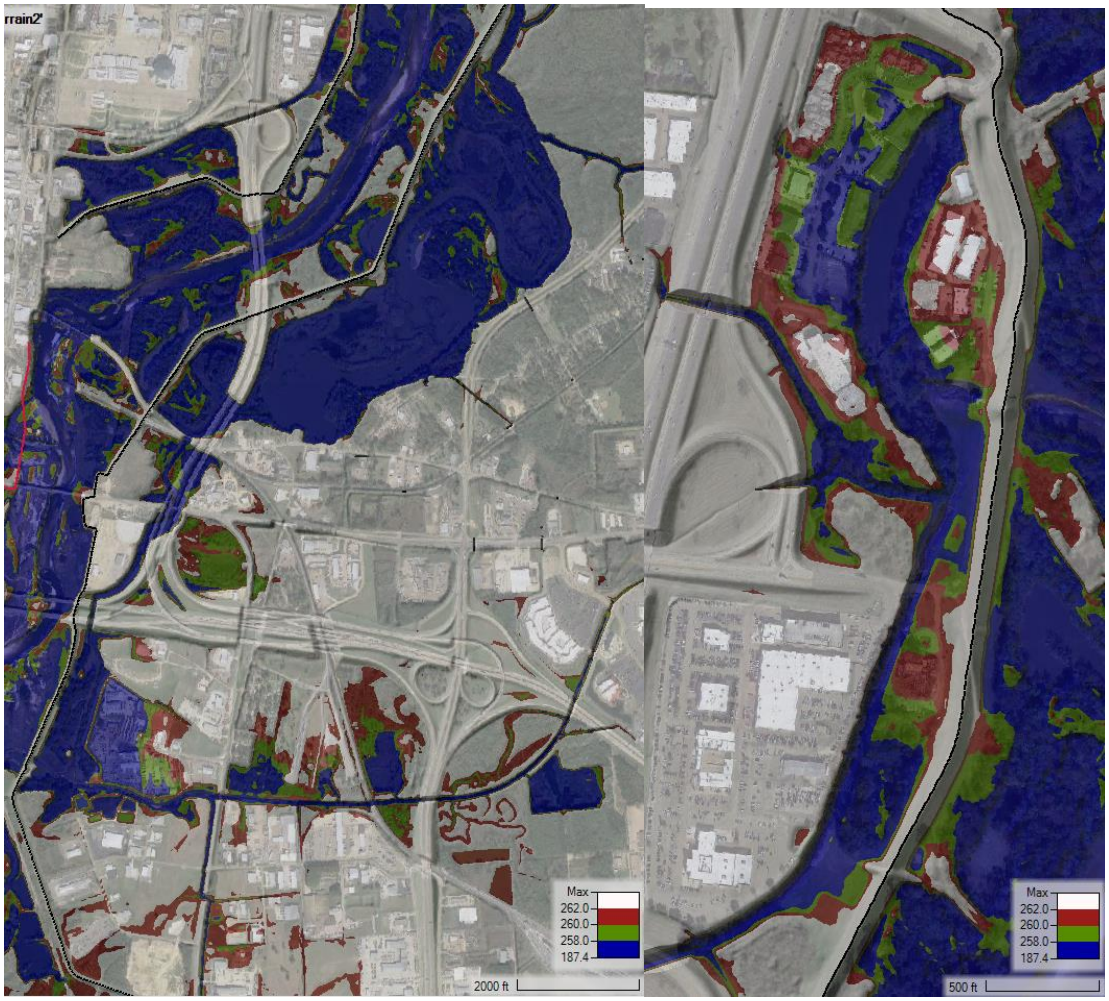


*Figure 5-2. Terrain Mapping at Existing USACE Levees – Jackson East (Left) and Jackson Fairgrounds (Right)*

**Levee Safety Risk Analysis- Pearl River Project Alternative C and CTO**

As part of the USACE review of the current study report, a qualitative evaluation of the potential life safety impacts only considering available information is included. This evaluation focusses on the Alt C plan(s) in terms of levee risk.

Please note that the Alternative CTO plan is not included in this assessment, and further investigation will need to be completed after final selection of CTO features. Alternative CTO with Weir can be assumed to have the same order of magnitude life safety concerns as Alternative C (ranging from same results to less risk to life loss). Alternative CTO without the weir will have less impacts from a Life Safety perspective.

There are three existing levee systems that are impacted as part of the Alt C plans that are shown in the National Levee Database (NLD).

1. Jackson Fairgrounds MS (NLD System # 5905000002)
2. East Jackson MS (NLD System # 5905000015)
3. Jackson-East Jackson Flood Control Project (NLD System # 1405000124)

USACE has completed screening level risk assessments for the Jackson Fairgrounds MS and East Jackson MS levee systems evaluating the life safety risks associated with the existing levees. USACE developed the risk screenings using available data in the NLD, the data included in the feasibility report, screening level risk assessments of the existing Jackson Fairground MS and East Jackson MS levee systems completed by USACE, and evaluation of this data. Additionally, the uncertainties and impacts of each of these alternatives are included, along with recommendations to reduce these data gaps and comply with USACE policy as the project advances to PED.

**Jackson Fairgrounds MS (NLD System # 5905000002)**

#### 6.5.2.1.1 Alternative C – Overtopping Risks:

The currently proposed Alt C being evaluated by USACE does not include any alignment or height changes to the existing Jackson Fairgrounds Levee. The proposed plan would decrease the overtopping risk to the system by reducing the frequency of overtopping. The new, less frequent, overtopping frequency of the system cannot be accurately determined based on information included in the current study. This overtopping frequency and location would need to be calculated in PED phases.

#### 6.5.2.1.2 Alternative C – Prior to Overtopping Risks – Jackson Fairgrounds MS Levee System:

The proposed Alt C plan would reduce the frequency of loading on the levee which does reduce the probability of high loading levels that could trigger a failure of the levee due to seepage. Adjacent to the Jackson Fairgrounds MS levee system, the Alt C plan includes placement of fill areas on the riverside of the levee. The Alt C plan includes construction of a minimum 40-ft wide maintenance berm on the riverside of the levee where there is a permanent pool. The riverside fill and maintenance berm will not have a negative impact on the seepage performance of the existing levee system and may reduce the risk of the levee from a seepage failure.

The channel excavations within the Pearl River floodway provide the economic and life safety benefits for this project by reducing the frequency of loading on the existing levee system. A potential negative impact of the channel excavations is their proximity to the existing levee system. Excavations within the channel have the potential to remove riverside

fine-grained blanket soils and create an effective seepage entry point closer to the levee. These excavations have the potential to increase the probability of initiation and progression of a seepage failure mode that can lead to breach. The Alt C plan does include the construction of a 40-ft wide maintenance berm on the riverside of the levee where there is a permanent pool. It is expected that the final design will be optimized during PED to widen the berm towards the riverside to eliminate the negative impacts of the channel excavation impacting the performance.

One area on the levee system where permanent pool may be against the levee and where the minimum 40-ft wide maintenance berm cannot be constructed is at an existing pump station. At this location the presence of the permanent pool may require cutoff walls and/or relief wells. If required, these mitigation measures would reduce the probability of failure of the existing levee system to a tolerable level compared with the overall levee overtopping risks.

**East Jackson MS (NLD System # 5905000015)**

**6.5.2.1.3 Alternative C – Overtopping Risks:**

The currently proposed Alt C being evaluated by USACE does not include any alignment or height changes to the existing East Jackson Levee. The proposed plan would *decrease the overtopping risk for a majority* of the system by reducing the frequency of overtopping. However, inducements below the CN railroad raise the overtopping frequency by up to 0.4 feet for the 1% ACE. The new overtopping frequency of the system cannot be accurately determined based on information included in the current feasibility study. It is also unknown whether the proposed alternative will change the overtopping location on the levee system. This overtopping frequency and location would need to be calculated in PED phases.

**Alternative C – Prior to Overtopping Risks – East Jackson MS Levee System:**
The proposed Alt C plan would reduce the frequency of loading on the levee which does *reduce* the probability of high loading levels that could trigger a failure of the levee due to seepage. Adjacent to the East Jackson MS levee system, the Alt C plan includes the construction of spoil disposal areas on the landside of the levee. These soil disposal areas will effectively function as “seepage berms” in the areas where they are constructed. Thus, the probability of breach due to seepage at a given flood stage will likely *decrease* in areas where spoil disposal is placed on the landside of the levee. This decrease would only occur in areas where the “seepage berms” are placed as part of spoil disposal. The feasibility study does not identify whether the proposed locations of the spoil piles are in the most critical seepage areas. Therefore, the overall probability of a seepage failure of the levee system during a given flood stage may not decrease but would not increase due to of the placement of spoil piles.

The channel excavations within the Pearl River floodway provide the economic and life safety benefits for this project by reducing the frequency of loading on the existing levee system upstream of the CN railroad Bridge. The channel excavations within the Pearl River floodway induce flooding and increase the frequency of loading on the existing levee system

downstream of the CN railroad Bridge. Another potential negative impact of the channel excavations is their proximity to the existing levee system. Excavations within the channel have the potential to remove riverside fine-grained blanket soils and create an effective seepage entry point closer to the levee. These excavations have the potential to increase the probability of initiation and progression of a seepage failure mode that can lead to breach. The Alt C plan does include the construction of a 40-ft wide maintenance berm on the riverside of the levee where there is a permanent pool. It is expected that the final design will be optimized during PED to widen the berm towards the riverside to eliminate the potential negative impacts of the channel excavation negatively impacting the performance of the existing levee system.

