

DRAFT

ENVIRONMENTAL ASSESSMENT

**Merriwether-Cherokee and Presidents Island Top Bank Repairs
Lake and Shelby Counties, Tennessee**



**U.S. Army Corps of Engineers
Mississippi Valley Division
Regional Planning and Environmental Division South**

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1.0 INTRODUCTION

The U.S. Army Corps of Engineers (USACE), Mississippi River Valley Regional Planning and Environmental Division South, Environmental Compliance Branch, has prepared this draft environmental assessment (EA) to evaluate impacts associated with the proposed repair of top bank and overbank scour along the left descending bank of the Mississippi River near approximate river miles 869 and 733 above Head of Passes (AHP) in Lake and Shelby Counties, Tennessee, resulting from the flood of 2011 (Figures 1-2). Record flooding occurred in the Lower Mississippi River in early May 2011 resulting in these two large top bank failures within the Memphis District. The river stage during peak flow near the Merriwether-Cherokee failure location was 48.22 feet on the Tiptonville Gage on May 6, 2011. The bank failure at Merriwether-Cherokee threatened to cut off a nine mile meander of the river. At Presidents Island, the river stage during peak flow was 48.0 feet on the Memphis Gage on May 9, 2011. Approximately 75% of the entire flow was across Presidents Island during peak flow, threatening to cut off approximately six miles of river meander. This draft EA provides sufficient information on the potential adverse and beneficial environmental effects to allow the District Commander, U.S. Army Corps of Engineers, Memphis District, to make an informed decision on the appropriateness of an EIS or a Finding of No Significant Impact (FONSI) for repairs of the bank failures and overbank scours in order to maintain the present navigation channel at these two reaches. This document has been prepared in accordance with the National Environmental Policy Act of 1969 and the Council on Environmental Quality's Regulations (40 CFR 1500-1508), as reflected in the USACE Engineering Regulation ER 200-2-2.

MERRIWETHER-CHEROKEE FAILURE/OVERBANK SCOUR



Figure 1. Map of the bank failure and path of overbank flow from Mississippi River floodwaters in 2011 at Merriwether-Cherokee, Lake County, Tennessee.

PRESIDENTS ISLAND BANK FAILURE/OVERBANK SCOUR

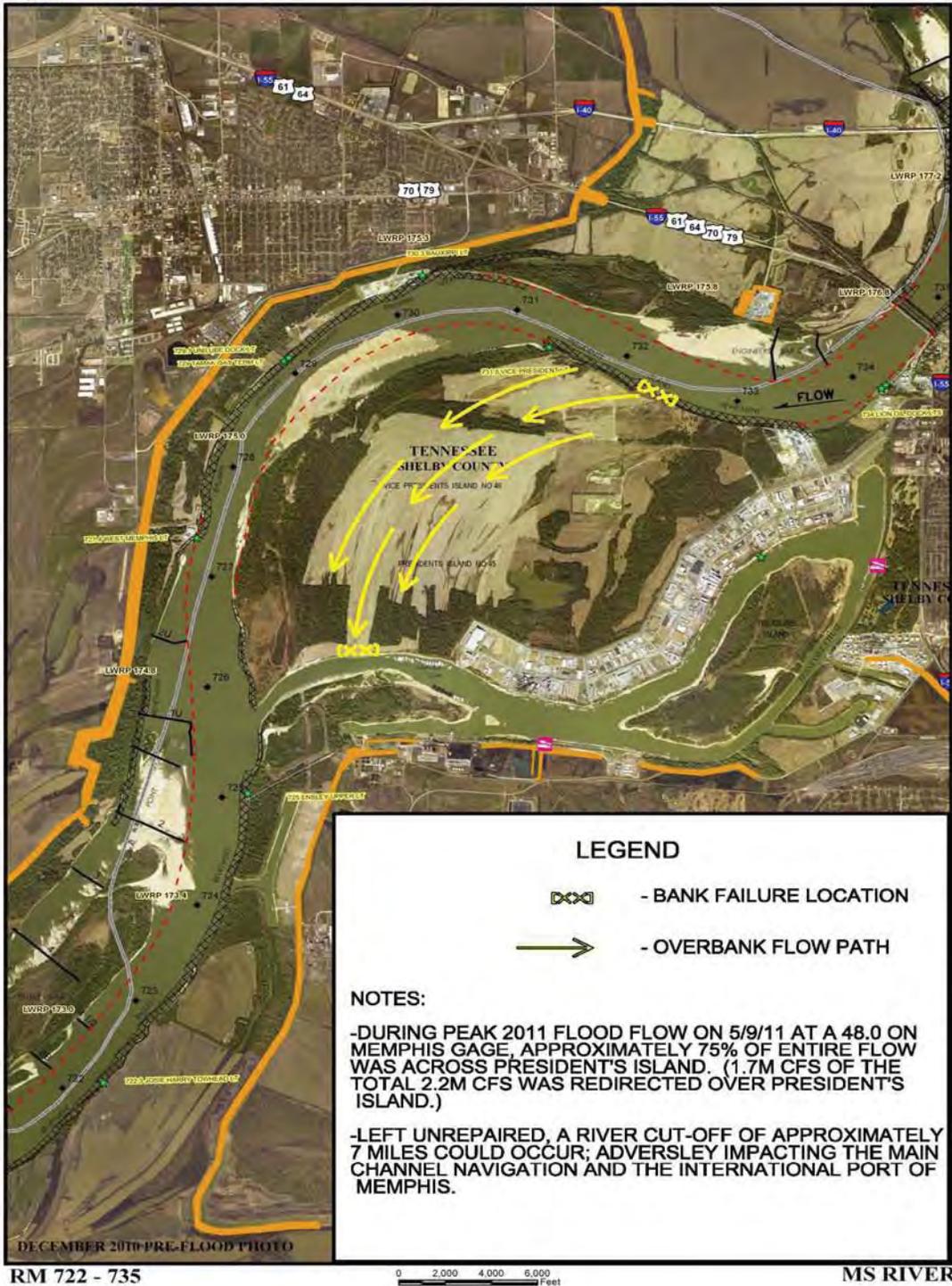


Figure 2. Map of the bank failure and path of overbank flow from Mississippi River floodwaters in 2011 at Presidents Island, Shelby County, Tennessee.

1.1 Proposed Action. The proposed action at Merriwether-Cherokee consists of construction of a stone containment baffle approximately 1,600 feet in length placed across the overbank scour hole and parallel to the recently restored top bank. Bank paving consisting of riprap side slopes would connect the baffle to top bank for reinforcement and to prevent flanking. The existing scour hole between the stone baffle and top bank would then be filled with approximately 1.2 million cubic yards of dredge fill for stability. Assuming a production rate of approximately 26,400 cubic yards of dredged sand per day, approximately 46 days of dredging would likely be required for the dredge fill. Dredge sand would be piped in from the river near the failure location, and effluent would return to the Mississippi River through an existing notch in the recently restored top bank closure structure. Finally, underwater bank armoring consisting of 8,100 squares of articulated concrete mattress (ACM) would be installed riverside of top bank, and riprap stone paving (maximum thickness of 4 feet) would be installed on top of the dredge fill, extending approximately 100 feet landward of top bank. Plans for the proposed action at Merriwether-Cherokee are shown in Appendix A.

The same approach would be used for the proposed repairs at Presidents Island. Approximately 135,000 tons of stone would be used to construct the containment baffle extending approximately 2,400 feet in length, and approximately 2 million cubic yards of dredge fill would be needed to fill the scour hole between the containment baffle and top bank. Assuming a production rate of approximately 26,400 cubic yards of dredged sand per day, approximately 76 days of dredging would likely be required for the dredge fill. Dredge sand would be piped in from the river near the failure location and effluent would return to the Mississippi River through an existing notch in the recently restored top bank closure structure. Finally, underwater bank armoring consisting of 9,600 squares of articulated concrete mattress (ACM) would be installed riverside of top bank, and a maximum thickness of 4 feet of riprap stone paving would be installed on top of the dredge fill extending approximately 100 feet landward of top bank. Plans for the proposed action at Presidents Island are shown in Appendix A.

All rock work would be conducted from the water. Draglines would be used to pull rock from floating barges for the placement of rock. The barges would access the overbank scour hole at each location through an approximately 300-foot wide notch in the newly restored top bank. Dredge pipes would temporarily be placed across the land during the dredge fill operation.

1.2 Purpose And Need For The Proposed Action. The purpose of the proposed repairs to top bank and overbank scour is to prevent river cut-offs at the two locations and maintain the current navigation channel. A river cut-off at Presidents Island would also destroy the existing entrance to McKellar Lake Harbor which is one of the largest inland ports in the United States.

1.3 Authority. This project is authorized by the Flood Control Act of 15 May 1928, Public Law No. 391-70, as amended and supplemented by subsequent Acts of Congress. The 1928 Flood Control Act authorized the MR&T Project, which included channel improvement and stabilization works for stabilizing the channel to provide an efficient navigation alignment, increase the flood-carrying capacity, and protect the levee system.

1.4 Prior Reports. Subsequent legislation and experience with other major floods have resulted in many modifications to the 1928 Flood Control Act resulting in several studies and appurtenant documents. Of particular significance is the 1976 Environmental Impact Statement for the Mississippi River and Tributaries, Mississippi River Levees and Channel Improvement Project (USACE 1976). That EIS addressed the mainstem flood risk management and navigation features of the MR&T Project located in the Lower Mississippi River Valley, between Cairo, Illinois, and Venice, Louisiana. The project, as disclosed in the EIS, is designed to make the Mississippi River more navigable and manage risks associated with flooding by utilizing channel training devices, levees, and maintenance and construction of the mainstem levees and key harbors. Alternatives included no action, alternative maintenance measures, maintenance of existing project efficiency, storage of excess floodwaters in reservoirs, dredging to increase the hydraulic capacity of the Mississippi River, additional cutoffs to increase the hydraulic capacity of the river, diverting flood flows, widening existing floodways, and alternative construction and maintenance methods.

1.5 Public Concerns. The navigation industry has expressed a need to stabilize the two reaches to prevent potential significant impacts to the present navigation channel, such as, river cut offs. Local landowners have expressed an urgent need to stabilize top bank and the overbank scours at the two locations in order to manage flood risks to their property associated with future flood events along the Mississippi River. Officials from the city of Memphis and from the Port of Memphis, which includes McKellar Lake Harbor, expressed concerns of severe economic losses if the river cut off occurs at Presidents Island.

2.0 ALTERNATIVES TO THE PROPOSED ACTION

Several alternatives were investigated for repairs at Merriwether-Cherokee and Presidents Island. For the purposes of NEPA, the no-action alternative serves as the baseline against which impacts and benefits of the action alternatives are evaluated. A description of each alternative is included below. Diagrams of alternatives are shown in Appendix A.

2.1 No Action. The no action alternative is defined as leaving the top bank and the adjacent overbank scour holes in their existing conditions with no improvements. This alternative would not reduce the risk of river cutoffs occurring at flood flows for an extended duration.

If the Mississippi River were to flood again and continue cutting a channel where the failure at Merriwether-Cherokee occurred, nine miles of existing river channel that has approximately \$54,000,000 of river training structures already in place could be lost. Furthermore, the head cutting that would result from the cutoff would progress upstream causing more damage to this reach while degrading and possibly invalidating many of the existing structures in place to aid in navigation and flood control. If the Mississippi River were to flood again and continue cutting a channel toward the harbor where the failure at Presidents Island occurred, approximately six miles of existing river channel that has approximately \$47,000,000 of river training structures

already in place could be lost. It would also adversely impact and possibly shut down the International Port of Memphis.

2.2 Restore top bank, completely fill scour hole with dredge material, and then place ACM along the riverbank. At Merriwether Cherokee, this alternative would provide the highest level of protection until the Sheep Ridge Road / levee is restored; however, the resultant magnitude of dredge fill that would be required rendered this alternative unacceptable. The estimated amount of over 6 million cubic yards of dredge fill is not only cost prohibitive, but the quantity of source material needed for this fill would be difficult to identify. Even if this magnitude of source material was identified, placement of dredge fill would take multiple seasons to accomplish. Dredge fill would also be vulnerable to scour during a flood until the levee is restored. Therefore this alternative would not provide adequate or timely protection from a potential river cutoff. The estimated cost for this alternative at Merriwether-Cherokee is \$34,000,000.

At Presidents Island, this alternative would provide the highest level of protection to the navigation channel and the International Port of Memphis; however, the quantity of dredge fill material that would be required rendered this alternative unacceptable. As would be the case at Merriwether-Cherokee, the estimated amount of over 3 million cubic yards of dredge fill would be cost prohibitive, would be difficult to find this large quantity of source materia, and would take too much time to accomplish. Therefore this alternative would not provide adequate or timely protection from a potential river cutoff. The cost for these proposed repairs at Presidents Island would be approximately \$30,500,000.

The total cost for Alternative 2.2 would be \$64,500,000.

2.3 Construct stone baffle/containment dike on recommended alignments and fill with dredge material. The proposed action at Merriwether-Cherokee consists of construction of a stone containment baffle approximately 1,600 feet in length placed across the overbank scour hole and parallel to the recently restored top bank. Bank paving consisting of riprap side slopes would connect the baffle to top bank for reinforcement and to prevent flanking. The existing scour hole between the stone baffle and top bank would then be filled with approximately 1.2 million cubic yards of dredge fill for stability. Assuming a production rate of approximately 26,400 cubic yards of dredged sand per day, approximately 46 days of dredging would be required for the dredge fill. Dredge sand would be piped in from the river near the failure location and effluent would return to the Mississippi River through an existing notch in the recently restored top bank closure structure. Finally, underwater bank armoring consisting of 8,100 squares of ACM would be installed riverside of top bank, and riprap stone paving (maximum thickness of 4 feet) would be installed on top of the dredge fill extending approximately 100 feet landward of top bank. The cost for these proposed repairs at Merriwether-Cherokee would be \$15,200,000.

The same approach would be used for the proposed repairs at Presidents Island. Approximately 135,000 tons of stone would be used to construct the containment baffle extending approximately 2,400 feet in length. Approximately 2 million cubic yards of dredge fill would be needed to fill the scour hole between the containment baffle and top bank. Assuming a production rate of approximately 26,400 cubic yards of dredged sand per day, approximately 76

days of dredging would be required for the dredge fill. Dredge sand would be piped in from the river near the failure location and effluent would return to the Mississippi River through an existing notch in the recently restored top bank closure structure. Finally, underwater bank armoring consisting of 9,600 squares of ACM would be installed riverside of top bank, and riprap stone paving (maximum thickness of 4 feet) would be installed on top of the dredge fill, extending approximately 100 feet landward of top bank. The estimated cost for these proposed repairs at Presidents Island is \$28,568,000.

All rock work would be conducted from the water. Draglines would be used to pull rock from floating barges for the placement of rock. The barges would access the overbank scour hole at each location through an approximately 300-foot wide notch in the newly restored top bank. Dredge pipes would temporarily be placed across the land during the dredge fill operation.

