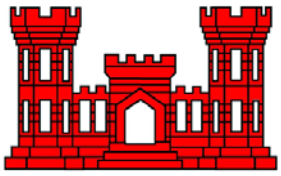
DRAFT

ENVIRONMENTAL ASSESSMENT

Dyer County Little Levee Scour PL 84-99 Project
Within Chute of Island No. 21 – Mississippi River
Dyer County, Tennessee



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

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Dyer County Little Levee Scour PL 84-99 Project Within Chute of Island No. 21 - Mississippi River Dyer County, Tennessee

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 levee rehabilitation and bank stabilization measures for the Dyer County Little Levee located adjacent to the left descending bank of the Chute of Island 21 near approximate River Mile 825 above head of passes (AHP) (Figure 1). The Dyer County Little Levee is a non-Federal levee located in southwestern Dyer County, Tennessee, between the mainline Mississippi River Levee, the Mississippi River and the Obion River (river miles 820 to 840). The levee is exposed to overbank flows along 20 miles of the Mississippi River. The Dyer County Little Levee sustained significant damages as a result of flooding during the period of 28 December 2015 to 18 January 2016. During the high water event, river stages remained above 30 feet for over 24 days. Damages sustained during the high water event consisted of stream bank erosion/bank caving that is threatening the stability and integrity of the levee. The stream bank erosion/bank caving has progressed into the extended footprint of the levee foundation and has compromised the levee foundation stability (Figure 2). The likelihood of levee failure occurring is very high due to the failure progression observed if no action is taken.

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 environmental impact statement (EIS) or a Finding of No Significant Impact (FONSI) for the proposed Dyer County Little Levee rehabilitation and bank stabilization measures in the Chute of Island No. 21 of the Mississippi River. 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.

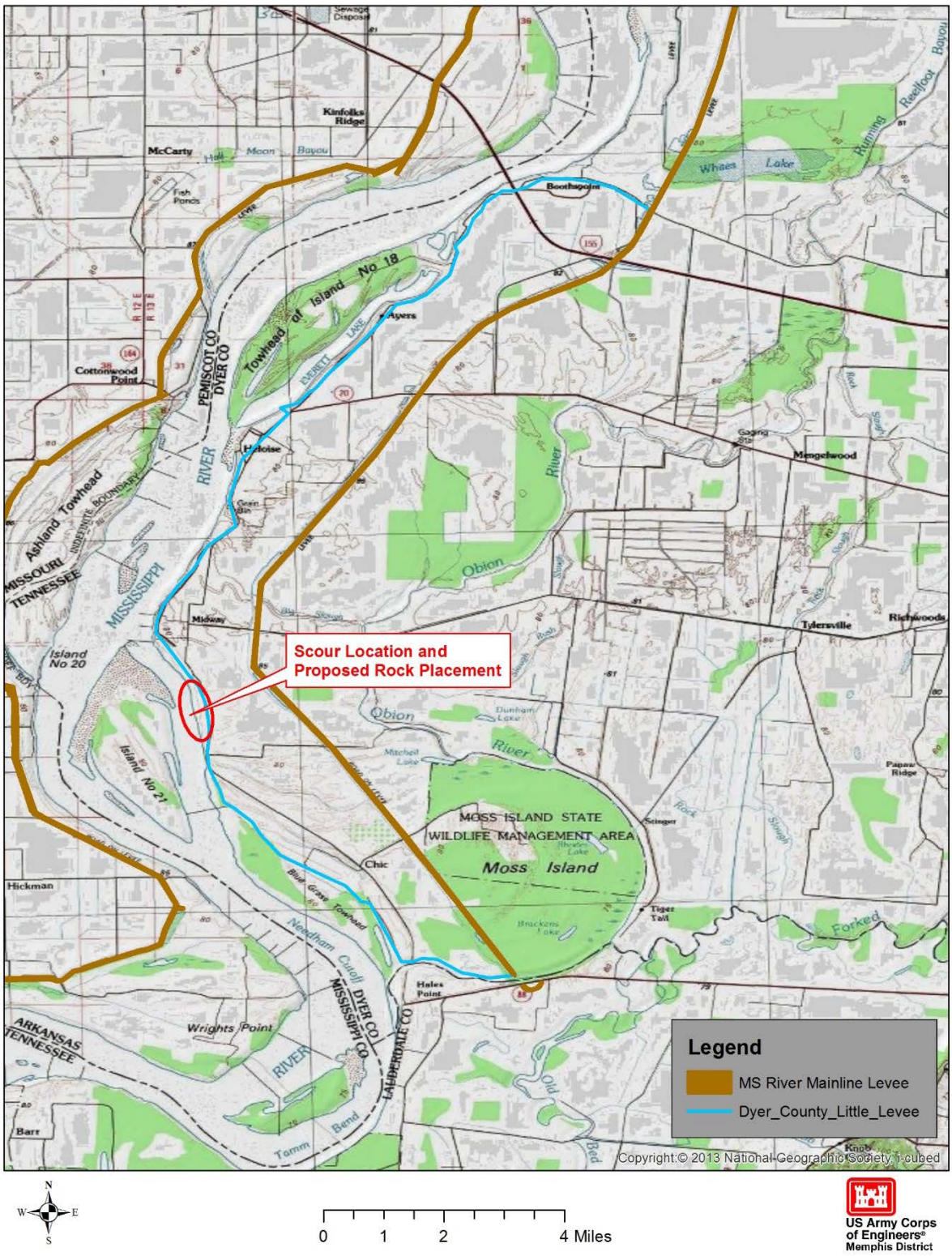

Figure 1. Vicinity map of the scour and associated levee rehabilitation measures for the Dyer County Little Levee Scour P.L. 84-99 Project located in northwestern Tennessee.

Figure 2. Photograph of the active scour occurring at the Dyer County Little Levee PL 84-99 Project Area, in Northwestern Tennessee.

1.1 Proposed Action**.** The proposed levee rehabilitation consists of bank protection and reconstruction of the levee to pre-flood section and grade using Graded Stone C and 250 LB Riprap placed along the bank and riverside toe of the levee in the Chute of Island 21 of the Mississippi River. Stone would be delivered by barge, and the work would be performed by floating plant using barge mounted draglines or hydraulic excavators. A river stage of $\geq$ 28 feet on the Caruthersville gage is needed to allow for sufficient flotation of barge mounted equipment and material at the upstream entrance to the chute. The recommended work is separated into 3 areas based on the progression of bank failure (Figure 3). Area 1 is the most critical area extending for approximately 1,000 feet in length where active caving has progressed into the toe of the levee. Within Area 1, the levee would be reconstructed to pre-flood section and grade using Graded Stone C. Approximately 40,109 tons of Graded Stone C would be placed down to the channel bottom with a minimum thickness of 4 feet establishing a slope of 1V:1.5H. Approximately 3,300 tons of 250 LB Riprap would also be placed to a thickness of 2 feet along the riverside slope of the levee. Area 2 is the next highest priority area extending approximately 1,500 feet downstream of Area 1. Within Area 2, approximately 45,821 tons of Graded Stone C would be placed from top bank down to the channel bottom with a minimum thickness of 4 feet establishing a slope of 1V:1.5H. Area 3 extends approximately 1,500 feet upstream of Area 1.

Within Area 3, approximately 47,333 tons of Graded Stone C would be placed from top bank down to the channel bottom with a minimum thickness of 3 feet establishing a slope of 1V:1.5H. Prior to stone placement, some minor grading (approximately 900 cubic yards) will be required in the upstream portion of Area 3 where eddy currents are causing a vertical and actively caving, unstable bank. Any large woody debris encountered in the channel from the recent scour would be removed from the work area prior to stone placement and placed in the deeper portions of the Chute of Island No. 21. Detailed plans and cross-sections of all work areas are shown in Appendix A.

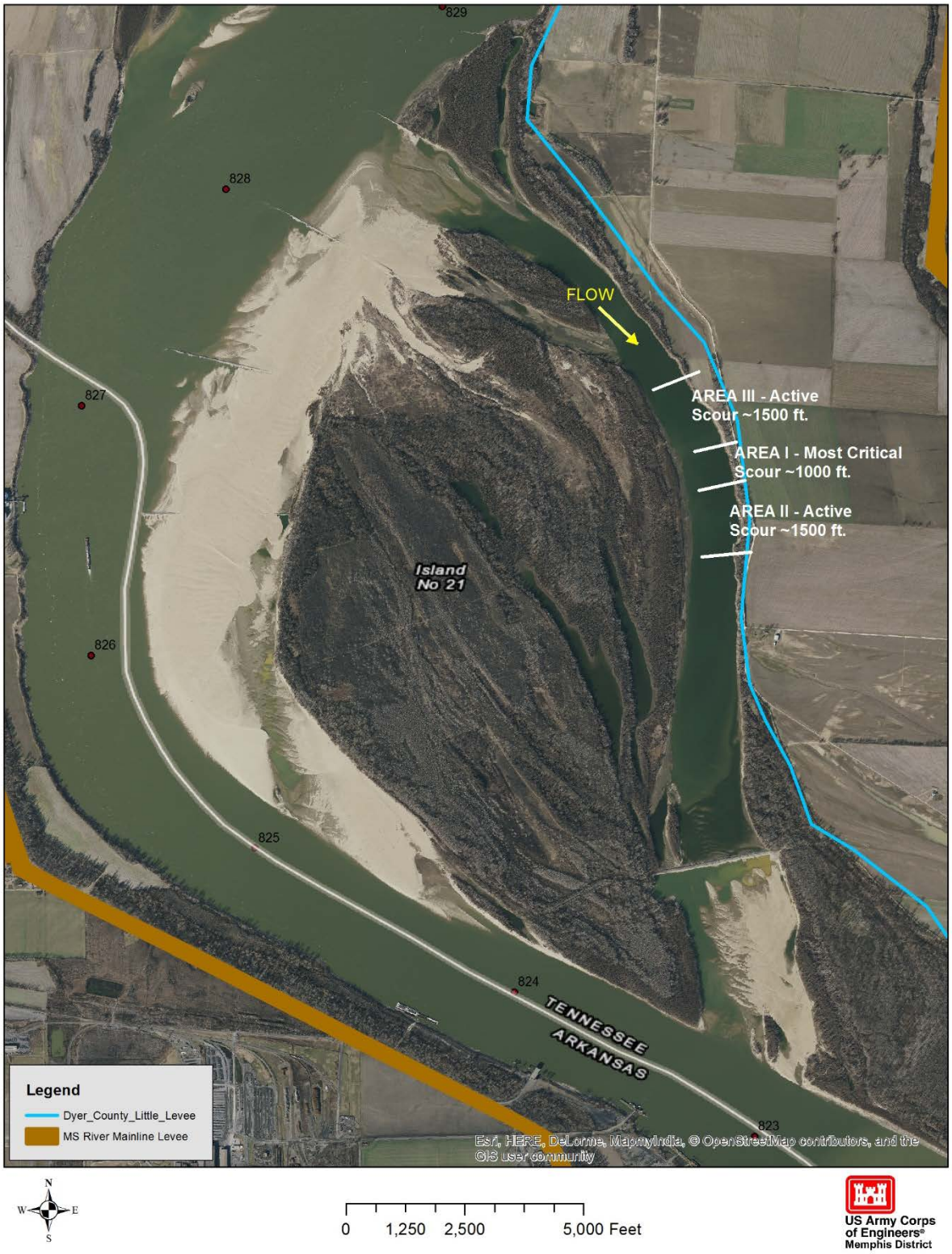

Figure 3. Location of the scour and associated levee rehabilitation measures for the Dyer County Little Levee PL 84-99 Project in northwestern Tennessee.

1.2 Purpose and Need For The Proposed Action**.** As a result of winter flooding from 28 December 2015 to 18 January 2016, significant damage occurred along the Dyer County Little Levee. During this event, river stages up to 42.66 feet were observed on the Caruthersville, MO Gage, with river stages over 30 feet for over 24 days, causing stream bank erosion and bank caving to progress into the extended footprint of the levee compromising the levee foundation stability. Additional information on the disaster incident is included in Appendix C. The likelihood of levee failure occurring is very high due to the progression of bank failures. The Dyer County Little Levee protects approximately 12,000 acres of agriculturally developed land, 30 homes, 1 business, a church and 41 farm buildings. The total value of the structures is estimated at $2,935,000. It is also estimated that approximately 80 people reside within the area. With the levee in its current condition, this prolonged high water event is likely to cause the continued erosion of the levee if action is not taken.

1.3 Authority**.** USACE has authority under Public Law 84-99 (PL 84-99), Flood Control and Coastal Emergencies (FCCE) (33 U.S.C. 701n) (69 Stat. 186) for emergency management activities. Under PL 84-99, the Chief of Engineers, acting for the Secretary of the Army, is authorized to undertake activities, including rehabilitation of flood control works threatened or destroyed by flood. The proposed action is authorized as part of PL 84-99.

2.0 ALTERNATIVES TO THE PROPOSED ACTION

Three alternatives were considered for the proposed action. These alternatives were: (1) No-action; (2) stone protection; (3) levee setback.

2.1 Alternative 1 – No Action. This alternative consists of providing no emergency levee repairs under PL84-99 authority or funding sources. Under this alternative, the likelihood of levee failure occurring is very high due to the failure progression observed. Currently, the levee has height sufficient to provide protection from a 4 percent chance of exceedance flood (25-year level of protection) without freeboard. The levee is threatened by riverside scour which has encroached on the toe of the levee. If the scouring is allowed to continue the levee will be beached. When the breach occurs, water would enter the area at a 50 percent chance exceedance flood (2-year level of protection). Increased flooding frequency would reduce the availability of the land for agricultural use, cause property loss, displace residents, and could potentially cause human injuries and/or loss of life. Due to the significant negative consequences of the "No Action" alternative, it was deemed unacceptable.

2.2 Alternative 2. This alternative consists of reconstructing the levee to the pre-flood section and grade and associated bank stabilization using stone protection. Stone would be delivered by barge, and the work would be performed by floating plant using barge mounted draglines or hydraulic excavators. A river stage of $\geq$ 28 feet on the Caruthersville gage is needed to allow for sufficient flotation of barge mounted equipment and material at the upstream entrance to the chute. The recommended work is separated into 3 areas based on the progression of bank failure (Figure 3). Area 1 is the most critical area extending for approximately 1,000 feet in length where active caving has progressed into the toe of the levee. Within Area 1, the levee would be

reconstructed to pre-flood section and grade using Graded Stone C. Approximately 40,109 tons of Graded Stone C would be placed down to the channel bottom with a minimum thickness of 4 feet establishing a slope of 1V:1.5H. Approximately 3,300 tons of 250 LB Riprap would also be placed to a thickness of 2 feet along the riverside slope of the levee. Area 2 is the next highest priority area extending approximately 1,500 feet downstream of Area 1. Within Area 2, approximately 45,821 tons of Graded Stone C would be placed from top bank down to the channel bottom with a minimum thickness of 4 feet establishing a slope of 1V:1.5H. Area 3 extends approximately 1,500 feet upstream of Area 1. Within Area 3, approximately 47,333 tons of Graded Stone C would be placed from top bank down to the channel bottom with a minimum thickness of 3 feet establishing a slope of 1V:1.5H. Prior to stone placement, some minor grading (approximately 900 cubic yards) will be required in the upstream portion of Area 3 where eddy currents are causing a vertical and actively caving, unstable bank. Any large woody debris encountered in the channel from the recent scour would be removed from the work areas prior to stone placement and placed in the deeper portions of the Chute of Island No. 21. Detailed plans and cross-sections are shown in Appendix A.

A total of approximately 900 cubic yards of grading, 133,263 tons of Graded Stone C, and 3,300 tons of 250 LB riprap would be required for this alternative.