One area on the East Jackson levee system where the minimum 40-ft wide maintenance berm cannot be constructed and where permanent pool may be against the levee is at an existing pump station and major sump area. The existing levee south of the pump station may also be subject to a permanent pool, but the most critical location will be near the pump station. The presence of the permanent pool will likely require additional seepage control measures such as cutoff walls and/or relief wells. Although unlikely, there is the potential that isolated areas along the existing levee may require seepage mitigation south of the pump station, but that is unknown at this time and would need to be evaluated during PED. If required, these mitigation measures would reduce the probability of failure of the existing levee system to a tolerable level compared with the overall levee overtopping risks.

**Jackson-East Jackson Flood Control Project (NLD System # 1405000124)**

The NLD has limited information regarding this levee system. The Jackson-East Jackson Flood Control Project is a non-Federal levee system. The condition of the levee is unknown by USACE, and a risk assessment has not been completed for this levee. The levee is approximately 2.69 miles long and provides flood risk reduction to the wastewater treatment facility for the city of Jackson, MS. The levee system is believed to have not overtopped or breached during past flood events, in part due to flood fighting. Anecdotally, there may be potential seepage concerns for the existing levee. Upgrades to the existing levee will likely be required to bring the existing levee up to USACE standards. The extent of these potential upgrades is unknown but could be extensive. The improved upstream flow capacity for the Alt C plan will increase the probability of loading and overtopping on this system, which will necessitate a raise of the levee. The amount of the raise is unknown.

**Frequency of Overtopping for Alternative C and CTO**

A formal re-analysis of specific overtopping frequency by plan was paused for the purposes of this study. The HEC-RAS modeling shows that the Jackson East, Jackson Fairgrounds, Pearson, the local levee behind Jackson East, and the Savanna Street WWTP Levees protect to the 100-year level of protection for Existing Conditions. The Brashear's Creek Levee does not protect to the 100-year level of protection.

Jackson East will have flood elevations both raised and lowered along the levee profile. The Jackson Fairground and Pearson Levees will not have flood elevations raised along the

levee profile. However, constant loading along the Jackson East and Jackson Fairground will be raised significantly. The Savanna Street WWTP levee will require a levee raise that has not yet been designed to combat inducements for Alternative C. The Local levee behind the Jackson East Levee may have impacts, depending on the final design of Alternative C. The impact to the local levee will be father defined and mitigated to Alternative C in a PED Phase, as needed. The overtopping frequency and location would need to be calculated in PED phases as well.

## 6.6 INCOMPLETE OR UNAVAILABLE INFORMATION

### 6.6.1 Mitigation Plan:

(a) It is unknown what activities were considered during project planning to avoid, minimize, rectify, or reduce habitat impacts from Alternative C.
(b) The Rankin Hinds District generated a habitat mitigation plan with costs that are significantly lower than USACE costs. The Rankin Hinds District habitat mitigation plan included acquisition costs and many costs for threatened and endangered species avoidance and minimization measures (which don't necessarily apply to habitat mitigation). The habitat mitigation costs do not include all aspects of mitigation construction such as site preparation, seedings, planting, monitoring, and maintenance.
(c) The Rankin Hinds District's habitat mitigation plan was not formulated consistent with USACE policies which seeks to replace habitat value and function through a calculation of Average Annual Habitat Units (AAHU). The Rankin Hinds District mitigation plan does not calculate AAHUs by habitat type produced at the mitigation site(s) and therefore it is difficult, if not impossible, to determine if sufficient mitigation is being met. The Rankin Hinds District habitat mitigation plan is being further assessed for consideration as a habitat mitigation alternative.
(d) At this time, USACE has calculated mitigation requirements only. The AAHUs of impacts used to generate mitigation requirements came from the Rankin Hinds District's 2014 HEP analysis. USACE used assumptions from recent USACE mitigation projects to determine acres required (based on those AAHUs). Potential mitigation lands have been identified by the NFI and the IMT is is running preliminary HEP analysis to determine acres needed at each site. Preliminary costs were developed using recent USACE projects and approved mitigation banks with available credits within the Pearl River basin. USACE costs include site prep, seedlings, planting, monitoring, maintenance, and acquisition. These costs will need to be revisited once mitigation strategies and acres needed are calculated at each site. A project specific mitigation plan will be formulated consistent with USACE policies and developed during PED at which time actual mitigation costs will also be developed.
(e) At this time, riverine impacts have not been sufficiently calculated. The acres of impact are known, but the functional loss is unknown. During PED, appropriate obligate riverine species will be used to run HEP models that will determine how many AAHUs would be impacted if a weir were constructed.

### 6.6.2 Environmental Factors

**a)** In accordance with the January 9, 2023, CEQ guidance for Greenhouse Gas (GHG), both direct and indirect evaluations of GHG and the reduction features would be evaluated of the proposed project once when additional information is gathered. A GHG evaluation will be conducted prior to the release of the final EIS.

b) An environmental evaluation for HTRW was conducted by the NFI September 2014 and updated by the NFI in August 2021 of the project area. A technical memorandum was conducted by the NFI in December 2023 of the project area. Though the evaluation discovered contamination at two locations, additional sampling and reconnaissance is needed to truly determine the level of HTRW within the study area and the RECs identified. Once HTRW evaluation is finalized, appropriate remedial actions will be selected.

c) Within the Gallatin Street Landfill, it was noted within the NFI's Appendix L that there was limited sampling of the surface water to truly detect if the landfill is leaching or not. Per the contractor, the sampling was insufficient to truly determine whether leachate was released to the Pearl River.

d) Within the LeFleur's Landing Site, it was noted within the NFI's appendix L that there is an uncertainty if a constructed cap or liner system is currently present within the landfill.

e) Additional sampling is needed to determine the level of contamination within the study area and the RECs identified: Heavy Metal Analysis, BTEX, organic and inorganic, Radioactive Isotope analysis, etc.

USACE is continuing to follow its Section 106 procedures described in Section 1.11.1 to develop a project-specific NRHP PA in furtherance of USACE's Section 106 responsibilities for this Undertaking. The PA would then govern USACE's subsequent NHPA compliance efforts for all habit mitigation. Economic Factors

With and without project and Future with and without project H&H for the CTO and subsequent economic analysis have not been completed as part of this document. The CTO will be assessed in subsequent decision documents.

### 6.6.3 Engineering Factors

#### 6.6.3.1 Borrow Plan

A borrow plan has not been developed at this stage of the analysis for the Alternatives. It is conceivable that there is enough borrow material from the material excavated but it is unknown at this time if the material is suitable for constructing levees. Should the excavated material be determined to not be suitable, borrow material would need to be identified for construction of any levees. There are potential borrow sources within close proximity of the

project area (10-mile radius). Borrow opportunities would be further investigated during PED and a supplemental NEPA document would be prepared at that time.

### 6.6.4 Hydrology and Hydraulic Factors

#### 6.6.4.1 Sediment Analysis and Management

See discussion in section 6.6.1. Additional analysis required to validate the selected alternative and determine any mitigation and operation planning. Results from this analysis would be necessary to complete an O&M Plan.

#### 6.6.4.2 Water Quality Analyses

See discussion in section 6.6.1.3. Additional analysis required to validate the selected alternative and determine any mitigation and operation planning.

#### 6.6.4.3 Downstream Gaging

It is recommended that additional stream flow and stage gaging locations be added to the project location during future study to better understand localized impacts.

#### 6.6.4.4 Bridge Impacts

If any stabilization or armoring, such as riprap, slope paving, slide repairs, etc., is required, it will be carried out prior to clearing and any major channel work. Following its own analysis, the Mississippi Department of Transportation (MDOT) has informed the Rankin-Hinds Flood Control District (the Flood Control District), MDOT agrees to collaborate with the Flood Control District in “the advancement of this project and to ensure countermeasures are included, if determined necessary during the future design process.” (letter to G. Rhoads, dated February 26, 2024) To this end, the Flood Control District developed a range of potential structural and hydraulic countermeasures that could be recommended if countermeasures are determined necessary. The array of countermeasure features analyzed will mitigate potential impacts to MDOT bridges that will be identified during the PED phase. When additional information becomes available during PED, adjustments to the design would be made to reduce potential impacts. Any proposed countermeasure design and implementation will be conducted with MDOT’s concurrence.

Rough estimations of the level of effort required to mitigate for bridge impacts include improvements for approximately 36 bents, 12 piers, abutment scour, as well as funding to conduct monitoring surveys. A pile is a concrete post that is driven into the ground to act as a leg or support for a bridge. A bent is a combination of the cap and the pile. Together, with other bents, act as supports for the entire bridge.

There are a total of 2 active railroad bridges within the project area. All efforts would be made to avoid, monitor, and protect these structures. Additional modeling is required to validate these assumptions during PED. If avoidance is not possible, then coordination with the operating entity to determine specific requirements and cost estimates to reduce risk to

each railway bridge will be conducted during PED. All alterations of railroad bridges would be in accordance with Section 3 of the 1946 Flood Control Act (22 USC 701p).