The total cost for Alternative 2.3 would be \$43,768,000.

2.4 Construct stone baffle/containment dike on further landward alignments and fill with dredge material. This alternative is very similar to Alternative 2.3, however the location of the baffle was adjusted landward. Moving the baffle further landward caused dredge fill cubic yardage to increase dramatically. Additionally, riprap stone paving would need to be increased to a distance of 900 feet landward of top bank for stability. The changes associated with this alternative alignment resulted in higher estimated costs than the proposed alternative; thus, this alternative was not selected as the preferred alternative. The estimated cost for these proposed repairs at Merriwether-Cherokee is \$18,500,000 plus \$30,031,550 at Presidents Island.

The total cost for Alternative 2.4 would be \$48,531,550.

2.5 Construct stone baffle/containment dike on further riverward alignments and fill with dredge material. This alternative is very similar to Alternative 2.3; however, the location of the baffle was adjusted riverward. This alternative would require less dredge fill; however, the decreased distance between baffle and stone fill on the downstream end reduces the integrity of the overall repair, possibly increasing risk of failure when compared to the other alternatives. Due to this decreased integrity, riprap stone paving would need to be increased to a distance of 300 feet landward of top bank for stability. This alternative yielded higher estimated costs than the proposed alternative. The estimated cost for these proposed repairs at Merriwether-Cherokee is \$16,800,000 and \$34,371,500 at Presidents Island.

The total cost for Alternative 2.5 would be \$51,171,500.

The no action alternative was determined to be unacceptable because of the risks and extent of projected flood damages. Alternative 2.2 would provide the highest level of protection; however, it would also require the largest amount of dredge fill and has the highest costs. This large amount of dredge fill would not only be cost prohibitive, but also take multiple seasons to accomplish. Therefore Alternative 2.2 would not provide adequate or timely protection from a potential river cutoff. Alternatives 2.3, 2.4, and 2.5 were similar in scope; however, Alternative

2.3 provided the best protection at the lowest cost. Alternative 2.3 offered the best compromise of environmental impacts and project costs, and thus was selected as the proposed action.

3.0 AFFECTED ENVIRONMENT

3.0.1 Environmental Setting. The Merriwether-Cherokee project area is located along the left descending bank of the Mississippi River near approximate River Mile 869 AHP in Lake County, Tennessee (Figure 1). This reach of the Mississippi River consists of an approximately 9-mile river bend. The mainline Mississippi River Levee traverses south throughout this reach, and a private levee known as the Sheep Ridge Levee extends west from the mainline levee and comes to within several hundred feet of top bank. The lands surrounding the Merriwether-Cherokee project area are predominantly agricultural. During May of 2011, floodwaters overtopped the bank and scoured out a section of the Sheep Ridge Levee located a few hundred feet from top bank. During peak flow, all lands riverside of the mainline Mississippi River Levee with the exception of a portion of the Sheep Ridge Levee were inundated with floodwaters throughout this reach threatening a cutoff of approximately nine miles of river. Presently, there is a large overbank scour hole at the overtop location and large amounts of sand deposited landside of top bank throughout this reach from the 2011 flood.

The Presidents Island project area is located along the left descending bank of the Mississippi River near approximate River Mile 733 AHP in Shelby County, Tennessee, approximately two miles downstream of the Interstate 55 Bridge (Figure 1). Presidents Island is part of the International Port of Memphis, one of the largest inland ports on the shallow draft portion of the Mississippi River and is situated near downtown Memphis. A large industrial park exists on the downstream side of Presidents Island within McKellar Lake Harbor; however, much of the land on Presidents Island is a mix of agricultural and wooded lands. During the flood of 2011, floodwaters overtopped the bank inundating all of the agricultural and wooded lands on Presidents Island. During peak flow, approximately 75 percent of the floodwaters travelled over Presidents Island threatening a river cutoff extending into the mouth of the McKellar Lake Harbor. Presently, a large overbank scour exists at the overtop location, and large amounts of sand were deposited landside of top bank throughout this reach.

3.0.2 Description of Watershed. The Merriwether-Cherokee and Presidents Island project areas are in the Tennessee portion of the Mississippi River Watershed, Hydrologic Unit Code (HUC) 08010100, which drains approximately 583 square miles. Average ground elevations within the Tennessee portion of this watershed are between 200 and 300 feet mean sea level with little relief. The average downvalley slope of the watershed is less than one foot/mile. The immediate project areas both consist of overbank scour holes hydrologically connected to the Mississippi River by a large notch in the recently restored top banks comprised of stone revetment.

3.0.3 Climate. This section is summarized from the U.S. Department of Agriculture, Soil Surveys of Lake and Shelby Counties, Tennessee (USDA 1969, USDA 1970). The climates of Lake County and Shelby County are similar throughout the year characterized by long, hot summers, fairly mild winters, and abundant rainfall. Occasional cold fronts bring temperatures

near or below freezing, but most winter precipitation falls as rain. The total annual precipitation is approximately 49 inches. Average daily maximum and minimum temperatures are approximately 72 degrees and 50 degrees Fahrenheit, respectively.

3.0.4 Geology. The project areas are located within the Mississippi Alluvial Valley, which formed by glacial melt waters carrying large amounts of water, silt, sand, and gravel from the country’s interior down to the Gulf Coast. The alluvial valley is bordered on the east by bluffs and on the west by merging valleys of the principal tributaries and ranges in width from approximately 30 to 90 miles (Saucier 1994). Quaternary deposits within the alluvial valley consist of various abandoned channels and point bar deposits of historic Mississippi River meander belts. The fluvial-geomorphic history determines the individual soil types at specific locations. Prior to the flood of 2011, the soil types within Merriwether-Cherokee project area were frequently flooded Commerce silt loam and frequently flooded Robinsonville fine sandy loam; whereas, the soil type within the Presidents Island project areas was Crevasse fine sand (SSURGO 2011).

3.1 RELEVANT RESOURCES

This section contains a description of those resources that could be impacted by the proposed project. The important resources described in this section (Table 1) 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. Aesthetic resources and Environmental Justice have been considered and found to not be affected by the alternative under consideration.

Resource	Institutionally Important	Technically Important	Publicly Important
Agricultural Lands	Food Security Act of 1985, as amended; the Farmland Protection Policy Act of 1981	The habitat provided for the provision or potential provision of human and livestock food products.	The present economic value or potential for future economic value.
Terrestrial and Wildlife Resources	Fish and Wildlife Coordination Act of 1958, as amended and the Migratory Bird Treaty Act of 1918	They are a critical element of many valuable aquatic and terrestrial habitats; they are an indicator of the health of various aquatic and terrestrial habitats; and many species are important commercial resources.	The high priority that the public places on their aesthetic, recreational, and commercial value.

Resource	Institutionally Important	Technically Important	Publicly Important
Wetlands	Clean Water Act of 1977, as amended; Executive Order 11990 of 1977, Protection of Wetlands; EO 11988, and Fish and Wildlife Coordination Act.	They provide necessary habitat for various species of plants, fish, and wildlife; they serve as ground water recharge areas; they provide storage areas for storm and flood waters; they serve as natural water filtration areas; they provide protection from wave action, erosion, and storm damage; and they provide various consumptive and non-consumptive recreational opportunities.	The public places a high value on the functions and values that wetlands provide. Environmental organizations and the public support the preservation of marshes and other wetlands.
Threatened and Endangered Species	The Endangered Species Act of 1973, as amended; and the Bald Eagle Protection Act of 1940.	Federal and state wildlife agencies cooperate to protect these species. The status of such species provides an indication of the overall health of an ecosystem.	The public supports the preservation of rare or declining species and their habitats.
Cultural Resources	National Historic Preservation Act of 1966, as amended; the Native American Graves Protection and Repatriation Act of 1990; and the Archeological Resources Protection Act of 1979	State and Federal agencies document and protect important sites because of their association or linkage to past events, to historically important persons, to design and construction values, and for their ability to yield important information about prehistory and history.	Preservation groups and private individuals support protection and enhancement of historical resources.
Recreation Resources	Federal Water Project Recreation Act of 1965 as amended and Land and Water Conservation Fund Act of 1965 as amended	Provide high economic value to local, state, and national economies.	Public makes high demands on recreational areas. There is a high value that the public places on fishing, hunting, and boating, as measured by the large number of fishing and hunting licenses sold in Tennessee and the large per-capita number of recreational boat registrations in Tennessee.
Socio-Economic Resources	River and Harbor Act and Flood Control Act of 1970 (PL 91-611)	N/A	Social concerns and items affecting area economy are of significant interest to community.
Air Quality	Clean Air Act of 1963, Missouri Air Conservation Law	State and Federal agencies recognize the status of ambient air quality in relation to the National Ambient Air Quality Standards (NAAQS).	Virtually all citizens express a desire for clean air.
Water Quality and Hydrology	Clean Water Act of 1977, Fish and Wildlife Coordination Act	Federal and state water quality agencies recognize value of fisheries and good water quality. National and state standards are established to assess water quality.	Environmental organizations and the public support the preservation of water quality and fishery resources and the desire for clean drinking water.

Resource	Institutionally Important	Technically Important	Publicly Important
Aquatic Resources/ Fisheries	Fish and Wildlife Coordination Act of 1958, as amended	They are a critical element of many valuable freshwater and marine habitats; they are an indicator of the health of the various freshwater and marine habitats; and many species are important commercial resources.	The public places a high priority on their aesthetic, recreational, and commercial value.
Navigation	Section 10 of the Rivers and Harbors Act of 1899	Inland navigation is a key element in economic development and job-creation efforts and is essential in maintaining interstate commerce, economic competitiveness and national security.	The public places importance on the facilitation of safe, reliable, and economically efficient movement of vessels for interstate and foreign commerce.

3.1.1 AGRICULTURAL LANDS, PRIME AND UNIQUE FARMLANDS

Existing Conditions: The predominant land use surrounding the Merriwether-Cherokee project area is agriculture, with most of the area being eligible for classification as prime farmland (SSURGO 2012). However due to the velocity and large volume of floodwaters in 2011, large overbank scour and sand deposits now exist over much of this farmland. Most of Presidents Island is a mixture of agriculture and forested lands, with the exception of the large industrial park on the downstream end. Similarly, a large overbank scour and sand deposits now exist over much of this land. Most of the agricultural land on Presidents Island was shown as eligible for classification as prime farmland prior to the flood; however, the land immediately adjacent to the top bank failure and containing the footprint of the proposed repairs was not (SSURGO 2012).

3.1.2 TERRESTRIAL AND WILDLIFE RESOURCES

Existing Conditions: At the Merriwether-Cherokee project area, the majority of the surrounding lands were in agricultural production prior to the flood of 2011. Some wooded and marshy lands comprised mainly of cottonwood and willows extend along the bank, and the widths of these areas vary. At Presidents Island, land use is mixed between agriculture and wooded lands comprised mainly of sugarberry, cottonwood, silver maple, American elm, box elder, and green ash.

Overbank scour removed all of the wooded land within the footprint of the proposed repairs at both Merriwether-Cherokee and Presidents Island during the flood of 2011. Both top bank failures occurred where the widths of mature trees and vegetation along the banks (i.e., tree screens) were thin, extending less than 100 feet from top bank. Open water and sand deposits characterize existing conditions at the project areas. Annuals, such as, amaranth (*Amaranthus sp.*) and cocklebur (*Xanthium sp.*) have invaded the sand deposits since the flood. Wildlife that would be expected to currently utilize the existing overbank scour holes are raccoon, coyotes, deer, wild turkey, muskrat, river otter, beaver, turtles, snakes, frogs, toads, killdeer, and waterbirds common to the Mississippi River.

3.1.3 WETLANDS

Existing Conditions: Wetlands are not currently present within the proposed project footprint at Merriwether-Cherokee or Presidents Island. Large overbank scour holes (deep water habitat) surrounded by sand deposits exist within the proposed project footprint. At Merriwether-Cherokee, a records search of the National Wetlands Inventory showed approximately 7 acres of forested wetlands present along the bank prior to the flood of 2011 (USFWS 2011). Also, soils within the immediate vicinity of the Merriwether-Cherokee project area met hydric soil criteria reinforcing the probability of wetlands along the bank prior to the flood of 2011 (SSURGO 2012). Much of the wooded and marshy lands adjacent to the river banks are likely wetlands, including approximately 1,000 acres of lands in the Wetlands Reserve Program near River Mile 864L and approximately 1,650 acres near River Mile 860, downstream of the project limits. A records search of the Presidents Island project area showed neither wetlands nor soils meeting hydric criteria prior to the flood of 2011 in the proposed project footprint (USFWS 2011, SSURGO 2012). However, most of the wooded lands on Presidents Island likely meet wetland criteria due to their low elevations.

3.1.4 THREATENED AND ENDANGERED SPECIES

Existing Conditions: Three federally listed species may occur within the Lower Mississippi River in the vicinity of the proposed project areas: the interior least tern (*Sterna antillarum athalassos*), pallid sturgeon (*Scaphirhynchus albus*), and fat pocketbook pearly mussel (*Potamilus capax*).

Interior Least Terns

The interior least tern is the smallest North America tern and typically nests on large isolated sandbars in the lower Mississippi River from late May to August, depending on specific yearly river stages. Both top bank failures occurred along outside bends in areas normally containing high velocities and deeper water; therefore, least tern habitat did not exist prior to the flood of 2011. Sandy point bars (and associated dike fields) that exist across the river from both project areas typically host nesting colonies on an annual basis. Nesting colonies also congregate a few miles downstream of the top bank failures on other point bars and associated dike fields. Although no least terns were documented within the sand deposits at the two project locations, least terns were observed briefly utilizing similar habitat during the flood of 2011. However, the least terns observed on overbank sand deposits departed for isolated sandbars once they became available.

Pallid sturgeon

Pallid sturgeon are part of an ancient group of fishes that inhabit benthic habitats of large, turbid rivers of the central United States, such as the Mississippi River. Although pallid sturgeon captures in the middle and lower reaches of the Mississippi River continue to increase with fishing effort, little information exists to date on their habitat and life cycle requirements.

Extensive sampling in the lower Mississippi River is currently underway through a joint effort of the U.S. Fish and Wildlife Service (USFWS) and USACE-Engineering and Research Development Center (ERDC) so that a better understanding of population size, population density, habitat preference, extent of range in lower Mississippi River, and impacts on the population can be quantified. Captures of pallid sturgeon in the Mississippi River have been associated with the main channel, islands, channel borders, sandbars, gravel bars, dikes, and secondary channels. The overbank scour holes at both project locations remain connected to the Mississippi River channel by large notches; thus, pallid sturgeon could be found at both project locations.