2.3 Alternative 3. This alternative consists of setting the levee back for a distance of approximately 150 feet. The levee would be constructed to the same dimensions (approximate 20-ft crown width and 1V:3H side slopes). Approximately 162,800 cubic yards of borrow material would come from the existing levee, and an additional 40,000 cubic yards of borrow would be needed from an unidentified borrow area. It is assumed that this borrow area would be located in prior-converted cropland between the mainline Mississippi River Levee and the Dyer County Little Levee. The levee crown would be covered with approximately 3,000 tons of aggregate surfacing to allow for transportation. A typical levee cross section for this alternative is included in Appendix B. These proposed repairs would require more than one construction season and could not be started until the flood hazards are greatly reduced in summer and early fall.

The no action alternative was determined to be unacceptable because of the risks and extent of projected flood damages (including $1,047,000 annually for crops and $178,000 for farm property other than crops). Alternative 3 would require more than one construction season, could not be started until the flood hazards are greatly reduced in summer and early fall, would result in the loss of prime farmland, and would be slightly more expensive than Alternative 2. With the levee in its current condition, a prolonged high water event is likely to cause the continued erosion of the levee and increased risks of a levee breach this flood season. Alternative 2 is more likely be completed prior to a potential spring flood event, is the least costly structural alternative, and is economically justified with a benefit-to-cost ratio of 1.9 to 1. Alternative 2 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

Dyer County Little Levee is located in Dyer County, Tennessee, within the Mississippi River floodplain and is within close proximity to the Mississippi River. The non-federal Dyer County Little Levee extends along the left descending bank of the Mississippi River and is positioned between the federally constructed Mainline Levee and the Mississippi River to protect property and assets riverside of the Mainline Levee. The Dyer County Little Levee begins at the Mainline Levee just east of Boothspoint in Dyer County, Tennessee, and extends to the Obion River, between river miles 820 and 840. The levee is approximately 20 miles in length and ranges from 6 to 12 feet in height. At the Obion River, the levee turns eastward along the top bank of the Obion River until it intersects with the Mainline Levee (Figure 1). Essentially all of the lands between the Mainline Levee and the Dyer County Little Levee are in agricultural production.

The Chute of Island 21 extends for approximately 4 miles in length along the left descending bank of the Mississippi River between River Miles 828.5 and 823 and varies in width from approximately 600 feet to 2,000 feet. A closure dike exists at the lower end of the chute built to an elevation of approximately 28 feet on the Caruthersville gage (Figure 3). During extreme low river stages, flow in the chute remains mostly disconnected from the main channel due to sand deposition at the upstream entrance to the chute. However, the upstream 3 miles of the chute remains connected to main channel flows throughout most of the year.

The immediate project footprint is defined as an approximately 4,000-ft. reach of the actively caving left descending bank of the Chute of Island No. 21. Area 1 is an approximately 1,000-ft. reach where scour encroached into the toe of the Dyer County Little Levee, and nearly all riparian vegetation was lost into the channel (Figure 2). Area 2 extends for approximately 1,500 feet downstream of Area 1 to a portion of stream bank with existing rock protection. Within Area 2, there is approximately 200 feet of riparian vegetation between the levee toe and top bank consisting of an overstory of mature cottonwood trees averaging approximately 24 inches diameter breast height (dbh) and sugarberry trees (~4-5 inches dbh) and an understory consisting primarily of poison ivy standing approximately 3-6 feet in height and some willow saplings. Area 3 extends approximately 1,500 feet upstream of Area 1, and an agricultural field and fallow field extend from top bank to the riparian vegetation along the levee toe for nearly the entire reach.

3.0.2 Description of the Watershed

The project area sits in the shared floodplain between the Mississippi and Obion rivers in Dyer County, Tennessee. The 12-digit Hydrologic Unit Code (HUC) watershed for the area between the Dyer County Little Levee and the mainline Mississippi River Levee is the West Levee Drainage (HUC 080102020502) and consists mainly of unnamed agricultural drainage ditches and sloughs that flow west, emptying directly into the Mississippi River or flow east toward the Mainline Levee. Waters that flow toward the Mainline Levee are collected into the borrow area at the toe of the levee and then flow south along the levee and drain into the Obion River through

culverts just upstream of the confluence with the Mississippi River. The predominant land use for this area is agricultural row-crop production. Small areas of forest, pond, and wetland exist primarily along the existing levee reach and the banks of the Obion and Mississippi Rivers. The 12-digit HUC for the area riverside of the Dyer County Little Levee is the Everett Lake-Mississippi River (0801001000503) and consists mainly of the Mississippi River channel and adjacent floodplain. The predominant land use is open water (Mississippi River) and the floodplain is a mixture of woody wetlands (vegetated islands and riparian vegetation) and agricultural row-crop production.

The Chute of Island 21 extends for approximately 4 miles in length along the left descending bank of the Mississippi River between River Miles 828.5 and 823 and varies in width from approximately 600 feet to 2,000 feet. A closure dike exists at the lower end of the chute built to an elevation of approximately 28 feet on the Caruthersville gage (Figure 3). During extreme low river stages, flow in the chute remains mostly disconnected from the main channel due to sand deposition at the upstream entrance to the chute. However, the upstream 3 miles of the chute remains connected to main channel flows throughout most of the year. Approximately six feet of sand was deposited at the upstream entrance of the chute within the last 15 months.

3.0.3 Climate

The average annual temperature for Dyer County is 61 degrees Fahrenheit. The average daily maximum temperature for the area is 70 degrees Fahrenheit with 2 years in every 10 having temperatures greater than 100 degrees Fahrenheit occurring in July. The average daily minimum temperature is 51 degrees Fahrenheit with 2 years in every 10 having temperatures less than 2 degrees Fahrenheit occurring in January. Yearly precipitation averages 51 inches. Rainfall will average less than 35 inches and greater than 58 inches 2 out of every 10 years. The month receiving the most rainfall is December with an average of 5.2 inches and the month receiving the least is September with an average of 2.9 inches. Most precipitation falls in the form of rain; however snow may fall in the months of November through March.

3.0.4 Geology

The proposed project area is 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. The majority of the soils within the immediate project footprint is sand alluvium.

3.1 RELEVANT RESOURCES

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

Table 1: Relevant Resources

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.
Wetlands/ Bottomland Hardwoods	Clean Water Act of 1977, as amended; Executive Order 11990 of 1977, Protection of Wetlands; Coastal Zone Management Act of 1972, as amended; and the Estuary Protection Act of 1968., EO 11988, and Fish and Wildlife Coordination Act.	They provide necessary habitat for various species of plants, fish, and wildlife; they serve as ground water recharge areas; they provide storage areas for storm and flood waters; they serve as natural water filtration areas; they provide protection from wave action, erosion, and storm damage; and they provide various consumptive and non-consumptive recreational opportunities.	The high value the public places on the functions and values that wetlands provide. Environmental organizations and the public support the preservation of marshes.
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 high priority that the public places on their esthetic, recreational, and commercial value.
Wildlife	Fish and Wildlife Coordination Act of 1958, as amended and the Migratory Bird Treaty Act of 1918	They are a critical element of many valuable aquatic and terrestrial habitats; they are an indicator of the health of various aquatic and terrestrial habitats; and many species are important commercial resources.	The high priority that the public places on their esthetic, recreational, and commercial value.
Threatened and Endangered Species	The Endangered Species Act of 1973, as amended; the Marine Mammal Protection Act of 1972; and the Bald Eagle Protection Act of 1940.	USACE, USFWS, NMFS, NRCS, USEPA, TWRA, and TDEC 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.

Table 1: Relevant Resources			
Resource	**Institutionally Important**	**Technically Important**	**Publicly Important**
Cultural Resources	National Historic Preservation Act of 1966, as amended; the Native American Graves Protection and Repatriation Act of 1990; and the Archeological Resources Protection Act of 1979	State and Federal agencies document and protect sites. Their association or linkage to past events, to historically important persons, and to design and construction values; and for their ability to yield important information about prehistory and history.	Preservation groups and private individuals support protection and enhancement of historical resources.
Socio-Economic Resources	River and Harbor Flood Control Act of 1970 (PL 91-611).	The social and economic welfare of the nation may be positively or adversely impacted by the proposed action.	Social concerns and items affecting area economy are of significant interest to community.
Environmental Justice	Executive Order 12898 and the Department of Defense's Strategy on Environmental Justice of 1995,	The social and economic welfare of minority and low-income populations may be positively or disproportionately impacted by the tentatively selected plans.	Public concerns about the fair and equitable treatment (fair treatment and meaningful involvement) of all people with respect to environmental and human health consequences of federal laws, regulations, policies, and actions.
Air Quality	Clean Air Act of 1963.	State and Federal agencies recognize the status of ambient air quality in relation to the NAAQS.	Virtually all citizens express a desire for clean air.
Water Quality	Clean Water Act of 1977, Fish and Wildlife Coordination Act,	USACE, USFWS, NMFS, NRCS, USEPA, and TDEC and TWRA recognize value of fisheries and good water quality. the national and state standards 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.
Navigation	Section 10 of the Rivers and Harbors Act	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 on the protected side of the Dyer County Little Levee is agriculture totaling approximately 12,000 acres. Much of this area is eligible for classification as prime farmland. The four primary crops grown are corn, cotton, soybeans, and wheat. There is one agricultural field in the immediate vicinity of the proposed project located on the riverside of the Dyer County Little Levee and immediately adjacent to an approximately 300-ft. reach of top bank in the upstream portion of Area 3. Active scour has encroached into this agricultural field.

3.1.2 WETLANDS/BOTTOMLAND HARDWOODS

Existing Conditions: The riparian vegetation adjacent to the riverside toe of the Dyer County Little Levee is comprised of bottomland hardwood species and is identified as Freshwater Forested/Shrub Wetlands on the National Wetlands Inventory (USFWS 1981). The riparian vegetation adjacent to top bank is actively being lost into the channel due to the streambank erosion. Nearly all vegetation in Area 1 is now lost into the channel (Figure 2). Within Area 2, there is riparian vegetation between the levee toe and top bank (a width of approximately 200 feet) consisting of an overstory of mature cottonwood trees (~24 inches in dbh) and sugarberry trees (~4-5 inches dbh) and an understory consisting primarily of poison ivy standing approximately 3-6 feet in height and some willow saplings.

3.1.3 AQUATIC RESOURCES/FISHERIES

Existing Conditions: The proposed work is located along the outside bend of the Chute of Island No. 21 of the Mississippi River. This chute is connected to the main channel throughout much of the year allowing for a diverse number of fish species to utilize aquatic habitats in the area. Over a hundred species of fish utilize the lower Mississippi River and could be found within the chute at different portions of the year. Dominant fish species likely include catfishes, freshwater drum, shads, gars, and numerous minnow and suckers. A closure dike exists on the downstream end of the chute, and the upstream mouth of the chute mostly disconnects during the lowest stages. Thus, the fish community assemblage likely changes from those species adapted to swift-current habitats to those adapted to slackwater habitats depending on seasons and associated river stages (Baker et al. 1991). Due to the frequency of high velocities, the actively caving banks, and the shifting sand substrate, few or no mussels are likely to be within close proximity of the project footprint. There is the potential for low densities of freshwater mussels to be present in limited portions of the Chute of Island No. 21, such as, areas protected from high flows with stable substrates. Low densities of mayflies, chironomids, amphipods, and oligochaetes likely inhabit the sandy channel bottom near the project area.

3.1.4 WILDLIFE

Existing Conditions: The project vicinity consists of a mosaic of forested lands, old river channels, borrow pits, and agricultural land. The area landside of the Dyer County Little Levee has been largely cleared and drained for the purposes of agricultural production. There does remain some riparian vegetation between the levee and top bank of the river capable of supporting wildlife. Additionally, Island No. 21 located across the chute from the project is entirely forested and capable of supporting wildlife. Wildlife expected to utilize the shorelines and adjacent lands include raccoon, opossum, mink, bobcat, coyotes, deer, wild turkey, muskrat, river otter, beaver, turtles, snakes, frogs, toads, hawks, vultures, Mississippi kite, bald eagle, kingfishers, and various songbirds and woodpeckers. Herons, egrets, pelicans, cormorants, killdeer, gulls, terns, bald eagle, osprey, and various shorebirds would be bird species commonly observed utilizing the Mississippi River channel near the project area.

3.1.5 THREATENED AND ENDANGERED SPECIES

Existing Conditions: Five federally listed species may occur in the vicinity of the proposed project areas: the endangered interior least tern (*Sterna antillarum athalassos*), endangered pallid sturgeon (*Scaphirhynchus albus*), endangered fat pocketbook mussel (*Potamilus capax*), endangered Indiana bat (*Myotis sodalis*), and threatened northern long-eared bat (*Myotis septentrionalis*).

Interior Least Terns

The federally endangered interior least tern is the smallest North America tern. In the lower Mississippi River (LMR), interior least terns typically nest on large isolated sandbars from late May to August, depending on timing and duration of low river stages. A nesting colony of interior least terns is seasonally present within the dike field on the riverside (main channel side) of Island No. 21 approximately 1-2 miles from the project area.

Pallid sturgeon

The federally endangered 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 and Missouri Rivers and several of their major tributaries (and distributaries). Captures of pallid sturgeon in the Mississippi River have been associated with a variety of habitats including: the main channel, island tips, channel borders, sandbars, gravel bars, dikes, and secondary channels. Recent data has shown that pallid sturgeon positively selected island tips, natural banks, and to a lesser degree, revetted banks, over other habitat features in the LMR (Herrala et al. 2014). Extensive sampling in the Mississippi River is currently underway so that a better understanding of population size, population density, habitat preference, extent of range, and impacts on the population can be quantified. The closest pallid sturgeon detections to the proposed project area are approximately 27 miles upstream near River Mile 854 AHP (J. Killgore, USACE, pers. communication 2009).

Fat pocketbook mussel

The federally endangered fat pocketbook mussel is a relatively large species of freshwater mussel reaching approximately 5 inches in length and native to the Ohio River system and Mississippi River drainage. Fat pocketbook mussels typically inhabit sand and silt depositional areas of slow moving rivers. The largest population is currently found within the St. Francis River Basin in Arkansas, a tributary downstream of the project area. Low densities of fat pocketbook mussels may be found sporadically in the LMR typically within relatively stable secondary channels and side channels (USFWS 2012). The closest fat pocketbook mussel observed near the proposed project area was a dead shell found approximately 28 miles downstream near River Mile 800 AHP (B. Posey, AGFC, pers. communication 2012).

Indiana bat (Myotis sodalis)

Indiana bats are found over most of the eastern United States. They hibernate in large numbers in relatively few caves and are thus, vulnerable to disturbances. During summer, they roost under the peeling bark of dead and dying trees and often forage on flying insects along rivers or lakes and in upland forests. Threats contributing to their decline include the disease white-nose

syndrome, commercialization of caves, loss of summer habitat, pesticides and other contaminants. The entire state of Tennessee is within the species range.

Northern Long Eared Bat (Myotis septentrionalis)
The northern long-eared bat is one of the bat species impacted by the white-nose syndrome. It was listed as threatened with an interim 4(d) rule in 2015. The northern long-eared bat hibernates in caves but during summer, it roosts and forages along forested areas and along rivers and lakes. Their summer roosting habitat is similar to that of the Indiana bat. The species range includes the entire state of Tennessee.

3.1.6 CULTURAL RESOURCES

Existing Conditions: There are eight historic properties listed on the National Register of Historic Places in Dyer County, Tennessee. None of these properties fall within the area of potential effect of the proposed project. Previously unrecorded archaeological sites may be present in alluvial landforms such as natural levees in the surrounding area. The area of potential effect for the proposed project is an actively caving riverbank.

3.1.7 SOCIO-ECONOMIC RESOURCES

Existing Conditions: The Dyer County Little Levee protects approximately 12,000 acres of agriculturally developed land, with agriculture being the major industry within the area. Along with the farmland, 30 homes, 2 businesses, a church and 41 farm buildings are located within the area protected by the levee. The total value of the structures is estimated at $2,935,000. It is also estimated that approximately 80 people reside within the area.