#### 6.6.4.5 Survey of Existing Levees

It is recommended that a survey of all existing levees be incorporated into the model to better understand and design levee assurances and ability to protect interior areas.

#### 6.6.4.6 Coincidence Flows- Local Tributary versus Ross Barnett Releases

It was determined to be reasonably conservative to assume full coincidence with a three-day lag for the current effort. This coincidence and timing pattern were observed in the case of the catastrophic 1979 flood event.

It is recommended that a survey of tributaries and structures along the tributaries be incorporated into the model to better estimate flooding and impacts along tributaries.

To adequately size drainage structures through selected alternatives if alternatives are available to continue this effort, it is recommended that a Watershed Analysis Tool (WAT) model be developed to combine meteorological inputs, HEC-HMS rainfall-runoff calculations, and HEC-ResSim reservoir operations and routing later in the project. Consideration would also be given to storm sewer or other drainage features.

#### 6.6.4.7 Interior Drainage and Seepage Reduction

Cost estimates for interior drainage, seepage reduction, and bridge mitigation were applied to alternatives as applicable. Further design analysis on interior drainage and pump sizing would be required during further phase of study. Final design of seepage reduction would be required during further phases of study. Final design of bridge replacement or protection would be required during further phases of study.

#### 6.6.4.8 Weir Design

The proposed weir in Alternative C meets USACE and State criteria for a dam and a rough cost estimate was added to the project cost to account for design and constructing the weir to Federal and State criteria for a dam. Collaboration with MDEQ's Dam Safety group and further design would be needed to ensure the weir is designed to meet all required USACE and State Standards for safety.

#### 6.6.4.9 Operation and Maintenance of Proposed Hydraulic Features

The Operation and Maintenance of proposed hydraulic features have not been developed. Procedures, costs and schedules would need to be further refined to improve confidence in project costs.

### 6.6.7 Threatened and Endangered Species

ESA consultation needs to be reinitiated to include Alternative CTO with and without a weir. USACE is currently updating the BA to include this information and to make determinations

for T&E species based on this alternative. The updated BA was submitted to the Service on May 28, 2024.

Velocity analysis on area of impoundment and on fish ladder to assess impacts to GS has not been conducted. If the weir is included in the alternative for implementation, then velocity analysis would be conducted during PED.

Sedimentation analysis is needed to determine the impacts on listed species. If the weir is included in the alternative for implementation, then sedimentation analysis would be conducted during PED.

# SECTION 7
# Environmental Laws and Regulations

This Section provides a summary of the compliance status with various Executive Orders and Environmental compliance laws. A more exhaustive listing of the Relevant Environmental Federal Statutory Authorities and Executive Orders is included in a table in Appendix L. Correspondence and coordination documents are located within the applicable appendix corresponding to the environmental law.

## 7.1 EXECUTIVE ORDER 11988: FLOODPLAIN MANAGEMENT

Executive Order 11988 directs Federal agencies to reduce flood loss risk; minimize flood impacts on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by floodplains. Agencies must consider alternatives to avoid adverse and incompatible development in the flood plain. If the only practical alternative requires action in the floodplain, agencies must design or modify their action to minimize adverse impacts. Some project features would extend into floodplains; however, Alternative A1 would not promote future development within the floodplain that otherwise would not occur. The study is compliant with the order. Alternative C and CTO would have some project features within the floodplain (channel excavation and proposed weir) that will not promote future development within the floodplain. Alternative C and CTO would also have features to promote future development (Land Creation) within the historic 1 percent AEP flood plain. However, those areas designed such that they would no longer be located within the updated 1 percent AEP floodplain upon project completion. Verification during PED would be necessary to ensure compliance with this executive order. Alternative C would also create a rise in the 1 percent AEP floodplain downstream of the project site and would require mitigation.

## 7.2 EXECUTIVE ORDER 11990: PROTECTION OF WETLANDS

Executive Order 11990 directs Federal agencies to assess the likely impacts to wetlands associated with any proposed action, This is met through the following: (a) avoid long and short term adverse impacts associated with the destruction or modification of wetlands; (b) avoid direct or indirect support of new construction in wetlands; (c) minimize the destruction, loss or degradation of wetlands; (d) preserve and enhance the natural and beneficial values served by wetlands; and (e) involve the public throughout the wetlands protection decision-making process. All unavoidable impacts would be mitigated as described in Chapter 5 for both Alternative C and Alternative CTO. Alternative A1 would not impact wetlands.

## 7.3 EXECUTIVE ORDER 12898, FEDERAL ACTIONS TO ADDRESS ENVIRONMENTAL JUSTICE IN MINORITY POPULATIONS AND LOW-INCOME POPULATIONS DATED FEBRUARY 11, 1994

Executive Order 12898 directs Federal agencies to: identify and address the disproportionately high and adverse human health or environmental effects of their actions on minority and low-income populations to the greatest extent practicable and permitted by law. Potential high adverse disproportionate impacts are identified for Alternative C and CTO that include flood inducements that occur predominately in areas of EJ concern. A1 is a NS plan that may require those eligible participants to undertake financial burdens such as relocation costs during elevation that those in disadvantaged communities may not be able to afford. Mitigation of high, adverse disproportionate impacts is required. Potential impacts to homeowners in disadvantaged communities may occur from Alternative A1, if at the time of implementation, it is determined that low-income residents cannot afford the costs to participate in the elevation plan. Using a whole of government approach that would identify other public entities that can provide financial assistance may be required to bridge the financial gap so eligible residents in disadvantaged communities can participate in the elevation plan. Another option should be explored, possibly voluntary buyouts, and offered to those in disadvantage communities who cannot afford to participate in the plan. Alternative CTO does offer voluntary buyouts as part of the NS Plan. The CTO Alternative offers the opportunity to prioritize alleviating or reducing the induced flooding modeled as part of implementing Alternative C by offering those induced structure owners the opportunity to take part in the NS plan.

## 7.4 EXECUTIVE ORDER 13175: CONSULTATION AND COORDINATION WITH INDIAN TRIBAL GOVERNMENTS

It is the policy of the Federal government to consult with Federally recognized Tribal Governments on a Government-to-Government basis as required in E.O. 13175 (“Consultation and Coordination with Indian Tribal Governments;” U.S. President 2000). The requirement to conduct coordination and consultation with Federally-Recognized Tribes on and off of Tribal lands for “any activity that has the potential to significantly affect protected tribal resources, tribal rights (including treaty rights), and Indian lands” finds its basis in the constitution, Supreme Court cases, and is clarified in later planning laws. The USACE Tribal Consultation Policy, December 05, 2023, updated the implementation of this E.O. and later Presidential guidance. The 2023 USACE Tribal Consultation Policy and Related Documents provide definitions for key terms, such as tribal resources, tribal rights, Indian lands, consultation, as well as guidance on the specific trigger for consultation.

## 7.5 EXECUTIVE ORDER 14008, TACKLING THE CLIMATE CRISIS AT HOME AND ABROAD DATED 27 JANUARY 2021, SEC 219: SECURING ENVIRONMENTAL JUSTICE AND SPURRING ECONOMIC OPPORTUNITY; OFFICE OF MANAGEMENT AND BUDGET MEMORANDUM M-21-28

Section 219 of Executive Order 14008 states that agencies shall make achieving environmental justice part of their missions by developing programs, policies, and activities

to address the disproportionately high and adverse human health, environmental and climate-related impacts as well as the accompanying economic challenges of such impacts. An EJ assessment identified potential high, adverse human impacts and determined that these impacts are possibly disproportionate to disadvantage communities, for Alternatives C, CTO and A1, as described under EO 12898. The impacts that are potential disproportionate, high adverse impacts are the flooding inducements caused by Alternatives C and CTO while A1 is a NS plan that requires those participants to undertake financial burdens such as relocation costs during elevation that those in disadvantaged communities may not be able to afford. Additionally, EO 14008 directs agencies to identify benefits to areas of EJ concern. Both Alternatives C, CTO and A1 would benefit disadvantage communities (areas of EJ concern), however, the degree of benefit varies between the plans. Alternative A1 could provide benefits but only to 143 structures and only if a large percentage of eligible homeowners are willing and able to participate in the plan. Alternative C only provides marginal benefits to areas of EJ concern, regarding flood risk reduction and mostly offers a lowering of flood stages while also causing flooding inducements. Alternative CTO would have the largest benefit in terms of structures no longer flooding but it also causes flooding inducements, and the NS plan is smaller than Alternatives A1 and C. EO14008 also introduced the Justice40 Initiative, which is a government effort to deliver at least 40 percent of the overall benefits from certain federal investments to disadvantaged communities Justice40. Alternative A1 provides 60% of project benefits while CTO provides 20 percent of project benefits to disadvantaged communities.

## 7.6 EXECUTIVE ORDER 14096: REVITALIZING OUR NATION'S COMMITMENT TO ENVIRONMENTAL JUSTICE FOR ALL

Executive Order 14096 states that advancing environmental justice will require investing in and supporting culturally vibrant, sustainable, and resilient communities. The Flood Risk Management systems, Alternatives, CTO, C and A1, benefit areas of EJ concern by reducing flood risk to those living in vulnerable communities. The vast majority of the study areas is identified as disadvantage communities and would benefit from the alternatives but to different degrees.