Fat pocketbook mussel

The federally endangered fat pocketbook mussel is typically found in stable mud and sand substrates of slow-flowing rivers and streams. Large populations of fat pocketbook mussels are found within the St. Francis River Basin in Arkansas. There have been a few recent records of individual fat pocketbook mussels in the Mississippi River below the mouth of the St. Francis River, primarily in backwater habitat. However, both project areas are adjacent to outside bends containing high velocities and shifting sand substrates and do not contain suitable habitat for fat pocketbook.

3.1.5 CULTURAL RESOURCES

Existing Conditions: Near the Merriwether-Cherokee project area around River Mile 869, the steamer *Alaska* is reported to have sunk on a sandbar above Island No. 13 over 100 years ago. Additionally, the Merriwether Bend area near river mile 870.5 was the home of the Merriwether family that owned plantations in the area. However, the river has migrated a couple of miles south at these locations since those times; and no known cultural resources are within the present project right of way.

Presidents Island has a rich history. In 1862, the Confederate ram boat *General Jeff. Thompson* was sunk at the head of the island. Some years later several other boats, the *Platte Valley* and the *Mary Boyd*, crashed into the wreckage of the *General Jeff. Thompson* and sank. During the later part of the Civil War, the Island became a refugee camp for more than 1,500 African Americans. After the Civil War, General Nathan B. Forrest retired to the Island and managed a large plantation. Many years after the Civil War a “pest house” hospital, where people with highly contagious diseases were isolated from the general public, was constructed on the Island. There was also a prison located on the Island at the same time. During the 1920’s, the area became internationally known for cock fighting and other forms of gambling. A newly discovered historic cultural resource (with human remains) was observed after the flood of 2011. This site was located near the edge of overbank scour approximately 1,000 feet southeast of the proposed project. Based on the history of the island and the number of human remains uncovered by the 2011 floodwaters, the archeological site can be considered to be significant and potentially eligible for inclusion on the National Register of Historic Places. No known cultural resources are within the proposed project rights-of-way.

3.1.6 RECREATION RESOURCES

Existing Conditions: Outdoor recreational opportunities are limited around the Merriwether-Cherokee project area due to the predominantly agricultural landscape, but there are some types of activities available throughout the year. Fishing, waterfowl hunting, camping, hiking, and bird watching are available activities at Reelfoot Lake State Park and National Wildlife Refuge located approximately 10 miles northeast of the proposed work areas. Also, a public boat ramp on the Mississippi River is located a few miles upstream of the project area near Mississippi River Mile 872. Recreational fishing would be difficult in the Mississippi River in the immediate vicinity of the proposed project area at Merriwether-Cherokee due to high velocities around this outside bend; however, a dike field across the river and a dike field a few miles downstream of the project area would provide some fishing opportunities. Presidents Island is located just a few miles from downtown Memphis; however, it remains relatively isolated due to limited access. Public boat ramps are available in downtown Memphis upstream of the proposed project area and in McKellar Lake downstream of the project area; however, recreational fishing would be difficult in the Mississippi River in the immediate vicinity of the proposed project area due to high velocities around this outside bend. The Tennessee Wildlife Resources Agency (TWRA) leases most of the agricultural and forested lands on Presidents Island as a wildlife management area and conducts three permitted weekend bow and arrow hunts per year for deer. The hunts on October 14-16 and October 21-23 are limited to a 150 hunter quota, and the hunt on December 2-4 is limited to a 50 hunter quota.

3.1.7 SOCIO-ECONOMIC RESOURCES

Existing Conditions: The Merriwether Cherokee project area is located in Lake County, a predominantly agricultural area. The population of Lake County in 2010 was 7,832 with an estimated 1.5 percent decrease from 2000 to 2010. The median household income of Lake County was \$24,700 from 2006 to 2010. The income of Lake County is mostly generated from retail trade and services, industry, agriculture, and tourism (mainly centered around Reelfoot Lake). Presidents Island is located near downtown Memphis. The population of Memphis was 646,889 in 2010 a decrease of 0.5 percent from 2000. The median household income of Memphis was \$36,473 from 2006 to 2010. Presidents Island is part of the International Port of Memphis, one of the largest inland ports on the shallow draft portion of the Mississippi River. The Memphis Commercial Appeal reported that a June 2011 economic analysis of the port activities showed a 7.1 billion dollar impact with the port being directly or indirectly responsible for 15,691 jobs (Risher 2011). In 2009, the Waterborne Commerce Statistics Center reported over 13.9 million tons of commodities through the port, ranking it 19th in total domestic trade among U.S. Ports. The top five commodities were petroleum and petroleum products (~29%), coal and lignite (~22%), food and farm products (~20%), crude materials (~16%), and chemicals and related products (~7%).

3.1.8 AIR QUALITY

Existing Conditions: Lake and Shelby Counties, Tennessee, are presently classified as “in attainment” with the state’s air quality requirements.

3.1.9 WATER QUALITY AND HYDROLOGY

Existing Conditions: The entire main stem of the Mississippi River in the State of Tennessee is listed as impaired on the final 2010 303(d) list because it was not fully supporting designated use classifications due to elevated levels of chlordane, dioxins, and polychlorinated biphenyls (PCBs) in fish tissue samples and for physical substrate habitat alterations (TDEC 2010). There were also some elevated levels of mercury in fish tissue samples near the City of Memphis in Shelby County. Total Maximum Daily Loads (TMDLs) for chlordane, dioxins, and PCBs in the Mississippi River were approved by EPA on 25 July 2008 (TDEC 2008).

The overbank scour hole at each project location are currently hydrologically connected to the mainstem Mississippi River channel by large notches in the recently restored top bank comprised of stone revetment.

3.1.10 AQUATIC RESOURCES AND FISHERIES

Existing Conditions: Each of the project areas currently contain recently restored rock revetment along the previous top bank alignment with deep overbank scour holes landside of this revetment from the flood of 2011. A large notch approximately 300 feet in top width currently connects the overbank scour hole with the main channel at each location. Hydropsychid caddisflies have likely begun to colonize the large limestone rocks comprising the rock revetment. Chironomids, oligochaetes, amphipods, and nematodes would have colonized the sandy substrate at the bottom of the overbank scour holes. Gars, catfishes, shads, numerous minnows and suckers, bowfin, and freshwater drum would be fish species common to the overbank scour holes.

3.1.11 NAVIGATION

Existing Conditions: The Memphis District maintains a commercial navigation channel along 355 miles of the Mississippi River from Cairo, Illinois, near river mile 954, to the mouth of the White River at Rosedale, Mississippi, River Mile 599, which includes the two project areas. Over 250 million tons of goods pass through the Memphis District boundaries annually. The major commodities include: petroleum and petroleum products, crude materials, food and farm products, chemicals and related products, primary manufactured goods, and coal. The Memphis District also maintains nine harbors throughout its boundaries, including the Memphis Harbor near the Presidents Island project area.

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 AGRICULTURAL LANDS, PRIME AND UNIQUE FARMLANDS

Future Conditions with No Action: With no action, repairs to the agricultural lands surrounding the large overbank scour holes would continue. Most of the sand deposits would likely be removed and repairs to agricultural facilities, irrigation systems, and drainage ditches would continue. The timing and extent of these repairs at Merriwether-Cherokee would be dependent on the restoration of the Sheep Ridge Levee. The risk of river cut-offs at both locations would remain for future high water events. Much of the land susceptible to the river cutoffs was shown as eligible for classification as prime farmland prior to the flood of 2011 (SSURGO 2012) and would be removed from production if cut-offs occur.

Future Conditions with the Proposed Action: With the proposed action, the channel improvement features along these reaches of the Mississippi River would be stabilized reducing the risk of river cut-offs and associated loss of farmlands throughout these river reaches. The placement of rock would be conducted using water based equipment. The proposed dredging sites for both Merriwether-Cherokee and Presidents Island are located approximately 2 miles downstream of the top bank failures. Dredge pipes may be temporarily placed across agricultural fields to carry the dredge material from the dredging locations to fill the overbank scour holes. The temporary rights-of-way would be approximately 150 feet in width to accommodate the dredge pipes. Exact alignment of dredge pipes would be determined upon identification of suitable dredge fill. Based on the project footprint and nature of the proposed work, a Farmland Conversion Impact Rating (Form AD-1006) is not required from the Natural Resources Conservation Service (NRCS).

4.2 TERRESTRIAL AND WILDLIFE RESOURCES

Future Conditions with No Action: Without implementation of the proposed action, the risks for river cutoffs at both Merriwether-Cherokee and Presidents Island would remain high during large flood events. On-going repairs to the lands surrounding the large overbank scour holes would continue. Some previously farmed lands with extensive sand deposits and/or scour within and immediately adjacent to the proposed project areas could revert into forested areas due to abandonment of agriculture or from enrollment into conservation easements. If river cutoffs occur from future flood events, large scale land use changes from agriculture to forested areas would be likely due to restricted access. Terrestrial and wildlife habitat would be created due to the newly created islands within the Lower Mississippi River; however, extensive channel improvement measures would be needed to stabilize the navigation channel.

Future Conditions with the Proposed Action: With implementation of the proposed action, land use in both project areas would likely return to a state similar to that which existed before the flood of 2011. Any wildlife utilizing the scour holes would be displaced. Top bank failures at both Merriwether-Cherokee and Presidents Island occurred in areas where tree screens were limited (less than 100 feet in width). Landowners would be encouraged to allow for tree screens

(mature vegetation) to grow to a minimum width of 300 feet adjacent to top bank. These potential tree screens would likely be dominated by cottonwood, black willow, and sugarberry, and could be used as wildlife corridors connecting larger wooded tracts. Dredge pipes may temporarily be placed across land to carry dredge fill to the overbank scour holes. Exact alignment of the dredge pipes would be determined upon identification of suitable dredge fill. At the Merriwether-Cherokee project area, the majority of the dredge pipe would follow the Sheep Ridge levee or parallel to the riverbank. At Presidents Island, the majority of the dredge pipe would be placed over agricultural fields or parallel the bank. Nevertheless some minor clearing of vegetation adjacent to the riverbank may be needed due to the dredge pipe alignment. The temporary rights of way would be approximately 150 feet in width to accommodate these dredge pipes, and any cleared vegetation would be allowed to reestablish upon completion of the dredge fill operations.

4.3 WETLANDS

Future Conditions with No Action: Without implementation of the proposed action, some of the prior converted farmland containing extensive sand deposits and/or scour within and immediately adjacent to the proposed project areas could revert into wetlands due to abandonment of agriculture or from enrollment into conservation easements. If river cutoffs occur and large islands are created in the river, wetland habitat would be created on lower elevations of these islands. Some of the lands currently in the wetland reserve program on the southern end of the Merriwether-Cherokee reach would be lost due to the scouring effects of overbank flows.

Future Conditions with the Proposed Action: Wetlands are not present within the proposed project footprint at Merriwether-Cherokee or Presidents Island. Large overbank scour holes (deep water habitat) surrounded by sand deposits exist within the proposed project footprint. Pursuant to Section 404 of the Clean Water Act, the proposed placement of rock within the scour holes and the proposed dredge fill are covered under Nationwide Permit 3 for Maintenance Activities. An Aquatic Resource Alteration Permit (ARAP), or Section 401 water quality certification, was received from the State of Tennessee for the proposed repairs at Merriwether-Cherokee on 4 April 2012 and for Presidents Island on 19 March 2012. These ARAP permits are shown in Appendix B.

4.4 THREATENED AND ENDANGERED SPECIES

Future Conditions with No Action: There is a small possibility that least terns could attempt to nest on the sand deposits near the overbank scour holes if high water stages extend into the upcoming summer months and leave only limited isolated sandbar habitat available. However, land based predation would be high on these areas, and the terns would depart for isolated sandbars in the Mississippi River once the sandbars became exposed. Furthermore, least terns would not be expected to use the sand deposits after this year due to the encroachment of vegetation occurring at the two locations.

The no action scenario would result in the large notches left in the restored top bank being closed to stabilize the bank; thus, pallid sturgeon would not utilize the scour holes except during overbank flood events. If river cutoffs occurred at the two project locations, there would be some additional secondary channel, island tips, and other habitats that could be utilized by pallid sturgeon.

Fat pocketbook mussels would not be expected to utilize either project area due to unsuitable habitat during typical conditions. However, if future flood events caused river cutoffs and flow conditions allowed for a secondary channel containing stable substrate, there is potential for the creation of suitable fat pocketbook mussel habitat. This would only occur under ideal future conditions; and it is not likely due to large volumes of flow and sandy substrate.

Future Conditions with the Proposed Action: Regular nesting colonies of the interior least tern occur on the sandy point bars (and associated dike fields) across the river and a few miles downstream from both project areas. The proposed construction of the stone baffles and dredge fill will be localized to the overbank scour areas and would not adversely impact the least tern. Dredging operations could be conducted adjacent to the downstream nesting colonies depending on the location of suitable substrate. Dredging operations would be conducted outside of the nesting season if possible; however, the timing of the repairs would proceed opportunistically, as river conditions permit, and there is a possibility of dredging during the nesting season. The only work needed on potential nesting sandbars would be the temporary placement of dredge pipe and care would be taken to avoid nests. Pallid sturgeon can be found in most habitats in the lower Mississippi River, including the overbank scour holes and potential dredge locations. The potential spawning season of the pallid sturgeon is from 1 April to 30 June. Channel improvement activities typically avoid this time period in the Memphis District. However, timing of the proposed repairs would proceed opportunistically, as river conditions permit, and there is a possibility of construction activities being conducted during the potential pallid sturgeon spawning season. Spawning sites have not yet been documented on the lower Mississippi River, but spawning is suspected to occur on gravel bars. No gravel bars will be impacted by the proposed work. Any potential harassment of pallid sturgeon from construction would be localized and difficult to measure, but would not result in jeopardy of the species. The large notches that are present in the restored top bank would allow for pallid sturgeon to regress to the Mississippi River channel as the overbank scour hole is filled with dredge material. Fat pocketbook mussels would not be expected to utilize either project area due to unsuitable habitat during typical conditions; thus, no impacts to fat pocketbook mussels should occur due to the proposed repairs.

The proposed actions have been coordinated with the U.S. Fish and Wildlife Service and are part of an emergency consultation for flood repairs due to the 2011 flood, as provided for in Section 7 of the Endangered Species Act, as amended. A copy of this emergency consultation is included in Appendix B.

4.5 CULTURAL RESOURCES

Future Conditions with No Action: Leaving the project area as it presently exists, will leave open the possibility of further erosion and scouring during flood events, thus causing more damage to the area. Also, this will leave open the possibility of damaging the known archeological site on Presidents Island should major flooding occur.

Future Conditions with the Proposed Action: Completion of the proposed action will provide erosion protection to this portion of Presidents Island and will provide protection against flood damages to the known archeological site southeast of the project. Protecting the site from damage is extremely important due to the history of Presidents Island, the number of human remains discovered, and the number of potential human remains in the site.