3.1.8 ENVIRONMENTAL JUSTICE

Existing Conditions: The Department of Defense's Strategy on Environmental Justice of 1995, directs Federal agencies to identify and address any disproportionately high adverse human health or environmental effects of Federal actions to minority and/or low-income populations. Minority populations are those persons who identify themselves as Black, Hispanic, Asian American, American Indian/Alaskan Native, and Pacific Islander. A minority population exists where the percentage of minorities in an affected area either exceeds 50 percent or is meaningfully greater than in the general population.

According to the 2014 U.S. Census Bureau, 19.7% of the residents of Dyer County are minorities. The percentage of people living below the poverty level in 2014 was 19.6% (http://www.census.gov/quickfacts/table/PST045215/00,47045).

3.1.9 AIR QUALITY

Existing Conditions: Dyer County is in attainment with national ambient air quality standards.

3.1.10 WATER QUALITY

Existing Conditions: According to the Tennessee Department of Environment and Conservation (TDEC), the Mississippi River in this area does not support recreational, fish and wildlife water quality standards; however, they do support domestic, irrigation, and livestock use water quality standards. The entire main stem of the Mississippi River in the State of Tennessee is listed as impaired on the final 2014 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 2014). There were also some elevated levels of mercury in fish tissue samples near the City of Memphis in Shelby County. Total Maximum Daily Loads for chlordane, dioxins, and PCBs in the Mississippi River were approved by EPA on 25 July 2008 (TDEC 2008).

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. 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. Commercial navigation may occasionally occur through the Chute of Island No. 21 at extremely high river stages. The closure dike at the downstream end of the chute is at an elevation of 28 feet on the Caruthersville gage limiting this potential throughout most of the year.

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 AGRICULTURAL LANDS, PRIME AND UNIQUE FARMLANDS

Future Conditions with No Action: As stated previously, the Dyer County Levee provides protection up to a 4 percent chance of exceedance flood. With no action, a levee breach is expected to occur with the next prolonged high water event. With the levee breach, there would be a 50 percent chance the water would enter the formerly protected area in any given year (50 percent chance of exceedance). Without the project, approximately 6,168 acres of cropland, most of which is considered prime farmland, would be flooded annually. Flood damages would also occur to noncrop items (i.e., farm property other than crops). These include damages to farm supplies; farm roads; drainage ditches; fences; irrigation systems; and landforming and leveling of fields.

Future Conditions with the Proposed Action: With the levee repairs and bank stabilization, the Dyer County Little Levee would continue to provide protection up to a 4 percent chance of exceedance flood. Thus, only 493 acres of cropland are expected to be flooded annually yielding protection to 5,675 acres annually compared to the no action alternative.

4.2 WETLANDS/BOTTOMLAND HARDWOODS

Future Conditions with No Action: Without implementation of the proposed activity, scour would continue to encroach into the remaining riparian vegetation riverside of the Dyer County Little Levee and adjacent to top bank.

Future Conditions with the Proposed Action: With the bank stabilization activities, vegetative clearing would be the minimum necessary to key the rock into the bank (approximately 2 feet from top bank). Based on the sandy soils and extent of the active scour at these locations, these activities would not exceed what would be lost if no action is taken. Every effort would be made to preserve all trees not interfering with construction.

4.3 AQUATIC RESOURCES/FISHERIES

Future Conditions with No Action: Without implementation of the proposed action, the aquatic resources and fisheries of the proposed project area would not change significantly from current conditions.

Future Conditions with the Proposed Action: With implementation of the proposed action, minimal adverse impacts to aquatic resources are expected. During construction, fish are expected to temporarily migrate upstream or downstream and many of the macroinvertebrates would most likely drift downstream. Due to the high velocities, actively caving banks, and sandy substrate, few or no mussels are likely to inhabit the project footprint or be affected by construction. Low densities of mayflies, chironomids, amphipods, and oligochaetes likely inhabit the sandy channel bottom along the Chute of Island No. 21. During construction, many of these macroinvertebrates in the immediate vicinity of the project are expected to drift downstream. The large woody debris present within the project footprint from the active scour would be placed further into the channel of the Chute of Island No. 21 but not removed from the aquatic system. Following rock placement, the macroinvertebrate community composition would likely shift to high densities of hydropsychid caddisflies. Construction would take place in swift water and thus should not have an effect on bighead or silver carp or other invasive species in the Mississippi River.

4.4 WILDLIFE

Future Conditions with No Action: Without implementation of the proposed action, wildlife near the proposed project area would not change significantly from current conditions.

Future Conditions with the Proposed Action: With implementation of the proposed action, some wildlife in the immediate area of construction may be temporarily displaced due to construction. However, since all work would be done from barges floating in the river, any disturbance would be minimal and short-lived.

4.5 THREATENED AND ENDANGERED SPECIES

Future Conditions with No Action: Without implementation of the proposed action, no threatened or endangered species or their critical habitat would be directly impacted by the proposed actions.

Future Conditions with the Proposed Action: The sandbar adjacent to the Island No. 21 Dike Field utilized by least terns during the low water nesting season is over one mile from the proposed activities; however, no impacts to the species are expected since habitat would be inundated and least terns would not be present during construction. Pallid sturgeon could utilize any areas connected to the main channel of the Mississippi River during portions of the year. However, with the presence of the closure dike on the downstream end of the Chute of Island No. 21 and the amount of recent deposition at the upstream entrance to the chute, it is unlikely that pallid sturgeon are frequent residents in the vicinity of the proposed repairs. Pallid sturgeon 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. No significant adverse impacts to pallid sturgeon are expected due to the proposed actions. Based on the current velocities, unstable substrate, and rate of bank caving at the proposed location of rock deposition, no fat pocketbook mussels are expected to occur within the vicinity of the project. No significant adverse impacts to the fat pocketbook mussel are expected due to the proposed actions. Nearly all of the riparian vegetation within Area 1 has been recently lost due to the bank erosion (Figure 2). The remaining riparian vegetation within other work reaches consists mostly of an overstory of small sugarberry trees (~3-5 inches dbh) and larger cottonwood trees (>24 inches dbh) containing significant amounts of poison ivy vines. Understory consists of poison ivy standing approximately 3-6 feet in height and some black willow saplings scattered throughout. Every effort would be made to leave all trees not interfering with construction; however, some vegetation within 2 feet from top bank may be removed in areas of vertical banks for construction equipment to key the rock into the bank. This vegetation would be lost due to the ongoing erosion should no action be taken. The intent is to complete repairs prior to the spring flood season and during the time when Indiana bats and northern long-eared bats would not be present; however, timing is dependent on river stages. Based on the type of habitat present in the immediate vicinity, rate of active bank caving, and proposed timing of the actions, no impacts to the Indiana bat or northern long-eared bat are expected. Pursuant to Section 7 of the Endangered Species Act, USACE has requested concurrence with the U.S. Fish and Wildlife Service, Cookeville, TN Office, for a not likely to adversely affect determination for federally listed species and critical habitat.

4.6 CULTURAL RESOURCES

Future Conditions with No Action: Without implementation of the proposed action, no significant cultural resources would be directly impacted. However, previously unrecorded sites could be damaged or eroded with the next flood event as the approximately 12,000-acre area would be left unprotected.

Future Conditions with the Proposed Action: Pursuant to 36 CFR 800.3(a)(1), the District Archaeologist has determined that this project has no potential to cause effects to historic properties eligible for the National Register of Historic Places. Thus, no further Section 106 National Historic Preservation Act consultation is required. However, if prehistoric or historic artifacts, human bones, or other archaeological materials subject to the Native American Graves Protection and Repatriation Act (NAGPRA) are found during construction, all activities are to cease immediately in that area and the Memphis District Archaeologist, shall be contacted. State Historic Preservation Officer and tribal NAGPRA representatives, the local sheriff, etc., will be contacted as required by state and federal law.

4.7 SOCIO-ECONOMIC RESOURCES

Future Conditions with No Action: Without implementation of the proposed action, the damaged Dyer County Little Levee would allow low to moderate flooding from the Mississippi River to inundate part or all of the protected area behind the levee causing significant economic loss. This levee protects approximately 12,000 acres of agriculturally developed land, 30 homes, 2 businesses, a church, and 41 farm buildings. The total value of the structures is estimated at $2,935,000. It is also estimated that approximately eighty people reside within the area. Flooding displaces residents and businesses; increases mental and physical stress of those displaced, and generally diminishes the quality of life and economy of the residents and local communities. If the levee is not repaired, damages are expected to agricultural lands and residential dwellings with a levee breach from the next prolonged high water event.

Future Conditions with the Proposed Action: With implementation of the proposed action, quality of life for the residents and businesses protected by the Dyer County Little Levee will not change significantly from current conditions.

4.8 ENVIRONMENTAL JUSTICE

Future Conditions with No Action: Without implementation of the proposed action, no adverse impacts to low-income communities are expected**.** The study area was not identified as a low-income community. If the proposed project features are not constructed, there will be no direct disproportionately high or adverse human health or environmental effects on any minority and/or low-income populations as per E.O. 12898.

Future Conditions with the Proposed Action: With implementation of the proposed action, no adverse impacts to low-income communities are expected**.** The study area was not identified as a low-income community. If the proposed project features are constructed, there will be no direct disproportionately high or adverse human health or environmental effects on any minority and/or low-income populations as per E.O. 12898.

4.9 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: With implementation of the proposed action, the project-related construction equipment will produce small amounts of engine exhaust during construction activities. The temporary, minor impacts to air quality will be localized to the project area and will not affect area residents. Tennessee's State Implementation Plan is not expected to be impacted. 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.

4.10 WATER QUALITY

Future Conditions with No Action: Without implementation of the proposed action, no significant changes to water quality would likely occur due to current regulatory mechanisms and the existing management of the river. Continued bank erosion near the project area during higher river stages would add to the sediment load of the river; however, these increases would be minor compared to the natural sediment load of the Mississippi River.

Future Conditions with the Proposed Action: With implementation of the proposed action, some sediments (mostly sands) would be stirred up when the Graded Stone C is first deposited onto the riverbank. This minimal increase in turbidity would be transitory and not detectable from the surface. Material graded along the bank during bank preparation consists of alluvium deposits (mostly sands) which is the same material that has recently fallen into the river due to bank caving and similar to what is located on the channel bottom. Minor increases in sediment load would be expected with grading activities; however, any increases in turbidity would be transitory and minor compared to the natural sediment load of the river, especially during high river stages. A Section 404(b)(1) evaluation was prepared for the proposed activities and is included in Appendix E. Section 401 water quality certification was requested from the State of Tennessee.

4.11 NAVIGATION

Future Conditions with No Action: Without implementation of the proposed action, navigation conditions on the Mississippi River would not change.

Future Conditions with the Proposed Action: Commercial navigation is not likely to attempt to use the Chute of Island No. 21 during the proposed timing of construction (river stages between 28 and 46 feet on the Caruthersville gage). The U.S. Coast Guard would be coordinated with at least 2 weeks prior to beginning work and within 1 week of completion to ensure continued river navigation safety. No adverse impacts to navigation are expected.

4.12 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE

The USACE is obligated under Engineer Regulation (ER) 1165-2-132 to assume responsibility for the reasonable identification and evaluation of all hazardous, toxic, and radioactive waste (HTRW) contamination within the vicinity of proposed actions. ER 1165-2-132 identifies that HTRW policy is to avoid the use of project funds for HTRW removal and remediation activities. A record search has been conducted of the Environmental Protection Agency's (EPA) EnviroMapper Web Page (http://maps.epa.gov). The EPA search engine was checked for any superfund sites, toxic releases, or hazardous waste sites within the vicinity of the proposed project. Site inspection of the proposed project area was conducted by USACE personnel on March 7, 2016. An Environmental records search and the site survey conducted did not identify the presence of any hazardous or suspected hazardous wastes in the project area. As a result of these assessments, it was concluded that the probability of encountering HTRW is low. If a recognized environmental condition is identified in relation to the project site, the USACE, Memphis District, will take the necessary measures to avoid the recognized environmental condition so that the probability of encountering or disturbing HTRW will continue to be low. If any HTRW is encountered during construction activities, the proper handling and disposal of these materials will be coordinated with the TDEC.

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."

The Dyer County Little Levee is a non-Federal levee system constructed in the 1930s, except in the reach along the Obion River, which was added in the early 1970s. Five set back levees have been constructed during the life of the project. The construction of the projects were completed in 1968, 1975, 1988, 1989 and 2015. Additional repair measures to the system include emergency bank protection in 1983, 1985 and 1991, extensive rehab in 1973, an emergency raise in 1997 and a culvert replacement currently under construction. The levee is 20 miles in length and ranges from 6 to 12 feet in height. The Dyer County Little Levee is exposed to overbank flows along 20 miles of the Mississippi River. Based on the gage at Caruthersville, Missouri, stages of 30 feet or more begin to impact the levee. Flood stage at Caruthersville is 32 feet. The levee system provides flood risk reduction to a 0.04 (25-year frequency) chance exceedance flood or a Caruthersville Gage stage reading of 44 feet. The Dyer County Little Levee reduces the risk for approximately 12,000 acres, 30 homes, 1 business, a church, and 41 farm buildings. The levee runs from high ground to high ground and is considered a completely integrated system. The system includes 4 gravity drains for interior drainage and approximately 4,300 linear feet of bank protection. In 2015, USACE repaired 3 segments of the Dyer County Little Levee under the PL 84-99 Program. These segments are hereafter referred to as the Northern

Levee Realignment, the Choctaw Levee Realignment, and the Culvert Replacement at the Obion River. The Northern Levee reach of the Dyer County Little Levee is located along Bungie Road immediately north of Interstate-155 as it crosses the Mississippi River into Dyer County, Tennessee. The Choctaw Levee reach of the Dyer County Little Levee is located off of Tennessee Highway 104 at the Choctaw Transportation Company in Dyer County, Tennessee. The location of the culvert replacement is within Dyer County Little Levee approximately 300 feet west of Tennessee Highway 181 where the highway crosses the Obion River in Dyer County, Tennessee. Approximately 1.81 acres of non-wet bottomland hardwood forest on the landside and 1.53 acres of BLH forested wetlands on the riverside of the Dyer County Little Levee were impacted by tree clearing due to the replacement of the damaged culverts and digging a new channel to redirect storm water away from the existing damaged culverts through the new box culvert. A 14.8-acre mitigation tract along the mainline Mississippi River Levee in Dyer County was planted in March 2014 in a mixture of bottomland hardwood species to compensate for unavoidable impacts to wetlands and bottomland hardwoods. Monitoring of the mitigation site is on-going.

In the vicinity of the chute of Island 21, there are several dikes constructed in the Mississippi River as part of the Channel Improvement Program of the Mississippi River and Tributaries (MR&T) Project. In 1957, four pile dikes were constructed upstream of the mouth of the chute to address the division of flow around Island 21 for navigation purposes. In 1969, a closure dike called the Island 21 Chute Dike was constructed in the downstream portion of the Chute of Island 21 to restrict flow through the chute which was adversely affecting the navigation channel both upstream and downstream of Island 21 and caving the river bank opposite of the Island. In 1994, four additional dikes (Dikes numbers 5, 6 and 7) were constructed on the riverward side of Island 21 extending to the navigation channel to maintain the channel alignment. Maintenance of these structures has occurred periodically since their construction. The primary environmental effects of the overall MR&T project and channel improvement activities include the physical loss of channel habitat quantity, a growing disconnect with the relict floodplain during low to moderate river stages, and a general loss of riverine habitat complexity (USACE 2013). Efforts to maintain, restore, and improve habitat values in the LMR have increased in recent years. In 2012 and 2013, ten thousand acres of batture, an area of active floodplain riverward of the levees, were placed under easement and reforested to increase the contiguous forested wetlands along the LMR (IEC 2014). Over 873,000 acres of wetlands have been restored as part of the Wetland Reserve Program in the LMR corridor encompassing lands both within and outside of the levee system (IEC 2014). A programmatic conservation plan was developed in 2013 detailing the actions and mechanisms by which the Channel Improvement Program of the MR&T project implements conservation measures to maintain and improve habitat values within the LMR (USACE 2013). The number and condition of secondary channels are monitored on the LMR and opportunities to maintain and restore connectivity are discussed and implemented annually (USACE 2013, USFWS 2013). The Lower Mississippi River Conservation Committee has identified the potential for a project consisting of restoring some secondary channel habitat in the Chute of Island 21. These potential efforts would focus on restoring flow during the low water periods while avoiding any adverse effects to the flood risk reduction provided by the Dyer County Little Levee.