## 7.7 EXECUTIVE ORDER 13990 of January 20, 2021 - Protecting Public Health and the Environment and Restoring Science To Tackle the Climate Crisis.

EO 13990 directs federal agencies to review and, if necessary, revise or suspend regulations and policies that may hinder environmental protection or public health. The EO also establishes a review process to identify actions that may disproportionately affect disadvantaged communities.

## 7.8 CLEAN AIR ACT OF 1970, AS AMENDED

The Clean Air Act (CAA) sets goals and standards for the quality and purity of air and requires the EPA to set national ambient air quality standards (NAAQS) for pollutants considered harmful to public health and the environment. The study area is currently in attainment of NAAQS. No general conformity determination is required.

## 7.9 CLEAN WATER ACT OF 1972, AS AMENDED – SECTIONS 401, 402 AND 404

The CWA sets and maintains goals and standards for water quality and purity. Section 401 requires a Water Quality Certification from the MDEQ that a proposed project does not violate established effluent limitations and water quality standards. A Section 401 Water Quality Certificate application was submitted to MDEQ on 11 July 2023 and was reissued on April 26, 2024 due to the inclusion of Alternative CTO. Current coordination with MDEQ is ongoing. Section 402 of the CWA requires a NPDES wastewater discharge permit. A NPDES permit will be prepared to help mitigate the potential impacts from runoff from construction activities. As required by Section 404(b)(1) of the CWA, an evaluation is underway to assess the short- and long-term impacts associated with the placement of fill materials into waters of the United States resulting from implementation of the proposed action. A Section 404(b)(1) evaluation will be conducted during PED and prior to construction, The public will be provided an opportunity to review and comment prior to finalization of the 404(b)(1) and approval.

## 7.10 ENDANGERED SPECIES ACT OF 1973

Consultation with the Service is underway for potential project impacts to multiple threatened and endangered species and their critical habitat. A draft Biological Assessment (BA) was submitted to the Service on January 22, 2024. The Service responded to the draft BA via letter dated February 13, 2024. Based on comments from the Service and further coordination, the USACE revised the draft BA and submitted it to the Service by letter dated February 26, 2024. Since the February submission, the CTO alternative has been further refined and USACE has submitted a revised the BA for another submittal to the Service. ESA coordination documents are available in Appendix D. Refer to Section 4 for a summary of the BA.

ESA consultation is ongoing. Based on currently available historical data, a review of current literature and studies, and with the employment of avoidance measures, the USACE has determined that Alternative C and CTO with a weir may affect but would not likely adversely affect the NLEB and the TCB; would likely adversely affect the GS, ringed map turtle, AST, PRMT, LA pigtoe, and monarch butterfly. Alternative CTO without a weir may affect but would not likely adversely affect the GS, NLEB, TCB, LA pigtoe, and monarch butterfly; would likely adversely affect the ringed map turtle, AST, and PRMT. Based upon the assessment completed, it was determined that Alternative C, CTO with a weir, and CTO without a weir would not result in an adverse modification to Gulf sturgeon critical habitat.

## 7.11 FARMLAND PROTECTION POLICY ACT

The Farmland Protection Policy Act of 1981 is intended to minimize the impact Federal programs have on the unnecessary and irreversible conversion of farmland to non-agricultural uses. The USDA-NRCS is responsible for designating prime or unique farmland protected by the act. Prime farmland is land with the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops that is available for these uses. It can be cultivated land, pastureland, forestland, or other land, but

is not urban or built-up land or water areas. Unique farmland is land other than prime farmland that is used for the production of specific high value food and fiber crops, such as citrus, tree nuts, olives, and vegetables. There would be no impacts anticipated to designated prime and unique farmlands resulting from implementation of Alternatives A1, C, or CTO. Determination of not likely to impact prime, unique, statewide, or local important farmland, as defined by the Farmland Protection Policy Act (FPPA), was made in coordination with the Mississippi National Resources Conservation Service (NRCS) State Soil Scientist on 2 May 2024 as there is no designated farmland in the area, therefore, no further FPPA documentation would be required.

## 7.12 FISH AND WILDLIFE COORDINATION ACT OF 1943

The Fish and Wildlife Coordination Act (FWCA) provides authority for the Service and NMFS involvement in evaluating impacts to fish and wildlife from proposed water resource development projects. It requires that fish and wildlife resources receive equal consideration to other project features. It requires Federal agencies that construct, license, or permit water resource development projects to first consult with the Service, NMFS, and State resource agencies regarding the impacts on fish and wildlife resources and features to mitigate these impacts. Section 2(b) requires the Service to produce a Coordination Act Report (CAR) that details existing fish and wildlife resources in a study area, potential impacts due to a proposed project and recommendations for a project. USACE initiated coordination in December 2022. The Service provided a letter in response to USACE's NOI on June 14, 2023 and a draft CAR on August 23, 2023. Since the August draft, the CTO alternative was further defined. As a result of time constraints and the last minute updates of the CTO alternative, there is not sufficient time for The Service to provide a revised Draft CAR. The Draft CAR dated August 2023 is located in Appendix J. The August 2023 Draft Service Conservation Measures and Recommendations and USACE responses are listed below:

To ensure that fish and wildlife resources receive equal consideration with other project purposes, the Service recommends that important riverine habitats, their functions, values, and aquatic communities be conserved, protected, and restored where practicable to provide natural river habitats including flowing waters, heterogeneous microhabitats, and connectivity to backwaters and oxbow lakes. We also recommend important terrestrial habitats be conserved, protected, and restored. The Service recommends the following planning objectives be adopted to guide future planning efforts:

1. Avoid losses of wetlands and riverine habitat. Conserve, protect, and restore riverine habitats and fish communities (including flowing waters with velocities, backwaters, and oxbow lakes representative of the natural river). Any instream structures should provide fish passage.

   USACE Response: Concur. The Corps is working closely with the Service to develop a mitigation plan to compensate for impacts to wetlands and riverine habitats. Additionally, a fish passage is included in alternative C. The optional measures under the CTO provide an opportunity to provide FRM while avoiding and minimizing wetland and riverine impacts depending on the measures ultimately included.

2. Important terrestrial wildlife habitats (i.e., bottomland hardwoods, cypress swamps, riparian corridors, and sandbars) should be conserved, protected, and restored.

   USACE Response: Concur. The Corps is working closely with the Service to develop a mitigation plan to compensate for impacts to all affected habitats.

3. Mitigation should be developed on a river basin basis to facilitate conservation of fish and wildlife resources. Measures should include compensation for function and habitat loss of the system.

   USACE Response: Concur. The Corps is working closely with the Service to develop a mitigation plan to compensate for all affected habitat types. This mitigation would take place within the PR basin unless impossible due to lack of opportunity.

4. Downstream resources should be conserved, protected, and restored.

   USACE Response: Concur. The Corps is working closely with the Service to develop a mitigation plan that would include all riverine impacts.

5. Detailed measures to offset fish and wildlife resource losses should be determined.

   USACE Response: Concur. The Corps is working closely with the Service to develop a mitigation plan that includes measures to offset fish and wildlife resource losses.

6. A basin wide assessment of the hydrological changes, sedimentation, land use, and water quality should be conducted to determine their influence on flooding and the ecosystem response with a goal of identifying and developing ecosystem restoration projects that are coupled with flood risk reduction features through the basin.

   USACE Response: Acknowledged. Identification and development of primarily ecosystem restoration projects are not authorized under the current authority; however, flood risk projects that have secondary ecosystem benefits may be considered (i.e. engineering with nature).

The following recommendations are provided particularly for Alternative C but should also be considered when developing the CTO. To make appropriate recommendations for the CTO alternative, the Service requests design details and potential impacts once finalized.

1. Further description and analysis of dam construction, operation, and maintenance should be provided.

   USACE Response: Concur. The Corps will continue to coordinate closely with the Service throughout planning, preconstruction engineering and design (PED), and implementation.

2. Adequate turbidity, silt, and spoil containment barriers should be used to protect aquatic and wetland resources.

USACE Response: Concur. Coordination with the Service will continue to determine the best approach.

3. Incorporate sediment and erosion control measures during construction and revegetate all disturbed areas immediately following construction. Incorporate measures to identify potential erosion issues, and control erosion and potential headcutting downstream.

   USACE Response: Concur. A storm water pollution protection plan (SWPPP) will be prepared prior to and implemented during construction to address erosion control. Any temporarily disturbed areas would be revegetated to pre-construction condition. During PED, downstream impacts will be assessed and coordination with the resource agencies will take place to determine best approach if necessary.

4. Continue to include the Service in planning and project collaboration to evaluate and oversee environmental efforts.

   USACE Response: Concur. The Corps will continue to coordinate closely with the Service throughout planning, PED, and implementation.

5. Mitigation should be implemented concurrent with construction.

   USACE Response: Concur. A mitigation plan is being developed in close coordination with the Service and construction of any FRM features will not be implemented prior to implementation of mitigation.