4.6 RECREATION RESOURCES

Future Conditions with No Action: Without implementation of the proposed action, there would be no significant impacts to recreational fishing in the Mississippi River at either project location. If a river cutoff occurred at Presidents Island, access to a large portion of the TWRA leased hunting lands would be limited due to the creation of a large island.

Future Conditions with the Proposed Action: Overall, no adverse impacts to recreational resources would occur from implementation of the proposed action. The temporary placement of dredge pipes on Presidents Island could occur on the TWRA leased deer hunting lands. However, due to the small area needed for placement of dredge pipes, no significant impediments to hunting would occur.

4.7 SOCIO-ECONOMIC RESOURCES

Future Conditions with No Action: The socio-economic resources at both project areas were disrupted with the overbank flooding of 2011. Damage to property, agricultural fields, and the Sheeps Ridge Levee occurred at Merriwether-Cherokee. At Presidents Island, there were losses of rent from agricultural leases due to flooding and flooding of some industrial buildings. In the likelihood that future flood events cause river cutoffs at the two project locations, agricultural land would be lost due to scour and isolation of lands from river flows. A river cutoff at Presidents Island would result in extensive damage to the mouth of McKellar Lake Harbor, resulting in at least a temporary shutdown of the shipment of waterborne commerce in the port. River cutoffs at both locations would also result in at least a temporary shutdown of navigation and associated waterborne commerce throughout these two river reaches until the necessary channel improvement structures could be constructed and the Coast Guard deemed the areas safe for navigation.

Future Conditions with the Proposed Action: The proposed flood damage repairs would lower the risk of disruption of waterborne commerce from potential river cutoffs. Risks to the

agricultural lands and associated income would also be lowered with the proposed repairs. Repairs to the agricultural lands and facilities would continue, and the overall socio-economic resources within the project areas would most likely return to a condition similar to what existed prior to the flood of 2011 with implementation of the proposed actions.

4.8 AIR QUALITY

Future Conditions with No Action: Without implementation of the proposed action, air quality in the area would not change.

Future Conditions with the Proposed Action: The various types of conventional construction equipment that would be used for construction with implementation of the proposed action are classified as mobile sources. No permits are required for air emissions from mobile sources within attainment areas. Best management practices would be used throughout the construction to minimize air pollution. No adverse impacts to air quality are expected.

4.9 WATER QUALITY AND HYDROLOGY

Future Conditions with No Action: Without implementation of the proposed action, there is an increased risk for permanent river cutoffs at the two project locations. At Merriwether-Cherokee, approximately nine miles of river would be cut off as overbank flows scoured and cut across approximately two miles of land. At Presidents Island, approximately six to seven miles of river would be cut off as flows scoured across approximately 3.5 miles of land. Some slope adjustment would likely occur due to the cutoffs at these two river reaches. The typical response to cutoffs in an alluvial channel such as, the Lower Mississippi River is degradation upstream of the cutoff and aggradation downstream (Biedenharn et al. 2000). Extreme sediment pulses have been observed with quickly formed chute cutoffs on large rivers and would be expected at these locations (Zinger et al. 2011).

Future Conditions with the Proposed Action: Dredging activities associated with construction would result in a temporary increase in turbidity within the Mississippi River. At Merriwether-Cherokee, approximately 1.2 million cubic yards of dredge fill would be pumped into the area between the stone baffle and top bank. Assuming a production rate of approximately 26,400 cubic yards of dredged sand per day, approximately 46 days of dredging would likely be required for the dredge fill. At Presidents Island, approximately 2 million cubic yards of dredge fill would be needed to fill the scour hole between the containment baffle and top bank. Assuming a production rate of approximately 26,400 cubic yards of dredged sand per day, approximately 76 days of dredging would likely be required for the dredge fill. At both locations, dredge sand would be piped in from the river near the failure locations and effluent would return to the Mississippi River through an existing notch in the recently restored top bank closure structure. The overall water quality and hydrology within these two river reaches would return to pre-construction conditions upon completion. Pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act, the proposed placement of rock within the scour holes

and the proposed dredge fill are covered under Nationwide Permit 3 for Maintenance Activities. An Aquatic Resource Alteration Permit (ARAP), or Section 401 water quality certification, was received from the State of Tennessee for the proposed repairs at Merriwether-Cherokee on 4 April 2012 and for Presidents Island on 19 March 2012. These ARAP permits are shown in Appendix B.

4.10 AQUATIC RESOURCES AND FISHERIES

Future Conditions with No Action: Without implementation of the proposed action, the overbank scour holes would continue to be used by fish species common to slackwater areas adjacent to the river channel, such as, gars, catfishes, shads, numerous minnows and suckers, bowfin, and freshwater drum. Macroinvertebrates, such as, chironomids, oligochaetes, amphipods, and nematodes would continue to colonize the sandy substrate within the scour holes. If future flood events caused river cutoffs at the two river reaches, side channels would likely be formed creating new habitat types for aquatic resources. Extensive channel improvement activities would be needed to stabilize the river if cutoffs occur.

Future Conditions with the Proposed Action: Temporary impacts would occur from dredging activities associated with filling the overbank scour hole between the proposed stone baffle and restored top bank. Fish would be expected to regress into the Mississippi River channel through the large notch in the recently restored top bank and some macroinvertebrates would drift downstream upon initiation of construction activities. Some of the less mobile macroinvertebrates would be lost with the dredge fill activities. The overall fisheries and other aquatic resources within these two river reaches would likely return to a condition similar to what existed prior to the flood of 2011.

4.11 NAVIGATION

Future Conditions with No Action: Without implementation of the proposed action, continued channel maintenance activities would be needed to protect the bank within the immediate vicinity of the project locations. If river cutoffs occur due to large flood events, navigation would be shutdown throughout the two river reaches until channel stabilization measures were constructed and the Coast Guard deemed the areas safe for navigation. A river cutoff at Presidents Island would shutdown navigation in and out of the McKellar Lake Harbor until this river reach was stabilized. The existing river training structures already in place along the two river reaches, totaling \$54,000,000 at Merriwether-Cherokee and \$47,000,000 at Presidents Island, would be rendered useless if a new navigation channel was cut due to river cutoffs. Head cutting resulting from cutoffs would progress upstream causing more damage to these reaches and would degrade many of the existing channel improvement structures in place for navigation. If cutoffs were formed quickly, large sediment pulses would be expected downstream posing a potential need for extensive dredging to stabilize the navigation channel following a future flood event.

Future Conditions with the Proposed Action: With implementation of the proposed action, navigation on the Mississippi River would not change. The barges and small towboats required for the placement of rock would be working close to the bank and would not pose a significant navigation hazard. Dredging activities would be conducted outside of the main navigation channel of the Mississippi River to avoid any impacts to navigation. The contractor would have a contact pilot on the job at all times to manage towboat traffic and conduct communication with industry. The Coast Guard would be coordinated with during construction to ensure continued river navigation safety. No adverse impacts to navigation are expected.

4.12 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE (HTRW)

A search of EPA databases on superfund sites (CERCLIS), toxic release inventory (TRI), Resource Conservation and Recovery Act (RCRA), and water discharge permits (PCS) revealed that no releases or spills occurred within the proposed work limits. Site visits to the two project areas did not reveal any potential HTRW concerns within the proposed project footprint. No additional HTRW investigations are recommended unless new information is revealed or HTRW is discovered during construction.

4.13 CUMULATIVE IMPACTS

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

Federal efforts to improve navigation on the Mississippi River began as early as 1820 (USACE 1976). Surveys, maps, and charts were developed for the river, and USACE began the removal of stumps, snags, and other hazards to navigation in 1824. By the middle of the nineteenth century, growing river commerce and increased destruction from flooding created the need for more Federal participation in improvements for navigation and flood control. On 28 June 1879, the Mississippi River Commission (MRC) was created by an Act of Congress to prepare a plan to permanently locate and deepen the navigation channel, stabilize the banks, prevent destructive floods, and promote commerce along the river. Following the disastrous flood of 1927, the Flood Control Act of 1928 was passed committing the Federal Government to a definite program of flood control, channel stabilization, and river regulation, known as the Mississippi River and Tributaries (MR&T) Project. The MR&T project has four major features: 1) levees and floodwalls for flood protection, 2) floodways to divert excess flows past critical reaches, 3) channel improvement and stabilization for both navigation and flood control, and 4) tributary basin improvements for flood protection and drainage.

The MR&T project is responsible for many of the physical, hydraulic, and ecological features that presently exist in the Lower Mississippi River (Baker et al. 1991). Dikes, revetments, and bendway weirs found throughout the Lower Mississippi River have resulted in a mosaic of artificial and natural habitats utilized by aquatic organisms and wildlife, including at least 91 species of freshwater fishes (Baker et al. 1991). Levee construction has greatly reduced the amount of seasonally inundated floodplain throughout the region. Keeping the channel from naturally meandering has reduced the formation of new slackwater habitats in the floodplain. Although secondary channels continue to form and aggrade, there appears to be a net loss in the number of these features. The purpose of the proposed top bank repairs is to reduce the risk of river cutoffs from occurring at the two project locations protecting property, infrastructure, the mouth of McKellar Lake Harbor, and ensure navigation safety throughout the two river reaches. Restricting river cutoffs from occurring would maintain the current navigation channel and protect valuable infrastructure and property; however, it would restrict the creation of new secondary channels and large sediment fluxes that would occur if cutoffs scoured a new channel during a future large flood event.

The 2011 Mississippi River flood was the flood of record for most gauges on the Lower Mississippi River. Damage assessment reports were completed for levees, channel improvements, navigation channels, and structures associated with the MR&T project. A prioritized list of critical repairs has been developed, and the recently approved Disaster Relief Appropriations Act designated approximately \$802 million for repairs to the MR&T system. Construction of these critical repairs is ongoing.

5.0 COORDINATION

Comments are being solicited from the public; federal, state and local agencies and officials; Indian Tribes; and other interested parties in order to consider and evaluate the impacts of the proposed activity. Any comments received will be considered by USACE to determine whether to modify or condition the project.

6.0 MITIGATION

The Council on Environmental Quality's regulations (40 CFR 1508.20) implementing the procedural provisions of the National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. 4321 et seq.) define "mitigation" as including a) avoiding the impact altogether by not taking a certain action or parts of an action; b) minimizing impacts by limiting the degree or magnitude of the action and its implementation; c) rectifying the impact by repairing, rehabilitating, or restoring the affected environment; d) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and e) compensating for the impact by replacing or providing substitute resources or environments.

No adverse impacts have been identified that would require compensatory mitigation.

7.0 COMPLIANCE WITH ENVIRONMENTAL LAWS AND REGULATIONS

The relationships of the tentatively recommended plan to the requirements of environmental laws, executive orders, and other policies are presented in Table 2 (IWR 1996):

Table 2. Relationship of Plan to Environmental Laws and Regulations

<u>Federal Policies and Acts</u>	<u>Compliance Status</u>
Archaeological Resources Protection Act of 1979	1
Bald Eagle Protection Act	1
Clean Air Act Amendments of 1977	1
Clean Water Act of 1977, as amended	1
Endangered Species Act of 1973, as amended	2
Farmland Protection Policy Act of 1981	1
Fish and Wildlife Coordination Act of 1958	2
Food Security Act of 1985	1
Land and Water Conservation Fund Act	3
National Environmental Policy Act of 1969	2*
National Historic Preservation Act of 1966, as amended	2
River and Harbors Appropriation Act of 1899	1
Water Resources Development Act of 1986	1
Water Resources Planning Act of 1965	1
<u>Executive Orders</u>	
Floodplain Management (E.O. 11988)	1
Protection, Enhancement of the Cultural Environment (E.O. 11593)	1
Protection of Wetlands (E.O. 11990)	1
Environmental Justice in Minority and Low Income Populations (E.O. 12898)	1
Invasive Species (E.O. 13112)	1
<u>Other Federal Policies</u>	
Prime and Unique Farmlands	1
Water Resources Council, Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies	1

1/ Full compliance with the policy and related regulations has been accomplished.

2/ Partial compliance with the policy and related regulations has been accomplished.

3/ Not applicable.

*Full compliance would be met following a Finding of No Significant Impact.

8.0 CONCLUSION

This office has assessed the environmental impacts of various project alternatives. No significant impacts to agricultural lands, terrestrial and wildlife resources, wetlands, threatened and endangered species, cultural resources, recreation resources, socio-economic resources, air quality, water quality and hydrology, aquatic resources and fisheries, navigation, and HTRW are expected. There are no foreseen cumulative impacts that would have a significant negative impact on human health or the environment. Therefore, an environmental impact statement is not warranted. Pending the results of the public review of this document a finding of no significant impact (FONSI) would be prepared, if warranted.

9.0 PREPARED BY

This draft EA and the associated draft FONSI were prepared by Mike Thron, biologist, with cultural resources sections prepared by Jimmy McNeil, archaeologist. The address of the preparers is: U.S. Army Corps of Engineers, Memphis District, Environmental Compliance Branch, USACE Memphis District, Attn: Mike Thron, 167 North Main St., B202, Memphis, TN 38103-1894.

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APPENDICES

APPENDIX A – Alternatives

Alternative 2.2 Restore top bank, completely fill scour hole with dredge material, and then place ACM along the riverbank.

Alternative 2.3 Construct stone baffle/containment dike on recommended alignments and fill with dredge material.

Alternative 2.4 Construct stone baffle/containment dike on further landward alignments and fill with dredge material.

Alternative 2.5 Construct stone baffle/containment dike on further riverward alignments and fill with dredge material.

APPENDIX B – Coordination

Aquatic Resource Alteration Permit from Tennessee Department of Environment and Conservation for Top Bank Repairs at Presidents Island, dated 19 March 2012.

Aquatic Resource Alteration Permit from Tennessee Department of Environment and Conservation for Top Bank Repairs at Merriwether-Cherokee, dated 4 April 2012.

Endangered Species Act Emergency Consultation for repairs of the 2011 flood damage, letter dated 23 April 2012.

APPENDIX A

MERRIWETHER-CHEROKEE PROJECT AREA
ALTERNATIVE 2.2

RESTORED TOP BANK
TO BE FACED WITH ACM
AT LATER DATE

DREDGE FILL





PHOTO TAKEN
AUGUST 2011

ARIZONA COUNTY
CRITTENDEN COUNTY

TENNESSEE
SHELBY COUNTY

STONE FILL
TO BE RAISED

DREDGEFILL

MISSISSIPPI RIVER
FLOW

ALTERNATIVE NO. 2
DREDGEFILL ENTIRE
SCOUR HOLE



NO.	DATE	DESCRIPTION

DATE: 27 MARCH 2012	DESIGNED BY: JSC
SOBATHUM NO.:	JOB NO.:
CONTRACT NO.:	CDR NO.:
OWNER & MASTER P.E.:	CDR NO.:
FILE NUMBER:	CDR NO.:
PLAT SCALE:	CDR NO.:
PLAT OF DATE:	CDR NO.:
FILE NAME:	CDR NO.:

U.S. ARMY CORPS OF ENGINEERS	MEMPHIS DISTRICT	MEMPHIS, TENNESSEE
SCALE AS SHOWN	PHASE 1B	GENERAL MAP
	RIVER MILE 732L	MISSISSIPPI RIVER

SHEET NUMBER	G-004
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- LEGEND**
- STONE FILL TO BE RAISED
 - STONE BAFLE TO BE CONSTRUCTED
 - EXISTING DIKE
- NOTES:**
- 1- CONTOURS AND ELEVATIONS REFER TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 1988).
 - 2- HORIZONTAL DATUM WAS COMPUTED ON THE NORTH AMERICAN DATUM OF 1983 (NAD83) USING UTM ZONE 15 PLANE COORDINATES IN FEET.
 - 3- AZIMUTHS ARE REFERENCED TO 0 NORTH.