The preferred alternative would reduce the risk of failure of the Dyer County Little Levee and accomplish flood risk reduction objectives, which are of great importance in the Lower

Mississippi Valley. The proposed activities would result in some minor alterations to the environment; however, no significant adverse cumulative impacts are expected due to the proposed action. Overall, the proposed project, in comparison to past, present, and reasonably foreseeable future actions, will not contribute significant impacts to the general project area.

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.

To minimize impacts, work limits would only include areas where active scour poses a threat to the levee. Grading would be limited to the upstream 175-ft. reach of Area 3 where eddy effects are causing active bank lost. Work would be conducted from floating equipment minimizing impacts to the existing riparian vegetation. Every effort would be made to preserve all trees not interfering with construction. Vegetative clearing would only be the minimum necessary to key the rock into the bank (approximately 2 feet from top bank). Based on the sandy soils and extent of the active scour at these locations, the clearing/grading activities would not exceed what would be lost if no action is taken. Contractors are also responsible for an approved environmental protection plan for the prevention/control of pollution and habitat disruption that may occur to the environment during construction. No adverse impacts have been identified that would require compensatory mitigation.

7.0 COMPLIANCE WITH ENVIRONMENTAL LAWS AND REGULATIONS

Environmental compliance for the proposed action would be achieved upon: coordination of this EA and draft Finding of No Significant Impact (FONSI) with appropriate agencies, organizations, and individuals for their review and comments; USFWS confirmation that the proposed action would not be likely to adversely affect any endangered or threatened species; receipt of a Water Quality Certificate from the State of Tennessee; public review of the Section 404(b)(1) Public Notice, and signature of the Section 404(b)(1) Evaluation. The FONSI will not be signed until the proposed action achieves environmental compliance with applicable laws and regulations, as described above.

On January 18, 2017, USACE sent an application to TDEC-Division of Water Pollution Control for an Aquatic Alteration Resource Alteration Permit (ARAP) (Section 401 Water Quality Certification). The public notice for the ARAP (#NRS17.008) was posted on the TDEC website (http://tn.gov/environment/topic/ppo-water) on February 6, 2017. A public notice sign was posted in the vicinity of the proposed project area for the obligatory 30-day public comment period on February 9, 2017. A legal notice is scheduled to be posted in the Dyersburg State Gazette on February 24, 2017.

On February 1, 2017, USACE requested concurrence with the U.S. Fish and Wildlife Service for a not likely adversely to affect determination on federally listed species or their critical habitat, pursuant to Section 7 of the Endangered Species Act.

8.0 CONCLUSION

This office has assessed the environmental impacts of various project alternatives. No significant impacts to agricultural lands, wetlands, aquatic resources, fisheries, wildlife, threatened and endangered species, cultural resources, socio-economic resources, environmental justice, air quality, water quality, 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 input provided by Dr. Robert Dunn, archaeologist. The address of the preparer is: U.S. Army Corps of Engineers, Memphis District, Environmental Compliance Branch, Regional Planning and Environmental Division South, Attn: Mike Thron, 167 North Main St., B202, Memphis, TN 38103-1894.

10.0 REFERENCES

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APPENDICES

Appendix A – Detailed Plans and Cross-Sections for Proposed Action - Alternative 2 (Stone Protection)

Appendix B – Representative Cross-Section for Alternative 3 (Levee Setback)

Appendix C – Background Information on Disaster Incident

Appendix D – Photographs of Damages

Appendix E – 404(b)(1) Evaluation

APPENDIX A

Detailed Plans for Proposed Action

US Army Corps
of Engineers®

DYER COUNTY LITTLE LEVEE SCOUR REPAIR

DYER COUNTY, TN

MILES 12/36+00 - 13/21+00

JANUARY 2017

THIS PROJECT WAS DESIGNED BY THE MEMPHIS DISTRICT CORPS OF ENGINEERS. THE INITIALS OR SIGNATURES AND REGISTRATION DESIGNATIONS OF INDIVIDUALS APPEAR ON THESE PROJECT DOCUMENTS WITHIN THE SCOPE OF THEIR EMPLOYMENT AS REQUIRED BY ER 1110-1-8152. SIGNATURES INDICATE OFFICIAL RECOMMENDATION OF ALL DRAWINGS IN THIS SET.

APPROVED BY:

XX
CHIEF ENGR & CONST DIVISION

US Army Corps
of Engineers®
MEMPHIS DISTRICT

MARK	DESCRIPTION	DATE	APPR.	MARK	DESCRIPTION	DATE	APPR.

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MEMPHIS DISTRICT
MEMPHIS, TN

DESIGNED BY: KANDI H. WALLER
DWN BY: KHW
CKD BY: DSC
SUBMITTED BY: DARIAN S. CHASTEEN, P.E.
PLOT SCALE:
SIZE:
DATE: June 2015
SOLICITATION NO.:
CONTRACT NO.:
ISSUE DATE:
FILE NUMBER:
FILE NAME:

DYER COUNT LITTLE LEVEE SCOUR REPAIR
LAKE COUNTY, TN
MILES 12\36+00 - 13\21+00
COVER SHEET

SHEET IDENTIFICATION
G-001

1 2 3 4 5

D C B A

HUEEMAN REVETMENT

HICKMAN REVETMENT

MISSISSIPPI RIVER FLOW

MISSISSIPPI RIVER FLOW

ISLAND 21 DIKES

ISLAND 21 DIKE 1

CHIC ROAD

DYER COUNTY LITTLE LEVEE

POORWAY ROAD

BRADLEY ROAD

GREAT RIVER ROAD

AREA 1

AREA 2

AREA 3

N

US Army Corps of Engineers®
Memphis District

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U.S. ARMY CORPS OF ENGINEERS
MEMPHIS DISTRICT
MEMPHIS, TENNESSEE

DESIGNED BY: Kendi H. Waller
DWN BY: KHW
CKD BY: DSC
SUBMITTED BY: Darian S. Claasen, P.E.
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DYER COUNTY LITTLE LEVEE SCOUR REPAIR
LAKE COUNTY, TENNESSEE

MILES 12/36+00 - 13/21+00
GENERAL MAP

SHEET IDENTIFICATION
G-002

auto_time

APPROXIMATE LIMITS OF STONE PLACEMENT

HEAVY DEBRIS AREA

FLOW

X=846531.89
Y=13075033.98

X=846516.42
Y=13075132.98

X=846454.70
Y=13075527.98

X=846381.51
Y=13076022.50

X=846366.59
Y=13076121.48

AREA 1

AREA 2

AREA 3

BASELINE

DYER COUNTY LITTLE LEVEE

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DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

DESIGNED BY: Kandi H. Waller
DWN BY: KHW
CKD BY: DSC
SUBMITTED BY: Darian S. Chastain, P.E.
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SIZE: ANSI D
FILE NAME: G-BSDxxx.dgn

U.S. ARMY CORPS OF ENGINEERS
MEMPHIS DISTRICT
MEMPHIS, TENNESSEE

1"=40'

DYER COUNTY LITTLE LEVEE SCOUR REPAIR
LAKE COUNTY, TENNESSEE

MILES 12/36+00 - 13/21+00
PLAN VIEW - AREA 1

SHEET IDENTIFICATION
G-003

auto_time

FLOW

TIE TO EXISTING
RIPRAP PAVING

POTENTIAL HAZARD
EXISTING STONE PILE

MANY DOWNED TREES

LARGE DOWNED TREES

X=846548.31
Y=13073654.96

X=846591.25
Y=13073850.29

X=846656.61
Y=13074147.60

X=846649.28
Y=13074271.71

X=846634.68
Y=13074376.15

X=846578.20
Y=13074737.57

X=846516.45
Y=13075132.78

X=846485.57
Y=13075330.38

M13/ 20+00

M13/ 15+00

M13/ 10+00

M13/ 6+00

AREA 1

AREA 2

BASELINE

DYER COUNTY LITTLE LEVEE

APPROXIMATE LIMITS
OF STONE PLACEMENT

US Army Corps of Engineers
Memphis District

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: Kandi H. Waller
DWN BY: KHW
SUBMITTED BY: Darian S. Chasteen, P.E.
PLOT SCALE: 1"=60'
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CONTRACT NO.:
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MEMPHIS DISTRICT
MEMPHIS, TENNESSEE

DYER COUNTY LITTLE LEVEE SCOUR REPAIR
LAKE COUNTY, TENNESSEE

MILES 12/36+00 - 13/21+00
PLAN VIEW - AREA 2

SHEET IDENTIFICATION
G-004

autoc_time

FLOW

APPROXIMATE LIMITS OF STONE PLACEMENT

X=845688.60
Y=13077442.09

X=845801.48
Y=13077098.92

X=845861.03
Y=13077024.14

X=846020.68
Y=13076873.30

X=846098.97
Y=13076777.77

X=846305.91
Y=13076510.79

X=846275.35
Y=13076707.22

X=846258.33
Y=13076805.75

X=846396.06
Y=13075923.66

X=846336.66
Y=13076319.24

X=846317.34
Y=13076417.35

X=846287.14
Y=13076608.99

X=846381.50
Y=13076022.59

OFFSET BASELINE

AREA 1

AREA 3

DYER COUNTY LITTLE LEVEE

BASELINE

0+00 1+00 2+00 3+00 4+00 5+00 6+00 8+00

23+00 24+00 25+00 26+00 27+00 28+00 29+00 30+00 31+00 32+00

M12/ 50+00 M12/ 45+00 M12/ 40+00 M12/ 38+00 M12/ 37+00 M12/ 36+00

N

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MARK	DESCRIPTION	DATE	APPR.

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MEMPHIS, TENNESSEE

DESIGNED BY: Kandi H. Waller
DWN BY: KHW
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SUBMITTED BY: Darian S. Chasteen, P.E.
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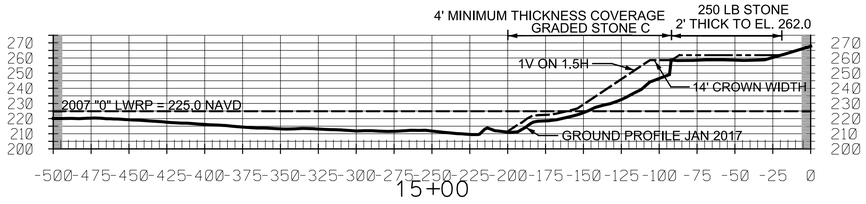
SIZE: ANSI D
FILE NAME: G-B5Door.dgn

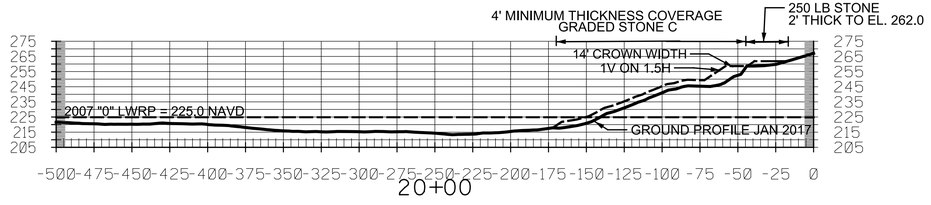
DYER COUNTY LITTLE LEVEE SCOUR REPAIR
LAKE COUNTY, TENNESSEE

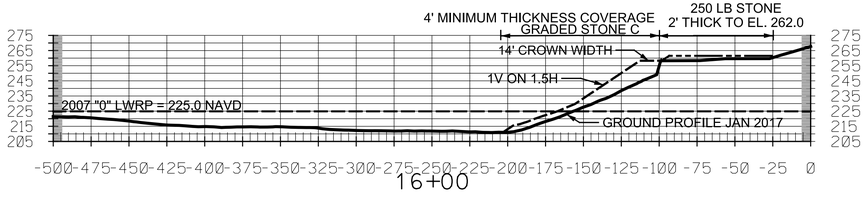
MILES 12/36+00 - 13/21+00
PLAN VIEW - AREA 3

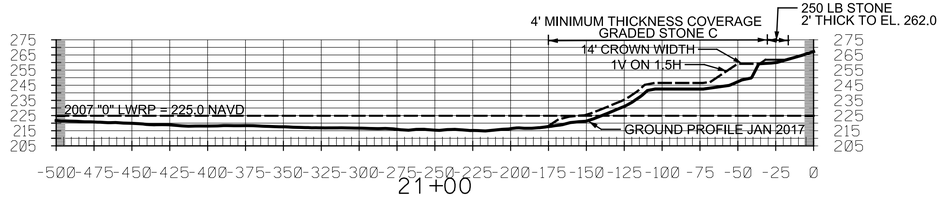
SHEET IDENTIFICATION
G-005

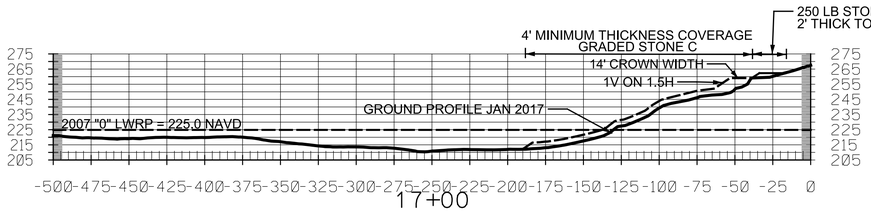
date_time

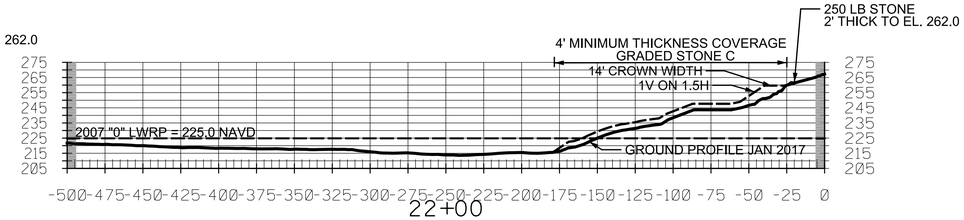


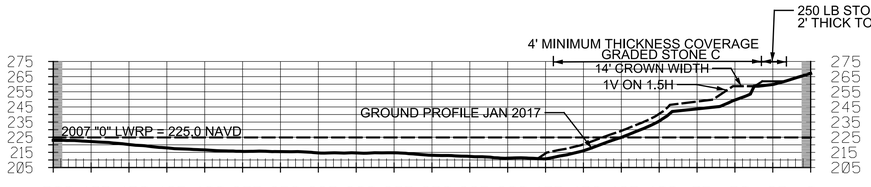


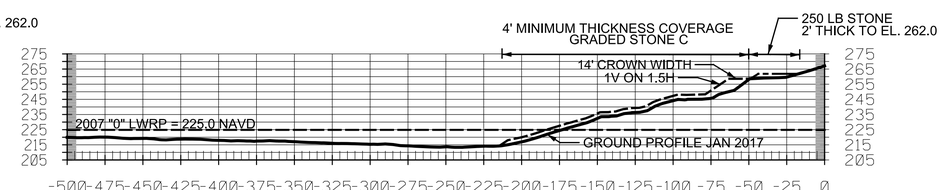


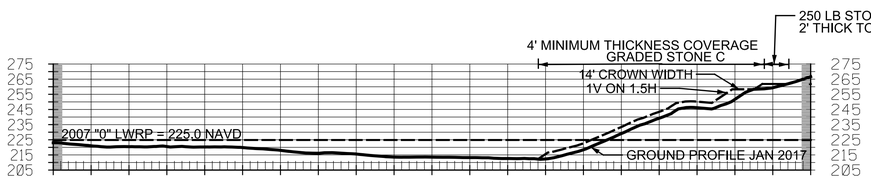


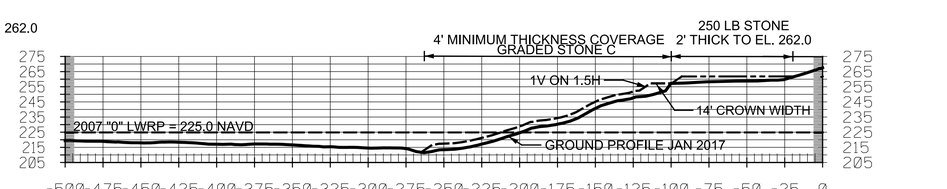












Note: Every effort should be made to preserve all trees in the area not interfering with construction.