6. Mitigation for unavoidable losses of fish and wildlife habitat, as reflected by loss of Average Annual Habitat Units (AAHUs), as well as loss of function, should be implemented within the Pearl River Basin. We recommend maintaining the interagency mitigation team for planning, coordination, future sampling and HEP analysis. At minimum plan components should include:
   (a) criteria for determining ecological success.
   b) monitoring until after successful completion.
   c) a description of available lands for mitigation and the basis for the determination of availability.
   d) incorporate a public land measure for any impacts to public lands.
   e) identification of the entity responsible for monitoring.
   f) development of a contingency plan (i.e., adaptive management).
   g) during consideration of mitigation sites, recovery goals for threatened species within the project area should be considered as well as habitat that would help conserve at-risk species.
   h) implement riverbank protection/stabilization in areas that are experiencing instability, gravel bar protection/restoration, sand and gravel mine restoration.
   i) and establish a consultation process with appropriate Federal and State agencies to determine acceptable means of mitigation and success criteria.

USACE Response: Concur. The interagency mitigation team (IMT) will be maintained for planning, coordination, future sampling and HEP analysis. Additionally, all components above will be included in the mitigation plan to the extent possible.

7. Remove obsolete barriers, such as Poole's Bluff Sill, West Pearl lock and dam, and Bogue Chitto Sill to restore instream functions within the mainstem Pearl River as a form of partial mitigation for impacts to riverine functions within the project area.

   USACE Response: Concur. The IMT will explore this option during mitigation planning and the engineering team will be included to confirm feasibility.

8. Assess existing constrictions on flow and improve for flood control considerations (i.e., in stream debris-clean up, bridge and culvert inadequacy for flow, railway obstruction, etc.).

   USACE Response: Concur. The Corps has included bridge modifications and clearing and snagging tributaries as potential CTO measures. Addressing culvert inadequacy is a potential mitigation feature. These measures will be further analyzed during PED.

9. Include measures and features to promote aquatic organism l throughout the project area, and ensure designs facilitate appropriate velocities for fish and turtles.

   USACE Response: Concur. A fish passage is included in Alt C. During PED, design of the fish passage will be coordinated with the Service to ensure appropriate velocities for fish and turtles.

10. During low-flow periods, including droughts, sufficient flow should be maintained even if water levels fall below target pool elevations, matching the discharge from the Ross Barnett Reservoir.

    USACE Response: Concur. A low flow gate is included in the design of Alt C.

11. When filling the pool, the downstream flow should at least maintain the minimum required discharge from the Ross Barnett Reservoir, while also allowing portions of flood flows to pass downstream. Develop plan to aid in sediment flushing.

    USACE Response: Partially Concur. A low flow gate is included in the design of Alt C. This type of flushing analysis is not included in the existing proposed sediment study but could be completed in PED.

12. Gate operations at reservoirs have been used to help flush sediment captured within pools downstream (Fruchard and Camenen 2012; Espa et al. 2013); therefore, development of an operational plan to aid sediment flushing should be undertaken. Since benthic communities can be at risk of impairment (Cattaneo et al. 2020), such a plan should include ecological objectives and operations should limit or avoid adverse impacts downstream.

USACE Response: Partially Concur. This would need to be investigated for feasibility and would likely be done so in PED.

13. Release of contaminants during construction and pool filling, and their impact on fish and wildlife resources is a concern that should be addressed via the development of a contaminant investigation and report on methods for addressing that potential issue.

    USACE Response: Concur. A Phase I Environmental Site Assessment (ESA) would be conducted prior to any form of construction. Based on the information provided by the NFI, there is a possibility that a Phase II ESA would have to be conducted. A phase II ESA could include sampling of both ground water and soils within the areas of concern.

14. Watershed, sediment, and water quality analysis within the Pearl River Basin is recommended, which may help identify and develop ecosystem restoration projects that could reduce flood risk throughout the basin. In addition, long-term water quality and quantity monitoring up and down stream and within the expanded channel should be undertaken pre- and post-construction. Measured parameters should include at minimum temperature, dissolved oxygen (DO), total suspended sediments, nitrogen, pH, fecal coliforms, velocity, discharge, and water levels, as well as other physical and chemical parameters necessary to maintain the life cycle of selected aquatic species. This water quality-monitoring plan should be developed in cooperation with the natural resource agencies and should be used to ensure aquatic AAHUs mitigated by the pool are achieved (ER 1110-2-8154; engineer regulation on water quality).

    USACE Response: Partially Concur. Sediment, and water quality analysis will be conducted within the project area and downstream to a distance yet to be confirmed. Additionally, a monitoring plan will be developed and implemented in coordination with the natural resource agencies that will include long-term water quality and quantity monitoring up and down stream and within the expanded channel. Identification and development of primarily ecosystem restoration projects are not authorized under the current authority; however, flood risk projects that have secondary ecosystem benefits may be considered (i.e. engineering with nature).

15. In consultation with the natural resource agencies, a plan should be developed to identify and designate shoreline usage areas within the project area, as well as down and upstream areas influenced by the project. Designations should include: 1) limited development, 2) public recreation, 3) protected shoreline, and 4) prohibited access areas (e.g., public safety). This would help ensure that fish and wildlife mitigation, including minimization, associated with the project are maintained and would aid in complying with ER 1110-2-8154.

    USACE Response: Concur. This could be accomplished through mitigation efforts. The Corps will continue to coordinate closely with the Service to develop a mitigation plan.

16. Sediment testing for contaminants is recommended in areas proposed for use as borrow or that would be flooded by the project, especially those around known contaminated areas that are proposed for use in levees, berms, or islands, where contaminant exposure to fish and wildlife is probable. The testing and response plan for any contaminated soil should be developed in cooperation with the natural resource agencies.

    USACE Response: Concur. A Phase I ESA would be conducted prior to any form of construction. Based on the information provided by the NFI, there is a possibility that a Phase II ESA would have to be conducted. A phase II ESA could include sampling of both ground water and soils within the areas of concern.

17. A monitoring and adaptive management plan addressing upstream and downstream geomorphology impacts should be developed to determine the need to implement grade or other erosion control (e.g., bank stabilization, etc.) features to minimize project impacts to the Pearl River and its tributaries. That plan should include at minimum the use of aerial photographs, geographical information systems, gauge and cross-section data, as well as other parameters deemed necessary during development of that plan. The plan should be developed in cooperation with the natural resource agencies. Monitoring may result in the determination of additional monitoring and/or mitigation needs from such impacts; the plan should incorporate a request for preauthorization for such mitigation if it is determined necessary.

    USACE Response: Partially Concur. This is not included in the existing proposed sediment study, only a screening for impacts. However, it could be included and conducted in PED.

18. An invertebrate and fishery monitoring plan should be developed to ensure that all impacts to the project have been mitigated and that mitigation features (e.g., river restoration, etc.) are functioning as intended. This long-term plan should incorporate various gear types (e.g., electro-shocking, seines, gill nets, etc.) to maximize the detection of various riverine guild species most susceptible to water resource development projects and should be cost-shared as a project feature. That plan should be developed in cooperation with the natural resource agencies.

    USACE Response: Concur. As part of ESA consultation, this plan will be developed in coordination with the service.

19. Creation and reforestation of a riparian zone along the toe of the levee should be undertaken where feasible to provide riparian habitat and provide erosion protection to the fill areas. To provide erosion protection, the width would need to be approximately 300 feet; this would be advantageous to wildlife as well, but narrower widths could also provide useable wildlife habitat.

    USACE Response: Concur. This could be considered during mitigation planning and optimized in PED.

20. Impacts to the public lands, such as LeFleur's Bluff State Park, and other conservation lands (Fannye Cook Natural Area) should be avoided and minimized. Mitigation for such impacts should be located on public lands or property that is placed into the public trust.

    USACE Response: Concur. Any unavoidable impact to public lands would be mitigated on public lands.

21. A conservation easement, in perpetuity, should be recorded on the deed of any mitigation site.

    USACE Response: Concur. All mitigation lands are purchased in fee and deeds include restrictions to ensure protection of the site in perpetuity.

22. The Service and other natural resource agencies should be coordinated with during the next planning and construction phases as project details are developed.

    USACE Response: Concur. The Corps will continue to coordinate with the Service and other resource agencies throughout the planning and implementation phases.

23. Loss of any flows and the resulting potential changes to water quality, including salinities, within the Mississippi Sound should be monitored. Details regarding water quality parameters and location should be developed with the LDWF Marine Fisheries staff.

    USACE Response: Acknowledged. The Corps does not expect any appreciable changes to existing conditions below Copiah Creek, and therefore an assessment of the Mississippi Sound would not be necessary

24. Undeveloped portions of the floodplain serve to absorb an store storm run-off and reduce additional flood damages. Restrictive use-zoning or non-development easements should be implemented by the local sponsor, prior to project construction, and contain language stringent enough to ensure that flood-prone development does not occur and that undeveloped lands in the floodplain are used for floodwater storage, wildlife, outdoor recreation, and other flood compatible land uses. Floodplain ordinances could be an effective measure to avoid additional future flood damages throughout the Jackson metropolitan area.

    USACE Response: Concur. It is against The Corps policy to induce development within a floodplain. That being said, it is anticipated that if Alt C is implemented, the floodplain would be redefined.