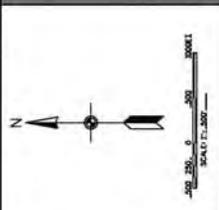


PHOTO TAKEN AUG 2011

870

MISSISSIPPI RIVER
FLOW

5

4

2

1

868

869

EXISTING NOTCH IN STONE FILL

TOP BANK STONE PAVING 2' THICK

EXISTING STONE FILL

DREDGE FILL

STONE PAVING

TOP BANK STONE PAVING 2' THICK

STONE PAVING

STONE BAFFLE TO BE CONSTRUCTED

LEGEND

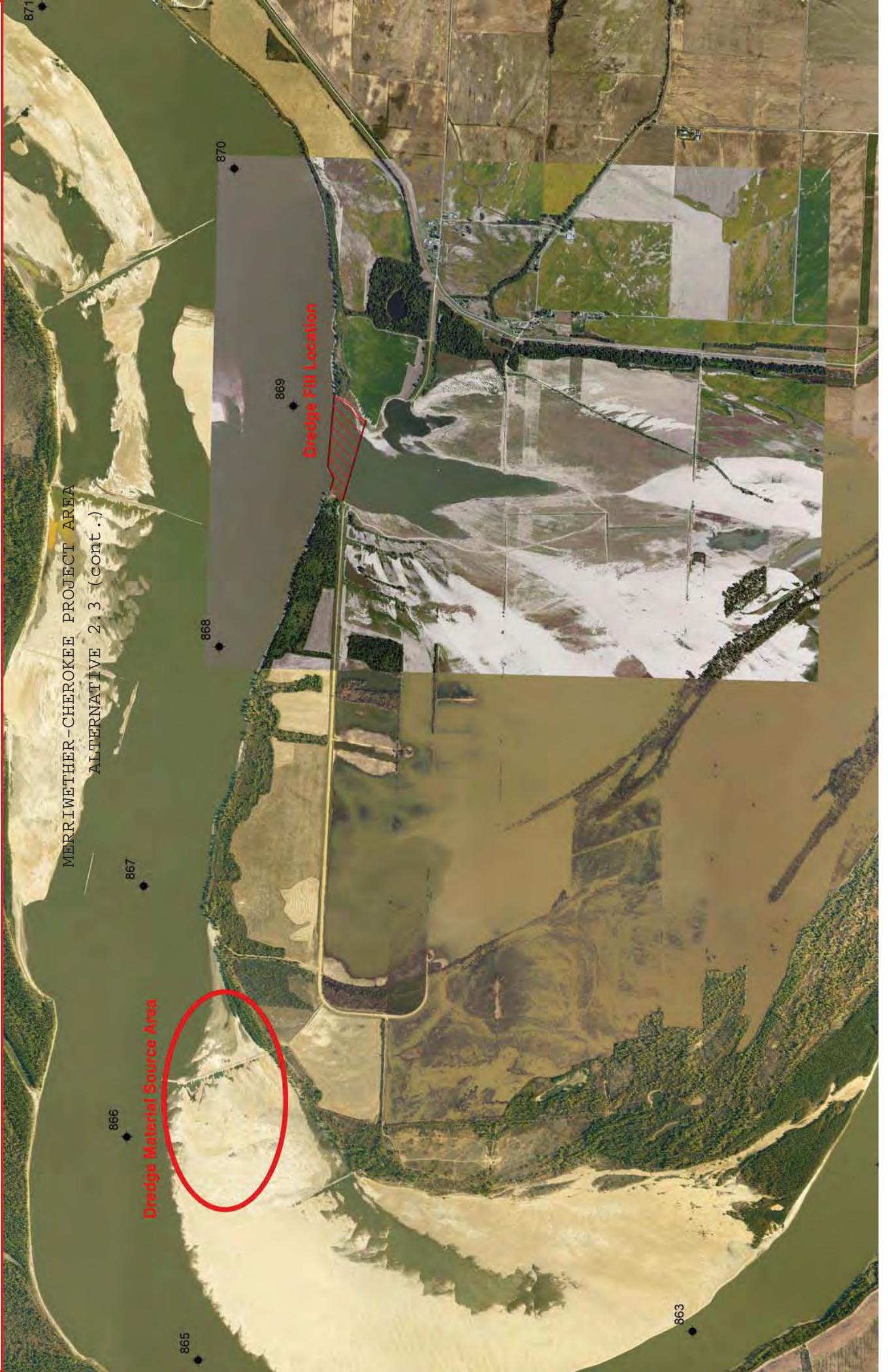
- STONE BAFFLE TO BE CONSTRUCTED
 - STONE PAVING TO BE PLACED ON SLOPES
 - ▨ STONE PAVING TO BE PLACED ON TOP BANK
 - STONE FILL RECENTLY CONSTRUCTED
- NOTES:
- 1- CONTOURS ARE ABOVE AND BELOW THE 2007 LOW WATER REFERENCE PLANE (LWRP)
 - 2- ELEVATIONS REFER TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 1988)
 - 3- HORIZONTAL DATUM WAS COMPUTED ON THE NORTH AMERICAN DATUM OF 1983 (NAD83) USING UTM ZONE 16 PLANE COORDINATES IN FEET.
 - 4- AZIMUTHS ARE REFERENCED TO 0 NORTH.

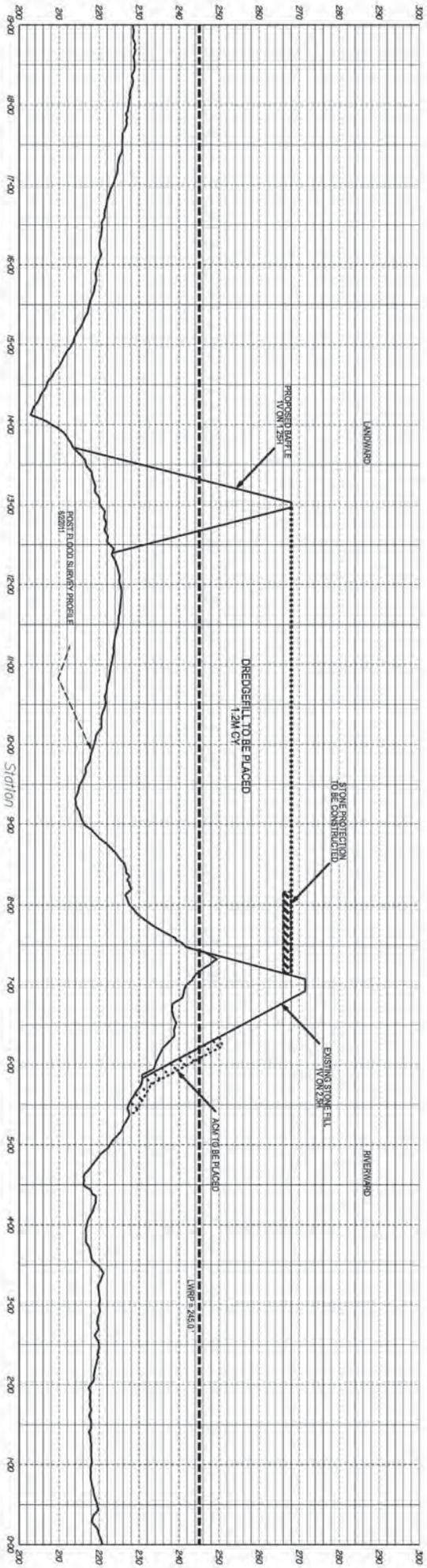
TENNESSEE
LAKE COUNTY

		MISSISSIPPI RIVER CHANNEL IMPROVEMENT MERRIWETHER-CHEROKEE GENERAL MAP STONE BAFFLE RIVER MILE 869L	
SCALE AS SHOWN		SHEET DERIVATION FROM BOOK 4 OF 8	
DATE: 12 JANUARY 2012 DRAWN BY: CHECKED BY: DATE:	PROJECT NO.: DRAWING NO.: SHEET NO.: TOTAL SHEETS:	TITLE:	SCALE:

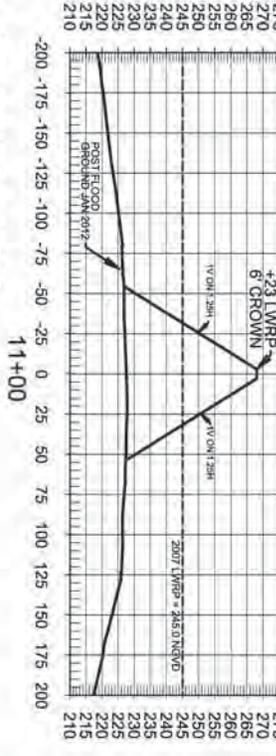
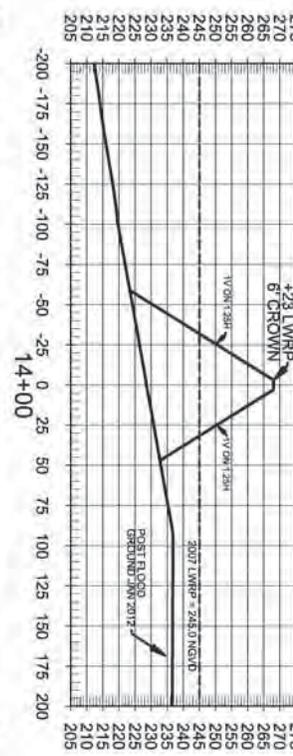
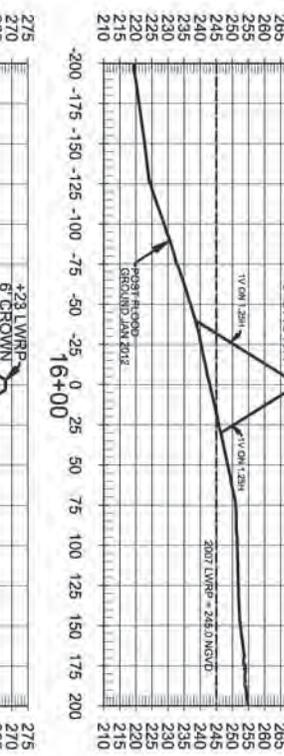
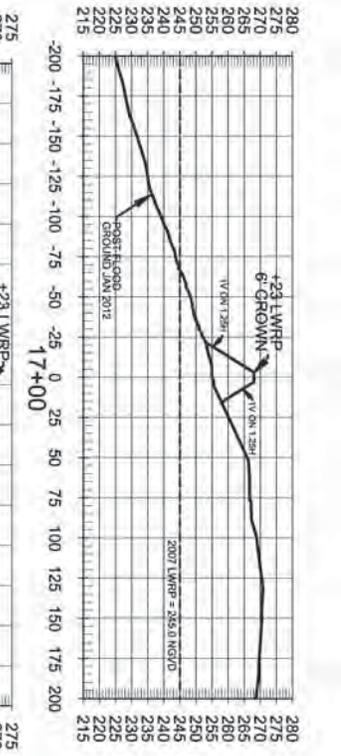
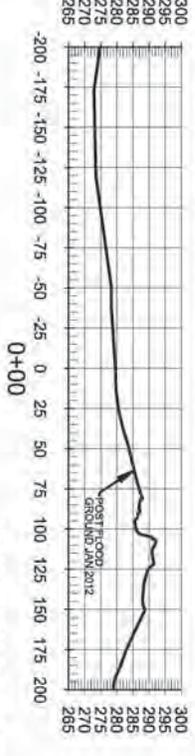
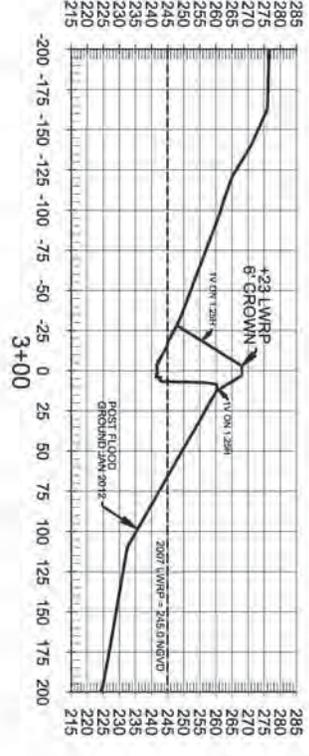
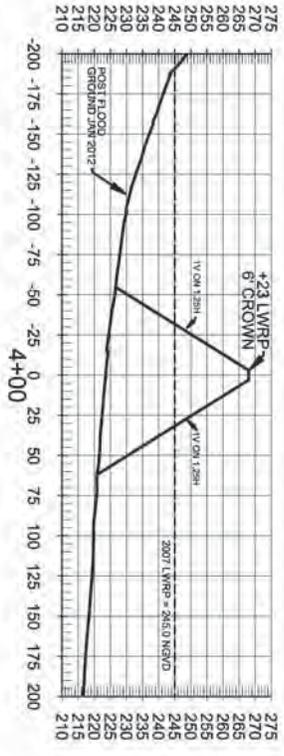
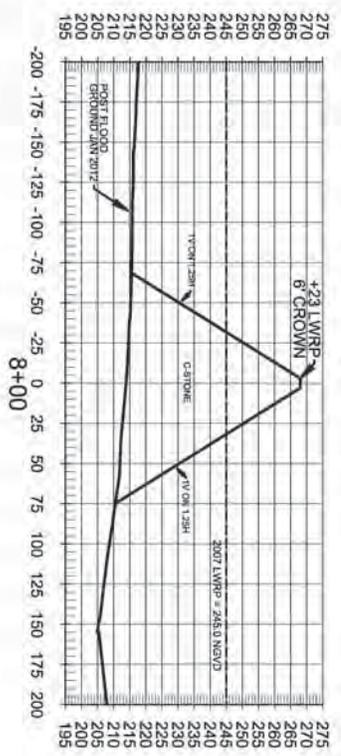
MERRIWETHER-CHEROKEE, LAKE COUNTY, TN

MERRIWETHER-CHEROKEE PROJECT AREA
ALTERNATIVE 2.3 (cont.)