US Army Corps of Engineers
Memphis District

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
MEMPHIS DISTRICT
MEMPHIS, TENNESSEE

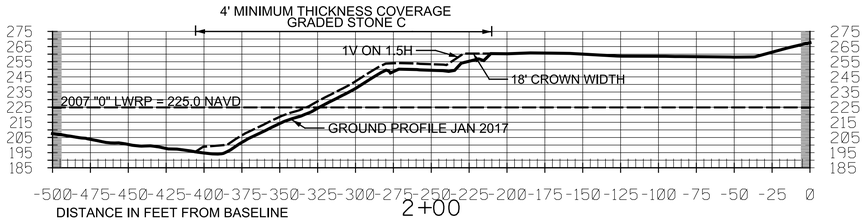
DESIGNED BY: Kandi H. Waller
DWN BY: KHW
SUBMITTED BY: Darian S. Chasteen, P.E.
CKD BY: DSC
PLOT SCALE: 1"=50'
PLOT DATE:
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
SIZE: ANSI D
FILE NAME: C-sht3xxx.dgn

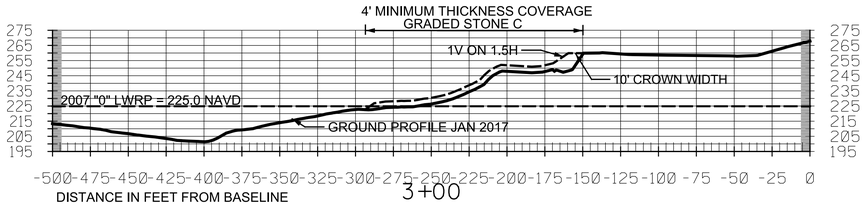
DYER COUNTY LITTLE LEVEE SCOUR REPAIR
LAKE COUNTY, TENNESSEE

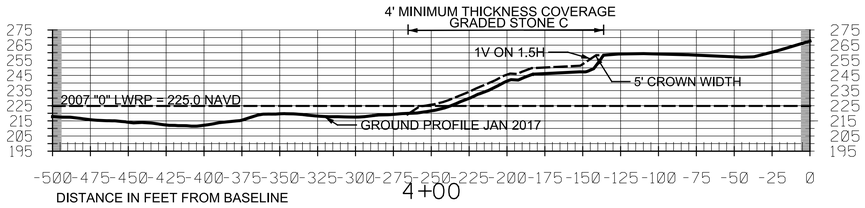
MILES 12/36+00 - 13/21+00
CROSS SECTIONS - AREA 1

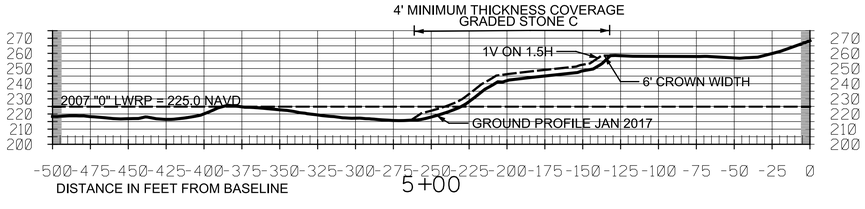
SHEET IDENTIFICATION
C-101

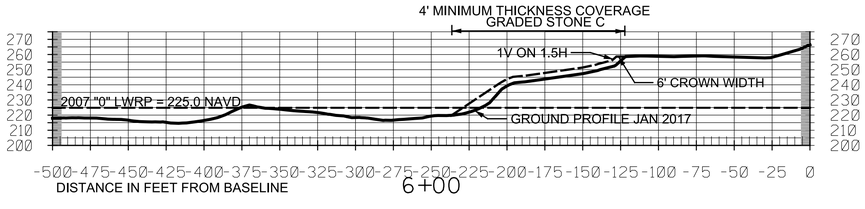
date_time

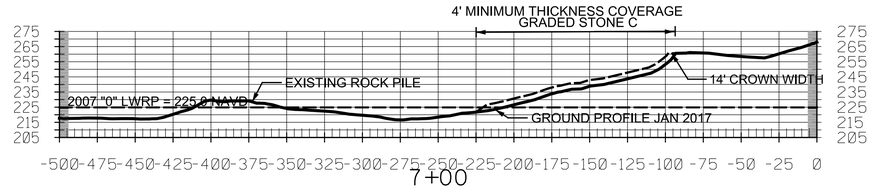


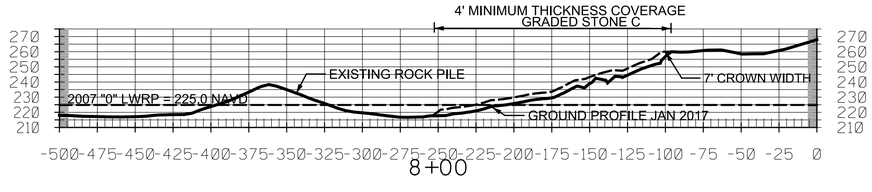


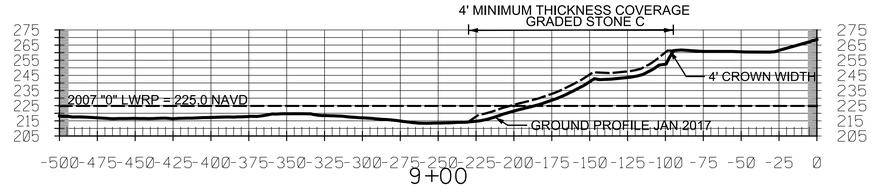


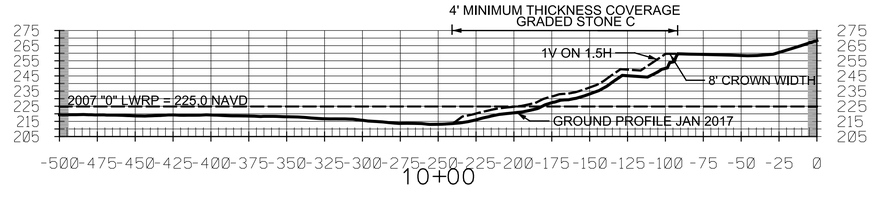


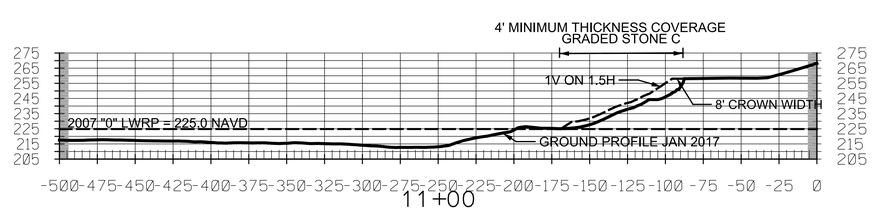












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US Army Corps of Engineers
Memphis District

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
MEMPHIS DISTRICT
MEMPHIS, TENNESSEE

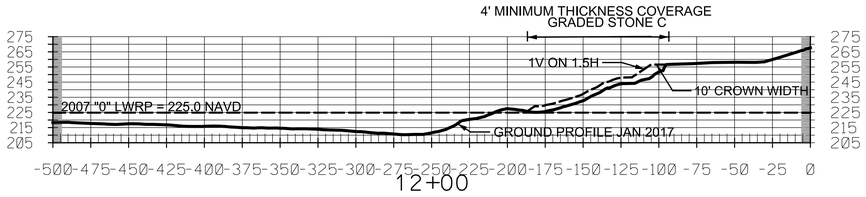
DESIGNED BY: Kandi H. Waller
DRAWN BY: KHW
CKD BY: DSC
SUBMITTED BY: Darius S. Chastain, P.E.
PLOT SCALE: 1"=50'
PLOT DATE:
SIZE: ANSI D
FILE NAME: C-BSDxxx.dgn
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

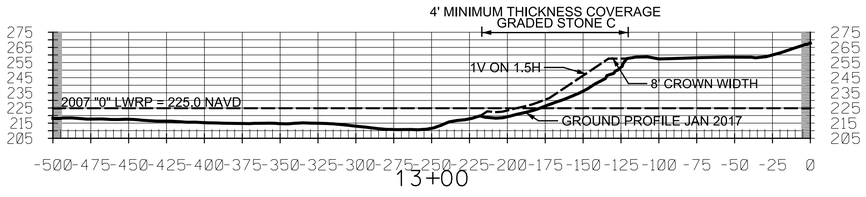
DYER COUNTY LITTLE LEVEE SCOUR REPAIR
LAKE COUNTY, TENNESSEE

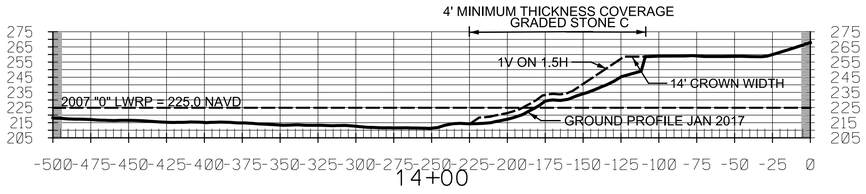
MILES 12/36+00 - 13/21+00
CROSS SECTIONS - AREA 2

SHEET IDENTIFICATION
C-102

auto_time







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Memphis District

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U.S. ARMY CORPS OF ENGINEERS
MEMPHIS DISTRICT
MEMPHIS, TENNESSEE

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SUBMITTED BY: Darian S. Chasteen, P.E.
PLOT SCALE: 1"=50'
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FILE NAME: C-BSDxx.dgn
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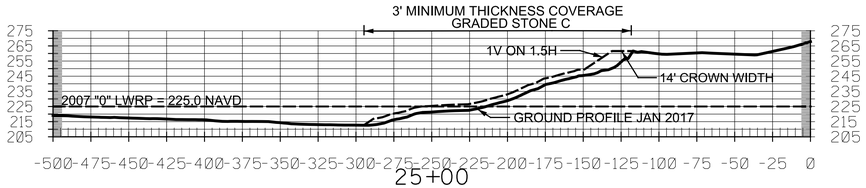
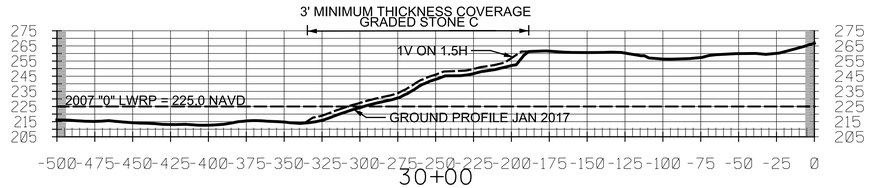
DYER COUNTY LITTLE LEVEE SCOUR REPAIR
LAKE COUNTY, TENNESSEE

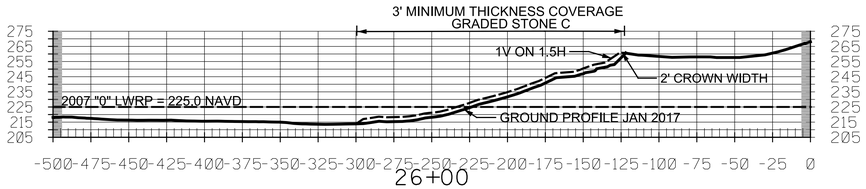
MILES 12/36+00 - 13/21+00
CROSS SECTIONS - AREA 2

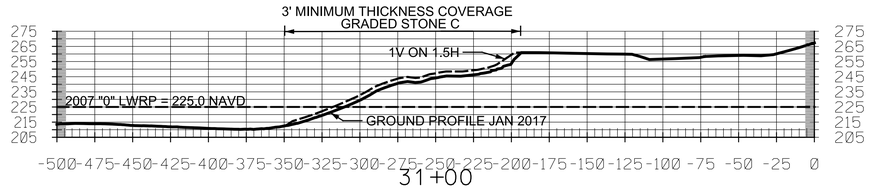
SHEET IDENTIFICATION
C-103

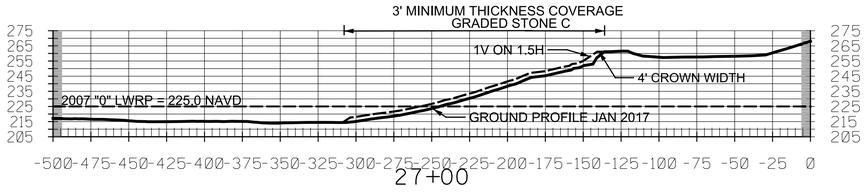
auto_time

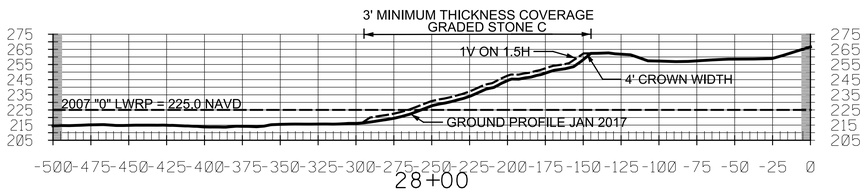


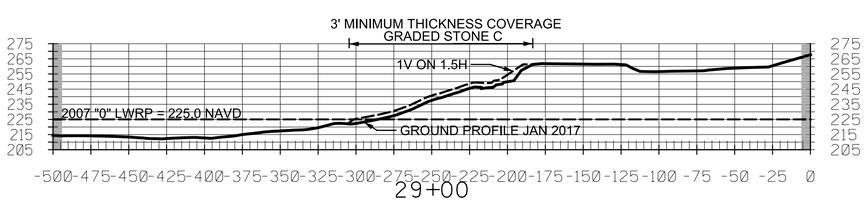












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US Army Corps of Engineers®
Memphis District

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U.S. ARMY CORPS OF ENGINEERS
MEMPHIS DISTRICT
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FILE NAME: C-BSDxx.dgn

DYER COUNTY LITTLE LEVEE SCOUR REPAIR
LAKE COUNTY, TENNESSEE

MILES 12/36+00 - 13/21+00
CROSS SECTIONS - AREA 3

SHEET IDENTIFICATION
C-104

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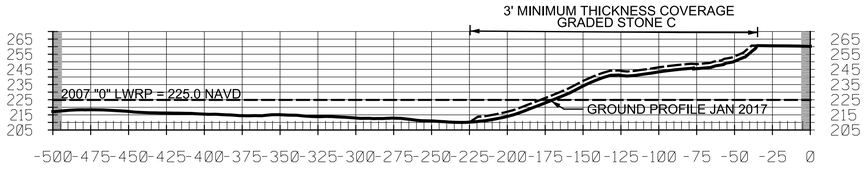