25. Federal and state listed, and at-risk mussel and turtle species relocations should be conducted prior to dredging and construction activities.

USACE Response: Concur. As part of ESA consultation, this effort will be developed in coordination with the Service and implemented prior to construction.

26. The Service recommends continued consultation on federally protected species.

USACE Response: Concur. The Corps will continue to coordinate closely with the Service to ensure compliance with the ESA.

## 7.13 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE

Pursuant to USACE policy, potential Hazardous, Toxic, and Radioactive Waste concerns are to be identified early and construction in HTRW-contaminated areas is to be avoided to the extent practicable. A Phase I & II Environmental Site Assessment (ESA) was conducted by the Non-Federal Interest (NFI) September 2014 and updated by the NFI in August 2021 to assess the potential for HTRW materials within the footprints of the study area. Within the study area, it was found that there is a high probability of encountering HTRW during construction. Prior to construction, an ASTM E 1527-13 Phase I and possibly a Phase II, depending on the selected construction footprint, ESA would be completed. Reference Section 4.2.1.1 HTRW for additional information.

## 7.14 GOLDEN EAGLE PROTECTION ACT

USACE is coordinating with the Service through development of a BA submitted January 22, 2024, which includes potential impacts to and measures to avoid and minimize impacts to bald eagles. Coordination is ongoing.

## 7.15 MIGRATORY BIRD TREATY ACT AMENDED

The MBTA is the primary legislation in the United States established to conserve migratory birds. The MBTA prohibits taking, killing, or possessing of migratory birds unless permitted by regulations promulgated by the Secretary of the Interior. The Service and the Department of Justice are the Federal agencies responsible for administering and enforcing the statute. USACE is coordinating with the Service through development of a BA which includes potential impacts to and features to avoid and minimize impacts to birds protected under the MBTA. Coordination is ongoing.

The bald eagle is protected under the Bald and Golden Eagle Protection Act (BGEPA) and the MBTA. The Service developed the National Bald Eagle Management (NBEM) Guidelines to provide landowners, land managers, and others with information and recommendations to minimize potential project impacts to bald eagles, particularly where such impacts may constitute “disturbance,” which is prohibited by the BGEPA. A copy of the NBEM Guidelines is available at: extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.fws.gov/sites/default/files/documents/national-bald-eagle-management-guidelines_0.pdf

These guidelines recommend: (1) maintaining a specified distance between the activity and the nest (buffer area); (2) maintaining natural areas (preferably forested) between the activity and nest trees (landscape buffers); and (3) avoiding certain activities during the breeding

season. During construction of features in areas where nests could occur (e.g. forested areas), on-site personnel should be informed of the possible presence of nesting bald eagles in the vicinity of the project boundary, and should identify, avoid, and immediately report any such nests to USACE. If a bald eagle nest occurs or is discovered within 660 feet of the project footprint, then an evaluation must be performed to determine whether the construction and/or operation of the project is likely to disturb nesting bald eagles. An evaluation would be conducted in accordance with the procedures outlined by The Service. Following completion of the evaluation, a determination would be made as to whether additional consultation is necessary or not. During nesting season, construction must take place outside of The Service buffer zones. A USACE Biologist and a Biologist with The Service would survey for nesting birds prior to the start of construction.

## 7.16 NATIONAL HISTORIC PRESERVATION ACT OF 1966, AS AMENDED (NHPA)

USACE has determined that this project is a Federal Undertaking, as defined by 54 U.S.C. § 300320 and 36 CFR § 800.16(y). The consideration of impacts to historic and cultural resources is mandated under Section 101(b)4 of NEPA as implemented by 40 CFR, Parts 1501-1508. Section 106 of the NHPA, 54 U.S.C. § 306108, and its implementing regulations under 36 CFR § 800 (2004) requires Federal agencies to take into account the effects of their Undertakings on historic properties (i.e., historic, cultural, and Tribal-trust resources) and allow the ACHP an opportunity to comment. Historic properties are identified by qualified agency representatives in consultation with interested parties. USACE has chosen to address potential impacts to historic properties through the “Section 106 consultation process” of the NHPA as implemented through 36 CFR § 800.

## 7.17 NATIONAL WILD AND SCENIC RIVERS ACT (16 U.S.C. §1271)

The National Wild and Scenic Rivers System was created by Congress in 1968 (Public Law 90-542; 16 U.S.C. 1271 et seq.) to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations. The Act is notable for safeguarding the special character of these rivers, while also recognizing the potential for their appropriate use and development. It encourages river management that crosses political boundaries and promotes public participation in developing goals for river protection. Subpart A, Section 297. D6 Requires Federal agencies to consider potential environmental effects of proposed water resource projects on Federally designated wild and scenic rivers.

There are no Federally designated Wild and Scenic Rivers under the Federal Wild and Scenic Rivers Act, 16 U.S.C. §1271, *et seq* within the study area.

# SECTION 8
# Public Involvement

## 8.1 PUBLIC INVOLVEMENT

The involvement of the Public in the planning and decision making process is an important part of the NEPA process. Federal, State and Local agencies, NGO's, and individual citizens provide valuable information that is utilized in the planning, evaluation and analysis presented in this EIS. The NEPA affords individuals, organizations, and governments an opportunity to review and comment on proposed major Federal actions such as this proposed action. Engaging with and receiving input from the public, interested parties, stakeholders, government entities, and NGOs in the evaluation process throughout all stages of the process is critical to achieving the USACE objective of enhancing trust and understanding with customers, stakeholders, teammates, and the public through strategic engagement and communication.

USACE began its coordination efforts in November 2022 with the NFI and initiated discussions and meetings with the Service in December 2022. Weekly project delivery team meetings were held and attended by NFI representatives and Resource agencies. Geospatial files, the NFI Section 211 Report/EIS and other information provided by the NFI were evaluated to determine what work conducted by the NFI could be utilized for this DEIS. The exchange of information between the USACE, Service, Tribes, and other agencies is ongoing and will continue throughout the process to completion of a Final EIS and approved Record of Decision.

As part of the early coordination by the NFI, two public outreach meetings were held: (1) 11 February 2020, at the Mandeville Community Center, and (2) 12 February 2020, in the Slidell Civic Auditorium. PowerPoint presentations presented information about the project and PDT members were available to discuss issues of local concern that would factor into the planning process and analysis. Both public meetings were well attended by municipal and parish officials, along with a large contingent of local residents. Information received from the public was incorporated into the planning process. Information was distributed regarding how to submit comments via letter, email, and telephone.

A public website page was created to aide interested parties in obtaining study information and provide feedback. The project website address it as follows: https://www.mvk.usace.army.mil/Missions/Programs-and-Project-Management/Project-Management/Pearl-River/

A Notice of Intent was published on May 18, 2023 (88 Fed. Reg. 3,1738), notifying the public of the USACE intent to prepare a DEIS and to conduct public outreach for a study to evaluate potential FRM features in the study area and to analyze FRM plans that can be implemented under Section 3104 of WRDA of 2007 for the Pearl River Flood Risk Management Project, Pear River Watershed, Rankin and Hinds Counties, Mississippi . This notice updated the original Notice of Intent declaring the Rankin-Hinds Pearl River Flood and

Drainage Control District, the NFI and USACE's intent to conduct a Feasibility Study and EIS process, which was published in the Federal Register on July 25, 2013.

## 8.2 SCOPING

NEPA affords all persons, organizations, and government agencies the right to review and comment on proposed major Federal actions that are evaluated by a NEPA document. This is known as the scoping process. The scoping process is the initial step in the preparation of the DEIS. The scoping process is an early and open process to help determine the scope of issues to address and identify the significant issues related to the proposed action. Therefore, the scoping process would help identify (1) the range of actions (project, procedural changes), (2) alternatives—both those to be rigorously explored and evaluated and those that may be eliminated, and (3) the environmental resources considered in the evaluation of potential environmental impacts.

Cooperating agencies include the Service Jackson MS and Lafayette, LA offices, FEMA, EPA region 4, and MDEQ. As cooperating agencies, they were invited to participate in the study planning and in the PDT meetings.

The following agencies were invited to participate in the planning process as participating agencies: MDWFP, MDMR, MNRCS, LDWF, LDEQ, LDNR, CPRA, and Mississippi Department of Archives & History.

In addition, participating agencies in the Section 106 consultations include the following Federally-Recognized Tribes that have historic interest in Mississippi and the study area were also invited to participate in the planning process as participating agencies: Alabama-Coushatta Tribe of Texas (ACTT), Chickasaw Nation (CN), the Choctaw Nation of Oklahoma (CNO), the Chitimacha Tribe of Louisiana (CTL), the Jena Band of Choctaw Indians (JBCI), the Mississippi Band of Choctaw Indians (MBCI), the Muscogee (Creek) Nation (MCN), Quapaw Nation (QN), and the Tunica-Biloxi Tribe of Mississippi (TBTL). The QN, MBCI and the CNO are participating as consulting parties and are invited as a signatory party to the Section 106 Programmatic Agreement.