CROSS SECTION
 MERRIWETHER-CHEROKEE
 TOP BANK CONSTRUCTION



NOTE: BAFFLE SIDE SLOPES ARE TO BE ANGLE OF REPOSE.

	DESIGNED BY: [] DRAWN BY: [] CHECKED BY: [] SUBMITTED BY: [] DATE: 18 MAR 2012 SOLICITATION NO.: [] CONTRACT NO.: [] FILE NUMBER: []
	SCALE AS SHOWN SHEET IDENTIFICATION: 5 OF 8
MERRIWETHER - CHEROKEE STONE BAFFLE CROSS SECTIONS RIVER MILE 869L	



PHOTO TAKEN
AUGUST 2011

ARKANSAS
CRITTENDEN COUNTY



TOP BANK TO BE
RESTORED

BANK TO
BE PAVED

TENNESSEE
SHELBY COUNTY

DREDGEFILL

STONE BAFFLE
TO BE CONSTRUCTED

BANK TO
BE PAVED

STONE FILL
TO BE RAISED

FLOW

- LEGEND**
- STONE FILL TO BE RAISED
 - - - TOP BANK TO BE RESTORED
 - ▨ STONE BAFFLE TO BE CONSTRUCTED
 - ▨ BANK TO BE PAVED
 - ⊗ EXISTING DIKE

- NOTES:**
- 1- CONTOURS AND ELEVATIONS REFER TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 1988).
 - 2- HORIZONTAL DATUM WAS COMPUTED ON THE NORTH AMERICAN DATUM OF 1983 (NAD83) USING UTM ZONE 15 PLANE COORDINATES IN FEET.
 - 3- AZIMUTHS ARE REFERENCED TO 0 NORTH.

NO.	DATE	DESCRIPTION

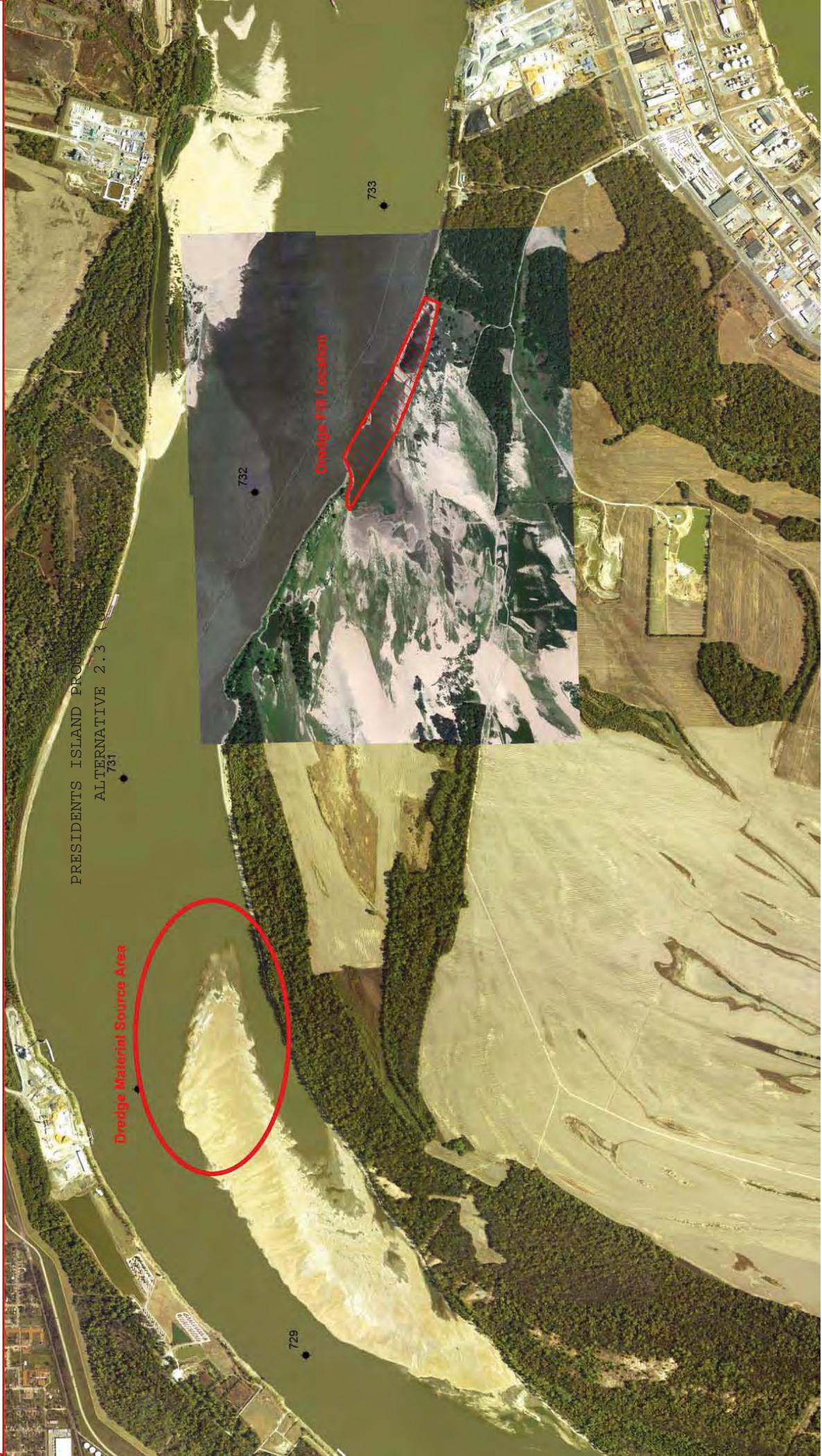
DATE: 1 MAR 2012	SCALE AS SHOWN
DESIGNED BY: [REDACTED]	U.S. ARMY CORPS OF ENGINEERS
CHECKED BY: [REDACTED]	MEMPHIS DISTRICT
APPROVED BY: [REDACTED]	MEMPHIS, TENNESSEE
PROJECT NO. [REDACTED]	STONE FILL
CONTRACT NO. [REDACTED]	GENERAL MAP
PLANSHEET NO. [REDACTED]	RIVER MILE 732L
PLANTING DATE: [REDACTED]	
PLANTING NO. [REDACTED]	
PLANTING DATE: [REDACTED]	
PLANTING NO. [REDACTED]	

MISSISSIPPI RIVER CHANNEL IMPROVEMENT
PRESIDENT'S ISLAND PHASE 1
GENERAL MAP
RIVER MILE 732L

SHEET NUMBER
G-104
1 OF 12

PRESIDENTS ISLAND, SHELBY COUNTY, TN

PRESIDENTS ISLAND PROJECT
ALTERNATIVE 2.3



Dredge Material Source Area

Dredge Fill Location

731

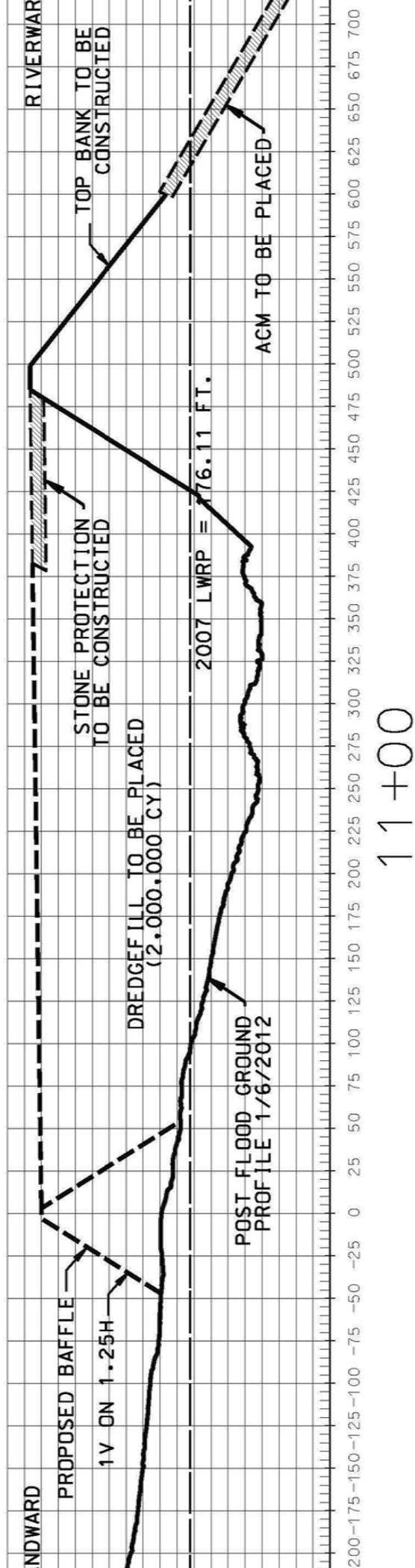
732

733

729

PRESIDENTS ISLAND PROJECT AREA
ALTERNATIVE 2.3 (cont.)

CROSS SECTIONS
PRESIDENT'S ISLAND
TOP BANK CONSTRUCTION



11+00

MERRIWETHER - CHEROKEE PROJECT AREA
ALTERNATIVE 2.4

RESTORED TOP BANK
TO BE FACED WITH ACM
AT LATER DATE



BAFFLE
ALIGNMENT #1

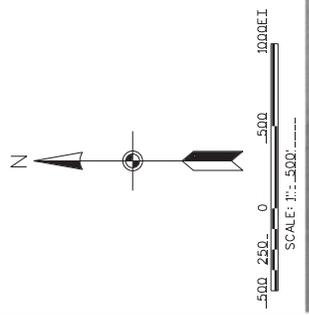
DREDGE FILL AREA

BAFFLE
ALIGNMENT #1

PRESIDENT'S ISLAND PROJECT AREA
ALTERNATIVE 2.4

ARKANSAS
CRITTENDEN COUNTY

PHOTO TAKEN
AUGUST 2011

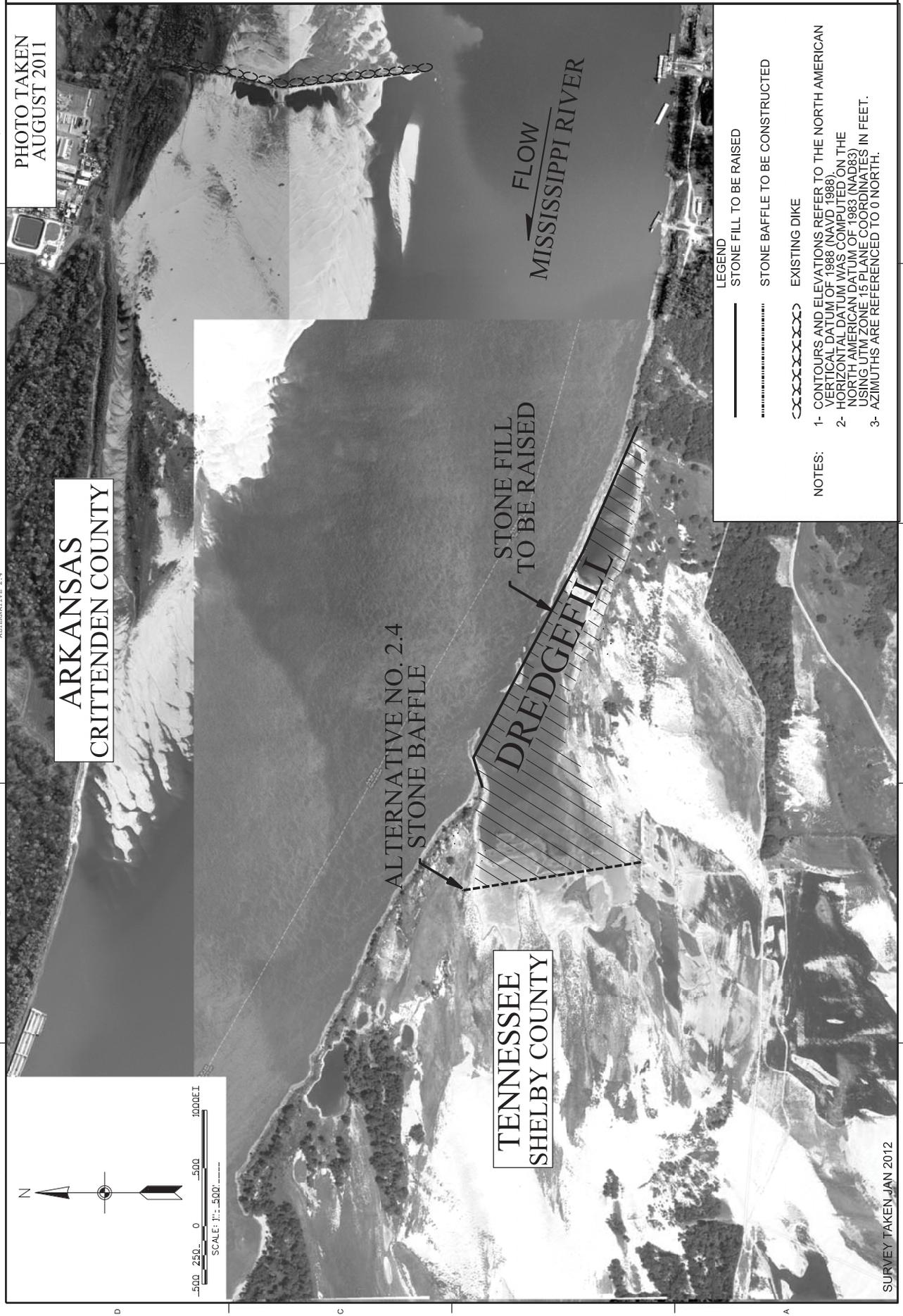


NO.	DATE	DESCRIPTION	BY

DATE: 27 MARCH 2012	DESIGNED BY: JSE
SOBATHUM NO: 105	JOB NO: 105
CONTRACT NO: 105	CDR NO: 105
CONTRACT NO: 105	CDR NO: 105
CONTRACT NO: 105	CDR NO: 105
CONTRACT NO: 105	CDR NO: 105
CONTRACT NO: 105	CDR NO: 105
CONTRACT NO: 105	CDR NO: 105
CONTRACT NO: 105	CDR NO: 105
CONTRACT NO: 105	CDR NO: 105

U.S. ARMY CORPS OF ENGINEERS MEMPHIS DISTRICT MEMPHIS, TENNESSEE	SCALE AS SHOWN
PHASE 1B PRESIDENT'S ISLAND GENERAL MAP RIVER MILE 732L	
MISSISSIPPI RIVER CHANNEL IMPROVEMENT	

SHEET NO. G-004



- LEGEND**
- STONE FILL TO BE RAISED
 - - - - - STONE BAFFLE TO BE CONSTRUCTED
 - XXXXXX EXISTING DIKE
- NOTES:**
- 1- CONTOURS AND ELEVATIONS REFER TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 1988).
 - 2- HORIZONTAL DATUM WAS COMPUTED ON THE NORTH AMERICAN DATUM OF 1983 (NAD83) USING UTM ZONE 15 PLANE COORDINATES IN FEET.
 - 3- AZIMUTHS ARE REFERENCED TO 0 NORTH.