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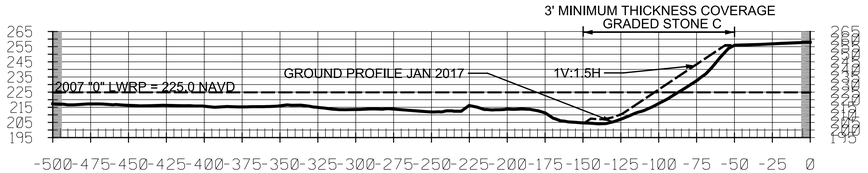

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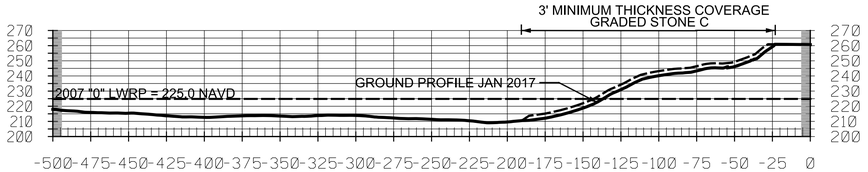

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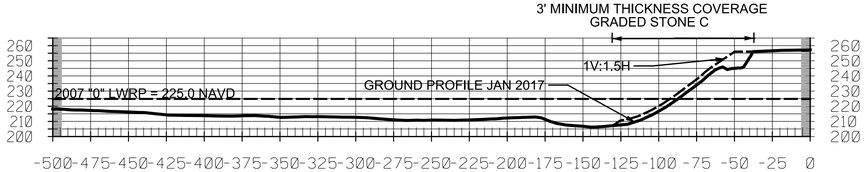

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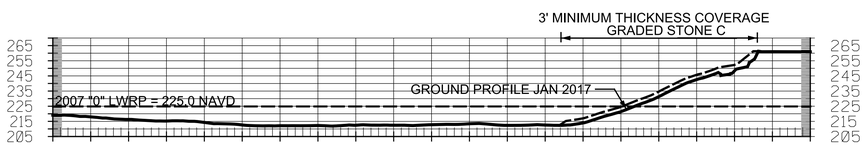

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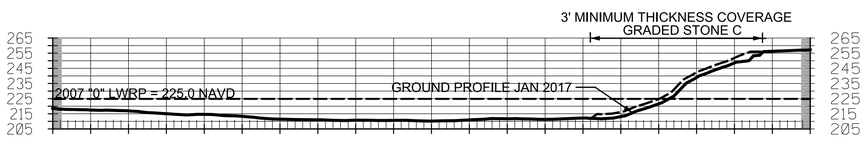

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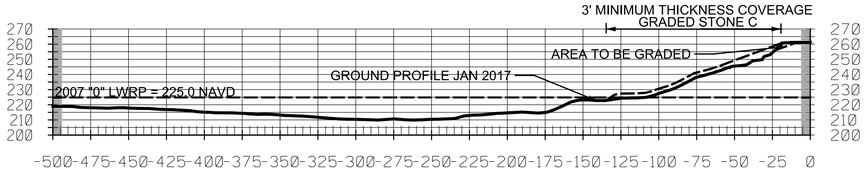

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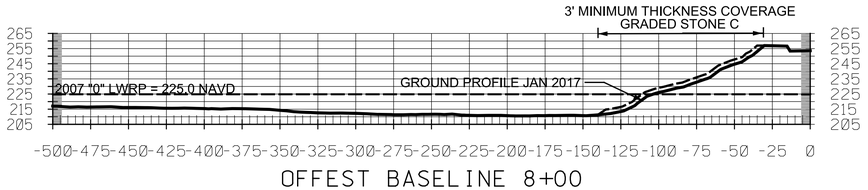

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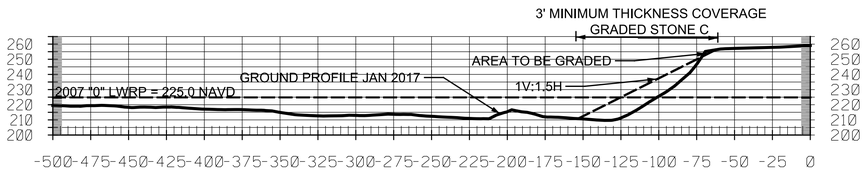

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US Army Corps of Engineers
Memphis District

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
MEMPHIS DISTRICT
MEMPHIS, TENNESSEE

DESIGNED BY: Kandi H. Waller
DWN BY: KHW
SUBMITTED BY: Dorian S. Chasteen, P.E.
DATE:
SOLICITATION NO.:
CKD BY: DSC
CONTRACT NO.:
PLOT SCALE: 1"=50'
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SIZE: ANSI D
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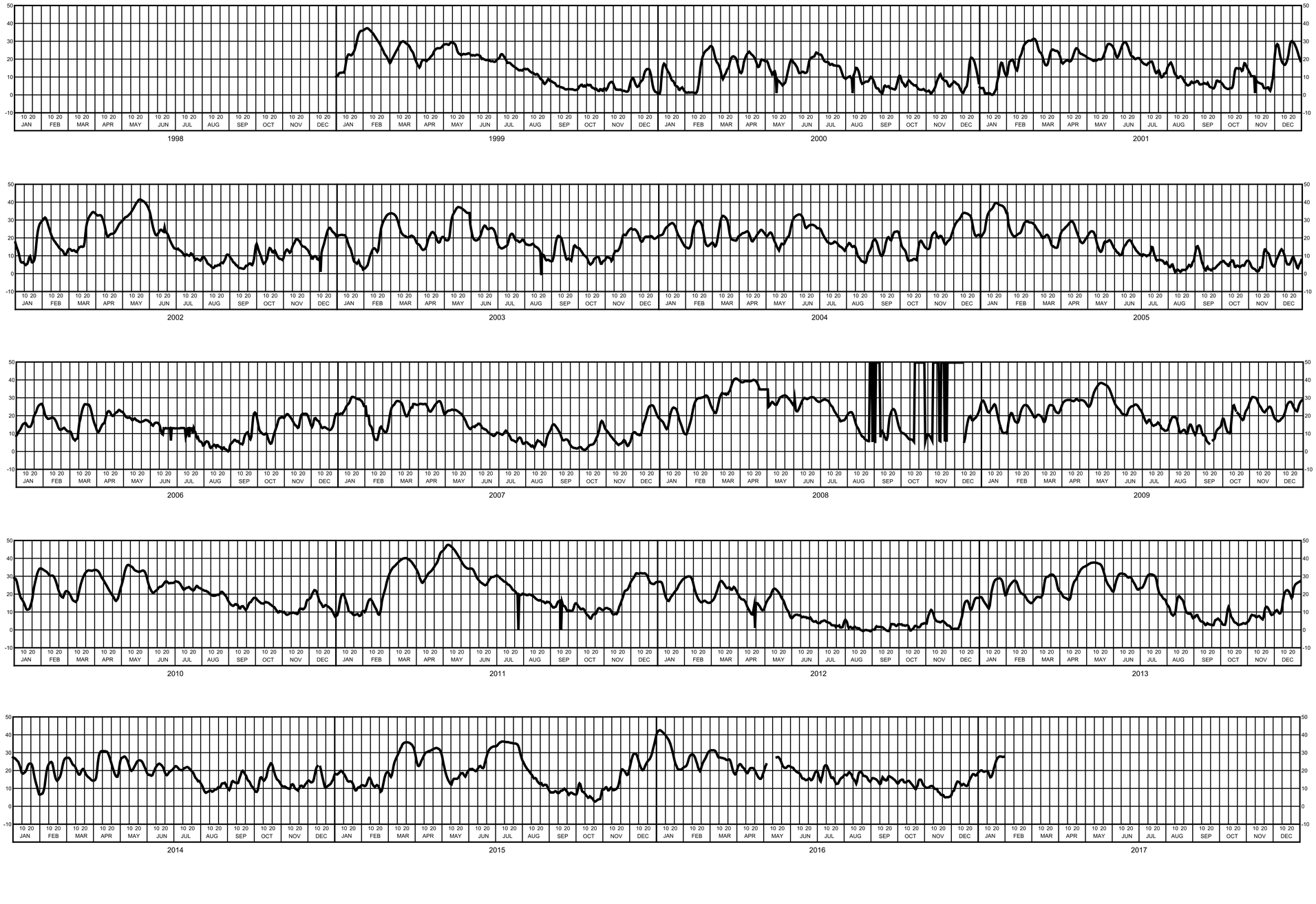
DYER COUNTY LITTLE LEVEE SCOUR REPAIR
LAKE COUNTY, TENNESSEE

MILES 12/36+00 - 13/21+00
CROSS SECTIONS - AREA 3

SHEET IDENTIFICATION
C-105

date_time



STAGE IN FEET - GAGE ZERO, 235.64 NAVD

THIS PROJECT WAS DESIGNED BY THE MEMPHIS DISTRICT OF THE U.S. ARMY CORPS OF ENGINEERS. THE INITIALS OR SIGNATURES AND PROFESSIONAL DESIGNATIONS OF INDIVIDUALS APPEARS ON THESE PROJECT DOCUMENTS WITHIN THE SCOPE OF THEIR EMPLOYMENT AS REQUIRED BY ER1110-1-8152.

US Army Corps of Engineers®

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY:
DWN BY:
CKD BY:
SUBMITTED BY:
PLOT SCALE:
PLOT DATE:
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
SIZE:
FILE NAME:

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
MEMPHIS, TENNESSEE

SCALE: AS SHOWN

CARUTHERSVILLE, MO.

STAGE HYDROGRAPH - CARUTHERSVILLE GAGE

RIVER MILE: 846.4

SHEET IDENTIFICATION
1 OF 1

auto_time

APPENDIX B

Alternative 3 – Levee Setback

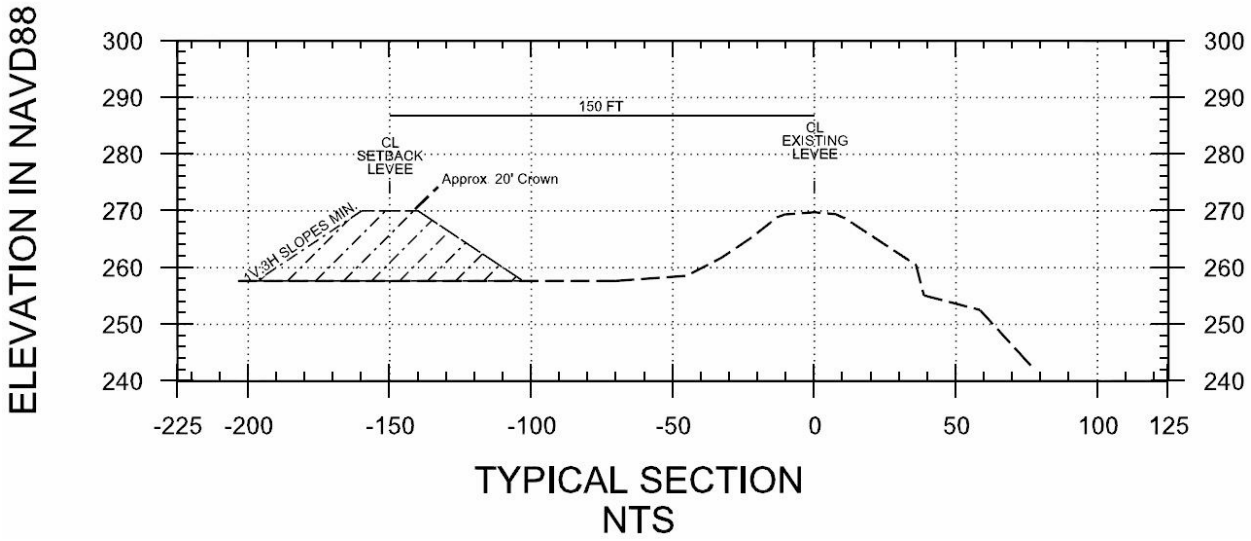


Figure B.1. Alternative 3 – Levee setback for the Dyer County Little Levee Scour PL 84-99 Project.