### 8.2.1 Public Outreach

Public outreach meetings were held in person twice a day on May 23 and May 24, 2023, and virtually twice a day on June 1, 2023. The In-Person public meetings were held on May 23, 2023, in Slidell, LA at the Slidell High School Auditorium and May 24, 2023, in Jackson, MS at the MS Ag Museum, Sparkman Auditorium. The virtual meetings were broadcast from the MVK office at 1 p.m. and 6 p.m. The public was notified about the meetings through publication of the NOI, as well as through multiple social media channels and local newspaper. Recorded presentations of the scoping meetings were uploaded to the study website for those who could not attend. Questions were answered live by the PDT during both meetings.

Scoping comments were received through 30 June 2023, which was established as the last day to provide comments to inform the study planning process. There were 3,474 emails

received containing approximately 159 comments. A majority of the emails received included a letter in the form of a form letter representing the same comments therefore they were counted as one comment made by multiple individuals.

Input received from the public meetings assisted the PDT in refining study problems and opportunities, goals, objectives, potential features, and alternative plans.

The comments were evaluated to determine common Themes of concern. The top five common themes identified include:

- Flood risk/ Concern (184)
- Environmental impacts (164);
- Ecosystem Impacts (wildlife etc.) (108)
- Water supply (90)
- Alternatives (71)

Reference Appendix A: Scoping Report for the public notices, coordination letters, Scoping Report, and public comments received to date.

## 8.3 PUBLIC COMMENT PERIOD

A Notice of Availability announcing the availability of the DEIS for a 45-day public comment period will be published in the Federal Register. The public comment period will begin June 7, 2024 and end July 22, 2024. A public notice and the announcement of public hearings dates and venues will be published on the project website, MVK and MVN District PAO Media Announcement pages.

### 8.3.1 Agency Coordination

Preparation of the draft EIS has been coordinated with appropriate, Federal, Tribal, state, and local interests, as well as environmental groups and other interested parties. The following agencies all agreed to be cooperating agencies, and participate in the NEPA process:

Federal Emergency Management Agency (FEMA) Region IV
Louisiana Coastal Protection and Restoration Authority (CPRA)
Louisiana Department of Environmental Quality (LDEQ)
Louisiana Department of Natural Resources (LDNR)
Louisiana Department of Wildlife and Fisheries (LDWF)
Mississippi Department of Archives & History
Mississippi Department of Environmental Quality (MDEQ)
Mississippi Department of Marine Resources (MDMR)
Mississippi Department of Wildlife Fisheries and Parks (MDWFP)
Mississippi Natural Resources Conservation Service (MNRCS)
U.S. Department of Interior, Fish and Wildlife Service, Jackson, MS District
U.S. Department of Interior, Fish and Wildlife Service, Lafayette, LA District

U.S. Environmental Protection Agency, Region 4

### 8.3.2 Public Hearings

Public Hearings will be scheduled during the public review period. Dates and locations of the hearings will be posted on the project website and released in media announcements.

### 8.3.3 Public and Agency Comments

TBD

# SECTION 9
# Conclusion

## 9.1 SUMMARY DISCUSSION

This DEIS presents four alternatives, prepared in accordance with NEPA and USACE ER 1105-2-100, for evaluation and consideration. In conjunction with the EIS, a Commander's Report will be provided to ASA will be able to select some combination of the alternatives studied, not a particular alternative The Commander's Report will provide an overview of the study and provide a comparative analysis of the alternatives including the level of flood risk reduction, economic justification, environmental acceptability and technical feasibility.

The USACE conducted a review and analysis on the NFI Section 211 Report final array of alternatives. As discussed in Section 3, the NFI final array included a nonstructural plan (Alternative A), a levee plan (Alternative B) and a channel improvement/weir/levee plan (Alternative C). In addition, the USACE developed alternatives including a modified nonstructural plan (Alternative A1) and a CTO Alternative.

Alternatives A and B were determined to not be economically justified and were removed from further consideration early in the evaluation process.

Significant risks are associated with the implementation of Alternative A1 including a potentially reduced participation rate from the assumed rate, the inability of residents to address ineligible project costs, inaccessible or unusable structures and emergency services due to roadways impacted by flood events, and impacts to water and sewage systems resulting from flood events preventing structure owners and residents from returning or utilizing impacted structures during and post flood event. These significant residual risks and the inability of this alternative to address the stated problems and objectives of the Project may prohibit selection of Alternative A1 as the NED plan.

Of the remaining implementable alternatives assessed, the Alternative CTO with weir minimizes implementation risks, maximizes the difference between monetized benefits and costs, and satisfies the USACE Planning Principles and Guidelines (P&G) criteria of completeness, effectiveness, efficiency, and acceptability. Accordingly, the Alternative CTO with weir could be considered the preliminary NED plan.

Regardless of the plan that is chosen by the ASA-CW, given the magnitude of the Pearl River Basin, Mississippi, flood risk, water supply and water quality concerns, it has become apparent that a systematic approach involving multiple projects from several different programs would be required to effectively deal with magnitude of the concerns identified.

To fully understand the hydrology and hydrodynamic conditions of the Pearl River Basin, a Watershed study under Section 729 of the WRDA of 1986, would be highly beneficial. A

watershed study would facilitate an understanding of local, state, and Federal actions under consideration in the Pearl River Basin.

## 9.2 VIEW OF THE NON-FEDERAL INTEREST

The Pearl River Basin Flood Risk Management Project, Alternative C would provide community benefits for Hinds County, Rankin County, and the Cities of Jackson, Flowood, Pearl, and Richland. The plan includes the environmental, social, and other public benefits that are difficult to quantify but that would have a positive impact on these communities. Certain land areas, throughout the project footprint, would be designated for the quality-of-life benefits considering a mix of recreation (pedestrian/bike connectivity) public use, residential, commercial, natural and open space, improved transportation access or other beneficial land uses.

The plan would make currently inaccessible land areas behind the existing levee structures, more accessible for the local communities. These land areas historically have been subject to inundation and flood risk but now would provide recreation and revitalization opportunities that would have direct and indirect benefits to the Metro Area environmentally, economically, and socially. It is the intent of the Rankin Hinds Flood Control District (District) that the effort evaluates the economic and social benefits that revitalization of these areas would provide at the community and regional levels.

It is expected that distinct and transformative opportunities from implementation of Alternative C could be realized in the areas of cultural, physical fitness and educational facilities.

### 9.2.1 Recreation

The Project envisions expanding on the current efforts of connecting the four existing museums within the LeFleur Museum District via bike and pedestrian trails. There will be further connection to the new public areas by the Pearl Riverbank that will be made possible via the implementation of Alternative C . This will include additional parks, natural areas, and other public amenities. Residents and visitors will be able to enjoy visiting the museums, LeFleur’s Bluff State Park Mayes Lake, State Fairgrounds, Belhaven Beach, and downtown Jackson.

### 9.2.2 Physical Fitness

Studies have shown that the City of Jackson has one of the highest rates of obesity and has the highest rate of hypertension. Currently there are limited public parks and recreation activities in the project area. The project’s improvements of public access to the river and recreation opportunities in the metropolitan area, specifically for the City of Jackson residents who have limited transportation options, will open outside opportunities currently unavailable in the area. The project will also provide recreation opportunities (including public aquatic recreation opportunities) for low income and minority communities in much closer proximity of their homes and places of work and therefore, would easily be accessed by walking or public transportation. Currently there is only one park with river access, which

limits river usage due to the existing weir. The park itself floods numerous times a year forcing it to completely close.

The ability to securely bike or walk across an expanded and connected bike and pedestrian trail along the riverbanks will greatly add exercise and other leisure and outdoor activity options that are not currently available to residents and visitors. It will be a magnet for attracting people of all ages, fitness levels, and income levels to enjoy these resources along with kayaking and canoeing or walking on the riverbanks of the Pearl River.

The newly available land area generated by Alternative C provides a rare opportunity by establishing specific outdoor areas of public interest such as playgrounds, an outdoor amphitheater, a healthy exercise course for all ages and ability levels, a botanical garden, and a covered pavilion where people can enjoy other recreational activities, such as playing pickleball or other court sports.

Riverside enjoyment can completely and positively connect and revitalize the Cities of Jackson, Flowood and Richland within Hinds and Rankin Counties and provide a beautiful setting for the residents to walk, run, bike, exercise and enjoy multiple outdoor activities. This project can be a transformational catalyst for enhancing the quality of life of these communities for decades.

### 9.2.3 Educational Facilities

The project will provide educational and field trip opportunities for schools and visitors to the museums for vocational and STEM activities.

Despite the relatively small population in the State of Mississippi, the Metropolitan Area is recognized regionally as a magnet for college and vocational students alike. Amongst the higher learning institutions in or near the Alternative C project area, we can list 13 universities, technical colleges, and junior colleges.

The implementation of Alternative C can provide many qualities of life, community and social benefits which will cause an economic revival with a riverside focus that simply does not currently exist. The proper riverside focus on amenities available to residents and visitors can become a focal point of transformation of these communities and reinforce the desire of Mississippians and visitors to live, work and play in the Metropolitan Area.

Community benefits include but are not limited to:

- Sustainability/green building opportunities
- Set asides for neighborhood organizations, community centers, childcare centers, and other non-profits.
- Construction of parks and other recreational facilities
- Affordable housing requirements
- Job training programs
- Local, Minority and Women Owned Business participation.