SURVEY TAKEN JAN 2012

MERRIWETHER - CHEROKEE PROJECT AREA
ALTERNATIVE 2.5

RESTORED TOP BANK
TO BE FACED WITH ACM
AT LATER DATE

BAFFLE
ALIGNMENT #2

DREDGE FILL AREA



PHOTO TAKEN
AUGUST 2011

ARKANSAS
CRITTENDEN COUNTY

TENNESSEE
SHELBY COUNTY

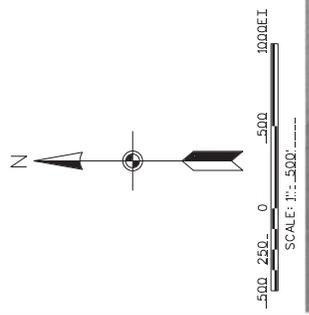
STONE BAFFLE
MOVED RIVERWARD

STONE FILL
TO BE RAISED

DREDGEFILL

ALTERNATIVE NO. 2.5
STONE BAFFLE

MISSISSIPPI RIVER
FLOW



- LEGEND**
- STONE FILL TO BE RAISED
 - STONE BAFFLE TO BE CONSTRUCTED
 - EXISTING DIKE
- NOTES:**
- 1- CONTOURS AND ELEVATIONS REFER TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 1988).
 - 2- HORIZONTAL DATUM WAS COMPUTED ON THE NORTH AMERICAN DATUM OF 1983 (NAD83) USING UTM ZONE 15 PLANE COORDINATES IN FEET.
 - 3- AZIMUTHS ARE REFERENCED TO 0 NORTH.

U.S. ARMY CORPS OF ENGINEERS MEMPHIS DISTRICT MEMPHIS, TENNESSEE SCALE AS SHOWN		MISSISSIPPI RIVER CHANNEL IMPROVEMENT PHASE 1B PRESIDENT'S ISLAND RIVER MILE 732L	
DESIGNED BY: DATE: 27 MARCH 2012 SUBMITTAL NO.: JOB NO.: CADD BY: CHECK BY:	CONTRACT NO.: DRAWN & CHECKED P.E. FILE NUMBER: PLOT SCALE: PLOT DATE:	SHEET NO.: DATE:	SHEET LOCATION G-004

SURVEY TAKEN JAN 2012

APPENDIX B



STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
MEMPHIS ENVIRONMENTAL FIELD OFFICE
DIVISION OF WATER POLLUTION CONTROL
8383 WOLF LAKE DRIVE
MEMPHIS, TN 38133

March 19, 2012

Mr. Edward Lambert
Chief, Planning Branch
U.S. Army Corps of Engineers
167 North Main Street, Room B-202
Memphis, TN 38103

Subject: **General Permit for Bank Stabilization
Aquatic Resource Alteration Permit (ARAP) NR1205.014
President's Island Top of Bank Repairs
Memphis, Shelby County, Tennessee**

Dear Mr. Lambert:

We have reviewed your application for the proposed river bank flood repairs and stabilization. Pursuant to the *Tennessee Water Quality Control Act of 1977* (T.C.A. § 69-3-101 et seq.) and supporting regulations the Division of Water Pollution Control is required to determine whether the activity described in the attached notice of coverage will violate applicable water quality standards.

This activity is governed by the *General Permit for Bank Stabilization*. The work must be accomplished in conformance with accepted plans and information submitted in support of application NR1205.014 and the limitations and conditions set forth in the *General Permit for Bank Stabilization* (enclosed). It is the responsibility of the permittee to ensure that all contractors involved with this project have read and understand the permit conditions before the project begins.

Please note that unnecessary vegetation removal is prohibited and stabilization activities are limited to the stream bank. In addition, adequate erosion controls must be installed prior to construction and maintained during construction of the project. All disturbed areas must be revegetated or otherwise stabilized upon completion of construction. Please make the necessary provisions for these circumstances.

We appreciate your attention to the Aquatic Resource Alteration Permit program. If you have any questions, please contact Mr. Lew Hoffman at (901) 371-3019 or by e-mail at Lew.Hoffman@tn.gov.

Sincerely,

A handwritten signature in blue ink that reads "Lew E. Hoffman".

Assistant Manager
Memphis Environmental Field Office

Encl: NOC and copy of general permit
CC: DWPC, Memphis EFO Permit File
Mike Thron, U. S. Army Corps of Engineers, Memphis District

Tennessee Department of Environment and Conservation

General Permit for Bank Stabilization



Effective Date: July 1, 2010
Expiration Date: June 30, 2015

Activities Covered by this Permit:

This general permit authorizes the repair and protection of eroded stream and reservoir banks. Bank stabilization activities typically include grading of the bank to the appropriate slope, based on hydrology, in conjunction with the placement of riprap, gabion baskets and/or installation of bioengineering techniques. Bioengineering techniques shall incorporate primarily materials found in the natural riparian environment, such as cedar tree revetments, rock or log current deflection weirs, live willow post application and log crib structures.

Limitations of this Permit:

Certain activities due to size, location or potential water quality impacts are not covered under this general permit. Those activities are described in this section. Activities not qualifying for authorization under this general permit may be authorized by an individual permit provided that all requirements of the *Tennessee Water Quality Control Act of 1977* are met.

- 1) Except as provided in item 1)a and 1)b of this section, the length of bank stabilization is limited to 300 linear feet.
 - a. Activities located within water resource development lands and waters, including flowage easements, managed by the Tennessee Valley Authority or the United States Corps of Engineers **are not** limited to 300 linear feet.
 - b. Activities using bioengineering techniques **are not** limited to 300 linear feet.
- 2) Activities that may adversely affect wetlands are not covered.
- 3) Activities located in any waterways which have been identified by the department as having contaminated sediments, and the activity will likely mobilize the contaminated sediments are not covered.
- 4) Activities that may result in an adverse effect to a threatened or endangered species, or to designated critical habitat; or is likely to jeopardize the continued existence of a species proposed for listing as endangered or threatened without prior authorization from the U.S. Fish and Wildlife Service as required by section 7 or section 10 of the Endangered Species Act where applicable are not covered. Adverse effects comprise, but are not necessarily limited to, the following: (a) death or injury to one or more individuals that results from activities associated with an action, (b) a change in habitat quantity or quality that results from activities associated with an action that renders the habitat unsuitable for the species, or (c) activities associated with an action that disrupts normal behavior or functions of individuals.
- 5) Activities that may result in the take, harassment, or destruction of plant or wildlife listed as threatened or endangered or a species deemed to be in need of management, as defined and identified under Tennessee Code Annotated (TCA) 70-08-103, Tennessee Wildlife Resources Agency (TWRA) Proclamations 00-14 and 00-15, and Division of Natural Heritage (DNH) Rule 0400-6-2 or which will destroy the habitat of such species without prior authorization from TWRA and/or DNH where applicable are not covered.
- 6) Activities, either individually or cumulatively, that may result in degradation to waters of the state are not covered. For example, this general permit shall not be used in incremental means to combine with other projects to alter larger areas of stream.
- 7) Activities that otherwise require an individual permit are not covered.

Obtaining Permit Coverage:

Coverage under this general permit may be obtained by submitting a signed and completed application (form CN-1091) to the division. Work shall not commence until written authorization from the division is received. As noted above, not all activities can be covered under this general permit, and an application for coverage may be denied when appropriate.

Certain activities do not require the submittal of an application or written authorization from the division prior to commencement of work. Those activities are:

- 1) where the length of the stream or reservoir bank to be treated does not to exceed a total length of 50 feet (limited to one site per 1000 linear feet of stream or reservoir bank and may be done only once without notification); or
- 2) where the activity is located within water resource development lands and waters, including flowage easement, managed by the Tennessee Valley Authority (TVA) or the United States Army Corps of Engineers (USCOE).

However, authorization from the appropriate federal management agency (TVA or USCOE) must first be obtained. Even though written authorization is not required, the proposed activity shall be performed in accordance with all limitations, terms and conditions of this permit, and authorization from the appropriate federal management agency (TVA or USCOE) must be obtained.

Where written authorization is required, the division will establish an expiration date for coverage under this general permit that is specific to the authorization and separate from the general permit's expiration date.

Terms and Conditions of this Permit:

All activities covered under this general permit shall comply with all terms and conditions contained hereinafter.

- 1) All work shall be accomplished in conformance with the accepted plans, specifications, data and other information submitted in support of the above mentioned application and the limitations, requirements, and conditions set forth herein.
- 2) All work shall be carried out in such a manner as will prevent violations of water quality criteria as stated in Rule 1200-4-3-.03 of the Rules of the Tennessee Department of Environment and Conservation. This includes, but is not limited to, the prevention of any discharge that causes a condition in which visible solids, bottom deposits, or turbidity impairs the usefulness of waters of the state for any of the uses designated by Rule 1200-4-4. These uses include fish and aquatic life (including trout streams and naturally reproducing trout streams), livestock watering and wildlife, recreation, irrigation, industrial water supply, domestic water supply, and navigation.
- 3) Applicant is responsible for obtaining the necessary authorization pursuant to applicable provisions of §10 of *The Rivers and Harbors Act of 1899*; §404 of *The Clean Water Act* and §26a of *The Tennessee Valley Authority Act*, as well as any other federal, state or local laws.
- 4) Applicant is responsible for obtaining coverage under the National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges from Construction Activities for construction sites involving clearing, grading or excavation that result in an area of disturbance of one or more acres, and activities that result in the disturbance of less than one acre if it is part of a larger common plan of development or sale.
- 5) Sediment shall be prevented from entering waters of the state. Erosion and sediment control measures shall be designed according to the size and slope of disturbed or drainage areas to detain runoff and trap sediment, and shall be properly selected, installed, and maintained in accordance with the manufacturer's specifications and good engineering practices. Information on erosion and sediment control measures can be found in the department's Erosion and Sediment Control Handbook (www.tn.gov/environment/wpc/sed_ero_controlhandbook/).
- 6) Erosion and sediment control measures shall be in place and functional before earth moving operations begin, and shall be constructed and maintained throughout the construction period. Temporary measures may be removed at the beginning of the work day, but shall be replaced at the end of the work day.
- 7) Litter, construction debris, and construction chemicals exposed to storm water shall be picked up prior to anticipated storm events (e.g. forecasted by local weather reports), or otherwise prevented from becoming a pollutant source for storm water discharges (e.g., screening outfalls, daily pick-up, etc.). After use, silt fences should be removed or otherwise prevented from becoming a pollutant source for storm water discharges.
- 8) Clearing, grubbing and other disturbance to the riparian vegetation shall be kept at the minimum necessary for slope construction and equipment operations. Unnecessary riparian vegetation removal, including trees, is prohibited.
- 9) Excavated materials, removed vegetation, construction debris, and other wastes shall be removed to an upland location and properly stabilized or disposed of in such a manner as to prevent reentry into the waterway.
- 10) The activity may not be conducted in a manner that would permanently disrupt the movement of fish and aquatic life.
- 11) Stream beds shall not be used as transportation routes for construction equipment. Temporary stream crossings shall be limited to one point in the construction area and erosion control measures shall be utilized where stream banks are disturbed. The crossing shall be constructed so that stream flow is not obstructed. Following construction, all materials used for the temporary crossing shall be removed and disturbed stream banks shall be restored and stabilized if needed.
- 12) Materials used in bank stabilization shall include clean rock, riprap, anchored trees or other non-erodible materials found in the natural environment. Unsuitable materials (e.g., trash, debris, car bodies, asphalt, etc.) are strictly prohibited. Furthermore, the materials shall be free of contaminants, including toxic pollutants, hazardous substances, waste metal, construction debris and other wastes as defined by T.C.A. 69-3-103(18).
- 13) Material may not be placed in a location or manner so as to impair surface water flow into or out of any wetland area.

- 14) Appropriate steps shall be taken to ensure that petroleum products or other chemical pollutants are prevented from entering waters of the state. All spills shall be reported to the appropriate emergency management agency and to the division. In the event of a spill, measures shall be taken immediately to prevent pollution of waters of the state, including groundwater.
- 15) This general permit does not authorize impacts to cultural, historical or archaeological features or sites.
- 16) Failure to comply with the terms and conditions of this permit is a violation of the *Tennessee Water Quality Control Act of 1977* and is subject to penalty in accordance with T.C.A. §69-3-115.

APPROVED: _____

Paul E. Davis, Director, Water Pollution Control

DATE: 6/28/10



STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
JACKSON ENVIRONMENTAL FIELD OFFICE
DIVISION OF WATER POLLUTION CONTROL
1625 HOLLYWOOD DRIVE
JACKSON, TN 38305

April 4, 2012

Mr. Edward Lambert, Chief, Planning Branch
U.S. Army Corps of Engineers
167 North Main Street, Room B-202
Memphis, TN 38103

Subject: **General Permit for Maintenance Activities**
Aquatic Resource Alteration Permit (ARAP) NR1202.024
U.S. Army Corps of Engineers, Memphis District
Tiptonville, Lake County, Tennessee

Dear Mr. Lambert:

We have reviewed your application for the proposed construction of a 1,600' stone containment baffle with riprap side slopes; filling in a scour hole with 1.2 million CY of dredged sand and installation of an articulated concrete mattress for 100' long x 4' thick underwater. Pursuant to the *Tennessee Water Quality Control Act of 1977* (T.C.A. § 69-3-101 et seq.) and supporting regulations the Division of Water Pollution Control is required to determine whether the activity described in the attached notice of coverage will violate applicable water quality standards.

This activity is governed by the *General Permit for Maintenance Activities*. The work must be accomplished in conformance with accepted plans and information submitted in support of application NR1202.024 and the limitations and conditions set forth in the *General Permit for Maintenance Activities* (enclosed). It is the responsibility of the permittee to ensure that all contractors involved with this project have read and understand the permit conditions before the project begins.

Please note that dredging or excavation of sediment shall be limited to the *minimum necessary* to restore the waterway in the immediate vicinity of the structure to the approximate dimensions that existed when the structure was built, but cannot in any circumstance extend further than 100 feet in any direction of the structure. In addition, adequate erosion controls must be installed prior to construction and maintained during construction of the project. All disturbed areas must be revegetated or otherwise stabilized upon completion of construction. Please make the necessary provisions for these circumstances.

We appreciate your attention to the Aquatic Resource Alteration Permit program. If you have any questions, please contact Ms. Amy Fritz at (731) 512-1307 or by e-mail at Amy.Fritz@tn.gov.