APPENDIX C

Disaster Incident

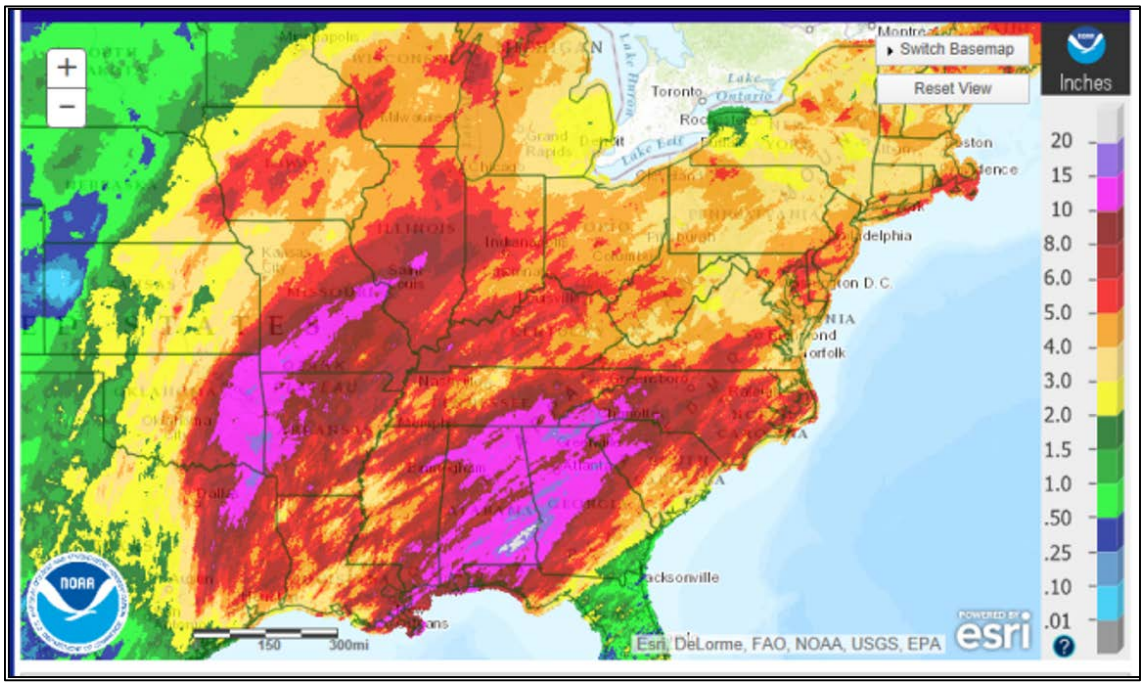


Figure C.1 - Precipitation December, 2015

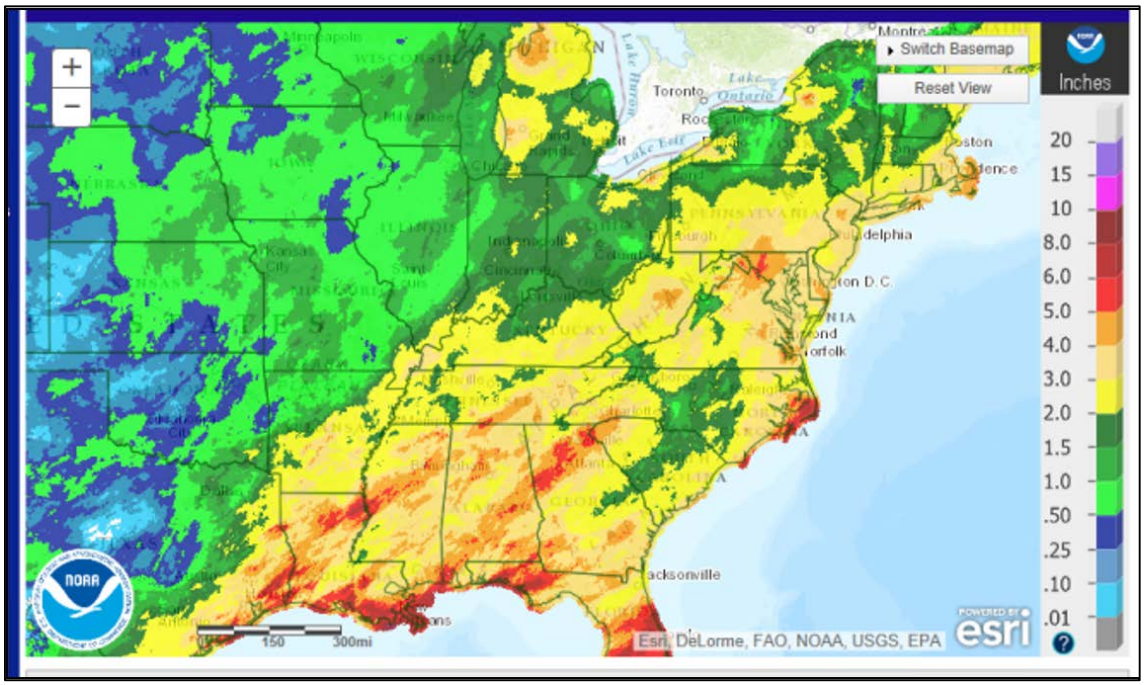


Figure C.2 - Precipitation January, 2016

APPENDIX C

Disaster Incident

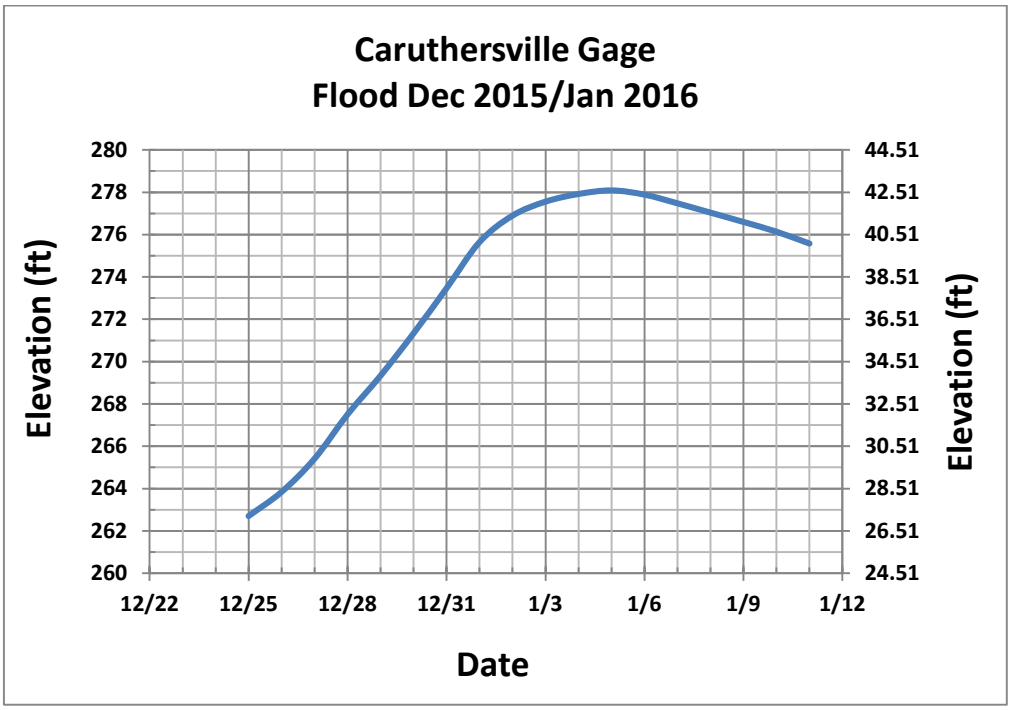


Figure C.3 - Caruthersville Gage – High Water December 2015/January 2016

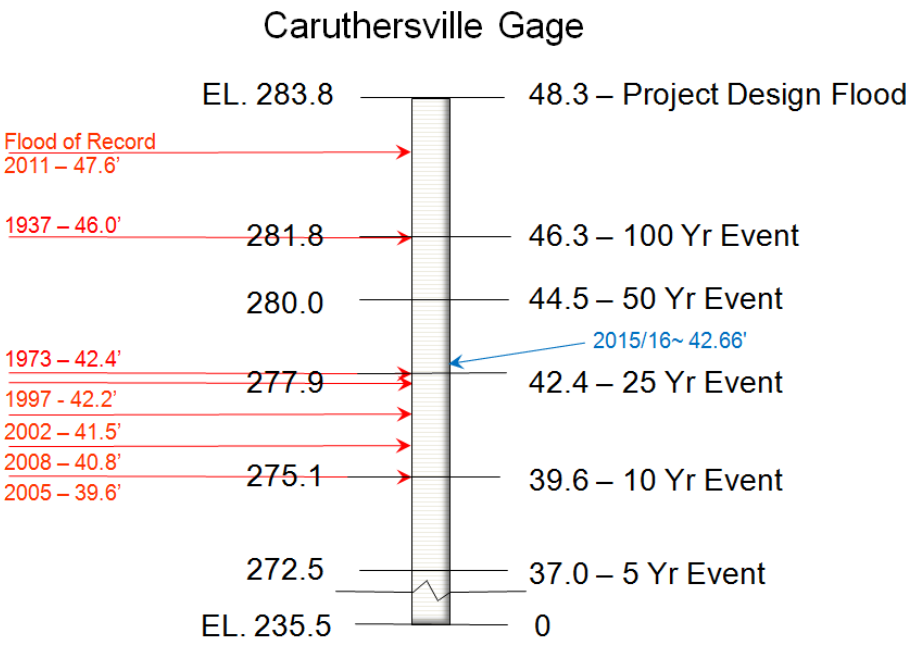


Figure C.4 - Caruthersville Gage – Historical High Water Events

APPENDIX D

Damages

Figure D.1 – Stream bank erosion looking east from the chute

Figure D.2 – Stream bank erosion looking east from the chute

APPENDIX D

Damages

Figure D.3 – Stream bank erosion looking north from end of existing riprap

Figure D.4 – Stream bank erosion looking north from chute

APPENDIX D

Damages

Figure D.5 – Stream bank erosion looking east from chute

Figure D.6 – Stream bank erosion end of existing riprap revetment

APPENDIX E

Clean Water Act Section 404(b)(1) Evaluation

SECTION 404(b)(1) EVALUATION

Dyer County Little Levee Scour PL-84-99 Project
Dyer County, Tennessee

I. PROJECT DESCRIPTION

a. Location. The Dyer County Levee is a non-Federal levee located in Dyer County, Tennessee, between the mainline Mississippi River Levee, the Mississippi River and the Obion River. The Dyer County Levee begins at the Mainline Levee east of Boothspoint and extends to the Obion River, between river miles 820 and 840. Scour has occurred along the riverside toe of the levee along a reach immediately adjacent to the left descending bank of the Chute of Island No. 21 of the Mississippi River. The Chute of Island 21 is a secondary channel in the Mississippi River located between River Miles 828.5 and 823.

b. General Description. The proposed levee rehabilitation consists of bank protection and reconstruction of the levee to pre-flood section and grade using Graded Stone C and 250 LB Riprap placed along the bank and riverside toe of the levee in the Chute of Island 21 of the Mississippi River. Stone would be delivered by barge, and the work would be performed by floating plant using barge mounted draglines or hydraulic excavators. The recommended work is separated into 3 areas based on the progression of bank failure. Area 1 is the most critical area extending for approximately 1,000 feet in length where active caving has progressed into the toe of the levee. Within Area 1, the levee would be reconstructed to pre-flood section and grade using Graded Stone C, and the Graded Stone C would extend down to the channel bottom with a minimum thickness of 4 feet establishing a slope of 1V:1.5H. A thickness of 2 feet of 250 LB Riprap would also be placed along the riverside slope of the levee. Area 2 is the next highest priority area extending approximately 1,500 feet downstream of Area 1. Within Area 2, Graded Stone C would be placed from top bank down to the channel bottom with a minimum thickness of 4 feet establishing a slope of 1V:1.5H. Area 3 extends approximately 1,500 feet upstream of Area 1. Within Area 3, Graded Stone C would be placed from top bank down to the channel bottom with a minimum thickness of 3 feet establishing a slope of 1V:1.5H. Prior to stone placement, some minor grading (approximately 900 cubic yards) will be required in the upstream portion of Area 3 where there is a vertical and actively caving, unstable bank. Any large woody debris encountered in the channel from the recent scour would be removed from the work area prior to stone placement and placed in the deeper portions of the Chute of Island No. 21.

c. Authority and Purpose. USACE has authority under Public Law 84-99 (PL 84-99), Flood Control and Coastal Emergencies (FCCE) (33 U.S.C. 701n) (69 Stat. 186) for emergency management activities. Under PL 84-99, the Chief of Engineers, acting for the Secretary of the Army, is authorized to undertake activities, including rehabilitation of flood control works threatened or destroyed by flood. The proposed action is authorized as part of PL 84-99. The purpose of the proposed activities is to reconstruct the levee to the pre-flood section and grade and stabilize the active scour using stone protection.

d. General Description of Dredged and /or Fill Material.

(1) General Characteristics of Fill Material. In the extreme upstream limits of Area 3 where there is a vertical, actively caving and unstable bank, grading would be required to provide stable slopes prior to stone placement. This material would consist of recent alluvium deposits (mostly sands) and essentially the same material composing the substrate below the water line. Fill material for the reconstruction of the levee within Area 1 and for bank protection within Areas 1, 2, and 3 would consist of Graded Stone C. Two hundred and fifty pound riprap stone would also be placed along the riverside levee slope within Area 1 above the C-stone. Size requirements for the stone are shown below:

Graded Stone "C"	
Stone Weight (LBS)	Cumulative Percent (Finer by Weight)
400	100
250	70-95
100	50-80
30	32-58
5	15-34
1	0-15
NOTE: 5 percent of the material can weigh more than 400 pounds; however, no piece shall weigh more than 500 pounds.	

250-LB Riprap Stone	
Stone Weight (LBS)	Cumulative Percent (Finer by Weight)
>250	95-100
150-250	80-100
100-150	65-90
50-100	48-75
20-50	30-52
5-20	5-25
1-5	0-10
NOTE: up to 5 percent may be above 250 pounds, but no single stone may exceed 300 pounds.	

(2) Quantity of Material. Estimated quantities for Area 1 include approximately 40,000 tons of Graded Stone C placed a minimum of 4 feet thick and 3,300 tons of 250 LB Riprap placed 2 feet thick. Estimated quantities for Area 2 include approximately 46,000 tons of Graded Stone C placed at least 4 feet thick. Estimated quantities for Area 3 include approximately 47,000 tons of Graded Stone C placed at least 3 feet thick. Approximately 900 cubic yards of grading will be required prior to stone placement in Area 3.

(3) Source of Material. The material associated with bank grading would consist of recent alluvium deposits (mostly sands) and is essentially the same material composing the substrate below the water line. The Graded C Stone and 250-lb riprap used for the proposed activities would be obtained from quarries producing stone which meets USACE specifications.

e. Description of Proposed Discharge Sites.

(1) Location. The scour locations to be repaired are along the left descending bank of the Chute of Island No. 21 adjacent to the Dyer County Little Levee. The Chute of Island 21 is a secondary channel of the Mississippi River located between River Miles 828.5 and 823.

(2) Size. The scour area where stone would be placed has been separated into 3 areas based on the stages of failure and prioritization of work. Area 1 is the most critical area where active caving has progressed to the toe of the levee extending for approximately 1,000 feet. Within Area 1, Graded Stone C would be placed along the toe of the Dyer County Little Levee at

approximate elevation 260 feet NAVD down to the channel bottom at approximate elevation 210 feet. Additionally, 250-lb riprap would be placed along the levee toe above the C-stone up to an elevation of 262 feet NAVD. Area 2 is the next highest priority area extending approximately 1,500 feet downstream of Area 1. Within Area 2, Graded Stone C would be placed from top bank at approximate elevation 260 feet NAVD down to the channel bottom at approximate elevation 215 feet. Area 3 is the remaining area extending approximately 1,500 feet upstream of Area 1. Within Area 3, Graded Stone C would be placed from top bank at approximate elevation 260 feet NAVD down to the channel bottom at approximate elevation of 215 feet. Along an approximate 175 ft. reach of the upstream portion of Area 3, the vertical bank would be graded to a slope of 1V:2H prior to stone placement.

(3) Type of Habitat. The Chute of Island 21 is a secondary channel in the Mississippi River located between River Miles 828.5 and 823. It is approximately 4 miles in length and ranges in width from approximately 800 to 2,000 feet. A closure dike exists approximately one mile upstream from the downstream end of the chute, constructed to an elevation of 28 feet on the Caruthersville gage. Substrate in the channel of the chute consists nearly entirely of sands.

The scour area where rock would be placed consists of approximately 4,000 linear feet of an actively caving bank. Within the critical scour area (Area 1), approximately 1,000 feet of scour has occurred and encroached to the levee toe. Nearly all of the riparian vegetation has been recently scoured and lost into the channel. The substrate consists of recent alluvium (mostly sands). Within the downstream scour reach (Area 2), scour has occurred for a distance of approximately 1,500 feet downstream of Area 1 to some remnant riprap along the bank. Approximately half of the bank along Area 2 is scoured to a vertical slope in intermittent locations throughout this reach. Riparian vegetation extends from the levee toe to the bank. Overstory mostly consists of large cottonwood trees greater than 24 inches diameter breast height (dbh) and small (3-5 inches dbh) sugarberry trees. Understory consists nearly entirely of poison ivy standing approximately 3-5 feet in height and significant amounts of poison ivy vines covering the larger trees; some black willow saplings are also scattered throughout. The substrate along the bank consists of recent alluvium (mostly sands). Within the upstream scour reach (Area 3), scour has occurred for a distance of approximately 1,500 feet upstream of Area 1. Nearly the entire length of the riverbank is at a vertical slope. Riparian vegetation extending from the levee toe to approximately 100 feet riverward consists of the same community composition as Area 2, described above. Between the riverward limits of the riparian vegetation and the Chute of Island No. 21, a cleared agricultural field extends to top bank upstream approximately 300 feet in Area 3 and a fallow field extends downstream for another approximately 400 feet. An existing eddy is causing this upstream reach to remain active and the bank is actively being lost.

(4) Timing and Duration of Discharge. The goal is to complete the needed repairs prior to the upcoming 2017 spring flood season. River stages needed to float equipment and material into the chute are $\geq$ 28 feet on the Caruthersville gage. The proposed placement of rock along the bank and adjacent to the levee toe would take approximately 15-30 days. During construction, work typically occurs daylight to dark until completion.

f. Description of Disposal Method. Stone would be placed along the bank by a barge mounted crane or dragline equipped with either skip, grapple, clamshell, or rock bucket to a slope of 1 vertical on 1.5 horizontal. In the upstream portion of Area 3 where eddies are causing active bank failures, the bank will be graded down to a slope of 1V:2H prior to the placement of stone with the material by barge mounted draglines or hydraulic excavators.

II. FACTUAL DETERMINATION

a. Physical Substrate Determinations.