- Retail/commercial space set asides for small and local business and big box retail restrictions
- Mitigation in excess of those required under federal/state/local regulations to address parking, traffic, increased pollution and other environmental impacts.
- Potential revitalization of communities due to project features

# SECTION 10
# List of Preparers

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**Software:**

**RPEDS Data Sources, Guidance, and Procedures:**

# List of Acronyms and Abbreviations

| | |
|---|---|
| AAHU | Average Annual Habitat Unit |
| ACHP | Advisory Council on Historic Preservation |
| ACS | American Community Survey |
| ACTT | Alabama-Coushatta Tribe of Texas |
| ADCIRC | Advanced Circulation Model |
| AEP | Annual Exceedance Probability |
| AMM | Alternatives Milestone Meeting |
| APE | Area of Potential Effects |
| AQCR | Air Quality Control Region |
| ASA(CW) | Assistant Secretary of the Army for Civil Works |
| ASCII | American Standard Code for Information Exchange |
| ASTM | American Society for Testing Materials |
| BBA | Bipartisan Budget Act |
| BCR | Benefit to Cost Ratio |
| BGEPA | Bald and Golden Eagle Protection Act |
| BMP | Best Management Practice |
| BLH | Bottomland Hardwood |
| CAA | Clean Air Act |
| CAR | Coordination Act Report |
| CDP | Census Designated Place |
| CEMVN | USACE New Orleans District |
| CEMVK | USACE Vicksburg District |
| CEQ | Council on Environmental Quality |
| CERCLA | Comprehensive Environmental Response, Compensation and Liability Act |
| CFS | Cubic Feet Per Second |
| CN | Chickasaw Nation |
| CNO | Choctaw Nation of Oklahoma |
| CO | Carbon Monoxide |
| CPRA | Coastal Protection and Restoration Authority |
| CSRM | Coastal Storm Risk Management |
| CSRA | Cost Schedule Risk Analysis |
| CT | Coushatta Tribe of Louisiana |
| CTL | Chitimacha Tribe of Louisiana |
| CTO | Combination Thereof |
| CWA | Clean Water Act |
| DEIS | Draft Environmental Impact Statement |
| DEQ | Department of Environmental Quality |
| EAD | Estimated Annual Damages |
| EFH | Essential Fish Habitat |
| EIS | Environmental Impact Statement |
| EJ | Environmental Justice |
| EO | Executive Order |
| EPA | Environmental Protection Agency |
| EQ | Environmental Quality |
| ER | Engineer Regulation |
| ESA | Endangered Species Act |
| FCSA | Federal Cost Share Agreement |
| FDR | Federal Discount Rate |
| FEIS | Final Environmental Impact Statement |
| FEMA | Federal Emergency Management Agency |

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| FLOAT | Flood Loss Outreach and Awareness Taskforce |
| FRM | Flood Risk Management |
| FWCA | Fish and Wildlife Coordination Act |
| FWCAR | Coordination Act Report |
| FWS | Fish and Wildlife Services |
| FWP | Future with Project |
| FWOP | Future with Out Project |
| GHG | Greenhouse Gas |
| GIS | Geographic Information System |
| GOMESA | Gulf of Mexico Energy Security Act |
| H&H | Hydraulics and Hydrology |
| HEC-FDA | The Flood Damage Reduction Analysis |
| HEC-RAS | Hydrologic Engineering Center- River Analysis System |
| HMGP | Hazard Mitigation Grant Program |
| HTRW | Hazardous, Toxic, and Radioactive Waste |
| HQUSACE | Headquarters United States Army Corps of Engineers |
| IMT | Interagency Mitigation Team |
| IUCN | International Union for Conservation of Nature |
| JBCI | Jena Band of Choctaw Indians |
| LACPR | Louisiana Coastal Protection and Restoration |
| LADOTD | Louisiana Department of Transportation and Development |
| LDEQ | Louisiana Department of Environmental Quality |
| LDNR | Louisiana Department of Natural Resources |
| LDOA | Louisiana Division of Archaeology |
| LDRIPs | Long Term Disaster Recovery Investment Plans |
| LDWF | Louisiana Department of Wildlife and Fisheries |
| LERRD | Lands, Easements, Rights-of-way, Relocations and Disposal Areas |
| LIDAR | Light Detection and Ranging |
| LPP | Locally Preferred Plan |
| LPRW | Lower Pearl River Watershed |
| LSRA | Louisiana Scenic Rivers Act |
| LWCF | Land and Water Conservation Fund |
| LWFMP | Louisiana Statewide Comprehensive Water Based Floodplain Mgmt Program |
| MAV | Mississippi Alluvial Valley |
| MBCI | Mississippi Band of Choctaw Indians |
| MBTA | Migratory Bird Treaty Act |
| MCACES | Micro-Computer Aided Cost Estimating System |
| MCN | Muscogee (Creek) Nation (MCN) |
| MDEQ | Mississippi Department of Environmental Quality |
| MDMR | Mississippi Department of Mineral Resources |
| MDWFP | Mississippi Department of Wildlife, Fisheries and Parks |
| MDAH | Mississippi Division of Archives and History |
| MSA | Metropolitan Statistical Area |
| MSC | Major Subordinate Command |
| MSL | Mean Sea Level |
| MVD | Mississippi Valley Division |
| NAAQS | National Ambient Air Quality Standards |
| NAWMP | North American Waterfowl Management Plan |
| NB | Nature Based |
| NBEM | National Bald Eagle Management |
| NCDC | National Climatic Data Center |
| NED | National Economic Development |
| NEPA | National Environmental Policy Act |
| NFI | Non- Federal Interest |

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|---|---|
| NGVD | National Geographic Vertical Datum |
| NHL | National Historic Landmarks |
| NHPA | National Historic Preservation Act |
| NLEB | Northern Long-Eared Bat |
| NMFS | National Marine Fisheries Service |
| NLAA | Not Likely to Adversely Affect |
| NOA | Notice of Availability |
| NO2 | Nitrogen Dioxide |
| NOAA | National Oceanic and Atmospheric Administration |
| NOI | Notice of Intent |
| NPS | National Park Service |
| NRCS | Natural Resource Conservation Service |
| NRHD | National Register of Historic District |
| NRHP | National Register of Historic Places |
| NS | Nonstructural |
| O&M | Operation and Maintenance |
| OCD | Office of Community of Development |
| OMRR&R | Operations, Maintenance, Repair, Rehabilitation, and Replacement |
| OSE | Other Social Effects |
| O3 | Ozone |
| PA | Public Assistance |
| PA | Programmatic Agreement |
| Pb | Lead |
| PPA | Project Partnership Agreement |
| PBF | Physical Biological Features |
| P&G | Principles and Guidelines |
| PED | Pre-Construction Engineering and Design |
| PDT | Project Delivery Team |
| Phase 1 ESA | Phase 1 Environmental Site Assessment |
| PM | Particulate Matter |
| PMP | Project Management Plan |
| PPA | Project Partnership Agreement |
| PPT | Parts Per Thousand |
| PRMT | Pearl River Map Turtle |
| PRBDD | Pearl River Basin Development District |
| PRVWSD | Pearl River Valley Water Supply District |
| QN | Quapaw Nation |
| RCRA | Resource Conservation and Recovery Sites |
| REC | Recognized Environmental Condition |
| RED | Regional Economic Development |
| REP | Real Estate Plan |
| RM | River MilesRMPRisk Management Plan |
| ROD | Record of Decision |
| ROE | Right of Entry |
| ROM | Rough Order of Magnitude |
| ROW | Right Of Way |
| RPEDS | Regional Planning and Environment Division South |
| RSLC | Relative Sea Level Change |
| RSLR | Relative Sea Level Rise |
| S | Structural |
| SELA | Southeast Louisiana Urban Flood Control Project |
| SHPO | State Historic Preservation Officer |
| SLC | Sea Level Change |
| SMART | Specific Measurable Attainable Risk Informed Timely |

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|---|---|
| SO2 | Sulfur Dioxide |
| STLDCD | St. Tammany Levee, Drainage and Conservation District |
| STPG | St. Tammany Parish Government |
| SWPPP | Stormwater Pollution Prevention Plan |
| T&E | Threatened and Endangered |
| TBTL | Tunica-Biloxi Tribe of Louisiana |
| TCP | Traditional Cultural Property |
| TIF | Tag Image File Format |
| TRI | Toxic Release Inventory |
| TSCA | Toxic Substances Control Act |
| TSP | Tentatively Selected Plan |
| URA | Uniform Relocation Assistance Act |
| USACE | United States Army Corps of Engineers |
| USFWS | United States Fish and Wildlife Service |
| USGS | United States Geological Survey |
| VOC | Volatile Organic Compound |
| VRAP | Visual Resources Assessment Procedure |
| WBDHU12 | U.S. Geological Survey Watershed Boundary Dataset Hydrologic Unit 12 |
| WIIN | Water Infrastructure Improvement Act for the Nation |
| WSE | Water Surface Elevation |
| WMA | Wildlife Management Area |
| WQC | Water Quality Certification |
| WRDA | Water Resources Development Act |
| WRRDA | Water Resources Reform and Development Act |
| WTP | Water Treatment Plant |
| WWTP | Wastewater Treatment Plant |
| WVA | Wetland Value Assessment |