Sincerely,

DWPC Manager
Jackson Environmental Field Office

Encl: NOC and copy of general permit
CC: DWPC, Jackson EFO Permit File
Mike Thron, U. S. Army Corps of Engineers, Memphis District, 167 North Main Street, Room B-202,
Memphis, TN 38103

Tennessee Department of Environment and Conservation

General Permit for Maintenance Activities



Effective Date: July 1, 2010
Expiration Date: June 30, 2015

Activities Covered by this Permit:

This general permit authorizes the maintenance of existing, previously authorized, currently serviceable structures or fills, such as dams, intake and outfall structures, utilities, culverts, and bridges. This general permit also authorizes the excavation of accumulated sediments and debris and the placement of clean rock fill material in the vicinity of existing structures where the erosive action of flowing water has undermined structural integrity. Further, minor deviations in the structure's configuration or filled area including those due to changes in materials, construction techniques, or current construction codes or safety standards which are necessary to make the necessary repair or rehabilitation are also authorized. Correspondingly, the placement of new or additional riprap to protect the structure is authorized. "Currently serviceable" means useable as is or with some maintenance, but not so degraded as to essentially require reconstruction.

Limitations of this Permit:

Certain activities due to size, location or potential water quality impacts are not covered under this general permit. Those activities are described in this section. Activities not qualifying for authorization under this general permit may be authorized by an individual permit, provided that all requirements of the *Tennessee Water Quality Control Act of 1977* are met.

- 1) Activities where the work involves excavation of accumulated bedload and unconsolidated sediments, such as loose gravel, for a distance **greater than 100** feet up and down the stream from a culvert or bridge are not covered.
- 2) Activities where the structure or fill is to be put to uses differing from the original use or those uses specified in the original permit are not covered.
- 3) Activities that may adversely affect wetlands are not covered.
- 4) Activities located in any waterway which is identified by the department as having contaminated sediments, and the activity will likely mobilize the contaminated sediments are not covered.
- 5) Activities located in a component of the National Wild and Scenic River System, a State Scenic River, waters designated as Outstanding National Resource Waters are not covered.
- 6) Activities that may result in an adverse effect to a threatened or endangered species, or to designated critical habitat; or is likely to jeopardize the continued existence of a species proposed for listing as endangered or threatened without prior authorization from the U.S. Fish and Wildlife Service as required by section 7 or section 10 of the Endangered Species Act where applicable are not covered. Adverse effects comprise, but are not necessarily limited to, the following: (a) death or injury to one or more individuals that results from activities associated with an action, (b) a change in habitat quantity or quality that results from activities associated with an action that renders the habitat unsuitable for the species, or (c) activities associated with an action that disrupts normal behavior or functions of individuals.
- 7) Activities that may result in the take, harassment, or destruction of plant or wildlife listed as threatened or endangered or a species deemed to be in need of management, as defined and identified under Tennessee Code Annotated (TCA) 70-08-103, Tennessee Wildlife Resources Agency (TWRA) Proclamations 00-14 and 00-15, and Division of Natural Heritage (DNH) Rule 0400-6-2 or which will destroy the habitat of such species without prior authorization from TWRA and/or DNH where applicable are not covered.
- 8) Activities, either individually or cumulatively, that may result in degradation to waters of the state are not covered.
- 9) Activities that otherwise require an individual permit are not covered.

Obtaining Permit Coverage:

Coverage under this general permit may be obtained by submitting a signed and completed application (form CN-1091) to the division. Work shall not commence until written authorization from the division is received. As noted above, not all activities can be covered under this general permit, and an application for coverage may be denied when appropriate.

Certain activities do not require the submittal of an application or written authorization from the division prior to commencement of work. Those activities are where the work involves excavation of debris, accumulated bedload and unconsolidated sediments, such as loose gravel, from within culverts and for a distance of **up to 100** feet up and down the stream. Even though written authorization is not required, the proposed activity shall be performed in accordance with all limitations, terms and conditions of this permit.

Where written authorization is required, the division will establish an expiration date for coverage under this general permit that is specific to the authorization and separate from the general permit's expiration date.

Terms and Conditions of this Permit:

All activities covered under this general permit shall comply with all terms and conditions contained hereinafter.

- 1) The work shall be accomplished in conformance with the accepted plans, specifications, data and other information submitted in support of the above mentioned application and the limitations, requirements, and conditions set forth herein.
- 2) All work shall be carried out in such a manner as will prevent violations of water quality criteria as stated in Rule 1200-4-3-.03 of the Rules of the Tennessee Department of Environment and Conservation. This includes, but is not limited to, the prevention of any discharge that causes a condition in which visible solids, bottom deposits, or turbidity impairs the usefulness of waters of the state for any of the uses designated by Rule 1200-4-4. These uses include fish and aquatic life (including trout streams and naturally reproducing trout streams), livestock watering and wildlife, recreation, irrigation, industrial water supply, domestic water supply, and navigation.
- 3) Applicant is responsible for obtaining the necessary authorization pursuant to applicable provisions of §10 of *The Rivers and Harbors Act of 1899*; §404 of *The Clean Water Act* and §26a of *The Tennessee Valley Authority Act*, as well as any other federal, state or local laws.
- 4) Applicant is responsible for obtaining coverage under the National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges from Construction Activities for construction sites involving clearing, grading or excavation that result in an area of disturbance of one or more acres, and activities that result in the disturbance of less than one acre if it is part of a larger common plan of development or sale.
- 5) Placement of material for scour protection or repair shall be limited to clean rock, riprap, rock-filled wire baskets or mattresses, or concrete contained by formwork for footing repair. Clean rock can be of various type and size, depending on the application. Clean rock shall not contain fines, soils or other wastes or contaminants.
- 6) Materials used in maintenance activities shall be free of contaminants, including toxic pollutants, hazardous substances, waste metal, construction debris and other wastes as defined by T.C.A. 69-3-103(18).
- 7) Placement of material shall not impair flow or be conducted in a manner that would permanently disrupt the movement of fish and aquatic life.
- 8) Stream beds shall not be used as transportation routes for construction equipment. Temporary stream crossings shall be limited to one point in the construction area and erosion control measures shall be utilized where stream banks are disturbed. Stream crossings should be constructed of clean rock and stream flow should be conveyed in appropriately sized pipe. The crossing shall be constructed so that stream flow is not obstructed. Following construction, all materials used for the temporary crossing shall be removed and disturbed stream banks shall be restored and stabilized if needed.
- 9) Excavation and fill activities shall be kept to a minimum and shall be separated from flowing waters to the extent practicable and necessary. Activities shall be conducted in the dry to the maximum extent practicable, by diverting flow utilizing cofferdams, berms, temporary channels or pipes. Temporary diversion channels shall be protected by non-erodible material and lined to the expected high water level.
- 10) Excavated materials, removed vegetation, construction debris, and other wastes shall be removed to an upland location and properly stabilized or disposed of in such a manner as to prevent reentry into the waterway.
- 11) The placement of riprap shall be the minimum necessary to protect the structure or to ensure the safety of the structure.
- 12) Sediment shall be prevented from entering waters of the state. Erosion and sediment controls measures shall be designed according to the size and slope of disturbed or drainage areas to detain runoff and trap sediment and shall be properly selected, installed, and maintained in accordance with the manufacturer's specifications and good engineering practices. Information on erosion and sediment control measures can be found in the department's Erosion and Sediment Control Handbook (www.tn.gov/environment/wpc/sed_ero_controlhandbook/).
- 13) Erosion and sediment control measures shall be in place and functional before earth moving operations begin, and shall be constructed and maintained throughout the construction period. Temporary measures may be removed at the beginning of the work day, but shall be replaced at the end of the work day.
- 14) Litter, construction debris, and construction chemicals exposed to storm water shall be picked up prior to anticipated storm events (e.g. forecasted by local weather reports), or otherwise prevented from becoming a pollutant source for storm water discharges (e.g., screening outfalls, daily pick-up, etc.). After use, silt fences should be removed or otherwise prevented from becoming a pollutant source for storm water discharges.

- 15) Clearing, grubbing and other disturbance to the riparian vegetation shall be kept at the minimum necessary for slope construction and equipment operations. Unnecessary riparian vegetation removal, including trees, is prohibited.
- 16) Material may not be placed in a location or manner so as to impair surface water flow into or out of any wetland area.
- 17) Appropriate steps shall be taken to ensure that petroleum products or other chemical pollutants are prevented from entering waters of the state. All spills shall be reported to the appropriate emergency management agency and to the division. In the event of a spill, measures shall be taken immediately to prevent pollution of waters of the state, including groundwater.
- 18) This general permit does not authorize impacts to cultural, historical or archaeological features or sites.
- 19) Failure to comply with the terms and conditions of this permit is a violation of the *Tennessee Water Quality Control Act of 1977* and is subject to penalty in accordance with T.C.A. §69-3-115.

APPROVED:


Paul E. Davis, Director, Water Pollution Control

DATE:

6/28/10



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Mississippi Field Office
6578 Dogwood View Parkway, Suite A
Jackson, Mississippi 39213



April 23, 2012

Edward P. Lambert
Chief, Environmental Compliance Branch
Memphis District Corps of Engineers
167 N. Main Street, B-202
Memphis, Tennessee 38103-1894

Dear Mr. Lambert:

The Fish and Wildlife Service (Service) is providing the following information in response to your April 12, 2012, letter requesting emergency consultation for flood repairs along the Mississippi River within the Memphis District, as provided for in Section 7 (50 CFR 402.05) of the Endangered Species Act (ESA), as amended (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.). Due to damages resulting from the flood of 2011, the Corps of Engineers Memphis District (Corps) has determined the need to conduct repairs at 15 locations under existing work authorities to prevent or reduce the risk of revetment failure and the imminent risk of life, health and property, and severe economic losses in those damaged areas. This letter represents the Service's formal documentation of the emergency consultation under the authority of the ESA. Emergency consultation allows for expedited consultation where time does not allow for administrative work required under non-emergency situations. Included in the definition of emergencies are situations involving an act of God and/or disasters and response activities taken to prevent the imminent loss of human life or property. Conservation recommendations provided in this letter are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species, to help implement recovery plans, or to develop information. They, in no way, should impede any emergency actions.

The emergency action will consist of repairs of stone fill, stone paving and/or articulated concrete mat repair at 15 locations (action area) in Illinois (Ohio River Mile 978R), Missouri (Mississippi River Mile 863R, 857L), Kentucky (MRM 911L), Tennessee (MRM 869L, 770-772L, 768L, 733L, 724L), Arkansas (MRM 643R), and Mississippi (MRM 698L, 686L, 629L). Some repairs will need to be completed or underway prior to the 2012 flood season, which usually begins in April or May. Timing and location of repair work (e.g., during spawning or nesting seasons, or adjacent to nesting areas or within secondary channels) may have local effects on listed species within or adjacent to work areas. Repair construction will proceed opportunistically, as river conditions permit, therefore construction is not known.

Endangered species found in areas that could be affected (i.e., action area) by the emergency action include: 1) the pallid sturgeon (*Scaphirhynchus albus*), 2) interior least tern (*Sterna antillarum*), and 3) the fat pocketbook mussel (*Potamilus capax*).

Pallid Sturgeon

Pallid sturgeon have been documented at multiple locations in the Mississippi River within the Memphis District. Pallid sturgeon have been collected on sand bars, island tips, wing dikes, and in flooded secondary channels. There have also been occasional detections of sonic tagged pallid sturgeon on revetted banks. Pallid sturgeon in spawning condition have been collected in the lower Mississippi River, and spawning is believed to occur between April and June. Spawning sites are unknown, but are suspected to include natural gravel bars and possibly revetment or riprap under appropriate conditions. Following hatching, sturgeon larvae drift in the water column, eventually settling on the river bottom on island tips and along secondary and main channel margins.

The level of take of pallid sturgeon from the emergency repair work will be affected by the location and timing of each project. However, take of pallid sturgeon is expected to be localized and difficult to measure, and is not expected to result in jeopardy to this species. As part of an emergency consultation, the Service may make conservation recommendations to minimize impacts to listed species. To minimize the potential take of pallid sturgeon we have recommended, when possible, avoidance of work during the April – June spawning season, and avoidance of disturbance of island tips and secondary channels.

Interior Least Tern

Interior least tern migrate into the Mississippi River to nest on sand and gravel bars and islands during June through August. Multiple nesting colonies have been identified by the Corps throughout the Memphis District. Disturbance of nesting colonies may expose eggs and chicks to elevated temperatures, and disrupt feeding of chicks by adults. Several of the work sites in the project area are in the vicinity of interior least tern nesting colonies.

The level of take of interior least tern from the emergency repair work will be affected by the location and timing of each project. Take will be localized and difficult to measure, and is not expected to result in jeopardy to interior least tern. To minimize potential disturbance and take of interior least tern, we have recommended, where possible, avoidance of work adjacent to nesting colonies during the June – August nesting season, and avoidance of disturbance of islands and nesting bars.

Fat Pocketbook Mussel

The distribution and occurrence of fat pocketbook mussels in the Mississippi River is poorly known, however, they have been documented in several secondary channels within the Memphis District below the confluence of the St. Francis River. Fat pocketbook mussels have also been collected in the main channel of the Ohio River approximately 40 miles upstream of the construction location at ORM 978R. No proposed construction location is within a secondary channel. The ORM 978R construction location is remote from known fat pocketbook localities in the Ohio River, and is in a high energy portion of the channel where mussels are unlikely to be present. Therefore, we do not believe take of fat pocketbook mussel will be likely due to the

proposed repair work. To avoid potential take, we have recommended avoidance of disturbance or work in secondary channels of the Mississippi River.

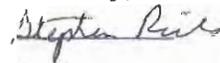
The Service, based on initial review of existing information on the pallid sturgeon, interior least tern, and fat pocketbook mussel, does not believe that the action may result in jeopardy to any of these species. We offer no additional recommendations for reducing or avoiding any affect to those species. There is no designated critical habitat for listed species within the action area, therefore, none will be affected.

In accordance with Section 7a of the Endangered Species Act, upon completion of the emergency actions, the Corps must prepare a biological assessment to determine the effects of the emergency operation on the above-listed species and submit it to this office. A biological assessment should include the dates and locations of repair work, results of any on-site visits, views of recognized experts, an analysis of effects (including cumulative), and an analysis of alternative actions considered. Presented above are the Service's recommended conservation measures that would provide valuable information concerning the potential effect of the action (and future actions) on the species that could be utilized during the analysis of effects.

If the Corps determines in the biological assessment that the proposed action may affect any listed species under our jurisdiction, the Corps should initiate formal consultation with the Service. Even though this consultation occurs after the emergency action, it is not procedurally treated any different than non-emergency consultations. However, the Corps would be required to provide a description of the emergency, a justification of the expedited consultation, and an evaluation to and the impacts of the emergency on affected species and their habitats, including documentation of how the Service's recommendations were implemented and their results.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations. Any future potential changes in the construction schedule or locations of work should also be coordinated with the Service. If you have any questions concerning the above comments please contact Mr. Daniel Gregg at 601-321-1136.

Sincerely,



Stephen Ricks
Field Supervisor