(1) Substrate Elevation and Slope. There would be an immediate change in substrate elevation and slope within the footprint of the rock protection. Within Area 1, the levee would be reconstructed to pre-flood section and grade using Graded Stone C. This includes a crown width of 14 feet at approximate elevation of 260 feet NAVD. Graded Stone C would continue down to the channel bottom at approximate elevation of 210 feet establishing a slope not steeper than 1V:1.5H. Above the Graded Stone C, 250-lb riprap would be placed up to an elevation of 262 NAVD. Within Area 2, Graded Stone C would be placed from top bank at approximate elevation of 260 feet NAVD down to the channel bottom at approximate elevation of 215 feet establishing a slope not steeper than 1V:1.5H. An approximately 175-ft. reach of the upstream portion of Area 3 with actively caving banks would be graded to 1V:2H prior to stone placement. Within the entire reach of Area 3, Graded Stone C would then be placed from top bank at approximate elevation of 260 feet NAVD down to the channel bottom at approximate elevation of 215 feet establishing a slope not steeper than 1V:1.5H

(2) Sediment Type. Any material graded during bank preparation consists of alluvium deposits (mostly sands) which is the same material that has recently fallen into the river due to bank caving and similar to what is located on the channel bottom. This material does not change the substrate type or composition in the immediate area of discharge or downstream. Stone placed along the bank is either Graded C Stone (approximately 1-400 pounds in size) or 250 pound riprap (approximately 1-250 pounds in size). Natural concentrations of stones this size are not typically found on the lower Mississippi River.

(3) Dredged and Fill Material Movement. Active bank caving is already occurring at the proposed project location within the Chute of Island No. 21. The amount of bank lost for the proposed grading activities in Area 3 would be less than what would be lost with no action at the project location. Extreme high flows may cause some stone to be dislodged from the bank in the future; however, no major failures are likely to occur. Stone size (Graded Stone C and 250 pound riprap) and thickness (3-4 feet) would minimize the potential for movement of the proposed rock fill.

(4) Physical Effects on Benthos. Due to the high velocities, actively caving banks, and sandy substrate, few or no mussels are likely to inhabit the project footprint or be affected by construction. Low densities of mayflies, chironomids, amphipods, and oligochaetes likely inhabit the sandy channel bottom along the Chute of Island No. 21. During construction, many of these macroinvertebrates in the immediate vicinity of the project are expected to drift

downstream. Following rock placement, the macroinvertebrate community composition would likely shift to high densities of hydropsychid caddisflies. Benthic fish would temporarily shift upstream or downstream during construction.

(5) Other Effects. N/A

(6) Action Taken to Minimize Impacts. To minimize impacts, work limits would only include areas where active scour poses a threat to the levee. Grading would be limited to the upstream 175-ft. reach of Area 3 where eddy effects are causing active bank lost. Every effort would be made to preserve all trees not interfering with construction. Vegetative clearing would only be the minimum necessary to key the rock into the bank (approximately 2 feet from top bank). Based on the sandy soils and extent of the active scour at these locations, the clearing/grading activities would not exceed what would be lost if no action is taken. Contractors are also responsible for an approved environmental protection plan for the prevention/control of pollution and habitat disruption that may occur to the environment during construction.

b. Water Circulation, Fluctuation, and Salinity Determination.

(1) Water.

(a) Salinity. No effect.

(b) Water Chemistry. No expected change.

(c) Clarity. Some sediments would be stirred up during bank preparation and when rock protection is deposited into the chute. However, due to the size of the receiving waters, no significant change in clarity is expected.

(d) Color. No expected change.

(e) Odor. No expected change.

(f) Taste. No expected change.

(g) Dissolved Gas Levels. No expected change.

(h) Nutrients. No expected change.

(i) Eutrophication. No expected change.

(j) Others as Appropriate. Not applicable.

(2) Current Patterns and Circulation.

(a) Current Patterns and Circulation. Some eddy effects occurring along the bank at the project location would be reduced. No other major changes in current patterns and circulation are expected.

(b) Velocity. No expected change.

(c) Stratification. Work would be conducted while river stages are between 28-46 feet on the Caruthersville gage and flow is passing through the chute. Stratification would not occur as a result of the proposed activities, and no changes to stratification are expected throughout other portions of the year.

(d) Hydrologic Regime. The proposed repairs would stabilize the active scour along the left descending bank of the Chute of Island No. 21 and reduce the risk of failure of the Dyer County Little Levee. No additional effects to the hydrologic regime are expected.

(3) Normal Water Level Fluctuations. The proposed repairs would reduce the risk of failure at the Dyer County Little Levee. The levee system provides flood risk reduction to a 4 percent (25-year frequency) chance exceedance flood or a Caruthersville Gage stage reading of 44 feet. The proposed repairs would not change the levee height or affect normal water level fluctuations.

(4) Salinity Gradients. No expected change.

(5) Action Taken to Minimize Impacts. To minimize impacts, work limits would only include areas where active scour poses a threat to the levee. Grading would be limited to the upstream 175-ft. reach of Area 3 where eddy effects are causing active bank lost. Every effort would be made to preserve all trees not interfering with construction. Vegetative clearing would only be the minimum necessary to key the rock into the bank (approximately 2 feet from top bank). Based on the sandy soils and extent of the active scour at these locations, the clearing/grading activities would not exceed what would be lost if no action is taken. Contractors are also responsible for an approved environmental protection plan for the prevention/control of pollution and habitat disruption that may occur to the environment during construction.

c. Suspended Particulate/Turbidity Determination.

(1) Expected Changes in suspended Particulates and Turbidity Levels in Vicinity of Disposal Sites. Some sediments (mostly sands) would be stirred up when the Graded Stone C is first deposited onto the riverbank. This minimal increase in turbidity would be transitory and not detectable from the surface. Material graded during bank preparation consists of alluvium deposits (mostly sands) which is the same material that has recently fallen into the river due to bank caving and similar to what is located on the channel bottom. Minor increases in sediment load would be expected with grading activities; however, any increases in turbidity would be transitory and minor compared to the natural sediment load of the river, especially during high river stages.

(2) Effects on Chemical and Physical Properties of the Water Column.

(a) Light Penetration. The temporary increase in turbidity during construction would be minor and of short duration. The proposed project would have no lasting effect on light penetration.

(b) Dissolved Oxygen. No change is expected.

(c) Toxic Metals and Organics. No change is expected.

(d) Pathogens. No change is expected

(e) Aesthetics. The majority of the rock would be placed below top bank and not be visible during portions of the year with high river stages. The project area would transition from an actively caving bank to a protected bank. Stone protection currently exists along the bank downstream of the project limits within the Chute of Island No. 21 and has since been covered with sediment deposition and riparian vegetation. Overall, there would be no significant impacts to the aesthetics of the project area.

(f) Others as Appropriate. None are noted.

(3) Effects on Biota.

(a) Primary Production. The proposed work should have no distinguishable effects on primary productivity.

(b) Suspension/Filter Feeders. Due to the high velocities, actively caving banks, and sandy substrate, few or no mussels are likely to inhabit the proposed areas of rock placement along the chute of Island No. 21.

(c) Sight Feeders. Resident fish are adapted to turbidity increases that occur with high water events. Project-related turbidity increases would be minor compared to these natural events. Since fish and other sight feeders are highly mobile, project impacts to sight-feeding organisms would be insignificant and short term.

(4) Actions Taken to Minimize Impacts. To minimize impacts, work limits would only include areas where active scour poses a threat to the levee. Grading would be limited to the upstream 175-ft. reach of Area 3 where eddy effects are causing active bank lost. Every effort would be made to preserve all trees not interfering with construction. Vegetative clearing would only be the minimum necessary to key the rock into the bank (approximately 2 feet from top bank). Based on the sandy soils and extent of the active scour at these locations, the clearing/grading activities would not exceed what would be lost if no action is taken. Contractors are also responsible for an approved environmental protection plan for the prevention/control of pollution and habitat disruption that may occur to the environment during construction.

d. Contaminant Determinations. Stones used for the bank protection are considered inert material. The bank is comprised of mostly sands; thus, any material introduced via grading would have low potential for pollutants. There is a low likelihood that any contaminants would be introduced or translocated due to construction.

e. Aquatic Ecosystems and Organism Determination.

(1) Effects on Plankton. Effects, if any, on plankton communities are expected to be insignificant and of short duration.

(2) Effects of Benthos. Due to the high velocities, actively caving banks, and sandy substrate, few or no mussels are likely to inhabit the project footprint or be affected by construction. Low densities of mayflies, chironomids, amphipods, and oligochaetes likely inhabit the sandy channel bottom along the Chute of Island No. 21. During construction, many of these macroinvertebrates in the immediate vicinity of the project are expected to drift downstream. Following rock placement, the macroinvertebrate community composition would likely shift to high densities of hydropsychid caddisflies. Benthic fish would temporarily shift upstream or downstream during construction.

(3) Effects on Nekton. Nekton would be temporarily displaced during construction but expected to return shortly after project completion. Resident fish in the Mississippi River are adapted to turbidity increases that occur with high water events. Minor increases in sediment load would be expected with grading activities; however, these effects would be transitory and minor compared to natural events in the Mississippi River. Since fish and other sight feeders are highly mobile, project impacts to sight-feeding organisms within the Chute of Island No. 21 of the Mississippi River would be insignificant and short term.

(4) Effects on Aquatic Food Web. Temporary reductions in benthic macroinvertebrate communities and drift from such a small area should not significantly impact the aquatic food web. These organisms would quickly colonize the area after construction.

(5) Effects on Special Aquatic Sites.

(a) Sanctuaries and Aquatic Sites. N/A

(b) Wetlands. Riparian vegetation (mostly cottonwood, black willow, and sugarberry) along the banks is actively being lost due to the bank erosion within the project footprint. There is no remaining riparian vegetation within Area 1 (the critical scour reach). Vegetative clearing would be the minimum necessary to key the rock into the bank (approximately 2 feet from top bank) in Areas 2 and 3. Based on the sandy soils and extent of the active scour at these locations, any loss of vegetation would be less than if no action is taken. Over time, similar riparian vegetation would return as sediment fills the interstitial spaces of the stone.

(c) Mud Flats. N/A

(d) Vegetated Shallows. N/A

(e) Riffle and Pool Complexes. None exist within the project area.

(6) Threatened and Endangered Species. Preliminary coordination with the U.S. Fish and Wildlife Service has indicated that the proposed activities would not likely adversely affect threatened or endangered species or critical habitat. Per the Endangered Species Act, informal consultation with the U.S. Fish and Wildlife Service, Cookeville, TN Office is currently underway for the proposed action, and no action will be taken until receipt of their determination and any special conditions required as part of that consultation.

(7) Other Wildlife. Some wildlife in the immediate area of construction may be temporarily displaced due to construction. However, since all work would be done from barges floating in the river, any disturbance would be minimal and short-lived.

(8) Actions Taken to Minimize Impacts. To minimize impacts, work limits would only include areas where active scour poses a threat to the levee. Grading would be limited to the upstream 175-ft. reach of Area 3 where eddy effects are causing active bank lost. Every effort would be made to preserve all trees not interfering with construction. Vegetative clearing would only be the minimum necessary to key the rock into the bank (approximately 2 feet from top bank). Based on the sandy soils and extent of the active scour at these locations, the clearing/grading activities would not exceed what would be lost if no action is taken. Contractors are also responsible for an approved environmental protection plan for the prevention/control of pollution and habitat disruption that may occur to the environment during construction.

f. Proposed Disposal Site Determinations.

(1) Mixing Zone Determination. Construction would occur when river stages are between 28-46 feet on the Caruthersville gage resulting in water depths (surface depth to channel bottom) between approximately 33-51 feet within the Chute of Island No. 21 near the project limits. Fill material would be placed in depths varying from less than one foot to the depth of the channel bottom (a maximum of approximately 51 feet depending on river stages at the time of construction. Water velocities are expected to be approximately 6 cubic feet per second. Flow direction is generally downstream, although localized eddy currents may be present in some locations. Natural turbulence is characteristic of the lower Mississippi River. Stratification would not occur as a result of the proposed bank stabilization measures. The proposed activities would take place over approximately 15-30 days. Minor increases in sediment load would be expected with the proposed activities; however, any increases in turbidity would be transitory and minor compared to the natural sediment load of the river, especially during high river stages.

(2) Compliance with Applicable Water Quality Standards. Section 401 water quality certification has been requested from the State of Tennessee for the proposed activities.

(3) Potential Effects on Human Use Characteristics.

(a) Municipal and Private Water Supply. N/A

(b) Recreational and Commercial Fishing. Fishing should not be affected by the proposed work.

(c) Water Related Recreation. N/A

(d) Aesthetics. The majority of the rock would be placed below top bank and not be visible during portions of the year with high river stages. The project area would transition from an actively caving bank to a protected bank. Stone protection currently exists along the bank downstream of the project limits within the Chute of Island No. 21 and has since been covered with sediment deposition and riparian vegetation. Overall, there would be no significant impacts to the aesthetics of the project area.

(e) Parks, National Historical Monuments, National Seashore, Wilderness Areas, Research Sites and Similar Preserves. No sites exist within the footprint of the proposed project.

g. Determination of Cumulative Effects on the Aquatic Ecosystem. No significant adverse cumulative effects are anticipated beyond those discussed above in Section II.

h. Determination of Secondary Effects on the Aquatic Ecosystem. No significant adverse secondary effects are anticipated beyond those discussed above in Section II.

III. FINDING OF COMPLIANCE OR NON-COMPLIANCE WITH THE RESTRICTIONS ON DISCHARGE

a. No significant adaptations of the Section 404(b)(1) guidelines were made relative to this evaluation.

b. The purpose of the proposed activities is to reconstruct the levee to the pre-flood section and grade and stabilize the active scour using stone protection. No practicable alternatives to the proposed discharges were identified that would have less adverse effect on the aquatic ecosystem.

c. Section 401 water quality certification has been requested from the State of Tennessee for the proposed activities.

d. The proposed project is not likely to adversely impact the endangered Indiana bat, threatened northern long-eared bat, interior least tern, pallid sturgeon, or fat pocketbook pearly mussel. Per the Endangered Species Act, informal consultation with the U.S. Fish and Wildlife Service, Cookeville, TN Office is currently underway for the proposed action, and no action will be taken until receipt of their determination and any special conditions required as part of that consultation.

e. The proposed work would not significantly affect human health and welfare, the municipal water supply, or commercial or sport fishing. No long-term impacts on plankton communities; breeding, spawning, or nursery habitats; or shellfish areas are expected. No adverse impacts to wetlands should occur due to the proposed actions. No other special aquatic sites are located in the proposed work areas.

f. No significant adverse impacts to aquatic life or terrestrial wildlife, dependent on aquatic ecosystems, are expected due to the proposed project.

g. The proposed work should not cause significant adverse impacts on ecosystem diversity, productivity, or stability.

h. No adverse impacts on recreational, aesthetic, or economic values are anticipated. The proposed repairs would lower the risk of failure of the Dyer County Little Levee.

i. To minimize impacts, work limits would only include areas where active scour poses a threat to the levee. Grading would be limited to the upstream 175-ft. reach of Area 3 where eddy effects are causing active bank lost. Every effort would be made to preserve all trees not interfering with construction. Vegetative clearing would only be the minimum necessary to key the rock into the bank (approximately 2 feet from top bank). Based on the sandy soils and extent of the active scour at these locations, the clearing/grading activities would not exceed what would be lost if no action is taken. Contractors are also responsible for an approved environmental protection plan for the prevention/control of pollution and habitat disruption that may occur to the environment during construction.

j. Pursuant to 36 CFR 800.3(a)(1), the District Archaeologist has determined that this project has no potential to cause effects to historic properties eligible for the National Register of Historic Places. Thus, no further Section 106 National Historic Preservation Act consultation is required. However, if prehistoric or historic artifacts, human bones, or other archaeological materials subject to the Native American Graves Protection and Repatriation Act (NAGPRA) are found during construction, all activities are to cease immediately in that area and the Memphis District Archaeologist, shall be contacted. State Historic Preservation Officer and tribal NAGPRA representatives, the local sheriff, etc., will be contacted as required by state and federal law.

Date: _____

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